

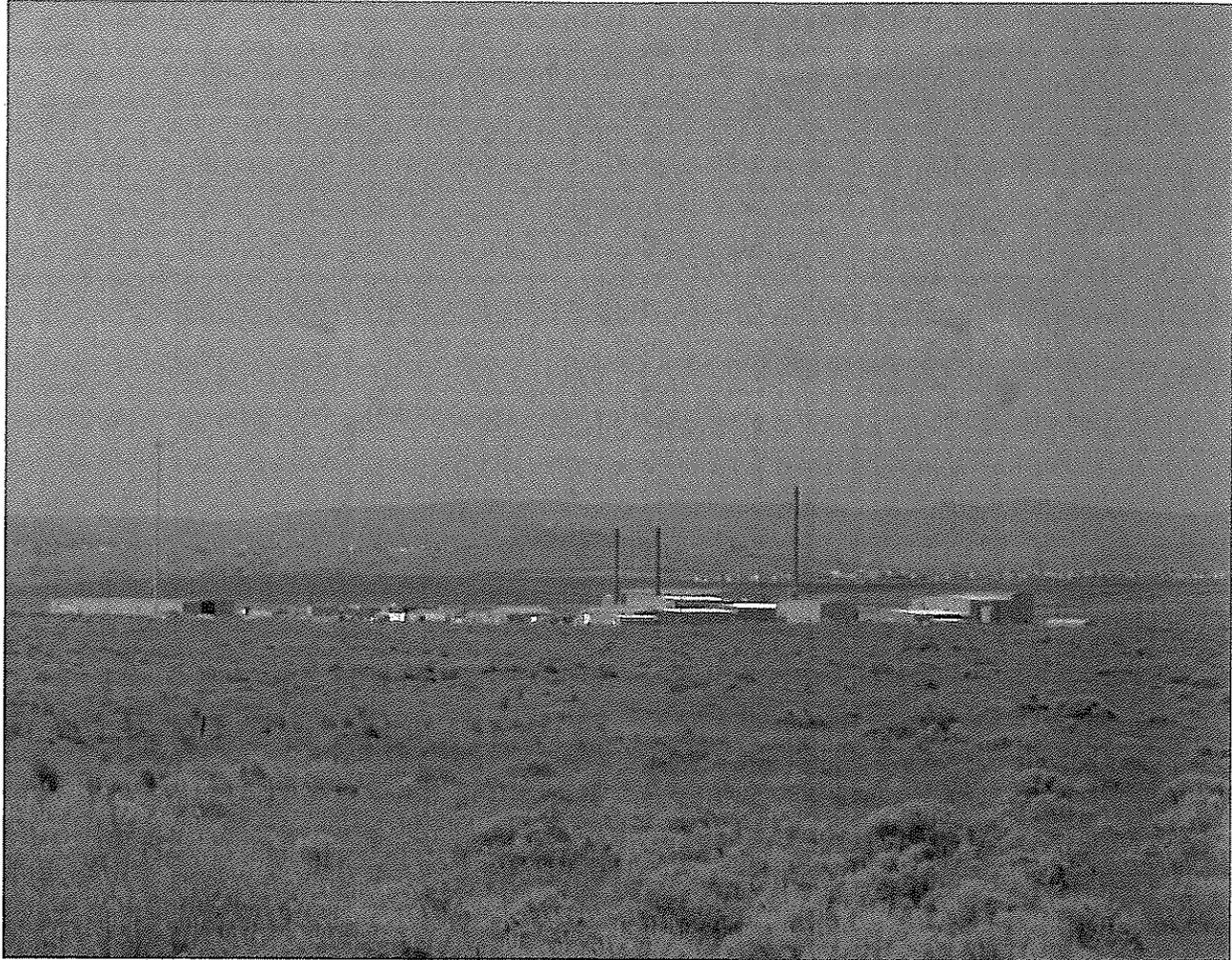
APPENDIX 9-B

CLOSURE COST ESTIMATE

**MIXED WASTE FACILITY
RCRA/TSCA PERMIT APPLICATION**

**PERMA-FIX NORTHWEST RICHLAND, INC.
RICHLAND, WASHINGTON**

Mixed Waste Facility



Closure Cost Estimate Prepared for Perma-Fix Northwest Richland, Inc.

Mixed Waste Facility

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CLOSURE COST ESTIMATE FOR PERMA-FIX NORTHWEST RICHLAND, INC.

1.0 INTRODUCTION

This closure cost estimate for the Perma-Fix Northwest Richland, Inc. (PFNW-R) facility, is consistent with the requirements set forth in the state regulations Washington State Administrative Code (WAC) 173-303-610 and 173-303-620. Currently, post-closure activities such as control and maintenance of the site are not required since the anticipated closure activities should achieve clean closure. Therefore, references to post closure activities are not included in this closure cost estimate.

The purpose of this closure cost estimate is to ensure that adequate funds along with a suitable financial mechanism will be available to pay for costs in the event that the permittee is unable or unwilling to complete closure. The estimated costs should be sufficient to enable a third party herein after referred to as an independent contractor to assume and carry on responsibilities for closure.

The sections of WAC 173-303-610 describe the closure standards.

- 173-303-610(2): Closure Performance Standards
- 173-303-610(3): Closure Plan; amendment of plan
- 173-303-610(4): Closure; time allowed for closure
- 173-303-610(5): Disposal or decontamination of equipment, structures, and soils
- 173-303-610(6): Certification of closure

Specifically, WAC 173-303-610(5) states "During the partial and final closure periods, all contaminated equipment, structures, and soils must be properly disposed of or decontaminated unless otherwise specified in WAC 173-303-640(8), 173-303-650(6), 173-303-655(8), 173-303-660(9), 173-303-655(6) or under the authority of WAC 173-303-680(2) and (4)."

The cost estimate for closure includes the following:

- A description of the facility and areas within the facility likely to require closing as a result of routine operation

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- Anticipated labor, equipment, and material costs
- Anticipated waste volume,
- Anticipated packaging, and transportation,
- Decontamination of container storage areas, and equipment used to process waste,
- Transportation and disposal of wastes generated from decontamination activities.

The costs for all major closure activities include: (1) planning and preparation; (2) decontamination and/or dismantling of facility components; (3) packaging, shipment, and disposal of waste, (4) a final radiation survey. Wastes to be generated during closure activities could be in the following categories:

- Radioactive, dangerous and Toxic Substances Control Act (TSCA) regulated PCB wastes,
- Radioactive and Toxic Substances Control Act (TSCA) regulated PCB wastes,
- Radioactive only,
- RCRA and TSCA regulated wastes; and
- Wastes that could qualify as bulk survey for release (BSFR).

The categories of waste described previously would be disposed of at the following sites.

Radioactive, dangerous, and Toxic Substances Control Act (TSCA) regulated non-liquid PCB wastes

Radioactive, dangerous and Toxic Substances Control Act (TSCA) regulated non-liquid PCB wastes would be disposed of at the Energy Solutions site at Clive, Utah.

Radioactive, dangerous, and Toxic Substances Control Act (TSCA) regulated liquid PCB wastes

Radioactive, dangerous and Toxic Substances Control Act (TSCA) regulated liquid PCB wastes would be disposed of at the Diversified Scientific Services, Inc. site in Kingston, Tennessee.

Radioactive and Toxic Substances Control Act (TSCA) regulated non-liquid PCB wastes

Radioactive and Toxic Substances Control Act (TSCA) regulated non-liquid PCB wastes would be disposed of at the Energy Solutions site at Clive, Utah.

Radioactive Only

Disposal of radioactive only waste would be considered to be generated within the Northwest Compact hence it is assumed that radioactive only waste would be disposed of at US Ecology on the Hanford Site.

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RCRA and TSCA regulated liquid wastes

RCRA and TSCA regulated liquid wastes will be disposed of at Diversified Scientific Services, Inc. in Kingston, Tennessee.

RCRA and TSCA regulated non-liquid wastes

RCRA and TSCA regulated non-liquid wastes will be disposed of at US Ecology.

Bulk survey for release (BSFR)

Disposal of bulk survey for release (BSFR) waste would occur at the Chestnut Ridge Landfill Facility in Heiskell, Tennessee.

The closure cost estimate consists of closure and non-closure costs. The **closure cost** refers to all waste generated as a result of closure activities. These activities include decontamination and dismantling, waste packaging and disposal resulting from contaminated facility components and process equipment, contaminated piping and ventilation duct work and HEPA filters, and secondary waste (e.g., protective clothing, contaminated tools, rags, papers, plastic, metal scrap, etc.

The **non-closure cost** includes costs associated with the return of waste to generators. All customer waste accepted for management include a “return of waste” clause as part of the contractual agreement between PFNW-R and its customers (this clause allows PFNW-R to return the waste to the customers if PFNW-R determines the waste cannot be processed).

Typically, generator waste falls into two categories and those categories are government and commercial customers. Currently, the federal government accounts for approximately ninety-nine (99) percent of the waste in inventory and commercial customers account for approximately one (1) percent of the waste in inventory. For the purposes of this closure cost estimate it is assumed that PFNW-R will expand amount of commercial customers to approximately five (5) percent in the next ten years, hence the closure cost estimate will include the higher cost estimate amount for commercial customer.

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Disposal and Transportation Costs

Unit cost associated with disposal of waste at the Hanford Site disposal facility in Richland, Washington, is based on the current rate schedule data. Unit cost associated with disposal of waste at the US Ecology's Low-Level Radioactive Waste (LLRW) disposal facility in Richland, Washington, is based on the current rate schedule data from US Ecology-Washington, Inc.. Unit disposal costs of mixed and TSCA regulated PCBs waste at the Energy Solutions of Utah facility and the BSFR waste at the Chestnut Ridge Landfill Facility in Heiskell, Tennessee, are based on current rate schedule. Transportation costs for returning waste to generators (customers) and/or transporting waste to disposal facilities were obtained from certified carriers.

TABLE 1.0

FACILITY INFORMATION	
Facility Name:	Perma-Fix Northwest Richland, Inc.
Address:	2025 Battelle Blvd.
City	Richland
State	Washington
Zip	99354
Closure Cost Estimate Creator Contact Information	
Address :	2025 Battelle Blvd
City	Richland
State	Washington
Zip	99354
Telephone:	509.375.7022
Fax:	509.375.0613
Closure Activity Questions	
Does your facility store waste in containers?	Yes
Does your facility store waste in tanks?	Yes
Does your facility have a secondary containment system?	Yes
Will your facility need to do any sampling and analysis to perform or verify closure?	Yes
As part of closure, will you have to remove or decontaminate heavy equipment?	Yes
As part of closure, will you have to remove or demolish buildings or other structures?	No
As part of closure, will you have to remove or decontaminate soil?	Yes
As part of closure, will you use steam cleaning or pressure washing?	Yes
As part of closure, will you use sandblasting or scarification?	Yes
As part of closure, will you need to transport waste?	Yes
As part of closure, will you need to treat/dispose of waste?	Yes
As part of closure, will you need to decontaminate the containment system(s)?	Yes
As part of closure, will you need to dispose of the containment system(s)?	No

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2.0 ASSUMPTIONS

Assumptions used in deriving the closure cost estimate are as follows:

- The estimate is based on assumptions that there would be sufficient funds available to enable a third party (an independent contractor) to assume and carry on responsibilities for closing the Mixed Waste Facility (MWF) in the event that the permittee is unable or unwilling to complete closure in a timely manner.
- Salary structure for workers to be employed by a contractor was established by using salary structures for professionals and non-technical staff in the Richland area, and information available from current U.S. Bureau of Labor Statistics. The information is presented in Table 4.0. An overhead of 70 percent is added to the yearly salary basis to cover for insurance, workers' compensation, miscellaneous fringe benefits, and contractor's profit. No overhead was assumed for the independent qualified register engineer and the clerical support.
- Crew size determination information is presented in Table 4.0.
- Hours required by workers to perform a particular task were established by Allied Technology Group (ATG) and are presented in with each particular activity. Hours required by workers to perform a particular task associated with a proposed unit or building were based on hours established by ATG for a similar task.
- Planning and preparation activities include documentation for regulatory agencies, and development of a work plan, procurement/rental of equipment.
- Facility components are closed by dismantling and/or decontamination. The components are then cut into small sections, and packaged for disposal at offsite facilities.
- A density of 75 pounds per cubic foot for wastes destined for US Ecology, as determined by PFNW-R. For waste destined for Energy Solutions of Utah, a density of 75 pounds per cubic foot is assumed, based on information determined by PFNW-R.
- Some equipment to complete the closure, including disposal containers, will be either rented or purchased by the contractor. It is expected that the contractor would use the supercompaction (TP-07), cutting and shearing (TP-02), in-container mixing (TT-03), physical extraction (TT-05), debris washing (TT-10) to facilitate closure of the other permitted equipment.
- Shipments of waste from PFNW-R to US Ecology's disposal site assumes each truckload is expected to carry a maximum of 88 drums.

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- Cost of shipment (returning waste to generators under the “return of waste” clause contractual agreement or transporting waste to disposal facilities) is established at **\$3.95** per (truckload) mile. (The \$3.95 per mile includes \$3.30 per mile, plus a fuel surcharge of 20%, and is based on current transportation rate from a certified carrier.
- It takes about 1.5 hrs for two laborers to load a package (i.e., a box) with a volume of 100 ft³. This time includes the time it takes to survey the box, inventory adjustment, and preparation of paperwork for transfer and disposal.
- Waste for disposal is assumed to be shipped in either B-25 type or 55 gallon drums. Each B-25 container is assumed to be approximately 100 cubic feet and cost \$1,100. Each 55-gallon drum is assumed to cost \$30.
- Costs associated with environmental restoration of outdoor areas and site stabilization are not included in this estimate.
- Contaminated equipment will be dismantled and containerized for disposal at Energy Solutions in Clive, Utah.
- Contaminated equipment will be assumed to be a mixture of low level radioactive waste, hazardous waste, and TSCA regulated PCB waste.
- Permitted container storage areas will be triple rinsed with an appropriate solvent to remove PCB and hazardous waste contamination.
- Permitted container storage area triple rinse solvent will be disposed of at Diversified Scientific Services, Inc. (DSSI) or Energy Solutions.
- Although less than 1% of the waste received at the facility is commercial waste, the closure cost estimate will assume 5% of the total waste inventory is commercial and is to be managed appropriately. The waste in inventory at the time of closure will be returned to the generator.
- Personnel protective equipment (PPE) generated during closure activities will be disposed of at Energy Solutions in Clive, Utah. PPE includes tyvek coveralls, gloves, rubber boots, and respirators. For the cost estimate, it will be assumed that one B-25 container will be filled with PPE for disposal at Energy Solutions.
- Inventoried waste that is not regulated by TSCA or as a hazardous waste will be disposed of as radiological waste at US Ecology.
- HVAC equipment in Building 13 up to and including the carbon adsorption system will be considered RCRA and TSCA-regulated waste.
- The carbon adsorption system will be disposed of at Energy solutions in Clive, Utah.

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- All ductwork, filters, and exhaust stack after the carbon adsorption system will be treated as Bulk Survey for Release (BSFR) at the Chestnut Ridge Landfill in Heiskell, TN.
- Building structure will not be treated as RCRA or TSCA regulated units. The building structures will be radiologically surveyed for free release. Closure costs for surveying and release are included in this cost estimate.
- Disposal cost at the destination facilities has been assumed to be as follows:
 - Energy Solutions: \$227.37/ft³
 - US Ecology: \$159/ft³
 - Chestnut Ridge Landfill: \$0.14/lb
- Mileage between facilities has been estimated to be:
 - Perma-Fix to Energy Solutions: 650 miles (one way)
 - Perma-Fix to US Ecology: 20 miles (one way)
 - Perma-Fix to INEEL: 500 miles (one way)
 - Perma-Fix to Los Alamos: 1,250 miles (one way)
 - Perma-Fix to Chestnut Ridge Landfill: 2,390 miles (one way)
 - Perma-Fix to DSSI: 2,390 miles (one way)
 - Perma-Fix to Department of Energy (Hanford): 20 miles (one way)
- Apart from Hanford, the government waste is received from other locations (e.g. INEEL, Los Alamos). For the closure cost estimate, the longer distance (i.e. 1250 miles to Los Alamos) is used for the return of wastes to government entities outside Hanford.
- The rotary desorber and plasma arc furnace units have been added as equipment to be dismantled and disposed of at Energy Solutions.

3.0 DATA AND PARAMETERS

Salary structure and overhead provided in Table 4.0 were established using salary information associated with technical professionals (engineer, health physicist), management and non-technical staff (labor and clerical) in the Richland area, and information available from current U.S. Bureau of Labor Statistics. Table 4.0 provides the breakdown for the crew size.

Estimates (in hours) for dismantling and/or decontamination provided in Tables 8.0 and 10.0 were provided by Allied Technology Group (ATG).

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Hours for planning and preparation and final radiation surveys are provided in Table 5.0.

Total wages (planning and preparation, D &D work and final radiation surveys) are listed in Table 5.0.

Costs for waste containers (\$1,100 per B-25 container) are provided with each activity.

Sampling and laboratory costs shown in Table 12.0 and are based on the assumption that approximately 150 soil samples will be needed to assess the soil conditions for contaminants associated with the site as currently permitted.

Rental cost of special equipment and supplies for closure work is obtained from local vendors and is shown in Table 14.0.

Costs associated with independent qualified registered professional engineer oversight are provided in the overall cost summary. These costs are directly from Ecology's cost estimating tool and overhead costs were not included.

Costs associated with returning waste to generators are shown in Table 6.0.

4.0 WASTE CATEGORIES

Two sources of waste are considered in the closure estimate: (1) Wastes associated with closure; and (2) non-closure wastes. For closure of the mixed waste facility, there are several types of wastes to be managed:

1. Waste received from the Department of Energy that has not been processed. This waste will be returned to the generator. Although more than 99% of the waste received at the mixed waste facility is generated from the DOE, for the closure cost, it is assumed that 95% of the waste inventory will be DOE generated waste.
2. Waste received from commercial generators. For the closure cost, it is assumed that 5% of the waste inventory will be from commercial generators. This waste will be returned to the generator and it is assumed that the generators are at a distance of 2,390 miles.

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3. Decontamination wastes generated from decontaminating the storage areas will be sent to DSSI or Energy Solutions.
4. Waste that is not TSCA or RCRA regulated will be treated as radiological waste and will be disposed of at US Ecology.
5. HVAC equipment, up to and including the carbon adsorption system, will be dismantled and containerized for disposal at Energy Solutions.
6. PPE generated during closure activities will be containerized and disposed of at Energy Solutions.
7. All ductwork and filters after the carbon adsorption system, including the stack, will be treated as BSFR and transported to the Chestnut Ridge Landfill in Heiskell, TN.

4.1. Closure Wastes

Closure wastes refers to the waste resulting directly from dismantling and/or decontamination of the MWF components and areas including piping, tanks, duct work, personal protective equipment, trash, debris, etc. The mixed waste from closure would be disposed at the following sites:

Radioactive, dangerous, and Toxic Substances Control Act (TSCA) regulated non-liquid PCB wastes

Radioactive, dangerous and Toxic Substances Control Act (TSCA) regulated non-liquid PCB wastes would be disposed of at the Energy Solutions site at Clive, Utah.

Radioactive, dangerous, and Toxic Substances Control Act (TSCA) regulated liquid PCB wastes

Radioactive, dangerous and Toxic Substances Control Act (TSCA) regulated liquid PCB wastes would be disposed of at the Diversified Scientific Services, Inc. site in Kingston, Tennessee.

Radioactive and Toxic Substances Control Act (TSCA) regulated PCB wastes

Radioactive and Toxic Substances Control Act (TSCA) regulated PCB wastes would be disposed of at the Energy Solutions site at Clive, Utah.

Radioactive Only

Disposal of radioactive only waste would be considered to be generated within the Northwest Compact hence it is assumed that radioactive only waste would be disposed of at US Ecology on the Hanford Site.

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Bulk survey for release (BSFR)

Disposal of bulk survey for release (BSFR) waste would occur at the Chestnut Ridge Landfill Facility in Heiskell, Tennessee.

4.2 Non-Closure Wastes

The non-closure waste is customer waste. Customer waste is received from customers for treatment by PFNW-R. The primary customer for the MWF is the Federal Government (i.e., U.S. Department of Energy). A very small portion of the mixed waste received at the MWF is from commercial customers. Currently the amount of commercial waste in inventory is less than one percent. All customer waste is assumed to have a valid return of waste clause and the company and/or entity that generated the waste is still in existence. Maximum mixed waste storage at the facility will be 171,886 ft³ and the maximum TSCA-regulated waste quantity will be 103,600 ft³.

TABLE 2.0

INVENTORY BREAK OUT	
Hanford	91%
INL	4%
Commercial Customers	5%

5.0 INVENTORY WASTE COST OR RETURN TO GENERATOR (NON-CLOSURE WASTE)

Under the "return of waste" clause contractual agreement between PFNW-R and its customers, PFNW-R can return the waste to the customers if PFNW-R determines the waste cannot be processed. This option can be used for waste that is accepted by PFNW-R under a legally binding contract with a legally binding "return of waste clause" and that the generator holds a valid radioactive license. The customer/generator, along with volume and transportation cost associated with each is identified in Table 6.0.

5.1 Non-Closure Wastes

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The following is an outline of the types of waste and the associated costs for returning to generators:

- a) Non-Closure waste
 - i) New waste (customer generated)
 - (1) Return to generator (DOE Hanford waste)
 - (a) Loading and transportation
 - (2) Return to generator (DOE-Los Alamos waste)
 - (a) Loading and transportation
 - (3) Return to generator (Commercial Waste)
 - (a) Loading and transportation

To simplify the calculation for the non-closure cost waste, the wastes are grouped according to their proposed return sites. The actual cost is found in Table 6.0 (return to generator).

5.1.1 Waste to be Returned to the Hanford Site

The assumed number of miles for transportation is 20 miles. For the closure cost estimate, it will be assumed that 91% of the waste inventory consists of wastes to be returned to the Hanford Site.

(1) Transportation Costs

The following example illustrates the calculation for transportation costs:

Assume: Eighty-eight drums per shipment for waste

Distance to the Hanford Site: 20 miles

Transportation cost = (4,373 55-gallon drums)(20 miles)(\$3.95/mile)/88 drums per shipment = \$ 3,950

(2) Packaging Costs

It is assumed that return to generator wastes would not require re-packaging; hence no packaging cost is required.

(3) Loading Cost for Transportation

Calculate an estimated cost for loading as follows:

Divide the estimated cost by the total number of 55-gallon drums to be returned to the customer:

Calculate the number of truckloads required:

(4,373 55-gallon drums) divided by (88 drums per shipment) equals 50 truckloads

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Assume: 1.5 hours for 2 laborers to load a truck;

Calculate the number Person-hours for loading 50 truckloads;

$(1.5)(50)(2) = 150$ Person-hours.

Labor cost:

Assume labor at \$25.42 per hour

$(150 \text{ Person-hours})(\$25.42 \text{ per person-hrs})$ equals \$ 3,813.

5.1.2 Waste to be Returned to Los Alamos

The assumed number of miles for transportation is 1,250 miles. For the closure cost estimate, it will be assumed that 4% of the waste inventory consists of wastes to be returned to the Los Alamos Site.

(1) Transportation Costs

The following example illustrates the calculation for transportation costs:

Assume: Eighty-eight drums per shipment for waste

Distance to the Los Almos Site: 1250 miles

Transportation cost = $(193 \text{ 55-gallon drums})(1250 \text{ miles})(\$3.95/\text{mile})/88 \text{ drums per shipment} = \$ 14,812$

(2) Packaging Costs

It is assumed that return to generator wastes would not require re-packaging; hence no packaging cost is required.

(3) Loading Cost for Transportation

Calculate an estimated cost for loading as follows:

Divide the estimated cost by the total number of 55-gallon drums to be returned to the customer:

Calculate the number of truckloads required:

$(193 \text{ 55-gallon drums})$ divided by $(88 \text{ drums per shipment})$ equals 3 truckloads

Assume: 1.5 hours for 2 laborers to load a truck;

Calculate the number Person-hours for loading 50 truckloads;

$(1.5)(3)(2) = 9$ Person-hours.

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Labor cost:

Assume labor at \$25.42 per hour

(9 Person-hours)(\$25.42 per person-hrs) equals \$ 229.

5.1.3 Return to Generator of Commercial Waste

Although less than 1% of the waste received at PFNW-R is from commercial generators, for the closure cost estimate, it will be assumed that 5% of the waste in inventory could be from commercial generators. The commercial generator waste would be returned. For the cost estimate, it will be assumed that the facility is near Kingston, Tennessee, at a distance of 2,390 miles.

(1) Transportation Costs

The following example illustrates the calculation for transportation costs:

Assume: Eighty-eight drums per shipment for waste.

Distance to the DSSI Site: 2390 miles

Transportation cost = (241 55-gallon drums)(2390 miles)(\$3.95/mile)/88 drums per shipment = \$ 28,322

(2) Packaging Costs

It is assumed that return to generator wastes would not require re-packaging; hence no packaging cost is required.

(3) Loading Cost for Transportation

Calculate an estimated cost for loading as follows:

Divide the estimated cost by the total number of 55-gallon drums to be returned to the customer:

Calculate the number of truckloads required:

(241 55-gallon drums) divided by (88 drums per shipment) equals 3 truckloads

Assume: 1.5 hours for 2 laborers to load a truck;

Calculate the number Person-hours for loading 50 truckloads;

(1.5)(3)(2) = 9 Person-hours.

Labor cost:

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Assume labor at \$25.42 per hour

(9 Person-hours)(\$25.42 per person-hrs) equals \$ 229.

The total cost estimate for returning the current maximum waste in inventory is \$51,355.

6.0 CLOSURE WASTE

Closure waste will consist of process equipment dismantled for disposal. All HVAC equipment up to and including the carbon adsorption system will be treated as RCRA and TSCA regulated waste and will be disposed of at Energy Solutions. All piping and filtration after the carbon adsorption system, including the stack, will be dismantled and disposed of as BSFR waste at the Chestnut Ridge Landfill.

6.1 Non-Thermal Area

The existing equipment in the non-thermal area of Building 13 is shown in Table 8.0. The equipment has been divided into four (4) types of waste for disposal:

1. Radiological only waste. This waste is assumed to be packaged at 75 pounds per cubic foot and will be disposed of at US Ecology.
2. Mixed waste. This waste is assumed to be packaged at 40 pounds per cubic foot and will be disposed of at Energy Solutions.
3. Solid waste. This waste will be disposed of by the ton at the local Waste Management facility.
4. 50/50 split between solid waste and radiological only waste (HVAC ducts).

The closure costs associated with the equipment in the non-thermal area of Building 13 will include the following:

1. Labor for dismantling the equipment, packaging the equipment for disposal, and loading the equipment on transport carriers.
2. Cost of the shipping containers.
3. Transportation cost to the disposal site.
4. Disposal cost.

6.1.1 Labor For Dismantling, Packaging, and Loading Equipment for Disposal

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16 hours per 3 man labor crew plus supervision and health physics for dismantling and packaging at \$207 per hour for the crew:

$$(16 \text{ hours})(\$207/\text{hr}/\text{crew}) = \$3,312$$

1.5 hours to load 100 ft³ with a total of 213 ft³ for TP01 for 2 people:

$$(1.5 \text{ hours})(2 \text{ labors})(\$25.42 \text{ per hour})(213 \text{ ft}^3)/(100 \text{ ft}^3) = \$163.$$

6.1.2 Cost of Shipping Containers

Shipping will be in B25 boxes at \$1,100 per container. Each container holds 100 ft³. Total volume for TP01 is 213 ft³.

$$(213 \text{ ft}^3)(\$1,100 \text{ per B25 box})/(100 \text{ ft}^3 \text{ per B25 box}) = \$2,343.$$

6.1.3 Transportation to Energy Solutions for Disposal

Distance to Energy Solutions is 650 miles (one way). For TP01, there will be one shipment.

$$(650 \text{ miles})(\$3.95/\text{mile})(1 \text{ shipment}) = \$2,568.$$

6.1.4 Disposal at Energy Solutions

Disposal cost is estimated to be \$227.37 per ft³. TP01 is estimated to be 213 ft³.

$$(\$227.37/\text{ft}^3)(213 \text{ ft}^3) = \$48,430.$$

6.2 Thermal Area

The existing equipment in the thermal treatment area in Building 13 is shown in Table 8.0. The equipment has been divided into the same four (4) categories as the equipment in the non-thermal area.

The closure costs associated with the equipment in the thermal area of Building 13 will include the following:

5. Labor for dismantling the equipment, packaging the equipment for disposal, and loading the equipment on transport carriers.
6. Cost of the shipping containers.
7. Transportation cost to the disposal site.
8. Disposal cost.

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6.3 BSFR Equipment

All of the ductwork, filters, and stack after the carbon adsorption system will be treated as bulk survey for release (BSFR) and will be disposed of at the Chestnut Ridge Landfill.

7.0 CLOSURE COST ANALYSIS

7.1 Fixed Costs

7.1.1 Planning and Preparation for Closure/Post-Closure

Planning and preparation includes activities to ensure that the closure effort is performed in a safe and cost-effective manner in accordance with all applicable federal, state, and local regulations. Planning and preparation activities include development of the closure work plan, procurement of special equipment (as needed), securing contracts for transportation and third party labor to dismantle and dispose of the equipment.

Estimates for planning and preparation are shown in Table 5.0. Table 5.0 contains the total hours worked, and the costs associated with planning and preparation.

7.1.2 Restoration of Outdoor Areas and Site Stabilization

Costs associated with environmental restoration of outdoor areas and site stabilization are not included in this estimate, since it is assumed that the site is clean closed within the regulatory guidelines.

7.1.3 Equipment Costs

Rental costs for equipment required during decontamination and dismantling operations are summarized in Table 14.0. Period of rent for equipment varies and is based on best engineering judgment.

7.1.4 Supplies

Personal protective clothing and other safety supplies:

Assume \$125/40 hour week for supplies per technician or laborer. The total cost is found by multiplying the number of hours worked by \$125 per 40 hours worked. All contaminated PPE will be loaded into a bulk container for disposal at Energy Solutions.

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The total cost for personal protective equipment supplies and disposal are included in Table 13.0.

7.1.5 Independent Qualified Registered Professional Engineer Oversight Costs

Costs associated with oversight of activities by an Independent Qualified Registered Professional Engineer (IQRPE) during closure activities are assumed to be approximately 40 hours (during the whole closure phase). This estimate is based on information from Ecology Closure Estimating Tool. The hourly rate for the IQRPE is assumed to be \$200/hr.

8.0 SUMMARY

TABLE 3.0

Closure Cost Summary				
Description	Closure Costs for previously permitted storage volume and equipment	Additional Closure Costs for proposed additional equipment for Building 13	Additional Closure Costs for proposed increase in Building 13 storage capacity	Additional Closure Costs for RLA and TLA
Planning and Oversight	\$136,727	\$21,940	\$26,340	\$6,836
Return to Generator Cost Non-Thermal Equipment	\$51,355	\$0	\$179,773	\$0
Disposal	\$401,786	\$131,520	\$0	\$0
Thermal Equipment Disposal	\$828,297	\$0	\$0	\$0
Decontamination	\$160,334	\$35,538	\$0	\$9,766
Decontamination Disposal	\$247,599	\$69,662	\$0	\$46,447
Soil Sampling and Analytical	\$75,000	\$0	\$0	\$7,500
PPE Disposal	\$23,837	\$23,837	\$23,837	\$23,837
Equipment Rental	\$67,312	\$6,300	\$3,900	\$2,812
Engineering Certification	\$8,000	\$0	\$0	\$8,000
Total Closure Cost	\$2,000,246			
Additional Closure Cost		\$288,796	\$233,850	\$105,199

Based on the engineering design of Buildings 13 and 20, soil contamination is not expected. However, the closure cost estimate includes soil sampling and analysis costs.

This closure/post-closure estimate is consistent with the requirements set forth in the state regulations "WAC 246-232-060 and WAC 246-235-075". It is based on the assumption that there would be sufficient funds to enable a third party (an independent contractor) to assume and carry out

Mixed Waste Facility

responsibilities for closure and any necessary control and maintenance of the site in the event that the licensee is unable or unwilling to complete closure in a timely manner.

This estimate assumes that all equipment, including containers to dispose of waste, will be either rented or purchased by the contractor to complete the closure work. No credit is taken for reduced taxes or the salvage value of material and equipment left over on the site.

Mixed Waste Facility

9.0 TABLES

Closure Cost Summary

Description	Closure Costs for previously permitted storage volume and equipment	Additional Closure Costs for proposed additional equipment for Building 13	Additional Closure Costs for proposed increase in Building 13 storage capacity	Additional Closure Costs for RLA and TLA
Planning and Oversight	\$136,727	\$21,940	\$26,340	\$6,836
Return to Generator Cost	\$51,355	\$0	\$179,929	\$0
Non-Thermal Equipment Disposal	\$401,786	\$131,520	\$0	\$0
Thermal Equipment Disposal	\$828,297	\$0	\$0	\$0
Decontamination	\$160,334	\$35,538	\$0	\$9,766
Decontamination Disposal	\$247,599	\$69,662	\$0	\$46,447
Soil Sampling and Analytical	\$75,000	\$0	\$0	\$7,500
PPE Disposal	\$23,837	\$23,837	\$23,837	\$23,837
Equipment Rental	\$67,312	\$6,300	\$3,900	\$2,812
Engineering Certification	\$8,000	\$0	\$0	\$8,000
Total Closure Cost	\$2,000,246	\$288,796	\$234,006	\$105,199
Additional Closure Cost				

Table 4.0 Salary Structure

Salary Structure / Unit Cost and Overhead				
Profession	Rate/Yr	Overhead	Total / Year	Hourly Rate¹
Manager	\$110,000	70%	\$187,000	\$89.90
Supervisor	\$78,500	70%	\$133,450	\$64.16
Engineer	\$82,400	70%	\$140,080	\$67.35
Health Physicist	\$81,000	70%	\$137,700	\$66.20
Technician	\$52,800	70%	\$89,760	\$43.15
Laborer	\$31,100	70%	\$52,870	\$25.42
Secretary	\$30,650	70%	\$52,105	\$25.05

Hourly Rate¹ based on 2080 hours / year

Salary Structure / Unit Cost and Overhead			
Determination of Crew Size for Dismantling and Packaging Activities			
Profession	Number	Hourly Rate	Total \$ / Hr
Supervisor	1	\$64.16	\$64.16
Health Physicist	1	\$66.20	\$66.20
Laborer	3	\$25.42	\$76.25
Total			\$207

Salary Structure / Unit Cost and Overhead			
Determination of Crew Size for Dismantling and Packaging Activities			
Profession	Number	Hourly Rate	Total \$ / Hr
FSP / H&SP / QAPP	1	\$75	\$75.00
Field Survey	1	\$50	\$50.00
Total			\$125

Table 5.0A - Additional Planning and Preparation Cost for Proposed Equipment in Building 13

Activity	TOTAL HOURS WORKED																	
	Manager hrs	Supervisor hrs	Health Physicist hrs	Engineer hrs	H&S Officer hrs	Laborer hrs	Clerical hrs	FSP / H&SP/ QAPP hrs	Field Survey hrs	Manager hrs	Supervisor hrs	Health Physicist hrs	Engineer hrs	H&S Officer hrs	Laborer hrs	Clerical hrs	FSP / H&SP/ QAPP hrs	Field Survey hrs
Planning and Prep	0	0	0	0	0	0	0	28	0									0
Field Survey*	0	0	0	0	0	0	0	0	0									0
General Management and Oversight	88	0	0	88	88	0	88	0	0									0

TOTAL WAGES

Activity	TOTAL WAGES																	
	Manager cost	Supervisor cost	Health Physicist cost	Engineer cost	H&S Officer cost	Laborer cost	Clerical cost	FSP / H&SP/ QAPP cost	Field Survey cost	Manager cost	Supervisor cost	Health Physicist cost	Engineer cost	H&S Officer cost	Laborer cost	Clerical cost	FSP / H&SP/ QAPP cost	Field Survey cost
Planning and Prep	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,100	\$0									\$0
Field Survey	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0									\$0
General Management and Oversight	\$7,912	\$0	\$0	\$5,926	\$3,798	\$0	\$2,204	\$0	\$0									\$0
Additional Total																		\$21,940

*Field survey activities for Building 13 are included in closure costs for existing operations

Table 6.0 - Current Return to Generator Cost for Building 13 Storage

Return to Generator Wastes

Generator	Distance (miles, one way)	Total Drums	Drums/Shipments	Shipments	Transportation Cost (\$/mile)	Total Transportation Cost (\$)
DOE - Hanford	20	4373	88	50	\$3.95	\$3,950
Los Alamos	1250	193	88	3	\$3.95	\$14,813
Commercial	2390	241	88	3	\$3.95	\$28,322

Generator	Total Drums	Drums/Shipments	Shipments	Hours/Shipments	Labor Cost (\$/hr)	Total Labor Cost (\$)
DOE - Hanford	4373	88	50	3	\$25.42	\$3,813
Los Alamos	193	88	3	3	\$25.42	\$229
Commercial	241	88	3	3	\$25.42	\$229

Generator	Total Return to Generator Cost
DOE - Hanford	\$7,763
Los Alamos	\$15,041
Commercial	\$28,550
Total	\$51,355

The total number of drums is calculated from total storage capacity

Storage Capacity (ft³) 35319
 Storage Capacity (gal) 264221.439
 Number of Drums 4805 at 55 gallons per drum

Breakdown of total drums by destination:

DOE - Hanford	4373	91%
Los Alamos	193	4%
Commercial	241	5%
Total	4805	

Table 6.0A - Additional Return to Generator Costs for Building 13 Proposed Storage

Return to Generator Wastes						
Generator	Distance (miles, one way)	Total Drums	Drums/Shipments	Shipments	Transportation Cost (\$/mile)	Total Transportation Cost (\$)
DOE - Hanford	20	17028	88	194	\$3.95	\$15,326
Los Alamos	1250	749	88	9	\$3.95	\$44,438
Commercial	2390	936	88	11	\$3.95	\$103,846

Generator	Total Drums	Drums/Shipments	Shipments	Hours/Shipments	Labor Cost (\$/hr)	Total Labor Cost (\$)
DOE - Hanford	17028	88	194	3	\$25.42	\$14,794
Los Alamos	749	88	9	3	\$25.42	\$686
Commercial	936	88	11	3	\$25.42	\$839

Generator	Total Return to Generator Cost
DOE - Hanford	\$30,120
Los Alamos	\$45,124
Commercial	\$104,684
Total	\$179,929

The total number of drums is calculated from total storage capacity

*Storage Capacity (ft³) 137567

Storage Capacity (gal) 1029138.727

Number of Drums 18712 at 55 gallons per drum

Breakdown of total drums by destination:

DOE - Hanford	17028	91%
Los Alamos	749	4%
Commercial	936	5%
Additional Total	18712	

*Previously permitted storage capacity of Building 13 = 35,319 ft³

Total proposed storage capacity of Building 13 = 162,886 ft³ this is difference of 127,567 ft³

Table 8.0 - Current Equipment Disposal Cost for Building 13 Non-Thermal Area

Current Non-Thermal Area Equipment	Constructed (y/n)	Waste Designation	Pounds	Cubic Feet	Disposal cost		Disposal Cost
					\$/m ³	\$/ton	
TP-02 (Cutting and Shearing System)	Y	Rad Only	800	11	\$159.00		\$1,696.00
TT-03 (In-Container Mixer)	Y	Rad Only	4900	63	\$159.00		\$8,480.00
TT-05 (Physical Extraction)	Y	Mixed Waste	2000	50	\$227.37		\$11,368.50
Dust Collectors	Y	Rad Only	2000	27	\$159.00		\$4,240.00
HEPA Filter	Y	Rad Only	3000	40	\$159.00		\$6,360.00
TP-01 (Shredder)	Y	Mixed Waste ²	8500	213	\$227.37		\$48,316.13
TP-07 (Super/In-Drum Compactor)	Y	Mixed Waste	15000	375	\$227.37		\$85,263.75
TT-02 (Low Capacity Mixer)	Y	Mixed Waste	4000	100	\$227.37		\$22,737.00
HVAC Ducts	Y	50/50 Split Solid Waste / Rad Waste	5000	33	\$159.00	\$280.00	\$3,000.00
HVAC Ducts	Y	50/50 Split Solid Waste / Rad Waste	5000	33	\$159.00	\$280.00	\$3,000.00
Stack	Y	Solid Waste	3000	0		\$280.00	\$420.00
Total for Non-Thermal Area Equipment							\$194,831.38

	Shipments	Disposal Site	Distance to Disposal Site	Transportation Cost
TP-02 (Cutting and Shearing System)	1.00	US Ecology	20	\$158.00
TT-03 (In-container Mixer)	1.00	US Ecology	20	\$158.00
TT-05 (Physical Extraction)	1.00	Energy Solutions	650	\$5,135.00
Dust Collectors	1.00	US Ecology	20	\$158.00
HEPA Filter	1.00	US Ecology	20	\$158.00
TP-01 (Shredder)	3.00	Energy Solutions	650	\$15,405.00
TP-07 (Super/In-Drum Compactor)	4.00	Energy Solutions	650	\$20,540.00
TT-02 (Low Capacity Mixer)	1.00	Energy Solutions	650	\$5,135.00
HVAC Ducts	2.00	Energy Solutions	650	\$10,270.00
HVAC Ducts	2.00	Energy Solutions	650	\$10,270.00
Stack	1.00	Chestnut Ridge Landfill	2360	\$18,881.00
Total for Non-Thermal Area Equipment				\$86,268.00

	Containers Needed	Container Cost (\$1100 each)
TP-02 (Cutting and Shearing System)	1.00	\$1,100.00
TT-03 (In-container Mixer)	1.00	\$1,100.00
TT-05 (Physical Extraction)	1.00	\$1,100.00
Dust Collectors	1.00	\$1,100.00
HEPA Filter	1.00	\$1,100.00
TP-01 (Shredder)	3.00	\$3,300.00
TP-07 (Super/In-Drum Compactor)	4.00	\$4,400.00
TT-02 (Low Capacity Mixer)	1.00	\$1,100.00
HVAC Ducts	1.00	\$1,100.00
HVAC Ducts	1.00	\$1,100.00
Stack		
Total for Non-Thermal Area Equipment		\$16,600.00

	General Labor (\$25.42/hr)			
	Dismantle / Package (hrs)	Health Physics (hrs) (\$66.20/hr)	Supervision (hrs) (\$64.16/hr)	Labor Cost
TP-02 (Cutting and Shearing System)	72	24	24	\$4,958.88
TT-03 (In-container Mixer)	96	32	32	\$6,611.84
TT-05 (Physical Extraction)	144	48	48	\$9,917.76
Dust Collectors	144	48	48	\$9,917.76
HEPA Filter	240	80	80	\$16,529.60
TP-01 (Shredder)	48	16	16	\$3,305.82
TP-07 (Super/In-Drum Compactor)	120	40	40	\$8,264.80
TT-02 (Low Capacity Mixer)	96	32	32	\$6,611.84
HVAC Ducts	240	80	80	\$16,529.60
HVAC Ducts	240	80	80	\$16,529.60
Stack	72	24	24	\$4,958.88
Total for Non-Thermal Area Equipment	1512	604	604	\$104,136.48

Total Cost For Current Non-Thermal Area Equipment Disposal **\$401,785.86**

Rad Only¹ Waste designated as Rad Only is assumed to be packaged at 75 pounds per cubic foot
 Mixed Waste² Waste designated as Mixed Waste is assumed to be packaged at 40 pounds per cubic foot
 Solid Waste³ Waste designated as Solid Waste is to be disposed of by the ton
 Mixed Waste / TSCA⁴ The TSCA component (i.e., PCBs) is considered to be an underlying hazardous waste constituent

Table B.0A - Additional Equipment Disposal Cost for Building 13 Non-Thermal Area Proposed Equipment

Proposed Non-Thermal Area Equipment	Constructed (y/n)	Waste Designation ^{1,2}	Pounds	Cubic Feet	Disposal cost		Disposal Cost
					\$/m ³	\$/ton	
TT-09 Mercury Treatment	N	Mixed Waste	2000	50	\$227.37		\$11,368.50
TT-10 Debris Washing	N	Rad Only	2000	27	\$159.00		\$4,240.00
TP-04 Liquid Treatment (4 Portable Totes)	N	Rad Only	1000	13	\$159.00		\$2,120.00
TT-01 (High Capacity Mixer)	N	Mixed Waste	4000	100	\$227.37		\$22,737.00
TP-10 Extraction Mixer	N	Rad Only	1500	20	\$159.00		\$3,180.00
TP-10 Extraction Mixer	N	Rad Only	1500	20	\$159.00		\$3,180.00
TP-13 Sorting System	N	Mixed Waste	2000	50	\$227.37		\$11,368.50
Total for Proposed Non-Thermal Area Eq.							\$58,194.00

	Shipments	Disposal Site	Distance to Disposal Site	Transportation Cost
TT-09 Mercury Treatment	1.00	Energy Solutions	650	\$5,135.00
TT-10 Debris Washing	1.00	US Ecology	20	\$158.00
TP-04 Liquid Treatment (4 Portable Totes)	1.00	US Ecology	20	\$158.00
TT-01 (High Capacity Mixer)	1.00	Energy Solutions	650	\$5,135.00
TP-10 Extraction Mixer	1.00	US Ecology	20	\$158.00
TP-10 Extraction Mixer	1.00	US Ecology	20	\$158.00
TP-13 Sorting System	1.00	Energy Solutions	650	\$5,135.00
Total for Proposed Non-Thermal Area Eq.				\$16,037.00

	Containers Needed	Container Cost (\$1100 each)
TT-09 Mercury Treatment	1.00	\$1,100.00
TT-10 Debris Washing	1.00	\$1,100.00
TP-04 Liquid Treatment (4 Portable Totes)	1.00	\$1,100.00
TT-01 (High Capacity Mixer)	1.00	\$1,100.00
TP-10 Extraction Mixer	1.00	\$1,100.00
TP-10 Extraction Mixer	1.00	\$1,100.00
TP-13 Sorting System	1.00	\$1,100.00
Total for Proposed Non-Thermal Area Eq.		\$7,700.00

	General Labor (\$25.42/hr)				Labor Cost
	Dismantle / Package (hrs)	Health Physics (hrs) (\$66.20/hr)	Supervision (hrs) (\$64.16/hr)		
TT-09 Mercury Treatment	144	48	48		\$9,917.76
TT-10 Debris Washing	144	48	48		\$9,917.76
TP-04 Liquid Treatment (4 Portable Totes)	96	32	32		\$6,611.84
TT-01 (High Capacity Mixing)	96	32	32		\$6,611.84
TP-10 Extraction Mixer	96	32	32		\$6,611.84
TP-10 Extraction Mixer	96	32	32		\$6,611.84
TP-13 Sorting System	48	16	16		\$3,305.82
Total for Proposed Non-Thermal Area Eq.	720	240	240		\$49,588.80

Total Additional Cost For Proposed Non-Thermal Area Equipment*

\$131,519.80

*None of this equipment has been installed

Rad Only¹ Waste designated as Rad Only is assumed to be packaged at 75 pounds per cubic foot
 Mixed Waste² Waste designated as Mixed Waste is assumed to be packaged at 40 pounds per cubic foot

Total Additional Cost For Proposed Non-Thermal Area Individual Equipment

TT-09 Mercury Treatment	\$27,521.28
TT-10 Debris Washing	\$15,415.76
TP-04 Liquid Treatment (4 Portable Totes)	\$9,989.84
TT-01 (High Capacity Mixing)	\$35,583.84
TP-10 Extraction Mixer	\$11,049.84
TP-10 Extraction Mixer	\$11,049.84
TP-13 Sorting System	\$20,909.42

Table 9.0 - Current Equipment Disposal Cost for Building 13 Thermal Area

Thermal Area Vitrification	Constructed (y/n)	Waste Designation	Pounds	Cubic Feet	Disposal cost		Disposal Cost
					\$/ft ³	\$/ton	
Liquid Feed System	Y	Rad Only	780	10	\$159.00		\$1,811.20
Additional Feed System1	Y	Rad Only	12000	160	\$159.00		\$25,440.00
Additional Feed System2	Y	Rad Only	6000	67	\$159.00		\$10,600.00
Process Chamber - Metal Components	Y	Rad Only	20000	267	\$159.00		\$42,400.00
Dust Collectors	Y	Rad Only	200	3	\$159.00		\$424.00
HEPA Filters	Y	Rad Only	10000	133	\$159.00		\$21,200.00
Process Chamber - Refractory	Y	Mixed Waste / TSCA	50000	1250	\$234.00		\$2892,500.00
Offgas Treatment System	Y	50/50 Split Solid / Rad Waste	13150	88	\$159.00	\$280.00	\$7,890.00
Offgas Treatment System	Y	50/50 Split Solid / Rad Waste	13150	88	\$159.00	\$280.00	\$7,890.00
HVAC Ducts	Y	50/50 Split Solid / Rad Waste	250	3	\$159.00	\$280.00	\$282.50
HVAC Ducts	Y	50/50 Split Solid / Rad Waste	250	3	\$159.00	\$280.00	\$282.50
Stack	Y	Solid Waste	3000	40		\$280.00	\$420.00
Thermal Area Other Equipment							
TT-08 Rotary Desorber	Y	Mixed Waste	4000	100	\$227.37		\$22,737.00
TT-07 Plasma Arc Furnace	Y	Mixed Waste	4000	100	\$227.37		\$22,737.00
							\$456,414.20

Thermal Area Vitrification	Shipments	Disposal Site	Distance to Disposal Site	Transportation Cost
Liquid Feed System	1.00	US Ecology	20	\$158.00
Additional Feed System1	3.00	US Ecology	20	\$474.00
Additional Feed System2	2.00	US Ecology	20	\$316.00
Process Chamber - Metal Components	5.00	US Ecology	20	\$760.00
Dust Collectors	1.00	US Ecology	20	\$158.00
HEPA Filters	3.00	US Ecology	20	\$474.00
Process Chamber - Refractory	12.00	DSSI	2380	\$226,572.00
Offgas Treatment System	4.00	Energy Solutions	650	\$20,540.00
Offgas Treatment System	4.00	Energy Solutions	650	\$20,540.00
HVAC Ducts	1.00	Energy Solutions	650	\$5,135.00
HVAC Ducts	1.00	Energy Solutions	650	\$5,135.00
Stack	1.00	Chestnut Ridge Landfill	2390	\$18,881.00
Thermal Area Other Equipment				
TT-08 Rotary Desorber	1.00	Energy Solutions	650	\$5,135.00
TT-07 Plasma Arc Furnace	1.00	Energy Solutions	650	\$5,135.00
				\$309,443.00

Thermal Area Vitrification	Containers Needed	Container Cost (\$1100 each)
Liquid Feed System	1	\$1,100.00
Additional Feed System1	2	\$2,200.00
Additional Feed System2	1	\$1,100.00
Process Chamber - Metal Components	3	\$3,300.00
Dust Collectors	1	\$1,100.00
HEPA Filters	2	\$2,200.00
Process Chamber - Refractory	13	\$14,300.00
Offgas Treatment System	1	\$1,100.00
Offgas Treatment System	1	\$1,100.00
HVAC Ducts	1	\$1,100.00
HVAC Ducts	1	\$1,100.00
Stack	1	\$1,100.00
Thermal Area Other Equipment		
TT-08 Rotary Desorber	1.00	\$1,100.00
TT-07 Plasma Arc Furnace	1.00	\$1,100.00
		\$33,000.00

Thermal Area Vitrification	General Labor (\$26.56/hr)			Supervision (hrs) (\$48.15/hr)	Labor Cost
	Dismantle / Package (hrs)	Health Physics (hrs) (\$66/hr)			
Liquid Feed System	18	8		8	\$1,160.88
Additional Feed System1	68	22		22	\$4,220.28
Additional Feed System2	24	8		8	\$1,534.64
Process Chamber - Metal Components	72	24		24	\$4,603.92
Dust Collectors	30	10		10	\$1,918.30
HEPA Filters	24	8		8	\$1,534.64
Process Chamber - Refractory	24	8		8	\$1,534.64
Offgas Treatment System	24	8		8	\$1,534.64
Offgas Treatment System	15	5		5	\$959.15
HVAC Ducts	15	5		5	\$959.15
HVAC Ducts	15	5		5	\$959.15
Stack	30	10		10	\$1,918.30
Thermal Area Other Equipment					
TT-08 Rotary Desorber	48	16		16	\$3,305.82
TT-07 Plasma Arc Furnace	48	16		16	\$3,305.82
Total for Thermal Building					\$29,439.61

Total for Thermal Building \$829,296.81

Rad Only¹ Waste designated as Rad Only is assumed to be packaged at 75 pounds per cubic foot
Mixed Waste² Waste designated as Mixed Waste is assumed to be packaged at 40 pounds per cubic foot
Solid Waste³ Waste designated as Solid Waste is to be disposed of by the ton
Mixed Waste / TSCA⁴ The TSCA component (i.e., PCBs) is considered to be an underlying hazardous waste constituent
Note: Volumes of existing vitrification equipment assumed to be equivalent to any future vitrification system equipment

Table 10.0 - Current Decontamination Cost for Building 13

THERMAL AREA DECONTAMINATION											
Item / Area	Activity ¹	Area ft ²	Manager hr	Supervisor hr	Health Physicist hr	Engineer hr	H&S Officer hr	Laborer hr ²	Clerical hr	FSP / H&SP / QAPP hr	Field Survey
Thermal Area - Feed Prep	Triple Rinsing			32	32			96			
Thermal Area - Waste Feed	Triple Rinsing			40	40			120			
WSB, Rm 4	Triple Rinsing	1,800		24	24			72			
Unit A (Thermal Treatment, Rm 1)	Triple Rinsing			14	14			42			
HAZMAT Enclosure (Thermal Treatment, Rm 4)	Triple Rinsing	1,960		14	14			42			
Storage Area Floors	Steam Clean			24	24			72			
Storage Area Stelves	Steam Clean			16	16			48			
Floors / Walls / Ceiling	Steam Clean	24,000		64	64			192			
Thermal Treatment - Residue Handling	Decon			10	10			30			
Thermal Treatment - Offgas Processing Units	Decon			24	24			72			
Thermal Treatment - Gas Monitoring and Discharge	Decon			10	10			30			
Thermal Treatment - Secondary Waste Treatment	Decon			10	10			30			
Thermal Treatment - Misc Equipment	Decon			10	10			30			
Total				292	292			876			

NON-THERMAL AREA DECONTAMINATION											
Item / Area	Activity	Area ft ²	Manager hr	Supervisor hr	Health Physicist hr	Engineer hr	H&S Officer hr	Laborer hr	Clerical hr	FSP / H&SP / QAPP hr	Field Survey
Non-Thermal Area											
TP-02 - Cutting & Shredding	Steam Clean			24	24			72			
TI-03 - In-container Mixing	Steam Clean			16	16			48			
Containerized Waste Staging	Steam Clean			16	16			48			
Bulk Waste Receiving	Steam Clean			16	16			48			
Northeast Section Floors / Walls	Steam Clean	13,000		40	40			120			
Southeast Section Floors / Walls	Steam Clean	13,000		40	40			120			
West Section Floors / Walls	Steam Clean	13,000		40	40			120			
Cutting Section Floors / Walls / Cutting	Steam Clean	5,800		30	30			90			
HVAC Ducts	Steam Clean			120	120			360			
Dust Collectors	Steam Clean			32	32			96			
HEPA Filter	Steam Clean			64	64			192			
Stack	Steam Clean			16	16			48			
HEPA Filter Floors / Walls / Ceiling	Steam Clean	5,800		30	30			90			
Total				484	484			1452			

Item	Hours	\$/hour	Total Cost (\$)
Labor Cost for Decontamination			
Supervisor	776	64.16	\$49,787
Health Physicist	776	66.20	\$51,373
Laborer	2328	25.42	\$59,174
Total			\$160,334

Activity¹ Areas used to store / process PCBs will be triple rinsed
 hr² Hours represent total crew hours for each activity. The crew consists of 1 supervisor, 1 health physicist, and 3 laborers.

Table 10.0A - Additional Decontamination Cost for Building 13 Proposed Equipment

PROPOSED EQUIPMENT DECONTAMINATION											
Item / Area	Activity ¹	Area ft ²	Manager hr	Supervisor hr	Health Physicist hr	Engineer hr	H&S Officer hr	Laborer hr ²	Clerical hr	FSP / H&SP / OAPP	Field Survey
TT-09 Mercury Treatment	Triple Rinsing			20	20			60			
TT-10 Debris Washing	Triple Rinsing			16	16			48			
TP-14 Liquid Treatment (4 Portable Totes)	Triple Rinsing			64	64			192			
TT-01 (High Capacity Mixer)	Steam Clean			24	24			72			
TP-10 Extraction Mixer	Triple Rinsing			16	16			48			
TP-10 Extraction Mixer	Triple Rinsing			16	16			48			
TP-13 Sorting System	Triple Rinsing			16	16			48			
Total				172	172			516			

Activity¹ Proposed equipment to be installed that will process PCBs and are container-like will be triple rinsed. Surfaces of equipment will be double rinsed/washed.

hr² Hours represent total crew hours for each activity. The crew consists of 1 supervisor, 1 health physicist, and 3 laborers.

Note: No additional costs for cleaning the building structure are included because the physical area of Building 13 will not increase.

Labor Cost for Decontamination	Hours	\$/hour	Total Cost (\$)
Supervisor	172	64.16	\$11,035
Health Physicist	172	66.20	\$11,387
Laborer	516	25.42	\$13,116
Additional Total			\$35,538

Table 10.0B - Additional Decontamination Cost for Rail Loading Area and Truck Loading Area

CLOSURE COST ESTIMATE											
RLA and TLA LOADING / UNLOADING AREAS											
Item / Area	Activity	Area ft ²	Manager hr	Supervisor hr	Health Physicist hr	Engineer hr	H&S Officer hr	Laborer hr	Clerical hr	FSP / H&SP / QAPP	Field Survey
Building 20 RLA Loading/unloading floor	Steam Clean	8940		29.8	29.8			89.4			
TLA Loading/unloading floor	Steam Clean	5,240		17.5	17.5			52.4			
Total		14,180		47.3	47.3			141.8			

Assumes a labor can steam clean 100 ft² per hour
Crew is 3 laborers and 1 supervisor and 1 HP

Labor Cost for Decontamination	Hours	\$/hour	Total Cost (\$)
Supervisor	47.3	64.16	\$3,033
Health Physicist	47.3	66.20	\$3,129
Laborer	141.8	25.42	\$3,604
Additional Total			\$9,766

Calculations

RLA pad area is 90' x 90'
RLA curbs 8" high x 1ft wide

8100 sq feet
840 sq feet
8940

TLA pad area is 60' x 70'
TLA curbs 6" high x 3ft wide

4200 sq feet
1040 sq feet
5240

Table 11.0 - Current Disposal of Rinsate Cost for Building 13

THERMAL AREA DECONTAMINATION										
Item / Area	Activity	Area ft ²	Gallons	Containers (drums)	Container Cost (\$/drum)	Container Cost	Disposal Site	Disposal Cost	Transportation (miles)	Transportation (\$)
Thermal Treatment - Feed Prep	Triple Rinsing									
Thermal Treatment - Waste Feed	Triple Rinsing									
WSB, Rm 4	Triple Rinsing	1,800	180	4	30	120	Energy Solutions	5471.067888	650	2667.5
Unit A (Thermal Treatment, Rm 1)	Triple Rinsing									
HAZMAT Enclosure (Thermal Treatment, Rm 4)	Triple Rinsing	1,980	198	4	30	120	Energy Solutions	5957.385034	650	2667.5
Storage Area Floors	Steam Clean									
Storage Area Shelves	Steam Clean									
Floors / Walls / Ceiling	Steam Clean	24,000	2400	44	30	1320	Energy Solutions	72947.57184	650	2667.5
Thermal Treatment - Residue Handling	Decon									
Thermal Treatment - Offgas Processing Units	Decon									
Thermal Treatment - Gas Monitoring and Discharge	Decon									
Thermal Treatment - Secondary Waste Treatment	Decon									
Thermal Treatment - Misc Equipment	Decon									
Total			2776	51	30	1530	Energy Solutions	84376.02476	650	2667.5

CLOSURE COST ESTIMATE										
NON-THERMAL AREA DECONTAMINATION										
Item / Area	Activity	Area ft ²	Gallons	Containers (drums)	Container Cost (\$/drum)	Container Cost	Disposal Site	Disposal Cost	Transportation (miles)	Transportation (\$)
Non-Thermal Area										
TP-02 - Cutting & Shredding	Steam Clean									
TT-03 - In-container Mixing	Steam Clean									
Containerized Waste Staging	Steam Clean									
Bulk Waste Receiving	Steam Clean									
Northeast Section Floors / Walls / Ceiling	Steam Clean	13,000	1300	24	30	720	Energy Solutions	39513.26808	650	2667.5
Southeast Section Floors / Walls / Ceiling	Steam Clean	13,000	1300	24	30	720	Energy Solutions	39513.26808	650	2667.5
West Section Floors / Walls / Ceiling	Steam Clean	13,000	1300	24	30	720	Energy Solutions	39513.26808	650	2667.5
Cutting Section Floors / Walls / Ceiling	Steam Clean	5,800	580	11	30	330	Energy Solutions	17628.99653	650	2667.5
HVAC Ducts	Steam Clean									
Dust Collectors	Steam Clean									
HEPA Filter	Steam Clean									
Stack	Steam Clean									
HEPA Filter Floors / Walls / Ceiling	Steam Clean	5,800	580	11	30	330	Energy Solutions	17628.99653	650	2667.5
Total			5060	92	30	2760	Energy Solutions	153797.7973	650	2667.5

Total Decontamination Cost \$247,599

Table 11.0A - Additional Disposal of Rinsate Cost for Building 13 Proposed Equipment

Item / Area	Activity	Volume gal	Gallons ¹ (rinsate)	Containers (drums)	Container Cost (\$/drum)	Disposal Site	Disposal Cost	Transportation (miles)	Transportation (\$)
TT-09 Mercury Treatment	Triple Rinsing	200	60	2	30	Energy Solutions	1823.689286	650	2567.5
TT-10 Debris Washing	Triple Rinsing	2,000	600	11	30	Energy Solutions	18236.68286	650	2567.5
TP-14 Liquid Treatment (4 Portable Totes)	Triple Rinsing	2,200	660	12	30	Energy Solutions	20060.68226	650	2567.5
TT-01 (High Capacity Mixer)	Steam Clean		10	1	31	Energy Solutions	303.948216	650	2567.5
TP-10 Extraction Mixer	Triple Rinsing	500	150	3	30	Energy Solutions	4559.22324	650	2567.5
TP-10 Extraction Mixer	Triple Rinsing	500	150	3	30	Energy Solutions	4559.22324	650	2567.5
TP-13 Sorting System	Triple Rinsing		100	2	30	Energy Solutions	3039.48216	650	2567.5
Total			1670	31	30	Energy Solutions	50759.35207	4550	17972.5

Gallons¹ 10% of the volume x 3 equals the volume used for triple rinse the equipment plus 10% to clean surfaces

Additional Total Decontamination Cost \$69,662

Table 11.0B - Additional Disposal of Rinsate Cost for RLA and TLA

Item / Area	Activity	Area ft ²	Gallons	Containers (drums)	Container Cost (\$/drum)	Container Cost	Disposal Site	Disposal Cost	Transportation (miles)	Transportation (\$)
RLA and TLA Loading/unloading area	Steam Clean	14,180	1418	26	30	780	Energy Solutions	43099.86	650	2567.5
Total			1418	26	30	780		43099.86	650	2567.5

Additional Total Decontamination Cost

\$46,447

Table 12.0 - Current Soil Sampling and Analysis Cost for Building 13

Soil Sampling and Analysis		
No. of samples	Cost per sample (\$)	Total Cost
150	500	\$75,000.00

Table 12.0A - Additional Soil Sampling and Analysis Cost for RLA and TLA

Soil Sampling and Analysis		
No. of samples	Cost per sample (\$)	Additional Total Cost
15	500	\$7,500.00

Table 13.0 - Current PPE Disposal Cost for Building 13

Activity		Containers	Container Cost	Disposal Cost
Decontamination		1	\$1,100	\$22,737

Total Cost to dispose of PPE **\$23,837**

Table 13.0A - Additional PPE Disposal Cost

Activity		Containers	Container Cost	Disposal Cost
Decontamination		1	\$1,100	\$22,737

Total Cost to dispose of PPE **\$23,837**

It is assumed that one additional PPE disposal box will be required for the following:

RLA and TLA

Additional proposed storage capacity in Building 13

Additional proposed equipment in Building 13

Table 14.0 - Current Equipment Rental Cost for Building 13

Equipment Rentals	Number of Units				
Steam Cleaner	3	\$80	days	180	\$43,200
Misc. Equipment Rentals	N/A	\$60	days	180	\$10,800
Size Reduction Tools	N/A	\$70	days	180	\$12,600
Concrete Coring Drill	1	\$356	week	2	\$712
					\$67,312
					\$67,312

Table 14.0A - Additional Equipment Rental Cost For Proposed Building 13 Equipment

Equipment Rentals	Number of Units						
Steam Cleaner	1	\$80	days	30		\$2,400	
Misc. Equipment Rentals	N/A	\$60	days	30		\$1,800	
Size Reduction Tools	N/A	\$70	days	30		\$2,100	
						\$6,300	\$6,300

Table 14.0B - Additional Equipment Rental Cost For Proposed Building 13 Storage

Equipment Rentals	Number of Units				
Steam Cleaner	1	\$80	days	0	\$0
Misc. Equipment Rentals	N/A	\$60	days	30	\$1,800
Size Reduction Tools	N/A	\$70	days	30	\$2,100
					\$3,900
					\$3,900

Table 14.0C - Additional Equipment Rental Cost For RLA and TLA

Equipment Rentals	Number of Units					
Steam Cleaner	1	\$80	days	15	\$1,200	
Misc. Equipment Rentals	N/A	\$60	days	15	\$900	
Size Reduction Tools	N/A	\$70	days	0	\$0	
Concrete Coring Drill	1	\$356	week	2	\$712	
					\$2,812	\$2,812