

**Closure/Post-Closure Care Plan
Unit 3 AQCS Solids Landfill
Sherburne County Generating Plant
MPCA Permit No. SW-293
Becker, MN**

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1.0 Introduction

This report is divided into two sections: the Site Closure Plan and the Post-Closure Care Plan. The purpose of the Closure Plan is to outline the steps to follow at the time of closure, or partial closure of the Unit 3 AQCS Solids Landfill (Landfill). While there are no specific MPCA requirements for industrial solid waste disposal site closure plans, MPCA Solid Waste Management Rules, Sections 7035.2625 and 7035.2635 for municipal solid waste disposal sites have been used as guidelines.

The Post-Closure Care Plan identifies the observation, maintenance, and monitoring activities to be completed during the postclosure care period for the Landfill, and identifies the approximate frequency for conducting these activities. While there are no specific MPCA requirements for industrial solid waste disposal site postclosure care plans, MPCA Solid Waste Management Rules, Sections 7035.2645 and 7035.2655 for municipal solid waste disposal sites have been used as guidelines.

2.0 Closure Plan

2.1 Notification of Final Cover Construction

The MPCA will be notified of impending final cover construction at least one week prior to initiation of closure activities.

2.2 Notification of Final Closure

The MPCA will be notified of impending final site closure at least 90 days prior to termination of landfilling activity. A planned closure date and arrangements for compliance with the closure program must be included in the notification.

2.3 Closure Schedule

Site closure will occur in stages as areas of the Landfill are filled to final grade. As operations continue to the north in Phase I, portions of Cell 2B and Cell 2C will be closed, as noted on the Permit Application Drawings. The next area scheduled for closure will be the remainder of Cell 2C. Future phases of closure will continue as Cell 3 is filled to final ash grades. As discussed in the Engineering Report, due to variability in ash production rates and pending ash utilization projects, the long term ash disposal rates and closure phasing are not clearly known and have not been precisely calculated beyond 2014. Future capacity needs and Landfill closure phasing will be revised periodically as disposal rates fluctuate and disposal volumes are calculated. The final cover system will be placed as described in the Engineering Report.

Final cover construction will generally occur during the summer and fall months. Final cover along the peak of the Landfill will be deferred until final closure of the entire Landfill, allowing haul traffic to access active portions of the Landfill from the top of the ramp without traveling over final cover. The details of the temporary haul route are shown on the Permit Application Drawings. Areas without final cover during a given construction season, but brought to final grade, must have temporary erosion controls placed as necessary until final cover is installed.

2.4 Closure Procedure

Closure will consist of placement of the final cover consisting of 0 to 6 inches of random fill buffer layer soil for slope grading, a geomembrane barrier layer of 40-mil minimum thickness, a 12-inch granular drainage layer, and a 12-inch top layer. The top layer will consist of a minimum of 6-inches of topsoil and will be vegetated. Concurrent with the installation of final cover, the surface water control system will be constructed as described in the Engineering Report. Material requirements, specific construction requirements and techniques are outlined in the draft Technical Specifications contained in this application package. Project-specific specifications will be developed prior to undertaking each construction activity.

2.5 Certification of Closure

2.5.1 Certification of Phase Closure

A closure documentation report will be prepared after completion of each stage of closure of the Landfill. The report will be signed by a professional engineer registered in the State of Minnesota, stating that to the best of their knowledge and according to their records, a segment of the Landfill cover construction has been completed in general accordance with the approved plans, specifications, and license requirements. The construction of the various components of the Landfill cover will be tested and documented in accordance with testing requirements presented in the Construction Quality Assurance (CQA) plan for site closure.

The construction documentation will be submitted to the MPCA no later than 90 days following completion of each stage of Landfill closure activities. The report will contain descriptions of the construction process, survey data collected during construction, pertinent correspondence, material test data, and photographs at major points of the construction process.

2.5.2 Certification of Final Closure

Upon completion of final closure activities when ash will no longer be disposed of at the Landfill, Xcel Energy will submit to the county recorder and the MPCA a closure record including an estimate of the volume of waste placed at the Landfill and a description of the

Landfill use, along with a survey plat of the site. The plat will be prepared and certified by a land surveyor registered in Minnesota.

2.6 Deed Notation

Xcel Energy will record a notation on the deed to the property, or on some other instrument normally examined during a title search, that will in perpetuity notify any potential purchaser of the property of any special conditions or limitations for use of the site. The notation will include construction documentation plans for the industrial solid waste disposal facility. A copy of the notification, as filed with the County recorder and carrying the recorder's seal, will be submitted to the MPCA with the final site closure certification report.

2.7 Closure Costs

Estimated costs for closure of the Landfill have been calculated, and are included in Tables 1-4

3.0 Post-Closure Care Plan

The licensee and owner of the Landfill and any successor will be responsible for the postclosure care of the site in accordance with permit requirements. The postclosure will begin on the date of MPCA approval of final closure certification and continue for the duration required by the Landfill permit.

3.1 Inspection

In the spring and autumn of each year following closure, a routine inspection of the site will be performed according to the appropriate sections in the Operations and Maintenance Plan. The inspection will include an evaluation of the final cover for settlement, erosion and quality of vegetation; inspection of leachate collection and monitoring systems for damage or degradation; and inspection of drainage control facilities for erosion or accumulation of sediment.

3.2 Maintenance

If inspection of the site reveals problems with the leachate collection system, monitoring systems, security systems, cover material or the vegetation, corrective measures will be taken. In the event that substantial erosion occurs, additional soil cover will be placed and compacted, and measures will be taken to prevent further occurrence of the problem.

If there are any areas where the cover vegetation is poorly established or otherwise stressed, reseeding and/or growth and development measures will be instituted to establish turf. In addition, routine surface care maintenance such as mowing to prevent tree growth, and maintenance of drainage channel flow capacity will be performed.

Any equipment found to need repairs during a routine inspection will likewise be repaired. This includes, but is not limited to, security fence, gates, monitoring wells, leachate measurement and collection systems, and stormwater runoff control structures.

3.3 Leachate and Groundwater Monitoring

Routine leachate and groundwater monitoring will be performed during the postclosure period in accordance with the monitoring program outlined in the Phase IV Hydrogeologic Monitoring Plan, and may be modified periodically by Xcel Energy upon approval of the MPCA.

3.4 Reporting

A report describing the inspection, conditions observed, corrective actions, maintenance activities, and monitoring activities performed in connection with the Landfill, as described in the Operations and Maintenance Plan will be prepared and transmitted to the MPCA with the annual report.

3.5 Ultimate Land Use

The present site owner/operator, Xcel Energy, will reserve the option regarding the final use of the Landfill site (to the extent of limitations imposed by the city of Becker, Sherburne County, and the MPCA). Xcel Energy will not allow use of the site for activities, which would be considered to be detrimental to the maintenance of adequate final earth and vegetative cover, surface water drainage systems, and groundwater monitoring wells.

3.6 Post-Closure Costs

Estimated postclosure costs for the Landfill have been calculated, and are included in Tables 5-11.

Tables

Table 1
Final Cover Cost Estimate (Typical)
Based on 2013 Unit Prices
Sherco Unit 3 AQCS Solids Landfill

	Item	Quantity	Unit Price	Extension
1.	Random Fill Buffer Soil for Slope Grading (on-site)			
	a. Area to be capped (acres)	5		
	b. Depth of buffer soil (ft)	0.5		
	c. In-place quantity (cy)	4,034		
	d. Total buffer soil unit cost (\$/cy)		\$3.50	
	e. Buffer soil cost (lines 1c x 1d)			\$14,100
2.	40 mil LLDPE Liner			
	a. Area to be capped (acres)	5		
	b. Quantity of material needed (sf)	217,800		
	c. Liner unit cost (\$)		\$0.60	
	d. Liner cost (lines 2b x 2c)			\$130,700
3.	Granular Drainage Material (on-site, screened)			
	a. Area to be capped (acres)	5		
	b. Depth of material needed (ft)	1.0		
	c. In-place quantity (cy)	8,067		
	d. Total sand unit cost (\$/cy)		\$7.00	
	e. Sand cost (lines 3c x 3d)			\$56,500
4.	Soil for Rooting Zone (on-site)			
	a. Area to be capped (acres)	5		
	b. Depth of sand needed (ft)	0.5		
	c. In-place quantity (cy)	4,034		
	d. Total rooting soil unit cost (\$/cy)		\$3.50	
	e. Rooting soil cost (lines 4c x 4d)			\$14,100
5.	Topsoil (on-site)			
	a. Area to be capped (acres)	5		
	b. Depth of topsoil needed (ft)	0.5		
	c. In-place quantity needed (cy)	4,034		
	d. Total topsoil unit cost (\$/cy)		\$3.50	
	e. Topsoil cost (lines 5c x 5d)			\$14,100
6.	Class II Riprap and Filter Fabric			
	a. Area to receive riprap (sf)	270		

	Item	Quantity	Unit Price	Extension
	b. Depth of riprap needed (ft)	1.0		
	c. Quantity needed (in-place, cy)	10		
	d. Total riprap unit cost (\$/cy)		\$60.00	
	e. Riprap cost (lines 6c x 6d)			\$600
7.	Surface Water Collection			
	a. Type and length needed			
	4" perforated drain tubing (lf)	1,600		
	12" PEP (lf)	850		
	b. Pipe unit cost (including excavation, installation, replacing cover soils)			
	4" perforated drain tubing (\$/lf)		\$6.00	
	12" PEP (\$/lf)		\$20.00	
	c. Surface water collection cost			
	4" perforated drain tubing			\$9,600
	12" PEP			\$17,000
8.	Miscellaneous			
	a. Type and quantity needed			
	Geomembrane flap (sf)	3,200		
	Erosion control blanket (sy)	1,600		
	Geomembrane boots (ea)	4		
	Liner temporary termination/plywood (lf)	1,250		
	Connect to existing geomembrane (lf)	1,250		
	b. Unit cost			
	Geomembrane flap (\$/sf)		\$0.60	
	Erosion control blanket (\$/sy)		\$1.25	
	Geomembrane boots (ea)		\$200	
	Liner temporary termination/plywood (\$/lf)		\$3.00	
	Connect to existing geomembrane (\$/lf)		\$15.00	
	c. Total cost			
	Geomembrane flap			\$1,900
	Erosion control blanket			\$2,000
	Geomembrane boots			\$800
	Liner temporary termination/plywood			\$3,800
	Connect to existing geomembrane			\$18,700
9.	Surface Water Structures			
	a. Surge basins (ea)	2	\$2,000	\$4,000
10.	Vegetation			
	a. Area requiring vegetation (acres)	5		

	Item	Quantity	Unit Price	Extension
	b. Seed unit cost (includes fertilizer and mulch, \$/acre)		\$1,100	
	c. Vegetation cost (lines 10a x 10b)			\$5,500
11.	Final Cover Subtotal			\$293,400
12.	Mobilization/Demobilization and Contingency			
	a. Heavy equipment mobilization/demobilization cost (10% of above costs)			\$29,300
	b. Contingency (10% of above costs)			\$32,300
13.	Construction Documentation and Report Preparation			
	a. Construction duration (weeks)	6		
	b. Professional Engineer inspection time required (hrs/week)	8		
	c. Professional Engineer unit labor cost (\$/hr)		\$125	
	d. Professional Engineer inspection cost (lines 13a x 13b x 13c)			\$6,000
	e. Professional Engineer project management time required (hrs/week)	20		
	f. Professional Engineer management cost (lines 13a x 13c x 13e)			\$15,000
	g. Technician inspection time required (hrs/week)	55		
	h. Technician unit labor cost (\$/hr)		\$80	
	i. Technician cost (lines 13a x 13g x 13h)			\$26,400
	j. Laboratory testing unit cost (\$/acre)		\$350	
	k. Laboratory testing cost (1a x 13j)			\$2,100
	l. Land surveyor time required (hrs)	80		
	m. Land surveyor unit labor cost (2-man crew, \$/hr)		\$150	
	n. Land surveyor cost (lines 1a x 13l x 13m)			\$12,000
	o. Equipment rental, material, expenses (ls)			\$5,000
	p. Report preparation (ls)			\$10,000
14.	Construction documentation and report subtotal			\$76,500
15.	Estimated Total Closure Cost			\$431,500
16.	Estimated Closure Cost per Acre (line 15/1a)			\$86,000

Notes: Costs based on 2013 unit prices Extensions rounded to the nearest \$100, Total rounded to the nearest \$1,000.

Table 2
Estimated Total Closure Cost
Based on 2013 Unit Prices
Sherco Unit 3 AQCS Solids Landfill

Description	Cover Area (acres)	Unit Cost (\$/acre)¹	Estimated Cost
Phase 1 (Cells 1, 2A, 2B and 2C)	22.22	\$86,000	\$1,190,920
Cell 3	24.12	\$86,000	\$2,074,320
Total	46.32	\$86,000	\$3,983,520

¹Unit Cost per acre from Closure Table 1

Table 3
Notice to Local Land Authority
Landfill Closure Cost Estimate
Sherco Unit 3 AQCS Solids Landfill

Item	Quantity	Unit	Unit Cost	Extension*
1. Registered Land Survey	1	L.S.	\$2,500	\$2,500
2. Plat Submittal	8 20	Hr. Hr.	\$150 \$60	\$1,200
a. Attorney				\$1,200
b. Clerical				\$2,400
Subtotal				
3. Waste Record Submittal	10 4	Hr. Hr.	\$125 \$60	\$1,300
a. Engineer				\$200
b. Clerical				\$1,500
Subtotal				
Total Estimated Cost of Notice to Local Land Authority				\$6,400

* Extensions rounded to nearest \$100.

Table 4
Notation on Property Deed
Landfill Closure Cost Estimate
Sherco Unit 3 AQCS Solids Landfill

Item	Quantity	Unit	Unit Cost	Extension*
1. Attorney	4	Hr.	\$150	\$600
2. Clerical	20	Hr.	\$60	\$1,200
3. Filing	1	L.S.	\$100	\$100
Total Estimated Cost of Notation on Property Deed				\$1,900

* Extensions rounded to nearest \$100.

Table 5
Total Estimated Cost
Post-Closure Care Annual Cost Estimate Summary
Sherco Unit 3 AQCS Solids Landfill

The Postclosure Care Cost Estimates Address the Following Issues	Estimated Annual Cost
Facility Inspection (Table 6) Engineer Technician	\$7,000
Routine Maintenance and Repairs (Table 7) Mowing Revegetation of cover Sprinkling or irrigation of revegetated area Security system maintenance and repair Diversion ditch cleaning Rodent control Snow plowing	\$35,000
Sedimentation Basin Maintenance (Table 8) Erosion or Settlement Damage Repair (Table 9) Soil acquisition Heavy equipment mobilization/demobilization Revegetation	\$1,000 \$11,000
Leachate and Groundwater Monitoring (Table 10) Groundwater quality analysis Monitoring well maintenance Monitoring well replacement	\$22,000
Administrative and Reporting Services (Table 11) Engineer Clerical	\$12,000
Estimated Total Annual Postclosure Care Cost	\$88,000

Table 6
Facility Inspection
Post-Closure Care Annual Cost Estimate
Sherco Unit 3 AQCS Solids Landfill

	Item	Quantity	Unit Price (\$)	Extension (\$)
1.	Engineer			
	a. Number of inspections during postclosure period (insp/yr)*	3		
	b. Engineer time required (hrs/insp)	12		
	c. Engineer unit labor cost (\$/hr)		\$125	
	d. Engineer cost (lines 1a X 1b X 1c)			\$4,500
2.	Technician			
	a. Number of inspections during postclosure period (insp/yr)*	3		
	b. Technician time required (hrs/insp)	8		
	c. Technician unit labor cost (\$/hrs)		\$80	
	d. Technician time (lines 2a x 2b x 2c)			\$1,900
3.	Travel Expense			
	a. Number of inspections during postclosure period (insp/yr)	3		
	b. Miles driven per inspection (miles/insp)	100		
	c. Mileage cost (\$/mile)		\$0.60	
	d. Travel cost (3a x 3b x 3c)			\$180
4.	Facility Inspection Total Cost (sum lines 1d + 2d + 3d)			\$7,000

*Number of inspections during postclosure period includes two routine annual inspections and one inspection per year after a severe storm event.

Note: 2013 unit prices shown. Total annual cost rounded to nearest \$1,000.

Table 7
Routine Maintenance and Repairs
Post-Closure Care Annual Cost Estimate
Sherco Unit 3 AQCS Solids Landfill

	Item	Quantity	Unit Price	Extension
1.	Mowing			
a.	Mowing frequency (vis/yr)	1		
b.	Area to be mowed per visit (acres/vis)	100		
c.	Mowing time required (hrs/acre)	0.5		
d.	Unit labor cost (including equipment, \$/hr)		100	
e.	Mowing subtotal (lines 1a x 1b x 1c x 1d)			\$5,000
f.	Mobilization/demobilization cost			\$500
g.	Total mowing cost (lines 1e + 1f)			\$5,500
2.	Revegetation of cover			
a.	Number of visits (vis/yr)	2		
b.	Area to be vegetated (acres/vis)	5		
c.	Seed unit cost (includes fertilizer and mulch, \$/acre)		\$1,500	
d.	Revegetation cost (lines 2a x 2b x 2c)			\$15,000
3.	Sprinkling or Irrigation			
a.	Sprinkling frequency (days/year)	10		
b.	Sprinkling unit cost (\$/day)		\$500	
c.	Sprinkling cost (lines 3a x 3b)			\$5,000
4.	Security System Maintenance			
a.	Security system maintenance frequency (vis/yr)	1		
b.	Amount of fence needing replacement (lf/vis)	50		
c.	Fencing unit cost (lf)		\$50	
d.	Fence cost (lines 4a x 4b x 4c)			\$2,500
e.	Number of other security items needing replacement (signs, items/vis)	1		
f.	Other security items unit cost (\$/item)		\$200	
g.	Other security items replacement cost (lines 4a x 4e x 4f)			\$200
h.	Security system maintenance cost (sum lines 4d + 4g)			\$4,700

5.	Ditch Cleaning			
	a. Diversion ditch cleaning frequency (vis/yr)	0.5		
	b. Length of ditch requiring cleaning (lf/vis)	2,000		
	c. Cleaning time required (hrs/lf)	0.01		
	d. Unit labor cost (\$/hr)		\$125	
	e. Diversion ditch cleaning cost (lines 5a x 5b x 5c x 5d)			\$1,300
6.	Rodent Control			
	a. Rodent control frequency (vis/yr)	1		
	b. Area requiring rodent control (acres/vis)	80		
	c. Rodent control unit cost (\$/acre)		\$4.00	
	d. Application time required (hrs)	16		
	e. Unit labor cost (\$/hr)		\$50	
	f. Rodent control cost (lines 6a x 6b x 6c) + (lines 6d x 6e)			\$1,100
7.	Snow Plowing			
	a. Plowing frequency (vis/yr)	10		
	b. Time required for plowing (hrs/vis)	3		
	c. Unit labor cost (including equipment, \$/hr)		\$100	
	d. Snow plowing cost (lines 7a x 7b x 7c)			\$3,000
8.	Routine Maintenance Total Annual Cost (sum lines 1g + 2d + 3c + 4h + 5e + 6f + 7d)			\$35,000

Note: 2013 unit prices shown. Total annual cost rounded to nearest \$1,000

Table 8
Sedimentation Basin Maintenance
Post-Closure Care Annual Cost Estimate
Sherco Unit 3 AQCS Solids Landfill

	Item	Quantity	Unit Price	Extension
1.	South Basin Dredging (by backhoe)			
	a. Dredging frequency (vis/yr)	0.2		
	b. Area requiring dredging (sf)	2,000		
	c. Sediment depth (ft)	1.5		
	d. Cubic yards dredged (lines 1b x 1c/27,cy) ¹	111		
	e. Unit labor cost (including equipment, \$/cy)		25	
	f. Dredging cost (lines 1a x 1d x 1e)			\$600
	g. Mobilization			\$400
	h. South basin dredging total annual cost (lines 1f + 1g)			\$1,000

Note: 2013 unit prices shown. Total annual cost rounded to nearest \$1,000.

Table 9
Erosion or Settlement Damage Repair
Post-Closure Care Annual Cost Estimate Summary
Sherco Unit 3 AQCS Solids Landfill

Item		Quantity	Unit Price	Extension
1.	Topsoil Acquisition (off-site soil) a. Repairing frequency (vis/hr) b. Quantity of soil required (cy/vis) c. Off-site topsoil unit cost (in-place, \$/cy) d. Total off-site topsoil cost (lines 1a x 1b x 1c)	1 200	\$15.00	\$3,000
2.	Fill Soil Acquisition (off-site soil) a. Repairing frequency (vis/yr) b. Quantity of soil required (cy/vis) c. Off-site fill soil unit cost (in-place, \$/cy) d. Total off-site fill soil unit cost (lines 2a x 2b x 2c)	1 600	\$9.00	\$5,400
3.	Revegetation a. Area to be seeded, fertilized, and mulched (acres/vis) b. Seed unit cost (includes fertilizer and mulch, \$/acre) c. Total revegetation cost (sum lines 1a x 3a x 3b)	2	\$1,500	\$3,000
4.	Severe Erosion or Settlement Damage Repair Total Annual Cost (sum lines 1d + 2d + 3c)			\$11,000

Note: 2013 Unit prices shown. Total estimated cost rounded to the nearest \$1,000.

Table 10
Leachate and Groundwater Monitoring
Post-Closure Care Annual Cost Estimate Summary
Sherco Unit 3 AQCS Solids Landfill

Item		Quantity	Unit Price	Extension
1. Leachate and Groundwater Quality Analysis				
a. Monitoring frequency (vis/yr)	3			
b. Number of points sampled per visit (wells/vis)	15			
c. Sample collection and preparation time required (includes monitoring well inspection, hrs/point)	1.5			
d. Time required to deliver samples (hrs/vis)	2			
e. Technician unit labor cost (2-man crew, \$/hr)			\$140	
f. Sample collection time (hrs/vis) (lines (1b x 1c) + 1d)	25			
g. Sampling cost (\$/vis)			\$3,000	
h. Average contract lab fee (\$/sample)			\$250	
i. Contract lab cost (\$/vis) (lines 1b x 1h)			\$3,800	
j. Analysis cost (lines 1a x (1g + 1i))				\$20,400
2. Monitoring Well Maintenance				
a. Maintenance frequency (vis/yr)	1			
b. Monitoring wells needing maintenance per visit (wells/vis)	3			
c. Maintenance time required (hrs/well)	2			
d. Unit labor cost (\$/hr)			\$175	
e. Monitoring well maintenance cost (lines 2a x 2b x 2c x 2d)				\$1,100
3. Monitoring Well Replacement				
a. Number of wells needing replacement during postclosure period	5			
b. Monitoring well unit cost (\$/well)			\$3,500	
c. Annual monitoring well replacement cost (lines 3a x 3b)/20)				\$900
4. Leachate and Groundwater Monitoring Total Annual Cost (sum lines 1j + 2e + 3c)				\$22,000

Note: 2013 Unit Prices shown. Total annual cost rounded to the nearest \$1,000.

Table 11
Administrative and Reporting Services
Post-Closure Care Annual Cost Estimate Summary
Sherco Unit 3 AQCS Solids Landfill

Item		Quantity	Unit Price	Extension
1. Engineer				
a. Engineer time required (hrs/hr)		80	\$125	
b. Engineer unit labor cost (\$/hr)				
c. Engineer cost (lines 1a x 1b)				\$10,000
2. Clerical				
a. Clerical time required (hrs/yr)		40	\$60	
b. Clerical unit labor cost (\$/hr)				
c. Clerical cost (lines 2a x 2b)				\$2,400
3. Administrative Services Total Annual Cost (sum lines 1c + 2c)				\$12,000

Note: 2013 Unit Prices shown. Total annual cost rounded to nearest \$1,000.