

*Closure Cost Estimates for Standardized Permits
Background Document - Option 4*

*Provide to Owners and Operators Standard Worksheets
That Can Be Used to Calculate Cost Estimates for Closure*

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1.0 INTRODUCTION

Tetra Tech EM Inc. (Tetra Tech) received Work Assignment (WA) No. R11018 from the U.S. Environmental Protection Agency (EPA) Office of Solid Waste (OSW), Permits Branch under Contract No. 68-W4-0007 (RCRA Enforcement, Permitting, and Assistance [REPA] Contract, Zone II). Under the WA Tetra Tech will assist EPA in developing additional methods of estimating costs of closure for noncommercial container storage areas, tank systems, and containment buildings that are regulated as hazardous waste treatment or storage units under subtitle C of the Resource Conservation and Recovery Act (RCRA). The methods developed are designed to reduce the financial, technical, and administrative burdens on the regulated community of complying with requirements under Title 40 Code of Federal Regulations (CFR) parts 264.142 and 265.142 by enabling owners or operators of certain hazardous waste units to provide acceptable estimates of the costs of closure for those units without preparing full closure plans. After the methods have been developed, they will be proposed in conjunction with new regulations that will allow owners or operators to use standard permits for specific types of units.

Under this WA, Tetra Tech developed for EPA several preliminary options for estimating the costs of closure for units that are eligible for standard permits and proposed strategies for testing the accuracy of those options. Each of the options considered was designed to reduce the burden on owners and operators of developing such cost estimates. Among the preliminary options selected by EPA for further development was to provide to owners or operators standard worksheets that can be used to calculate estimates of the costs of closure. This document provides information about the steps taken by Tetra Tech to develop that option and presents worksheets and other materials that owners or operators of hazardous waste units eligible to use standard permits can use to develop cost estimates for closure of such units.

Section 1.1 of this document presents background information about EPA's standard permit initiative. Section 2.0 of this document presents information about how Tetra Tech developed standard worksheets that owners or operators can use to calculate estimates of the costs of closure. Sections 2.1, 2.2, and 2.3 of this document present information about those worksheets that have been designed for owners or operators to use to estimate the costs of closure of container storage areas, tank systems, and containment buildings, respectively. Appendix A presents worksheets owners or operators can use to estimate the costs of closure activities for container storage areas. Appendix B presents worksheets for tank systems, and Appendix C presents worksheets for containment buildings.

1.1 BACKGROUND INFORMATION

Currently, regulations under subtitle C of RCRA require that owners or operators of hazardous waste treatment, storage, and disposal facilities (TSDF) prepare closure plans that provide to regulators detailed information about the operating conditions of each hazardous waste management unit at an owner's or operator's facility. The amount of financial assurance for closure that must be demonstrated by each owner or operator for each facility is determined by the cost estimate for closure that is included in the facility's closure plan. Subpart G of the facility standards (40 CFR parts 264 and 265) sets forth the rules for preparing closure plans for TSDFs. The cost estimating standards appear in subpart H.

Under subpart G, owners or operators of TSDFs are required to close their facilities in a manner that meets a general performance standard (see sections 264.111 and 265.111) and to develop a written closure plan for each facility (see sections 264.112 and 265.112). The plan must identify the steps necessary to perform partial or final closure of the facility at any point during its active life. Sections 264.112(b) and 265.112(b) describe the required content of a closure plan. In addition, during closure, the owner or operator must comply with: 1) applicable requirements governing the time periods within which closure activities must be commenced and completed; 2) procedures for proper decontamination and management of equipment; and 3) requirements for submittal of a certification to the implementing agency that closure has been conducted in accordance with an approved plan.

Under subpart H, the owner or operator must have a detailed written estimate of the cost of closing the facility in accordance with the requirements for closure (see sections 264.142 and 265.142). Several rules apply to the preparation of such cost estimates: 1) the estimate must equal the cost of final closure at the point in the active life of the facility at which the extent and manner of its operations would make closure most expensive; 2) the estimate must be based on costs to the owner or operator of hiring a third party to close the facility; 3) the estimate may not incorporate any salvage value that may be realized from the sale of wastes, structures, equipment, land, or other assets associated with the facility at the time of partial or final closure; and 4) the owner or operator may not incorporate into the estimate a zero cost for the treatment or disposal of wastes that may have economic value. The owner or operator must adjust the cost estimate for inflation annually and to reflect any changes in the operations at the facility that would increase the cost of closure.

Under sections 264.142(d) and 265.142(d), the owner or operator must keep at the facility the latest (and presumably, therefore, the most up-to-date and accurate) cost estimate for closure. For a facility that is to be permitted under RCRA, the owner or operator must submit the most recent cost estimate for closure of the facility in Part B of its permit application.

In 1994, EPA convened a special task force to study permitting activities under its various programs and to make specific recommendations to improve those programs. The task force, known as the Permit Improvement Team (PIT), worked for two years with EPA personnel, personnel of state agencies, representatives of industry, and representatives of environmental groups and associations to develop recommendations for standardizing processes for permitting. The PIT recommended that the processes for permitting TSDFs be modified to make them commensurate with the complexity of hazardous waste management activities that are conducted at certain facilities. The PIT further recommended that, to streamline the permitting process, EPA investigate the possibility of using “standardized” permits for those hazardous waste management units that: 1) are container storage areas, tank systems, or containment buildings, 2) are used to conduct operations that are noncommercial in nature, and 3) will not be closed with wastes in place (post-closure care will not be required).

EPA is investigating the possibility of proposing new regulations that would allow the use of standard permits for such units. Under the proposed rule, only owners or operators of noncommercial TSDFs that have units that are classified as container storage areas, tanks, or containment buildings would be eligible to use standard permits, and then only for those specific units. Owners or operators of units that are eligible for standard permits would not be required, at the time of permitting, to prepare and submit to the implementing agency a complete closure plan. However, those owners or operators that use standard permits still would be required to prepare, at the time of permitting a cost estimate for closure activities. They also would be required to prepare and submit to the implementing agency before the initiation of final closure activities, a complete closure plan and cost estimate that meets requirements specified under 40 CFR 264.112 and 265.112.

Under the proposed rule, owners or operators of facilities that have two or more units that are eligible for standard permits (for example, one facility might have both a container storage area and an aboveground tank) would be allowed to permit all of their units under a single standard permit. Owners or operators of facilities that have both units that are eligible for standard permits and units that are not eligible for standard permits (for example, one facility might have both a container storage area and a waste pile)

would have the option of permitting their eligible units under a standard permit and permitting their ineligible units separately under a traditional permit or of permitting all their units (both eligible and ineligible) under a single traditional permit.

To support the use of standard permits for certain types of units, EPA is developing several options that it believes will provide to owners or operators less burdensome methods of preparing cost estimates for closure of units that may be eligible to use standard permits. The options are designed to reduce the financial, technical, and administrative burdens on the regulated community of complying with requirements under 40 CFR parts 264.142 and 265.142 by enabling owners or operators to develop estimates that they and the permitting agency can accept as reasonably accurate without the need to prepare an accompanying closure plan for the units of concern. Use of any such methods will be optional. If they prefer, owners or operators of units that are eligible for standard permits may follow the standard procedures currently established under the regulations to develop estimates of the cost of closure.

The following section presents information about the option to provide to owners or operators standard worksheets that they can use to calculate estimates of the cost of closure.

2.0 PROVIDE TO OWNERS AND OPERATORS STANDARD WORKSHEETS THAT THEY CAN USE TO CALCULATE ESTIMATES OF THE COST OF CLOSURE

For this option, Tetra Tech developed a series of worksheets that owners or operators of units eligible to use standard permits can use to estimate the cost of closure for those units. The worksheets provide a methodology that can help reduce the burden on the regulated community by simplifying and standardizing the cost-estimating process. The worksheets have been designed to help ensure that owners and operators consider all applicable closure activities and incorporate the costs of those activities into their estimates.

Use of the worksheets would reduce the burden on the owner or operator of complying with the applicable regulations because the worksheets would provide an easy-to-follow, step-by-step approach to developing cost estimates for eligible units. Because the worksheets would identify, in a standard format, the specific activities required for closure, use of the worksheets also would reduce the burden on the permitting agency of reviewing and evaluating estimates prepared by owners or operators. It would be easier for the permitting agency to review and evaluate the adequacy of cost estimates developed by the use of the

worksheets because the information submitted by each owner or operator would be uniform and because the costs of specific activities easily could be identified and checked for reasonableness.¹

EPA's decision to develop this option was based in part on the favorable experiences of several state environmental agencies that use standard worksheets. Those agencies use the worksheets to help simplify the processes owners or operators of TSDFs in their states use to develop cost estimates for closure and post-closure care. For example, similar worksheets are in use in the states of Alabama, California, and Florida. In each of those states, owners and operators of TSDFs have used standard worksheets successfully to prepare cost estimates for closure and post-closure care for their regulated hazardous waste units.

EPA developed the worksheets presented in this document by modifying the worksheets in existing closure and post-closure care cost estimating software titled CostPro[®].² In 1994, EPA Region 4 developed a comprehensive methodology to assist EPA and state permit writers in evaluating the adequacy of cost estimates for closure and post-closure care prepared by owners and operators of TSDFs. The methodology is discussed in detail in a document titled *Evaluating Cost Estimates for Closure and*

¹ In evaluating the adequacy of cost estimates for closure developed by use of the worksheets, the implementing agency may request that owners or operators provide documentation to substantiate estimates of costs for particular items that are submitted in the worksheets.

² EPA and Tetra Tech currently hold a joint copyright on the CostPro[®] software. The terms of the copyright allow EPA to distribute the software freely to all entities within the federal government that act on behalf of EPA. The software is sold commercially, however, to all entities other than the federal government. EPA Region 4 maintains the CostPro[®] software and has updated it annually to incorporate current cost data. The cost data used in the CostPro[®] software is provided primarily by R.S. Means Company, Inc. (R.S. Means) and is published in the *Means Cost Guides*. Under special arrangement, R.S. Means has agreed to allow its cost data to be used in the CostPro[®] software. However, because the data provided by R.S. Means are proprietary, and because EPA wishes owners or operators of eligible units to be able to derive cost data from whatever sources may be most appropriate for those units, the R.S. Means data are not included in the worksheets EPA developed for this option. Persons who wish to obtain the CostPro[®] software may contact Mr. Steven Jeffords, Tetra Tech EM Inc., at (404) 225-5514 for more information.

*Post-Closure Care of RCRA Hazardous Waste Management Units.*³ After that document had been developed, EPA Region 4 developed the CostPro[®] software, primarily to automate the methodology set forth in the document, thereby enhancing the ability of regulators to evaluate the adequacy of such cost estimates.

CostPro[®] provides worksheets that assist owners or operators in preparing cost estimates for closure and post-closure care for all types of TSDFs and regulators in evaluating the adequacy of such cost estimates. In developing this option, however, EPA identified and extracted from CostPro[®] only those worksheets appropriate for closure activities at units that would be eligible to use standard permits. EPA modified those worksheets by removing from them all proprietary cost and work rate data and by eliminating from them certain activities that probably would not be performed for the closure of units eligible to use standard permits. For example, the CostPro[®] software provides worksheets that can be used to estimate the costs of post-closure care activities for units that will be closed with waste in place. However, such units will not be eligible to use standard permits. Therefore, EPA did not include in this option worksheets used to estimate the costs of post-closure care.

The worksheets presented in this document were designed primarily to be used to estimate the costs of closure for individual units. However, the worksheets also can be used to estimate the costs of closure for groups of units at a single facility that will be closed at the same time. If the worksheets are used in that way, circumstances might arise that could justify the allocation of certain common costs of closure among the various units to be closed. For example, the costs of mobilizing and demobilizing heavy equipment must be included as part of the estimated cost of each activity that requires the use of such equipment. If, however, the equipment required to conduct one closure activity already had been mobilized to conduct another activity, owners or operators might be justified in allocating the cost of mobilizing and demobilizing the equipment among the various activities for which the equipment will be required. In completing the worksheets, owners or operators should indicate which costs of closure, if any, are allocated

³ EPA released the final version of this document on May 13, 1994. Because the document contains proprietary cost information, and because it has been superseded by various editions of the CostPro[®] software that provide more recent cost information, copies of the document currently are not available for distribution outside the agency. When development of this option has been completed, however, EPA will make one copy of the document available for viewing in the RCRA Information Center (RIC), Crystal Gateway I, First Floor, 1235 Jefferson Davis Highway, Arlington, Virginia, 22202.

among the various closure activities and provide the information the Agency needs to determine whether the allocation of those costs is justified.

The following section presents information about worksheets that owners or operators can use to estimate costs for closure of container storage areas eligible to use standard permits.

2.1 CLOSURE COST ESTIMATING WORKSHEETS FOR CONTAINER STORAGE AREAS

Appendix A of this document provides an inventory worksheet and worksheets for specific activities to be used to calculate the costs of closure activities that are specific to container storage areas. A summary worksheet also is provided for accumulating the costs identified through the use of all the worksheets applicable to the unit.

In the case of container storage areas, data owners or operators need to use the worksheets include:

1) physical state of each hazardous waste to be stored at the unit; 2) maximum permitted capacity (in gallons) of each unit; 3) types of containers that will be used to store hazardous waste at the unit (for example, 55-gallon drums); 4) surface area (in square feet [ft²]) of all pads, berms, or other secondary containment structures; 5) types of heavy equipment to be used during closure activities; 6) level of personal protective equipment (PPE) assumed to be required during closure activities; 7) methods of decontamination to be used for the unit and for heavy equipment; 8) number and types of samples to be taken and appropriate analytical procedures to be performed; 9) an estimation of whether the unit will be closed with the containment system in place or whether the containment system will be removed during closure; and 10) anticipated methods of treatment and disposal of all wastes removed and all residues generated during closure activities.

The inventory worksheet is completed first, since the data entered on that worksheet will be used to complete all activity-specific worksheets for the unit. Depending on the activities to be conducted to close the unit, some of the information requested on the inventory worksheet may not be necessary or applicable. The user should complete only those portions of the inventory worksheet that are applicable to anticipated closure activities.

The summary worksheet is provided for accumulating the costs derived through the use of all worksheets applicable to the unit. The summary worksheet lists the name and number of each worksheet that might

be used to calculate the costs of closure for a container storage area. Along with worksheets for those activities that are conducted routinely during closure, the summary worksheet lists worksheets for certain additional activities that the owner or operator might conduct to close the unit. Because not all of the activities listed may be conducted to close the unit, only the applicable worksheets and the applicable portions of the summary worksheet should be completed. When all worksheets that are applicable to the container storage area have been completed, the total cost of closure activities for the unit is calculated on the summary worksheet. Factors then are applied to that cost to account for management and engineering expenses and to allow for contingencies and unforeseen expenses.

Presented below are descriptions of those cost estimating worksheets that may be used to determine the costs of conducting routine closure activities at container storage areas. If certain costs of closure are to be allocated among groups of units at the facility to be closed at the same time, owners or operators must indicate on the worksheets which of the costs are to be allocated and provide to the Agency the information needed to determine whether the allocation of those costs is justified.

- **Removal of Waste** - This activity includes preparing the containers and loading them onto trucks for shipment.
- **Decontamination of the Containment System and Equipment** - This activity includes decontaminating the unit and the heavy equipment that is used to close the unit. The unit decontamination worksheets allow for decontamination by one of two methods: (1) steam cleaning or pressure washing or (2) sandblasting. The equipment decontamination worksheet assumes the use of steam cleaning or pressure washing to decontaminate heavy equipment that may come into contact with hazardous waste while conducting closure activities.
- **Sampling and Analysis** - This activity includes all sampling and analysis to be conducted during closure. Sampling and analysis will be needed to verify that decontamination efforts have been successful. Factors to be considered in estimating the costs of sampling and analysis include the number and types of samples to be collected and the methods to be used to analyze those samples.
- **Transportation of Wastes** - This activity includes transportation of all wastes by a third party. Types of wastes transported may include inventoried wastes and contaminated components of the containment system.
- **Treatment and Disposal of Wastes** - This activity includes treatment and disposal of all wastes by a third party. The wastes to be treated and disposed of may include inventoried wastes, contaminated components of the containment system, and wastes resulting from decontamination activities. A separate worksheet is provided specifically to estimate the costs of transporting, treating, and disposing of decontamination fluids.

- **Inspection and Certification of Closure** - This activity includes professional and administrative fees for conducting closure inspections and preparing the certification of closure report. If multiple units of the same type are being closed in the same manner and at the same time, the user may choose to account for the cost of certification of closure only once for all of those units.

Presented below are descriptions of cost estimating worksheets for certain additional activities that might be conducted to effect closure at container storage areas:

- **Demolition and Removal of the Containment System** - Demolition and removal of the containment system are additional activities that might be conducted if the owner or operator intends, or will be required, to demolish and remove the system at the time of closure.
- **Removal of Contaminated Soils** - Removal of contaminated soils is an additional activity that might be conducted at the time of closure.
- **Backfilling** - The cost of backfilling should be included in the cost estimate when areas are excavated to remove components of the containment system or to remove contaminated soil.

The following section presents information about worksheets that owners or operators can use to estimate costs for closure of tank systems eligible to use standard permits.

2.2 CLOSURE COST ESTIMATING WORKSHEETS FOR TANK SYSTEMS

Appendix B of this document provides an inventory worksheet and worksheets for specific activities to be used to calculate the costs of closure activities that are specific to tank systems. A summary worksheet also is provided for accumulating the costs identified through the use of all the worksheets applicable to the unit.

In the case of tank systems, data owners or operators need to use the worksheets include: 1) type of tank (aboveground or on-ground)⁴; 2) physical state of each hazardous waste to be stored or treated in the tank system; 3) maximum permitted capacity (in gallons) of each unit; 4) interior surface area (in ft²) of the tank system; 5) length (in feet) and nominal diameter (in inches) of all ancillary piping; 6) surface area (in ft²) of all pads, berms, or other secondary containment structures; 7) types of heavy equipment to be used during closure activities; 8) level of PPE assumed to be required during closure activities; 9) methods of decontamination to be used for the unit and for heavy equipment; 10) number and types of samples to be taken and appropriate analytical procedures to be performed; 11) an estimation of whether

⁴ In-ground tanks and underground storage tanks are not eligible for standard permits.

the tank system will be closed in place or disassembled and removed; and 12) anticipated methods of treatment and disposal of all wastes removed and all residues generated during closure activities.

The inventory worksheet is completed first, since the data entered on that worksheet will be used to complete all activity-specific worksheets for the unit. Depending on the activities to be conducted to close the unit, some of the information requested on the inventory worksheet may not be necessary or applicable. The user should complete only those portions of the inventory worksheet that are applicable to anticipated closure activities.

The summary worksheet is provided for accumulating the costs derived through the use of all worksheets applicable to the unit. The summary worksheet lists the name and number of each worksheet that might be used to calculate the costs of closure for a tank system. Along with worksheets for those activities that are conducted routinely during closure, the summary worksheet lists worksheets for certain additional activities that the owner or operator might conduct to close the unit. Because not all of the activities listed may be conducted to close the unit, only the applicable portions of the summary worksheet should be completed. When all worksheets that are applicable to the tank system have been completed, the total cost of closure for the unit is calculated on the summary worksheet. Factors then are applied to that cost to account for management and engineering expenses and to allow for contingencies and unforeseen expenses.

Presented below are descriptions of the cost estimating worksheets to be used in determining the costs of conducting routine closure activities at tank systems. If certain costs of closure are to be allocated among groups of units at the facility to be closed at the same time, owners or operators must indicate on the worksheets which of the costs are to be allocated and provide to the Agency the information needed to determine whether the allocation of those costs is justified.

- **Removal of Waste** - This activity includes pumping the waste out of the tank and all ancillary piping and placing it in trucks for shipment off site.
- **Purging of the Tank System** - This activity includes introducing carbon dioxide (dry ice) into tanks that have contained ignitable wastes and purging them of all volatile vapors.
- **Decontamination of the Tank System and Equipment** - This activity includes decontaminating the unit and the heavy equipment that is used to close the unit. The unit decontamination worksheets allow for decontamination by one of two methods: (1) steam cleaning or pressure washing or (2) sandblasting. The equipment decontamination worksheet

assumes the use of steam cleaning or pressure washing to decontaminate heavy equipment that may come into contact with hazardous waste while conducting closure activities.

- **Sampling and Analysis** - This activity includes all sampling and analysis activities to be conducted during closure. Sampling and analysis will be needed to verify that decontamination efforts have been successful. Factors to be considered in estimating the costs of sampling and analysis include the number and types of samples to be collected and the methods to be used to analyze those samples.
- **Transportation of Wastes** - This activity includes transportation of all wastes by a third party. The wastes transported may include: (1) inventoried wastes, (2) wastes resulting from flushing the tank and ancillary piping, (3) contaminated components of the tank system, and (4) contaminated components of the containment system.
- **Treatment and Disposal of Wastes** - This activity includes treatment and disposal of all wastes by a third party. The wastes to be treated and disposed of may include: (1) inventoried wastes, (2) wastes resulting from flushing the tank and ancillary piping, (3) wastes resulting from decontamination activities, (4) contaminated components of the tank system, and (5) contaminated components of the containment system. A separate worksheet is provided specifically to estimate the costs of transporting, treating, and disposing of decontamination fluids.
- **Inspection and Certification of Closure** - This activity includes professional and administrative fees for conducting closure inspections and preparing the certification of closure report. If a number of units of the same type are being closed in the same manner and at the same time, the user may choose to account for the cost of certification of closure only once for all those units.

Presented below are descriptions of cost estimating worksheets for certain additional activities that might be conducted to effect closure at tank systems:

- **Flushing the Tank and Ancillary Piping** - This activity includes flushing the tank system and ancillary piping with water or a mixture of soap and water to remove residues of hazardous waste. Under certain circumstances, this activity might be done before, or as a substitute for, decontamination of the tank system.
- **Disassembly and Loading of the Tank and Ancillary Piping** - Disassembly and loading of the tank and ancillary piping are additional activities that might be conducted if the owner or operator intends, or will be required, to disassemble and remove the tank system at the time of closure.
- **Demolition and Removal of the Containment System** - Demolition and removal of the containment system are additional activities that might be conducted if the owner or operator intends, or will be required, to demolish and remove the system at the time of closure.
- **Removal of Contaminated Soils** - Removal of contaminated soil is an additional activity that might be conducted at the time of closure.

- **Backfilling** - The cost of backfilling should be included in the cost estimate when areas are excavated to remove components of the containment system or to remove contaminated soil.

The following section presents information about worksheets that owners or operators can use to estimate costs for closure of containment buildings eligible to use standard permits.

2.3 CLOSURE COST ESTIMATING WORKSHEETS FOR CONTAINMENT BUILDINGS

Appendix C of this document provides an inventory worksheet and worksheets for specific activities to be used to calculate the costs of closure activities that are specific to containment buildings. A summary worksheet also is provided for accumulating the costs identified through the use of all the worksheets applicable to the unit.

In the case of containment buildings, data owners or operators need to use the worksheets include:

- 1) physical state of each hazardous waste to be stored at the unit; 2) maximum permitted capacity (in cubic yards [yd^3]) of each hazardous waste to be stored at the unit; 3) interior surface area (in ft^2) of the containment building (walls, floor, and roof); 4) types of heavy equipment to be used during closure activities; 5) level of PPE assumed to be required during closure activities; 6) methods of decontamination to be used for the unit and for heavy equipment; 7) number and types of samples to be taken and appropriate analytical procedures to be performed; 8) an estimation of whether the unit will be closed with the containment building in place or the containment building will be removed; and
- 9) anticipated methods of treatment and disposal of all wastes removed and all residues generated during closure activities.

The inventory worksheet is completed first, since the data entered on that worksheet will be used to complete all activity-specific worksheets for the unit. Depending on the activities to be conducted to close the unit, some of the information requested on the inventory worksheet may not be necessary or applicable. The user should complete only those portions of the inventory worksheet that are applicable to anticipated closure activities.

The summary worksheet is provided for accumulating the costs derived through the use of all worksheets applicable to the unit. The summary worksheet lists the name and number of each worksheet that might be used to calculate the costs of closure for a containment building. Along with worksheets for those activities that are conducted routinely during closure, the summary worksheet lists worksheets for certain

additional activities that the owner or operator might conduct to close the unit. Because not all of the activities listed may be conducted to close the unit, only the applicable portions of the summary worksheet should be completed. When all worksheets that are applicable to the containment building have been completed, the total cost of closure activities for the unit is calculated on the summary worksheet. Factors then are applied to that cost to account for management and engineering expenses and to allow for contingencies and unforeseen expenses.

Presented below are descriptions of the cost estimating worksheets to be used in determining the costs of conducting routine closure activities at containment buildings. If certain costs of closure are to be allocated among groups of units at the facility to be closed at the same time, owners or operators must indicate on the worksheets which of the costs are to be allocated and provide to the Agency the information needed to determine whether the allocation of those costs is justified.

- **Removal of Waste** - This activity includes removing all solid wastes from the unit and loading the waste into debris boxes for transportation off site. Any liquid wastes in the liquid collection system at the unit must be pumped from the system and removed.
- **Decontamination of the Containment Building** - This activity includes decontaminating the unit and the heavy equipment that is used to close the unit. The unit decontamination worksheets allow for decontamination by one of two methods: (1) steam cleaning or pressure washing or (2) sandblasting. The equipment decontamination worksheet assumes the use of steam cleaning or pressure washing to decontaminate heavy equipment that may come into contact with hazardous waste while conducting closure activities.
- **Sampling and Analysis** - This activity includes all sampling and analysis to be conducted during closure. Sampling and analysis will be needed to verify that decontamination efforts have been successful. Factors to be considered in estimating the costs of sampling and analysis include the number and types of samples to be collected and the methods to be used to analyze those samples.
- **Transportation of Wastes** - This activity includes transportation of all wastes by a third party. The wastes transported may include: (1) inventoried wastes, (2) any liquid wastes in the liquid collection system, and (3) contaminated components of the containment system.
- **Treatment and Disposal of Wastes** - This activity includes treatment and disposal of all wastes by a third party. The wastes treated and disposed of may include: (1) inventoried wastes, (2) any liquid wastes in the liquid collection system, (3) contaminated components of the containment system, and (4) wastes resulting from decontamination activities. A separate worksheet is provided specifically to estimate the costs of transporting, treating, and disposing of decontamination fluids.
- **Inspection and Certification of Closure** - This activity includes professional and administrative fees for conducting closure inspections and preparing the certification of closure report. If a

number of units of the same type are being closed in the same manner and at the same time, the user may choose to account for the cost of certification of closure only once for all those units.

Presented below are descriptions of cost estimating worksheets for certain additional activities that might be conducted to effect closure at containment buildings.

- **Demolition and Removal of the Floor** - Demolition and removal of the floor are additional activities that might be conducted if the owner or operator intends, or will be required, to demolish and remove the floor at the time of closure.
- **Demolition and Removal of the Building** - Demolition and removal of the building are additional activities that might be conducted if the owner or operator intends, or will be required, to demolish the building at the time of closure.
- **Removal of the Containment System** - The components of a containment system for a containment building that manages liquids will include one or several geomembrane liners and a drainage system. It may not be necessary to remove all the components of the containment system at the time of closure.
- **Removal of Contaminated Soils** - Removal of contaminated soil is an additional activity that might be conducted at the time of closure.
- **Backfilling** - The cost of backfilling should be included in the cost estimate when areas are excavated to remove components of the building or the containment system or to remove contaminated soil.

APPENDIX A

**COST ESTIMATING WORKSHEETS
FOR CONTAINER STORAGE AREAS**

APPENDIX B

**COST ESTIMATING WORKSHEETS
FOR TANK SYSTEMS**

APPENDIX C

**COST ESTIMATING WORKSHEETS
FOR CONTAINMENT BUILDINGS**