



COLORADO

Department of Public
Health & Environment

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SOLID WASTE GUIDANCE DOCUMENT

Title: Concerning Solid Waste Site and Facility Financial Assurance

Developing Closure and Post-Closure Cost Estimates

Date: June 21, 2016

Purpose: Owners and operators of any solid waste disposal site or facility (SWSF) are required to maintain a detailed estimate of the cost of hiring a third party to close the site or facility in the event the owner or operator is unable to perform necessary tasks. Therefore, a detailed written estimate of the costs of hiring a third party to conduct closure and post-closure care must be available prior to any operations at SWSFs. This guidance document aims to improve the efficiency of the regulatory review process by clarifying the desired content of SWSF Closure and Post-Closure Cost Estimates (CPC\$) for Financial Assurance that are required to be submitted to the Colorado Department of Public Health and Environment (Department), Hazardous Material and Waste Management Division, Solid Waste and Materials Management Program (Program) for review and approval. Samples forms available for use can be found at:

<https://www.colorado.gov/pacific/cdphe/swforms>

The funding of financial assurance is not the primary focus of this Guidance.

The content presented in this guidance document is not intended to supersede previously approved documents. The content set out in this document is intended solely as guidance. Such guidance is not intended and cannot be relied upon to create rights, substantive or procedural, enforceable by any person or party in litigation with the Department. The Department reserves the right to be at variance with this guidance. The Department also reserves the right to change this guidance at any time with appropriate publication.

Statement of Guidance: The Division's Solid Waste and Materials Management Program recognizes a need to provide additional information on financial assurance and establish an improved level of consistency in the area of financial assurance closure and post-closure cost estimates. This guidance is an effort to promote consistency regarding the desired content of such submittals to facilitate the Division's review and approval process.

Background and Applicability: Under the Federal Facilities Compliance Act, federal agencies engaged in the management of solid or hazardous waste are subject to all applicable Federal, state, and local laws, regulations, and ordinances addressing solid and hazardous waste in 42 USC § 6961. The Colorado's Solid Waste Act directs the solid and hazardous waste commission to promulgate regulations to require financial assurance pursuant to Section 30-20-104.5(3)(a), C.R.S.(2011). Section 30-20-104.5 further states:



“The rules promulgated by the solid and hazardous waste commission pursuant to this section shall comply with the federal regulations promulgated pursuant to subtitle D of the federal “*Resource Conservation and Recovery Act of 1976*”, as amended.” The federal regulation explicitly requires financial assurance for municipal solid waste (MSW) landfills, with the exception of facilities owned or operated by state or federal entities in 40 C.F.R. Section 258.70(a) and Section 280.90(c). The Colorado Solid Waste Regulations require all owners and operators of solid waste facilities to provide financial assurance per Section 1.8 of the *Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, as amended* (the “Regulations”). This includes all solid waste disposal sites and facilities, regardless of facility type, even one’s own waste facilities and facilities owned by the state and federal government. It does not include transfer stations or recycling facilities, which are not considered solid waste disposal sites and facilities according to state law.

Completion of the financial assurance process for SWSF’s under Section 1.8 of the Regulations involves two general steps: 1) development and approval of the closure and post-closure CPC\$ and 2) funding the CPC\$. Various mechanisms are available to fund an approved CPC\$ as presented in Section 1.8.4 and Sections 1.8.6 through 1.8.16 of the Regulations. Financial assurance mechanisms are also addressed in detail in Appendix A of the Regulations or at:

<https://www.colorado.gov/pacific/cdphe/solid-waste-financial-assurance>

The CPC\$ can be prepared by any individual familiar with the facility’s governing operation plans and does not require a Professional Engineer certification. The proposed CPC\$ will be submitted for review and approval by the CDPHE HMWMD solid waste permitting unit and local governing agency prior to funding. CPC\$ are evaluated and revised at least every five (5) years and adjusted annually for inflation and deflation pursuant to Section 1.8.3 of the Regulations. CPC\$ additionally require re-evaluation and revision when new units are constructed or other significant changes occur at the facility that are not included in the approved CPC\$ that result in increases or decreases in necessary financial assurance costs necessary for a third party to complete closure and post-closure care.

Developing the Closure and Post-Closure Construction Cost Estimate

The owner/operator of SWSF shall maintain a detailed written current cost estimates for hiring a **third party** to close the largest area of a SWSF requiring closure and to conduct post-closure care and maintenance pursuant to Section 1.8.1 of the Regulations to ensure adequate funding is available to complete these tasks in the event the owner or operator is unable to perform them. Generally, a SWSF’s Engineering Design and Operations Plan (EDOP) addresses the assumptions regarding the “largest area requiring closure.” If the EDOP is silent in this regard a facility should provide detailed assumptions about the “largest area requiring closure” and include these assumptions along with the submitted CPC\$. The Division generally considers the “largest area requiring closure” to include, at a minimum, all units and areas used for solid waste treatment or disposal including berms, all access roads, all buildings, all parking lots, all storm water management infrastructure, all subgrade piping, utilities and ancillary equipment, and all borrow areas and soil stockpiles. At a minimum the largest area requiring closure must account for the maximum area to be filled prior to the next five-year revised cost estimate becoming due (see below). This

option may not be available to sites that have a history of missing the five year update deadline. For sites using a trust fund as the financial assurance mechanism, the basis for the mechanism is to fund over the largest area closure over a twenty year period (or shorter if the operating life is less than twenty years). Thus, for sites using a trust fund mechanism, the largest area assumptions should be adjusted to fit the mechanism.

The CPC\$ assumptions are necessary only for the constructed areas of the SWSF and any disturbed area available for use that will require reclamation. The CPC\$ is typically not included in an EDOP but rather as a stand-alone document. Closure and post-closure plans are typically an integral part of the EDOP and provide the framework in preparing the CPC\$.

The CPC\$ are **revised** (recalculated) every 5 years pursuant to Section 1.8.3 of the Regulations or following construction of new cells or other landfill facilities that increase or decrease financial assurance cost requirements. Note that this is not an annual adjustment but rather an actual recalculation of the cost estimate using current unit costs and operational assumptions. Alternatively, the cost estimate must be revised following changes to the EDOP (including the closure and post-closure care plans), following new cell / pond construction, lateral expansions of work pads, etc., if the activity/new cell are is not already included in the approved CPC\$ or if the EDOP revision is considered significant. Please work with the solid waste program permitting staff in this regard.

The key components of the CPC\$ include the closure and post-closure plan activities, the unit cost to complete each specific activity, and the assumptions made to develop the actual cost.

- 1) Identify All Activities for the Cost Estimate - All of the various activities identified in the Closure and Post-Closure Plans provide the framework for developing the CPC\$. In addition, use appropriate sections from the Regulations pertaining to the facility. Note that Sections 1.7, 1.8, 2.5, and 2.6 of the Regulations apply to every SWSF. The Department's hourly activity fees and annual facility fees described in Section 1.7 of the Regulations must be included in the CPC\$. In addition, refer to the following sections of the Regulations for specific types of facilities:
 - Sections 3.5 and 3.6 for MSW landfills/landfarms
 - Sections 9.2.5, 9.2.6 or 9.3.6, 9.3.7 for waste impoundments (not E&P)
 - Section 14.8, 14.9 for compost facilities;
 - Section 17.5, 17.6 for E&P impoundments.
- 2) Cross check the draft cost estimate with the required activities in the Regulations (as well as the approved closure/post-closure plans) to make sure all are accounted for. If a facility is waived from a specific activity then it is helpful to mention that in the submittal, such as a waiver from groundwater monitoring (typically an annual cost). A waiver from groundwater monitoring requires periodic re-demonstration pursuant to Appendix B, Section B1 of the Regulations, which might be additional cost on a 5-year schedule.

- 3) **Cost Basis Assumptions** - For each closure and post-closure activity, cost assumptions should be based on the facility operations, EDOP Plan, site maps, etc. For grading at final closure, assumptions may include: revised grading plan, area to be re-graded (acres), distance to soil borrow source, soil volumes required. For monitoring, assumptions may include: monitoring schedule, number of wells, labor hours, and analytical list. For final cover assumptions may include: area to receive final cover (acres), materials needed and volume (square feet of synthetic liner, cubic yards of clay soil), haul distance for borrow source. Examples of assumptions at various existing facilities are provided (see Appendix B).
- 4) **Unit Costs** - Provide a unit cost for every sub-activity. These can be obtained from RS Means, subcontractor bids (either on your projects or similar nearby projects), subcontractor fee schedules, etc. A unit cost may simply be the cost per cubic yard to dig up and haul material from the borrow area or it may be a calculation using all tasks over a period of one year, such as for monitoring. Calculate a per event cost that might include several tasks: subcontractor travel, labor, equipment, analytical laboratory and reporting. Examples of Unit cost calculations are provided in Appendix C.

Note that there are typically several assumptions necessary to prepare the CPC\$. Please provide a description of the assumptions, include reference footnotes (or similar items) and append the references (contractor bids/rate sheets, etc.) that are used in the unit cost calculations. Several examples of assumptions and unit costs calculations and references are provided (see Appendix D).

The Program has developed two Excel spreadsheets in an effort to standardize and provide guidance in the preparation of CPC\$ submittals. Hard copies are included in Appendix E. Electronic versions of Tables C1 and C2 are available on the CDPHE website at:

<https://www.colorado.gov/pacific/cdphe/swforms>

Table C1 provides for closure costs and Table C2 for post-closure costs. These tables are general in nature and they identify numerous activities pertaining to closure and post closure. Note that some of the activities may not be appropriate or necessary for every solid waste facility. Examples of these tables are provided as examples of the type of information reviewed by the CDPHE (see Appendix D). Other closure and post-closure cost estimate table examples are also provided.

All revised cost estimates are submitted to the CDPHE HMWMD solid waste permitting unit for review and approval. The permitter for your SWSF can be identified at:

<https://www.colorado.gov/pacific/cdphe/swpermitting>

Funding Mechanisms

Section 1.8.4(C) of the Regulations provides requirements for financial assurance including a description of the various funding mechanisms and procedures. These mechanisms include:

- trust fund;
- letter of credit;
- surety bond;
- insurance;
- corporate financial test;
- local government financial test;
- corporate guarantee;
- local government guarantee; and,
- State approved mechanism including certificate of deposit and other methods as approved.

These mechanisms are discussed further in Sections 1.8.6 through 1.8.14 of the Regulations. Funding financial assurance using multiple mechanisms and for multiple facilities is also possible. Requirements for federally owned or operated facilities may have different requirements as identified above. Contact the appropriate SWSF permitter to identify the current contact for technical assistance with the funding aspects of financial assurance.

Annual Adjusted Financial Obligation

The closure and post-closure cost estimate must be **adjusted** annually (by owner/operator) to account for inflation or deflation by using the implicit price deflator for the gross domestic product or its successor published by the US Dept of Commerce pursuant to Section 1.8.3(C) of the Regulations. The factor can be obtained either from the SWSF permitter or the on the CDPHE website at:

<https://www.colorado.gov/pacific/cdphe/solid-waste-financial-assurance>

Note that the annual submittal is **not** a recalculation of the closure and post-closure cost estimate but rather an adjustment of the approved CPC\$ by the factor provided by the US Dept of Commerce. Typically the submittal consists of an adjustment calculation followed by an update to the financial assurance funding mechanism. Please address questions regarding adjustments based on annual submittals with the CDPHE HMWMD financial assurance staff. All annual financial assurance submittals for solid waste facilities are managed out of the Denver office of CDPHE, not directly through the solid waste unit permit staff in satellite offices.

Please submit the **annual** financial assurance documents and adjustment to the CPC\$ to the attention of Financial Assurance as follows:

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Dr
Mail Code: HAZ-SWP-B2
Denver, CO 80246-1530

Attention: Solid Waste Financial Assurance

APPENDIX A – STATE AND FEDERAL OWNED/OPERATED FACILITIES

STATE OF COLORADO

John W. Hickenlooper, Governor
Christopher E. Urbina, MD, MPH
Executive Director and Chief Medical Officer



Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S. Laboratory Services Division
Denver, Colorado 80246-1530 8100 Lowry Blvd.
Phone (303) 692-2000 Denver, Colorado 80230-6928
Located in Glendale, Colorado (303) 692-3090

<http://www.cdphe.state.co.us>

Colorado Department
of Public Health
and Environment

Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division Solid Waste and Materials Management Program

To: Solid Waste State Owned Sites
From: Mira Neumiller
Date: September 12, 2012
Subject: Financial Assurance Required under Solid Waste Regulations

The Colorado's Solid Waste Act directs the solid and hazardous waste commission to promulgate regulations to require financial assurance in Section 30-2—104.5(3)(a), C.R.S.(2011). Section 30-20-1-4.5 further states: "The rules promulgated by the solid and hazardous waste commission pursuant to this section shall comply with the federal regulations promulgated pursuant to subtitle D of the federal *Resource Conservation and Recovery Act of 1976*", as amended." The federal regulation explicitly require financial assurance for municipal solid waste landfills (MSW), with the exception of facilities owned or operated by state or federal entities in 40 C.F.R. Section 258.70(a) and Section 280.90(c). The Colorado Solid Waste Regulations currently require all owners and operators of solid waste facilities to provide financial assurance per Section 1.8 of the *Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, as amended*. Therefore, if the facility is federally or state owned or operated and is not a MSW landfill, financial assurance is required.

To comply with the financial assurance mechanism requirement, the state owned or operated site may use "other mechanisms as approved" under State approved mechanisms in Section 1.8.4(C)(9)(c) of the Solid Waste Regulations. This mechanism must be submitted to the Department with every revised cost estimate. For a State agency, an acceptable mechanism would be a letter signed by the agency's Chief Financial Officer that includes the following language:

This State agency is aware of and will comply with Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, as amended to achieve timely and protective closure, post-closure and/or corrective action care to protect human health and welfare and the environment, and to restore the property to appropriate standards. This State agency has planned accordingly in their budget and these costs are covered by the _____ fund, if the activities are to occur in the period covered by the budget.

The state sites must also comply with the cost estimate requirements of Section 1.8, which include submission of the closure, post-closure and/or corrective actions cost, as appropriate, for review and approval. These costs must be updated annually for inflation and revised every five (5) years. The inflationary adjustments to the cost, do not need to be submitted to the Department, but any revisions to the cost estimate resulting from changes in the engineering design and operations plan, including the closure and post-closure care plans, or the requisite five 5 year update, must be submitted to the Department for review and approval. Financial assurance submittals should be addressed to the Director of the Hazardous Materials and Waste Management Division and can be sent to:

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Dr
Mail Code: HAZ-SWP-B2
Denver, CO 80246-1530
Attention: Financial Assurance

STATE OF COLORADO

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Colorado Department
of Public Health
and Environment

Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division Solid Waste and Materials Management Program

To: Solid Waste Federally Owned Sites
From: Mira Neumiller
Date: September 12, 2012
Subject: Financial Assurance Required under Solid Waste Regulations

Under the Federal Facilities Compliance Act, Federal agencies, engaged in the management of solid or hazardous waste are subject to all applicable Federal, state, and local laws, regulations, and ordinances addressing solid and hazardous waste in 42 USC § 6961. The Colorado's Solid Waste Act directs the solid and hazardous waste commission to promulgate regulations to require financial assurance in Section 30-2—104.5(3)(a), C.R.S.(2011). Section 30-20-1-4.5 further states: "The rules promulgated by the solid and hazardous waste commission pursuant to this section shall comply with the federal regulations promulgated pursuant to subtitle D of the federal *Resource Conservation and Recovery Act of 1976*", as amended." The federal regulation explicitly require financial assurance for municipal solid waste landfills (MSW), with the exception of facilities owned or operated by state or federal entities in 40 C.F.R. Section 258.70(a) and Section 280.90(c). The Colorado Solid Waste Regulations currently require all owners and operators of solid waste facilities to provide financial assurance per Section 1.8 of the *Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, as amended*. Therefore, if the facility is federally or State owned or operated and is not a MSW landfill, financial assurance is required.

To comply with the financial assurance mechanism requirement, the federally owned or operated site may use "other mechanisms as approved" under State approved mechanisms in Section 1.8.4(C)(9)(c) of the Solid Waste Regulations. This mechanism must be submitted to the Department with every revised cost estimate. For a Federal agency, an acceptable mechanism would be a letter signed by the agency's Base Commander, Fiscal Program Manager, or CFO that includes the following language:

This Federal agency is aware of and will comply with *Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, as amended* to achieve timely and protective closure, post-closure and/or corrective action care to protect human health and welfare and the environment, and to restore the property to appropriate standards. This Federal agency will plan accordingly in the agency's budget. This letter does not obligate expenditure of any Federal funds and is not intended to violate the anti-Deficiency Act. Any funding decision will be based on the availability of congressionally appropriated funds.

The federal site must also comply with the cost estimate requirements of Section 1.8, which include submission of the closure, post-closure and/or corrective actions cost, as appropriate, for review and approval. These costs must be updated annually for inflation and revised every five (5) years. The inflationary adjustments to the cost, do not need to be submitted to the Department, but any revisions to the cost estimate resulting from changes in the engineering design and operations plan, including the closure and post-closure care plans, or the requisite five 5 year update, must be submitted to the Department for review and approval. Financial assurance submittals should be addressed to the Director of the Hazardous Materials and Waste Management Division and can be sent to:

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Dr
Mail Code: HAZ-SWP-B2
Denver, CO 80246-1530
Attention: Financial Assurance

APPENDIX B - EXAMPLES OF ASSUMPTIONS

The following are examples of assumptions used in estimating the third party costs for closure and post-closure for financial assurance. These are not considered technically complete or approvable.

EXAMPLE 1 – THREE IMPOUNDMENTS

- Ponds will be clean closed, i.e., all waste will be removed and properly disposed
- All fluids are allowed to evaporate
- The base of the impoundment areas are given below to estimate sludge volume.
 - North Pond - 90 ft by 90 ft = 8100 sf
 - South Pond – 90 ft by 90 ft = 8100 sf
- 1 foot of sludge in each pond must be removed
- XXX cy of sludge requires characterization and is taken to the active solid waste cell using a loader and 12 cy dump truck
- XX sample trips are necessary – 1 for sludge, 1 for subsoil
- 3 samples are collected for sludge and 3 for subsoil (liner)
- Sludge and subsoil are determined to be non-hazardous
- Sludge passes the paint-filter test and is disposed in the active cell on-site
- 1,500 foot haul distance for disposal of sludge in the active cell
- Embankments for north and south ponds are used to re-grade the area
- 14,000 cy of additional material is brought to the area as backfill – mostly for the new west pond
- Final grading is consistent with the surrounding natural slopes and grades resulting in no topographic depression
- The disturbed area for the 3 impoundments including embankments and access road is 1.3 acres
- The pond area requires only grading and vegetation with no environmental cover system

EXAMPLE 2 – SOLID WASTE CELLS

- Within the next 5 years, the currently active Trench XX will reach capacity, Trench YY will be constructed (5 acres) and will reach capacity approximately in 2112
- Likely Trench WW will be constructed and filled to ground level at which time above-ground filling will occur in Cell VV and then move from south to north
- The worst case scenario for closure is that an area including all of Cells XX, YY and WW will require final cover at some time in the future prior to closure of any above ground fill space
- The footprint for Cells is 20 acres, which is the largest area ever requiring closure under the current operations plan
- The re-vegetated area and the area to receive final cover are assumed to be the same
- The current plan is to stockpile soil for use when the landfill is using the area-fill approach (above ground), therefore there is, and will be, excessive amounts of soil stockpiled on site
- If closure is necessary before area-filling, there will be adequate soil material stockpiled on site for use as final cover. No off-site hauling (of soil) will be necessary
- The worst case area requiring intermediate cover is Cell XX (5 acres)
- Final cover is 4 feet of native soil
- For construction of final cover, no compaction, moisture conditioning or special placement is necessary except final walk over with a tracked vehicle prior to seeding

EXAMPLE 3 – OTHER FACILITIES

- Main landfill office and scale are salvaged for no third party cost
- XX acres is graded and vegetated in the office/scale area
- The existing soil stockpiles are the borrow source for all fill material and for intermediate and final covers
- The final unused stockpiled material is graded to 4:1 slopes and vegetated
- The footprint for soil stockpiles requiring reclamation is XX acres, which is the footprint for the current BB stockpile and the projected Cell 5 stockpile, which will be partially located on Cell AA
- The main access road is not reclaimed
- There are 7,400 lf of diversion ditches and channels designed for the facility.
- Half of the surface water diversions need to be reconstructed for the 100-year, 24-hour storm event (3,700 lf)
- Groundwater monitoring wells are operational but 2 new groundwater or methane monitoring wells are installed at the time of closure. These are installed to a depth of 120 feet with 2 inch PVC casing.
- Fencing is intact for the perimeter of the property so assume 200 feet of fencing repairs
- Total waste volume on-site is less than 2.5 million cubic meters
- Venting of methane gas is included in this cost estimate based on high methane readings recently
- 5 passive methane vent wells are placed across the closure area, approximately 1 vent for every trench or 1 vent for every XX acres.
- Each vent well is drilled to 60 feet with an XX-inch diameter hollow stem auger and cased with XX-inch diameter PVC pipe
- Venting or collection/treatment of non-methane organic compounds (NMOCs) is not necessary
- Total reclamation area is XX acres including Cells A, B and C including the shop, C&D area, stockpiles, septage ponds and the office/scale area

EXAMPLE 4 – SITE MAINTENANCE

- Annual inspection by a qualified engineer & final Certification by a Professional Engineer
- Inspection and report is completed in 10 hours, including travel
- Closed areas require maintenance for 30 years
- Areas previously closed require maintenance and consists of 2 cells covering approximately 16 acres (Cells 1 and 2)
- Worst case scenario for area requiring maintenance is 57 acres; 41 acres of new closure and 16 acres previously closed.
- The average soil loss due to erosion is XX cy/ac/yr
- 10% of the XX acres requires soil amendments and repairs once every 5 years over the post-closure period
- A weighting factor of 0.2 is used for tasks that occur only every fifth year during the 30-year post-closure period (1/5)

EXAMPLE 5 – ENVIRONMENTAL MONITORING

- Two groundwater or methane monitoring wells are installed at the time of closure
- One new groundwater or methane monitoring well is installed every 10 years during post-closure
- Four groundwater wells are monitored for groundwater quality on a semi-annual basis
- Groundwater is monitored according to the parameter list developed in the current baseline
- Assume that no Assessment monitoring is necessary
- Mobilization is from Denver
- Groundwater and methane monitoring activities are conducted by the same third party but during separate trips
- Methane monitoring is conducted quarterly; groundwater monitoring semi-annually

APPENDIX C – EXAMPLES OF UNIT COST CALCULATIONS

UNIT COST CALCULATION NO. 1 EARTH WORK

OBJECTIVE: ESTIMATE COST TO RESTORE TOPOGRAPHY, PONDS AND BERMS TO ACCEPTABLE CONDITIONS

ASSUMPTIONS:

1. Pushing in the berms and moving minimum yardages of soil will allow Ponds 1 and 2 to be reclaimed and restored with natural looking contours and stock ponds located at the lower elevations.
2. Access road to the ponds will not be restored. The road will be used for post-closure monitoring/inspection purposes.
3. Secondary containment pond will remain as a stock pond.
4. Existing soil stockpile has previously been seeded and revegetated and will not be disturbed.
5. All secondary containment berms will be leveled to the natural contours including berm around oil/water separator.
6. Mobilization is included in the estimated cost.

ITEM	Qty	UNIT	COST/UNIT	SUB-TOTAL
Earthwork (Fill)				
Pond 1	27,000	cubic yds	\$1.80	\$48,600
Pond 2	21,000	cubic yds	\$1.80	\$37,800
Earthwork (Cut)				
Berms	9,065	cubic yds	\$1.80	\$16,317
Total Cost				\$102,717

REFERENCES

(1) F. Cost Schedule

UNIT COST CALCULATION NO. 7 SOIL TESTING BENEATH LINERS

OBJECTIVE: ESTIMATE COST TO TEST SOIL BENEATH LINERS

ASSUMPTIONS:

1. Soil has been adequately protected by liner systems. A one time analysis of 8 samples will be conducted to verify that potential residual petroleum hydrocarbons do not exceed acceptable levels of BTEX, TVPH, TEPH, PAHs, and pH.
2. Samples locations include: 3 per pond footprint (2 ponds), 1 below oil/water separator, and 1 below crude oil storage tank.

ITEM	Qty	UNIT	COST/UNIT	SUB-TOTAL
Labor				
Env. Field Technician	10	hr	\$85	\$850
Indirect Costs (eg mileage, equipment, supplies)	1	each	\$235	\$235
Subcontractors				
Analytical Laboratory	8	each	\$430	\$3,440
Subtotal				\$4,525
Administrative Cost (10%)			10%	\$452.50
Total Cost				\$4,977.50

REFERENCES

- () Analytical Cost Schedule
- () Cost Schedule

Notes:

- BTEX=benzene, toluene, ethylbenzene and xylene
- TVPH=Total volatile petroleum hydrocarbons
- TEPH=Total extractable petroleum hydrocarbons
- PAH=Polynuclear aromatic hydrocarbons

UNIT COST CALCULATION NO. 8 MONITORING WELL SAMPLING

OBJECTIVE: ESTIMATE COST TO COLLECT AND ANALYZE GROUNDWATER SAMPLES FROM MONITORING WELLS

ASSUMPTIONS:

1. Four monitoring wells (4, 5, 6, and 7) will be sampled.
2. All samples will be analyzed for the following: (cations)- Magnesium, Sodium, Potassium and Calcium. (Anions)- Carbonate, Bicarbonate, Chloride, Sulfate, Nitrite and Nitrate. (Inorganics)- Total and Dissolved Metals: Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Nickel, Selenium, Silver, Thallium, Vanadium and Zinc. (Organics)- VOCs. (Other) Total Dissolved Solids.
3. Analysis will be conducted one time only.

ITEM	Qty	UNIT	COST/UNIT	SUB-TOTAL
Labor				
Env. Field Technicians (2)	20	hr	\$85	\$1,700
Indirect Costs (eg mileage, equipment)	1	each	\$270	\$270
Subcontractors				
West Analytical Laboratories, Inc.	5	each	\$165	\$825
	4	each	\$379.20	\$1,516.80
Subtotal				
Administrative Cost (10%)			10%	\$431.18
Total Cost				\$4,742.98

REFERENCES

- (1) Cost Schedule
- laboratories, Inc. Cost Schedule
- analytical Cost Schedule

UNIT COST CALCULATION NO. 12 POST-CLOSURE MONITORING

OBJECTIVE: ESTIMATE COST TO SAMPLE POINT OF COMPLIANCE WELL (MW-7) AND CONDUCT REQUIRED INSPECTIONS

ASSUMPTIONS:

1. Sample point of compliance well (MW-7) once per year.
2. Sample to be analyzed for the following: (cations)- Magnesium, Sodium, Potassium and Calcium. (Anions)- Carbonate, Bicarbonate, Chloride, Sulfate, Nitrite and Nitrate. (Inorganics)- metals (TOTAL/DISSOLVED) Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Nickel, Selenium, Silver, Thallium, Vanadium and Zinc. (Organics)- VOCs. (Other) Total Dissolved Solids.
3. Semi-annual (2 per year) engineer inspections of site. One inspection conducted by Project Engineer and one conducted by Senior Engineer.
4. Sampling and inspection reports prepared.
5. Sampling/inspections to be conducted for a period of ten years.
6. One time repair of areas exhibiting erosion assuming a 2 acre area.

ITEM	Qty	UNIT	COST/UNIT	SUB-TOTAL
Labor - Sampling				
Env. Field Technicians (2)	12	hr	\$85	\$1,020
Senior Env. Consultant	4	hr	\$120	\$480
Indirect Costs (eg mileage, equipment)	1	each	\$225	\$225
Subcontractors				
Env. Test Analytical Laboratories, Inc.	2	each	\$165	\$330
Administrative	1	each	\$379.20	\$379.20
Labor - Inspections				
Project Engineer	7	hr	\$100	\$700
Senior Engineer	7	hr	\$140	\$980
Indirect costs (Two trips [mileage])	280	miles	\$0.80	\$224.00
Subtotal				\$4,338.20
Administrative Cost (10%)			10%	\$433.82
Total Cost For 1 Year				\$4,772.02
Total Cost For 10 Years				\$47,720.20

REFERENCES

- Cost Schedule
- Environmental Laboratories, Inc. Cost Schedule
- Analytical Cost Schedule

Attachment 1
RS Means Information

example unit cost references

Line Number	Description	Total	Zip Code ¹
015433406950	Rent water truck, off highway, 6000 gallon capacity	1129.54	815
015433407620	Rent vacuum truck, hazardous material, 2500 gallons	\$258.53	815
015626500500	Temporary fencing, wire mesh, on 4" x 4" posts, 4' high	\$18.73	815
017123131200	Boundary & survey markers, crew for building layout, 3 person crew	\$1,263.74	815
312216103310	Fine grading, slopes, steep, finish grading	\$0.21	815
312316500350	Excavation, bulk, scrapers, bank measure, common earth, 3000' haul, 11 CY bucket, elevating scraper, 1/4 push dozer	\$4.36	815
312316500550	Excavation, bulk, scrapers, bank measure, clay, 3000' haul, 11 CY bucket, elevating scraper, 1/4 push dozer	\$7.00	815
312316501300	Excavation, bulk, scrapers, bank measure, common earth, 1500' haul, 14 CY bucket, self propelled scrapers, 1/4 push dozer	\$3.74	815
312319100200	Cut drainage ditch, clay and till, 30' wide x 1' deep	\$0.38	815
312323240300	Compaction, structural, common fill, 8" lifts, sheepsfoot or wobbly wheel roller	\$1.34	815
313713100100	Rip-rap and rock lining, random, broken stone, machine placed for slope protection	\$65.28	815
320190130130	Fertilizing, dry granular, 4lb./MSF, tractor towed spreader, 12' spread	\$4.67	815
329113160700	Soil preparation, mulching, oat straw, 1" deep, power	\$106.02	815
329219130020	Seeding, mechanical seeding, 215 lb/acre	\$1,579.38	815
329219141000	Seeding athletic fields, seeding bluegrass, common with mulch and fertilizer, 4 lb. per MSF, hydro or air seeding	\$58.31	815
330130160140	Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum	\$4.29	815

Notes:

1) Refers to first three numbers of zip code for area adjustment factor. Zip codes starting with 815

UNIT COST CALCULATIONS NO. 1 WATERING NEW SEEDED AREAS

Objective:

Estimate unit cost per acre to apply water to final cover to establish vegetation.

Assumptions:

1. Water 3 times per week for 6 weeks (18 total applications)
2. Water 1,000 gallons per acre per application
3. Water truck is 6,000 gallon capacity and can deliver 4 loads in 8 hours
4. Water will be obtained on-site free of charge

Input Information:

18 Applications
\$ 1,141.38 cost per day for water truck (RS Means 015433406950 Attachment 1)
0.6 Days per application for 26.2 acres
26.2 Acres (Total area required for closure)

Unit Cost:

\$ 684.83 Per application
\$ 12,327 Total cost
\$ 470.49 Unit cost per acre

UNIT COST CALCULATIONS NO. 2 GRASS LINED SWALE CONSTRUCTION

Objective:

Estimate unit cost per linear foot to construct and seed diversion ditch.
Estimate unit cost per acre for final seeding of disturbed area.

Assumptions:

1. 4ft wide base, 2h:1v side slope, 2ft deep
2. Ditch along south and east sides of landfill and ditch south of C&D
3. All ditches adequate for 100-year, 24-hour storm even
4. No rip rap required based on natural ground slopes
5. Cross-sectional width of the ditch is $4+4+4=12$ feet

Input Information:

2500 Linear feet of ditch

12 X-section of ditch (width)

\$0.29 Construction cost per linear foot (RSMeans 312319100200 Attachment 1)

\$0.06 Cost per square foot to seed, with mulch and fertilizer (RSMeans 329219141000 Attachment 1)

Unit Costs:

\$0.70 Cost to seed per linear foot

\$0.99 Cost per linear foot to construct and seed ditches

\$2,485.88 Total cost per acre to seed disturbed area

UNIT COST CALCULATIONS NO. 3

Groundwater and Methane Monitoring

Objective:

Estimate unit cost to monitor groundwater quality and methane.

Assumptions:

1. Sample GW twice annually and methane four times annually
2. Mobilization is from Denver (526 miles each event), 8 hours driving round trip
3. Facility will continue to use dedicated bladder pumps in detection wells, and dedicated bailers in assessment wells.
4. 10 GW monitoring wells (10 are sampled semi-annually; though it is not all the same 10 wells in both events), 8 methane wells, 3 non-well locations and 1 leachate sump are monitored
5. Methane is measured in 7 of the groundwater wells sampled
6. GW analytical list is consistent with the current (2014) GW monitoring program
7. Leachate analytical list is for VOC's and tests requested by the wastewater treatment plant in Craig
8. Update of the Statistical Analysis Plan every 4 years
9. Methane monitoring is conducted independently of GW sampling
10. 1.5 hours per well to collect GW samples
11. 4 hours total (each trip) to monitor for methane
12. Leachate is sampled and tested annually
13. Annual Reporting
14. Groundwater sampling will take 3 days to perform.

Input Information:

- \$57.00 Hourly rate for field labor
- \$65.00 Hourly rate for data quality control and reporting
- \$0.75 Transportation per mile
- 8 Travel time per event (hours)
- \$4,410.00 Analytical cost for GW per event (10 samples) from ESC Lab Sciences
- \$500.00 Analytical cost for leachate per sample
- 23 GW sampling time and QC/reporting time (hours)
- \$4,550.00 Cost for Annual Reporting
- \$5,000.00 Cost for Statistical Analysis Plan Update (every 4 years)

WBC Equipment Costs:

- \$81.50 Water quality meter (pH, Conductivity, Temperature meter)
- \$32.50 Water level sounder
- \$102.00 Cost for Controller for dedicated pumps (per controller, per day)
- \$204.00 GEM Meter
- \$20.00 Misc. Supplies
- \$974.00 Total for GW sampling
- \$204.00 Total for methane monitoring

Unit Costs:

Event Costs for GW Sampling:

- \$5,384.00 Equipment and analytical costs
- \$1,240.50 Travel & Per Diem
- \$855.00 Labor for sampling
- \$292.50 Data QC (Annual)
- \$2,275.00 Annual Report
- \$625.00 Statistical Analysis Plan Update (every 4 years)

Event Costs for Methane Monitoring

- \$204.00 Equipment and analytical costs
- \$850.50 Travel
- \$228.00 Labor for sampling
- \$130.00 Reporting

\$10,672.00 Total per event

\$21,344.00 Annual total

\$10,672.00 Annual per Landfill

\$1,412.50 Total per event

\$5,650.00 Annual total

\$2,825.00 Annual per landfill

Total Annual Costs:

\$26,994.00 Annual monitoring cost

UNIT COST CALCULATIONS NO. 5

Survey Crew for Closure Costs

Assumptions:

1. Survey work will require 1 registered Public Land Surveyor (PLS) and 1 Instrument Person
2. 6 days will be required, 8 hours of work per day
3. Mobilization is 3 miles from Craig, CO
4. Prices from [redacted] Associates based in [redacted] CO (See Attachment 1)

Input Information:

- \$62.00 Survey crew per hour
- \$95.00 GPS unit (Real Time Kinematic) per hour
- \$7.00 Survey Vehicle per hour

Unit Costs:

\$1,312.00 Total Cost per day of surveying

Quote Number: MOFFAT CO. LAB SHORT

Matrix: Ground Water Moffat County Landfill Groundwater Monitoring Program - Long List

DESCRIPTION	INSTRUMENT	DETECTION LIMIT	UNIT	ANALYSIS
-------------	------------	-----------------	------	----------

Inorganic Prep

Nitrogen, total Kjeldahl M351.2 - Block Digester \$0.00

Metals Analysis

Arsenic, dissolved	M6020 ICP-MS	0.0005 mg/L		\$14.40
Calcium, dissolved	M6010B ICP	0.2 mg/L		\$7.20
Chromium, dissolved	M6010B ICP	0.01 mg/L		\$7.20
Iron, dissolved	M6010B ICP	0.02 mg/L		\$7.20
Magnesium, dissolved	M6010B ICP	0.2 mg/L		\$7.20
Manganese, dissolved	M6010B ICP	0.005 mg/L		\$7.20
Potassium, dissolved	M6010B ICP	0.3 mg/L		\$7.20
Sodium, dissolved	M6010B ICP	0.3 mg/L		\$7.20

Misc.

Setup Charge for ICPMS - dissolved \$18.00

Wet Chemistry

Alkalinity as CaCO3	SM2320B - Titration	2 mg/L		\$9.00
Cation-Anion Balance	Calculation			\$0.00
Chemical Oxygen Demand	M410.4	10 mg/L		\$21.60
Chloride	SM4500Cl-E	1 mg/L		\$9.00
Lab Filtration	SM 3030 B			\$8.10
Lab Filtration & Acidification	SM 3030 B			\$8.10
Nitrate as N, dissolved	Calculation: NO3NO2 minus NO2	Calculation		\$0.00
Nitrate/Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	0.02 mg/L		\$9.00
Nitrite as N, dissolved	M353.2 - Automated Cadmium Reduction	0.01 mg/L		\$9.00
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	0.1 mg/L		\$20.70
Sulfate	375.4 - Turbidimetric	1 mg/L		\$9.90

Cost/Sample: \$187.20

This quote is based on a Standard Turn Around Time of 14 days. All projects received are subject to a \$125.00 Minimum Charge.

DRILLING SERVICE, INC.

(714) 970-9880

ENVIRONMENTAL SOIL DRILLING - SPECIALIZING IN A.T.V. DRILLING

We can do: Rotary/Core Drilling / Auger Size: 4" & 6"	Hollow Stem Auger	ODEX
NX, HX, HW, Casing advancer	3 3/4" ID	6 Inch & 4 Inch system

Note: The only drill rig capable of ODEXING is - CME 55 All rigs can do - Rotary, Hollow or Regular auger.

*** DRILL RIGS ***

CME 55-Truck Mounted * ATV'S INCLUDE: CME 45 - BOMBARDIER track rig * JOHN DEER Log Skidder- On rubber tires / Drill-CME 55
 Other equipment available: Water truck-2000 gal., Steam cleaner, Grout Plant, Air compressor

2008 PRICE LIST

55 CME RUBBER TIRED RIG DRILL

* AUGER 4"	\$140.00	Per hour / Reg. Truck Rig price
* HOLLOW	\$150.00	Per hour / Reg. Truck Rig price
* ROTARY/CORING	\$150.00	Per hour / Plus Bit wear or replacement
* ODEX - 4" OR 6"	\$300.00	Per hour / Plus \$50.00 per sample

A.T.V. DRILL RIGS / C.M.E. Drill 45 & 55

* A.T.V. TRACK DRILLS - BOMB & JOHN DEER		
* AUGER 4"	\$185.00	Per hour
* HOLLOW	\$195.00	Per hour
* ROTARY/CORING	\$195.00	Per hour / Bit wear at cost

MOBE PER HOUR :

* TRUCK RIG	CME 55	\$165.00	Per hour
A.T.V. TRACK RIG	BOMB, JOHN DEER	\$175.00	Per hour
* WATER TRUCK		\$150.00	Per day
* PICKUP TRUCK		\$100.00	Per hour
* Pickup Truck Mileage		\$1.00	Per hour

OUT OF TOWN EXPENSES:

* PERDIEM	\$40.00	Per day
* MOTEL		Actual cost

MISCELLANEOUS COSTS:

TEETH :	\$10.00	Each
STANDBY	\$120.00	Per hour
CREW TRAVEL :	\$80.00	Per hour
LOST EQUIPMENT :		At Cost
CHECK OUT JOB SITE :	\$80.00	Per hour
OVERTIME CHARGES :	Over drill rate price	\$30.00 Per hour / Additional

EQUIPMENT LIST

STEAM CLEANER	\$150.00	Per day
GROUT MIXER	\$150.00	Per day
AIR COMPRESSOR	\$350.00	Per day
WATER PUMP	\$50.00	Per day

NOTE: WHEN USING THE ODEX DRILLING SYSTEM - AN AIR COMPRESSOR IS USED TO RUN THIS SYSTEM. THE AIR COMPRESSOR RENTAL CHARGE IS EXTRA.

Effective: Jan. 10 th, 2007

Cassion Pricing Depth Per Foot - \$4.00 ft 16" - \$3.85 ft 12"
 Mobe \$150.00

APPENDIX D – EXAMPLES OF CALCULATION TABLES

CLAYTON LAKES LANDFILL DISPOSAL FACILITY
CLOSURE/ POST-CLOSURE COST ESTIMATE
SUMMARY
COUNTY COLORADO

	Calc. Cost	Item Description	Item Total
	1	Earth Work	\$102,717.00
	2	Concrete Removal	\$1,900.00
	3	Storage Tank Removal	\$16,909.20
	4	Liner and Piping Removal	\$66,863.40
	5	Silt Fence Installation	\$12,496.00
	6	Reseeding Disturbed Areas	\$20,984.60
	7	Soil Testing Beneath Liners	\$4,977.50
	8	Monitoring Well Sampling	\$4,742.98
	9	Monitoring Well Abandonment	\$8,671.30
	10	Facility Office Building Removal	\$1,000.00
	11	Closure Report	\$4,730.00
	12	Post-Closure Monitoring	\$47,720.20
TOTAL CLOSURE AMOUNT			\$245,991.98
TOTAL CLOSURE AND POST-CLOSURE AMOUNT			\$293,712.18

Table 1: Financial Assurance-Closure
Landfill

Example

Item	Basis of Cost	Unit Qty	Unit	Unit Cost	Extended Cost
FINAL COVER CONSTRUCTION					
Foundation Layer (Intermediate cover for 5 acres for C&D cell only)					
Unclassified Fill Placement	5 ac	4,033	lcy	\$3.74	\$15,084.67
Final Fine Grading		24,200	sy	\$0.21	\$5,082.00
Barrier Layer					
Soil Placement	19.4 ac	47,045	lcy	\$7.07	\$332,606.74
Compaction		47,045	ecy	\$1.36	\$63,980.93
Frost/Erosion Protection Layer					
Unclassified Fill Placement	19.4	78,408	lcy	\$3.74	\$293,245.92
Vegetative Soil Layer					
Unclassified Fill Placement	16.2 ac	13,068	lcy	\$4.41	\$57,629.88
Seeding		27.20	ac	\$1,579.34	\$42,958.05
Water with Tank Truck		27.20	ac	\$470.49	\$12,797.40
Final Cover Cost Subtotal					\$823,385.58
SURFACE WATER CONTROL STRUCTURES					
Grass Lined Drainage Swales		2,500	lf	\$0.99	\$2,474.00
Surface Water Control Structures Cost Subtotal					\$2,474.00
MISCELLANEOUS					
Access Road Construction					\$0.00
Posting of Signs	Included in cost to construct final cover	1	each	\$150.00	\$150.00
Miscellaneous Cost Subtotal					\$150.00
Subtotal Project Cost					\$826,009.58
ENGINEERING MANAGEMENT					
Construction Inspection/Oversight	Experience	1	ls	6%	\$49,560.57
Surveying	Calculation NO. 5	6	days	\$1,312.00	\$7,872.00
Construction Design Documents/CQA Manuals & Reports	Experience	1	ls	6%	\$49,560.57
Engineering Management Cost Subtotal					\$106,993.15
CLOSURE COST ESTIMATE SUBTOTAL					\$933,002.72
Adjustments					
Administrative Costs	5%	1	ls	5%	\$46,650.14
Contingency	5%	1	ls	5%	\$46,650.14
CLOSURE COST ESTIMATE TOTAL					\$1,026,303.00

Notes:

- Unit quantities obtained from information provided by Moffat County Landfill and Drawing 1
- Refer to Attachment 1.

Legend

lcy=lump cubic yard ecy=embankment cubic yards ac=acre(s) msf=thousands of square feet lf=linear feet sy=square yards ls=lump sum days=days

Post Closure
Example

Table 2: Financial Assurance-Postclosure
County Landfill

Example

Item	Basis of Cost	Unit Qty	Unit	Unit Cost	Events Per Year	Annual Extended Cost
Site Inspection/Reporting	WBC Rates	8	hr	\$125.00	1	\$1,000.00
Maintenance/Repairs						
Erosion Damage Repair (Assume soil loss of 0.51 cy/ac/yr)	Calculation 4					
Active Landfill (27.2 acres)	Means 312316500350 ³	13.9	cy	\$4.40	1	\$61.16
Vegetation and Soil Amendments (Assume 10% of site requires amendments)						
Active Landfill	Means 329219130020 ³	2.72	ac	\$1,574.22	0.2	\$856.38
Closed Landfill	Means 329219130020 ³	2	ac	\$1,574.22	0.2	\$629.69
Groundwater and Gas Wells	Experience	1	ls	\$500.00	0.2	\$100.00
Leachate Collection System Line Cleaning	Means 330130160140 ³	1,200	lf	\$4.29	0.2	\$1,029.60
Groundwater (GW) Monitoring						
Equipment and Lab Analysis	Calculation NO. 3	1	day	\$5,384.00	2	\$10,768.00
Mobilize/Demobilize	Calculation NO. 3	1	ea	\$1,240.50	2	\$2,481.00
Sampling Labor	Calculation NO. 3	15	hours	\$57.00	2	\$1,710.00
Data Quality Control and Annual Sanitas License	Experience	1	ea	\$292.50	2	\$585.00
Annual Report Preparation	Experience	1	ls	\$4,550.00	1	\$4,550.00
Statistical Analysis Plan Update-Every 4 years	Experience	1	ls	\$5,000.00	0.25	\$1,250.00
GW COST ESTIMATE SUBTOTAL (ACTIVE AND CLOSED)						\$21,344.00
GW COST ESTIMATE SUBTOTAL (ACTIVE ONLY)						\$10,672.00
Explosive Gas Monitoring						
Equipment	Equipment Rates	1	day	\$204.00	4	\$816.00
Mobilize/Demobilize	Rates	1	ea	\$1,240.50	4	\$4,962.00
Field Labor	Experience	4	hours	\$57.00	4	\$912.00
Data Quality Control and Report Preparation	Experience	2	hours	\$65.00	4	\$520.00
GAS MONITORING COST ESTIMATE SUBTOTAL (ACTIVE AND CLOSED)						\$7,210.00
GAS MONITORING COST ESTIMATE SUBTOTAL (ACTIVE ONLY)						\$3,605.00
Treatment/Disposal (Note 2)						
Leachate Lab Analysis	ESC Lab Sciences Rates	1	samples	\$500.00	1	\$500.00
Leachate Disposal	WTF	10,000	gal	\$0.00	1	\$0.00
Vacuum/Trucking Costs	Means 015433407620 ³	1	days	\$258.53	1	\$258.53
POST CLOSURE COST ESTIMATE SUBTOTAL						\$18,712.35
Adjustments						
Administrative Costs	5%	1	ls	5%	1	\$935.62
Contingency	5%	1	ls	5%	1	\$935.62
TOTAL ANNUAL POST CLOSURE COST						\$20,583.59
TOTAL COST FOR 30 YEAR PERIOD						\$617,507.67

Notes:

- Unit quantities obtained from information provided by County Landfill and Drawing 1, by Landfill Site Plan, dated May, 2014.
- Leachate will be taken to the Water Treatment Facility
- Refer to Attachment 1

Legend

hr=hour cy=cubic yard ac=acre(s) ls=lump sum day=day ea=each gal=gallons

APPENDIX E – TABLES C1 & C2 AVAILABLE FROM CDPHE (EXCEL FORMAT)

Form C1: Financial Assurance - Closure Cost Estimate		Please save as your own spreadsheet and then add and delete rows to make it work for your facility			Date:			
Facility Name:	ACTIVITY	UNITY QUANTITY	REFERENCE	Current Year:	UNIT	UNIT COST	REFERENCE	ACTIVITY COST
FINAL COVER CONSTRUCTION								
Foundation Layer								
	Specified material available on site (see assumption 1)				XX			\$ -
	Equipment mobilization				CY			\$ -
	Site grading - see assumptions and calculation ##				CY			\$ -
	Other Materials:				AC			\$ -
					XX			\$ -
					XX			\$ -
Infiltration / Barrier Layer								
Clay Placement								
	Clay availability / purchase or haul cost				XX			\$ -
	Placement - see calculation ##				CY			\$ -
	XXXX				CY			\$ -
	Other Materials:				XX			\$ -
					XX			\$ -
Geomembrane Barrier Layer								
Liner System - materials and installation								
	HDPE (60 mil)				SF			\$ -
	Geocomposite clay liner				SF			\$ -
	XXXX				SF			\$ -
					XX			\$ -
					XX			\$ -
Drainage Netting & Geogrid & Geotextile								
	1/4 inch thick high density polyethylene				SF			\$ -
	geotextile fabric, heat bonded 1 side				SF			\$ -
	60 mil, non-woven				SY			\$ -
	Other Materials:				XX			\$ -
					XX			\$ -
Rooting Layer (Frost-protection layer)								
Specified material, thickness XX inches								
	Specified material available on site & hauled				SF			\$ -
	fine grading				CY			\$ -
	Other Materials:				CY			\$ -
Erosion Layer (seed-bed layer)								
Topsoil Placement								
	Topsoil available on site				SF			\$ -
	fine grading				CY			\$ -
Seeding (top and side slope), mulch, fertilizer, watering								
	Hydraulic spread, XXX lb/msf				SF			\$ -
	Mechanical seeding, XX lb/msf - see Calculation ##				ACRE			\$ -
	Water w/ tank truck XX kgal/ac				ACRE			\$ -
	Other Materials:				XX			\$ -
					XX			\$ -
Final Cover Cost Subtotal								\$ -
SURFACE WATER CONTROL STRUCTURES								
	10 ft wide, grass lined swale				LF			\$ -
	Drainage channel Grass-lined channel 3' x 3' 2:1 Side Slopes				LF			\$ -
	Drainage channel Rip-rap lined channel 3' x 3' 2:1 Side Slopes				LF			\$ -
	Sed pond XX ac-ft				LS			\$ -
	CMP XX inch diameter, plain				LF			\$ -
	Culvert XX ft complete, XX inch CMP culvert with headwalls				EA			\$ -

Please save as your own spreadsheet and then add and delete rows to make it work for your facility

Form C1: Financial Assurance - Closure Cost Estimate		Closure Plan date:		Current Year:		Date:	
Facility Name:	ACTIVITY	UNITY QUANTITY	REFERENCE	UNIT	UNIT COST	REFERENCE	ACTIVITY COST
Berms, size				CY			\$ -
Other:				XX			\$ -
<i>Surface Water Control Structures Cost Subtotal</i>							
GROUNDWATER & GAS MONITORING WELL INSTALLATION							
Well Installation (XX inch well casing size)				SF			\$ -
Mobilize/demobilize drilling rig & crew				LS			\$ -
Hollow-stem auger, 8 in OD BH for 2 inch well				SF			\$ -
per well installation cost (see calc ##)				LF			\$ -
well installation cost - see calc ##				LF			\$ -
well abandonment cost - see calc #				LF			\$ -
guard posts				EA			\$ -
pumps				EA			\$ -
Other materials:				XX			\$ -
<i>Groundwater and Gas Well Installation Cost Subtotal</i>							
GAS VENTING SYSTEM CONSTRUCTION							
Extraction Well Installation (XX inch dia)				SF			\$ -
Mobilize/demobilize drilling rig & crew				LS			\$ -
Hollow-stem auger, 11 in OD BH for 4 inch well				LF			\$ -
4 inch HDPE well casing, perf and none				LF			\$ -
gravel pack and seal				LF			\$ -
horizontal pipe purchase and installation				LF			\$ -
Well Head Assembly				EA			\$ -
Other materials:				XX			\$ -
Gas/Vapor Collection System							
Excavation				EA			\$ -
Header Pipe Installation				LF			\$ -
Sand backfill 950, 3.00 cy, Delivered & Dumped				LF			\$ -
Materials and Installation				EA			\$ -
blowers				EA			\$ -
buildings				EA			\$ -
Other:				XX			\$ -
Flare				SF			\$ -
XXX million BTU/Hour				EA			\$ -
Other:				XX			\$ -
<i>Gas Venting System Construction Cost Subtotal</i>							
SECURITY SYSTEM INSTALLATION							
Fencing, 6' Galvanized Chain Link				LF			\$ -
Posting of signs				EA			\$ -
Other:				XX			\$ -
<i>Security System Installation Cost Subtotal</i>							
MISCELLANEOUS							
Access Road Construction				LF			\$ -
Grading				SY			\$ -
Gravel Delivered & Dumped				CY			\$ -

Form C1: Financial Assurance - Closure Cost Estimate		Please save as your own spreadsheet and then add and delete rows to make it work for your facility			Date:		
Facility Name:	ACTIVITY	UNITY QUANTITY	REFERENCE	Current Year: UNIT	UNIT COST	REFERENCE	ACTIVITY COST
	Geotextile - 60 mil			SF			\$ -
	Building demolition			SY			\$ -
	Other:			XX			\$ -
Miscellaneous Cost Subtotal							\$ -
ENGINEERING MANAGEMENT							
	Construction Inspection/Oversight			WK			\$ -
	Surveying, 2 man crew			DAY			\$ -
	Construction Design documents/CQA Manuals/CQA reports			LS			\$ -
	Other:			DAY			\$ -
Engineering Management Cost Subtotal							\$ -
CLOSURE COST ESTIMATE SUBTOTAL							\$ -
	Zip code adjustment factor				0		\$ -
	Administrative Cost (XX%)			%	0.00%		\$ -
	Contingency (xx%)			%	0.00%		\$ -
CLOSURE COST ESTIMATE TOTAL							\$ -
Unit Cost Abbreviations							
	cy = cubic yard						
	sf = square foot						
	sy = square yard						
	LF = linear foot						
	LS = lump sum						
* Please provide backup justification for volumes and unit costs							
Please provide copies of all assumptions and side calculations for volumes, units and unit costs							

