

SOLID WASTE FINANCIAL ASSURANCE PROGRAM REPORT



**OKLAHOMA DEPARTMENT OF ENVIRONMENTAL
QUALITY
WASTE MANAGEMENT DIVISION**



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Chapter 3

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Chapter 3 - Comprehensive List of Tasks and Services

While the regulations establish broad categories of tasks and services, a more specific list of these items must be established for landfills to calculate the amount of financial assurance. Chapter 3 develops the comprehensive lists of tasks and services necessary for conducting final closure and post-closure activities at a landfill. Tasks and services are identified based on regulatory requirements and modified based on research and technical information obtained in Chapter 2. This chapter also describes how tasks and services can be modified due to technical or regulatory changes.

3.1 Evaluation of Closure Tasks and Services

The development of closure tasks and services begins with review of existing regulatory requirements completed in Chapter 1 and presented in Table 1.5. Table 1.5 illustrates the regulatory language defining closure requirements for MSWLFs, NHISW landfills, and C&D landfills is very similar. Regulatory language can be ambiguous and the use of Table 1.5 for calculating closure costs estimates would be difficult for a specific site. Research of surrounding states' and the United States Environmental Protection Agency's solid waste financial assurance programs presented in Chapter 2 provided valuable information to consider in modifying the tasks and services listed in Table 1.5.

Based on the information in Chapter 1 and research completed for Chapter 2, the closure tasks and services listed in Table 1.5 were evaluated to answer these questions:

- Does the regulatory task or service require clarification before it is able to be implemented?
- Are there separate tasks and services that from a practical engineering and construction perspective would be completed as a single task or service?
- Can one or more tasks or services be combined to simplify the cost estimating procedure and still comply with the regulations?
- Can a unit cost be precisely described or defined for the task or service?

Discussion and examples of the evaluation process are presented in the following subsections.

3.1.1 Regulatory Clarification

The regulatory language for closure activities, presented in Table 1.5, identifies closure tasks but does not describe the tasks in sufficient detail to allow a landfill to list specific closure task(s) to calculate a cost estimate. Therefore, the procedure for calculating closure costs must clarify how a specific landfill will implement the regulation. The difficulty of implementing some of the regulations is illustrated by Task109 in Table 1.5, which quotes regulatory language stating the landfill closure plan must include "(a) plan for reworking or replacing any defective groundwater monitor wells and other defective monitoring equipment, monitoring ground water and surface water, and collecting and analyzing soil and water samples." Although the regulation identifies a task, the language format is not specific enough for a landfill to determine a cost estimate. A C&D landfill or NHISW landfill may only have groundwater monitoring wells, while a MSWLF

may have groundwater monitoring wells, methane gas probes, and a landfill gas extraction system. Task 15 in Table 1.5 quotes regulatory language stating the landfill closure plan must include “(a) method for obtaining, hauling and placing soil for final cover.” Once again, the regulation may be interpreted and implemented differently at the different types of landfills. A NHISW landfill may only be required to construct a final cover with a specific thickness of topsoil. A MSWLF operating on an existing footprint or C&D landfill may only be required to construct a final cover with specific thickness of clay cap and topsoil. And a composite lined MSWLF may be required to construct a final cover with a clay cap, gas venting layer, passive gas vents, flexible membrane liner, drainage layer, filter fabric, and topsoil. Therefore, development of specific closure tasks and services must reflect the landfill type and specific site.

3.1.2 Aggregate Tasks and Services Based on Engineering or Construction Practices

The regulatory language for closure activities presented in Table 1.5 lists the necessary tasks and services for completing final closure. However, based on standard engineering or construction practices, several individual tasks or services may be aggregated together. The point is illustrated by Tasks 1, 2, and 5 in Table 1.5. Amending the site specific closure plan, preparing construction documents, completing the bidding process, and providing a construction schedule are inter-related tasks that are better aggregated together. Combining regulatory tasks like these also simplifies the closure cost calculation by reducing the number of items. Ultimately it was determined that nine items would best be combined to form the closure category, Technical and Professional Services, that now include:

- Amend closure plan;
- Prepare construction documents with final cover description and installation procedures;
- Prepare schedule for completing all activities;
- Technical and professional services;
- Plan for redesigning final closure in accordance with existing site conditions and applicable regulations;
- A description of the final cover construction, including a calculation of the amount of material needed for each phase of closure, the identification of the soil type and location to be used for the final cover, analysis of the proposed cover material’s permeability, and the schedule and method of placement of final cover;
- A plan for remedying all former improper closure at the site;
- A plan for preparing final closure certification and other final closure reports and notices required; and
- Conducting the final closure survey.

3.1.3 Aggregate Tasks and Services Based on Procedure Simplification

The regulatory language for closure activities, presented in Table 1.5, lists the necessary tasks and services for completing final closure, including several general categories. Task 6, 7, and 21 list general categories “Technical and Professional Services”, “Administrative Services”, and “Final Closure Contingency”. “Technical and Professional Services” may include activities such as evaluating existing site conditions and redesigning final closure accordingly; identifying, testing, evaluating, and specifying all the construction materials necessary for completing

closure; conducting a topographic survey to validate former proper disposal and former closure activities; and completing all construction quality assurance activities. “Administrative Services” may include administrating the various construction and service contracts, managing the funds for completing closure, conducting review of construction activities, completing necessary recordkeeping, and performing necessary legal actions associated with completing closure. “Final Closure Contingency” may include activities such as remedying improperly closed areas and waste placed outside the permit boundaries, installing a groundwater remediation system or gas control system, and other possible, but unforeseen, problems at the landfill. Separately describing, defining, and determining cost estimates for the numerous activities associated with each of these categories would create a very complicated and unquantifiable procedure for calculating closure costs. Therefore, creating general categories for “Technical and Professional Services”, “Administrative Services”, and “Final Closure Contingency” allows landfills to comply with all the regulatory closure requirements and simplify the overall procedure.

3.1.4 Determination of Precise Unit Costs

The regulatory language for closure activities, presented in Table 1.5, lists the necessary tasks and services for completing final closure. However, some descriptions are impractical to assign a precise unit cost to the task or service. In instances where concise unit costs could not be practically determined from the regulatory language, the task or service was divided to more clearly define necessary items and allow development of concise unit costs. Task 17 in Table 1.5 illustrates the problem created when a concise unit cost cannot be determined. Task 17 requires landfills construct additional or rework existing surface drainage and erosion control measures. Erosion control measures could include terraces and let-down channels. Assigning a unit cost that would apply to surface drainage ditches, terraces, and let-down channels is impractical. Therefore, regulatory compliance is better achieved by separating the task into three subtasks. Individual unit costs for drainage ditches, terraces, and let-down channels can be reasonably determined. Therefore, dividing some ambiguous tasks and services allows landfills to achieve regulatory compliance and determine concise unit costs.

3.2 Identification of Closure Tasks and Services

The evaluation procedures discussed in [Section 3.1](#) and applied to Table 1.5 are tabulated in Attachment 6 and list closure tasks and services according to regulatory citation. [Table 3.1](#) presents a practical format and lists tasks and services chronologically and task-wise according to closure construction activities and represents the tasks and services for owner/operators to estimate third-party closure costs. Because there are differences between the types of landfills and specific permit requirements, not all items in the comprehensive list of closure tasks and services will be applicable to all landfills. Instead the list is intended to identify all closure tasks and services. Each individual landfill will use those items applicable to their site.

TABLE 3.1 Comprehensive Final Closure Cost Estimation Task and Services

FINAL CLOSURE COST ESTIMATION TASK and SERVICE	
1	PRELIMINARY SITE WORK
a	Conduct Site Evaluation
b	Dispose Final Wastes
c	Remove Temporary Building(s)
d	Remove Equipment
e	Repair/Replace Perimeter Fencing
f	Clean Leachate Line(s)
2	MONITORING EQUIPMENT
a	Rework/Replace Monitoring Well(s)
b	Plug Abandoned Monitoring Well(s)
c	Rework/Replace Methane Probe(s)
d	Plug Abandoned Methane Probe(s)
e	Rework/Replace Remediation Equipment and/or Gas Control Equipment
3	CONSTRUCTION
a	Complete Site Grading
b	Construct Final Cap (Clay or Geosynthetic Clay Liner (GCL))
c	Construct Landfill Gas Venting Layer
d	Install Passive Landfill Gas Vents
e	Install Flexible Membrane Liner
f	Drainage Layer (Sand or Geonet)
g	Install Geotextile Filter Fabric
h	Place Topsoil
I	Establish Vegetative Cover
4	DRAINAGE/EROSION CONTROL
a	Construct Terraces
b	Construct Letdown Channels
c	Clean Perimeter Drainage Ditches

5	ADMINISTRATIVE SERVICES
6	TECHNICAL and PROFESSIONAL SERVICES
7	FINAL CLOSURE CONTINGENCY

Chapter 4 will address each task and service identified in [Table 3.1](#), including a detailed description, determination whether task or service is subject to regional variation, units of measurement, constants, conversion and adjustment factors, assumptions, and documented unit cost.

3.3 Evaluation of Post-Closure Tasks and Services

The development of post-closure tasks and services begins with review of existing regulatory requirements completed in Chapter 1 and presented in Table 1.6. Table 1.6 illustrates the regulatory language defining post-closure requirements for MSWLFs, NHISW landfills, and C&D landfills is very similar. Regulatory language can be ambiguous and the use of Table 1.6 for calculating post-closure costs estimates would be difficult. Research of surrounding states' solid waste regulatory agency's and the United States Environmental Protection Agency's solid waste financial assurance programs presented in Chapter 2 provided valuable information to consider in modifying the tasks and services listed in Table 1.6.

Based on the information in Chapter 1 and research completed in Chapter 2, the regulatory post-closure tasks and services listed in Table 1.6 were evaluated to answer these questions:

- Does the regulatory task or service require clarification before it is able to be implemented?
- Are there separate tasks and services that from a practical engineering and construction perspective would be completed as a single task or service?
- Can one or more tasks or services be combined to simplify the cost estimating procedure and still comply with the regulations?
- Can a unit cost be precisely described or defined for the task or service?

Discussion and examples of the evaluation process are presented in the following subsections.

3.3.1 Regulatory Clarification

The regulatory language for post-closure activities, presented in Table 1.6, clearly identifies post-closure tasks but does not describe the tasks in sufficient detail to allow a landfill to list specific post-closure task(s) to calculate a cost estimate. Therefore, the procedure for calculating post-closure costs must clarify how a specific landfill will implement the regulation. The difficulty of implementing some of the regulations is illustrated by Task 8 in Table 1.6, which quotes regulatory language stating the landfill post-closure plan must include "procedures for reworking or replacing any defective required groundwater monitor wells and other defective monitoring equipment and installing new wells and equipment as required." Although the regulation clearly identifies a task, the language format is not concise enough for a landfill to

determine a cost estimate. A C&D landfill or NHISW landfill may only have groundwater monitoring wells, while a MSWLF may have groundwater monitoring wells, methane gas probes, and a landfill gas extraction system. Therefore, development of specific post-closure tasks and services must demonstrate compliance with the regulations and relevance to the landfill type and specific site.

3.3.2 Aggregate Tasks and Services Based on Engineering or Construction Practices

The regulatory language for post-closure activities presented in Table 1.6 lists the necessary tasks and services for completing post-closure. However, based on standard engineering or construction practices, several individual tasks or services may be aggregated. The point is illustrated by Tasks 1 and 2 in Table 1.6. Amending the site specific post-closure plan and completing a plan to comply with all applicable technical requirements are inter-related tasks that are better aggregated together. Another example is Tasks 6 and 7. These tasks require repair and maintenance of on-site improvement, structures, and drainage structures. From a practical construction perspective, these tasks would be completed by the same contractor and should be aggregated together. Combining regulatory tasks like these also simplifies the post-closure cost calculation by reducing the items. Ultimately it was determined that six items would best be combined to form the post-closure category: Technical and Professional Services, that now include:

- Amending closure plan;
- A plan to comply with all applicable technical requirements;
- Technical and professional services;
- Protocol for collecting and analyzing soil and water samples as required;
- Preparing annual maintenance and monitoring post-closure reports; and
- Preparing post-closure certification.

3.3.3 Aggregate Tasks and Services Based on Procedure Simplification

The regulatory language for post-closure activities, presented in Table 1.6, lists the necessary tasks and services for completing post-closure, including several general categories. Task 3, 4, and 17 list general categories “Technical and Professional Services”, “Administrative Services”, and “Post-Closure Contingency”. “Technical and Professional Services” may include activities such as conducting statistical analysis on groundwater data, preparing annual reports, and completing post-closure certification. “Administrative Services” may include administering the various maintenance and service contracts, managing the funds for completing post-closure, conducting review of maintenance and monitoring activities, completing necessary record keeping, and performing necessary legal actions associated with completing post-closure. “Post-Closure Contingency” may include activities such as correcting structural failure of the cap, and correcting a failed leachate collection system, and installing a groundwater remediation system or gas control system, and other possible, but unforeseen, problems at the landfill. Describing, defining, and determining cost estimates for the numerous activities associated with each of these categories would create a very complicated and unquantifiable procedure for calculating post-closure costs. Therefore, creating general categories for “Technical and Professional Services”, “Administrative Services”, and “Post-Closure Contingency” allows landfills to comply with all

the regulatory post-closure requirements and simplify the post-closure cost estimate calculation procedure.

3.3.4 Determination of Precise Unit Costs

The regulatory language for post-closure activities, presented in Table 1.6, presents the necessary tasks and services for completing post-closure. However, some descriptions are impractical to assign a concise unit cost to the task or service. In instances where precise unit costs could not be practically determined from the regulatory language, the task or service was divided to more clearly define necessary items and allow development of concise unit costs. Task 8 in Table 1.6 illustrates the problem created when a concise unit cost cannot be determined. Task 8 requires landfills have a “protocol for collecting and analyzing soil and water samples, as required.” Since different types of landfills have different requirements, a precise and concise unit cost cannot be determined. A C&D landfill may only have groundwater monitoring wells. While a NHISW landfill may have some surface water sampling points and groundwater monitoring wells, a MSWLF may have surface water sampling points, groundwater monitoring wells, and methane gas probes. Assigning a unit cost that would apply to all these facilities and monitoring requirements is impractical. Therefore, regulatory compliance is better achieved by separating the task into three subtasks. Individual unit costs for groundwater monitoring wells, methane gas probes, and surface water sampling points can be reasonably determined. Therefore, dividing some complicated tasks and services allows landfills to achieve regulatory compliance and determine concise unit costs.

3.4 Identification of Post-Closure Tasks and Services

The evaluation procedures discussed in Section 3.3 and applied to Table 1.6 are tabulated in Attachment 7 and list post-closure tasks and services according to regulatory citation. Table 3.2 presents a practical format and lists tasks and services chronologically and task-wise according to post-closure monitoring and maintenance activities and represents the tasks and services for owner/operators to estimate third-party post-closure costs. Due to differences between the types of landfills and specific permit requirements, not all items in the comprehensive list of post-closure tasks and services will be applicable to all landfills. Instead, the list is intended to identify all the post-closure tasks and services. Each individual landfill will use those items applicable to their site.

TABLE 3.2 Comprehensive Post-Closure Cost Estimation Task and Services

POST-CLOSURE COST ESTIMATION TASK and SERVICES	
1	SITE MAINTENANCE
a	Site Inspections
b	General Maintenance
c	Remediation and/or Gas Control Equipment
2	MONITORING EQUIPMENT
a	Rework/Replace Monitoring Well(s)
b	Plug Abandoned Monitoring Well(s)
c	Final Plugging of Monitoring Wells

POST-CLOSURE COST ESTIMATION TASK and SERVICES	
d	Rework/Replace Methane Probe(s)
e	Plug Abandoned Methane Probe(s)
f	Final Plugging of Methane Probes
g	Final Plugging of Piezometer(s)
4	SAMPLING and ANALYSIS
a	Groundwater Monitoring Wells
b	Methane Gas Probes
c	Surface Water Monitoring Points
d	Leachate
5	FINAL COVER MAINTENANCE
a	Mow and Fertilize Vegetative Cover
b	Repair Erosion, Settlement, and Subsidence
c	Re-seed Vegetative Cover
6	LEACHATE MANAGEMENT
a	Clean Leachate Line(s)
b	Maintain Leachate Collection System and Equipment
c	Collect, Treat, Transport, and Dispose Leachate
7	ADMINISTRATIVE SERVICES
8	TECHNICAL and PROFESSIONAL SERVICES
9	POST-CLOSURE CONTINGENCY

Chapter 4 will address each task and service identified in [Table 3.2](#), including a detailed description, determination whether the task or service is subject to regional variation, units of measurement, constants, conversion and adjustment factors, assumptions, and documented unit cost.

3.5 Procedures for Amending Closure and Post-Closure Tasks and Services

3.5.1 Amending Closure and Post-Closure Tasks and Services Due to Technical Requirements or Corrective Action

All facilities must develop closure and post-closure tasks and services and compute cost estimates in order to providing financial assurance. Each facility must then receive DEQ approval. Oklahoma Administrative Code (OAC) 252:510-21-2, OAC 252:510-21-3, and OAC 252:520-23-40 require landfills annually adjust closure and post-closure cost estimates to account for inflation and operational changes. Examples of operational changes include constructing new disposal cells or constructing final cover over completed areas. Facilities may also need to adjust closure or post-closure cost estimates due to changes in technical

requirements or the development of corrective action at the facility. For example, technical requirements change for a Title V landfill when non-methane gas emissions exceed 50 Megagrams per year (Mg/yr). Under current regulations these landfill would have to install a gas extraction system. Another possible scenario would be changes in the units or conversion factors used in calculating cost such as when a facility receives DEQ directive under OAC 252:510-19-11 or OAC 252:520-23-20 to lengthen the post-closure monitoring period. Development of corrective action might include the discovery of groundwater contamination or landfill gas levels exceeding regulatory limits. In all cases, a facility will modify the closure and post-closure plans and adjust cost estimates accordingly.

The procedure for adjusting closure and/or post-closure cost estimates due to changes in technical requirements or development of corrective action includes:

- Changing the unit or conversion factor in the specific calculation, if applicable;
- Adding specific task or service item to address the new technical requirement or corrective action, if applicable;
- Determining appropriate and documented unit cost(s);
- Recomputing closure and/or post-closure cost estimate(s) maintaining previously identified task and services; and
- Submitting revised closure and/or post-closure plan(s) and cost estimates to the DEQ.

3.5.2 Amending Closure and Post-Closure Tasks and Services Due to Regulatory Requirements

Landfills have designed operational lives measured in decades and regulatory post-closure monitoring requirements ranging from eight to 30 years. Facilities operating over such long periods of time will witness new developments and changes in the regulations that govern their operation. Therefore, a procedure is necessary to address how existing landfills adjust closure and post-closure cost estimates to comply with changing regulations.

The procedure for adjusting closure and/or post-closure cost estimates due to regulatory changes includes:

- During the rule making process, the DEQ identifies if a rule change affects calculating closure or post-closure cost estimates;
- After passage of the rule(s), in the case of adding new rule(s), the DEQ shall develop a description of tasks and services and determine appropriate standard unit cost(s). In the case of removing an existing rule, the DEQ shall determine which tasks or services associated with the rule are removed. After these determinations, the DEQ shall notify all facilities whose cost estimates will be affected by the rule(s);
- Owner/operators adds or deletes the appropriate task or service from the closure and/or post-closure cost estimating worksheets and recomputes the cost estimates; and
- Owner/operators submit revised closure and/or post-closure plan(s) and cost estimates to the DEQ.