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DRAFT SITE TREATMENT PLAN

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Draft Site Treatment Plan For Bettis Atomic Power Laboratory

Background Volume

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Draft Site Treatment Plan For
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Background Volume

1.0 Introduction

1.1 Purpose and Scope

The Department of Energy (DOE) is required by section 3021(b) of the Resource Conservation and Recovery Act (RCRA), as amended by the Federal Facility Compliance Act (the Act), to prepare site treatment plan (STPs or plans) describing the development of treatment capacities and technologies for treating mixed waste, which is waste that contains both radioactive and hazardous components. The plans will be submitted to state (or the U. S. Environmental Protection Agency (EPA) in cases where the state has not been delegated authority to regulate mixed waste at federal facilities) for approval, approval with modifications, or disapproval. The Bettis Atomic Power Laboratory (Bettis) Draft Site Treatment Plan (Draft STP or Draft Plan) is the intermediate version of the STP and is being provided to Pennsylvania, EPA, and others for review.

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

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

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

The Draft Plan reflects the results of discussion among Pennsylvania and other states, EPA, and others based on the Conceptual Site Treatment Plan submitted to the EPA in October 1993. The Conceptual Plan presented all known treatment needs, capabilities, and preliminary options for treating the mixed waste. The Conceptual Plan is available at the Science and Technology Department of the Carnegie Library, Pittsburgh.

This "Background Volume" is one of two volumes that constitute the Draft Site Treatment Plan. It provides a detailed discussion of the preferred option or options for each waste stream, and gives explanatory information for the "Plan Volume." The Plan volume identifies specific information, including schedules, as required by the Act.

1.2 Site History and Mission

The Bettis Atomic Power Laboratory is located on a 0.82 km^2 tract on a plateau above the Monongahela River in West Mifflin, Pennsylvania, about 13 km southeast of Pittsburgh. The laboratory is operated for the DOE by the Westinghouse Electric Corporation and is engaged solely in the design and development of naval nuclear propulsion plants. Activities relating to naval nuclear propulsion systems are performed in accordance with the requirements and authority of the Naval Nuclear Propulsion Program (NNPP), which is a joint Navy/DOE program. Per the joint DOE/Navy nature of the program and the legislative history of the FFCAct, all NNPP mixed waste including mixed waste at Bettis is included with DOE mixed waste. Key achievements of Bettis include the development of the power plant for the first nuclear-powered submarine, the development of the reactor plant for the first nuclear-powered surface ship, as well as the first nuclear-powered aircraft carrier. Bettis designed and developed the first full-scale nuclear power plant for civilian use, the Shippingport Atomic Power Station. Laboratory operations include development and testing of nuclear fuel materials and reactor materials including radiochemical analyses. Work with radioactive materials is performed in accordance with standardized NNPP requirements which include aggressive practices for minimizing mixed waste; however, small amounts of mixed waste could be generated by work performed at Bettis.

1.3 Framework For Developing DOE's Site Treatment Plans

RCRA Land Disposal Restriction (LDR) Requirements require the treatment of hazardous waste (including the hazardous component of mixed waste) to certain standards before 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 Federal Facility Compliance Act, signed on October 6, 1992, waives sovereign immunity for fines and penalties for RCRA violations at Federal facilities. However, the Act postpones the waiver for three years for LDR storage prohibition violations for DOE's 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 Act further provides that DOE will not be subject to fines and penalties for LDR storage prohibition violations for mixed waste as long as it is in compliance with an approved plan and order.

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

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

The *Conceptual Plan*, submitted last October, focused on identifying treatment needs, capabilities, and options for treating the site's mixed waste. This *Draft Plan* focuses on identifying preferred options for treating the site's mixed wastes, whenever possible, as well as proposed schedules for constructing capacity. The options represent the site's best judgement of the available information and the State's preferences, and should be viewed as a starting point for discussion leading to the development of the *Final Proposed Plan*, which will be submitted to the regulatory agency for review and approval, approval with modification, or disapproval, as required by the Act. Each version of the Plan will reflect 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 Act. DOE's goal is to have all plans and orders in place by October 1995.

1.4 Draft Site Treatment Plan Organization

Bettis's Draft Plan follows the same format as the Draft Plans of other DOE sites to facilitate cross-site comparisons. The Draft Plan is organized in two separate, but integrated, volumes. The *Background Volume* provides the detailed discussion of the options: it contains information on the waste streams and treatability groups as particular treatment option or options would address and describes uncertainties associated with that option, as well as the budget status of the option, and regulator and stakeholder input. The *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 Act. The Plan Volume also contains a mechanism to implement the Plan and establish milestones that will be enforced by the Order. It references, but does not duplicate, details on the options in the Background Volume.

Section 1.0 and 2.0 in both Volumes contain introductory material relevant to the purpose of the Volume. The Background Volume contains general information on the Draft 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 1.0 and 2.0 of the Plan Volume propose certain administrative provisions appropriate for the implementation of the Plan when finalized. These include provisions such as the approach to setting milestones, updates to the Plan, additions or removals to waste streams covered by the Plan, and funding considerations. These sections are intended to initiate discussion; it is expected that specific language will be developed in conjunction with the regulatory agency and may eventually be expanded to address other administrative provisions or incorporated into a separate consent order.

Sections 3.0 through 5.0 discuss the preferred option or options for low-level mixed waste, mixed transuranic waste, and mixed high-level waste, and 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 Plan Volume, the sections include proposed schedules, to the extent feasible, as required by the Act.

The Backgound Volume includes three additional sections that are not included in the Plan Volume because they are not required by the Act 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 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 Bettis mixed wastes pending treatment.

Section 8.0 describes a process being followed by the DOE and the states for evaluating options for disposal of mixed waste treatment residues. Although the Act does not require disposal to be covered in the Plans, DOE is including disposal information to be responsive to the states' request that disposal be addressed and to support state discussions. Section 8.0

identifies whether Bettis is being further considered as a disposal site and explains why or why not.

The Draft Plan also discusses the options selection process in *Appendix A*, and describes the results of applying the "Draft Site Treatment Plan Development Framework." For each option, the Appendix describes how options from the Conceptual Plan were evaluated and why the preferred option or options was selected. Appendix A also contains cost information developed to support the options analysis. Appendix B contains definitions of terms used in the Draft Plan.

1.5 Related Documents

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

Mixed Waste Inventory Report

The Mixed Waste Inventory Report, required by the Act, provides an inventory of mixed waste currently stored or generated, or expected to be generated over the next five years, at each DOE site and an inventory of treatment capacities and technologies. The Interim Mixed Waste Inventory Report, published by DOE in April of 1993, provided information on a waste stream-by-waste stream basis for each DOE site that generates or stores mixed waste. DOE made updated waste stream and technology data available to the States and EPA in May, 1994, and is preparing an Updated Mixed Waste Inventory Summary. The Report represents the best record of DOE's mixed waste inventory in the beginning of 1994. Since data is constantly being redefined, waste stream information in Bettis's Draft Plan may differ somewhat from the most recent Inventory Report. Significant changes in waste stream information are explained in the Background Volume.

NEPA Activities

The Programmatic Environmental Impact Statement for Environmental Restoration and Waste Management

DOE is preparing a Programmatic Environmental Impact Statement (PEIS) to support complex-wide integration of environmental management activities. The PEIS is intended to present to the public, states, EPA, and DOE an understanding of impacts to human health and the environment together with the costs associated with a wide range of alternative strategies for managing the DOE's environmental program. The PEIS is examining all waste types and activities, including mixed waste treatment also being addressed by the STP process.

Development of the Environmental Management (EM) PEIS is being coordinated with the preparation of the Plans under the Federal Facility Compliance Act. Information being generated to support the PEIS (e.g., hypothetical configurations, preliminary risk analyses, and cost studies) is shared with states to support Plan discussions. The Draft PEIS will not

identify a preferred alternative (i.e., configuration) for mixed waste facilities since this will be evolving in consultation with States and EPA through the STP process. However, the PEIS analyses of potential environmental risks and costs associated with a range of possible waste management configurations will provide valuable insight as the public, states, and DOE discuss using existing facilities and constructing new mixed waste facilities to treat mixed waste.

The Draft PEIS is scheduled to be published in the fourth quarter of 1994. The Final PEIS will be issued after a public comment period, at or near the time of submission of the Final Proposed STPs to the states or EPA for approval. To remain flexible and accommodate potential changes after submitting the Final STPs to the states and EPA, the PEIS Record of Decision for mixed waste will be issued after the appropriate regulatory agencies approve the Plans.

Compliance Agreements

Bettis does not have any compliance or clean up agreements with commitments relevant to treatment of mixed waste.

2.0 Methodology

2.1 Assumptions

All sites used the following assumptions to provide for a degree of consistency in the preparation of the Draft STPs. The assumptions were developed as part of the "Draft Site Treatment Plan Development Framework" and reflect review and comment from the states and EPA.

1. High-level waste (HLW) will continue to be managed according to current plans at each site (i.e., Hanford, West Valley, Savannah River, INEL). Primarily due to potential safety concerns, HLW will not be transported off-site except as a treated, stable waste that is ready for disposal. The DSTPs will not change management strategies for HLW.

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

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

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

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

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 utilization of facilities identified in the DSTPs are being considered for managing ER and D&D waste.

6. The DSTP will address all wastes in the updated Mixed Waste Inventory Report (MWIR). Significant changes/corrections to MWIR waste stream and treatment facilities information will be explained in the DSTP.

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

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

9. 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.

2.2 Preferred Option Selection Process

DOE prepared several guidance documents to assist the sites in working through treatment identification and selection of preferred options. The overall process is contained in the *Draft Site Treatment Plan Development Framework* (DSTP Framework). The DSTP Framework establishes common terminology, objectives and values, planning assumptions and recommended methodology for narrowing the alternatives presented in the Conceptual STP. The *Treatment Selection Guides* provides information on how to select among treatment

alternatives by allowing comparisons based on fundamental criteria such as regulatory compliance, environmental health and safety, treatment effectiveness, implementability, stakeholder concerns, life-cycle costs, and technology development. The *Draft Site Treatment Plan Cost Information Guidance* provides a level of commonality and consistency in the cost information by providing common cost assumptions. The *Protocol For Identifying a Potential Off-Site Mixed Waste Treatment Option in the Draft Site Treatment Plan* describes a coordination process to be used for identification of an off-site treatment option.

Bettis determined preferred options based on an evaluation of all feasible options (including on-site treatment, use of mobile treatment systems, commercial treatment, and treatment at other DOE facilities) in accordance with established guidance (e.g., DSTP Development Framework, Treatment selection guides etc.). Based on the very small volumes of Bettis waste streams, these evaluations indicated that off-site treatment at other DOE facilities is economically and technically preferable for the majority of these waste streams. Bettis identified potentially technically capable DOE facilities by evaluating available treatment facility information (mostly from the Mixed Waste Inventory Report data) and selected primary candidates for the preferred options from these facilities based primarily on facility status and location. The DOE sites were then formally contacted, and performed evaluations to confirm whether there is reasonable certainty that their facilities will have the technical capability to treat specific waste streams. The results of these site evaluations were used to select preferred options based on technical capability, facility status, location, and in some cases to consolidate shipments to one or two DOE treatment sites. Details concerning these evaluations for each waste stream are contained in Appendix A.

2.3 Coordinating with Regulatory Agencies and Other Stakeholders

The Act offers an opportunity for DOE and 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 National Governor's Association (NGA) to facilitate the DOE-to-State interactions. To date, the NGA has sponsored several national meetings between DOE, the states, EPA, and the Indian Nations to discuss the development of the STPs. Two working groups have been formed to discuss technical issues related to treatment and disposal of mixed waste. NGA and the states have also reviewed and provided comment on the guidance documents discussed in Section 2.2.

The Act requires the states and EPA to provide for public involvement after the Final Proposed Plans are submitted in February, 1995. DOE has provided additional opportunity for public input by making the Conceptual STPs and Draft STPs available for public review.

At the National level, DOE presented information on the development of the STPs to the Environmental Management Advisory Board (EMAB) and will continue to provide information to the EMAB and other national stakeholder groups as the STPs are developed. Other national level stakeholder involvement may be conducted after submission of the Draft STPs.

2.4 Characterization of Mixed Waste

In determining whether a radioactive waste is also hazardous, NNPP facilities, including Bettis, employ sampling and analysis, and process knowledge based on engineering and technical knowledge of materials used, reactions that occur, and materials that result from particular processes. Process knowledge determinations can rely on factors such as material safety data sheets, technical data sheets, procurement specifications and engineering assessments. Characterization of continuing mixed waste streams relies on process knowledge where past determinations have been made and the waste stream remains unchanged.

In using process knowledge to evaluate for toxicity characteristics, a waste stream is screened for thresholds based on process knowledge, calculations and conservative assumptions on the concentration of hazardous constituents. Such screening includes comparing a waste stream to similar wastes for which an evaluation has been completed; comparing the concentration of hazardous constituents contained in a mixed waste stream directly with the TCLP concentrations (data for making this comparison may be available in the form of chemical reagent compositions or component material chemical compositions); and obtaining actual data (e.g., from equipment specifications) on the concentration of hazardous constituents rather than using unduly conservative assumptions (which may be appropriate if little was known about the waste).

Sampling and analysis on surrogate (identical to the waste stream but non-radioactive) materials is done where process knowledge is insufficient and a representative sample can be constructed. This has been done for several low-level radioactive waste streams and is the preferred method of sampling and analysis when process knowledge is inconclusive or inadequate. Where process knowledge is not adequate and additional characterization and sampling is required, those waste streams are sampled and analyzed.

All NNPP mixed waste streams, including those projected to be generated at Bettis, are characterized using sampling and analysis and/or process knowledge as described above. These characterizations are sufficient to support determinations of the appropriate treatment for each waste stream.

2.5 Waste Minimization

All NNPP facilities, including Bettis, have taken aggressive action to minimize the creation of mixed waste by minimizing the commingling of radioactive and hazardous materials and avoiding the use of hazardous substances, particularly for work involving radioactivity.

Work involving radioactivity is done pursuant to detailed workplans developed for that specific job. These workplans are reviewed for use of RCRA "listed" hazardous substances. Unless substitution for a hazardous substance is technically unacceptable, non-hazardous substances are used. Workplans are also reviewed for use of substances resulting in waste with RCRA hazardous characteristics. Where technically acceptable, non-hazardous substances are used. These advance preparations prior to conducting work minimize the creation of mixed waste and also help identify waste streams that potentially have hazardous constituents.

3.0 Mixed Low-Level Waste Streams

3.1 Waste Streams For Which Treatment Technology Exists:

The following mixed waste streams which can be treated to LDR BDAT standards using proven technologies are projected to be generated at Bettis. For each waste stream, a description of the waste, technology needed to treat the waste, and the preferred treatment options are provided below.

3.1.1 MWIR ID#: BT-W001

Site ID#: BETTIS #0000000049

Waste Stream Name: Oil Containing Heavy Metals #1

Waste Stream Description: Lubricating and hydraulic oils, and sludges from equipment decommissioning.

Treatability Group: MLLW CH, organic sludges/particulates, toxic metals with mercury

Radionuclides: Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Ni^{63}, C^{14}, I^{129}, Tc^{99}, H^{3}, Cs^{134}, Pm^{147}, Kr^{85}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Sn^{121m}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{59}, Eu^{152}, Eu^{154}, Pr^{144}, Ce^{144}

EPA Waste Code(s): D006, D007, D008, D009, D010, D011

Current Inventory: 0.0 cubic meters

Five Year Projection: 0.21 cubic meters

Waste Characterization Determination: Characterization is based on sampling/analysis of previous generation of this waste stream. This waste stream is sufficiently characterized to support identification of proper treatment technology.

3.1.1.1 Treatment Technology Required: Stabilization is the concentration based LDR treatment required for lead, cadmium, selenium and silver. The presence of mercury in a waste stream requires that the waste be treated for the mercury first. The required treatment for mercury is incineration because the concentration is less than 260 ppm. Treatment will consist of organic destruction followed by chemical reduction (to reduce hexavalent chromium to trivalent chromium; if chromium is present) followed by stabilization to meet LDR standards for this waste stream.

3.1.1.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River Consolidated Incineration Facility (CIF) Incinerator-Solid Feed System.

Facility status: Savannah River has confirmed that the CIF Incinerator (solid feed system) is expected to be technically capable of treating this waste stream. This facility is currently under construction. Specific information on the schedule for completing facility construction and commencing operations is contained in the Savannah River Site DSTP.

Permit status: RCRA Final (Part B)

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based upon analysis and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Savannah River CIF Incinerator-Solid Feed System may require repackaging of this waste stream prior to treatment. If repackaging is necessary it will likely be performed by Bettis prior to shipment.

Type of technology: Savannah River CIF Incinerator-Solid Feed System will treat low level mixed wastes in a rotary kiln incinerator. Following incineration, residue will be chemically reduced and stabilized at Savannah River resulting in a final waste form that meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this option is $10,827. This amount is within Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.2 MWIR ID#: BT-W002

Site ID#: BETTIS #0000000050

Waste Stream Name: Spent Solvent Rags

Waste Stream Description: Solvent and rags used to clean material and tooling.

Treatability Group: MLLW CH, organic debris,toxic organics

Radionuclides: U-Depleted, U-Enriched, Th^{231}

EPA Waste Code(s): F002, F003, F005

Current Inventory: 0.21 cubic meters

Five Year Projection: 0.0 cubic meters

Waste Characterization Determination: Characterization is based on process knowledge and the waste stream is sufficient to support identification of proper treatment technology.

3.1.2.1 Treatment Technology Required: Organic destruction followed by stabilization of residue is the treatment required to meet LDR standards for this toxic organic waste stream.

3.1.2.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River Consolidated Incineration Facility (CIF) Incinerator-Solid Feed System.

Facility status: Savannah River has confirmed that the CIF Incinerator (solid feed system) is expected to be technically capable of treating this waste stream. This facility is currently under construction. Specific information on the schedule for completing facility construction and commencing operations is contained in the Savannah River Site DSTP.

Permit status: RCRA Final (Part B)

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based on process knowledge and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Savannah River CIF Incinerator-Solid Feed System may require repackaging of this waste stream prior to treatment. If repackaging is necessary it will likely be performed by Bettis prior to shipment.

Type of technology: Savannah River CIF Incinerator-Solid Feed System will treat low level mixed wastes in a rotary kiln incinerator. Following incineration, residue will be stabilized at Savannah River resulting in a final waste form that meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this option is $10,312. This amount is within Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.3 MWIR ID#: BT-W003

Site ID#: BETTIS 0000000051

Waste Stream Name: Oil Containing Heavy Metals #2

Waste Stream Description: Lubricating and hydraulic oils and sludges from equipment decommissioning.

Treatability Group: MLLW CH, organic sludges/particulates, toxic metals w/o mercury

Radionuclides: U^{234}, U^{235}, Th^{231}, Th^{234}, $Th^{Nat.}$, U^{238}

EPA Waste Code(s): D005, D006, D008, D011

Current Inventory: 0.0 cubic meters

Five Year Projection: 0.21 cubic meters

Waste Characterization Determination: Characterization of this waste stream was based on sampling/analysis. This waste stream is sufficiently characterized to support identification of proper treatment technology.

3.1.3.1 Treatment Technology Required: Organic destruction followed by stabilization of residue is the treatment required to meet LDR standards for barium, cadmium, lead and silver.

3.1.3.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River Consolidated Incineration Facility (CIF) Incinerator-Liquid Feed System.

Facility status: Savannah River has confirmed that the CIF Incinerator (liquid feed system) is expected to be technically capable of treating this waste stream. The CIF incinerator (liquid feed system) is currently under construction. Specific information on the schedule for completing facility construction and commencing operations is contained in the Savannah River Site DSTP.

Permit status: RCRA Final (Part B)

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based upon analysis and this waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Savannah River CIF Incinerator-Liquid Feed System is not expected to require repackaging of this waste stream.

Type of technology: Savannah River CIF Incinerator-Liquid Feed System accepts liquid wastes in 55-gallon drums or tanks of less than 5,000 gallon volume. Liquid is fed into the primary and secondary combustion chambers of a rotary kiln incinerator via spray nozzles. Following incineration, residue will be stabilized at Savannah River resulting in a final waste form that meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this option is $12,301. This amount is within the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.4 MWIR ID#: BT-W005

Site ID#: BETTIS 0000000390

Waste Stream Name: Lead And Chromium Based Paint Chips

Waste Stream Description: Paint chips from decontaminating radiological facilities and equipment.

Treatability Group: MLLW CH, inorganic sludges/particulates, toxic metals w/o mercury

Radionuclides: Th^{nat}, Sb^{126}, Sb^{126m}, Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, U^{234}, U^{235}, U^{238}, C^{14}, I^{129}, Tc^{99}, H^{3}, Kr^{85}, Pu^{241}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Sn^{121m}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{59}, Ni^{63}, Eu^{152}, Eu^{154}

EPA Waste Code(s): D007, D008

Current Inventory: 0.1 cubic meters

Five Year Projection: 0.0 cubic meters

Waste Characterization Determination: Characterization is based on process knowledge from an EP toxicity test performed on a surrogate sample. This waste stream is sufficiently characterized to support identification of proper treatment technology.

3.1.4.1 Treatment Technology Required: Stabilization is the concentration based LDR treatment required for lead and chromium. In addition, chemical reduction to reduce hexavalent chromium to trivalent chromium is required prior to stabilization if chromium is present.

3.1.4.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is RCRA on-site simple treatment in the accumulation container.

Facility status/Actions required to bring facility on-line: Existing radiological work facilities can be modified to perform RCRA simple treatment of the estimated low volume of this waste stream within 90 days of generation.

Type of technology: RCRA simple treatment for this waste stream would consist of chemical reduction (addition of water and reducing chemicals (e.g., ferrous salts) if hexavalent chromium is present) followed by cement based stabilization/solidification.

Regulatory status: Permitting is not required for RCRA simple treatment.

Budget status: The total cost estimate (including facility construction, operation and maintenance, and decontamination and decommissioning) to implement this option is $108,000. This amount is within the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.5 MWIR ID#: BT-W007

Site ID#: BETTIS 0000000839

Waste Stream Name: Solids With Solvents

Waste Stream Description: Solid waste such as charcoal and rags with organic solvents.

Treatability Group: MLLW CH, organic debris, toxic organics

Radionuclides: Fe^{55}, Co^{60}, Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Ni^{63}, C^{14}, I^{129}, Tc^{99}, H^{3}, Cs^{134}, Pm^{147}, Kr^{85}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Sn^{121m}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242}, Ni^{59}, Eu^{152}, Eu^{154}, Te^{125m}, Sb^{125}

EPA Waste Code(s): F001, F003

Current Inventory: 0.42 cubic meters

Five Year Projection: 0.0 cubic meters

Waste Characterization Determination: Characterization is based on process knowledge. Characterization is sufficient to support identification of proper treatment technology.

3.1.5.1 Treatment Technology Required: Organic destruction followed by stabilization of residue is the treatment required to meet LDR standards for this toxic organic waste stream.

3.1.5.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River Consolidated Incineration Facility (CIF) Incinerator-Solid Feed System.

Facility status: Savannah River has confirmed that the CIF Incinerator (solid feed system) is expected to be technically capable of treating this waste stream. This facility is currently under construction. Specific information on the schedule for completing facility construction and commencing operations is contained in the Savannah River Site DSTP.

Permit status: RCRA Final (Part B)

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based on process knowledge and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Savannah River CIF Incinerator-Solid Feed System may require repackaging of this waste stream prior to treatment. If repackaging is necessary it will likely be performed by Bettis prior to shipment.

Type of technology: Savannah River CIF Incinerator-Solid Feed System will treat low level mixed wastes in a rotary kiln incinerator. Following incineration, residue will be stabilized at Savannah River resulting in a final waste form that meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this

option is $11,608. This amount is within the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.6 MWIR ID#: BT-W008

Site ID#: BETTIS 0000002056

Waste Stream Name: Mercury Containing Waste

Waste Stream Description: Cloth, metal and glass waste containing small amounts of hardened mercury.

Treatability Group: MLLW CH, inorganic debris, toxic metals with mercury

Radionuclides: Sb^{125}, Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Ni^{63}, C^{14}, I^{129}, Tc^{99}, H^{3}, Cs^{134}, Pm^{147}, Kr^{85},Sm^{121}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{59}, Eu^{152}, Eu^{154}, Fe^{55}, Te^{126m}, Sb^{126m}, U^{235}, U^{238}, U^{234}, Th^{232+}

EPA Waste Code(s): D008, D009

Current Inventory: 0.0 cubic meters

Five Year Projection: 0.21 cubic meters

Waste Characterization Determination: Characterization is based on process knowledge. Characterization is sufficient to support identification of proper treatment technology.

3.1.6.1 Treatment Technology Required: Mercury separation followed by stabilization is the treatment required to meet LDR standards for this inorganic debris waste stream. Stabilization is the treatment required to meet LDR standards for lead.

3.1.6.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at the Idaho National Engineering Laboratory (INEL) Mercury Retort Facility.

Facility status: INEL has not yet provided confirmation of technical treatment capability for this waste stream. However, based on confirmation of technical capability for other similar NNPP waste streams, confirmation is expected. The Mercury Retort Facility is currently planned but not constructed. INEL has identified that construction of this facility is currently scheduled to begin in second quarter 1997, and facility operation is currently scheduled to begin in fourth quarter 1997.

Permit status: None.

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based on process knowledge and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: The Idaho National Engineering Laboratory Mercury Retort will not likely require repackaging of this waste stream.

Type of technology: Idaho National Engineering Laboratory Mercury Retort provides for the volatization of mercury from contaminated equipments by heating followed by decanting. Following mercury treatment, residue will be stabilized at INEL resulting in a waste form that meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this option is $10,690. This amount is with the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.7 MWIR ID#: BT-W009

Site ID#: Bettis 0000002058

Waste Stream Name: VOC Contaminated Soil

Waste Stream Description: Soils

Treatability Group: MLLW CH, soils, toxic organics

Radionuclides: Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Ni^{63}, C^{14}, I^{129}, Tc^{99}, H^{3}, Cs^{135}, Kr^{85}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Sn^{121m}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{59}, Eu^{152}, Eu^{154}, Fe^{55},Sb^{126m}, Sb^{126}, U^{234}, U^{235}, U^{238}, Th^{232}

EPA Waste Code(s): D039, F001

Current Inventory: 0.42 cubic meters

Five Year Projection: 0.0 cubic meters

Waste Characterization Determination: Sampling analysis was used to verify presence of total VOC. Specific constituents were identified by process knowledge. Characterization is sufficient to support identification of proper treatment technology.

3.1.7.1 Treatment Technology Required: Organic destruction is the treatment required to meet LDR standards for toxic organics. Organic destruction is also the TSCA treatment required for PCB's.

3.1.7.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Hanford Site Thermal Treatment Facility.

Facility status: Hanford Site has confirmed that the Thermal Treatment Facility is expected to be technically capable of treating this waste stream. This facility is planned but not built. DOE-Richland has identified that no schedule information (including construction start and facility operations start dates) for this facility is available at this time.

Permit status: None

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based upon analysis and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Hanford Site Thermal Treatment Facility is not expected to require repackaging of this waste stream.

Type of technology: At this time, no decisions have been made regarding the specific organic destruction technology to be utilized for the Hanford Site Thermal Treatment Facility. To date, cost estimates have been completed for Plasma Arc and Rotary Kiln thermal treatment technology. Following organic destruction, residue will be stabilized at Hanford resulting in a final waste form which meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this option is $17,428. This amount is within the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.8 MWIR ID#: BT-W010

Site ID#: BETTIS 0000002062

Waste Stream Name: Waste Oil With Heavy Metals And PCBs

Waste Stream Description: Liquid, oil from equipment draining/decommissioning.

Treatability Group: MLLW CH, organic liquids, toxic metals with mercury

Radionuclides: U^{232+}, U^{233}, Th^{nat}, Mixed Fission Products

EPA Waste Code(s): D006, D008, D009, D010

Current Inventory: 0.21 cubic meters

Five Year Projection: 0.0 cubic meters

Waste Characterization Determination: Characterization of this waste stream was by sample/analysis. Characterization is sufficient to support identification of proper treatment technology.

3.1.8.1 Treatment Technology Required: TSCA treatment required for PCBs is organic destruction. The LDR concentration based treatment standard for cadmium, lead, and selenium is stabilization. The presence of mercury in a waste stream requires that the waste be treated for the mercury first. The required treatment for mercury is incineration because the concentration is less than 260 ppm. Treatment will consist of organic destruction followed by stabilization.

3.1.8.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Hanford Site Thermal Treatment Facility.

Facility status: Hanford Site has confirmed that the Thermal Treatment Facility is expected to be technically capable of treating this waste stream. This facility is planned but not built. DOE-Richland has identified that no schedule information (including construction start and facility operations start dates) for this facility is available at this time.

Permit status: None.

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based upon analysis and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Hanford Site Thermal Treatment Facility is not expected to require repackaging of this waste stream.

Type of technology: At this time, no decisions have been made regarding the specific organic destruction technology to be utilized for the Hanford Site Thermal Treatment Facility. To date, cost estimates have been completed for Plasma Arc and Rotary Kiln thermal treatment technology. Following organic destruction, residue will be stabilized at Hanford resulting in a final waste form which meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this

option is $11,586. This amount is within the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.9 MWIR ID#: BT-W012

Site ID#: BETTIS 0000002070

Waste Stream Name: VOC And PCB Contaminated Debris

Waste Stream Description: Heterogeneous debris (sediment, rock, brick, cement block, plastic, herculite, glass and metal).

Treatability Group: MLLW CH, heterogeneous debris, toxic organics

Radionuclides: Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Ni^{63}, I^{129}, Tc^{99}, H^{3}, Kr^{85}, Sm^{151}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Sn^{121m}, Nb^{94}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{59}, Eu^{152}, Eu^{154}, Fe^{55}, Pu^{238},Cd^{113m}, C^{14}, Sb^{126m}, Sb^{126}, U^{235},Uu^{234},U^{238}, Th^{232}

EPA Waste Code(s): D039, D040, F001, F002, F003, F005

Current Inventory: 6.42 cubic meters

Five Year Projection: 2.1 cubic meters

Waste Characterization Determination: Characterization of this waste stream was by sampling/analysis. Characterization of this waste stream is sufficient to support the identification of the proper treatment technology.

3.1.9.1 Treatment Technology Required: TSCA treatment for PCBs is incineration. Organic destruction followed by stabilization is the required treatment to meet LDR standards for this toxic organics waste stream.

3.1.9.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Hanford Site Thermal Treatment Facility.

Facility status: Hanford Site has confirmed that the Thermal Treatment Facility is expected to be technically capable of treating this waste stream. However, this facility is planned, but not built. DOE-Richland has

identified that no schedule information (including construction start and facility operations start dates) for this facility is available at this time.

Permit status: None

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based upon analysis and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Hanford Site Thermal Treatment Facility is not expected to require repackaging of this waste stream.

Type of technology: At this time, no decisions have been made regarding the specific organic destruction technology to be utilized for the Hanford Site Thermal Treatment Facility. To date, cost estimates have been completed for Plasma Arc and Rotary Kiln thermal treatment technology. Following organic destruction, residue will be stabilized at Hanford resulting in a final waste form which meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this option is $153,995. This amount is within the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.10 MWIR ID#: BT-W013

Site ID#: BETTIS 0000002072

Waste Stream Name: VOC And PCB Contaminated Soil

Waste Stream Description: soils containing toxic organics and PCBs.

Treatability Group: MLLW CH, soil with <50% debris, toxic organics

Radionuclides: U-natural, Cs-137, Sr-90

EPA Waste Code(s): D039, F001, F002

Current Inventory: 1.97 cubic meters

Five Year Projection: 0.0 cubic meters

Waste Characterization Determination: Characterization is based on process knowledge. Characterization is sufficient to support identification of proper treatment technology.

3.1.10.1 Treatment Technology Required: TSCA treatment for PCBs is organic destruction. Organic destruction is treatment required to meet LDR standards for toxic organics.

3.1.10.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Hanford Site Thermal Treatment Facility.

Facility status: Hanford Site has confirmed that the Thermal Treatment Facility is expected to be technically capable of treating this waste stream. This facility is planned but not built. DOE-Richland has identified that no schedule information (including construction start and facility operations start dates) for this facility is available at this time.

Permit status: None.

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based upon analysis and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Hanford Site Thermal Treatment Facility is not expected to require repackaging of this waste stream.

Type of technology: At this time, no decisions have been made regarding the specific organic destruction technology to be utilized for the Hanford Site Thermal Treatment Facility. To date, cost estimates have been

completed for Plasma Arc and Rotary Kiln thermal treatment technology. Following organic destruction, residue will be stabilized at Hanford resulting in a final waste form which meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this option is $23,130. This amount is within the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.11 MWIR ID#: BT-W017

Site ID#: BETTIS 0000002076

Waste Stream Name: Ion Exchange Resin

Waste Stream Description: Resin

Treatability Group: MLLW RH, organic sludges/particulates, toxic metals w/o mercury

Radionuclides: Co^{60}, Ni^{63}, Fe^{55}, Ba^{133}, Ni^{59}

EPA Waste Code(s): D005

Current Inventory: 0.001 cubic meters

Five Year Projection: 0.0 cubic meters

Waste Characterization Determination: Characterization is based on process knowledge. Characterization is sufficient to support identification of proper treatment technology.

3.1.11.1 Treatment Technology Required: Organic destruction followed by stabilization is the treatment required to meet LDR standards for this organic sludges/particulates waste stream.

3.1.11.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River Consolidated Incineration Facility (CIF) Incinerator-Solid Feed System.

Facility status: Savannah River has confirmed that the CIF Incinerator (solid feed system) is expected to be technically capable of treating this waste stream. This facility is currently under construction. Specific information on the schedule for completing facility construction and commencing operations is contained in the Savannah River Site DSTP.

Permit status: RCRA Final (Part B)

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based on process knowledge and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Savannah River CIF Incinerator-Solid Feed System may require repackaging of this waste stream prior to treatment. If repackaging is necessary it will likely be performed by Bettis prior to shipment.

Type of technology: Savannah River CIF Incinerator-Solid Feed System will treat low level mixed wastes in a rotary kiln incinerator. Following incineration, residue will be chemically reduced and stabilized at Savannah River resulting in a waste form that meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this option is $9,772. This amount is within the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.12 MWIR ID#: BT-W018

Site ID#: BETTIS 0000002077

Waste Stream Name: TCLP Extraction Fluid

Waste Stream Description: Liquid from hazardous waste analysis.

Treatability Group: MLLW CH, lab packs with metals and mercury.

Radionuclides: **Unknown**

EPA Waste Code(s): Various listed and characteristic codes.

Current Inventory: 0.0 cubic meters

Five Year Projection: 0.001 cubic meters.

Waste Characterization Determination: Characterization is based on process knowledge. Characterization of lab packs is sufficient to support identification of proper treatment technology.

3.1.12.1 Treatment Technology Required: The LDR concentration based treatment standard for lab packs is organic destruction followed by stabilization. The presence of mercury in a waste stream requires that the waste be treated for the mercury first. The required treatment for mercury is incineration because the mercury concentration is less than 260 ppm. If after characterization of the actual waste stream, mercury is found to be greater than or equal to 260 ppm the above treatment would not be appropriate. In that case the waste stream would be treated as a new waste stream and the treatment plan will be updated in accordance with section (2) of the Plan Volume to determine a proper treatment option.

3.1.12.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River Consolidated Incineration Facility (CIF) Incinerator-Liquid Feed System.

Facility status: Savannah River has confirmed that the CIF Incinerator (liquid feed system) is expected to be technically capable of treating this waste stream. The CIF incinerator (liquid feed system) is currently under construction. Specific information on the schedule for completing facility construction and commencing operations is contained in the Savannah River Site DSTP.

Permit status: RCRA Final (Part B)

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based on process knowledge and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Savannah River CIF Incinerator-Liquid Feed System is not expected to require repackaging of this waste stream.

Type of technology: Savannah River CIF Incinerator-Liquid Feed System accepts liquid wastes in 55-gallon drums or tanks of less than 5,000 gallon volume. Liquid is fed into the primary and secondary combustion chambers of a rotary kiln incinerator via spray nozzles. Following incineration, residue will be stabilized at Savannah River resulting in a final waste form that meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this option is $9,788. This amount is within the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.13 MWIR ID#: BT-W019

Site ID#: BETTIS 0000002081

Waste Stream Name: Lead

Waste Stream Description: Elemental lead, bricks, sheets, shot, wool, pipe hubs, seals, floor anchors, sprinkler fuses, etc.

Treatability Group: MLLW CH, elemental lead, toxic metals w/o mercury

Radionuclides: C^{14}, I^{129}, Tc^{99}, H^{3}, Ba^{137m}, Cs^{137}, Kr^{85}, Pu^{238}, Sr^{90}, Y^{90}, Pu^{241}, Cm^{242}, Se^{79}, Sm^{151}, Nb^{93m}, Zr^{93}, Cd^{113m}, Sn^{126}, Sb^{126m}, Cs^{135}, Sb^{126},

Sn^{121m}, Co^{60}, Ni^{63}, Ni^{59}, U enriched, Th^{nat}, Ra^{224}, Rn^{220}, Po^{216}, Pb^{212}, Bi^{212}, Po^{212}, Tl^{208}

EPA Waste Code(s): D008

Current Inventory: 1.3 cubic meters

Five Year Projection: 2.52 cubic meters

Waste Characterization Determination: Characterization is based on process knowledge. Characterization is sufficient to support identification of proper treatment technology.

3.1.13.1 Treatment Technology Required: The LDR treatment standard for elemental lead is macroencapsulation.

3.1.13.2 Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Hanford Site Waste Receiving and Processing Facility (WRAP) Module IIA.

Facility status: Hanford Site has confirmed that the WRAP II A facility is expected to be technically capable of treating this waste stream. This facility is planned but not constructed. DOE-Richland had identified that construction of this facility is currently scheduled to begin in March 1996, and facility operation is currently scheduled to begin in September 1999.

Permit status: RCRA Interim (Part A)

Availability date for treatment of this waste stream: (TBD)

Waste stream characterization: The characterization is based on process knowledge and the waste stream is sufficiently characterized to support identification of the proper treatment technology.

Packaging and shipping: Hanford Site Waste Receiving and Processing Facility (WRAP) Module II A is not expected to require repackaging of this waste stream.

Type of technology: Hanford Site Waste Receiving and Processing Facility (WRAP) Module II A is being developed to process, package and certify low level mixed waste for disposal. Hanford Site Waste Receiving

and Processing Facility (WRAP) Module IIA will perform macroencapsulation of metals resulting in a final waste form that meets LDR requirements.

Budget status: The total cost estimate (including transportation and off-site treatment) to implement this option is $163,760. This amount is within the Bettis target level funding.

Regulator and stakeholder input: This preferred option has been preliminarily reviewed with the Pennsylvania Department of Environmental Resources and EPA Region III; no objections were identified.

3.1.14 MWIR ID#: BT-W020

Site ID#: BT-0000002082 (This is a new waste stream, which was not included in the May 1994 MWIR update, since it was just recently identified.)

Waste Stream Name: Brass and Bronze

Waste Stream Description: Brass and bronze valves, items and fittings.

Treatability Group: MLLW CH, metal debris, toxic metals w/o mercury.

Radionuclides: C^{14}, I^{129}, Tc^{99}, H^{3}, Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Cs^{134}, Pm^{147}, Kr^{85}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Sn^{121m}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{63}, Ni^{59}, Eu^{152}, Eu^{154}, Pr^{144}, Ce^{144}

EPA Waste Code(s): D008

Current Inventory: 0.0 cubic meters

Five Year Projection: 0.1 cubic meters

Waste Characterization Determination: Characterization is based on process knowledge. This waste stream is sufficiently characterized to support identification of the proper treatment technology.

3.1.14.1 Treatment Technology Required: Stabilization is the LDR technology based treatment standard for lead.

3.1.14.2 Preferred Option: BT has not yet identified a preferred option for this waste stream, since it was just recently identified. Bettis will review treatment options and

identify a preferred option for this waste stream in the final proposed STP.

3.2 Mixed Waste Streams For Which Technology Exists But Needs Adaption or For Which No Technology Exists:

N/A

3.3 Mixed Waste Streams Requiring Further Characterization or For Which Technology Has Not Been Done:

N/A

3.4 Additional Mixed Waste Streams and/or Volumes Resulting from Change to NNPP Mixed Waste Policy

Since 1987, the policy of the NNPP has been to apply the requirements of RCRA to radioactive waste after the completion of Program radiological processing. This policy was based on avoiding inconsistency between the requirements of RCRA, as administered by EPA and various states, and the Program's uniform radiological standards established pursuant to Program authority for radioactivity pertaining to naval nuclear propulsion under the Atomic Energy Act (AEA) and Executive Order 12344 (enacted as permanent law in 42 USC 7158).

Under the NNPP mixed waste policy, Program facilities including Bettis, have taken aggressive action to avoid the creation of mixed waste, or any material which has the potential to give rise to mixed waste. As a result of these efforts, the amount of mixed waste at Program facilities has remained small. Based on these minimization efforts, the Program's efforts to compare its radiological requirements to RCRA requirements on a technical level, and Program experience with state regulatory agencies over the past seven years, the Program recently concluded that no general inconsistency exists between RCRA and Program authority under the AEA and Executive Order 12344. Thus, the Program mixed waste policy is in the process of being revised to apply the requirements of RCRA at the point of radioactive waste generation.

As a result of the planned change in Program policy, mixed waste streams which were not previously identified in the Interim or Updated Mixed Waste Inventory Reports or in the Bettis Conceptual Site Treatment Plan because they were not mixed wastes upon completion of Program radiological processing, now should be included in the FFCA process. These waste streams, along with the standard NNPP radiological processing method and typical expected radiological processing results, are identified in the following table. Where some portion of the waste stream was previously expected to result in mixed waste following completion of radiological processing, the corresponding mixed waste stream number (section 3.1) is also identified.

As the Program policy change is implemented, it is Bettis's goal to handle materials in the same manner as was done previously. Thus, certain processing steps which were previously performed by Bettis under the Program policy (e.g., solidification of small volumes of

radioactive liquids), would continue to be performed by Bettis as on-site treatment of mixed waste. On-site treatment is, therefore, the preferred treatment option for these waste streams, and detailed evaluation of other treatment options has not been and will likely not be performed. It is expected that the majority of the processing to be performed on-site will qualify as RCRA "simple treatment" which will not require treatment permits. However, it is recognized that treatment permits may be required for some processing previously performed under the NNPP policy. Once the Commonwealth of Pennsylvania obtains authorization from EPA to regulate mixed waste at federal facilities, Bettis will apply for permits covering treatment and/or storage of mixed waste, as needed. Additional information regarding on-site treatment of these waste streams will be provided in the Final Proposed Site Treatment Plan.

Appendix C of the interim DOE Mixed Waste Inventory Report discussed on-going work within the Naval Nuclear Propulsion Program to recover and recycle lead scrap from excess heavy metal bearing equipment which had been used for past servicing of ships and prototypes now removed from active service. Several pieces of equipment have already been processed in house and a commercial contract for processing large pieces of equipment is near placement with work anticipated to begin this year. In addition, a similar contract for decontamination and recycling of excess elemental lead, patterned after the equipment contract, is in active development. Therefore, these items are managed as metal scrap and not included in the following table.

3.5 Mixed Waste Streams Which Have Been Deleted

The following waste streams have been shipped to an off-site DOE facility (i.e., Hanford, Washington) for storage for eventual treatment and disposal. Because the current and projected future inventories are zero, these waste streams have been deleted from the Bettis DSTP.

MWIR ID#	WASTE STREAM ID#	DESCRIPTION	DATE SHIPPED
BT-W004	0000000338	Spent M-192 Solvent	07/12/93
BT-W006	0000000838	Solid Waste with F-Listed Solvent Paint	07/12/93
BT-W011	0000002069	Sludge Containing Solvents	06/24/94
BT-W014	0000002073	Zirconyl Nitrate	06/24/94
BT-W015	0000002074	Vanadium Pentoxide	06/24/94
BT-W016	0000002075	Scintillation Standards	06/24/94

ADDITIONAL BETTIS MIXED WASTE STREAMS AND/OR VOLUMES RESULTING FROM CHANGE TO NNPP MIXED WASTE POLICY

Waste Stream Number	Waste Stream Name	Treatability Group	Radionuclides	EPA Waste Codes	Current Inventory, M^3	5 Year Projected, M^3	Radiological Processing Method	Expected Results, %				Section 3.1 Waste Stream Number
								LL RW	HW	MW	NR NH	
BT-M003	Oil Containing Heavy Metals #2	MLLW CH Organic Sludges/ Particulates, Toxic Metals w/o Mercury	U-234, U-235, U-238, C-14, I-129, Tc-99, H-3, Cs-137, Sr-90, Y-90, Ba-137m, Cs-134, Pm-147, Kr-85, Sm-151, Cd-113m, Zr-93, Se-79, Nb-93m, Sn-126, Cs-135, Sn-121m, Nb-94, Pu-238, Pu-241, Cm-242, Co-60, Ni-63, Ni-59, Eu-152, Eu-154, Pr-144, Ce-144	D005 (Ba) D006 (Cd) D007 (Cr) D008 (Pb) D010 (Se) D011 (Ag)	1.1	2.1	Radiological Characterization	5	5	85	5	0000000051 BT-W003

Waste Stream Number	Waste Stream Name	Treatability Group	Radionuclides	EPA Waste Codes	Current Inventory, M^3	5 Year Projected, M^3	Radiological Processing Method	Expected Results, %				Section 3.1 Waste Stream Number
								LL RW	HW	MW	NR NH	
BT-M008	Mercury Containing Waste	MLLW CH Inorganic Debris,Toxic Metals with Mercury	C-14, I-129, Tc-99, H-3, Cs-137, Sr-90, Y-90, Kr-85, Ba-137m, Pu-238, Eu-154, Sm-151, Cd-113m, Zr-93, Eu-152, Se-79, Nb-93m, Sn-126, Pm-147, Te-126m, Cs-135, Sm-121, Co-60, Sb-125, Ni-63, Fe-55, Cm-242, Cs-134, Pu-241, Nb-94, Ni-59, Sb-126m, U-235, U-234, U-238, Th-232	D008 (Pb) D009 (Hg)	0.0	0.21	Mercury Separation	90	0	10	0	0000002056 BT-W008
BT-M101	Uranium, Chromium, Mercury Solution	MMLW CH, Neutral Wastewaters, Toxic Metals w/Mercury	U-enriched, U-natural, U-depleted, Th-231, Th-234, Pa-234m	D007 (Cr) D009 (Hg)	0.0	0.56	Neutralize and Solidify	100	0	0	0	N/A
BT-M102	Chromate Solutions	MLLW CH Neutral Wastewaters, Toxic Metals w/o Mercury	Cs-137, Ba-137m, U-234, U-235, U-238, Co-60, Fe-55, Ni-63, Th-nat	D005 (Ba), D007 (Cr)	0	0.035	Solidification	100	0	0	0	N/A

Waste Stream Number	Waste Stream Name	Treatability Group	Radionuclides	EPA Waste Codes	Current Inventory, M^3	5 Year Projected, M^3	Radiological Processing Method	Expected Results, %				Section 3.1 Waste Stream Number
								LL RW	HW	MW	NR NH	
BT-M103	Acidic solutions	MLLW CH Acidic Wastewaters, Corrosive	Cs-137, Ba-137m, Co-60, Fe-55, Ni-63, Pu-238, Pm-147, U-234, U-235, U-238, Th-nat, Sr-60, Y-90	D002 (Corrosive)	0	0.125	Neutralize and Solidify	100	0	0	0	N/A
BT-M104	Brass and Bronze	MLLW CH Metal Debris, Toxic Metals without Mercury	C-14, I-129, Tc-99, H-3, Cs-137, Sr-90, Y-90, Ba-137m, Cs-134, Pm-147, Kr-85, Sm-151, Cd-113m, Zr-93, Se-79, Nb-93m, Sn-126, Cs-135, Sn-121m, Nb-94, Pu-238, Pu-241, Cm-242, Co-60, Ni-63, Ni-59, Eu-152, Eu-154, Pr-144, Ce-144	D008 (Pb)	0	0.1	Survey	0	0	10	90	0000002082 BT-W020
BT-M106	Zircaloy chips	MLLW CH Reactive Metals, Pyrophoric	U-235	D001 (Ignitable) (pyrophoric)	0.03	0.002	Solidify in Concrete	85	0	0	15	N/A

Waste Stream Number	Waste Stream Name	Treatability Group	Radionuclides	EPA Waste Codes	Current Inventory, M^3	5 Year Projected, M^3	Radiological Processing Method	Expected Results, %				Section 3.1 Waste Stream Number
								LL RW	HW	MW	NR NH	
BT-M107	Elemental Mercury	MLLW CH, Elemental Mercury, Toxic Metals w/Mercury	C-14, I-129, Tc-99, H-3, Cs-137, Sr-90, Y-90, Kr-85, Ba-137m, Pu-238, Eu-154, Sm-151, Cd-113m, Zr-93, Eu-152, Se-79, Nb-93m, Sn-126, Pm-147, Te-126m, Cs-135, Sm-121, Co-60, Sb-125, Ni-63, Fe-55, Cm-242, Cs-134, Pu-241, Nb-94, Ni-59, Sb-126m, U-235, U-234, U-238, Th-232	D009 (Hg)	0	0.004	Amalgamation	100	0	0	0	N/A
BT-M108	Cadmium	MLLW CH, Metal Debris, Toxic Metals w/o Mercury	Unknown	D006 (Cd)	0	0.3	Survey	0	100	0	0	N/A
BT-M109	VOC Contaminated Water	MLLW CH, Neutral Wastewaters, Toxic Organics	Sr-90, Y-90, Cs-137, Ba-137m, Ni-63, Co-60	F001 (Tetrachloroethylene) F001 (Trichloroethylene)	30	1,200	Ion Exchange	0	100	0	0	N/A

4.0 Mixed TRU Waste Streams:

4.1 TRU Wastes Expected To Go To WIPP

N/A

4.2 TRU Wastes Not Destined For WIPP

N/A

5.0 Mixed High-Level Waste Streams:

N/A

6.0 Future Generation of Mixed Waste Streams:

6.1 Environmental Restoration Waste:

The DOE has entered into a consent order with the EPA to investigate residual chemicals in the soil and groundwater at the Site and to study corrective measures for the conditions found. No interim measures or immediate corrective actions have been necessary, final actions have not yet been determined. It is anticipated, based on the results of the investigation, that little, if any, mixed waste will be generated as a result of corrective measures taken for the residual chemicals in the soil or groundwater.

6.2 Decon & Decommissioning Waste

As a result of aggressive actions to minimize the creation of mixed waste, it is anticipated that Decon & Decommissioning (D&D) activities will generate little, if any, mixed waste. Generation rates have been estimated based upon current D&D schedules, past experience with the types of waste typically generated during these activities, and the available knowledge of the areas where D&D activities are planned. All D&D waste is characterized before disposal and hazardous wastes are segregated to minimize mixed waste generation.

7.0 Storage Report

DOE is committed to storing waste in compliance with RCRA storage requirements in 40 CFR 264 or 40 CFR 265 pending the development of treatment capacity and implementation of the Site Treatment Plans.

For mixed waste to be shipped off-site for treatment, storage of mixed waste before treatment and mixed waste residue after treatment will be arranged on a case-by-case basis between the shipping and receiving sites, in consultation with the affected states. Factors such as inadequate compliant storage capacity at the shipping site and a need to facilitate closure of the shipping site will be considered in proposing shipping schedules. Bettis plans to address arrangements for storage of Bettis waste streams before and after treatment on the final proposed STP.

Bettis currently operates a mixed waste storage facility which was designed to meet RCRA and Pennsylvania hazardous waste storage requirements. However, since mixed waste is not currently regulated in Pennsylvania, a permit for this facility is not currently required. Once Pennsylvania obtains authorization from the EPA to regulate mixed waste, Bettis will apply for the necessary permits. The maximum capacity of the Bettis mixed waste storage facility is approximately 165 m^3.

8.0 Process for Evaluating Disposal Issues in Support of the STP Discussions

8.1 Introduction

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

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

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

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

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

been before considered for disposal activities may be suitable for the disposal of some MLLW residues.

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

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

8.2 Disposal Site Evaluation Process to Date

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

Site Grouping

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

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

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

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

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

Initial Site Screening

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

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

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

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

26 Site Evaluation

DOE and the States met on July 26-27, 1994, in Denver, Colorado, to discuss the site specific information on the 26 sites and to consider proposals for elimination of sites form further evaluation. The focus of these discussions was to identify sites suitable for further evaluation regarding their disposal capability. It was agreed that sites determined to have marginal or no potential for disposal activities would be removed or postponed from further evaluation under this process. As a result of the meeting, DOE and the States agreed that the following sites

would be eliminated from further evaluation due to their limited potential for disposal activities:

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

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

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

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

8.3 Next Steps in Disposal Site Evaluation Process

For the sites not eliminated from further evaluation or assigned a lower priority for evaluation, a more technically detailed performance evaluation will be conducted to increase the understanding of the strengths and weaknesses of a site's potential for disposal activities and to better identify what types of disposal activities could or could not occur at a site. A configuration analysis (risk, cost, transportation) will also be prepared, and a final set of sites will be identified as disposal options which will be technically capable of disposing of some waste. DOE officials, in concert with the public and pursuant to the National Environmental Policy Act, will then identify those sites that will be further evaluated for potential development as disposal sites. Permitting and preparation of performance assessments in accordance with radioactive waste management regulations will then be undertaken collaboratively with States and regulators.

Performance Evaluation

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

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

Confirmation Analysis

Through the Draft EM PEIS currently being prepared by DOE, the potential cost, risks, transportation, and other environmental impacts of using each of the remaining 16 sites for some level of disposal activity will be analyzed. This analysis is currently scheduled to be released for public review and comment in Late 1994/early 1995.

Site Limitations Analysis

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

Final EM PEIS

While the final proposed Site Treatment Plans are being prepared, and following their submission by DOE to the States and other regulators, it is expected that individual States and

DOE will enter discussions concerning what waste will be treated at which sites. It is also expected that as a part of these discussions, some arrangements may be established between DOE sites and States as to how any future disposal activities will be handled. DOE expects that the information supplied throughout this process will be used in those discussions. Likewise, DOE expects that the Final EM PEIS analyses will encompass the range of discussions and arrangements under consideration.

Post-Compliance Order Activities

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

Post--Record of Decision Activities

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

FIGURE 8-1
SITES ELIMINATED IN INITIAL SCREENING

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

FIGURE 8-1
SITES ELIMINATED IN INITIAL SCREENING

SITE	EXCLUSIONARY CRITERIA		
	100 meter buffer	100-Year Floodplain	Active Fault
Norfolk Naval Shipyard (a)		●	
Washington			
Puget Sound Naval Shipyard (a)		●	

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

FIGURE 8-2
26 SITES REMAINING AFTER INITIAL SCREENING

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

Colorado
- Rocky Flats Plant

Florida
- Pinellas Plant

Idaho
- Idaho National Engineering Laboratory

Illinois
- Argonne National Laboratory
- Site A/ Plot M

Kentucky
- Paducah Gaseous Diffusion Plant

Missouri
- Weldon Spring Remedial Action Project

Nevada
- Nevada Test Site

New Mexico
- Los Alamos National Laboratory
- Sandia National Laboratory

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

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

Pennsylvania
- Bettis Atomic Power Laboratory

South Carolina
- Savannah River Site

Tennessee
- Oak Ridge Reservation

Texas
- Pantex Plant

Washington
- Hanford

DRAFT SITE TREATMENT PLAN FOR
BETTIS ATOMIC POWER LABORATORY

Compliance Plan Volume

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Draft Site Treatment Plan For
Bettis Atomic Power Laboratory

Compliance Plan Volume

1.0 Purpose and Scope of the Compliance Plan Volume

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

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

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

Emerging or new technologies not yet considered may be identified in the future that provide opportunities to manage waste more safely, effectively and at lower cost than the current

technologies in the Draft Plan. Working closely with regulators and other interested parties during the implementation of the Draft Plan, DOE will continue to evaluate and develop technologies that offer potential advantages in the areas of public acceptance, risk abatement, performance and life cycle cost. Should better technologies be identified, DOE may request a modification of its treatment plan in accordance with provisions of the final Site Treatment Plan and/or the Order.

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

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

2.0 Implementation of the Plan

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

2.1 Approach to Setting Milestones

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

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

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

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

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

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

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

2.2 Annual Site Treatment Plan Update

This Section of the Final Plan would provide for submission of an Annual Site Treatment Plan Update intended to communicate information on progress in implementing the Plan and to provide a mechanism for establishing new milestones, amending wastes covered by the Plan, and updating the Plan, as well as proposing revisions to the Plan when necessary. These latter actions may be accomplished through other mechanisms as described in other Sections of this Plan, but the Annual Update provides a coordinated mechanism to effect such

changes on a routine basis. DOE proposes that all sites with Site Treatment Plans provide Annual Updates in the same timeframe to facilitate necessary site and State interactions and to facilitate tracking of progress across the DOE complex in developing treatment capacity and treating mixed waste.

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

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

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

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

2.3 Inclusion of New Waste Streams

This Section of the Final Plan would establish procedures for incorporating newly identified and newly generated or stored waste streams into the Site Treatment Plan and for developing a plan and schedules for providing treatment capacity.

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

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

2.4 Duration of the Plan and Deletion of Wastes

This Section of the Final Plan would establish that the approved Plan will terminate when the site's mixed waste, regardless of the time it was generated, is in compliance with the storage prohibition in RCRA 3004(j). This will occur: 1) when there is no longer any mixed waste stored or generated at the site that does not meet land disposal restriction requirements or 2)

when the mixed waste currently being stored or generated at the site, or that will be stored or generated, is being stored solely for the purposes of accumulating sufficient quantities as are necessary to facilitate proper treatment, recovery, or disposal.

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

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

The Section would provide for notification of the Commonwealth of Pennsylvania and the U.S. Environmental Protection Agency and other procedures as appropriate for terminating the Plan and for deleting waste streams.

2.5 Modifications/Extensions or Revisions to the Plan

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

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

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

2.6 Funding Considerations

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

2.7 Disputes

This Section would provide procedures to address disputes concerning scheduling under Section 2.1, modifications/extensions or revisions to the Plan under Section 2.5, review and submittal of deliverables in Section 2.8, and other circumstances agreed to by DOE and the U. S. Environmental Protection Agency. The Section would establish time frames to resolve a dispute and a process that would elevate the dispute when agreement cannot be reached.

2.8 Submittal, Review and Approval of Deliverables

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

3.0 Low Level Mixed Waste Treatment Plans and Schedules

3.1 Mixed Waste Streams for which Technology Exists

3.1.1 MWIR ID#: BT-W001

SITE ID#: BT-0000000049

Waste Stream Name: Oil Containing Heavy Metals #1

Current Inventory: 0 cubic meters

Projected Inventory: 0.21 cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River CIF Incinerator-Solid Feed System. Following incineration, residue will be chemically reduced (if necessary) and stabilized at Savannah River resulting in a final waste form which meets LDR requirements.

Estimated Schedule: This waste stream has not yet been generated at Bettis. Savannah River has preliminarily identified that the CIF incinerator is expected to be ready to receive and treat off-site waste around 1997, about one year after the expected start of the CIF mixed waste operations in February 1996. Bettis anticipates that transfer of

this small volume waste stream will be feasible around February 1997 [or following generation, whichever occurs first]. It is noted, however, that South Carolina approval of RCRA permit modification to allow CIF receipt of off-site waste, waste characterization and packaging to meet CIF requirements, coordination/prioritization of Bettis waste with other waste to be treated at CIF, and arrangements concerning storage (and possibly ultimate disposal) of treated waste residuals will need to be completed prior to shipment of this waste stream to Savannah River for treatment. All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.2 MWIR ID#: BT-W002

SITE ID#: BT-0000000050

Waste Stream Name: Spent Solvent Rags

Current Inventory: 0.21 cubic meters

Projected Inventory: 0 cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River CIF Incinerator-Solid Feed System. Following incineration, residue will be chemically reduced (if necessary) and stabilized at Savannah River resulting in a final waste form which meets LDR requirements.

Estimated Schedule: Savannah River has preliminarily identified that the CIF incinerator is expected to be ready to receive and treat off-site waste around 1997, about one year after the expected start of the CIF mixed waste operations in February 1996. Bettis anticipates that transfer of this small volume waste stream will be feasible around February 1997. It is noted, however, that South Carolina approval of RCRA permit modification to allow CIF receipt of off-site waste, waste characterization and packaging to meet CIF requirements, coordination/prioritization of Bettis waste with other waste to be treated at CIF, and arrangements concerning storage (and possibly ultimate disposal) of treated waste residuals will need to be completed prior to shipment of this waste stream to Savannah River for treatment. All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.3 MWIR ID#: BT-W003

SITE ID#: BT-0000000051

Waste Stream Name: Oil Containing Heavy Metals #2

Current Inventory: 0 Cubic meters

Projected Inventory: 0.21 Cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River CIF Incinerator-Liquid Feed System. Following incineration, residue will be chemically reduced (if necessary) and stabilized at Savannah River resulting in a final waste form which meets LDR requirements.

Estimated Schedule: Savannah River has preliminarily identified that the CIF incinerator is expected to be ready to receive and treat off-site waste around 1997, about one year after the expected start of the CIF mixed waste operations in February 1996. Bettis anticipates that transfer of this small volume waste stream will be feasible around February 1997. It is noted, however, that South Carolina approval of RCRA permit modification to allow CIF receipt of off-site waste, waste characterization and packaging to meet CIF requirements, coordination/prioritization of Bettis waste with other waste to be treated at CIF, and arrangements concerning storage (and possibly ultimate disposal) of treated waste residuals will need to be completed prior to shipment of this waste stream to Savannah River for treatment. All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.4 MWIR ID#: BT-W005

SITE ID#: BT-0000000390

Waste Stream Name: Lead & Chromium Based Paint Chips

Current Inventory: 0.1 cubic meters

Projected Inventory: 0 cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is RCRA on-site simple treatment in the accumulation container.

Estimated Schedule: This waste stream has been generated at Bettis. RCRA simple treatment of this waste stream will be completed within 90 days of each instance of generation. All actions necessary to support accomplishment of simple treatment, including modification of existing radiological work facilities, can be completed to support this estimated schedule.

Milestones: (Reserved)

3.1.5 MWIR ID#: BT-W007

SITE ID#: BT-0000000839

Waste Stream Name: Solids with Solvents

Current Inventory: 0.42 cubic meters

Projected Inventory: 0 cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River CIF Incinerator-Solid Feed System. Following incineration, residue will be chemically reduced (if necessary) and stabilized at Savannah River resulting in a final waste form which meets LDR requirements.

Estimated Schedule: Savannah River has preliminarily identified that the CIF incinerator is expected to be ready to receive and treat off-site waste around 1997, about one year after the expected start of the CIF mixed waste operations in February 1996. Bettis anticipates that transfer of this small volume waste stream will be feasible around February 1997. It is noted, however, that South Carolina approval of RCRA permit modification to allow CIF receipt of off-site waste, waste characterization and packaging to meet CIF requirements, coordination/prioritization of Bettis waste with other waste to be treated at CIF, and arrangements concerning storage (and possibly ultimate disposal) of treated waste residuals will need to be completed prior to shipment of this waste stream to Savannah River for treatment. All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.6 MWIR ID#: BT-W008

SITE ID#: BT-00000002056

Waste Stream Name: Mercury Containing Waste

Current Inventory: 0 cubic meters

Projected Inventory: 0.21 cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at the Idaho National Engineering Laboratory (INEL) Mercury Retort Facility.

Estimated Schedule: The waste stream has not yet been generated at Bettis. INEL has not identified a target date for shipment of this waste to INEL for treatment, and has indicated that target dates for acceptance of off-site waste will not be established until all equity issues associated with interstate waste transfers are resolved. Bettis anticipates that transfer of this small volume waste stream to INEL will be feasible soon after the WERF incinerator begins operations (currently scheduled for third quarter 1996). All Bettis actions required to prepare the waste for shipment, including completion of detailed characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.7 MWIR ID#: BT-W009

SITE ID#: BT-0000002058

Waste Stream Name: VOC Contaminated Soil

Current Inventory: 0.42 cubic meters

Projected Inventory: 0 cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Hanford Site Thermal Treatment Facility.

Estimated Schedule: Hanford Site has not yet identified a target date for shipment of this waste stream to Hanford for treatment. Bettis anticipates that following generation, transfer of this small volume waste stream will be feasible soon after the Thermal Treatment Facility begins operations. Hanford has identified that no estimated facility operations

start date is available at this time. All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.8 MWIR ID#: BT-W010

SITE ID#: BT-0000002062

Waste Stream Name: Waste Oil with Heavy Metals and PCBs

Current Inventory: 0.21 cubic meters

Projected Inventory: 0 cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Hanford Site Thermal Treatment Facility.

Estimated Schedule: Hanford Site has not yet identified a target date for shipment of this waste stream to Hanford for treatment. Bettis anticipates that following generation, transfer of this small volume waste stream will be feasible soon after the Thermal Treatment Facility begins operations. Hanford has identified that no estimated facility operations start date is available at this time. All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.9 MWIR ID#: BT-W012

SITE ID#: BT-0000002070

Waste Stream Name: VOC & PCB Contaminated Debris

Current Inventory: 6.42 cubic meters

Projected Inventory: 2.1 cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Hanford Site Thermal Treatment Facility.

Estimated Schedule: Hanford Site has not yet identified a target date for shipment of this waste stream to Hanford for treatment. Bettis anticipates that following generation, transfer of this small volume waste stream will be feasible soon after the Thermal Treatment Facility begins operations. Hanford has identified that no estimated facility operations start date is available at this time. All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.10 MWIR ID#: BT-W013

SITE ID#: BT-0000002072

Waste Stream Name: VOC & PCB Contaminated Soil

Current Inventory: 1.97 cubic meters

Projected Inventory: 0 Cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Hanford Site Thermal Treatment Facility.

Estimated Schedule: Hanford Site has not yet identified a target date for shipment of this waste stream to Hanford for treatment. Bettis anticipates that following generation, transfer of this small volume waste stream will be feasible soon after the Thermal Treatment Facility begins operations. Hanford has identified that no estimated facility operations start date is available at this time. All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.11 MWIR ID#: BT-W017

SITE ID#: BT-0000002076

Waste Stream Name: Ion Exchange Resin

Current Inventory: 0.001 cubic meters

Projected Inventory: 0 Cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River CIF Incinerator-Solid Feed System. Following incineration, residue will be chemically reduced (if necessary) and stabilized at Savannah River resulting in a final waste form which meets LDR requirements.

Estimated Schedule: Savannah River has preliminarily identified that the CIF incinerator is expected to be ready to receive and treat off-site waste around 1997, about one year after the expected start of the CIF mixed waste operations in February 1996. Bettis anticipates that transfer of this small volume waste stream will be feasible around February 1997. It is noted, however, that South Carolina approval of RCRA permit modification to allow CIF receipt of off-site waste, waste characterization and packaging to meet CIF requirements, coordination/prioritization of Bettis waste with other waste to be treated at CIF, and arrangements concerning storage (and possibly ultimate disposal) of treated waste residuals will need to be completed prior to shipment of this waste stream to Savannah River for treatment. All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.12 MWIR ID#: BT-W018

SITE ID#: BT-0000002077

Waste Stream Name: TCLP Extraction Fluid

Current Inventory: 0 cubic meters

Projected Inventory: 0.001 cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Savannah River CIF Incinerator-Liquid Feed System. Following incineration, residue will be chemically reduced (if necessary) and stabilized at Savannah River resulting in a final waste form which meets LDR requirements.

Estimated Schedule: This waste stream has not yet been generated at Bettis. Savannah River has preliminarily identified that the CIF incinerator is expected to be ready to receive and treat off-site waste around 1997, about one year after the expected start of the CIF mixed waste operations in February 1996. Bettis anticipates that transfer of this small volume waste stream will be feasible around February 1997 [or following generation, whichever occurs first]. It is noted, however,

that South Carolina approval of RCRA permit modification to allow CIF receipt of off-site waste, waste characterization and packaging to meet CIF requirements, coordination/prioritization of Bettis waste with other waste to be treated at CIF, and arrangements concerning storage (and possibly ultimate disposal) of treated waste residuals will need to be completed prior to shipment of this waste stream to Savannah River for treatment. All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.13 MWIR ID#: BT-W019

SITE ID#: BT-0000002077

Waste Stream Name: Lead

Current Inventory: 1.3 cubic meters

Projected Inventory: 2.52 cubic meters

Preferred Option: The Bettis preferred option for treatment of this waste stream is off-site treatment at Hanford Site Waste Receiving and Processing Facility (WRAP) Module IIA.

Estimated Schedule: The Hanford Site has not yet identified a target date for shipment of this waste stream to Hanford for treatment. Bettis anticipates that transfer of this small volume waste stream to Hanford will be feasible soon after the WRAP II facility begins operations (currently scheduled for September 1999). All Bettis actions required to prepare the waste for shipment, including characterization, preparation of waste certifications, and packaging for shipment, will be completed to support the schedule to be established.

Milestones: (Reserved)

3.1.14 MWIR ID#: BT-W020

SITE ID#: BT-0000002082 (This is a new waste stream, which was not included in the May 1994 MWIR update, since it was just recently identified.)

Waste Stream Name: Brass and Bronze

Current Inventory: 0.0 cubic meters

Projected Inventory: 0.1 cubic meters

Preferred Option: Bettis has not yet identified a preferred option for this waste stream, since it was just recently identified. Bettis will review treatment options and identify a preferred option for this waste stream in the proposed final Site Treatment Plan.

Estimated Schedule: (TBD)

Milestones: (Reserved)

3.2 Mixed Waste Streams for which Technology Exists but Needs Adaptation or for which No Technology Exists

N/A

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

N/A

3.4 Additional Mixed Waste Streams and/or Volumes Resulting from Change to NNPP Mixed Waste Policy

As discussed in section 3.4 of the Background Volume, mixed waste streams which were not previously identified in the Interim or Updated Mixed Waste Inventory Reports or in the Bettis Conceptual Site Treatment Plan will be added to the FFCA process as the result of a change to the NNPP mixed waste policy. These waste streams were not previously included because they are not mixed wastes upon completion of Program radiological processing. The preferred treatment option for these waste streams is on-site treatment (including RCRA simple treatment where appropriate). Additional information regarding on-site treatment of these waste streams will be provided in the Final proposed Site Treatment Plan.

4.0 TRU Mixed Waste Streams

N/A

5.0 High Level Mixed Waste Streams

N/A

Appendix A

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2.0 Cost Comparison Between All On-site Treatment, All Mobile Treatment, and Preferred Treatment Options

TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W001

Waste Stream ID# BETTIS #0000000049

Waste Stream Name: Oil Containing Heavy Metals #1

Waste Stream Description: Lubricating and hydraulic oils, and sludges from equipment decommissioning.

Treatability Group: MLLW CH, organic sludges/particulates, toxic metals with mercury

Radionuclides: Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Ni^{63}, C^{14}, I^{129}, Tc^{99}, H^{3}, Cs^{134}, Pm^{147}, Kr^{85}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Sn^{121m}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{59}, Eu^{152}, Eu^{154}, Pr^{144}, Ce^{144}

EPA Waste Code(s): D006, D007, D008, D009, D010, D011

Current Inventory: 0.0 cubic meters

Five Year Projection: 0.21 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization is based on sampling/analysis of previous generation of this waste stream. This waste stream is sufficiently characterized to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable : Stabilization is the concentration based LDR treatment required for lead, cadmium, chromium, selenium and silver. The presence of mercury in a waste stream requires that the waste be treated for the mercury first. The required treatment for mercury is incineration because the concentration is less than 260 ppm. Treatment will consist of organic destruction followed by chemical reduction (to reduce hexavalent chromium to trivalent chromium; if chromium is present) followed by stabilization to meet LDR standards for this waste stream.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatment

(1) Treatment at a New On-Site Facility: Treatment of this waste stream in a permitted on-site facility would consist of organic destruction followed by chemical reduction (to reduce hexavalent chromium to trivalent chromium) followed by stabilization.

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by chemical reduction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	200,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to build new work facility and procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	2,000,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		2,200,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat projected volume (0.21 M^3) based on estimated 0.2 M^3/shift, 6 mandays/shift, one shift training also included.)	20,600	
	3.2	Annual Utilities	3,000	
	3.3	Annual Materials	18,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	53,600	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		53,600
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		3,253,600

Note Years of Operation: 1 year used to facilitate comparison of all options based on 1 year projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform organic destruction followed chemical reduction followed by stabilization was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by chemical reduction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	15,800	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	84,000	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	74,800	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		174,600
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat projected volume of 0.21 M^3 based on 0.2 M^3/ shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	20,600	
	3.2	Annual Utilities	3,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	18,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	47,600	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		47,600
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	15,800	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	23,800	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		39,600
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		761,800

Note: Years of Operation: 1 year used to facilitate comparison of all options based on 1 year projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section 2 above, facilities that perform organic destruction followed by chemical reduction followed by stabilization were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF)(0324)	Facility deleted from MWIR database, It will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	WERF Incinerator (0251)	Based on available information, facility appears to be technically capable of treating this mixed waste stream.	Potential primary candidate based on near term availability date, although distant from generator.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Facility accepts identified radionuclides.

c. Waste Form: Facility accepts waste matrix codes for organic sludges/particulates.

d. Packaging: N/A; facility provides repackaging as needed for liquid and solid waste to be fed into incinerator.

e. Treatment Type: Organic destruction by incineration via dual chamber controlled-air type which discharges to stabilization unit.

f. Capacity: Normal capacity is 75,636 kg/yr; due to small volume of this waste stream this criteria is not limiting.

2) Non-technical

a. Facility Status: Constructed; not in use; plan to use to treat mixed waste; estimated start date 04/96.

b. Permit Status: RCRA interim; RCRA Part B (applied).

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Los Alamos National Laboratory	Solid Feed System (0309)	Based on available information, this facility does not appear technically capable of treating this waste stream due to unacceptable hazardous constituent and waste form.	

1) Technical

a. Hazardous Constituent: Facility does not accept any of the identified EPA waste codes , which makes this facility not usable for this waste stream.

b. Radionuclides: Facility accepts identified radionuclides.

c. Waste Form: Facility does not accept waste matrix code for this waste stream; therefore, facility is not acceptable.

d. Packaging: Facility accepts solid waste in 1' x 1' x 2' cardboard boxes.

e. Treatment Type: Organic destruction via incineration.

f. Capacity: Normal capacity is 82,000 kg/yr; due to small volume of this waste stream this criteria is not limiting.

2) Non-technical

a. Facility Status: Constructed; not is use; plan to use to treat mixed waste; estimated start date 9/95.

b. Permit Status: RCRA B final and TSCA final for hazardous waste; RCRA Part B prohibits treatment of off-site waste. RCRA Part A for treating mixed waste has been submitted; Part B for mixed waste to be submitted.

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Savannah River Site	CIF Incinerator-Solid Feed System (0142)	Based on available information, this facility appears to be technically capable of treating this mixed waste stream. Repackaging would be required.	Potential prime candidate based on location and status. Current permit restriction prohibiting off-site waste would have to be eliminated.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Unknown at this time; probably not limiting.

c. Waste Form: Facility accepts waste matrix codes for non-halogenated organic sludges.

d. Packaging: Facility accepts waste in 21 in. square cardboard box weighing between 5 and 75 lbs. Repackaging would be required.

e. Treatment Type: Organic destruction by incineration via rotary kiln type followed by secondary combustion chamber, air pollution control system, and ashcrete stabilization area.

f. Capacity: Normal capacity is 3,000,000 kg/yr; due to small volume of waste stream this criteria is not limiting.

2) Non-technical

a. Facility Status: Under construction; estimated start date 02/96.

b. Permit Status: RCRA final; air quality control final; NESHAP final; current state permit does not allow CIF to process off-site waste.

c. Facility Location: Out of state; in region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Idaho National Engineering Laboratory	Thermal Destruction System (0334)	Based on available information; this facility does not appear technically capable of treating this waste stream due to unacceptable hazardous constituent and waste form.	

1) Technical

a. Hazardous Constituent: Facility accepts only one of the identified EPA codes (D009), which makes this facility not usable for this waste stream.

b. Radionuclides: Unknown at this time; probably not limiting.

c. Waste Form: Facility does not accept waste matrix codes for this waste stream, therefore, facility is not acceptable.

d. Packaging: N/A; waste unpackaged, sorted, and sized by facility prior to incineration.

e. Treatment Type: Thermal desorption by heating and driving off organic materials from inorganic debris to secondary combustion chamber, where they are destroyed then sent for stabilization.

f. Capacity: Capacity unknown at this time; should not be limiting due to small volume of waste stream.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/07.

b. Permit Status: None

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Rocky Flats Plant	Solvent Contaminated Waste System (0340)	Based on available information; this facility does not appear technically capable of treating this waste stream due to unacceptable radionuclides and waste form.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes.

b. Radionuclides: Facility does not accept identified radionuclides; therefore, facility is unacceptable.

c. Waste Form: Facility does not accept waste matrix code for this waste stream; therefore, facility is not acceptable.

d. Packaging: N/A; unpackaging of received wastes done by another system.

e. Treatment Type: Organic destruction by one of three technologies; fluidized bed unit, controlled air incineration, and plasma arc furnace, also included is a immobilization component.

f. Capacity: Capacity is yet to be determined; should not be limiting due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Planned; estimated start date 12/05.

b. Permit Status: None

c. Facility Location: Out of state; out of region

3) Other System 1A of CTMP.

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facility

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts with Facilities			
Incineration	Savannah River Site	CIF Incinerator-Solid Feed System	Technically capable, under construction, estimated start date 2/96. Permit restriction for off-site waste would require revision, and repackaging would be necessary.
Facility contact: Savannah River Site has confirmed this facility is expected to be technically capable of treating this waste stream.			
Incineration	Idaho National Engineering Laboratory	WERF Incinerator	Technically capable, constructed, estimated start date 4/96.
Facility contact: Idaho National Engineering Laboratory has confirmed this facility is expected to be technically capable of treating this waste stream.			

In addition to the facilities included in the above evaluation, the following DOE facility was identified by the DOE site as being expected to have the technical capability to treat this waste stream. This site was requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Incineration	Hanford Site	Thermal Treatment Facility Incinerator

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			1,067
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars	10,827

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for organic sludges/particulates is $2.50 - $5.50 per pound, conservatively assume $5.0 per pound, 0.21 m^3 = 88 kg = 194 lb

7.0 (0.21 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization	Scientific Ecology Group, Inc.	Based on limited available information, appears to be potentially capable of treating this waste stream. Mercury separation isn't required for this waste stream since <260 ppm.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates, toxic metals with mercury.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform organic destruction and stabilization in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates, toxic metals with mercury. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction, or stabilization of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Organic destruction followed by stabilization	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Chem Nuclear Systems, Inc.	Based on limited available information, appears to be potentially capable of treating this waste stream.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates, toxic metals with mercury.

d. Packaging: Information not received.

e. Treatment Type: Can perform organic destruction, or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates, toxic metals with mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing organic destruction.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Based on limited available information, probably can treat organic sludges/particulates, toxic metals with mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can only perform stabilization, cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists and operational.

b. Permit Status: Permitted to treat solid phased mixed material.

c. Facility Location: Salt Lake City, UT

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.

Organic destruction followed by stabilization.	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization.	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	Non-Destructive Cleaning, Inc.	Not capable of treating this waste stream. Not capable of treating identified hazardous constituents.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates, toxic metals with mercury.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform, organic destruction, or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	NSSI/ Sources and Services, Inc.	Potentially capable of treating this waste stream.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates, toxic metals with mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can perform organic destruction and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates, toxic metals with mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Can treat organic sludges/particulates, toxic metals with mercury.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform organic destruction or stabilization.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on-site.	
Organic destruction followed by stabilization.	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates, toxic metals with mercury.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction or stabilization.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (none on hand, 0.21 cubic meters one year projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BT 0000000049

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., organic destruction followed by chemical reduction followed by stabilization) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence

that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$3,253,600
On-site Mobile Treatment Unit	$ 761,800
Off-site DOE Facility	$ 10,827
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is

anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at Savannah River Site-CIF Incinerator-Solid Feed System.

Savannah River has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Savannah River Site-CIF Incinerator-Solid Feed System was selected as the preferred option from among technically capable DOE facilities based on facility status and location.

TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W002

Waste Stream I.D.# BETTIS #0000000050

Waste Stream Name: Spent Solvent Rags (Name change)

Waste Stream Description: Solvent and rags used to clean material and tooling.

Treatability Group: MLLW CH, organic debris,toxic organics

Radionuclides: U-Depleted, U-Enriched, Th ^{231}

EPA Waste Code(s): F003, F005, F002

Current Inventory: 0.21cubic meters

Five Year Projection: 0.0 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization is based on process knowledge and is sufficient to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is practicable : Organic destruction followed by stabilization of residue is the treatment required to meet LDR standards for this toxic organic waste stream.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current

agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatments

(1) Treatment at a New On-Site Facility: Treatment of this waste stream in a permitted on-site facility would consist of organic destruction (incineration) followed by cement based stabilization/solidification.

The facility design, construction, and permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	280,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to build new work facility and procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	2,800,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		3,080,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume (0.21 M^3) based on estimated 0.21 M^3/shift, 6 mandays/shift, one shift training also included.)	13,200	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials	12,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	39,200	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		39,200
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		4,119,200

Note Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform organic destruction followed by stabilization was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	10,700	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	57,000	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	50,700	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		118,400
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume of 0.21 M^3 based on 0.21 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	13,200	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	12,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	33,200	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		33,200
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	10,700	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	16,100	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		26,800
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		678,400

Note: Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section (2) above, facilities that perform organic destruction followed by stabilization were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	WERF Incinerator (0251)	Based on available information, this facility appears to be technically capable of treating this mixed waste stream.	Although this facility is out of state, it is a good candidate for treating this waste stream since it is next nearest site and has been constructed.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes (F002, F003, F005) for this waste stream.

b. Radionuclides: Facility accepts identified radionuclides for this waste stream; activity levels in the waste are less than waste acceptance criteria limits.

c. Waste Form: Facility accepts waste matrix codes for this waste stream.

d. Packaging: Repackaging required; site can conduct repackaging at WERF facility. This criteria is not limiting.

e. Treatment Type: Organic destruction via rotary kiln incinerator; follow on ash stabilization conducted at WERF stabilization unit. This satisfies all treatment requirements.

f. Capacity: 75,600 kg/yr based on INEL CSTP; due to small volume of waste stream this criteria should not be limiting.

2) Non-technical

a. Facility Status: Constructed; not currently in use; plan to use to treat mixed waste; estimate start date 4/96.

b. Permit Status: RCRA Interim & Part B

c. Facility Location: Out of state; our of region.

3) Other:

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Los Alamos National Laboratory	CAI Solid Feed System (0309)	Based on available information, this facility appears to be technically capable of treating this waste stream. Use of this facility would require repackaging of waste into DOT 7A boxes.	Not likely to be a primary candidate based on location and because waste would require repackaging.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes (F002,F003, F005) for this waste stream.

b. Radionuclides: Facility accepts identified radionuclides for this waste stream.

c. Waste Form: Facility accepts identified waste matrix codes.

d. Packaging: Repackaging required; waste received in DOT 7A boxes containing cardboard boxes. This requirement would necessitate repackaging this waste stream.

e. Treatment Type: Organic destruction via incineration; technology for stabilization of ash has not been determined.

2) Non-technical

a. Facility Status: Constructed; not operational; estimated start date 9/95

b. Permit Status: RCRA B; TSCA for hazardous waste; RCRA Part A for MW submitted; current RCRA prohibits accepting off-site waste.

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Oak Ridge K-25 Site	K-25 Site TSCA Incinerator (0305)	Based on available information, this facility appears to be technically capable of treating this mixed waste stream.	Good candidate based on location & status. Could require permit modification to accept this waste.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes (F002, F003, F005) for this waste stream.

b. Radionuclides: Facility accepts the radionuclides identified in this waste stream.

c. Waste Form: Facility accepts waste matrix codes for this waste stream.

d. Packaging: Facility accepts 55 gal drums in which this waste stream is packaged.

e. Treatment Type: Organic destruction via incineration; technology for stabilization of ash has not been determined.

f. Capacity: 1860 m^3/yr (1.86E6kg/yr); not limiting due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Operating; treats mixed waste.

b. Permit Status: RCRA; TSCA; off-site waste acceptance limited to certain sites.

c. Facility Location: Out of state; in region.

3) Other:

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Savannah River Site	CIF Incinerator-Solid Feed System (0142)	Based on available information, this facility appears to be technically capable of treating this waste stream. Use of this facility would require repackaging.	Not likely to be a primary candidate based on location and because repackaging would be required. Permit currently prohibits off-site waste.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA (F002, F003, F005) waste codes for this waste stream.

b. Radionuclides: Unknown at this time.

c. Waste Form: Facility accepts waste matrix codes for this waste stream.

d. Packaging: Repackaging of waste would be required to 2'x2' boxes.

e. Treatment Type: Organic destruction via incineration; stabilization of ash conducted by CIF Ashcrete Facility. This satisfies all treatment requirements.

f. Capacity: 3.0E6 kg/yr, there is excess capacity.

2) Non-technical

a. Facility Status: Under construction; estimated start date 2/96.

b. Permit Status: RCRA; state permit prohibits accepting off-site waste.

c. Facility Location: Out of state; in region.

3) Other:

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Oak Ridge Y-12 Plant	MW Treatment Facility Incineration(0527)	Facility not evaluated because it will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility is not to be built.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF)(0324)	Facility deleted from MWIR database. It will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other:

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Idaho National Engineering Laboratory	(IWPF) Thermal Desorption System (0334)	Based on available information, this facility does not appear to be technically capable of treating this mixed waste stream because it does not accept the waste form.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes (F002, F003, F005) for this waste stream.

b. Radionuclides: Unknown at this time.

c. Waste Form: This unit of IWPF accepts only non combustible debris.

d. Packaging: None listed: waste received at central point.

e. Treatment Type: Removal of organic contaminants via heating, subsequent incineration of combustible materials and stabilization of ash. Treatments satisfies requirements for this waste stream.

f. Capacity: To be determined; should not be limiting criterion due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/07.

b. Permit Status: No information provided.

c. Facility Location: Out of state; out of region.

3) Other

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts with Facilities			
Incineration	Savannah River Site	CIF Incinerator-Solid Feed System	Technically capable of treating, although located out of region; repackaging would be required and permit currently prohibits accepting off-site waste.
Facility contact: Savannah River Site has confirmed this facility is expected to be technically capable of treating this waste stream.			
Incineration	Idaho National Engineering Laboratory	WERF Incinerator	Nearest facility to generator that has capability to treat this waste stream and based upon near term start date.
Facility contact: Idaho National Engineering Laboratory has confirmed this facility is expected to be technically capable of treating this waste stream.			
Incineration	Los Alamos National Laboratory	CAI Solid Feed System	Technically capable of treating, although located out of region and repackaging would be required.
Facility contact: Los Alamos National Laboratory was not contacted regarding treatment of this waste stream.			
Incineration	Oak Ridge	K-25 Site TSCA Incinerator	Technically capable; could require permit modification.
Facility Contact: Oak Ridge was not contacted regarding treatment of this waste stream.			

In addition to the facilities included in the above evaluation, the following DOE facility was identified by the DOE site as being expected to have the technical capability to treat this waste stream. This site was requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Incineration	Hanford Site	Thermal Treatment Facility Incinerator

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			552
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option (1994) Dollars		10,312

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for organic debris is $2.50 - $6.00 per pound, conservatively assume $6.00 per pound, 0.21 m^3 = 42 kg = 92 lb

7.0 (0.21 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization	Scientific Ecology Group, Inc.	Based on limited available information, appears to be potentially capable of treating this waste stream.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat organic debris toxic organics.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform organic destruction, stabilization in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic debris toxic organics. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction, stabilization of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Organic destruction followed by stabilization	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Cannot treat identified radionuclides.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat organic debris toxic organics.

d. Packaging: Information not received.

e. Treatment Type: Can perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic debris toxic organics.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing organic destruction, stabilization.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Based on limited available information, probably can treat organic debris toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Can only perform stabilization, cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists and operational.

b. Permit Status: Permitted to treat solid phased mixed material.

c. Facility Location: Salt Lake City, UT

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.

Organic destruction followed by stabilization	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Non-Destructive Cleaning, Inc.	Potentially capable of treating this waste stream.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic debris toxic organics.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	NSSI/ Sources and Services, Inc.	Potentially capable of treating this waste stream.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic debris toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Can perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic debris toxic organics.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents. Can perform treatability studies only.

b. Radionuclides: Cannot treat identified radionuclides. Can perform treatability studies only.

c. Waste Form: Can treat organic debris toxic organics.

d. Packaging: N/A, facility would develop mobile unit.

e. Treatment Type: Cannot perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Not existing.

b. Permit Status: Permitted to perform treatability studies only.

c. Facility Location: Knoxville, TN

3) Other Facility will develop a system and bring the system on-site.

Organic destruction followed by stabilization	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic debris toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction, stabilization.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (0.21 cubic on hand, no projected five year projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000000050

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., organic destruction followed by stabilization) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence

that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$4,119,200
On-site Mobile Treatment Unit	$ 678,400
Off-site DOE Facility	$ 10,312
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is

anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at Savannah River CIF Incinerator-Solid Feed System.

Savannah River has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Savannah River CIF Incinerator-Solid Feed System was selected as the preferred option from among technically capable DOE facilities based on facility status and location.

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TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W003

Waste Stream ID#: BETTIS #0000000051

Waste Stream Name: Oil Containing Heavy Metals #2

Waste Stream Description: Lubricating and hydraulic oils and sludges from equipment decommissioning.

Treatability Group: MLLW CH, organic sludges/particulates, toxic metals w/o mercury

Radionuclides: U^{234}, U^{235}, Th^{231}, Th^{234}, $Th^{Nat.}$, U^{238}

EPA Waste Code(s): D005, D006, D008, D011

Current Inventory: 0.0 cubic meters

Five Year Projection: 0.21 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization of this waste stream was based on sampling/analysis (barium 306 ppm, cadmium 31 ppm, lead 493 ppm, and silver <12 ppm). Specific concentrations may vary. This waste stream is sufficiently characterized to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable : Organic destruction followed by stabilization of residue is the treatment required to meet LDR standards for barium, cadmium, lead and silver.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatment

(1) Treatment at a New On-Site Facility: Treatment of this waste stream in a permitted on-site facility would consist of organic destruction (incineration) followed by cement based stabilization/ solidification.

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited BETTIS experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on BETTIS experience.)	200,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to build new work facility and procure equipment (e.g., shredder) - based on extensive BETTIS facility construction experience)	2,000,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		2,200,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat projected volume of 0.21 M^3 based on estimated 0.2 M^3/shift, 6 mandays/shift, one shift training also included.)	6,300	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials	12,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	32,300	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		32,300
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		3,232,300

Note Years of Operation: 1 year used to facilitate comparison of all options based on 1 year projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform organic destruction followed by stabilization was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited BETTIS experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. BETTIS share of design cost.)	10,700	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive BETTIS facility construction experience. BETTIS share of construction cost, including cost to incorporate equipment in mobile platform.)	57,000	
	2.5	Equipment (BETTIS share of cost, assumes system would be shared by 10 NNPP sites)	50,700	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		118,400
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat projected volume of 0.21 M^3 based on 0.2 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	6,300	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	12,000	
	3.4	Annual Maintenance (BETTIS share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	26,300	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		26,300
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (BETTIS share of cost)	10,700	
	4.2	Closure, Post-Closure, Monitoring (BETTIS share of cost)	16,100	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		26,800
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		671,500

Note: Years of Operation: 1 year used to facilitate comparison of all options based on 1 year projected waste generation although facility design life of 20 years is expected..

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section (2) above, facilities that perform organic destruction followed by stabilization were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

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Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF)(0324)	Based on available information, this facility appears to be technically capable of treating this waste stream.	Facility is planned, but currently on hold. This facility is not likely to be a prime candidate to treat this waste stream due to distance from generator and facility status.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: None provided at this time; probably not limiting.

c. Waste Form: Facility accepts identified waste matrix codes for organic sludges/particulates.

d. Packaging: Waste packaging acceptable to sizing unit which directly feed the incinerator.

e. Treatment Type: Incinerator for liquids and solids via rotary kiln type which directly feeds stabilization unit; thermal desorption not otherwise specified.

f. Capacity: Capacity has not been determined.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/07.

b. Permit Status: None

c. Facility Location: Out of state, out of region

3) Other Project on hold pending studies of alternate site treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	WERF Incinerator (0251)	Based on available information, this facility does not appear to be technically capable of treating this waste stream based on radionuclides present.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Facility does not currently accept all identified radionuclides (Th-231, 234).

c. Waste Form: Facility accepts waste matrix codes for organic sludges/particulates.

d. Packaging: N/A; facility provides repackaging as needed for liquid and solid waste to be fed in to incinerator.

e. Treatment Type: Organic destruction by incineration via dual chamber controlled-air type which discharges to stabilization unit.

f. Capacity: Normal capacity is 75,636 kg/yr; due to small volume of this waste stream this criteria is not limiting.

2) Non-technical

a. Facility Status: Constructed; not in use; plan to use to treat mixed waste; estimated start date 4/96.

b. Permit Status: RCRA (interim); RCRA Part B (applied).

c. Facility Location: Out of state, out of region

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (calcination pretreatment)	Idaho National Engineering Laboratory	New Waste Calcining Facility (0240)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable radionuclides and waste form.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Facility does not currently accept all identified radionuclides (U).

c. Waste Form: Facility does not accept the waste form of this waste stream.

d. Packaging: N/A; wastes transferred/blended in tanks by facility prior to calcination.

e. Treatment Type: Organic destruction of liquid waste by calcination which results in conversion to solid granular form, which is withdrawn and placed in long-term storage bins.

f. Capacity: Not available at this time; probably not limiting based on small volume of waste stream.

2) Non-technical

a. Facility Status: Operating; now treating mixed waste.

b. Permit Status: RCRA final (submitted); RCRA interim (approved); NESHAPS permit approved; PSD pending submittal.

c. Facility Location: Out of state, out of region

3) Other Calcination does not meet definition of treatment as defined as a process, system, or technology that is designed to destroy, remove, or immobilize the hazardous component of a waste so that it meets land disposal restrictions (LDR) treatment standards.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Los Alamos National Laboratory	Solid Feed System (0309)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable hazardous constituent and waste form.	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA codes (D005, D006, D008, D011).

b. Radionuclides: Facility accepts all identified radionuclides.

c. Waste Form: Facility does not accept waste form of this waste stream.

d. Packaging: Facility accepts solid waste in 1' x 1' x 2' cardboard boxes to be fed into incinerator.

e. Treatment Type: Organic destruction via incineration.

f. Capacity: Normal capacity is 82,000 kg/yr; should not be limiting based on small waste volume.

2) Non-technical

a. Facility Status: Constructed; not in use; plan to use to treat mixed waste; estimated start date 9/95.

b. Permit Status: RCRA B final and TSCA final for hazardous waste; RCRA Part B prohibits treatment of off-site waste. RCRA Part A for treating mixed waste has been submitted; Part B for mixed waste to be submitted.

c. Facility Location: Out of state, out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Savannah River Site	CIF Incinerator-Solid Feed System (0142)	Based on available information, this facility appears to be technically capable of treating this waste stream. Repackaging would be required.	Potential primary candidate based on estimated start date. Permit restriction on off-site waste would have to be revised.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Unknown at this time; not expected to be limiting.

c. Waste Form: Facility accepts non-halogenated organic sludges.

d. Packaging: Facility accepts waste in 21' square cardboard box weighing between 5 and 75 lbs. Repackaging would be required.

e. Treatment Type: Organic destruction by incineration via rotary kiln type followed by secondary combustion chamber, air pollution control system, and ashcrete stabilization area.

f. Capacity: Normal capacity is 3,000,000 kg/yr; should not be limiting due to small waste volume.

2) Non-technical

a. Facility Status: Under construction; estimated start date 02/96.

b. Permit Status: RCRA final; Air Quality Control final; NESHAP final; current state permit does not allow CIF to process off-site waste.

c. Facility Location: Out of state; in region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Idaho National Engineering Laboratory	(IWPF) Thermal Destruction Facility (0334)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable hazardous constituents and waste form.	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA codes (D005, D006, D008, D011).

b. Radionuclides: Unknown at this time; probably not limiting.

c. Waste Form: Facility does not accept waste form of this waste stream.

d. Packaging: N/A; waste unpackaged, sorted, and sized by facility prior to incineration.

e. Treatment Type: Thermal desorption by heating and driving off organic materials from organic debris to secondary combustion chamber, where they are destroyed then sent for stabilization.

f. Capacity: Capacity unknown at this time; should not be limiting due to small waste volume.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/07.

b. Permit Status: None.

c. Facility Location: Out of state, out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Rocky Flats Plant	Solvent Contaminated Waste System (0340)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable radionuclides and waste form.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Facility does not accept all identified radionuclides (Th, U^{234}, U^{235}).

c. Waste Form: Facility does not accept waste form of this waste stream.

d. Packaging: N/A; unpacking of received wastes done by another system.

e. Treatment Type: Organic destruction by one of three technologies: fluidized bed unit, controlled air incineration, and plasma arc furnace. Also includes a immobilization component.

f. Capacity: Capacity is yet to be determine; should not be limiting due to small waste volume.

2) Non-technical

a. Facility Status: Planned; estimated start date 12/05.

b. Permit Status: None

c. Facility Location: Out of state, out of region.

3) Other System 1A of CTMP.

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts with Facilities			
Incineration	Savannah River Site	CIF Incinerator - Solid Feed System	Technically capable, under construction; 2/96 estimated start date. Permit restriction on off-site waste would need to be resolved.
Facility contact: Savannah River Site has identified that this facility will not be technically capable of treating this waste stream because of incompatibly waste matrix.			
Incineration	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility	Technically capable, facility planned but on hold currently.
Facility contact: Idaho National Engineering Laboratory has identified that this facility will not be technically capable of treating this waste stream because this facility has been identified as a "low confidence" facility that is not likely to be built.			

In addition to the facilities included in the above evaluation, the following DOE facilities were identified by the DOE site as being expected to have the technical capability to treat this waste stream. These sites were requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Incineration	Savannah River Site	CIF Incinerator-Liquid Feed System
Incineration	Hanford Site	Thermal Treatment Facility Incinerator
Incineration	Idaho National Engineering Laboratory	WERF Incinerator

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			2,541
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars	12,301

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for organic sludges/particulates is $2.50 - $5.50 per pound, conservatively assume $5.50 per pound, 0.21 m^3 = 210 kg = 462 lb

7.0 (0.21 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization	Scientific Ecology Group, Inc.	Based on limited available information, appears to be potentially capable of treating this waste stream.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform organic destruction or stabilization in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates or toxic metals without mercury. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction or stabilization of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Organic destruction followed by stabilization	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates and toxic metals without mercury.

d. Packaging: Information not received.

e. Treatment Type: Can perform organic destruction and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing organic destruction.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Based on limited available information, probably cannot treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can only perform stabilization, cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists and operational.

b. Permit Status: Permitted to treat solid phased mixed material.

c. Facility Location: Salt Lake City, UT

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.

Organic destruction followed by stabilization	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Non-Destructive Cleaning, Inc.	Based on available information, does not appear to be capable of treating this waste stream. Cannot treat identified constituents.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates and toxic metals without mercury.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform organic destruction and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	NSSI/ Sources and Services, Inc.	Potentially capable of treating this waste stream.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates and toxic metals without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can perform organic destruction and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents. Can perform treatability studies only.

b. Radionuclides: Cannot treat identified radionuclides. Can perform treatability studies only.

c. Waste Form: Can treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: N/A, facility would develop mobile unit.

e. Treatment Type: Cannot perform organic destruction or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Not existing.

b. Permit Status: Permitted to perform treatability studies only.

c. Facility Location: Knoxville, TN

3) Other Facility will develop a system and bring the system on-site.

Organic destruction followed by stabilization	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream.. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction or stabilization.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (0.0 cubic meters on hand, 0.21 cubic meters one year projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000000051

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., organic destruction followed by stabilization) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$3,232,300
On-site Mobile Treatment Unit	$ 671,500
Off-site DOE Facility	$ 12,301
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these

costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at the Savannah River Site CIF Liquid-Feed System.

Savannah River has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Savannah River Site CIF Liquid-Feed System was selected as the preferred option from among technically capable DOE facilities based on facility status and location.

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TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W005

Waste Stream ID#: BETTIS #0000000390

Waste Stream Name: Lead And Chromium Based Paint Chips

Waste Stream Description: Paint chips from decontaminating radiological facilities and equipment.

Treatability Group: MLLW CH, inorganic sludges/particulates, toxic metals w/o mercury

Radionuclides: Th^{nat}, Sb^{126}, Sb^{126m}, Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, U^{234}, U^{235}, U^{238}, C^{14}, I^{129}, Tc^{99}, H^{3}, Kr^{85}, Pu^{241}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Sn^{121m}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{59}, Ni^{63}, Eu^{152}, Eu^{154}

EPA Waste Code(s): D007, D008

Current Inventory: 0.1 cubic meters

Five Year Projection: 0.0 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization is based on process knowledge from an EP toxicity test performed on a surrogate sample. This waste stream is sufficiently characterized to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable : Stabilization is the concentration based LDR treatment required for lead and chromium. In addition, chemical reduction to reduce hexavalent chromium to trivalent chromium is required prior to stabilization if chromium is present.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is amenable to RCRA simple treatment in the accumulation container and is identified in the on-site treatment option evaluation.. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

RCRA simple treatment consist of chemical reduction (addition of water and reducing chemicals (e.g., Ferrous salts) if hexavalent chromium is present) followed by cement based stabilization/solidification.

RCRA SIMPLE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting (Permitting not required for RCRA simple treatment, although notification may be necessary.)		
		1.3.4 Preparation for Operations	0	
		1.3.5 Project Management	0	
		TOTAL PRE-OPERATIONS		0
2.0	Facility Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	5,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to incorporate required work area into existing radiological work facilities and procure equipment - based on extensive Bettis facility construction experience)	50,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 and 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COST		55,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume (0.1 M^3) based on estimated 0.2 M^3/shift, 6 mandays/shift, one shift training also included.)	17,000	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials	12,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	43,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YRS	
		TOTAL O&M COSTS		43,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	10,000	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		10,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation		0	
		TOTAL COSTS (1994) Dollars		108,000

Note Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatments

(1) Treatment at a New On-Site Facility: Treatment of this waste stream in a permitted on-site facility would consist of cement based stabilization/ solidification in the accumulation container. If chromium is present, chemical reduction (addition of water and reducing chemicals (e.g., ferrous salts)) would be performed prior to solidification.

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(chemical reduction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	250,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		250,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	5,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to incorporate required work area into existing radiological work facilities and procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	50,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		55,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume (0.1 M^3) based on estimated 0.1 M^3/shift, 6 mandays/shift, one shift training also included.)	17,000	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials	12,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	43,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		43,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	20,000	
	4.2	Closure, Post-Closure, Monitoring	30,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		50,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		398,000

Note Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform chemical reduction followed by stabilization was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(chemical reduction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	250,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		250,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	5,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	27,000	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	23,400	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		55,400
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume of 0.1 M^3 based on 0.1 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	17,000	
	3.2	Annual Utilities	1,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	6,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	30,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		30,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	5,100	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	7,600	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		12,700
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		348,100

Note: Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section (2) above, facilities that perform chemical reduction followed by stabilization or stabilization were both identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Idaho National Engineering Laboratory	Waste Generator Treatment Plant (0244)	Not evaluated, this facility has been removed from the MWIR treatment data due to limitations in treatment capacity.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility has been removed from MWIR database.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Idaho National Engineering Laboratory	(IWPF) Stabilization System (0336)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because the system does not accept this waste form.	

1) Technical

a. Hazardous Constituent: Accepts the identified EPA waste codes (D007 , D008) for this waste stream.

b. Radionuclides: Unknown at this time.

c. Waste Form: Does not apparently accept the waste matrix code for this waste stream (3100/3131) paint.

d. Packaging: None listed.

e. Treatment Type: Stabilization process will physically and chemically stabilize the radiological and hazardous components of process waste. Selection of stabilization technologies are final at this date; stabilization of solids received directly from IWPF incinerator.

f. Capacity: Not known; should not be limiting due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Planned; estimated start date 1/07.

b. Permit Status: None listed.

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF) (0324)	Facility Deleted from MWIR database. It will not be constructed.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Idaho National Engineering Laboratory	WERF Waste Stabilization Unit (0252)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because it does not accept waste streams except from the incinerator, does not accept this waste form or packaging.	

1) Technical

a. Hazardous Constituent: Accepts identified EPA waste codes (D007, D008); Cr and Pb.

b. Radionuclides: Identified waste stream radionuclides are allowed by this system.

c. Waste Form: Does not accept listed waste form (3131); accepts only waste matrix 3111 (ash).

d. Packaging: Not listed since system accepts only ash, which precludes utilization by site's waste stream.

e. Treatment Type: Stabilization of incinerator ash via cement solidification in 55 gal. drums. No Cr reduction; no independent acceptance of waste except from incinerator.

f. Capacity: Capacity calculated to be 47,273 kg/yr. Due to the small volume of this waste stream, this should not be a limiting criterion.

2) Non-technical

a. Facility Status: Constructed; not currently in use but is operational; plan to use and treat mixed waste; plan start date 8/94.

b. Permit Status: Interim RCRA.

c. Facility Location: Out of state; out or region.

3) Other

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Idaho National Engineering Laboratory	Waste Characterization Facility (0259)	Based on available information, facility does not appear to be technically capable of treating this waste stream because the system does not accept the identified radionuclides. Primary system mission is characterization of TRU waste.	

1) Technical

a. Hazardous Constituent: Accepts identified EPA waste codes (D007 & D008); TCLP toxic for Cr and Pb.

b. Radionuclides: Facility system does not accept identified radionuclides constituents for this waste stream (Co^{60}).

c. Waste Form: System does not accept identified waste stream matrix code 3100/3131; facility not unusable for this waste stream.

d. Packaging: Accepts 100 gal. drums; waste stream is packaged in 55 gal. drums.

e. Treatment Type: Limited stabilization performed as adjunct support to the primary mission of examination/characterization of TRU waste.

f. Capacity: Unknown; limited stabilization will be performed based on results of laboratory analysis.

2) Non-technical

a. Facility Status: Planned, start date 12/97.

b. Permit Status: RCRA interim/ PSD/PTC application submitted.

c. Facility Location: Out of state; out of region.

3) Other System being developed to open, examine and characterize stored TRU waste.

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Idaho National Engineering Laboratory	Stabilization Unit (WEDF) (0322)	Based on available information, this facility appears to be technically capable of treating this waste stream.	This planned facility is not an optimal candidate due to the distance waste would have to be shipped.

1) Technical

a. Hazardous Constituent: Accepts identified EPA waste codes (D007 , D008) for this waste stream; Cr and Pb.

b. Radionuclides: Undetermined at this time. Not expected to be limiting.

c. Waste Form: System accepts the generalized waste matrix code for this waste stream.

d. Packaging: None listed; accepts waste from WEDF sizing unit.

e. Treatment Type: Facility will use sulfur polymer solidification and portland cement stabilization to treat wastes; no Cr reduction listed.

f. Capacity: 80,000 kg/yr normal capacity; part A permit identified\s a limit of 2000 gal/day or 2500 tons/yr. Due to the small volume of this waste stream, this would not be a limiting criterion.

2) Non-technical

a. Facility Status: Planned; plans to treat mixed waste; estimated start date 10/97.

b. Permit Status: Interim RCRA.

c. Facility Location: Out of state; out of region.

3) Other This facility accepts waste from the WEDF units which (if necessary) opens containers and samples wastes; sorts and sends waste to appropriate system. Sizing performed as necessary. WEDF sizing unit specifically accepts this waste stream waste matrix code (3131) and EPA waste code.

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Savannah River Site	CIF Ashcrete (0143)	Based on available information, this facility does not appear to be technically capable of treating this waste stream as it does not accept one of the hazardous constituents, the particular waste form or the packaging.	

1) Technical

a. Hazardous Constituent: Does not accept EPA waste code (D008 , Pb) one of the identified EPA waste codes for this waste stream. This is a limiting factor.

b. Radionuclides: Unknown at this time.

c. Waste Form: Accepts only ash, waste matrix 3111. Waste stream waste matrix (3131) not accepted.

d. Packaging: N/A; accepts only ash from CIF incinerator.

e. Treatment Type: Cement added to drums of ash received from CIF incinerator.

f. Capacity:

2) Non-technical

a. Facility Status: Under construction; start date 02/96.

b. Permit Status: RCRA; state permit prohibits from accepting off-site waste.

c. Facility Location: Out of state; in region.

3) Other This system is part of facility permitted as a single entity.

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Savannah River Site	Stabilization/ Solidification Unit (0148)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because system will not accept this waste form.	

1) Technical

a. Hazardous Constituent: Undetermined at this time.

b. Radionuclides: Undetermined at this time.

c. Waste Form: Facility waste matrix code acceptance list contains only code 4100 (soils), this would disqualify this system from use as waste stream has waste matrix code 3131.

d. Packaging: Not known at this time.

e. Treatment Type: Use of cementation material to create monolithic mass; not others\wise specified.

f. Capacity: Undetermined.

2) Non-technical

a. Facility Status: Planned; no date; all project activities are on hold pending further analysis to support site treatment plan.

b. Permit Status: None.

c. Facility Location: Out of state, in region.

3) Other

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Oak Ridge	MW Treatment Facility-Fixation Stabilization (0219)	This facility was not evaluated because it will not be built as originally planned.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Not to be built as planned.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Hanford Site	WRAP IIA (0326)	Based on available information, facility appears to be technically capable of treating this waste stream.	This system presently not a good candidate. It is a distant location from the generator.

1) Technical

a. Hazardous Constituent: Identified EPA waste codes (D007, D008); Cr and Pb accepted by this facility.

b. Radionuclides: To be decided at a later date

c. Waste Form: Waste form codes accepted at this facility include 3100 which includes this waste stream code.

d. Packaging: This facility accepts 55 gal. drums, packaging for this waste stream.

e. Treatment Type: Treatment will consist of stabilization and solidification by grout and polymer. No Cr reduction capability listed; this would preclude utilization of this facility to treat this waste stream if Cr is present.

f. Capacity: Information was not compiled at time of MWIR issuance and therefore not available.

2) Non-technical

a. Facility Status: Planned; estimated start date not determined.

b. Permit Status: RCRA Part A (interim).

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Sandia National Lab New Mexico	Radioactive and Mixed Waste Management Facility (0213)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because it does not currently accept the hazardous constituents or the waste form.	

1) Technical

a. Hazardous Constituent: Current listing of EPA hazardous constituents accepted by this facility do not list either D007 or D008 which are identified for this waste stream. Facility is to add other EPA codes to their list.

b. Radionuclides: Not all identified waste stream radionuclides are accepted by this facility (Pu, Eu).

c. Waste Form: Waste matrix code for this waste stream not accepted by this facility.

d. Packaging: This facility accepts 55 gal. drums, packaging for this waste stream.

e. Treatment Type: Bench scale solidification, no Cr reduction. Cannot treat this waste stream.

f. Capacity: Not yet determined; facility is primarily a repackaging and characterizing facility, not a treatment facility; capacity for treatment will be very small.

2) Non-technical

a. Facility Status: Under construction; estimated start date 6/95.

b. Permit Status: Interim RCRA; final RCRA applied for.

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (Immobilization)	Pantex Plant	Building 11-15A Building 11-9	Facilities were not evaluated because they are not to be constructed.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Current MWIR states these facilities will not be built.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (Immobilization)	Rocky Flats Plant	Process Waste Treatment Facility, Building 374 (0007)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because system does not accept this waste stream's radionuclide constituent, waste form or perform required treatment.	

1) Technical

a. Hazardous Constituent: Accepts the identified EPA waste codes (D007 , D008) for this waste stream. (TCLP toxic for Cr and Pb.)

b. Radionuclides: Does not accept this waste stream's identified waste stream radionuclides (Co^{60}, Ni, I).

c. Waste Form: Does not accept this waste stream matrix code (3131); accepts only liquid waste codes.

d. Packaging: None listed; liquid waste pipe to treatment site via system of pipe lines collection tanks, valves and receiving tanks. Receives no solid wastes directly which precludes this systems use.

e. Treatment Type: Solidifies solid wastes created from the treatment of mixed waste liquids. This system is used to treat liquids - solidification is an adjunct treatment for any precipitants, sludges, etc. created in the liquid processing system.

f. Capacity: Actual 1992 capacity = 10,407,711 gal; projected 1993 - 10,000,000 gal.

2) Non-technical

a. Facility Status: Operating; treats mixed waste and plans to continue; accept only wastes generated on-site.

b. Permit Status: RCRA; TSCA; NPDES.

c. Facility Location: Out of state; out of region.

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (Immobilization)	Rocky Flats Plant	Halliburton NUS B&C Process Trains	Not evaluated; system has been removed from service.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: MWIR update reports this facility is shut down and in process of being decommissioned.

b. Permit Status:

c. Facility Location:

3) Other Designed to replace the Pondcrete/Saltcrete Reprocessing Facility Building 904 and building 750 pad.

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (Immobilization)	Rocky Flats Plant	Halliburton NUS Remix Process Train	Facility not evaluated; system has been removed from service.	System has been cancelled.

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: MWIR reports system has been removed from service.

b. Permit Status:

c. Facility Location:

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (Immobilization)	Rocky Flats Plant	Building 374/744 Salt and Sludge Treatment (0343)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to not accepting the hazardous constituents or the waste form.	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA waste codes (D007 , D008) for this waste stream.

b. Radionuclides: Radionuclides limitations not yet determined.

c. Waste Form: Accepts only waste matrix code 3150 (solidification process residues); therefore, will not accept this waste stream.

d. Packaging: Not determined at this time.

e. Treatment Type: No final determination has been made; polymer immobilization and cementation are under consideration. No Cr reduction apparently planned.

f. Capacity: Not determined at this time.

2) Non-technical

a. Facility Status: Planned; estimated start date 10/06.

b. Permit Status: No information provided.

c. Facility Location: Out of state; out of region.

3) Other System 4A-CTMP.

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (Immobilization)	Rocky Flats Plant	CTMP3 Miscellaneous Waste Form Treatment (0341)	Based on available information, this facility appears to be technically capable of treating this waste stream. It needs to be verified that Cr reduction can be performed.	Based on status and location this is not the optimal selection.

1) Technical

a. Hazardous Constituent: Facility will accept identified EPA waste codes (D007 , D008) for this waste stream.

b. Radionuclides: Limiting radionuclides and quantities to be determined at a later date.

c. Waste Form: Appears that waste matrix code of this waste stream will be accepted by this facility.

d. Packaging: Information not provided; discussion provided in the MWIR indicates this is not a limiting consideration.

e. Treatment Type: Utilize polymer and cementation immobilization. Cr reduction not listed as a treatment.

f. Capacity: Not yet determined; should not be limiting due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Planned; estimated on-line date 1/05; plans to treat mixed waste.

b. Permit Status: Information not provided.

c. Facility Location: Out of state; out of region.

3) Other: System 3-CTMP.

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (Immobilization)	Rocky Flats Plant	Mixed Residue Treatment (0345)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because it does not provide the required treatment type, does not accept the identified waste matrix code and does not accept the radionuclides constituents.	

1) Technical

a. Hazardous Constituent: Identified EPA waste codes for this waste stream (D007, D008) are accepted.

b. Radionuclides: Facility does not accept waste stream identified radionuclides (Co^{60}); therefore unable to treat this waste stream.

c. Waste Form: Facility does not accept identified waste code matrix (3100/3131).

d. Packaging: Facility will accept waste as packaged in 55 gal. drums.

e. Treatment Type: Does not provide necessary treatment type to process this waste stream.

f. Capacity: To be determined.

2) Non-technical

a. Facility Status: Planned; estimated start date 4/03.

b. Permit Status: No information provided.

c. Facility Location: Out of state; out of region.

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (Immobilization)	Rocky Flats Plant	Solidified Bypass Sludge Treatment (0342)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because it does not accept this waste form.	

1) Technical

a. Hazardous Constituent: Identified EPA waste codes (D007 , D008); TCLP for Cr and Pb to be accepted by this facility.

b. Radionuclides: Limitations for radionuclides acceptance to be determined.

c. Waste Form: Facility does not accept this waste stream waste matrix code (3131); cannot treat this waste stream.

d. Packaging: None listed.

e. Treatment Type: Three immobilization technologies ar being considered; vitrification, polymer solidification and cementation. Cr reduction was not listed as an available treatment.

f. Capacity: To be determined.

2) Non-technical

a. Facility Status: Planned; estimate start date is 11/07.

b. Permit Status: None listed.

c. Facility Location: Out of state/ out of region.

3) Other: System 2 of CTMP.

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (Immobilization)	Rocky Flats Plant	Leaded Gloves and Bulk Lead Treatment (0344)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because the site does not accept the hazardous constituent, the waste form or perform the required treatment.	

1) Technical

a. Hazardous Constituent: Identified EPA waste codes (D007 ., D008); TCLP toxic for Cr and Pb not accepted by this facility; cannot treat this waste stream.

b. Radionuclides: To be determined.

c. Waste Form: Facility does not accept this waste stream matrix code; cannot treat this waste stream.

d. Packaging: Non listed.

e. Treatment Type: Site to perform steam cleaning/stripping and the combination of low temperature desorption and super critical Co^2 extraction for removal of organic contaminants from the surface of solid waste.

f. Capacity: To be determined.

2) Non-technical

a. Facility Status: Planned; estimated on-line date 1/08.

b. Permit Status: No information provided.

c. Facility Location: Out of state; out of region.

3) Other: System 5 of CTMP.

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (solidification)	Hanford Site	Concretion Facility (0536)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because site does not accept the identified hazardous constituents, radionuclides, waste form or packaging.	

1) Technical

a. Hazardous Constituent: Facility does not accept the identified EPA waste codes for this waste stream.

b. Radionuclides: Facility does not accept identified waste stream radionuclide (Co^{60}).

c. Waste Form: Facility accepts only pyrophoric fines waste matrix (6290); does not accept the waste code (3131) of this waste stream.

d. Packaging: Packages used are 30 gal. drums; this waste stream is packaged in 55 gal. drums.

e. Treatment Type: Use masonry cement to encapsulate phyophonic waste from fuel fabrication.

f. Capacity: Information in final form was not complied; assumption test normal capacity expected to $1.1 m^3$/day.

2) Non-technical

a. Facility Status: Constructed; not in use but system is operational.

b. Permit Status:

c. Facility Location:

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (solidification)	Oak Ridge K-25 Site	Sludge Fixation Unit (0521)	System not evaluated since operations have been discontinued.	Closed.

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility operations have been discontinued and system is scheduled for closure.

b. Permit Status:

c. Facility Location:

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (solidification)	Rocky Flats Plant	Pondcrete Solidification Process: Building 788 (0018)	System not evaluated since operations have been discontinued.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility is shut down; deconned and decommissioned.

b. Permit Status:

c. Facility Location:

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (solidification)	Rocky Flats Plant	Pondcrete/ Saltcrete Reprocessing Facility: 750 Pad (0016)	System not evaluated since operations have been shut down.	
		Pondcrete/ Saltcrete Reprocessing Facility: 904 Pad (0117)		

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: No longer available; removed from service deconned and decommissioned.

b. Permit Status:

c. Facility Location:

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (solidification)	Lawrence Livermore National Laboratory	Solidification Facility Building 513 (0228)	Based on available information, this facility does not appear to be technically capable of treating this waste stream since it does not accept the identified hazardous constituent or waste form.	

1) Technical

a. Hazardous Constituent: Site does not accept identified EPA codes for this waste stream (D007 , D008).

b. Radionuclides: Information not provided.

c. Waste Form: Does not accept identified waste matrix code for this waste stream.

d. Packaging: Accepts 55 gal. drums.

e. Treatment Type: Solidification by means not specified or described.

f. Capacity: Reported capacity of $7m^3$/day; not limiting due to the small volume of this waste stream.

2) Non-technical

a. Facility Status: Operating, now treating mixed waste.

b. Permit Status: RCRA A & B.

c. Facility Location: Out of state; out of region.

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (vitrification)	Mound Facility	Mound Glass Melter (0261)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because the site does not accept hazardous constituents, the identified radionuclides or this waste form.	

1) Technical

a. Hazardous Constituent: Site does not accept identified EPA codes (D007 , D008).

b. Radionuclides: Site does not accept identified radionuclides (Co^{60}) for this waste stream. Cannot treat.

c. Waste Form: Current plans to treat liquid waste only; does not accept identified waste stream waste matrix code. Cannot treat this waste stream.

d. Packaging: Waste stream packaging in 55 gal. drums is acceptable.

e. Treatment Type: Facility performs thermal organic destruction followed by vitrification; designed as a treatment for glass surface; ash and metal are incorporated into the glass which is drained.

f. Capacity: Solid or liquid capacity is 48,000 kg/yr. Not limiting due to the small volume of this waste stream.

2) Non-technical

a. Facility Status: Constructed; not operational; plan to use and treat mixed waste.

b. Permit Status: RCRA (interim).

c. Facility Location: Out of state; in region.

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (vitrification)	Hanford Site	Hanford Waste Vitrification Plant (0126)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because the site does not accept this waste form waste matrix code.	

1) Technical

a. Hazardous Constituent: Site accepts identified EPA codes for this waste stream (D007 , D008).

b. Radionuclides: Site accepts identified radionuclides (Co^{60}) for this waste stream.

c. Waste Form: Site does not accept identified waste stream waste matrix code (3131); accepts only waste liquid and slurries.

d. Packaging: None listed; accepts liquid from on-site tanks.

e. Treatment Type: Plans to treat high activity tank waste by fixing in borosiliate glass.

f. Capacity: Information not compiled.

2) Non-technical

a. Facility Status: Other: Construction design delayed for rescoping.

b. Permit Status: RCRA Part A (interim); RCRA construction (Part B).

c. Facility Location: Out of state; out of region.

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (vitrification)	Savannah River Site	M-Area Vendor Treatment (0150)	Based on available information, this facility does not appear to be technically capable of treating this waste stream since site does not accept this waste stream radionuclides' constituent	

1) Technical

a. Hazardous Constituent: Site accepts identified EPA codes for this waste stream (D007 , D008).

b. Radionuclides: Site does not accept identified radionuclides (Co^{60}) for this waste stream. Cannot treat.

c. Waste Form: Site apparently accepts this waste matrix code; site accepts waste code (3100) which is general code under which this waste code is found (3131).

d. Packaging: Accepts 55 gal. drums; this waste stream is packaged in 55 gal. drums.

e. Treatment Type: Cr reduction not listed as an available pretreatment; hazardous metal immobilization by vitrification; specific mode not yet determined.

f. Capacity: Not determined but is designed to treat entire on-site inventory of waste in 12-20 months.

2) Non-technical

a. Facility Status: Planned; estimated start date 10/95.

b. Permit Status: NPDES-construction.

c. Facility Location: Out of state; in region.

3) Other:

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (vitrification)	Idaho National Engineering Laboratory	Idaho Waste Immobilization Facility (0260)	Based on available information, this facility does not appear to be technically capable of treating this waste stream since the site will not accept this waste form, but only calcined solids from the waste calcining facility.	

1) Technical

a. Hazardous Constituent: Site accepts identified EPA codes for this waste stream (D007 , D008).

b. Radionuclides: Unknown at this time.

c. Waste Form: Site accepts only waste matrix code 3116, calcined solids; apparently does not accept and cannot treat this waste stream waste code (3131).

d. Packaging: Unknown at this time.

e. Treatment Type: Immobilization not otherwise described; no pretreatment steps listed.

f. Capacity: Unknown at this time.

2) Non-technical

a. Facility Status: Planned; start date under time.

b. Permit Status: None listed.

c. Facility Location: Out of state; out of region.

3) Other: To be built to support the waste calcining facility.

Treatment Type	Site	System Name	Results of Technical Evaluation	Results of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (vitrification)	Los Alamos National Laboratory	Waste Immobilization Facility (0510)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because it does not accept this waste form.	

1) Technical

a. Hazardous Constituent: Information not available; limited information implies that identified EPA waste codes will be accepted by this facility.

b. Radionuclides: Information not available.

c. Waste Form: This waste form will apparently not be accepted at this facility, this site will accept ash from incinerator.

d. Packaging: Unknown.

e. Treatment Type: Vitrification of ash.

f. Capacity: Unknown.

2) Non-technical

a. Facility Status: Planned.

b. Permit Status: Unknown.

c. Facility Location: Out of state; out of region.

3) Other: Not listed in National MWIR database.

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts with Facilities			
Stabilization	Idaho National Engineering Laboratory	(WEDF) Stabilization Unit	Technically capable. Undergoing upgrades.
Facility contact: Idaho National Engineering Laboratory was not contacted regarding treatment of this waste stream.			
Stabilization	Hanford Site	WRAP IIA	Technically capable, however, due to location and distant potential start date, this facility is not a good candidate for this waste stream.
Facility contact: Hanford Site was not contacted regarding treatment of this waste stream.			
Stabilization	Rocky Flats Plant	CTMP-3 Miscellaneous Waste Form Treatment	Technically capable; needs to be verified that Cr reduction can be performed
Facility Contact: Rocky Flats was not contacted regarding treatment of this waste stream.			

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			808
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars	10, 568

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for inorganic sludges/particulates is $3.50 - $8.50 per pound, conservatively assume $8.50 per pound, 0.1 m^3 = 43 kg = 95 lb

7.0 (0.1 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Stabilization	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Stabilization	Scientific Ecology Group, Inc.	Based on limited available information, appear to be potentially capable of treating this waste stream.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat inorganic sludges/particulates, toxic metals without mercury.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform stabilization in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Stabilization	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat inorganic sludges/particulates, toxic metals without mercury. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform stabilization of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Stabilization	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Stabilization	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Cannot treat identified radionuclides.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat inorganic sludges/particulates, toxic metals without mercury.

d. Packaging: Information not received.

e. Treatment Type: Can perform stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Stabilization	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat inorganic sludges/particulates, toxic metals without mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Stabilization	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Cannot treat identified radionuclides.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Based on limited available information, probably can treat inorganic sludges/particulates, toxic metals without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can perform stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists and operational.

b. Permit Status: Permitted to treat solid phased mixed material.

c. Facility Location: Salt Lake City, UT

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.

Stabilization	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Stabilization	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Stabilization	Non-Destructive Cleaning, Inc.	Not capable of treating this waste stream. Cannot treat hazardous constituents	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Can treat inorganic sludges/particulates, toxic metals without mercury.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Stabilization	NSSI/ Recovery Services, Inc.	Potentially capable of treating this waste stream.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat inorganic sludges/particulates, toxic metals without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can perform stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Stabilization	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat inorganic sludges/particulates, toxic metals without mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Stabilization	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Cannot treat inorganic sludges/particulates, toxic metals without mercury.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform stabilization.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on site.	
Stabilization	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Stabilization	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Can treat inorganic sludges/particulates, toxic metals without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can perform stabilization.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (0.1 cubic meters on hand, no projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., on-site RCRA simple treatment, treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000000390

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE SIMPLE TREATMENT	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	HIGH	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	HIGH	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	MIDDLE	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A	N/A

Treatment Effectiveness: All five treatment options are ranked the same in the treatment effectiveness categories since the same treatment technologies (i.e., stabilization or chemical reduction followed by stabilization) are utilized for each option. These are standard, robust technologies which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The simple treatment, on-site facility, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability"

categories based on high confidence that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. Four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements. The on-site simple treatment option is ranked "high" because it could be put on line in a relatively short time.

Environment, Health and Safety: All five treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site permitted facility and on-site mobile options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors. The on-site simple treatment option could be accomplished with any effort and thus is ranked "high".

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

RCRA Simple Treatment	$ 108,000
New On-site Fixed Facility	$ 398,000
On-site Mobile Treatment Unit	$ 348,100
Off-site DOE Facility	$ 10,568
Off-Site Commercial	Not Available

The high costs associated with the on-site permitted facility and mobile options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is on-site RCRA simple treatment.

Comparison of the treatment options indicated that the most significant discriminator was life-cycle cost with both off-site DOE treatment and on-site simple treatment ranking favorably. RCRA on-site simple treatment is considered the best overall alternative for this small volume waste stream because the life-cycle costs are not prohibitive and this treatment option is consistent with the state's preference to perform on-site treatment where practical.

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TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W007

Waste Stream ID#: BETTIS 0000000839

Waste Stream Name: Solids With Solvents

Waste Stream Description: Solid waste such as charcoal and rags with organic solvents.

Treatability Group: MLLW CH, combustible debris, toxic organics

Radionuclides: Fe^{55}, Co^{60}, Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Ni^{63}, C^{14}, I^{129}, Tc^{99}, H^{3}, Cs^{134}, Pm^{147}, Kr^{85}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Sn^{121m}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242},Ni^{59}, Eu^{152}, Eu^{154}, Te^{125m}, Sb^{125}

EPA Waste Code(s): F001, F003

Current Inventory: 0.42 cubic meters

Five Year Projection: 0.0 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization is based on process knowledge. Characterization is sufficient to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable : Organic destruction followed by stabilization of residue is the treatment required to meet LDR standards for this toxic organic waste stream.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatments

(1) Treatment at a New On-Site Facility: Treatment of this waste stream in a permitted on-site facility would consist of organic destruction (incineration) followed by cement based stabilization/solidification.

The facility design, construction, and permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	200,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to build new work facility and procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	2,000,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		2,200,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume (0.42 M^3) based on estimated 0.2 M^3/shift, 6 mandays/shift, one shift training also included.)	12,600	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials	12,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	38,600	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		38,600
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		3,238,600

Note Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform organic destruction followed by stabilization was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	10,700	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	57,000	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	50,700	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		118,400
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume of 0.42 M^3 based on 0.2 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	12,600	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	12,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	32,600	
		X NUMBER OF YEARS OF OPERATION	x 1 YRS	TOTAL
OPERATIONS AND MAINTENANCE COSTS				32,600
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	10,700	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	16,00	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		26,800
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		677,800

Note: Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section (2) above, facilities that perform organic destruction followed by stabilization were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	WERF Incinerator (0251)	Based on available information, this facility appears to be technically capable of treating this mixed waste stream.	Although this facility is out of state, it is a good candidate for treating this waste stream since it is next nearest site and has been constructed.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes (F001 & F003) for this waste stream.

b. Radionuclides: Facility accepts identified radionuclides for this waste stream; activity levels in the waste are less than waste acceptance criteria limits.

c. Waste Form: Facility accepts waste matrix codes for this waste stream.

d. Packaging: Repackaging required; site can conduct repackaging at WERF facility. This criteria is not limiting.

e. Treatment Type: Organic destruction via rotary kiln incinerator; follow on ash stabilization conducted at WERF stabilization unit. This satisfies all treatment requirements.

f. Capacity: 75,600 kg/yr based on INEL CSTP; due to small volume of waste stream this criteria should not be limiting.

2) Non-technical

a. Facility Status: Constructed; not currently in use; plan to use to treat mixed waste; estimate start date 4/96.

b. Permit Status: RCRA Interim & Part B

c. Facility Location: Out of state; out of region.

3) Other:

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Los Alamos National Laboratory	CAI Solid Feed System (0309)	Based on available information, this facility appears to be technically capable of treating this waste stream. Use of this facility would require repackaging of waste into DOT 7A boxes.	Not likely to be a primary candidate based on location and because waste would require repackaging.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes (F001 & F003) for this waste stream.

b. Radionuclides: Facility accepts identified radionuclides for this waste stream; no information provided on acceptance levels. Due to low levels in this waste stream this should not be limiting.

c. Waste Form: Facility accepts identified waste matrix codes.

d. Packaging: Repackaging required; waste received in DOT 7A boxes containing cardboard boxes. This requirement would necessitate repackaging this waste stream.

e. Treatment Type: Organic destruction via incineration; technology for stabilization of ash has not been determined.

2) Non-technical

a. Facility Status: Constructed; not operational; estimated start date 9/95

b. Permit Status: RCRA B; TSCA for hazardous waste; RCRA Part A for MW submitted; current RCRA prohibits accepting off-site waste.

c. Facility Location: Out of state; in region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Oak Ridge K-25 Site	K-25 Site TSCA Incinerator (0305)	Based on available information, this facility does not appear to be technically capable of treating this mixed waste stream because it does not accept all of the radionuclides identified with this waste stream.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes (F001 & F003) for this waste stream.

b. Radionuclides: Facility does not accept all radionuclides identified in this waste stream; more nuclides are under consideration to be added to facility waste acceptance criteria.

c. Waste Form: Facility accepts waste matrix codes for this waste stream.

d. Packaging: Facility accepts 55 gal drums in which this waste stream is packaged.

e. Treatment Type: Organic destruction via incineration; technology for stabilization of ash has not been determined.

f. Capacity: 1860 m^3/yr (1.86E6kg/yr); not limiting due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Operating; treats mixed waste.

b. Permit Status: RCRA; TSCA; off-site waste acceptance limited to certain sites.

c. Facility Location: Out of state; in region.

3) Other:

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Savannah River Site	CIF Incinerator-Solid Feed System (0142)	Based on available information, this facility appears to be technically capable of treating this waste stream. Use of this facility would require repackaging.	Not likely to be a primary candidate based on location and because repackaging would be required. Permit currently prohibits off-site waste.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes for this waste stream.

b. Radionuclides: Unknown at this time, not expected to be limiting.

c. Waste Form: Facility accepts waste matrix codes for this waste stream.

d. Packaging: Repackaging of waste would be required to 2'x2' boxes.

e. Treatment Type: Organic destruction via incineration; stabilization of ash conducted by CIF Ashcrete Facility. This satisfies all treatment requirements.

f. Capacity: 3.0E6 kg/yr, there is excess capacity.

2) Non-technical

a. Facility Status: Under construction; estimated start date 2/96.

b. Permit Status: RCRA; state permit prohibits accepting off-site waste.

c. Facility Location: Out of state; in region.

3) Other:

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Oak Ridge Y-12 Plant	MW Treatment Facility Incineration(0527)	Facility not evaluated because it will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility is not to be built.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF)(0324)	Facility deleted from MWIR database. It will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other:

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Idaho National Engineering Laboratory	(IWPF) Thermal Destruction System (0334)	Based on available information, this facility does not appear to be technically capable of treating this mixed waste stream because it does not accept the waste form.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes (F001 & F003) for this waste stream.

b. Radionuclides: Unknown at this time.

c. Waste Form: This unit of IWPF accepts only non combustible debris.

d. Packaging: None listed: waste received at central point.

e. Treatment Type: Removal of organic contaminants via heating, subsequent incineration of combustible materials and stabilization of ash. Treatments satisfies requirements for this waste stream.

f. Capacity: To be determined; should not be limiting criterion due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/07.

b. Permit Status: No information provided.

c. Facility Location: Out of state; out of region.

3) Other

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts with Facilities			
Incineration	Savannah River Site	CIF Incinerator-Solid Feed System	Technically capable of treating, although located out of region; repackaging would be required and permit currently prohibits accepting off-site waste.
Facility contact: Savannah River Site has confirmed this facility is expected to be technically capable of treating this waste stream.			
Incineration	Idaho National Engineering Laboratory	WERF Incinerator	Nearest facility to generator that has capability to treat this waste stream and based upon near term start date.
Facility contact: Idaho National Engineering Laboratory has confirmed this facility is expected to be technically capable of treating this waste stream.			
Incineration	Los Alamos National Laboratory	CAI Solid Feed System	Technically capable of treating, although located out of region and repackaging would be required.
Facility contact: Los Alamos National Laboratory was not contacted regarding treatment of this waste stream.			

In addition to the facilities included in the above evaluation, the following DOE facility was identified by the DOE site as being expected to have the technical capability to treat this waste stream. This site was requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Incineration	Hanford Site	Thermal Treatment Facility Incinerator

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			1,848.
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars	11,608

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for organic debris is $2.50 - $6.00 per pound, conservatively assume $6.00 per pound, 0.42 m^3 =140 kg = 308 lb

7.0 (0.42 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization	Scientific Ecology Group, Inc.	Based on limited available information, appears to be potentially capable of treating this waste stream.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat organic debris toxic organics.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform organic destruction, stabilization in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic debris toxic organics. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction, stabilization of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Organic destruction followed by stabilization	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Cannot treat identified radionuclides.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat organic debris toxic organics.

d. Packaging: Information not received.

e. Treatment Type: Can perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic debris toxic organics.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing organic destruction.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Based on limited available information, probably can treat organic debris toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Can only perform stabilization, cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists and operational.

b. Permit Status: Permitted to treat solid phased mixed material.

c. Facility Location: Salt Lake City, UT

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.

Organic destruction followed by stabilization.	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization.	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	Non-Destructive Cleaning, Inc.	Potentially capable of treating this waste stream.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic debris toxic organics.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	NSSI/ Sources and Services, Inc.	Potentially capable of treating this waste stream.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic debris toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Can perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic debris toxic organics.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Can treat organic debris toxic organics.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform organic destruction, stabilization.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on-site.	
Organic destruction followed by stabilization.	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization.	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream.. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic debris toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction, stabilization.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (0.42 cubic meters on hand, no five year projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000000839

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., organic destruction followed by stabilization]) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$3,238,600
On-site Mobile Treatment Unit	$ 677,800
Off-site DOE Facility	$ 11,608
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these

costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at Savannah River CIF Incinerator-Solid Feed System.

Savannah River has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Savannah River CIF Incinerator-Solid Feed System was selected as the preferred option from among technically capable DOE facilities based on facility status and location.

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TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W008

Waste Stream ID# BETTIS 0000002056

Waste Stream Name: Mercury Containing Waste

Waste Stream Description: Cloth, metal and glass waste containing small amounts of hardened mercury.

Treatability Group: MLLW CH, inorganic debris, toxic metals with mercury

Radionuclides: Sb^{125}, Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Ni^{63}, C^{14}, I^{129}, Tc^{99}, H^{3}, Cs^{134}, Pm^{147}, Kr^{85},Sm^{121}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{59}, Eu^{152}, Eu^{154}, Fe^{55}, Te^{126m}, Sb^{126m}, U^{235}, U^{238}, U^{234}, Th^{232+}

EPA Waste Code(s): D008, D009

Current Inventory: 0.00 cubic meters

Five Year Projection: 0.21 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization is based on process knowledge. Characterization is sufficient to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable : Mercury separation followed by stabilization is the treatment required to meet LDR standards for this inorganic debris waste stream. Stabilization is the treatment required to meet LDR standards for lead.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatment

(1) Treatment at a New On-Site Facility: Treatment of this waste stream in a permitted on-site facility would consist of mercury separation followed by cement based stabilization/solidification. Mercury separation will be used as the treatment for mercury since the mercury concentration is greater than 260 ppm. Size reduction via shredding would be performed as a pretreatment to expose surface areas for treatment.

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(size reduction followed by mercury separation followed by stabilzation)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited BETTIS experience.)	250,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		250,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on BETTIS experience.)	280,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to build new work facility and procure equipment (e.g., shredder) - based on extensive BETTIS facility construction experience)	2,800,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		3,080,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat projected volume (0.21 M^3) based on estimated 0.1 M^3/shift, 6 mandays/shift, one shift training also included.)	12,600	
	3.2	Annual Utilities	3,000	
	3.3	Annual Materials	18,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	45,600	
		X NUMBER OF YEARS OF OPERATION	x 5 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		228,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		4,058,000

Note Years of Operation: 5 years used to facilitate comparison of all options based on 5 year projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform size reduction followed by mercury separation followed by stabilization was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(size reduction followed by mercury separation followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited BETTIS experience.)	250,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		250,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. BETTIS share of design cost.)	38,100	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive BETTIS facility construction experience. BETTIS share of construction cost, including cost to incorporate equipment in mobile platform.)	192,000	
	2.5	Equipment (BETTIS share of cost, assumes system would be shared by 10 NNPP sites)	190,100	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		420,200
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat projected volume of 0.21 M^3 based on 0.1 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	12,600	
	3.2	Annual Utilities	3,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	18,000	
	3.4	Annual Maintenance (BETTIS share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	39,600	
		X NUMBER OF YEARS OF OPERATION	x 5 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		198,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (BETTIS share of cost)	38,100	
	4.2	Closure, Post-Closure, Monitoring (BETTIS share of cost)	57,200	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		95,300
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		963,500

Note: Years of Operation: 5 years used to facilitate comparison of all options based on 5 year projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section 2 above, facilities that perform size reduction followed by mercury separation followed by stabilization were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Mercury Separation (Amalgamation)	Savannah River Site	HWMWDF - Mercury Amalgamation Unit (0145)	Based on available information, this facility does not appear to be technically capable of treating this mixed waste stream; facility treats liquid mercury only.	

1) Technical

a. Hazardous Constituent: Acceptable EPA codes are undetermined at this time.

b. Radionuclides: Acceptable radionuclides are undetermined at this time.

c. Waste Form: Facility treats liquid mercury.

d. Packaging: N/A; mercury is decanted into 2 gallon containers by facility prior to amalgamation process..

e. Treatment Type: Mercury is combined with zinc powder dampened with sulfuric acid to form an amalgamation.

f. Capacity: Undetermined at this time; should not be limiting due to small waste volume.

2) Non-technical

a. Facility Status: Planned and approved.

b. Permit Status: RCRA interim (submitted).

c. Facility Location: Out of state; in region.

3) Other Facility is currently not funded.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Mercury Separation (Hg roasting/ retorting)	Savannah River Site	Mercury Roasting/Retorting and Recovery Unit (0145)	Facility deleted from MWIR data base. It will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contracts with Facilities			
No DOE facility identified.			

In addition to the facilities included in the above evaluation, the following DOE facility was identified by the DOE site as being expected to have the technical capability to treat this waste stream. This site was requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Mercury retort	Idaho National Engineering Laboratory	Mercury Retort

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			930
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars	$ 10,690

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for inorganic debris is $4.00 - $7.50 per pound, conservatively assume $7.50 per pound, 0.21 m^3 = 56 kg = 124 lb

7.0 (0.21 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Mercury separation followed by stabilization	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Mercury separation followed by stabilization	Scientific Ecology Group, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Cannot perform mercury separation.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat Inorganic debris, toxic metals with mercury.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Cannot perform mercury separation.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could not use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Mercury separation followed by stabilization	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat Inorganic debris, toxic metals with mercury. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform mercury separation, stabilization of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Mercury separation followed by stabilization	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Mercury separation followed by stabilization	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Cannot perform mercury separation.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat Inorganic debris, toxic metals with mercury.

d. Packaging: Information not received.

e. Treatment Type: Cannot perform mercury separation.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Mercury separation followed by stabilization	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat inorganic debris, toxic metals with mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform Mercury separation followed by stabilization

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Mercury separation followed by stabilization	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing mercury separation.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Based on limited available information, probably can treat Inorganic debris, toxic metals with mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can only perform stabilization, cannot perform mercury separation, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists and operational.

b. Permit Status: Permitted to treat solid phased mixed material.

c. Facility Location: Salt Lake City, UT

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.

Mercury separation followed by stabilization	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Mercury separation followed by stabilization	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Mercury separation followed by stabilization	Non-Destructive Cleaning, Inc.	Potentially capable of treating this waste stream.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat Inorganic debris, toxic metals with mercury.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform Mercury separation followed by stabilization

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Mercury separation followed by stabilization	NSSI/ Sources and Services, Inc.	Potentially capable of treating this waste stream.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat Inorganic debris, toxic metals with mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can perform Mercury separation followed by stabilization

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Mercury separation followed by stabilization	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat Inorganic debris, toxic metals with mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform Mercury separation followed by stabilization

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Mercury separation followed by stabilization	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Can treat Inorganic debris, toxic metals with mercury.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform Mercury separation followed by stabilization	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on-site.	
Mercury separation followed by stabilization	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Mercury separation followed by stabilization	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat Inorganic debris, toxic metals with mercury.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform Mercury separation followed by stabilization

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (0.0 cubic meters on hand, 0.21 cubic meters five year projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000002056

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., size reduction followed by mercury separation followed by stabilization) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence

that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$4,058,000
On-site Mobile Treatment Unit	$ 963,500
Off-site DOE Facility	$ 10,690
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is

anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at the Idaho National Engineering Laboratory - Mercury Retort.

Idaho National Engineering Laboratory has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Idaho National Engineering Laboratory - Mercury Retort was selected as the preferred option from among technically capable DOE facilities based on facility status and location.

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TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W009

Waste Stream ID#: Bettis #0000002058

Waste Stream Name: VOC Contaminated Soil

Waste Stream Description: Soils

Treatability Group: MLLW CH, soils, toxic organics

Radionuclides: Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Ni^{63}, C^{14}, I^{129}, Tc^{99}, H^{3}, Cs^{135}, Kr^{85}, Sm^{151}, Cd^{113m}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Sn^{121m}, Nb^{94}, Pu^{238}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{59}, Eu^{152}, Eu^{154}, Fe^{55},Sb^{126m}, Sb^{126}, U^{234}, U^{235}, U^{238}, Th^{232}

EPA Waste Code(s): D039, F001

Current Inventory: 0.42 cubic meters

Five Year Projection: 0.0 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Sampling analysis was used to verify presence of total VOC. Specific constituents were identified by process knowledge. Characterization is sufficient to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable: Organic destruction is the treatment required to meet LDR standards for toxic organics. Organic destruction is also the TSCA treatment required for PCB's.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current

agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatment

(1) Treatment at a New On-Site Facility: Treatment of this waste stream in a permitted on-site facility would consist of organic destruction (incineration).

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	200,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to build new work facility and procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	2,000,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		2,200,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current inventory (0.42 M^3) based on estimated 0.2 M^3/shift, 6 mandays/shift, one shift training also included.)	18,000	
	3.2	Annual Utilities	1,000	
	3.3	Annual Materials	6,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	37,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		37,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		3,237,000

Note Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform organic destruction was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	5,200	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	27,000	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	27,300	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		59,500
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current inventory of 0.42 M^3 based on 0.2 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	18,000	
	3.2	Annual Utilities	1,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	6,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	31,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		31,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	5,100	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	7,700	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		12,800
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		603,300

Note: Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected..

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section (2) above, facilities that perform organic destruction were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Organic Destruction (thermal destruction)	Energy Technology Engineering Center	Radioactive Materials Disposal Facility - Thermal Treatment (0509)	Based on available information, this facility does not appear to be capable of treating this mixed waste stream; facility appears to treat liquids only.	

1) Technical

a. Hazardous Constituent: Information not available.

b. Radionuclides: Information not available.

c. Waste Form: Facility appears to treat liquids only.

d. Packaging: Information not available.

e. Treatment Type: Organic destruction by thermal destruction.

f. Capacity: Design capacity is 800 gal/day.

2) Non-technical

a. Facility Status: Planned; estimated FY94 for start date.

b. Permit Status: RCRA Part A (applied); permitted to treat only on-site generated waste.

c. Facility Location: Out of state; out of region.

3) Other This facility was not listed in the MWIR. Information obtained is from CSTP Candidate Treatment Systems List.

Organic Destruction (incineration)	Oak Ridge Y-12 Plant	MW Treatment Facility-Incineration (0527)	Based on available information, facility does not appear to be technically capable of treating this mixed waste stream due to unacceptable hazardous constituents and waste form.	

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Organic Destruction (thermal destruction)	Energy Technology Engineering Center	Radioactive Materials Disposal Facility - Thermal Treatment (0509)	Based on available information, this facility does not appear to be capable of treating this mixed waste stream; facility appears to treat liquids only.	

1) Technical

a. Hazardous Constituent: Facility does not accept all identified EPA code (D039).

b. Radionuclides: To be determined; could be limiting due to the extensive listing.

c. Waste Form: Facility does not accept waste form of this waste stream. Facility does not accept soil.

d. Packaging: To be determined.

e. Treatment Type: Organic destruction by incineration.

f. Capacity: To be determined; probably not limiting due to small waste volume.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/06.

b. Permit Status: None.

c. Facility Location: Out of state; in region.

3) Other This mixed waste treatment facility will not be built at Y-12 Plant; instead it will be planned for K-25 Site and broken into four units. Above evaluation done on combustible mixed waste treatment facility for incineration.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Organic Destruction (thermal destruction)	Energy Technology Engineering Center	Radioactive Materials Disposal Facility - Thermal Treatment (0509)	Based on available information, this facility does not appear to be capable of treating this mixed waste stream; facility appears to treat liquids only.	
Thermal Desorption	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF)(0324)	Facility deleted from MWIR data base. It will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Organic Destruction (thermal destruction)	Energy Technology Engineering Center	Radioactive Materials Disposal Facility - Thermal Treatment (0509)	Based on available information, this facility does not appear to be capable of treating this mixed waste stream; facility appears to treat liquids only.	
Thermal Desorption	Oak Ridge Y-12 Plant	MW Treatment Facility-Thermal Desorption (0528)	Based on available information, this facility appears to be technically capable of treating this mixed waste stream if acceptable hazardous constituents are expanded to include identified EPA codes.	Potential candidate, only technically capable facility. Although located out of state and start date unknown.

1) Technical

a. Hazardous Constituent: Facility does not accept an identified EPA code (D039).

b. Radionuclides: To be determined; could be limiting due to extensive listing.

c. Waste Form: To be determined; could be limiting due to the extensive listing.

d. Packaging: N/A; facility will decant liquids and sort solids prior to heating.

e. Treatment Type: Thermal desorption and possible soil washing for removal of metals and radionuclides.

f. Capacity: To be determined; should not be limiting due to small waste volume.

2) Non-technical

a. Facility Status: Planned; estimated start date is unknown.

b. Permit Status: None.

c. Facility Location: Out of state; in region.

3) Other Mixed waste treatment facility will not be built at Y-12 plant - but rather at K-25 site. Above evaluation is for thermal desorption of soils at K-25 site.

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts with Facilities			
Thermal Desorption	Oak Ridge K-25 Site	MWT - Thermal Desorption Waste Solids Treatment Facility	Only technically capable facility identified by review of available information. Location and start date not optimal.
Facility contact: Oak Ridge K-25 Site has identified that this facility will not be technically capable of treating this waste stream because the physical form of the waste is not acceptable.			

In addition to the facilities included in the above evaluation, the following DOE facility was identified by the DOE site as being expected to have the technical capability to treat this waste stream. This site was requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Incineration	Hanford Site	Thermal Treatment Facility Incinerator

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			7,668
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars	17,428

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for soils is $3.50 - $9.00 per pound, conservatively assume $9.00 per pound, 0.42 m^3 = 387 kg = 852 lb

7.0 (0.42 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Organic destruction	Scientific Ecology Group, Inc.	Based on limited available information, appears to be potentially capable of treating this waste stream.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat soils and toxic organics.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform organic destruction in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat soils or toxic organics. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Organic destruction	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Cannot treat radionuclides.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat soils and toxic organics.

d. Packaging: Information not received.

e. Treatment Type: Can perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat soils, toxic organics.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing organic destruction.	
1) Technical a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents. b. Radionuclides: Cannot treat identified radionuclides. c. Waste Form: Based on limited available information, probably can treat soils, toxic organics. d. Packaging: Information not provided. e. Treatment Type: Can only perform stabilization, cannot perform organic destruction. f. Capacity: Information not provided. 2) Non-technical a. Facility Status: Exists and operational. b. Permit Status: Permitted to treat solid phased mixed material. c. Facility Location: Salt Lake City, UT 3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.			
Organic destruction.	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Organic destruction.	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	Non-Destructive Cleaning, Inc.	Based on available information, does not appear to be capable of treating this waste stream. Cannot treat hazardous constituents.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat soils, toxic organics.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	NSSI/ Sources and Services, Inc.	Potentially capable of treating this waste stream.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat soils, toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Can perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat soils, toxic organics.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Can treat soils, toxic organics.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform organic destruction.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on-site.	
Organic destruction.	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat soils, toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform Organic destruction.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (0.42 cubic meters on hand, no projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000002058

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., organic destruction) is utilized for each option. This a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence

that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$3,237,000
On-site Mobile Treatment Unit	$ 603,300
Off-site DOE Facility	$ 17,428
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is

anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at the Hanford Site - Thermal Treatment Facility Incinerator.

Hanford has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Hanford Site - Thermal Treatment Facility Incinerator was selected as the preferred option from among technically capable DOE facilities based on facility status and location.

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TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W010

Waste Stream ID#: BETTIS 0000002062

Waste Stream Name: Waste Oil With Heavy Metals And PCBs

Waste Stream Description: Liquid, oil from equipment draining/decommissioning.

Treatability Group: MLLW CH, organic liquids, toxic metals with mercury

Radionuclides: U^{232+}, U^{233}, Th^{na}, Mixed Fission Products

EPA Waste Code(s): D006, D008, D009, D010

Current Inventory: 0.21 cubic meters

Five Year Projection: 0.0 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization of this waste stream was by sample/analysis (TCLP results were cadmium 4.2 ppm, lead 31.4 ppm, mercury 1.2 ppm, selenium 1.4 ppm, and PCB's 74 ppm). Characterization is sufficient to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable: TSCA treatment required for PCBs is organic destruction. The LDR concentration based treatment standard for cadmium, lead, and selenium is stabilization. The presence of mercury in a waste stream requires that the waste be treated for the mercury first. The required treatment for mercury is incineration because the concentration is less than 260 ppm. Treatment will consist of organic destruction followed by stabilization.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatment

(1) Treatment at a New On-Site Facility: Treatment of this waste stream in a permitted on-site facility would consist of organic destruction followed by cement based stabilization/solidification.

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	200,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to build new required work facility and procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	2,000,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		2,200,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume (0.21 M^3) based on estimated 0.2 M^3/shift, 6 mandays/shift, one shift training also included.)	17,000	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials	12,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	43,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		43,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		3,243,000

Note Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform organic destruction followed by stabilization was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	10,700	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	57,000	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	50,700	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		118,400
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current inventory of 0.21 M^3 based on 0.2 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	17,000	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	12,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	37,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		37,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	10,700	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	16,100	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		26,800
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		682,200

Note: Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section 2 above, facilities that perform organic destruction followed by stabilization were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF)(0324)	Facility deleted from MWIR data base. It will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-Technical

a. Facility Status: Facility will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	WERF Incinerator (0251)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable radionuclides.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Facility does not accept all identified radionuclides (U-232, U-233).

c. Waste Form: Facility accepts organic liquids.

d. Packaging: N/A; facility provides repackaging as needed for liquids and solid waste to be fed into incinerator.

e. Treatment Type: Organic destruction by incineration f\via dual chamber controlled air type which discharges to stabilization unit.

f. Capacity: Normal capacity is 75,636 kg/yr; should not be limiting due to small waste volume.

2) Non-Technical

a. Facility Status: Constructed; not in use; plan to use to treat mixed waste; estimated start date 4/96.

b. Permit Status: RCRA interim; RCRA Part B (applied).

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Los Alamos National Laboratory	Controller Air Incinerator-Liquid Feed System (0312)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable EPA codes and radionuclides.	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA codes (D006, D008, D009, D010-TCLP metals).

b. Radionuclides: Facility probably will accept identified radionuclides. MWIR list MFP; facility accepts many fission products; more information needed for final determination.

c. Waste Form: Facility accepts organic liquids.

d. Packaging: Facility accepts waste in 30-gallon and 55-gallon carbon steel drums and non-halogenated plastic tuff tanks. Solid waste accepted.

e. Treatment Type: Organic destruction by incineration via dual h\chamber controlled-air type, subsequent to blending of liquids to adjust BTU content of waste.

f. Capacity: Normal capacity of the liquid burner is 480,000 kg/yr.

2) Non-Technical

a. Facility Status: Constructed; not in use; estimated start date 9/95.

b. Permit Status: Final TSCA; Final RCRA Part B for hazardous waste generated on site only. Part A for treating mixed waste (submitted); Part B for mixed waste to be submitted.

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Savannah River Site	CIF Incinerator-Liquid Feed System (0361)	Based on available information, this facility appears to be technically capable of treating this waste stream.	Potential primary candidate based on facility status. Permit restriction on off-site waste would require modification.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Unknown at this time; not expected to be limiting.

c. Waste Form: Facility accepts organic liquids.

d. Packaging: Accepted in 55-gallon drums or trucks (with volume no greater than 5,000 gallons. Liquids are placed in tank farm by facility. Solid waste accepted.

e. Treatment Type: Organic destruction by incineration via rotary kiln type followed by secondary combustion chamber, air pollution control system and ashcrete processing area. Liquids blended prior to incineration to optimize BTU rating.

f. Capacity: Normal capacity of hardpipe to kiln is 800,000 kg/yr; hardpipe to secondary combustion chamber is 3,700,000 kg/yr.

2) Non-Technical

a. Facility Status: Under construction; estimated start date 2/96.

b. Permit Status: RCRA final; Air Quality Control final; NESHAP; permitted to treat on-site generated waste only.

c. Facility Location: Out of state; in region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (chemical oxidation)	Los Alamos National Laboratory	HWTF - Detox Skid (0208)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable hazardous constituents and radionuclides.	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA codes (D006, D008, D009, D010, TCLP metals; facility does not accept PCBs).

b. Radionuclides: Facility does not accept identified radionuclides (Th and MFP).

c. Waste Form: Facility accepts organic liquids.

d. Packaging: Waste accepted in 30-gallon and 55-gallon carbon steel drums.

e. Treatment Type: Iron catalyzed oxidation of organic.

f. Capacity: Undetermined; probably not limiting due to small waste volume.

2) Non-Technical

a. Facility Status: Planned; estimated start date 1/98.

b. Permit Status: RCRA (construction).

c. Facility Location: Out of state; out of region.

3) Other Estimated start date for skid is based on availability for treatment, may be earlier than start date for HWTF.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Idaho National Engineering Laboratory	IWPF - Thermal Destruction System (0334)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable hazardous constituents and waste form.	

1) Technical

a. Hazardous Constituent: Facility does not accept all identified EPA codes (D006, D008, and D010).

b. Radionuclides: Unknown at this time; probably not limiting.

c. Waste Form: Facility does not accept the waste form of this waste stream.

d. Packaging: N/A; waste unpacked, sorted, and sized by facility prior to incineration.

e. Treatment Type: Thermal desorption by heating and driving off organic materials from inorganic debris to secondary combustion chamber, where they are destroyed then sent for stabilization.

f. Capacity: Capacity unknown at this time; should not be limiting due to small waste volume.

2) Non-Technical

a. Facility Status: Planned; estimated start date 01/07.

b. Permit Status: None.

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Rocky Flats Plant	Solvent Contaminated Waste System (0340)	Based on available information, this facility appears to be technically capable of treating this waste stream.	Not likely to be a primary candidate based on location and facility status.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: All acceptable radionuclides have not been determined; not expected to be limiting.

c. Waste Form: Facility accepts organic liquids.

d. Packaging: N/A; unpacking of received wastes done by another system.

e. Treatment Type: Organic destruction by one of three technologies; fluidized bed unit, controlled air incineration, and plasma arc furnace. Also included is a immobilization component.

f. Capacity: Capacity is yet to be determined; should not be limiting due to small waste volume.

2) Non-Technical

a. Facility Status: Planned; estimated start date 12/05.

b. Permit Status: None.

c. Facility Location: Out of state; out of region.

3) Other System 1A of CTMP.

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts with Facilities			
Incineration	Savannah River Site	CIF - Incinerator Liquid Feed System	Technically capable . Best candidate based on facility status and location. Permit restriction on off-site waste requires modification.
Facility contact: Savannah River Site has confirmed this facility is expected to be technically capable of treating this waste stream.			
Thermal Destruction	Rocky Flats Plant	Solvent Contaminated Waste System	Technically capable of treating this mixed waste stream once acceptable radionuclides have been determined. Available 12/05; location not optimal.
Facility contact: Rocky Flats Plant was not contacted regarding treatment of this waste stream.			

In addition to the facilities included in the above evaluation, the following DOE facilities were identified by the DOE site as being expected to have the technical capability to treat this waste stream. These sites were requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Incineration	Idaho National Engineering Laboratory	IWPF Incineration
Thermal Destruction	Hanford Site	Thermal Treatment Facility Incinerator

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			1,826
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars	11,586

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for organic liquids is $2.50 - $5.50 per pound, conservatively assume $5.50 per pound, 0.21 m^3 = 151 kg = 332 lb

7.0 (0.21 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Service

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization	Scientific Ecology Group, Inc.	Based on limited available information, appears to be potentially capable of treating this waste stream.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat organic liquids or toxic metals with mercury.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform organic destruction and stabilization in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. Cannot perform stabilization.	

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic liquids or toxic metals with mercury.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Organic destruction followed by stabilization	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat organic liquids and toxic metals with mercury.

d. Packaging: Information not received.

e. Treatment Type: Can perform organic destruction and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic liquids or toxic metals with mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing organic destruction.	
1) Technical a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents. b. Radionuclides: Cannot treat identified radionuclides. c. Waste Form: Based on limited available information, probably can treat organic liquids and toxic metals with mercury. d. Packaging: Information not provided. e. Treatment Type: Can only perform stabilization, cannot perform organic destruction. f. Capacity: Information not provided. 2) Non-technical a. Facility Status: Exists and operational. b. Permit Status: Permitted to treat solid phased mixed material. c. Facility Location: Salt Lake City, UT 3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.			
Organic destruction followed by stabilization	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Non-Destructive Cleaning, Inc.	Not capable of treating this waste stream. Cannot treat identified hazardous constituents.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic liquids and toxic metals with mercury.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform organic destruction and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	NSSI/ Sources and Services, Inc.	Potentially capable of treating this waste stream.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic liquid and toxic metals with mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can perform organic destruction and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic liquids or toxic metals with mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Can treat organic liquids,toxic metals with mercury.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform organic destruction or stabilization.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on-site.	
Organic destruction followed by stabilization	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic liquids,toxic metals with mercury.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction or stabilization.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (0.21 cubic meters on hand, no projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000002062

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., organic destruction followed by stabilization) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence

that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$3,243,000
On-site Mobile Treatment Unit	$ 682,200
Off-site DOE Facility	$ 11,586
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is

anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at the Hanford Site Thermal Treatment Facility Incinerator.

Hanford has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Hanford Site Thermal Treatment Facility Incinerator was selected as the preferred option from among technically capable DOE facilities based on facility status, location and to consolidate shipment of all Bettis mixed waste streams to be treated off-site to a single DOE facility.

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TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W012

Waste Stream ID#: BETTIS #0000002070

Waste Stream Name: VOC And PCB Contaminated Debris

Waste Stream Description: Heterogeneous debris (sediment, rock, brick, cement block, plastic, herculite, glass and metal).

Treatability Group: MLLW CH, heterogeneous debris, toxic organics

Radionuclides: Cs^{137}, Sr^{90}, Y^{90}, Ba^{137m}, Ni^{63}, I^{129}, Tc^{99}, H^{3}, Kr^{85}, Sm^{151}, Zr^{93}, Se^{79}, Nb^{93m}, Sn^{126}, Cs^{135}, Sn^{121m}, Nb^{94}, Pu^{241}, Cm^{242}, Co^{60}, Ni^{59}, Eu^{152}, Eu^{154}, Fe^{55}, Pu^{238},Cd^{113m}, C^{14}, Sb^{126m}, Sb^{126}, U^{235},Uu^{234},U^{238}, Th^{232}

EPA Waste Code(s): D039, D040, F001, F002, F003, F005

Current Inventory: 6.42 cubic meters

Five Year Projection: 2.1 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization of this waste stream was by sampling/analysis (maximum analysis results were tetrachloroethylene 33000 ppm, trichloroethylene 230 ppm, methyl ethyl ketone 0.17 ppm, carbon disulfide 0.01 ppm, toluene 0.062 ppm, acetone 0.6 ppm, ethyl benzene 0.044 ppm, xylene 0.28 ppm, chlorobenzene 95 ppm, methylene chloride 1100 ppm, PCB's <1500 ppm). Characterization of this waste stream is sufficient to support the identification of the proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable: TSCA treatment for PCBs is incineration. Organic destruction followed by stabilization is the required treatment to meet LDR standards for this toxic organics waste stream.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatment

(1) Treatment at a New On-Site Facility: Treatment of this waste stream at a permitted on-site facility would consist of organic destruction by incineration followed by cement based stabilization/ solidification.

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	200,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to build new work facility and procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	2,000,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		2,200,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current & projected volume of 8.52 M^3 based on estimated 0.2 M^3/shift, 6 mandays/shift, one shift training also included.)	261,300	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials	12,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	287,300	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		287,300
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		3,487,300

Note Years of Operation: 1 year used to facilitate comparison of all options based on 1 year projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform organic destruction followed by stabilization was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	10,700	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	57,000	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	50,700	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		118,400
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current & projected volume of 8.52 M^3 based on 0.2 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	261,300	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	12,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	281,300	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		281,300
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	10,700	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	16,100	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		26,800
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		926,500

Note: Years of Operation: 1 year used to facilitate comparison of all options based on 1 year projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities of other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section (2) above, facilities that perform organic destruction followed by stabilization were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

WS 0000002070 BETTIS

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison with Facility Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	WERF Incinerator (0251)	Based on available information, this facility appears to be technically capable of treating this waste stream.	This planned facility is out of state but is capable of treating this waste stream.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste code.

b. Radionuclides: Facility accepts identified radionuclide constituent of this waste stream.

c. Waste Form: Facility may not accept general waste form.

d. Packaging: Not applicable, repackaging can be performed as required.

e. Treatment Type: Organic destruction via dual chamber controlled air incinerator.

f. Capacity: 75,600 kg/yr; not limiting due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Constructed; not in use; estimated start date 04/96.

b. Permit Status: RCRA Interim

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison with Facility Screening Criteria				
Organic Destruction (incineration)	Los Alamos National Laboratory	CAI - Solid Feed System (0309)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because it does not accept all waste form components,the radionuclide content or all identified hazardous constituents.	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA code (D039, D040) for this waste stream.

b. Radionuclides: Facility does not accept identified radionuclide constituents for the waste stream.

c. Waste Form: Facility does not accept the non-combustible solid constituents of this waste form.

d. Packaging: Not a limiting consideration for this waste stream.

e. Treatment Type: Organic destruction via incineration is a dual chambered commercial incinerator.

f. Capacity: 82,000 kg/yr; not limiting due to small volume and this waste stream.

2) Non-technical

a. Facility Status: Constructed; not operational; estimated start date 09/95.

b. Permit Status: RCRA B & TSCA B final for hazardous; RCRA Part A for MW submittal; current RCRA prohibits acceptance of off-site waste for treatment.

c. Facility Location: Out of state; out of region

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison with Facility Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF) (0641)	Facility deleted from MWIR data base. It will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other:

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison with Facility Screening Criteria				
Organic Destruction (incineration)	Oak Ridge Y-12 Plant	MW Treatment Facility-Incineration (0527)	Based on available information, this facility appears to be technically capable of treating this waste stream.	Not an optimal candidate based on facility status.

1) Technical

a. Hazardous Constituent: Facility will accept identified EPA codes for this waste stream.

b. Radionuclides: To be determined.

c. Waste Form: Facility accepts generalized waste matrix code for this waste stream.

d. Packaging: To be determined at later date.

e. Treatment Type: Incineration not otherwise specified.

f. Capacity: Not determined; should not be limiting due to small volume.

2) Non-technical

a. Facility Status: This facility not to be built as planned, to be replaced by Combustible Mixed Waste Facility planned to accept wastes from a limited number of sites treatment facility.

b. Permit Status: None.

c. Facility Location: Out of state; in region.

3) Other: Evaluated as combustible Mixed Waste Treatment Facility.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison with Facility Screening Criteria				
Organic Destruction (thermal destruction)	Idaho National Engineering Laboratory	(IWPF) Thermal Destruction System (0334)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because it does not accept the waste form.	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA waste codes (D039, D040) for this waste stream.

b. Radionuclides: To be determined.

c. Waste Form: Facility does not accept the waste matrix codes associated with this waste stream.

d. Packaging: Not applicable; facility reviews waste from sizing unit which accepts this waste stream packaging.

e. Treatment Type: Thermal destruction of organics via heating solid debris and driving off organics.

f. Capacity: Unknown, but due to small volume of this waste stream this criterion should not be limiting.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/07.

b. Permit Status: No information provided.

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison with Facility Screening Criteria				
Organic Destruction (thermal destruction)	Rocky Flats Plant	Solvent Contaminated Waste System (0340)	Based on available information, this facility appears to be technically capable of treating this waste stream; further information on radionuclide acceptance is needed.	Not likely to be a primary candidate based on location and facility status.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA waste codes for this waste stream.

b. Radionuclides: To be determined.

c. Waste Form: Facility accepts this generalized waste form.

d. Packaging: Sizing unit which feeds thermal destruction unit accepts 55 gal drum, the packaging for this waste stream.

e. Treatment Type: Thermal destruction of organics via either a fluidized bed unit, controlled air incinerator or plasma arc furnace (specifics to be determined). Size reduction pretreatment available.

f. Capacity:

2) Non-technical

a. Facility Status: Planned; estimated start date 12/05.

b. Permit Status: No information provided.

c. Facility Location: Out of state; out of region.

3) Other: System 1A of CTMP.

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts With Facilities			
Incineration	Idaho National Engineering Laboratory	WERF Incinerator	Planned facility is technically capable of treating this waste stream.
Facility Contact: Idaho National Engineering Laboratory has identified that it is uncertain whether this facility can treat this waste stream because packaging and characterization information is required to develop treatment plan.			
Thermal Destruction	Rocky Flats Site	Solvent Contaminated Waste System	Technically capable, but long range start date.
Faciltiy Contact: Rocky Flats Site was not contacted regarding treatment of this waste stream.			
Incineration	Oak Ridge Y-12 Plant	MW Treatment Facility-Incineration	Technically capable; not a good candidate based on status.
Facilty Status: Oak Ridge was not contacted regarding treatment of this waste stream.			

In addition to the facilities included in the above evaluation, the following DOE facilities were identified by the DOE site as being expected to have the technical capability to treat this waste stream. These sites were requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Stabilization	Hanford Site	Thermal Treatment Facility Incinerator
Stabilization	Savannah River Site	CIF Incinerator-Solid Feed System

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			134,475
7.0	Transportation			19,520
		Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars	153,995

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for heterogeneous debris is $4.00 - $7.50 per pound, conservatively assume $7.50 per pound, 8.52 m^3 = 8,150 kg = 17,930 lb

7.0 (8.52 m^3 requires two shipments, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction, stabilization	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Organic destruction, stabilization	Scientific Ecology Group, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of treating PCBs/asbestos.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably cannot treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat heterogeneous debris or toxic organics.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform organic destruction or stabilization in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could not use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction, stabilization	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat heterogeneous debris, toxic organics. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction or stabilization.

f. Capacity: Information not received.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Organic destruction, stabilization	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction, stabilization	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Cannot treat identified radionuclides.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably cannot treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat heterogeneous debris, toxic organics.

d. Packaging: Information not received.

e. Treatment Type: Can perform organic destruction or stabilization.

f. Capacity: Information not received.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction, stabilization	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat heterogeneous debris, toxic organics.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction, stabilization.	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing organic destruction.	
1) Technical a. Hazardous Constituent: Based on limited available information, probably cannot treat identified hazardous constituents. b. Radionuclides: Cannot treat identified radionuclides. c. Waste Form: Based on limited available information, probably can treat heterogeneous debris, toxic organics. d. Packaging: Information not provided. e. Treatment Type: Can only perform stabilization, cannot perform organic destruction. f. Capacity: Information not provided. 2) Non-technical a. Facility Status: Exists and operational. b. Permit Status: Permitted to treat solid phased mixed material. c. Facility Location: Salt Lake City, UT 3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.			
Organic destruction, stabilization.	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Organic destruction, stabilization.	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction, stabilization.	Non-Destructive Cleaning, Inc.	Potentially capable of treating this waste stream.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat heterogeneous debris, toxic organics.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction, stabilization.	NSSI/ Sources and Services, Inc.	Not capable of treating this waste stream. Not capable of treating PCBs.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat heterogeneous debris, toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Can perform Organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction, stabilization.	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat heterogeneous debris, toxic organics.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction, stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction, stabilization.	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Can treat heterogeneous debris, toxic organics.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform organic destruction or stabilization.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on-site.	
Organic destruction, stabilization.	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction, stabilization.	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat heterogeneous debris, toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction or stabilization.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (6.42 cubic meters on hand, 2.1 cubic meters five year projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000002070

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., organic destruction followed by stabilization) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$3,487,300
On-site Mobile Treatment Unit	$ 926,500
Off-site DOE Facility	$ 153,995
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these

costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at Hanford Site Thermal Treatment Facility Incinerator.

Hanford has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Hanford Site Thermal Treatment Facility Incinerator was selected as the preferred option from among technically capable DOE facilities based on facility status, location and to consolidate shipment of all Bettis mixed waste streams to be treated off-site to a single DOE facility.

TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W013

Waste Stream ID#: BETTIS #0000002072

Waste Stream Name: VOC And PCB Contaminated Soil

Waste Stream Description: soils containing toxic organics and PCBs.

Treatability Group: MLLW CH, soil with <50% debris, toxic organics

Radionuclides: U-natural, Cs-137, Sr-90

EPA Waste Code(s): D039, F001, F002

Current Inventory: 1.97 cubic meters

Five Year Projection: 0.0 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization is based on process knowledge. Characterization is sufficient to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable : TSCA treatment for PCBs is organic destruction. Organic destruction is treatment required to meet LDR standards for toxic organics.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current

agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatment

(1) Treatment at a New On-Site Facility: Treatment of this waste stream in a permitted on-site facility would consist of organic destruction (incineration).

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	200,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to incorporate required work area into existing radiological work facilities and procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	2,000,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		2,200,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume (1.97 M^3) based on estimated 0.2 M^3/shift, 6 mandays/shift, one shift training also included.)	66,000	
	3.2	Annual Utilities	1,000	
	3.3	Annual Materials	6,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	84,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		84,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		3,284,000

Note Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform organic destruction was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	5,200	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	27,000	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	27,300	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		59,500
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume of 1.97 M^3 based on 0.2 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	66,000	
	3.2	Annual Utilities	1,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	6,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	78,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		78,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	5,100	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	7,700	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		12,800
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		650,300

Note: Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section (2) above, facilities that perform organic destruction were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Energy Technology Engineering Center	Radioactive Materials Disposal Facility - Thermal Treatment (0509)	Based on available information, this facility does not appear to be capable of treating this mixed waste stream; facility appears to treat liquids only.	

1) Technical

a. Hazardous Constituent: Information not available.

b. Radionuclides: Information not available.

c. Waste Form: Facility appears to treat liquids only.

d. Packaging: Information not available.

e. Treatment Type: Organic destruction by thermal destruction.

f. Capacity: Design capacity is 800 gal/day.

2) Non-technical

a. Facility Status: Planned; estimated FY94 for start date.

b. Permit Status: RCRA Part A (applied); permitted to treat only on-site generated waste.

c. Facility Location: Out of state; out of region.

3) Other This facility was not listed in the MWIR. Information obtained is from CSTP Candidate Treatment Systems List.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Oak Ridge Y-12 Plant	MW Treatment Facility-Incineration (0527)	Based on available information, facility does not appear to be technically capable of treating this mixed waste stream due to unacceptable hazardous constituents and waste form.	K-25 Facility appears to have no non-technical limitations.

1) Technical

a. Hazardous Constituent: Facility does not accept all identified EPA code (D039).

b. Radionuclides: To be determined; probably not limiting.

c. Waste Form: Facility does not accept waste form of this waste stream. Facility does not accept soil.

d. Packaging: To be determined.

e. Treatment Type: Organic destruction by incineration.

f. Capacity: To be determined; probably not limiting due to small waste volume.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/06.

b. Permit Status: None.

c. Facility Location: Out of state; in region.

3) Other This mixed waste treatment facility will not be built at Y-12 Plant; instead it will be planned for K-25 Site and broken into four units. Above evaluation done on combustible mixed waste treatment facility for incineration.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Thermal Desorption	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF)(0324)	Facility not evaluated; facility deleted from MWIR data base.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Thermal Desorption	Oak Ridge K-25 Site	MW Treatment Facility-Thermal Desorption (0528)	Based on available information, this facility appears to be technically capable of treating this mixed waste stream if acceptable hazardous constituents are expanded to include identified EPA codes.	Potential candidate, only technically capable facility. Although located out of state and start date unknown.

1) Technical

a. Hazardous Constituent: Facility does not accept an identified EPA code (D039). Final determination of contaminant acceptance has not been made.

b. Radionuclides: To be determined; probably not limiting.

c. Waste Form: To be determined.

d. Packaging: N/A; facility will decant liquids and sort solids prior to heating.

e. Treatment Type: Thermal desorption and possible soil washing for removal of metals and radionuclides.

f. Capacity: To be determined; should not be limiting due to small waste volume.

2) Non-technical

a. Facility Status: Planned; estimated start date is unknown.

b. Permit Status: None.

c. Facility Location: Out of state; in region.

3) Other Mixed waste treatment facility will not be built at Y-12 plant - but rather at K-25 site. Above evaluation is for thermal desorption of soils at K-25 site - DP-S006 Waste Soils Treatment Facility from MWIR: ".....any discussion concerning capabilities.....is purely speculative."

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts with Facilities			
Thermal Desorption	Oak Ridge K-25 Site	MW Thermal Desorption (Waste Soils Treatment Facility)	Only technically capable facility identified by review of available information. Location and start date not optimal.
Facility contact: Oak Ridge K-25 Site has identified that this facility will not be technically capable of treating this waste stream becausethe physical form of the waste is not acceptable for treatment in the incinerator.			

In addition to the facilities included in the above evaluation, the following DOE facility was identified by the DOE site as being expected to have the technical capability to treat this waste stream. This site was requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Incineration	Hanford Site	Thermal Treatment Facility Incinerator

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			13,370
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars	23,130

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for soils with < 50% debris is $3.50 - $8.50 per pound, conservatively assume $8.50 per pound, 1.97 m^3 = 715 kg = 1,573 lb

7.0 (1.97 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Organic destruction	Scientific Ecology Group, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of treating PCBs.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably cannot treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat soils with <50% debris, or toxic organics.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform organic destruction in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could not use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat soils with <50% debris, toxic organics. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Organic destruction	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Cannot treat identified radionuclides.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat soils with <50% debris, toxic organics.

d. Packaging: Information not received.

e. Treatment Type: Can perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat soils with <50% debris, toxic organics.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing organic destruction.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Based on limited available information, probably can treat soils with <50% debris, toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Can only perform stabilization, cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists and operational.

b. Permit Status: Permitted to treat solid phased mixed material.

c. Facility Location: Salt Lake City, UT

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.

Organic destruction.	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Organic destruction.	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	Non-Destructive Cleaning, Inc.	Based on available information, does not appear to be capable of treating this waste stream.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat soils with <50% debris, toxic organics.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	NSSI/ Sources and Services, Inc.	Not capable of treating this waste stream. Not capable of treating PCBs.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat soils with <50% debris, toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Can perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat soils with <50% debris, toxic organics.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Can treat soils with <50% debris, toxic organics.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform organic destruction.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on-site.	
Organic destruction.	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction.	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat soils with <50% debris, toxic organics.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (1.97 cubic meters on hand, no projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000002072

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., organic destruction) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exist regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$3,284,000
On-site Mobile Treatment Unit	$ 650,300
Off-site DOE Facility	$ 23,130
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these

costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at Hanford Site Thermal Treatment Facility Incinerator.

Hanford has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Hanford Site Thermal Treatment Facility Incinerator was selected as the preferred option from among technically capable DOE facilities based on facility status and location.

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TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W017

Waste Stream ID#: BETTIS #0000002076

Waste Stream Name: Ion Exchange Resin

Waste Stream Description: Resin

Treatability Group: MLLW RH, organic sludges/particulates, toxic metals w/o mercury

Radionuclides: Co^{60}, Ni^{59}, Ni^{63}, Fe^{55}, Ba^{133}

EPA Waste Code(s): D005

Current Inventory: 0.001 cubic meters

Five Year Projection: 0.0 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization is based on process knowledge. Characterization is sufficient to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable: Organic destruction followed by stabilization is the treatment required to meet LDR standards for this organic sludges/particulates waste stream.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current

agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatment

(1) Treatment at a New On-Site Facility: Treatment of this waste stream at a permitted on-site facility would consist of organic destruction (incineration) followed by cement based stabilization/ solidification.

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	200,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to build new work facility and procure procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	2,000,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		2,200,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume (0.001 M^3) based on estimated 0.001 M^3/shift, 6 mandays/shift, one shift training also included.)	7,000	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials	12,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	33,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		33,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		3,233,000

Note Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform organic destruction followed by stabilization was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	10,700	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	57,000	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	50,700	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		118,400
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current volume of 0.001 M^3 based on 0.001 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	7,000	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	12,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	27,000	
		X NUMBER OF YEARS OF OPERATION	x 1 YR	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		27,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	10,700	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	16,100	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		26,800
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		672,200

Note: Years of Operation: 1 year used to facilitate comparison of all options based on no projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities of other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section (2) above, facilities that perform organic destruction followed by stabilization were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF)(0324)	Facility deleted from MWIR database. It will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	WERF Incinerator (0251)	Based on available information, this facility does not appear to be technically capable of treating this waste stream based on radionuclides present.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Facility does not currently accept all identified radionuclides (Ba^{133}).

c. Waste Form: Facility accepts waste matrix codes for organic sludges/particulates.

d. Packaging: N/A; facility provides repackaging as needed for liquid and solid waste to be fed in to incinerator.

e. Treatment Type: Organic destruction by incineration via dual chamber controlled-air type which discharges to stabilization unit.

f. Capacity: Normal capacity is 75,636 kg/yr; due to small volume of this waste stream this criteria is not limiting.

2) Non-technical

a. Facility Status: Constructed; not in use; plan to use to treat mixed waste; estimated start date 4/96.

b. Permit Status: RCRA (interim); RCRA Part B (applied).

c. Facility Location: Out of state, out of region

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (calcination pretreatment)	Idaho National Engineering Laboratory	New Waste Calcining Facility (0240)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable radionuclides and waste form.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Facility does not currently accept any of the identified radionuclide.

c. Waste Form: Facility does not accept the waste form of this waste stream.

d. Packaging: N/A; wastes transferred/blended in tanks by facility prior to calcination.

e. Treatment Type: Organic destruction of liquid waste by calcination which results in conversion to solid granular form, which is withdrawn and placed in long-term storage bins.

f. Capacity: Not available at this time; probably not limiting based on small volume of waste stream.

2) Non-technical

a. Facility Status: Operating; now treating mixed waste.

b. Permit Status: RCRA final (submitted); RCRA interim (approved); NESHAPS permit approved; PSD pending submittal.

c. Facility Location: Out of state, out of region

3) Other Calcination does not meet definition of treatment as defined as a process, system, or technology that is designed to destroy, remove, or immobilize the hazardous component of a waste so that it meets land disposal restrictions (LDR) treatment standards.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Los Alamos National Laboratory	Solid Feed System (0309)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable hazardous constituent and waste form.	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA code (D005).

b. Radionuclides: Facility accepts all identified radionuclides.

c. Waste Form: Facility does not accept waste form of this waste stream (non- combustible constituents).

d. Packaging: Facility accepts solid waste in 1' x 1' x 2' cardboard boxes to be fed into incinerator.

e. Treatment Type: Organic destruction via incineration.

f. Capacity: Normal capacity is 82,000 kg/yr; should not be limiting based on small waste volume.

2) Non-technical

a. Facility Status: Constructed; not in use; plan to use to treat mixed waste; estimated start date 9/95.

b. Permit Status: RCRA B final and TSCA final for hazardous waste; RCRA Part B prohibits treatment of off-site waste. RCRA Part A for treating mixed waste has been submitted; Part B for mixed waste to be submitted.

c. Facility Location: Out of state, out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Savannah River Site	CIF Incinerator-Solid Feed System (0142)	Based on available information, this facility appears to be technically capable of treating this waste stream. Repackaging would be required.	Potential primary candidate based on estimated start date. Permit restriction on off-site waste would have to be revised.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Unknown at this time; not expected to be limiting.

c. Waste Form: Facility accepts non-halogenated organic sludges.

d. Packaging: Facility accepts waste in 21' square cardboard box weighing between 5 and 75 lbs. Repackaging would be required.

e. Treatment Type: Organic destruction by incineration via rotary kiln type followed by secondary combustion chamber, air pollution control system, and ashcrete stabilization area.

f. Capacity: Normal capacity is 3,000,000 kg/yr; should not be limiting due to small waste volume.

2) Non-technical

a. Facility Status: Under construction; estimated start date 02/96.

b. Permit Status: RCRA final; Air Quality Control final; NESHAP final; current state permit does not allow CIF to process off-site waste.

c. Facility Location: Out of state, in region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Idaho National Engineering Laboratory	Thermal Destruction Facility (0334)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable hazardous constituents and waste form.	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA codes.

b. Radionuclides: Unknown at this time; probably not limiting.

c. Waste Form: Facility does not accept waste form of this waste stream.

d. Packaging: N/A; waste unpackaged, sorted, and sized by facility prior to incineration.

e. Treatment Type: Thermal desorption by heating and driving off organic materials from organic debris to secondary combustion chamber, where they are destroyed then sent for stabilization.

f. Capacity: Capacity unknown at this time; should not be limiting due to small waste volume.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/07.

b. Permit Status: None.

c. Facility Location: Out of state, out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Rocky Flats Plant	Solvent Contaminated Waste System (0340)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable radionuclides and waste form.	

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA codes.

b. Radionuclides: Facility currently does not accept any of the identified radionuclide; other acceptable isotopes are yet to be determined..

c. Waste Form: Facility does not accept waste form of this waste stream.

d. Packaging: N/A; unpacking of received wastes done by another system.

e. Treatment Type: Organic destruction by one of three technologies: fluidized bed unit, controlled air incineration, and plasma arc furnace. Also includes a immobilization component.

f. Capacity: Capacity is yet to be determine; should not be limiting due to small waste volume.

2) Non-technical

a. Facility Status: Planned; estimated start date 12/05.

b. Permit Status: None

c. Facility Location: Out of state, out of region.

3) Other System 1A of CTMP.

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts with Facilities			
Incineration	Savannah River Site	CIF Incinerator - Solid Feed System	Technically capable, under construction; 2/96 estimated start date. Permit restriction on off-site waste would need to be resolved
Facility contact: Savannah River Site has confirmed this facility is expected to be technically capable of treating this waste stream.			

In addition to the facilities included in the above evaluation, the following DOE facility was identified by the DOE site as being expected to have the technical capability to treat this waste stream. This site was requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Thermal Destruction	Hanford Site	Thermal Treatment Facility Incinerator

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			12
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars	9,772

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for organic sludges/particulates is $2.50 - $5.50 per pound, conservatively assume $5.50 per pound, 0.001 m^3 = 1 kg = 2.2 lb

7.0 (0.001 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization	Scientific Ecology Group, Inc.	Based on limited available information, appears to be potentially capable of treating this waste stream.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform organic destruction or stabilization in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates or toxic metals without mercury. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction or stabilization of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Organic destruction followed by stabilization	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates and toxic metals without mercury.

d. Packaging: Information not received.

e. Treatment Type: Can perform organic destruction and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing organic destruction or stabilization.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Based on limited available information, probably [can / cannot] treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can only perform stabilization, cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists and operational.

b. Permit Status: Permitted to treat solid phased mixed material.

c. Facility Location: Salt Lake City, UT

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.

Organic destruction followed by stabilization	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Organic destruction followed by stabilization	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Non-Destructive Cleaning, Inc.	Based on available information, does not appear to be capable of treating this waste stream. Cannot treat identified constituents.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates and toxic metals without mercury.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform organic destruction and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	NSSI/ Sources and Services, Inc.	Potentially capable of treating this waste stream.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat organic sludges/particulates and toxic metals without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can perform organic destruction and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction or stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Can treat organic sludges/particulates or toxic metals without mercury.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform organic destruction or stabilization.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on-site.	
Organic destruction followed by stabilization	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction followed by stabilization	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat organic sludges/particulates or toxic metals without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction or stabilization.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (0.001 cubic meters on hand, no projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000002076

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., organic destruction followed by stabilization) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$3,233,000
On-site Mobile Treatment Unit	$ 672,200
Off-site DOE Facility	$ 9,772
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these

costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at Savannah River Site CIF Incinerator - Solid Feed System.

Savannah River has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because of the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Savannah River Site CIF Incinerator - Solid Feed System was selected as the preferred option from among technically capable DOE facilities based on facility status and location.

TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W018

Waste Stream ID#: BETTIS #0000002077

Waste Stream Name: TCLP Extraction Fluid

Waste Stream Description: Liquid from hazardous waste analysis.

Treatability Group: MLLW CH, lab packs with metals and mercury.

Radionuclides: Unknown

EPA Waste Code(s): Various listed and characteristic codes.

Current Inventory: 0.0 cubic meters

Five Year Projection: 0.001 cubic meters.

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization is based on process knowledge. Characterization of lab packs is sufficient to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable: The LDR concentration based treatment standard for lab packs is organic destruction followed by stabilization. The presence of mercury in a waste stream requires that the waste be treated for the mercury first. The required treatment for mercury is incineration followed by stabilization because the mercury concentration is less than 260 ppm. If after characterization of the actual waste stream, mercury concentration is found to be greater than or equal to 260 ppm, the above treatment would not be appropriate. In that case the waste stream would be treated as a new waste stream and the Site Treatment Plan will be updated in accordance with section (2) of the Plan Volume to determine a proper treatment option.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether The Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for Which On-Site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatment

(1) Treatment at a New On-Site Facility: Treatment of this waste stream in a permitted on-site facility would consist of organic destruction followed by stabilization.

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(organic detruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	200,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to build new work facility and procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	2,000,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		2,200,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat projected volume ($0.001m^3$) based on estimated 0.001 M^3/shift, 6 mandays/shift, one shift training also included.)	7,000	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials	12,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	33,000	
		X NUMBER OF YEARS OF OPERATION	x 5 YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		165,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	200,000	
	4.2	Closure, Post-Closure, Monitoring	300,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		500,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		3,365,000

Note Years of Operation: 5 years used to facilitate comparison of all options based on 5 year projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform organic destruction followed by stabilization was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(organic destruction followed by stabilization)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	500,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		500,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	10,700	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	57,000	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	50,700	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		118,400
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat projected volume of ($0.001m^3$) based on 0.001 M^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	7,000	
	3.2	Annual Utilities	2,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	12,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	27,000	
		X NUMBER OF YEARS OF OPERATION	x 5 YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		135,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	10,700	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	16,100	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		26,800
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		780,200

Note: Years of Operation: 5 years used to facilitate comparison of all options based on 5 year projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section (2) above, facilities that perform organic destruction followed by stabilization were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF)(0324)	Facility not evaluated; site deleted from MWIR data base.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-Technical

a. Facility Status: Facility will not be built.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Los Alamos National Laboratory	Controlled Air Incinerator-Liquid Feed System (0312)	Based on available information, this facility appears to be capable of treating this waste stream.	Facility is permitted to treat on-site generated waste only. Facility is a considerable distance from generator.

1) Technical

a. Hazardous Constituent: Facility may accept identified EPA codes; identified as various for this waste stream.

b. Radionuclides: Unknown at this time; probably not limiting.

c. Waste Form: Facility accepts lab packs.

d. Packaging: Facility accepts waste in 30-gallon and 55-gallon carbon steel drums and non-halogenated plastic tuff tanks. Solid waste accepted.

e. Treatment Type: Organic destruction by incineration, via dual chamber controlled air type, subsequent to blending of liquids to adjust BTU content of waste.

f. Capacity: Normal capacity of the liquid burner is 480,000 kg/yr.

2) Non-Technical

a. Facility Status: Constructed; not in use; estimated start date 9/95.

b. Permit Status: Final TSCA; final RCRA Part B for hazardous waste generated on-site only. Part A for treating mixed waste (submitted); Part B for mixed waste to be submitted.

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (incineration)	Idaho National Engineering Laboratory	WERF Incinerator (0251)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable radionuclides and waste form.	

1) Technical

a. Hazardous Constituent: Facility may accept EPA codes; identified as various for this waste stream.

b. Radionuclides: Unknown at this time; probably not limiting..

c. Waste Form: Facility does not accept lab packs.

d. Packaging: N/A; facility provides repackaging as needed for liquid and solid waste to be fed into incinerator.

e. Treatment Type: Organic destruction by incineration via dual chamber controlled-air type which discharges to stabilization unit.

f. Capacity: Normal capacity is 75,636 kg/yr; should not be limiting due to small waste volume.

2) Non-Technical

a. Facility Status: Constructed; not in use; plan to use to treat mixed waste; estimated start date 4/96.

b. Permit Status: RCRA interim; RCRA Part B (applied).

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Organic Destruction (thermal destruction)	Idaho National Engineering Laboratory	IWPF - Thermal Destruction System (0334)	Based on available information, this facility does not appear to be technically capable of treating this waste stream due to unacceptable waste form.	

1) Technical

a. Hazardous Constituent: Facility may accept identified EPA codes; identified as various for this waste stream.

b. Radionuclides: Unknown at this time; probably not limiting.

c. Waste Form: Facility does not accept lab packs.

d. Packaging: N/A; waste unpacked, sorted, and sized by facility prior to incineration.

e. Treatment Type: Thermal desorption by heating and driving off organic materials from inorganic debris to secondary combustion chamber, where they are destroyed then sent for stabilization.

f. Capacity: Capacity unknown at this time; should not be limiting due to small waste volume.

2) Non-Technical

a. Facility Status: Planned; estimated start date 01/07.

b. Permit Status: None.

c. Facility Location: Out of state; out of region.

3) Other

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Basis for Selection
Coordination Contacts with Facilities			
Incineration	Los Alamos National Laboratory	Controlled Air Incinerator-Liquid Feed System	Technically capable of treating this mixed waste stream if treatment of on-site only waste limitation is resolved.
Facility contact: Los Alamos National Laboratory has confirmed this facility is expected to be technically capable of treating this waste stream.			

In addition to the facilities included in the above evaluation, the following DOE facilities were identified by the DOE site as being expected to have the technical capability to treat this waste stream. These sites were requested to evaluate this waste stream for treatment capability, even though no technically capable facility was identified by the Bettis evaluation, since this waste stream contains common hazardous constituents and radionuclides, and requires standard treatment technology.

Treatment Type	Site	System Name
Organic Destruction	Hanford Site	Thermal Treatment Facility Incinerator
Organic Destruction	Savannah River Site	CIF Incinerator-Liquid Feed System

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			28
7.0	Transportation			9,760
		Total Cost for Off-site Treatment (DOE) Option (1994) Dollars		9,788

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for lab packs is $12.50 per pound, 0.001 m^3 = 1 kg = 2.2 lb

7.0 (0.001 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Organic destruction	Scientific Ecology Group, Inc.	Based on limited available information, does not appear to be not capable of treating this waste stream.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably cannot treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat lab packs with metals and mercury.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform Organic destruction in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could not use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat lab packs with metals and mercury. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Organic destruction	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Chem Nuclear Systems, Inc.	Based on limited available information, appears to be potentially capable of treating this waste stream.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat lab packs with metals and mercury.

d. Packaging: Information not received.

e. Treatment Type: Can perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat lab packs with metals and mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform Organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing organic destruction.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Based on limited available information, probably cannot treat lab packs with metals and mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can only perform stabilization, cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists and operational.

b. Permit Status: Permitted to treat solid phased mixed material.

c. Facility Location: Salt Lake City, UT

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.

Organic destruction	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Organic destruction	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Non-Destructive Cleaning, Inc.	Based on available information, does not appear capable of treating this waste stream. Cannot treat identified hazardous constituents.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat lab packs with metals and mercury.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	NSSI/ Sources and Services, Inc.	Not capable of treating this waste stream. Cannot treat identified hazardous constituents.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat lab packs with metals and mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat lab packs with metals and mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform organic destruction.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other: Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Can treat lab packs with metals and mercury.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform organic destruction.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on-site.	
Organic destruction	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Organic destruction	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat lab packs with metals and mercury.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform organic destruction.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (none on hand, 0.001 cubic meters five year projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: Bettis 0000002077

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., organic destruction followed by stabilization) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$3,365,000
On-site Mobile Treatment Unit	$ 780,200
Off-site DOE Facility	$ 9,788
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these

costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at the Savannah River Site CIF Incinerator - Liquid Feed System.

Savannah River has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Savannah River Site CIF Incinerator - Liquid Feed System was selected as the preferred option from among technically capable DOE facilities based on facility status and location.

TREATMENT OPTION EVALUATION

I. Waste Stream Information

MWIR ID#: BT-W019

Waste Stream ID#: BETTIS 0000002081

Waste Stream Name: Lead

Waste Stream Description: Elemental lead, bricks, sheets, shot, wool, pipe hubs, seals, floor anchors, sprinkler fuses, etc.

Treatability Group: MLLW CH, elemental lead, toxic metals w/o mercury

Radionuclides: C^{14}, I^{129}, Tc^{99}, H^{3}, Ba^{137m}, Cs^{137}, Kr^{85}, Pu^{238}, Sr^{90}, Y^{90}, Pu^{241}, Cm^{242}, Se^{79}, Sm^{151}, Nb^{93m}, Zr^{93}, Cd^{113m}, Sn^{126}, Sb^{126m}, Cs^{135}, Sb^{126}, Sn^{121m}, Co^{60}, Ni^{63}, Ni^{59}, U enriched, Th-nat, Ra^{224}, Rn^{220}, Po^{216}, Pb^{212}, Bi^{212}, Po^{212}, Tl^{208}

EPA Waste Code(s): D008

Current Inventory: 1.3 cubic meters

Five Year Projection: 2.52 cubic meters

II. Treatment Option Evaluation

1. Waste Characterization Determination: Characterization is based on process knowledge. Characterization is sufficient to support identification of proper treatment technology.

2. Determine if Treatment of Waste to LDR Standards is Practicable: The LDR treatment standard for elemental lead is macroencapsulation.

3. Define and Analyze Existing On-Site or Readily Available Treatment Capabilities:

a. Treatment in Existing On-Site Facilities: No on-site treatment facility exists.

b. Modify Existing On-Site Facilities: N/A

c. Treatment Under Current Agreement with an Existing Commercial Vendor or Existing Mobile Treatment System Arrangement: No current

agreement with a commercial vendor or mobile treatment system arrangement currently exists.

d. Treatment Using Low-Volume Waste Methods: This waste stream is not amenable to RCRA simple treatment in the accumulation container. Other low-volume treatment methods for this waste stream (e.g., R&D, or pilot scale equipment) are not currently available.

4. Determine Whether the Waste Stream Can Be Treated Off-Site: Based on DSTP framework document assumptions concerning waste streams likely to require on-site treatment (e.g., large volume, waste water, explosive, and remote-handled waste streams), this waste stream could be transported off-site for treatment.

5. Evaluate Treatment Options for Waste Streams for which On-site or Readily Available Treatment Capabilities Do Not Exist:

a. On-Site Treatment

(1) Treatment at a New On-Site Facility: Treatment of this waste stream at a permitted on-site facility would consist of macroencapsulation.

The facility design, construction, and permitting costs would have to be amortized over the small volume for this waste stream. These costs are not currently budgeted.

ON-SITE TREATMENT OPTION TOTAL COST ESTIMATE
(macroencapsulation)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	250,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		250,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of construction cost based on Bettis experience.)	53,000	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (to incorporate required work area into existing radiological work facilities and procure equipment (e.g., shredder) - based on extensive Bettis facility construction experience)	530,000	
	2.5	Equipment (included in 2.4)	0	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITY CONSTRUCTION COSTS		583,000
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current and projected volume (3.82m^3) based on estimated 0.2 m^3/shift, 6 mandays/shift, one shift training also included.)	114,600	
	3.2	Annual Utilities	1,000	
	3.3	Annual Materials	6,000	
	3.4	Annual Maintenance	12,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	133,600	
		X NUMBER OF YEARS OF OPERATION	x 5 YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		668,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	20,000	
	4.2	Closure, Post-Closure, Monitoring	30,000	
		TOTAL DECONTAMINATION AND DECOMMISSION		50,000
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COSTS (1994) Dollars		1,551,000

Note Years of Operation: 5 years used to facilitate comparison of all options based on 5 year projected waste generation although facility design life of 20 years is expected.

(2) Mobile Treatment Units: Development of mobile treatment units has been evaluated as a treatment option for NNPP mixed waste streams. Because many common work practices are performed at the ten NNPP sites which generate mixed waste, several common waste streams exist at more than one site, and common treatment types are required for many NNPP waste streams. Use of mobile treatment units for treating these wastes would enable sharing of costs for system design and construction among several sites to reduce overall cost compared with the option of constructing fixed facilities at each site. Costs associated with incorporation of treatment equipment in mobile platforms (e.g., trailers), system transportation, system installation and connection of services at each treatment site, and mobile unit storage when not in use were considered in this evaluation.

For this waste stream, consistent with section 2 above, use of a mobile treatment system to perform macroencapsulation was considered.

For the mobile treatment unit option, the site share of system design and construction costs, as well as permitting costs would have to be amortized over the small volume of this waste stream. These costs are not currently budgeted.

MOBILE TREATMENT OPTION TOTAL COST ESTIMATE
(macroencapsulation)

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests (not required)	0	
	1.2	Demonstration Costs (not required)	0	
	1.3	Operations Budget Funded Activities (Start-up)		
		1.3.1 Conceptual Design (included in 2.1)	0	
		1.3.2 Safety Assurance Documentation (included in 1.3.3)	0	
		1.3.3 Permitting (estimate for permitting and licensing, including notice of intent, demonstration of compliance, modification of existing RCRA permits, conducting NEPA evaluations (presumes EA will be sufficient, EIS will not be required), and test runs, as required, based on limited Bettis experience.)	250,000	
		1.3.4 Preparation for Operations (included in 2.4)	0	
		1.3.5 Project Management (included in 2.4)	0	
		TOTAL PRE-OPERATIONS		250,000
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) (estimated to be 10 percent of equipment and construction cost. Bettis share of design cost.)	6,700	
	2.2	Inspection (included in 2.4)	0	
	2.3	Project Management (included in 2.4)	0	
	2.4	Building Construction (based on extensive Bettis facility construction experience. Bettis share of construction cost, including cost to incorporate equipment in mobile platform.)	38,500	
	2.5	Equipment (Bettis share of cost, assumes system would be shared by 10 NNPP sites)	28,400	
	2.6	Construction Management (included in 2.4)	0	
	2.7	Contingency (included in 2.1 & 2.4)	0	
		TOTAL FACILITIES CONSTRUCTION COSTS		73,600
3.0	Operating and Maintenance			
	3.1	Annual Operating Labor (to treat current and projected volume 3.82 m^3 based on 0.2 m^3/shift, 6 mandays/shift, one shift training and one manday for system installation and connection of services also included.)	114,600	
	3.2	Annual Utilities	1,000	
	3.3	Annual Materials (includes mobile unit transportation cost)	6,000	
	3.4	Annual Maintenance (Bettis share of cost)	6,000	
	3.5	Annual Contingency (included in 3.1 thru 3.4)	0	
		TOTAL ANNUAL O&M	127,600	
		X NUMBER OF YEARS OF OPERATION	x 5 YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		638,000
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D (Bettis share of cost)	6,700	
	4.2	Closure, Post-Closure, Monitoring (Bettis share of cost)	10,000	
		TOTAL DECONTAMINATION AND DECOMMISSION COSTS		16,700
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-Site Treatment (DOE)			0
7.0	Transportation			0
		TOTAL COST (1994) Dollars		978,300

Note: Years of Operation: 5 years used to facilitate comparison of all options based on 5 year projected waste generation although facility design life of 20 years is expected.

b. Off-Site Treatment At Other DOE Facilities: The following existing and planned mixed waste treatment facilities at other DOE sites were identified in the CSTP as potential technically feasible options for treating this waste stream. Consistent with section (2) above, facilities that perform macroencapsulation were identified. For facility evaluations where only the primary treatment is identified, Bettis assumed that if multiple treatment steps were required the subsequent treatment steps would be completed at the site performing the primary treatment. These facility options have been further evaluated based on available information, primarily from the updated Mixed Waste Inventory Report, to determine whether they are technically capable of treating this waste stream, and to consider non-technical factors which may affect the overall desirability of specific options. The technical evaluation included consideration of facility hazardous constituent limits, radionuclide limits, waste form requirements, waste packaging requirements, and facility capacity, to the extent this information was available. Non-technical factors considered included facility status, permit status and restrictions, and facility location. Based on this evaluation, primary candidate off-site DOE facility options for this waste stream have been selected for further consideration and comparison with other treatment options.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Macroencapsulation	Hanford Site	WRAP II A (0326)	Based on available information, this facility appears to be technically capable of treating this waste stream.	Based on status and distance from generator this is not an optimal candidate for treating this waste stream.

1) Technical

a. Hazardous Constituent: Facility accepts identified EPA code (D008) for this waste stream.

b. Radionuclides: To be determined.

c. Waste Form: Facility accepts Inherently Hazardous Wastes (waste code 7000) which includes elemental lead, the hazardous constituent of this waste stream.

d. Packaging: Facility will accept packaging containing this waste (55 gal drum).

e. Treatment Type: Treatment will consist of stabilization and solidification by grout and polymer for organics and sludges and encapsulation of metals.

f. Capacity: System capacity information not provided; should not be limiting due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Planned; estimated start date TBD.

b. Permit Status: RCRA Interim (Part A)

c. Facility Location: Out of state; out of region

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization	Oak Ridge Y-12 Plant	MW Treatment Facility-Fixation/ Stabilization (0219)	Facility not to be built as planned and therefore not evaluated.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility not to be built as planned.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (immobilization)	Rocky Flats Plant	Leaded Gloves and Bulk Lead Treatment (0344)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because it does not accept the hazardous constituent code or the waste form.	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA code (D008).

b. Radionuclides: To be determined.

c. Waste Form: Facility does not accept this waste form waste matrix code.

d. Packaging: None listed.

e. Treatment Type: Steam cleaning/stripping and low temperature thermal desorption and super critical Co_2 extraction for removal of organic contaminants from the surface of solid waste. Size reduction if required. Immobilization or macroencapsulation after treatment to meet LDR.

f. Capacity: TBD - should not be limiting due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/08.

b. Permit Status: No information provided.

c. Facility Location: Out of state; out of region.

3) Other: System 5 of CTMP.

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (solidification)	Sandia National Laboratory	Radioactive and Mixed Waste Management Facility (0213)	Based on available information, this facility does not appear to be technically capable of treating this waste stream because it does not accept the hazardous constituent or the waste form..	

1) Technical

a. Hazardous Constituent: Facility does not accept identified EPA code (D008) for this waste stream.

b. Radionuclides: Facility accepts identified radionuclides for this waste stream.

c. Waste Form: Facility does not accept waste code for this waste stream.

d. Packaging: Waste stream 55 gal drum packaging is acceptable to this facility.

e. Treatment Type: Primarily a repackaging, characterizing type facility; very little treatment will occur. Treatment will include some limited stabilization, solidification and immobilization.

f. Capacity: To be determined, but will be very limited.

2) Non-technical

a. Facility Status: Under construction, estimated start date 06/95.

b. Permit Status: RCRA (Interim); RCRA Final applied for.

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (vitrification)	Los Alamos National Laboratory	Waste Immobilization Facility (0510)	Facility not evaluated due to no information available.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: This facility is not listed in latest MWIR.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (macroencapsulation)	Idaho National Engineering Laboratory	Waste Generator Treatment Plant (0244)	Facility not evaluated.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility has been removed from latest MWIR.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (macroencapsulation)	Savannah River Site	Macroencapsulation Unit SRS (0144)	Facility deleted from MWIR database. It will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (macroencapsulation)	Idaho National Engineering Laboratory	IWPF Macroencapsulation System (0335)	Based on available information, this facility appears to be technically capable of treating this waste stream.	Based on status, estimated start date and location, this is not the best candidate for treating this waste stream.

1) Technical

a. Hazardous Constituent: Facility will accept the EPA code (D008) for this waste stream.

b. Radionuclides: Unknown at this time.

c. Waste Form: Facility will accept this waste matrix code for this waste stream.

d. Packaging: N/A; packaging in 55 gal drum is accepted by sizing unit which receives waste.

e. Treatment Type: Macroencapsulation not otherwise specified; sizing if required could be provided by IWPF sizing unit.

f. Capacity: Unknown at this time; should be limiting due to small volume of this waste stream.

2) Non-technical

a. Facility Status: Planned; estimated start date 01/07.

b. Permit Status: No information provided.

c. Facility Location: Out of state; out of region.

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (macroencapsulation)	Idaho National Engineering Laboratory	Mixed Low-Level Waste Treatment Facility (MLLWTF) (0641)	Facility deleted from MWIR database. It will not be built.	

1) Technical

a. Hazardous Constituent:

b. Radionuclides:

c. Waste Form:

d. Packaging:

e. Treatment Type:

f. Capacity:

2) Non-technical

a. Facility Status: Facility will not be constructed.

b. Permit Status:

c. Facility Location:

3) Other

Treatment Type	Site	System Name	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Facility with Screening Criteria				
Stabilization (macroencapsulation)	Idaho National Engineering Laboratory	WEDF - Macroencapsulation Unit (0323)	Based on available information, this facility appears to be technically capable of treating this waste stream.	Potential candidate based on status, location; not ideal.

1) Technical

a. Hazardous Constituent: Facility will accept identified EPA code (D008) for this waste stream.

b. Radionuclides: To be determined.

c. Waste Form: Facility will accept identified waste matrix code for this waste stream.

d. Packaging: N/A; WEDF has central sizing unit which receives and distributes wastes as required; 55 gal drum of this waste stream is acceptable.

e. Treatment Type: Sizing provided if necessary to fit the encapsulation unit; macroencapsulation in plastics, polymers and inorganic matrices.

f. Capacity: Unknown at this time; should not be limiting due to small volume of this waste stream and potential capacity of WEDF system.

2) Non-technical

a. Facility Status: Planned, capital funded; estimated start date 10/96.

b. Permit Status: RCRA (Interim) submitted.

c. Facility Location: Out of state; out of region.

3) Other

Based on the evaluation described above, the following off-site DOE facilities are identified as primary candidates for treatment of this waste stream (listed in order of preference). The facilities contacted were requested to confirm they are technically capable of treating this waste stream and to determine whether any additional factors should be considered in selecting a preferred option. In addition, each DOE site was requested to confirm that the primary treatment facility would also perform any additional treatment steps to achieve LDR or identify a separate secondary treatment facility to complete LDR treatment. The results of these coordinations contacts are summarized below.

Primary Candidate Off-Site DOE Facilities

Treatment Type	Site	System Name	Reason For Selection
Coordination Contact with Facilities			
Macroencapsulation	Hanford Site	WRAP II A	Technically capable, not optimal due to distance and unknown start date.
Facility Contact: Hanford Site has confirmed this facility is expected to be technically capable of treating this waste stream.			
Stabilization (macroencapsulation)	Idaho National Engineering Laboratory	WEDF - Macroencapsulation Unit	Technically capable, 10/96 start date, location not ideal.
Facility Contact: Idaho National Engineering Laboratory was not contacted regarding treatment of this waste stream.			
Stabilization (macroencapsulation)	Idaho National Engineering Laboratory	IWPF- Macroencapsulation System	Technically capable, not optimal due to distance and 1/07 start date.
Facility Contact: Idaho National Engineering Laboratory was not contacted regarding treatment of this waste stream.			

OFF-SITE DOE TREATMENT OPTION TOTAL COST ESTIMATE

			SUB $	ELEMENT $
1.0	Pre-Operations			
	1.1	Studies and Bench Scale Tests	0	
	1.2	Demonstration Costs	0	
	1.3	Operation Budget Funded Activities		
		1.3.1 Conceptual Design	0	
		1.3.2 Safety Assurance Documentation	0	
		1.3.3 Permitting	0	
		1.3.4 Preparation for Operation	0	
		1.3.5 Project Management		
		TOTAL PRE-OPERATIONS		0
2.0	Facility Construction Costs			
	2.1	Design (Title I and II) Equipment (included in 2.2)	0	
	2.2	Inspection	0	
	2.3	Project Management	0	
	2.4	Building Construction	0	
	2.5	Equipment (inc. indirect)	0	
	2.6	Construction Management	0	
	2.7	Contingency	0	
		TOTAL FACILITY CONSTRUCTION COSTS		0
3.0	Operating and Maintenance			
	3.1	Annual Operating Manpower	0	
	3.2	Annual Utilities	0	
	3.3	Annual Materials	0	
	3.4	Annual Maintenance	0	
	3.5	Annual Contingency	0	
		TOTAL ANNUAL O&M	0	
		X NUMBER OF YEARS OF OPERATION x	YRS	
		TOTAL OPERATIONS AND MAINTENANCE COSTS		0
4.0	Decontamination and Decommissioning			
	4.1	Facility D&D	0	
	4.2	Closure, Post-Closure, Monitoring	0	
		TOTAL DECONTAMINATION AND DECOMMISSIONING		0
5.0	Contracted Services			
	5.1	Commercial Treatment /Disposal	0	
	5.2	Mobile Treatment	0	
		TOTAL CONTRACTED SERVICES		0
6.0	Off-site Treatment (DOE)			154,000
7.0	Transportation			9,760
	Total Cost for Off-site Treatment (DOE) Option	(1994) Dollars		163,760

Notes 6.0 Based on cost estimate guidance for off-site options, generic unit treatment cost for elemental lead is $9.50 - $10.00 per pound, conservatively assume $10.00 per pound, 3.82 m^3 = 7,000 kg = 15,400 lb

7.0 (3.82 m^3 requires one shipment, conservatively assume 1,000 miles, transportation cost = ($880 fixed cost per shipment + 1,000 miles @ $4.00 per mile (for CH MLLW) X 2 (to return residue)

c. Commercial Treatment: An evaluation of commercial mixed waste treatment capabilities was performed to determine whether existing and/or soon-to-be-on-line commercial facilities are available to treat this waste stream. An extensive search identified the following potentially suitable commercial vendors:

Facility Name
Battelle Pacific Northwest Division
Scientific Ecology Group, Inc.
Diversified Scientific Services, Inc.
Compacting Technologies Lab
Chem Nuclear Systems, Inc.
Quadrex Environmental Co.
Envirocare of Utah, Inc.
Roy F. Weston, Inc.
Rust Engineering, Inc.
Non-Destructive Cleaning, Inc.
NSSI/Sources and Services, Inc.
RAMP
International Technology Corp.
Advanced Recovery Systems
Nuclear Fuel Services

Each of these vendors was contacted and provided detailed waste stream information (including treatability group, hazardous and radioactive constituents, current and projected generation volumes, and treatment required to meet LDR standards). In addition, a questionnaire was provided, requesting information on existing and planned treatment capabilities (including capability to properly handle the hazardous and radioactive constituents), estimated treatment cost, permit status, and whether any administrative or legal barriers exist. The following table summarizes commercial treatment capability for this waste stream based primarily on vendor responses to these questionnaires.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Metal recovery and stabilization	Battelle Pacific Northwest Division	Did not respond to questionnaire, no other information available.	
Metal recovery and stabilization	Scientific Ecology Group, Inc.	Based on limited available information, appears to be potentially capable of treating this waste stream.	Permitted to perform treatability studies only.

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably can treat identified radionuclides.

c. Waste Form: Can treat elemental lead or toxic waste without mercury.

d. Packaging: Not expected to be limiting.

e. Treatment Type: Can perform metal recovery and stabilization in treatability studies.

f. Capacity Unknown

2) Non-technical

a. Facility Status: Operational

b. Permit Status: Awaiting approval for mixed waste permits. Permitted to perform mixed waste treatment for treatability studies only.

c. Facility Location: Oak Ridge, TN

3) Other SEG potentially could use this waste stream in treatability studies required to obtain their RCRA Part B permit. It may not be appropriate to treat the entire waste stream in a treatability study. Treatment costs are volume dependent and unknown at this time.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Metal recovery and stabilization	Diversified Scientific Services, Inc.	Not capable of treating this waste stream. DSSI treats only liquid mixed waste.	

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat elemental lead or toxic waste without mercury. Can treat only liquid waste.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform metal recovery and stabilization of solid waste.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Existing and operational.

b. Permit Status: Permitted to perform treatment on liquid mixed waste only.

c. Facility Location: Kingston, TN

3) Other

Metal recovery and stabilization	Compacting Technologies Lab	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Metal recovery and stabilization	Chem Nuclear Systems, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Cannot perform metal recovery.	

1) Technical

a. Hazardous Constituent: Based on limited available information, probably can treat identified hazardous constituents.

b. Radionuclides: Based on limited available information, probably cannot treat identified radionuclides.

c. Waste Form: Can treat elemental lead or toxic waste without mercury.

d. Packaging: Information not received.

e. Treatment Type: Cannot perform metal recovery.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Permitted for cement stabilization and thermal destruction.

c. Facility Location: Columbia, SC

3) Other Cost estimate not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Metal recovery and stabilization	Quadrex Environ-mental Co.	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream. Future capability uncertain.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat elemental lead or toxic waste without mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform metal recovery and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Gainesville, FL

3) Other Current company is being purchased - purchase date is 3/31/94.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Metal recovery and stabilization	Envirocare of Utah, Inc.	Based on limited available information, does not appear to be capable of treating this waste stream. Not capable of performing metal recovery.	
1) Technical			
a. Hazardous Constituent:		Based on limited available information, probably can treat identified hazardous constituents.	
b. Radionuclides:		Cannot treat identified radionuclides.	
c. Waste Form:		Based on limited available information, probably can treat elemental lead or toxic waste without mercury.	
d. Packaging:		Information not provided.	
e. Treatment Type:		Can only perform stabilization, cannot perform metal recovery.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Exists and operational.	
b. Permit Status:		Permitted to treat solid phased mixed material.	
c. Facility Location:		Salt Lake City, UT	
3) Other		Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet. Treatment costs are unknown.	
Metal recovery and stabilization.	Roy F. Weston, Inc.	Did not respond to questionnaire, no other information available.	
Metal recovery and stabilization.	Rust Engineering Inc.	Did not respond to questionnaire, no other information available.	

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Metal recovery and stabilization	Non-Destructive Cleaning, Inc.	Potentially capable of treating this waste stream.	Can only treat mixed waste on-site. Would entail developing a portable system. Cost prohibitive.

1) Technical

a. Hazardous Constituent: Can treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat elemental lead or toxic waste without mercury.

d. Packaging: N/A, facility would develop a mobile unit.

e. Treatment Type: Can perform metal recovery and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Would develop a mobile unit.

b. Permit Status: Information not provided.

c. Facility Location: Walpole, MA.

3) Other

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Metal recovery and stabilization	NSSI/ Sources and Services, Inc.	Not capable of treating this waste stream. Not capable of treating asbestos.	Does not normally work for federal government directly and does not wish to become a subcontractor.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Can treat elemental lead or toxic waste without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Can perform metal recovery and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists, operational.

b. Permit Status: Has mixed waste permits but details not provided.

c. Facility Location: Houston, TX

3) Other Does not normally work for the federal government. Cost data not provided.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Metal recovery and stabilization	RAMP Industries	Not capable of treating this waste stream. Cannot perform required treatment.	Not permitted to treat this waste stream.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Cannot treat identified radionuclides.

c. Waste Form: Cannot treat elemental lead or toxic waste without mercury.

d. Packaging: Facility accepts only liquid scintillation vials.

e. Treatment Type: Performs only bulking (non-LDR treatment), cannot perform metal recovery and stabilization.

f. Capacity: Information not provided.

2) Non-technical

a. Facility Status: Exists

b. Permit Status: Only mixed waste permitted for treatment is liquid scintillation vials.

c. Facility Location: Denver, CO

3) Other Did not respond to questionnaire and may not be interested in Naval mixed waste. Data based on DOE fact sheet.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Metal recovery and stabilization	International Technology Corp.	Not capable of treating this waste stream.	Not capable of treating this waste stream. Would develop mobile unit. However, this would be prohibitively expensive.
1) Technical			
a. Hazardous Constituent:		Cannot treat identified hazardous constituents. Can perform treatability studies only.	
b. Radionuclides:		Cannot treat identified radionuclides. Can perform treatability studies only.	
c. Waste Form:		Can treat elemental lead or toxic waste without mercury.	
d. Packaging:		N/A, facility would develop mobile unit.	
e. Treatment Type:		Cannot perform metal recovery and stabilization.	
f. Capacity:		Information not provided.	
2) Non-technical			
a. Facility Status:		Not existing.	
b. Permit Status:		Permitted to perform treatability studies only.	
c. Facility Location:		Knoxville, TN	
3) Other		Facility will develop a system and bring the system on-site.	
Metal recovery and stabilization.	Advanced Recovery Systems (ARS)		ARS is not considering development of treatment capability for mixed waste.

Treatment Type Required	Commercial Vendor	Result of Technical Evaluation	Result of Non-Technical Evaluation
Comparison of Vendor with Screening Criteria			
Metal recovery and stabilization	Nuclear Fuel Services, Inc (NFS)	Not capable of treating this waste stream. Has no capacity for treatment of mixed waste.	Performs only treatability studies for mixed wastes.

1) Technical

a. Hazardous Constituent: Cannot treat identified hazardous constituents.

b. Radionuclides: Can treat identified radionuclides.

c. Waste Form: Cannot treat elemental lead or toxic waste without mercury.

d. Packaging: Information not provided.

e. Treatment Type: Cannot perform metal recovery and stabilization.

f. Capacity:

2) Non-technical

a. Facility Status: Existing.

b. Permit Status: Permitted to perform only treatability studies on mixed wastes.

c. Facility Location: Erwin, TN

3) Other Data based on DOE fact sheet. Cost data not provided.

Based on the evaluation described above, only limited potential commercial capability is available for treatment of this waste stream. Substantial additional effort would be required to establish whether any of these potential commercial options could actually treat this waste stream (meet all technical requirements) and to resolve the significant uncertainties which exist regarding permit issues. Based on questionnaire responses and telephone contacts, a generally low level of interest on the part of commercial vendors exists regarding treatment of this waste stream. This low interest is attributed to the very small waste stream volume (1.3 cubic meters on hand, 2.52 cubic meters five year projected generation). None of the vendors contacted provided cost estimates for treatment of this waste stream; however, it is anticipated that unit cost to treat this waste stream commercially would be high due to the small volume. In addition, substantial administrative effort would be required to establish and maintain contracts for commercial treatment.

6. Options Analysis and Comparison: The various treatment options evaluated for this waste stream (i.e., treatment in a new on-site fixed facility, on-site treatment using mobile treatment units, off-site treatment at another DOE facility, and off-site commercial treatment) have been compared in the various categories identified in the DOE "Treatment Selection Guides" document to facilitate selection of a preferred treatment option. The "Treatment Selection Guides" document is being used by all sites involved in the FFCA process to achieve an appropriate level of consistency in the treatment option evaluation and preferred option selection processes. A subjective high/middle/low ranking scheme, as described in the "Treatment Selection Guides", has been used to focus attention on areas of difference between the various treatment options. It is noted that a "high" ranking in a particular category identifies that the option compares favorably in that area (i.e., a "high" ranking for transportation risk or life-cycle cost equates to a relatively low risk or cost). No attempt has been made to assign numerical values to the rankings, weight the various categories, or quantify scoring results. The ranking process is not intended for use as the "decision maker", but rather as a tool to identify areas of difference.

TREATMENT OPTION EVALUATION ANALYSIS
WASTE STREAM: BETTIS 0000002081

TREATMENT OPTION

TREATMENT SELECTION GUIDE	SUB ELEMENTS	ON-SITE PERMITTED TREATMENT FACILITY	ON-SITE MOBILE TREATMENT	OFF-SITE DOE FACILITY	OFF-SITE COMMERCIAL TREATMENT
Treatment Effectiveness	Volume Reduction	MIDDLE	MIDDLE	MIDDLE	MIDDLE
	Secondary Waste Generation	HIGH	HIGH	HIGH	HIGH
	Destruction, Removal & Demobilization Efficiency	HIGH	HIGH	HIGH	HIGH
	Flexibility	HIGH	HIGH	HIGH	HIGH
	Final Waste Form	HIGH	HIGH	HIGH	HIGH
	Ability to be Shipped	HIGH	HIGH	HIGH	HIGH
Implementability	System Implementability	HIGH	HIGH	HIGH	MIDDLE
	Availability	HIGH	HIGH	HIGH	MIDDLE
	Scalability	HIGH	HIGH	HIGH	HIGH
	Schedule for Waste Treatment	MIDDLE	MIDDLE	MIDDLE	MIDDLE
Environmental, Health and Safety	Environment/Public Health	HIGH	HIGH	HIGH	HIGH
	Non-Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Operational Worker Health and Safety	HIGH	HIGH	HIGH	HIGH
	Transportation Risk	HIGH	HIGH	MIDDLE	MIDDLE
Regulatory Compliance	Regulatory Compliance	MIDDLE	MIDDLE	MIDDLE	LOW
Stake Holder Concerns	Public Acceptance	HIGH	HIGH	HIGH	HIGH
	Equity Concerns	HIGH	HIGH	MIDDLE	MIDDLE
Life-Cycle Cost	Life-Cycle Cost	LOW	LOW	HIGH	MIDDLE
Technology Development	Market for Technology	N/A	N/A	N/A	N/A
	Private Sector Involvement	N/A	N/A	N/A	N/A

Treatment Effectiveness: All four treatment options are ranked the same in the treatment effectiveness categories since the same treatment technology (i.e., macroencapsulation) is utilized for each option. This is a standard, robust technology which, with a high degree of confidence, will be capable of effectively treating this waste stream.

Implementability: The on-site, mobile, and off-site DOE options are ranked "high" in the "system implementability" and "availability" categories based on high confidence that the required treatment technology could be established for any of these configurations. The commercial treatment option is ranked "middle" in these categories based on uncertainty regarding available commercial capabilities. All four options are ranked "middle" in the "schedule for waste treatment" category. For the on-site fixed facility and mobile treatment options it is expected that several years would be required to obtain/identify funding, complete system design and construction,and accomplish treatment. For the off-site DOE facility option, it is expected to take several years for the primary candidate facility to be completed and accept this waste stream for treatment. For the off-site commercial option, substantial time would be required to resolve technical and permit uncertainties and establish contractual arrangements.

Environment, Health and Safety: All four treatment options for this waste stream could be accomplished with little to no risk to workers, the public, or the environment. For the on-site options, no transportation prior to treatment would be required. For the off-site options, transportation of this waste stream (very small volume, low radioactivity levels) could be accomplished with minimal risk. All options may require transportation of treatment residue to a disposal facility, which could also be accomplished with minimal risk.

Regulatory Compliance: For the on-site options, substantial effort would be required to obtain treatment permits. While it is anticipated that all requirements to obtain such permits could be met, these options are ranked "middle" in the "regulatory compliance" category based on uncertainty associated with limited Bettis experience in this area. For the commercial treatment option, significant uncertainty exists regarding the permit status and prospects of potential vendors.

Stakeholder Concerns: Given the small volume of mixed waste at issue at Bettis, little public interest in the FFCA process is anticipated; any of the treatment options evaluated for this waste stream are expected to be acceptable to the public. For the off-site options, the equity issue associated with waste moving between states for treatment will need to be resolved. Based on the very small volume of this waste stream, it is expected that such resolution should be achievable.

Life Cycle Cost: Cost estimates for the treatment options evaluated for this waste stream are as follows:

New On-site Fixed Facility	$1,551,000
On-site Mobile Treatment Unit	$ 978,300
Off-site DOE Facility	$ 163,760
Off-Site Commercial	Not Available

The high costs associated with the on-site options are due to the high fixed costs associated with facility design and construction (site share for the mobile unit option) and permitting. Since the projected volume for this waste stream is very small, these

costs cannot be amortized over a large waste volume. None of the commercial vendors contacted provided cost estimates for treatment of this waste stream. It is anticipated that the cost to treat this waste stream commercially would be high due to the small volume and substantial administrative effort associated with contracting for commercial treatment.

7. Preferred Option Selection: Based on treatment option evaluations and comparisons discussed above, the Bettis preferred treatment option for this waste stream is off-site treatment at Hanford Site WRAP IIA.

Hanford has confirmed this facility is expected to be technically capable of treating this waste stream. The site will perform all treatment steps to produce a waste form that meets LDR requirements.

Comparison of treatment options indicated that the most significant discriminator was life-cycle cost with off-site DOE treatment ranking most favorably. Off-site DOE treatment is considered the best overall alternative because the large difference in life-cycle cost and the projected small volume of this waste stream make the design and effort associated with construction of on-site or mobile treatment facilities impractical. The Hanford Site WRAP IIA was selected as the preferred option from among technically capable DOE facilities based on facility status, location and to consolidate shipment of all Bettis mixed waste streams to be treated off-site to a single DOE facility.

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2.0 Cost Comparison Between All On-site Treatment, All Mobile Treatment, and Preferred Treatment Options

The above treatment option evaluations were done on a waste stream by waste stream basis. Cost comparisons from these evaluations played a significant role in selecting the preferred treatment options. Several BT waste streams require the same treatment types; therefore, if on-site or mobile treatment was selected for all waste streams, a unique facility for each waste stream would not be required. To account for this fact, the following site-wide cost comparison between all on-site treatment, all mobile treatment, and the selected preferred options was performed. This cost comparison supports selection of the identified preferred options.

Waste Stream	Treatment Steps	Preferred Option	Preferred Option Cost	Incremental On-site Cost	Incremental Mobile Site Cost
BT-W001 Oil Containing Heavy Metal #1	Organic destruction followed by chemical reduction followed by stabilization.	Savannah River Site - CIF Incinerator Solid Feed System	$10,827	$3,253,600	$761,800
BT-W002 Spent Solvent Rags	Organic destruction followed by stabilization.	Savannah River Site - CIF Incinerator Solid Feed System	$10,312	$39,200*	$33,200*
BT-W003 Oil Containing Heavy Metal #2	Organic destruction followed by stabilization.	Savannah River Site - CIF Incinerator Liquid Feed System	$12,301	$32,300*	$26,300*
BT-W005 Lead and Chromium Based Paint Chips	Chemical reduction followed by stabilization.	RCRA Simple Treatment On-Site	$108,000	$43,000*	$30,000*
BT-W007 Solids with Solvents	Organic destruction followed by stabilization.	Savannah River Site - CIF Incinerator Solid Feed System	$11,608	$38,600*	$32,600*
BT-W008 Mercury Containing Waste	Mercury Separation followed by stabilization.	INEL - Mercury Retort	$10,690	$4,058,000	$963,500

Waste Stream	Treatment Steps	Preferred Option	Preferred Option Cost	Incremental On-site Cost	Incremental Mobile Site Cost
BT-W009 **VOC Contaminated Soil**	Organic destruction followed by stabilization.	Hanford Site-Thermal Treatment Facility Incinerator	$17,428	$37,000*	$31,000*
BT-W010 Waste Oil with Heavy Metals and PCBs	Organic destruction followed by stabilization.	Hanford Site-Thermal Treatment Facility Incinerator	$11,586	$43,000*	$37,000*
BT-W012 VOC & PCB Contaminated Debris	Organic destruction followed by stabilization.	Hanford Site-Thermal Treatment Facility Incinerator	$153,995	$287,300*	$281,300*
BT-W013 VOC &PCB Contaminated Soil	Organic destruction followed by stabilization.	Hanford Site-Thermal Treatment Facility Incinerator	$23,130	$84,000*	$78,000*
BT-W017 Ion Exchange Resin	Organic destruction followed by stabilization.	Savannah River Site - CIF Incinerator Solid Feed System	$9,772	$33,000*	$27,000*
BT-W018 TCLP Extraction Fluid	Organic destruction followed by stabilization.	Savannah River Site - CIF Incinerator Liquid Feed System	$9,788	$165,000*	$135,000*
BT-W019 Lead	Macroen-capsulation	Hanford Site - WRAP II A	$163,760	$1,551,000	$978,300
Total			$553,197	$9,665,000	$3,415,000

* Only includes facility operation and maintenance costs associated with treating this waste stream because more than one site waste stream will utilize this facility. Facility design and construction, permitting, and other one-time costs have been accounted for in a separate waste stream.

DEFINITIONS

The terms defined below are used in this DSTP. Common abbreviations, if any, follow the term.

Best Available Technology (BAT) or Best Demonstrated Available Technology (BDAT) - (1) The technology for treating a particular waste, selected from among others after taking into account factors related to technology, economics, public policy, and other parameters. (2) Treatment technologies that have been shown through actual use to yield the greatest environmental benefit among competing technologies that are practically available.

Cemented Solids (as a waste matrix) - Sludges or solids (e.g., particulates, etc.) that have been solidified/stabilized with cement or other solidifying agents but do not meet LDR treatment standards. These wastes may require pretreatment (e.g., crushing/grinding, etc.) prior to subsequent LDR treatment.

Chemical Reduction (CHRED) - Chemical reduction utilizing the following reducing reagents (or waste reagents) or combination of reagents: (1) sulfur dioxide; (2) sodium, potassium, or alkali salts of sulfites, bisulfites, metabisulfites, 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 waste water residues). Chemical reduction is commonly used for the reduction of hexavalent chromium to the trivalent state.

Concentration Based Standard - In certain cases a concentration based standard has been developed for an extract of a restricted waste or treatment residue, or the constituent concentration in the waste or treatment residue. These standards are based on BDAT and the waste or waste extract or treatment residue must not exceed these concentrations if the waste is to be land disposed.

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

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

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 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 previous conditions.

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

Hazardous Substance - (1)(a) Any substance designated pursuant to §311(b)(2)(A) of the FWPCA; (b) any element, compound, mixture, solution, or substance designated pursuant to §102 of CERCLA; (c) any hazardous waste having the characteristics identified under or listed pursuant to §3001 of the SWDA; (d) any toxic pollutant listed under §307(a) of the FWPCA; (e) any hazardous air pollutant listed under §112 of the CAA; and (f) any imminently hazardous chemical substance or mixture with respect to which the Administrator of EPA has taken action pursuant to §7 of TSCA. (2) Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive.

Any substance designated by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or if otherwise emitted into the environment. (3)§101(14) of CERCLA, as amended, defines "hazardous substance" chiefly by reference to other environmental statutes, such as the SWDA, FWPCA, CAA, and TSCA. The term excludes petroleum, crude oil or any fraction thereof, natural gas, natural gas liquids, or synthetic gas usable for fuel. Under the Act, OERR also may include other substances that it specifically designates as "hazardous".

Hazardous Waste (HW) - (1) Those wastes that are designated hazardous by EPA [or authorized state] Regulations. (2) Byproducts of production or operation that can pose a potential hazard to human health or the environment when improperly managed and that possess at least one of four characteristics (ignitability, corrosivity, reactivity, toxicity), or that appear on special EPA lists. (3) A solid waste or combination of solid waste, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may (a) cause, or significantly contribute to, an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. (4) Those wastes listed by EPA or meeting characteristics specified by EPA in their criteria pursuant to the RCRA. Disposal treatment or storage of hazardous wastes can only take place in a site or facility issued a permit by EPA or a state. Note: Source, special nuclear material, and byproduct material, as defined by the AEA of 1954 as amended, are specifically excluded from the term hazardous waste.

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

High-Level Radioactive Waste (HLW) - (1) As defined by the NWPA, high-level waste is (a) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including the liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (b)

other highly radioactive material that the NRC, consistent with existing law, determines by rule to require permanent isolation. (2) (a) Irradiated reactor fuel, (b) liquid wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, and (c) solids into which such liquid wastes have been converted.

Inorganic Debris (as a waste matrix) - Wastes with matrices meeting the definition of debris per the 8/18/92 LDR debris rulemaking (57 FR 37194, 8/18/92). More specifically this category is defined for wastes that contain > 90 percent inorganic debris. Example inorganic debris materials are: metal shapes (e.g., equipment, scrap, etc.), metal turnings, glass (e.g., light tubes, leaded glass, etc.), ceramic materials, concrete, 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. Waste in this category may also contain some debris materials provided the amount of debris is less than 50 percent (based on 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. Example waste materials in this category are: sludges, ashes, sand blasting media, absorbed aqueous or organic liquids (or inorganic particulate absorbents), ion exchange resins, and paint chips/residues.

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

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

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

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

Mixed TRU (MTRU) Waste - TRU waste that also includes hazardous materials as

identified in 40 CFR 261, Subparts C and D.

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

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

NNPP (Program) - Joint DOE/Navy program responsible for all aspects of naval nuclear propulsion.

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

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

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 sludge or particulate materials. Waste in this category may also contain some debris materials provided the amount of debris is less than 50 percent (based on LDR debris rule). As opposed to Inorganic Sludges/Particulates, wastes in this category would not leave a large residue when thermally treated. Example waste materials in this category are: organic sludge (e.g., sewage sludges), activated carbon, organic resins, and absorbed liquids (organic particulate absorbents).

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

Radioactive Waste - (1) Solid, liquid, or gaseous material that contains radionuclides regulated under the AEA of 1954, as amended, and of negligible economic value considering costs of recovery. (2) A solid, liquid, or gaseous material of negligible economic value that

contains radionuclides in excess of threshold quantities. Does not include material contaminated by radionuclides from nuclear weapons testing.

Remote-Handled Waste (RH Waste) - (1) Packaged waste with an external surface dose rate that exceeds 200 mrem per hour.

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

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

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

Treatability Group - Based on the radioactive characteristics, hazardous components, and physical/chemical matrices, 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.

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