

Appendix J

Cost Estimate

POST-CLOSURE AND CORRECTIVE ACTION COST ESTIMATE - Permit Renewal Application, Revision 4, November 2024

Union Carbide Corporation, Woodbine, Georgia
Permit No. HW-063(D)

Item Description	Qty	Units	Unit Cost ¹	Extended Cost ¹	Comments/Cost Basis ²
QUARTERLY MONITORING AND REPORTING FOR 1 YEAR (Todd Creek)					
INSPECTIONS					
Inspections, Quarterly (Todd Creek)	195	HR	\$ 133	\$ 25,935	65 hours per event. 3 events with the fourth covered in the annual inspection captured in the annual cost section. Based on contractor costs.
Inspections, After Major Storms	65	HR	\$ 133	\$ 8,645	65 hours per event, 1 event. Based on contractor costs.
Reporting	1	LS	\$32,600	\$ 32,600	Based on contractor costs.
Inspections, Expenses	4	EA	\$ 8,000	\$ 32,000	4 events; Based on contractor costs.
Subtotal Quarterly Monitoring and Reporting for 1 Year (Todd Creek)				\$ 99,180	
			Total base year cost	\$ 99,180	Base Year 2023
			Implementation Likelihood ³	100%	
			Adjusted base year estimate	\$99,180	
			Inflation factor ⁴	1.070	Latest annual GNP issued for 2023
TOTAL QUARTERLY MONITORING AND REPORTING FOR 1 YEAR (Todd Creek)				\$ 106,168	Costs in 2024 dollars
PRIMARY CONTINGENCY ACTION FOR TODD CREEK					
PRE-CONSTRUCTION ACTIVITIES					
Design, permitting, and work planning	1	LS	\$ 269,000	\$ 269,000	Prefinal, Final Design; Permitting, Planning; Based on contractor costs.
Pre-Construction Activities Subtotal				\$ 269,000	
CONSTRUCTION					
Site Preparation	1	LS	\$ 181,880	\$ 181,880	Based on contractor costs.
Excavation and Installation of Bank Stabilization	1	LS	\$ 646,198	\$ 646,198	Based on contractor costs.
Site Restoration	1	LS	\$ 106,186	\$ 106,186	Based on contractor costs.
Subcontractor Mobilization / Demobilization	20%	Percent		\$ 186,853	Based on contractor costs.
Subcontractor General Conditions	5%	Percent		\$ 46,713	Based on contractor costs.
Subcontractor Bonding	2%	Percent		\$ 18,685	Based on contractor costs.
State and Local Taxes (on materials purchased)	6%	Percent	\$ 525,000	\$ 31,500	Based on contractor costs.
Construction Subtotal				\$ 1,218,015	
PROFESSIONAL SERVICES					
Project/Construction Management	1	LS	\$ 205,000	\$ 205,000	Based on contractor costs.
Professional Services Subtotal				\$ 205,000	
			Total base year cost	\$ 1,692,015	Base Year 2023
			Implementation Likelihood ³	25%	
			Adjusted base year estimate	\$423,004	
			Inflation factor ⁴	1.070	Latest annual GNP issued for 2023
TOTAL CORRECTIVE ACTION (PRIMARY CONTINGENCY ACTION FOR TODD CREEK)				\$ 452,810	Costs in 2024 dollars

CORRECTIVE ACTION MUNITIONS RESPONSE AREAS (MRAs (SWMU 8, SWMU 9, SWMU 1A))						
MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) INTERIM MEASURES (40 mm Range and 81 mm Range)						
Drum Removal Area	1	LS	\$53,000	\$	53,000	Engineers Estimate for Remaining Effort - Reporting Engineers Estimate
Project Management	1	LS	\$5,000	\$	5,000	
<i>Subtotal Interim Measures</i>				\$	58,000	
IMPLEMENTATION OF INSTITUTIONAL CONTROLS						
Work Planning/Project Management	1	LS	\$11,000	\$	11,000	
Field Planning	1	LS	\$11,000	\$	11,000	
Sign Installation Including Survey	1	LS	\$250,000	\$	250,000	
Finalize and Execute Environmental Covenants	1	LS	\$6,000	\$	6,000	
<i>Subtotal Implementation of Institutional Controls</i>				\$	278,000	
			<i>Total base year cost</i>	\$	336,000	Base Year 2023
			<i>Implementation Likelihood</i>		100%	
			<i>Adjusted base year estimate</i>		\$336,000	
			<i>Inflation factor⁴</i>		1.070	Latest annual GNP issued for 2023
<i>TOTAL MRAs</i>				\$	359,675	Costs in 2024 dollars
CORRECTIVE ACTION SWMU 8 DRUM REMOVAL AREA						
CS CORRECTIVE ACTION						
Work Planning, Project Management, Reporting	1	LS	\$180,300	\$	180,300	
Construction, Field Activities	1	LS	\$632,054	\$	632,054	Assumes 32 field days. Based on contractor estimates.
Offsite Waste Transport and Disposal	1	LS	\$477,157	\$	477,157	Based on contractor estimate.
Post-Field Activities	1	LS	\$30,090	\$	30,090	
<i>Subtotal Implementation of Institutional Controls</i>				\$	1,319,601	
			<i>Total base year cost</i>	\$	1,319,601	Base Year 2023
			<i>Implementation Likelihood</i>		100%	
			<i>Adjusted base year estimate</i>		\$1,319,601	
			<i>Inflation factor⁴</i>		1.070	Latest annual GNP issued for 2023
<i>TOTAL DRUM REMOVAL AREA</i>				\$	1,412,583	Costs in 2024 dollars
QUARTERLY MONITORING AND REPORTING FOR 1 YEAR STUDY (iSOC® System-Phase I)						
QUARTERLY MONITORING						
GW Sample Collection (Quarterly)	1	LS	\$ 33,920	\$	33,920	80 hours @ \$106/hour plus expenses. 4 events. Based on contractor costs.
Lab Analysis (Quarterly)	1	LS	\$ 27,488	\$	27,488	Quarterly monitoring of 8 wells. Based on contractor costs.
Report (Annual)	1	LS	\$ 22,612	\$	22,612	181.5 hours @ \$122.06/hour plus expenses. Based on contractor costs.
UCC Monitoring Oversight	1	LS	\$ -	\$	-	Included in GW Sampling Collection
<i>Quarterly Monitoring Subtotal</i>				\$	84,020	
			<i>Total base year cost</i>	\$	84,020	Base Year 2023
			<i>Implementation Likelihood</i>		100%	
			<i>Adjusted base year estimate</i>		\$84,020	
			<i>Inflation factor⁴</i>		1.070	Latest annual GNP issued for 2023
<i>TOTAL QUARTERLY MONITORING AND REPORTING FOR 1 YEAR (iSOC® System-Phase I)</i>				\$	89,940	Costs in 2024 dollars

CONTINGENCY ACTION (Landfill Groundwater - Air Sparge System)						
PRE-CONSTRUCTION ACTIVITIES					Estimated 500 feet for air sparge system based on treatment of select area around a well or wells where corrective action may be required	
Design, permitting, and work planning	1	LS	\$ 242,000	\$ 242,000		Engineering Estimate
Pre-Construction Activities Subtotal				\$ 242,000		
CONSTRUCTION					Engineering Estimate	
Pre Construction Survey	1	LS	\$ 5,150	\$ 5,150	Engineering Estimate	
Utility Locate	1	LS	\$ 5,150	\$ 5,150	Engineering Estimate	
Installation of Air Sparge Wells (2 inch dia PVC)	840	FT	\$ 103	\$ 86,520		
Conveyance Piping (1 inch dia HDPE)	4,800	FT	\$ 21	\$ 98,880		
Remediation System	1	LS	\$ 206,000	\$ 206,000		
Power Drop	1	LS	\$ 982,620	\$ 982,620		
Post Construction Survey	1	LS	\$ 5,150	\$ 5,150	Engineering Estimate	
Site Restoration	1	LS	\$ 5,150	\$ 5,150	Engineering Estimate	
Subcontractor Mobilization / Demobilization	10%	Percent		\$ 139,462	Engineering Estimate	
Subcontractor General Conditions	10%	Percent		\$ 139,462	Engineering Estimate	
Subcontractor Bonding	2%	Percent		\$ 27,892	Engineering Estimate	
State and Local Taxes (on materials purchased)	6%	Percent	\$ 296,000	\$ 17,760	Engineering Estimate	
Construction Subtotal				\$ 1,719,196		
SYSTEM START-UP						
Subcontractor Labor	1	week	\$ 8,000	\$ 8,000	Engineering Estimate	
Start-Up Equipment Rental	1	week	\$ 6,000	\$ 6,000	Engineering Estimate	
Travel Expenses, Misc.	1	week	\$ 6,000	\$ 6,000	Engineering Estimate	
System Start-Up Subtotal				\$ 20,000		
PROFESSIONAL SERVICES						
Project/Construction Management	1	LS	\$ 158,000	\$ 158,000	Engineering Estimate	
Professional Services Subtotal				\$ 158,000		
		Total base year cost		\$ 2,139,196	Base Year 2023	
		Implementation Likelihood ³		10%		
		Adjusted base year estimate		\$213,920		
		Inflation factor ⁴		1.070	Latest annual GNP issued for 2023	
TOTAL CONTINGENCY ACTION (Landfill Groundwater - Air Sparge System)				\$ 228,993	Costs in 2024 dollars	

DECOMMISSIONING (iSOC® System-Phase I)						
PRE-CONSTRUCTION ACTIVITIES						
Work planning	1	LS	\$ 25,000	\$ 25,000	Engineers Estimate	
Pre-Construction Activities Subtotal				\$ 25,000		
DECOMMISSIONING OF iSOC SYSTEM						
Mobilization and Site Setup	1	EA	\$ 10,000	\$ 10,000	Engineers Estimate	
Utility Clearance	1	EA	\$ 5,000	\$ 5,000	Engineers Estimate	
iSOC wells, 2-inch sch 40 PVC, 50', Direct Bury (no surface completion)						
Abandonment	15	wells	\$ 2,500	\$ 37,500	Engineers Estimate	
Removal and Disposal of Treatment Building and Other Ancillary Piping/Valves/Wiring	1	EA	\$ 35,000	\$ 35,000	Engineers Estimate	
Transportation and Disposal of Construction Debris	1	LS	\$ 5,000	\$ 5,000	Engineers Estimate	
Site Restoration	1	LS	\$ 5,000	\$ 5,000	Engineers Estimate	
Demobilization	1	LS	\$ 5,000	\$ 5,000	Engineers Estimate	
Decommission of iSOC System Subtotal				\$ 102,500		
PROFESSIONAL SERVICES						
Project/Construction Management	15%	of design and install		\$ 19,125		
Technical support during implementation	2%	of design and install		\$ 2,550		
G&A	12%	of design and install		\$ 15,300		
Fee	5%	of design and install		\$ 6,375		
Pollution liability insurance	3%	of design and install		\$ 3,825		
Payment & performance bond	3%	of design and install		\$ 3,825		
Professional Services Subtotal				\$ 51,000		
			Total base year cost	\$ 178,500	Base Year 2023	
			Implementation Likelihood	100%		
			Adjusted base year estimate	\$178,500		
			Inflation factor ⁴	1.070	Latest annual GNP issued for 2023	
TOTAL DECOMMISSIONING (iSOC® System-Phase I)				\$ 191,077	Costs in 2024 dollars	
MONITORING WELL ABANDONMENT (At No Further Action)						
MONITORING WELL ABANDONMENT						
Mobilization and Site Setup	1	EA	\$ 5,000	\$ 5,000	Engineers Estimate	
Abandonment	76	wells	\$ 2,500	\$ 190,000	Engineers Estimate	
Transportation and Disposal of Construction Debris	1	LS	\$ 10,000	\$ 10,000	Engineers Estimate	
Site Restoration	1	LS	\$ 10,000	\$ 10,000	Engineers Estimate	
Demobilization	1	LS	\$ 5,000	\$ 5,000	Engineers Estimate	
UCC Oversight, Labor	200	HR	\$ 133	\$ 26,600	Engineers Estimate	
UCC Oversight, Expenses	1	LS	\$ 1,500	\$ 1,500	Engineers Estimate	
Monitoring Well Abandonment Subtotal				\$ 248,100		
			Total base year cost	\$ 248,100	Base Year 2023	
			Implementation Likelihood	100%		
			Adjusted base year estimate	\$248,100		
			Inflation factor ⁴	1.070	Latest annual GNP issued for 2023	
TOTAL MONITORING WELL ABANDONMENT				\$ 265,582	Costs in 2024 dollars	

OTHER ANNUAL COSTS							
TODD CREEK BANK STABILIZATION MAINTENANCE		1	LS	\$ 15,000	\$ 15,000	Engineers Estimate	
Work Planning		1	LS	\$ 25,000	\$ 25,000		Engineer Estimate; One repair per year
Erosion Repair		16	HR	\$ 70	\$ 1,120		Engineers Estimate
Reseeding/Replanting (Annual), Labor		1	LS	\$ 10,000	\$ 10,000		Engineers Estimate
Reseeding/Replanting (Annual), Expenses		16	HR	\$ 133	\$ 2,128		Engineers Estimate
UCC Maintenance Oversight, Labor		1	LS	\$ 1,500	\$ 1,500		Engineers Estimate
UCC Maintenance Oversight, Expenses							
Todd Creek Bank Stabilization Maintenance Subtotal					\$ 54,748		
iSOC SYSTEM OPERATION AND MAINTENANCE							
Quarterly Monitoring of Infusion Wells and System and tank replacement		20	hours	\$ 100	\$ 2,000		
Waste Management		2	events	\$ 1,000	\$ 2,000		
O&M Supplies		1	LS	\$ 4,000	\$ 4,000		
Oxygen		6	tanks	\$ 540	\$ 3,240		
Oxygen tank rental		6	tanks	\$ 222	\$ 1,332		
Oxygen tank delivery		1	LS	\$ 200	\$ 200		
iSOC System Operation and Maintenance Subtotal					\$ 12,800	Base Year 2022	
			Implementation Likelihood		10%	Based on effectiveness review conclusions and trial shutdown	
			Adjusted base year estimate		\$ 1,280		
			Inflation factor ⁴		1.119		
					\$ 1,433	Latest annual GNP deflator issued is for 2023.	
COMPLIANCE MONITORING						Costs in 2024 dollars	
GW Sample Collection (Annual)		1	LS	\$ 33,587	\$ 33,587	209 hours @ \$106/hour plus expenses. Based on contractor costs. The costs for oversight and project management are loaded into this lump sum. Annual monitoring of 34 wells. Additional biennial monitoring of 6 wells. Based on contractor costs. The costs for oversight and project management are loaded into this lump sum. 181.5 hours @ \$122.06/hour plus expenses. Based on contractor costs. The costs for oversight and project management are loaded into this lump sum.	
Lab Analysis (Annual)		1	LS	\$ 25,561	\$ 25,561		
GW Reports (Annual)		1	LS	\$ 22,612	\$ 22,612		
Compliance Monitoring Subtotal					\$ 81,760		
INSPECTIONS							
Inspections, Annual (Todd Creek)		65	HR	\$ 133	\$ 8,645	65 hours per event. Based on contractor costs.	
Inspections, After Major Storms		130	HR	\$ 133	\$ 17,290	65 hours per event, 2 events. Based on contractor costs.	
Inspections, Quarterly (Landfill)		48	HR	\$ 80	\$ 3,840	12 hours per event. Based on contractor costs.	
Inspections, Expenses		7	EA	\$ 1,500	\$ 10,500	7 events; Based on contractor costs.	
Inspections Subtotal					\$ 40,275		

MAINTENANCE						
Mowing	1	LS	\$ 15,000	\$ 15,000	Based on contractor costs.	
Reseeding (Annual), Labor	16	HR	\$ 70	\$ 1,120	Based on contractor costs.	
Reseeding (Annual), Expenses	1	LS	\$ 4,600	\$ 4,600	Based on contractor costs.	
Fertilizing (Bi-annual), Labor	16	HR	\$ 70	\$ 1,120	Based on contractor costs.	
Fertilizing (Bi-annual), Expenses	1	LS	\$ 4,000	\$ 4,000	Based on contractor costs.	
Fence Maintenance/Repair	50	HR	\$ 70	\$ 3,500	Based on contractor costs.	
Erosion Repair	1	LS	\$ 6,000	\$ 6,000	Based on contractor costs; One repair per year	
Animal Control	1	LS	\$ 2,070	\$ 2,070	Based on contractor costs.	
Record Keeping	24	HR	\$ 70	\$ 1,680	Based on contractor costs.	
Sign Replacement	24	HR	\$ 70	\$ 1,680	Based on contractor costs.	
UCC O&M Oversight, Labor	68	HR	\$ 80	\$ 5,440	Based on contractor costs.	
UCC O&M Oversight, Expenses	1	LS	\$ 2,000	\$ 2,000	Based on contractor costs.	
Maintenance Subtotal				\$ 48,210		
		Total base year cost		\$ 226,426	Base Year 2023	
		Implementation Likelihood		100%		
		Adjusted base year estimate		\$226,426		
		Inflation factor ⁴		1.070	Latest annual GNP issued for 2023	
TOTAL OTHER ANNUAL COSTS				\$ 242,380	Costs in 2024 dollars	

TOTALS

CAPITAL COST SUMMARY

Quarterly Monitoring and Reporting for 1 Year (Todd Creek)	\$ 106,168
Primary Contingency for Todd Creek	\$ 452,810
Corrective Actions for MRAs	\$ 359,675
Corrective Action for Drum Removal Area	\$ 1,412,583
Quarterly Monitoring and Reporting for 1 Year (iSOC® System)	\$ 89,940
Contingency Action (Landfill Groundwater - Air Sparge)	\$ 228,993
Decommissioning of iSOC system	\$ 191,077
Monitoring Well Abandonment	\$ 265,582
SUBTOTAL	\$ 3,106,829

ANNUAL COST SUMMARY

Other Annual Costs	\$ 242,380
	\$ 242,380
Years	30
SUBTOTAL	\$ 7,271,411
GRAND TOTAL	\$ 10,378,240

Notes:
UCC - Union Carbide Corporation
Per 391-3-11-.05 Georgia Hazardous Waste Management Rules
¹ Cost includes overhead and fees
² Costs are based on current dollars unless otherwise noted
³ The implementation likelihood percentages were agreed to during the 2012 permitting cycle and have been carried forward.
⁴ Derived by dividing the latest published annual GNP Deflator (2023) by the annual GNP Deflator denominator for the first escalation of the base year