FORM EQP 5111 ATTACHMENT MODULE A12
CLOSURE AND POSTCLOSURE CARE COST ESTIMATES

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy's *Instructions for Completing Form EQP 5111, Operating License Application Form for Hazardous Waste Treatment, Storage, and Disposal Facilities.* See Form EQP 5111 for details on how to use this attachment.

The administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), R 299.9702 and Title 40 of the Code of Federal Regulations (CFR), Part 264, Subpart H, establishes requirements for providing financial assurance for closure and, if necessary, postclosure care. Specifically, R 299.9702(1) requires the preparation of associated cost estimates. This license application module addresses the requirement for preparing a closure cost estimate and, if necessary, a postclosure care cost estimate. The cost estimates provided in this attachment are based on the closure and postclosure care activities detailed in Module A11. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This module is organized as follows:

A12.A CLOSURE COST ESTIMATE
[R 299.9702(1) and 40 CFR §264.142]

The closure cost estimate covers the corresponding closure activities in the approved closure plan. These activities may include, but are not limited to, removal of waste inventory, decontamination, sampling and analysis, and closure certification. Unless otherwise specified in Section A11.A.3 of Module A11, the date of closure of the hazardous waste management units has not been determined. As such, it is not possible to predict, with any high degree of certainty, actual facility conditions or regulatory requirements at time of closure. Therefore, this closure cost estimate is based on closure of the unit within the next six months and includes a contingency estimate to account for media sampling and analysis, and removal based on current conditions.

The estimate assumes closure procedures are completed by a third party at the time facility closure would be most expensive (e.g., with a maximum inventory). The cost estimate for disposal assumes wastes will be treated and contaminated equipment disposed rather than recovered or salvaged. The total closure cost for the closure of the Dow Silicones Facility is

estimated at **$9,408,374**. The closure cost estimate breakdown is provided in Table A12.A.1 below and the unit-specific work sheets are provided in Appendix A12-1.

Additional cost estimate assumptions are listed below.

1. All hazardous waste will be transported off site to a licensed facility in accordance with all applicable state and federal regulations.

2. Costs are based on current year costs. All labor rates reflect commercial rates and include fringe benefits, payroll burden, and taxes.

3. Total costs include a 10 percent contingency for administrative and miscellaneous operating costs.

This closure cost estimate will be maintained at the facility. It will be revised whenever a change in the closure plan affects the cost of closure. It will be adjusted annually as required by pertinent regulations or when the types and quantity of wastes received at the facility change.

A12.A.1 Closure Cost Estimate Breakdown

The calculations upon which this closure cost estimate is based were derived using the following criteria:

1. Costs were calculated assuming that closure of the facility would occur at a point within the active life of the facility at which the extent and manner of the facility operations would make the closure the most expensive. Maximum waste inventories were assumed and all wastes in inventory were assumed to be hazardous waste requiring incineration for disposal.

2. The cost calculations were based on having a third party contractor performing the closure activities. DSC customarily employs several third party contractors for similar current activities, such as maintenance of the landfill slopes, so estimated costs were readily derived from actual costs incurred.

3. The cost estimate does not include any salvage value for scrap equipment, sale of wastes, or any other assets associated with the facility.

4. No hazardous wastes or non-hazardous wastes are expected to have economic value and none have been assigned zero cost in the calculations.

Adjustments to Closure Cost Estimate [40 CFR 270.14(b)(15), 264.142(b), MAC 299.9702]

During the active life of the facility, DSC will adjust the closure cost estimate for inflation within 60 days prior to the anniversary date of the financial instrument(s) used to comply with the financial assurance requirements at 40 CFR 264.143. If DSC chooses to use the financial test or corporate guarantee methods of financial assurance, the closure cost estimate will be updated for inflation within 30 days after the close of the fiscal year, and before submission to the Director of the information required in MAC R 229.9709(3).

Calculation of the adjusted closure cost will be made by recalculating the estimated closure cost in current dollars, using the same basis described above, or by using an inflation factor derived

from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce in its *Survey of Current Business*. The inflation adjustment using the Implicit Price Deflator will be made as follows:

1. The first adjustment will be made by multiplying the closure cost estimate by an inflation factor calculated by dividing the current year's Price Deflator by the previous year's Price Deflator.
2. Subsequent adjustments will be made by multiplying the most recent closure cost estimate by an inflation factor calculated by dividing the current year's Price Deflator by the previous year's Price Deflator.

Modification of Closure Plan [40 CFR 270.14(b)(15), 264.142(c), MAC 299.9702]

If DSC requests a modification to the facility Closure Plan which would case an increase in the estimated closure cost of the facility, the closure cost estimate will be revised within 30 days after approval of the modification by the Director. The revised closure cost estimate will then become the basis for future inflation adjustments.

Required Recordkeeping [40 CFR 270.14(b)(15), 264.142(d), MAC 299.9702]

During the operating life of the facility, DSC will maintain at the facility the latest closure cost estimate prepared in accordance with the requirements of 40 CFR 264.142(a) and (c), and the latest adjusted closure cost estimate.

Table A12.A.1 Facility Closure Cost Estimate Breakdown by Unit

1.	801 Building Container Storage Area Closure	$ 21,910.00
2.	806 Tank Storage Area Closure	$ 323,905.00
3.	809 Building Container Storage Area Closure	$ 821,566.00
4.	90-Day Dewatering Area Closure	$ 73,132.00
5.	Truck Wash Slab Closure	$ 5,128.00
6.	Landfill Closure	$ 7,218,869.00
7.	Miscellaneous Closure	$ 88,557.00
Sub-Total Facility Closure Care Estimate (add lines 1 through 7)		**$ 8,553,067.00**
8.	*Closure Contingency (10%)*	$ 855,307.00
Total Facility Closure Care Estimate (add lines 1 through 8)		**$ 9,408,374.00**

A12.B POSTCLOSURE COST ESTIMATE

[R 299.9702(1) and 40 CFR §264.144]

The postclosure care cost estimate covers activities that will be performed after closure of the landfill unit or any unit with waste left in place. These activities include maintaining the integrity of the containment system and the monitoring system and performing postclosure monitoring. The postclosure care activities are presented in Section A11.B.4 of Module A11. The associated cost estimate breakdown is provided in Table A12-1. The total postclosure care cost for the DSC facility is estimated at **$13,146,368** and the unit-specific work sheets are provided in Appendix A12-1.

A12.B.1 Postclosure Care Cost Estimate Breakdown

All cost calculations are based on hiring a third party contractor to perform the necessary sampling, inspection, and maintenance activities associated with post-closure care of the hazardous waste landfill and the quench pond facility previously closed in 1996. Current sampling and maintenance activities, including those associated with the closed quench pond facility, are performed by third party contractors; post-closure cost calculations are based on actual expenses incurred from similar current activities. The post-closure cost estimate is calculated based on current dollar costs. The associated cost estimate breakdown is provided in Appendix A12-1.

Adjustments to Post-Closure Care Cost Estimate [40 CFR 270.14(b)(16), 264.144(b), MAC R 299.9703]

During the active life of this facility the post-closure cost estimate will be adjusted annually within 60 days prior to the anniversary date of the establishment of the financial instrument(s) used to provide financial assurance for funding of post-closure care. The annual adjustment may be made by recalculating the post-closure cost estimate in current dollars or by applying an inflation factor derived from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce. The inflation factor is calculated by dividing the most recent published Price Deflator by the Price Deflator for the previous year.

Modification of Post-Closure Cost Estimate [40 CFR 270.14(b)(16), 264.144(c), MAC R 299.9703]

At any time during the active life of the facility, if DSC requests a modification to the Post-Closure Plan which increases the post-closure cost estimate, the post-closure cost estimate will be revised within 30 days after the approval of the modified Post-Closure Plan. This revised post-closure cost estimate will then be used as the basis for future annual inflation adjustments.

Required Recordkeeping [40 CFR 270.14(b)(16), 264.144(d), MAC R 299.9703]

During the active life of the facility, DSC will keep at the facility the latest post-closure cost estimate and, when this estimate has been adjusted for inflation, the latest adjusted post-closure cost estimate.

Table A.12.B.1 Facility Postclosure Cost Estimate Breakdown by Unit

1.	Sampling and Analysis (Entire Facility)	$ 3,153,600.00
2.	Landfill Maintenance	$ 2,223,525.00
3.	Leachate Disposal	$ 273,168.00
4.	Site Interceptor System	$ 6,300,950.00
Sub-Total Facility Postclosure Care Estimate (add lines 1 through 4)		**$ 11,951,243.00**
5.	*Postclosure Contingency (10%)*	$ 1,195,125.00
Total Facility Postclosure Care Estimate (add line 5)		**$ 13,146,368.00**

The total closure and postclosure care cost for the DSC facility is estimated at **$22,554,742.00**.

Dow Silicones Midland Licensed Facility - MID 000 809 632												
Closure Cost Calculations												
Activity	**Manhours**	**Labor Rate ($/hr.)**	**Labor Cost**	**Equipment Rate ($/hr.)**	**Equipment Hours**	**Equipment Cost**	**Disposal or Supplies -Qty**	**Disposal or Supplies - units**	**Disposal/Supplies Rate ($/unit)**	**Disposal or Supplies Cost**		**Item Total Cost**
801 Building Container Storage Area												
Remove containers	[This charge was grouped with container removal from 809 Building and appears in that figure, below.]											
Dismantle building (includes other outbldgs)*			0			0				0	$	12,252.00
Clean containment floor & dike	8	$ 37.50	300	103	8	824				0	$	1,124.00
Dispose of cleaning water			0			0	30	M3	0.813	24.39	$	24.39
Dispose of debris			0			0	40	cubic yd.	127	5080	$	5,080.00
Inspect concrete	8	$ 122.50	980			0				0	$	980.00
Certification	20	$ 122.50	2450			0				0	$	2,450.00
801 Subtotal			3730			824				5104.39	$	21,910.39
806 Tank Storage Area												
Remove waste from tanks (see detail page)			0			0				0	$	253,237.50
Pressure wash tanks and equipment	340	$ 37.50	12750	103	20	2060				0	$	14,810.00
Dismantle tanks	240	$ 73.50	17640			0				0	$	17,640.00
Dismantle piping & equipment	320	$ 73.50	23520			0				0	$	23,520.00
Dismantle structural steel	80	$ 37.50	3000			0				0	$	3,000.00
Pressure wash concrete	30	$ 37.50	5	103	30	3090				0	$	3,095.00
Dispose of dike cleaning water			0			0	114	M3	0.813	92.682	$	92.68
Dispose of debris and equipment			0			0	40	cubic yd.	127	5080	$	5,080.00
Inspect concrete	8	$ 122.50	980			0				0	$	980.00
Certification	20	$ 122.50	2450			0				0	$	2,450.00
806 Subtotal			60345			5150				5172.682	$	323,905.18
809 Building Container Storage Area												
Remove containers (see detail page)			0			0					$	683,735.00
Dismantle building*			0			0				0	$	122,518.00
Clean containment floor & dike	12	$ 37.50	450	103	12	1236				0	$	1,686.00
Dispose of cleaning water			0			0	45	M3	0.813	36.585	$	36.59
Dispose of debris			0			0	80	cubic yd.	127	10160	$	10,160.00
Inspect concrete	8	$ 122.50	980			0				0	$	980.00
Certification	20	$ 122.50	2450			0				0	$	2,450.00
809 Subtotal			3880			1236				10196.585	$	821,565.59
90-Day Dewatering Area												
Repack & remove wastes (see detail page)											$	68,016.00
Clean concrete containment	12	$ 37.50	450	103	12	1236				0	$	1,686.00
Inspect concrete	8	$ 122.50	980			0				0	$	980.00
Certification	20	$ 122.50	2450			0				0	$	2,450.00
									Dewatering total		$	73,132.00
Truck Wash Slab												
Clean concrete containment	12	$ 37.50	450	103	12	1236				0	$	1,686.00
Inspect concrete	8	$ 124.00	992			0				0	$	992.00
Certification	20	$ 122.50	2450			0				0	$	2,450.00
									Truck wash total:		$	5,128.00
Landfill												
Engineering/certification			87,614			0				0	$	87,613.69
Surface grading			0			0	119600	sq.yd.	0.6132	73338.72	$	73,338.72
Compacted clay cap			0			0	110000	cubic yd.	22.3	2453000	$	2,453,000.00
Geotextile cover			0			0	119600	sq.yd.	23.652	2828779.2	$	2,828,779.20
Sand layer			0			0	39900	cubic yd.	7.17	286083	$	286,083.00
Filter fabric			0			0	119600	sq.yd.	2.102	251399.2	$	251,399.20
Vegetative support soil layer - 6"			0			0	19933	cubic yd.	17.52	349226.16	$	349,226.16
Top soil layer - 6"			0			0	19933	cubic yd.	17.52	349226.16	$	349,226.16
Seed, fertilize, mulch -Hydroseed			0			0	119600	sq.yd.	0.876	104769.6	$	104,769.60
Construct perimeter ditch			0			0	4100	lineal ft.	6.578	26969.8	$	26,969.80
Sod ditch and slopes & erosion control			0			0	8500	sq.yd.	5.256	44676	$	44,676.00
Toe drainage aggregate			0			0	820	cubic yd.	33.447	27426.54	$	27,426.54
Culverts			0			0	100	lineal ft.	52.56	5256	$	5,256.00
Rip rap discharges			0			0	100	sq.yd.	49.056	4905.6	$	4,905.60
Perimeter fence - remove & replace			0			0	4100	lineal ft.	9.636	39507.6	$	39,507.60
Construction QA/QC - testing, surveying			286,692			0				0	$	286,691.62
Landfill Subtotal			$ 374,305			0				6844563.6	$	7,218,868.89
Miscellaneous												
Utility cuts, caps & disconnects											$	31,854.00
Remove septic tank											$	557.50
Relocate office trailer	12	$ 37.50	450	110	4	440					$	890.00
Fill compactor pit											$	6,126.00
Spill pond - clean, remove liner & backfill											$	9,311.00
Sampling and analysis											$	39,818.00
Misc.Subtotal									**Miscellaneous total:**		$	88,556.50
Closure Total			$ 442,260			$ 7,210				6865037.2	**$**	**8,553,066.55**
										rounded total	$	8,553,067.00
* Unit cost based on similar projects at DSC								10% contingency margin			$	855,306.65
										rounded total	$	855,307.00
								Closure Cost Estimate =			**$**	**9,408,374.00**
								Postclosure Cost Estimate =			**$**	**13,146,368.00**
								Total Closure + Postclosure =			**$**	**22,554,742.00**

Appendix A12-1
Postclosure Costs

Dow Silicones Landfill - Midland Site			**Cost Calculations for Post-Closure Care**				Revision 0, 3-24-22	
Activity	**Manhours**	**Labor Rate ($/hr.)**	**Labor Cost**	**Materials/ Disposal Cost**	**Item Total Cost**	**x Frequency per Year**	**Annualized Cost**	**30-Year Cost**
Sampling & Analysis includes:					annual contract:		$ 105,120.00	$ 3,153,600.00
Lingle Drain							$ -	$ -
Shallow monitoring wells, including quench pond							$ -	$ -
Deep monitoring wells							$ -	$ -
Leachate							$ -	$ -
								$ -
Landfill Maintenance								$ -
Repair cap & sidewalls	26	68.5	1781		1960	2	$ 3,920.00	$ 117,600.00
Clean leachate piping			0		7351	4	$ 29,404.00	$ 882,120.00
Clean perimeter ditches			0		3675.5	2	$ 7,351.00	$ 220,530.00
Reseed & mulch			0		1470	1	$ 1,470.00	$ 44,100.00
Semiannual inspection (5 yrs)			0		2205	2	$ 4,410.00	$ 22,050.00
Annual inspection (25 yrs)			0		2205	1	$ 2,205.00	$ 55,125.00
Management fee					2450	12	$ 29,400.00	$ 882,000.00
Leachate Disposal			0	**m3/yr**	**Cost/yr.**	**# of yrs.**		
First 2 years				70,000	56,910	2	$ 113,820.00	
Final 28 years				7,000	5,691	28	$ 159,348.00	$ 273,168.00
Total Leachate Disposal								
Site Intercept System								$ -
Daily visual check	0.25	55	13.75		13.75	260	$ 3,575.00	$ 107,250.00
Manhole inspection	8	73.5	588		588	2	$ 1,176.00	$ 35,280.00
Resurvey manholes			0		0	1	$ -	$ -
Calibrate SIS flow	2	184	368		368	1	$ 368.00	$ 11,040.00
Gradient/debris monitoring	4	73.5	294		294	4	$ 1,176.00	$ 35,280.00
Video camera (5 yrs)			0	2695	2695	0.2	$ 539.00	$ 16,170.00
Analytical costs	2	73.5	147	527	674	2	$ 1,348.00	$ 40,440.00
Electrician	1.5	73.5	110.25		110.25	52	$ 5,733.00	$ 171,990.00
Electricity	3	0.92	2.76		2.76	365	$ 1,007.40	$ 30,222.00
Parts					1225	1	$ 1,225.00	$ 36,750.00
SIS water disposal cost			0	**m3/yr**	**Cost/yr.**	**# of yrs.**		
				238,480	193,884.240	1	$ 193,884.24	$ 5,816,527.20
						Total Postclosure =		$ 11,951,242.20
							rounded total	$ 11,951,243.00
Note: Water disposal cost calculated at						+10% contingency =		$ 1,195,124.22
$.813/m3 for disposal at Dow WWTP							*rounded total*	$ 1,195,125.00
					30 yr. Postclosure costs total:			**$ 13,146,368.00**