

**APPENDIX 9-B**

**CLOSURE COST ESTIMATE**

MIXED WASTE FACILITY  
RCRA/TSCA PERMIT APPLICATION

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

# *Mixed Waste Facility*

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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.**

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### **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 “(D)uring 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
- Anticipated labor, equipment, and material costs

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- 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**

<b><u>FACILITY INFORMATION</u></b>	
Facility Name:	Perma-Fix Northwest Richland, Inc.
Address:	2025 Battelle Blvd.
City	Richland
State	Washington
Zip	99354
<b>Closure Cost Estimate Creator Contact Information</b>	
Address :	2025 Battelle Blvd
City	Richland
State	Washington
Zip	99354
Telephone:	509.375.7022
Fax:	509.375.0613
<b>Closure Activity Questions</b>	
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), the 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 ft<sup>3</sup>. 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/ft<sup>3</sup>
  - US Ecology: \$159/ft<sup>3</sup>
  - 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.
- The volume of equipment for the new proposed vitrification system and the existing vitrification system is equivalent.

### **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.

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

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.

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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.
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.

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### 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.

### 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 237,350 ft<sup>3</sup> and the maximum TSCA-regulated waste quantity will be 138,400 ft<sup>3</sup>.

**TABLE 2.0**

<b>Inventory Break Out</b>	
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.

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## **5.1 Non-Closure Wastes**

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:

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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

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

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

Labor cost:

Assume labor at \$25.42 per hour

$(9 \text{ Person-hours})(\$25.42 \text{ per person-hrs})$  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 =  $(241 \text{ 55-gallon drums})(2390 \text{ miles})(\$3.95/\text{mile})/88 \text{ drums per shipment} = \$ 28,322$

#### (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:

$(241 \text{ 55-gallon drums})$  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;

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

Labor cost:

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.

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### 4. Disposal cost.

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

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 ft<sup>3</sup> with a total of 213 ft<sup>3</sup> 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 ft<sup>3</sup>. Total volume for TP01 is 213 ft<sup>3</sup>.

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

#### **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 ft<sup>3</sup>. TP01 is estimated to be 213 ft<sup>3</sup>.

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

### **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.

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7. Transportation cost to the disposal site.
8. Disposal cost.

### **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:

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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.

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**

<b>Closure Cost Summary</b>				
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 proposed Building 20
Planning and Oversight	\$136,727	\$21,940	\$26,340	\$26,540
Return to Generator Cost Non-Thermal Equipment Disposal	\$51,355	\$0	\$179,773	\$96,609
Thermal Equipment Disposal	\$401,786	\$131,520	\$0	\$0
Decontamination	\$828,297	\$0	\$0	\$0
Decontamination Disposal	\$160,334	\$35,538	\$0	\$20,662
Soil Sampling and Analytical	\$247,599	\$69,662	\$0	\$2,568
PPE Disposal	\$75,000	\$0	\$0	\$25,000
Equipment Rental	\$23,837	\$23,837	\$23,837	\$23,837
Engineering Certification	\$67,312	\$6,300	\$3,900	\$3,862
	\$8,000	\$0	\$0	\$8,000
<b>Total Closure Cost</b>	<b>\$2,000,246</b>			
<b>Additional Closure Cost</b>		<b>\$288,796</b>	<b>\$233,850</b>	<b>\$207,077</b>

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.

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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 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.

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## **9.0 TABLES**