

INSTRUCTIONS FOR LANDFILL CLOSURE COST ESTIMATE WORKSHEET (without unit costs)

NOTES:

Use a separate worksheet for each landfill type and /or each permit number.

The calculated costs shall include the costs to complete all post-closure activities in a manner consistent with the approved facility post-closure plan.

To determine the area or capacity to be included in the calculation of estimated cost; for each solid waste disposal area, calculate the cost to be incurred for the largest area to have waste in place before the next annual permit renewal. The calculated cost shall include the cost to conduct the following, in a manner consistent with the approved facility post-closure plan, during the post-closure period of 30 years and any extensions of the post-closure period required by the Secretary:

- 1) Care and maintenance of the area, including all appurtenances; and
- 2) All required environmental monitoring.

The closure cost estimate must be calculated using third party costs from one or more of the authorized sources:

- 1) Representative costs supplied by the department;
- 2) Actual invoices paid by the owner or operator for the same or similar work;
- 3) Written bids from professional contractors having no other financial interest in the facility or its use; and
- 4) Authoritative costing tables issued by publishers recognized for their research into the costs of the activities to be priced.

Post-closure financial assurance may not be required for a facility, if the care and maintenance costs are deemed minimal and if environmental monitoring is not required. This normally exempts many construction & demolition landfills and tire monofills.

Please supply KDHE with the source of your unit cost. Omit quantities and costs for items that are not applicable to this facility and write NA instead.

CLOSURE ITEMS:

1.0.0 Preparing Site for Final Cover

1.0.1 Backfill below grade areas with structural fill: Cost includes the purchase of backfill material, the hauling of backfill material, the spreading of backfill material, the addition of water and compaction of the backfill.

1.0.2 Construction of Underdrain Sump and perpetual pumping system: Cost includes drainage medium, geomembrane, pump(s) and piping needed to dewater any saturated zone in contact with the composite liner.

1.0.3 Other: Provide design and itemize: Cost includes items in the provided design.

1.0.4 Preparing Site for Final Cover Subtotal: Total of 1.0.1, 1.0.2 and 1.0.3.

2.0.0 FINAL COVER

2.0.1 Low Permeability Soil Layer

2.0.2 Complete soil contouring and grading for final cover: Costs

include grading the site to final elevations prior to placement of low permeability soil layer.

2.0.3 Clay--compacted, off-site: Cost includes purchase of the clay, hauling and spreading of the clay, addition of water and compaction. This layer must have a minimum thickness of 18". *Do not include this item if clay is available on-site.*

2.0.4 Clay--compacted, on-site: Cost includes hauling and spreading of on-site materials, addition of water and compaction. This layer must have a minimum thickness of 18".

2.0.5 Low Permeability Soil Layer Subtotal: Total of 2.0.2, 2.0.3 and 2.0.4.

3.0.0 GEOMEMBRANE AND DRAINAGE LAYER

3.0.1 Drainage material--sand: Cost includes purchase of material and installation of sand drainage layer above the geomembrane with a minimum thickness of 6". If a geogrid is used, no sand is required.

3.0.2 Drainage material--geogrid: Cost includes installation of a drainage geogrid above the geomembrane.

3.0.3 Geomembrane: Cost includes installation of the geomembrane liner.

3.0.4 Geomembrane and Drainage Layer Subtotal: Total of 3.0.1, 3.0.2 and 3.0.3.

4.0.0 PROTECTIVE SOIL AND VEGETATIVE LAYER

4.0.1 Protective Soil, On-site: Cost includes the excavating, transporting, placing and compacting of protective soil on top of the low permeability layer or drainage layer to a depth capable of protecting the low permeability layer from desiccation due to freeze thaw. Quantity must match earthwork balance.

4.0.2 Soil--off-site: Cost includes purchasing, hauling, placing and compacting of protective soil on top of the low permeability layer or drainage layer to a depth capable of protecting the low permeability from desiccation due to freeze-thaw. Quantity must match earthwork balance. *Do not include this item if soil is available on-site.*

4.0.3 Vegetative Soil (Topsoil), On-site: Cost includes the loading of on-site soil and spreading of soil on top of the low permeability layer or drainage layer to a depth capable of protecting the low permeability layer from desiccation due to freeze-thaw. This layer should be capable of supporting vegetation. Quantity must match earthwork balance.

4.0.4 Vegetative Soil (Topsoil), Off-site: Cost includes purchasing and hauling soil to the landfill and spreading of soil on top of the low permeability layer or drainage layer to a depth capable of protecting the low permeability from desiccation due to freeze-thaw. This layer should be capable of supporting vegetation. Quantity must match earthwork balance. *Do not include this item if soil is available on-site.*

4.0.5 Seeding and mulching: Cost includes the purchase and application of grass seed and of 1" of straw mulch.

4.0.6 Fertilizer: Cost includes the purchase and application of appropriate, grass fertilizer.

4.0.7 Protective Soil and Vegetative Layer Subtotal: Total of 4.0.1, 4.0.2, 4.0.3, 4.0.4, 4.0.5 and 4.0.6.

5.0.0 EROSION CONTROL

5.0.1 Terraces and letdowns: Cost includes the construction of soil terraces and letdowns to control erosion.

5.0.2 Checkdams and filters: Cost includes the construction of checkdams and filters to control erosion.

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5.0.4 Grass ditching/channels: Cost includes the construction of grass-lined ditches to provide drainage from the top of the landfill.

5.0.5 Riprap ditching/channels: Cost includes the construction of riprap-lined ditches to provide drainage from the top of the landfill. Riprap should be used where flow velocities are in excess of 5 feet/sec.

5.0.6 Erosion Control Subtotal: Total of 5.0.1, 5.0.2, 5.0.3, 5.0.4, and 5.0.5.

6.0.0 GAS SYSTEM

6.0.1 Gas vents: Cost includes installation of a large diameter boring installation of piping, installation of gravel pack, and filling of the annular space with low permeability material.

6.0.2 Passive system

6.0.3 Passive well head flare: Cost includes installation of a passive well head flare with an auto-ignited solar-powered ignition unit.

6.0.4 Active System

6.0.5 Flare: Cost includes installation of a flare/blower unit.

6.0.6 Additional well installation: Costs include the installation of new gas wells..

6.0.7 Ancillary piping: Cost includes all necessary materials and labor to connect individual wells into an active system including but not limited to piping, trench, cuts, valves and sampling ports. Cost for equipment already installed need not be included.

6.0.8 Gas System subtotal: Total of 6.0.1, 6.0.2, 6.0.3, 6.0.4, 6.0.5, 6.0.6 and 6.0.7.

7.0.0 GROUNDWATER MONITORING SYSTEM

7.0.1 Well installation: Cost includes mobilization and mileage to bring personnel, materials and equipment on-site; labor equipment and materials needed to install new groundwater monitoring wells; and completing and submitting the WWC5 well forms.

7.0.2 Abandon and plug wells: Cost includes removal and disposal of the concrete pad, the steel protective casing and a minimum of the top 10' of the well casing. It also includes plugging the well with bentonite and completing and submitting the WWC5 well forms.

7.0.3 Upgrade or repair existing wells: Cost includes repair or replacement of well pads, repair of protective casing and padlocks. Cost also includes labor and materials and should assume a minimum of 4 hours of labor per well, prorated over 30 years.

7.0.4 Dedicated pump/sampling system installation/upgrade: Cost includes installation and maintenance of dedicated pump/sampling system.

7.0.5 Groundwater sample collection: Cost includes the transportation of personnel and equipment to the site and the sampling of the groundwater wells according to the approved Sampling and Analysis Plan. Costs also include decontamination of the sampling and depth sounding equipment. Costs are based on 2 sampling events per year multiplied by the number of wells sampled.

7.0.6 Sampling analysis and reporting: Cost includes analysis of groundwater samples from all monitoring wells within the approved system twice a year for all constituents listed in Appendix I of K.A.R. 28-29-113 for landfills and submittal of the groundwater sampling event report as defined in the

Sampling and Analysis Plan.

7.0.7 Groundwater Monitoring System Subtotal: Total of 7.0.1, 7.0.2, 7.0.3, 7.0.4, 7.0.5 and 7.0.6.

8.0.0 LEACHATE COLLECTION SYSTEM

8.0.1 Additional/upgrades for collection piping: Cost includes purchasing and installation of leachate collection system piping.

8.0.2 Additional/upgrades to pumps: Cost includes the purchasing and installation of leachate collection system pumps.

8.0.3 Additional/upgrades to storage containers: Cost includes the purchase and installation of leachate collection system storage containers.

8.0.4 Baseline sample collection: Cost includes drawing leachate samples for analysis. The cost also includes mobilization and mileage to bring personnel on- site.

8.0.5 Baseline sample analysis: Cost includes annual leachate analysis for each unit for parameters listed in K.A.R. 28-29-107 (i)(6)(B).

8.0.6 Leachate Collection System Subtotal: Total of 8.0.1, 8.0.2, 8.0.3, 8.0.4 and 8.0.5.

9.0.0 OPERATIONS AND INVENTORY REMOVAL

9.0.1 Excess solid waste: Cost includes the removal, hauling and disposal of excess solid waste.

9.0.2 Mobile equipment/machinery (e.g. containers, tanks, etc...): Cost includes the removal, hauling and disposal of mobile equipment/machinery.

9.0.3 Stored leachate: Cost includes the removal, hauling and disposal of stored leachate.

9.0.4 Contaminated soils: Cost includes the removal, hauling and disposal of contaminated soils.

9.0.5 Operations and Inventory Removal Subtotal: Total of 9.0.1, 9.0.2, 9.0.3 and 9.0.4.

10.0.0 DEMOLITION/REMOVAL SITE IMPROVEMENTS

10.0.1 Office/shop/maintenance and other ancillary buildings:

10.0.2 Equipment to be decommissioned (e.g., weigh scales, bulking/solidification pits, collection pits/sumps, piping, etc...):

10.0.3 Site Utilities: Cost includes the disconnecting and demolition of the utilities coming onto the site.

10.0.4 Demolition/Removal Site Improvements Subtotal:

10.0.1, 10.0.2 and 10.0.3

11.0.0 REPLACE/REBUILD SITE ACCESS CONTROLS

11.0.1 Fencing: Cost includes the purchase and installation of fence.

11.0.2 Gates: Cost includes the purchase and installation of Gates.

11.0.3 Access Barriers: Cost includes the purchase and installation of access barriers.

11.0.4 Other security equipment: Cost includes the purchase and installation of other security equipment.

11.0.5 Replace/Rebuild Site Access Controls Subtotal: Total of 11.0.1, 11.0.2, 11.0.3 and 11.0.4.

12.0.0 BORROW AREA RECLAMATION

12.0.1 Grading and site preparation: Costs include grading the borrow area to final elevations prior to placement of backfill.

12.0.2 Soil, On-site (excavate, transport, place, compact): Cost includes the excavating, transporting, placing and compacting of the soil.

12.0.3 Soil, Off-site: Cost includes purchase, hauling, spreading,

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and compaction of the soil. *Do not include this item if soil is available on-site.*

12.0.4 Seeding and mulching: Cost includes the purchase and application of grass seed and of 1" of straw mulch.

12.0.5 Fertilizer: Cost includes the purchase and application of appropriate, grass fertilizer.

12.0.6 Borrow Area Reclamation Subtotal: Total of 12.0.1, 12.0.2, 12.0.3, 12.0.4 and 12.0.5.

13.0.0 CLOSURE COST SUBTOTAL: Total of 1.0.4, 2.0.5, 3.0.4, 4.0.7, 5.0.6, 6.0.8, 7.0.7, 8.0.6, 9.0.5, 10.0.4, 11.0.5 and 12.0.6

14.0.0 PROFESSIONAL SERVICES [Closure cost subtotal (13.0.0) X 10% or enter costs provided by third party with sources listed in line items below]: Cost = 10% of the Closure Cost Subtotal.

14.0.1 Professional Services (10% of Closure Cost Subtotal):
Cost = 10% of the Closure Cost Subtotal.

14.0.2 Topographic and Boundary Survey: Cost includes development final closure survey and establishment of the final waste boundaries.

14.0.3 Engineering (Design, Bid Documents, Procurement, Construction Contract Management): Cost includes development of the bid documents for project letting from existing closure plans.

14.0.4 Engineering Services, (Construction Oversight, Testing, Reporting, Certification): Cost includes all construction quality assurance inspections and testing required to properly close the landfill and preparation of the Certification of Closure report.

14.0.5 Professional Services Subtotal: Total of 14.0.1, 14.0.2, 14.0.3 and 14.0.4.

15.0.0 ADMINISTRATION AND CONTINGENCY

15.0.1 Administration Services: Cost includes third party administration fee of 5% of the Closure Cost Subtotal.

15.0.2 Contingency: Cost includes a contingency of 10% of the Closure Cost Subtotal.

15.0.3 Administration and Contingency Subtotal: Total of 15.0.1 and 15.0.2.