

**Appendix H. Procedure for Calculating Closure Cost Estimates for Financial Assurance
[REVOKED]**

This Appendix presents the worksheet for calculating final closure cost estimates. The tasks and services included in this worksheet are based on the more complex closure requirements for MSWLFs. Some tasks and services may not be required for construction/demolition and non-hazardous industrial waste landfills, nor for other types of solid waste facilities requiring financial assurance. Owner/operators will be able to input site-specific information to calculate the necessary financial assurance.

Table H.1

All site data necessary to calculate estimates of closure and post-closure costs can be gathered by completing Table H.1. Data from Table H.1 should be inserted into Table H.2 of this Appendix and Table I.1 of Appendix I to complete calculations.

Table H.1 Site Data

FACILITY NAME:

PERMIT NUMBER:

DESCRIPTION	QUANTITY	UNITS
Total Permitted Area		acres
Active Portion		
Composite Lined		acres
Soil Lined		acres
Area of Largest Cell/Phase Requiring Final Cap		
Composite Lined		acres
Soil Lined		acres

Perimeter Fencing		linear feet
Groundwater Monitoring Wells		VLF
Methane Gas Probes		VLF
Terraces		linear feet
Letdown Channels		linear feet
Perimeter Drainage Ditches		linear feet
Average Daily Flow		tons/day
Landfill Disposal Cost		\$/ton

VLF = Vertical linear feet. The sum of the depths of all monitoring wells

Table H.2

Table H.2 can be used to calculate closure cost estimates for landfills for which site specific data are available. The table is designed to be executed as a computer spreadsheet, but will work equally as well using hand calculations.

- Input site-specific quantities from Table H.1 into Table H.2, making sure the requisite units are used. Some quantities are already given by the table.
- Input current year unit costs obtained from the ODEQ website.*
- For each line of Task/Service items 1 through 4, multiply the value input for quantity by the multiplier and current year unit cost, and enter the resultant value in the Subtotal column.
- Line 5. Identify each task required by the Closure Plan that is not identified in Table H.2. Calculate cost estimates in accordance with OAC 252:515-27-51(d), and input total in the Subtotal column.

- Line 6. Add Subtotals for Task/Service items 1 through 5.
- Lines 7, 8, and 9. Compute Administrative Services, Technical and Professional Services and Closure Contingency costs by multiplying Line 6 by the multiplier for each respective Item. Enter the resultant values.
- Line 10. Add lines 6 through 9.

* Unit costs for use in completing this table will be updated for inflation by ODEQ on an annual basis. Current costs will be posted on the ODEQ website. Users of this chart shall use costs prepared by the ODEQ or adjust currently approved costs for inflation as of April 1st of each subsequent year using the procedure in OAC 252:515-27-34(a)(2).

Table H.2 Closure Cost Estimate

FACILITY NAME:

PERMIT NUMBER:

	Task/Service	Quantity	Units	Multiplier^a	Unit Cost^b	Subtotal
1	PRELIMINARY SITE WORK					
1.1	Conduct Site Evaluation	1	lump sum	1		
1.2	Dispose Final Wastes					
	Average Daily Flow	c ^c	tons/day			
	Disposal Cost	d ^d	tons/day	5 (5 days of waste)	e ^e	
1.3	Remove Temporary Building(s)	1	lump sum	1		
1.4	Remove Equipment	1	lump sum	1		

1.5	Repair/Replace		linear feet	0.25 (25% of fencing)		
1.6	Clean Leachate Line(s)	1	lump sum	1		
2	MONITORING EQUIPMENT					
2.1	Rework/Replace Monitoring Well(s)		VLF	0.25 (25% of wells)		
2.2	Plug Abandoned Monitoring Well(s)		VLF	0.25 (25% of wells)		
2.3	Rework/Replace Methane Probe(s)		VLF	0.25 (25% of probes)		
2.4	Plug Abandoned Methane Probe(s)		VLF	0.25 (25% of probes)		
2.5	Rework/Replace Remediation and/or Gas Control Equipment	1	lump sum	0.05 (5% of equipment capital cost)	f ^f	
3	CONSTRUCTION					
3.1	Complete Site Grading to include on-and off-site borrow areas		acres	1		
3.2	Construct Final Cap					

	Compacted On-site Clay Cap or		cubic yards	1		
	Compacted Off-site Clay Cap or		cubic yards	1		
	Install Geosynthetic Clay Liner Cap		square feet	1		
3.3	Construct Landfill Gas Venting Layer					
	Place Sand or		acres	1		
	Install Net and Geotextile		square feet	1		
3.4	Install Passive Landfill Gas Vents		acres	1		
3.5	Install Flexible Membrane		square feet	1		
3.6	Drainage Layer					
	Place Sand or		acres	1		
	Install Net and Geonet		square feet	1		
3.7	Place On-site Topsoil		cubic yards	1		
	Place Off-site Topsoil		cubic yards	1		

3.8	Establish Vegetative Cover, including on-and off-site borrow areas		acres	1		
4	DRAINAGE/EROSION CONTROL					
4.1	Construct Terraces		linear feet	1		
4.2	Construct Letdown Channels		linear feet	1		
4.3	Clean Perimeter Drainage Ditches		linear feet	0.50 (50% of ditches)		
5	TASKS NOT IDENTIFIED					
6	SUBTOTAL					
7	ADMINISTRATIVE SERVICES	1	lump sum	0.10 (10%)	g	
8	TECHNICAL and PROFESSIONAL SERVICES	1	lump sum	0.12 (12%)	g	
9	CLOSURE CONTINGENCY	1	lump sum	0.10 (10%)	g	
10	TOTAL FINAL CLOSURE					h ^h

a. Multipliers are determined by the *Solid Waste Financial Assurance Program Report*, December 22, 2000.

b. Unit costs for use in completing this table will be updated for inflation by ODEQ on an annual basis. Current costs will be posted on the ODEQ website. Users of this chart shall use costs

prepared by ODEQ or adjust currently approved costs for inflation as of April 1st each year using the procedure in OAC 252:515-27-34(a) (2).

c. New facilities: Insert the value for "W" in OAC 252:515-27-8(a) (2). Existing facilities: Insert reported total tonnage for the previous year, divided by 312 operating days per year (52 weeks per year x 6 operating days per week).

d. Insert number of tons/day from above.

e. Insert landfill disposal cost per ton of waste (\$/ton).

f. Input capital cost for gas control/remediation equipment, if installed at the site.

g. Input Subtotal from line 6.

h. Add rows 6 through 9.

Appendix H. Procedure for Calculating Closure Cost Estimates for Financial Assurance [NEW]

This Appendix presents the worksheet for calculating final closure cost estimates. The tasks and services included in this worksheet are based on the more complex closure requirements for MSWLFs. Some tasks and services may not be required for construction/demolition and non-hazardous industrial waste landfills, nor for other types of solid waste facilities requiring financial assurance. Owner/operators will be able to input site-specific information to calculate the necessary financial assurance.

Table H.1

All site data necessary to calculate estimates of closure and post-closure costs can be gathered by completing Table H.1. Data from Table H.1 should be inserted into Table H.2 of this Appendix and Table I.1 of Appendix I to complete calculations.

Table H.1 Site Data

FACILITY NAME:

PERMIT NUMBER:

DESCRIPTION	QUANTITY	UNITS
Total Permitted Area		acres
Active Portion		
Composite Lined		acres
Soil Lined		acres
Area of Largest Cell/Phase Requiring Final Cap		
Composite Lined		acres
Soil Lined		acres

Perimeter Fencing		linear feet
Groundwater Monitoring Wells		VLF
Methane Gas Probes		VLF
Terraces		linear feet
Letdown Channels		linear feet
Perimeter Drainage Ditches		linear feet
Average Daily Flow		tons/day
Landfill Disposal Cost		\$/ton

VLF = Vertical linear feet. The sum of the depths of all monitoring wells

Table H.2

Table H.2 can be used to calculate closure cost estimates for landfills for which site specific data are available. The table is designed to be executed as a computer spreadsheet, but will work equally as well using hand calculations.

- Input site-specific quantities from Table H.1 into Table H.2, making sure the requisite units are used. Some quantities are already given by the table.
- Input current year unit costs obtained from the ODEQ website.*
- For each line of Task/Service items 1 through 4, multiply the value input for quantity by the multiplier and current year unit cost, and enter the resultant value in the Subtotal column.
- Line 5. Identify each task required by the Closure Plan that is not identified in Table H.2. Calculate cost estimates in accordance with OAC 252:515-27-51(d), and input total in the Subtotal column.

- Line 6. Add Subtotals for Task/Service items 1 through 5.
- Lines 7, 8, and 9. Compute Administrative Services, Technical and Professional Services and Closure Contingency costs by multiplying Line 6 by the multiplier for each respective Item. Enter the resultant values.
- Line 10. Add lines 6 through 9.

* Unit costs for use in completing this table will be updated for inflation by ODEQ on an annual basis. Current costs will be posted on the ODEQ website. Users of this chart shall use costs prepared by the ODEQ or adjust currently approved costs for inflation as of April 9th of each subsequent year using the procedure in OAC 252:515-27-34(a)(2).

Table H.2 Closure Cost Estimate

FACILITY NAME:

PERMIT NUMBER:

	Task/Service	Quantity	Units	Multiplier^a	Unit Cost^b	Subtotal
1	PRELIMINARY SITE WORK					
1.1	Conduct Site Evaluation	1	lump sum	1		
1.2	Dispose Final Wastes					
	Average Daily Flow	c ^c	tons/day			
	Disposal Cost	d ^d	tons/day	5 (5 days of waste)	e ^e	
1.3	Remove Temporary Building(s)	1	lump sum	1		
1.4	Remove Equipment	1	lump sum	1		

1.5	Repair/Replace		linear feet	0.25 (25% of fencing)		
1.6	Clean Leachate Line(s)	1	lump sum	1		
2	MONITORING EQUIPMENT					
2.1	Rework/Replace Monitoring Well(s)		VLF	0.25 (25% of wells)		
2.2	Plug Abandoned Monitoring Well(s)		VLF	0.25 (25% of wells)		
2.3	Rework/Replace Methane Probe(s)		VLF	0.25 (25% of probes)		
2.4	Plug Abandoned Methane Probe(s)		VLF	0.25 (25% of probes)		
2.5	Rework/Replace Remediation and/or Gas Control Equipment	1	lump sum	0.05 (5% of equipment capital cost)	f ^f	
3	CONSTRUCTION					
3.1	Complete Site Grading to include on-and off-site borrow areas		acres	1		
3.2	Construct Final Cap					

	Compacted On-site Clay Cap or		cubic yards	1		
	Compacted Off-site Clay Cap or		cubic yards	1		
	Install Geosynthetic Clay Liner Cap		square feet	1		
3.3	Construct Landfill Gas Venting Layer					
	Place Sand or		acres	1		
	Install Net and Geotextile		square feet	1		
3.4	Install Passive Landfill Gas Vents		acres	1		
3.5	Install Flexible Membrane		square feet	1		
3.6	Drainage Layer					
	Place Sand or		acres	1		
	Install Net and Geonet		square feet	1		
3.7	Place On-site Topsoil		cubic yards	1		
	Place Off-site Topsoil		cubic yards	1		

3.8	Establish Vegetative Cover, including on-and off-site borrow areas		acres	1		
4	DRAINAGE/EROSION CONTROL					
4.1	Construct Terraces		linear feet	1		
4.2	Construct Letdown Channels		linear feet	1		
4.3	Clean Perimeter Drainage Ditches		linear feet	0.50 (50% of ditches)		
5	TASKS NOT IDENTIFIED					
6	SUBTOTAL					
7	ADMINISTRATIVE SERVICES	1	lump sum	0.10 (10%)	g	
8	TECHNICAL and PROFESSIONAL SERVICES	1	lump sum	0.12 (12%)	g	
9	CLOSURE CONTINGENCY	1	lump sum	0.10 (10%)	g	
10	TOTAL FINAL CLOSURE					h ^h

a. Multipliers are determined by the *Solid Waste Financial Assurance Program Report*, December 22, 2000.

b. Unit costs for use in completing this table will be updated for inflation by ODEQ on an annual basis. Current costs will be posted on the ODEQ website. Users of this chart shall use costs

prepared by ODEQ or adjust currently approved costs for inflation as of April 9th each year using the procedure in OAC 252:515-27-34(a) (2).

c. New facilities: Insert the value for "W" in OAC 252:515-27-8(a) (2). Existing facilities: Insert reported total tonnage for the previous year, divided by 312 operating days per year (52 weeks per year x 6 operating days per week).

d. Insert number of tons/day from above.

e. Insert landfill disposal cost per ton of waste (\$/ton).

f. Input capital cost for gas control/remediation equipment, if installed at the site.

g. Input Subtotal from line 6.

h. Add rows 6 through 9.

Appendix I. Procedure for Calculating Post-closure Cost Estimates for Financial Assurance [REVOKED]

This Appendix presents the worksheet for calculating final post-closure cost estimates. The tasks and services included in this worksheet are based on the more complex closure requirements for MSWLFs. Some tasks and services may not be required for construction/demolition and non-hazardous industrial waste landfills, nor for other types of solid waste facilities requiring financial assurance. Owner/operators will be able to input site-specific information to calculate the necessary financial assurance.

I.1 Calculating Post-closure Costs

Table I.1 can be used to estimate Post-closure Costs. Table I.1 may be utilized in the same manner as Table H.2 of Appendix H.

- Input site-specific quantities from Table H.1 of Appendix H into Table I.1, making sure the requisite units are used. Some quantities are already given by the table. Input current year unit costs obtained from the ODEQ website.*
- For each line of Task/Service items 1 through 5, multiply the value input for quantity by the multiplier and current year unit cost*, and enter the resultant value in the subtotal column.
- Line 6. identify each task required by the Post-closure Plan that is not identified in Table I.2. Calculate cost estimates in accordance with OAC 252:515-27-51(d), and input total in the Subtotal column.
- Line 7. add Subtotals for Task/Service Items 1 through 6.
- Lines 8, 9, and 10. Compute Administrative Services, Technical and Professional Services and Post-closure Contingency costs by multiplying Line 7 by the multiplier for each respective Item. Enter the resultant values.
- Line 11. Add lines 7 through 10.

* Unit costs for use in completing this table will be updated for inflation by ODEQ on an annual basis. Current costs will be posted on the ODEQ website. Users of this chart shall use costs prepared by the ODEQ or adjust currently approved costs for inflation as of April 1st of each subsequent year using the procedure in OAC 252:515-27-34(a) (2).

Table I.1 Post-closure Estimate

FACILITY NAME:

PERMIT NUMBER:

	Task/Service	Quantity	Units	Multiplier^a	Unit Cost^b	Subtotal
1	SITE MAINTENANCE					
1.1	Site Inspections	4	per year	30 (30 yrs) 8 (8 yrs)		
1.2	General Maintenance	1	per year	30 (30 yrs) 8 (8 yrs)		
1.3	Remediation and/or Gas Control Equipment	1	lump sum	0.3 ^c	d ^d	
2	MONITORING EQUIPMENT					
2.1	Rework/Replace Monitoring Well(s)		VLF	0.25 (25% of wells)		
2.2	Plug Abandoned Well(s)		VLF	0.25 (25% of wells)		

2.3	Final Plugging of Monitoring Wells		VLF	1		
2.4	Rework/Replace Methane Probe (s)		VLF	0.25 (25% of probes)		
2.5	Plug Abandoned Probe (s)		VLF	0.25 (25% of probes)		
2.6	Final Plugging of Methane Probes		VLF	1		
2.7	Final Plugging of Piezometer (s)		VLF	1		
3	SAMPLING and ANALYSIS					
3.1	Groundwater Monitoring Wells		wells	60 (2/yr x 30yrs) 16 (2/yr x 8 yrs)	MSWLF&NHIW e ^e C&D	
3.2	Methane Gas Probes		probes	60 (2/yr x 30yrs)		
3.3	Surface Water Monitoring Points		points	60 (2/yr x 30yrs)		

3.4	Leachate		sample	60 (2/yr x 30yrs)		
4	FINAL COVER MAINTENANCE					
4.1	Mow and Fertilize Vegetative Cover		acres	30 (30 yrs) 8 (8 yrs)		
4.2	Repair Erosion, Settlement, and Subsidence for On-site Soils		acres	60 (60 yrs) 16 (16 yrs)		
	Repair Erosion, Settlement, and Subsidence for Off- site Soils		acres	30 (30 yrs) 8 (8 yrs)		
4.3	Reseed Vegetative Cover		acres	0.20 (20% reseeded over post-closure period)		

5	LEACHATE MANAGEMENT					
5.1	Clean Leachate Line(s)	1	per year	0 (30 yrs)		
5.2	Maintain Leachate Collection System and Equipment	1	per year	0 (30 yrs)		
5.3	Collect, Treat, Transport, and Dispose Leachate		gal/yr	30 (30 yrs)		
6	TASKS NOT IDENTIFIED					
7	SUBTOTAL					
8	ADMINISTRATIVE SERVICES	1	lump sum	0.06 (6%)	f ^f	
9	TECHNICAL and PROFESSIONAL SERVICES	1	lump sum	0.07 (7%)	f	
10	POST-CLOSURE CONTINGENCY	1	lump sum	0.10 (10%)	f	
11	TOTAL POST CLOSURE					g ^g

a. Multipliers are determined by the *Solid Waste Financial Assurance Program Report*, December 22, 2000.

- b. Unit costs for use in completing this table will be updated for inflation by ODEQ on an annual basis. Current costs will be posted on the ODEQ website. Users of this chart shall use costs prepared by ODEQ or adjust currently approved costs for inflation as of April 1st of each subsequent year using the procedure in OAC 252:515-27-34(a) (2).
- c. 5% of equipment capital cost, maintenance performed once per 5 yrs for 30 years.
- d. Input capital cost for gas control/remediation equipment, if installed at the site.
- e. If the approved groundwater monitoring plan requires monitoring for alternative constituents, unit costs shall be calculated in accordance with OAC 252:515-27-52(b) or (c).
- f. Input subtotal from line 7.
- g. Add lines 7 through 10.

Appendix I. Procedure for Calculating Post-closure Cost Estimates for Financial Assurance

[NEW]

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- Line 7. add Subtotals for Task/Service Items 1 through 6.
- Lines 8, 9, and 10. Compute Administrative Services, Technical and Professional Services and Post-closure Contingency costs by multiplying Line 7 by the multiplier for each respective Item. Enter the resultant values.
- Line 11. Add lines 7 through 10.

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1.3	Remediation and/or Gas Control Equipment	1	lump sum	0.3 ^c	d ^d	
2	MONITORING EQUIPMENT					
2.1	Rework/Replace Monitoring Well(s)		VLF	0.25 (25% of wells)		
2.2	Plug Abandoned Well(s)		VLF	0.25 (25% of wells)		

2.3	Final Plugging of Monitoring Wells		VLF	1		
2.4	Rework/Replace Methane Probe (s)		VLF	0.25 (25% of probes)		
2.5	Plug Abandoned Probe (s)		VLF	0.25 (25% of probes)		
2.6	Final Plugging of Methane Probes		VLF	1		
2.7	Final Plugging of Piezometer (s)		VLF	1		
3	SAMPLING and ANALYSIS					
3.1	Groundwater Monitoring Wells		wells	60 (2/yr x 30yrs) 16 (2/yr x 8 yrs)	MSWLF&NHIW e ^e C&D	
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3.4	Leachate		sample	60 (2/yr x 30yrs)		
4	FINAL COVER MAINTENANCE					
4.1	Mow and Fertilize Vegetative Cover		acres	30 (30 yrs) 8 (8 yrs)		
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4.3	Reseed Vegetative Cover		acres	0.20 (20% reseeded over post-closure period)		

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5.1	Clean Leachate Line(s)	1	per year	0 (30 yrs)		
5.2	Maintain Leachate Collection System and Equipment	1	per year	0 (30 yrs)		
5.3	Collect, Treat, Transport, and Dispose Leachate		gal/yr	30 (30 yrs)		
6	TASKS NOT IDENTIFIED					
7	SUBTOTAL					
8	ADMINISTRATIVE SERVICES	1	lump sum	0.06 (6%)	f ^f	
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- c. 5% of equipment capital cost, maintenance performed once per 5 yrs for 30 years.
- d. Input capital cost for gas control/remediation equipment, if installed at the site.
- e. If the approved groundwater monitoring plan requires monitoring for alternative constituents, unit costs shall be calculated in accordance with OAC 252:515-27-52(b) or (c).
- f. Input subtotal from line 7.
- g. Add lines 7 through 10.