

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		
				<i>Total base year cost</i>	\$ 99,180	Base Year 2023
				<i>Implementation Likelihood³</i>	100%	
				<i>Adjusted base year estimate</i>	\$99,180	
				<i>Inflation factor⁴</i>	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.	
<i>Pre-Construction Activities Subtotal</i>				\$ 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.	
<i>Construction Subtotal</i>				\$ 1,218,015		
PROFESSIONAL SERVICES						
Project/Construction Management	1	LS	\$ 205,000	\$ 205,000	Based on contractor costs.	
<i>Professional Services Subtotal</i>				\$ 205,000		
				<i>Total base year cost</i>	\$ 1,692,015	Base Year 2023
				<i>Implementation Likelihood³</i>	25%	
				<i>Adjusted base year estimate</i>	\$423,004	
				<i>Inflation factor⁴</i>	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		
Subtotal Interim Measures				\$ 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		
Subtotal Implementation of Institutional Controls				\$ 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
TOTAL MRAs				\$ 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	Assumes 32 field days. Based on contractor estimates. Based on contractor estimate.	
Construction, Field Activities	1	LS	\$632,054	\$ 632,054		
Offsite Waste Transport and Disposal	1	LS	\$477,157	\$ 477,157		
Post-Field Activities	1	LS	\$30,090	\$ 30,090		
Subtotal Implementation of Institutional Controls				\$ 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
TOTAL DRUM REMOVAL AREA				\$ 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	
Quarterly Monitoring Subtotal				\$ 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
TOTAL QUARTERLY MONITORING AND REPORTING FOR 1 YEAR (iSOC® System-Phase 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
<i>Pre-Construction Activities Subtotal</i>				\$ 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
<i>Construction Subtotal</i>				\$ 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
<i>System Start-Up Subtotal</i>				\$ 20,000	
PROFESSIONAL SERVICES					
Project/Construction Management	1	LS	\$ 158,000	\$ 158,000	Engineering Estimate
<i>Professional Services Subtotal</i>				\$ 158,000	
			<i>Total base year cost</i>	\$ 2,139,196	Base Year 2023
			<i>Implementation Likelihood³</i>	10%	
			<i>Adjusted base year estimate</i>	\$213,920	
			<i>Inflation factor⁴</i>	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		
				<i>Total base year cost</i>	\$ 178,500	Base Year 2023
				<i>Implementation Likelihood</i>	100%	
				<i>Adjusted base year estimate</i>	\$178,500	
				<i>Inflation factor⁴</i>	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		
				<i>Total base year cost</i>	\$ 248,100	Base Year 2023
				<i>Implementation Likelihood</i>	100%	
				<i>Adjusted base year estimate</i>	\$248,100	
				<i>Inflation factor⁴</i>	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					
Work Planning	1	LS	\$ 15,000	\$ 15,000	Engineers Estimate
Erosion Repair	1	LS	\$ 25,000	\$ 25,000	Engineer Estimate; One repair per year
Reseeding/Replanting (Annual), Labor	16	HR	\$ 70	\$ 1,120	Engineers Estimate
Reseeding/Replanting (Annual), Expenses	1	LS	\$ 10,000	\$ 10,000	Engineers Estimate
UCC Maintenance Oversight, Labor	16	HR	\$ 133	\$ 2,128	Engineers Estimate
UCC Maintenance Oversight, Expenses	1	LS	\$ 1,500	\$ 1,500	Engineers Estimate
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
			<i>Implementation Likelihood</i>	10%	Based on effectiveness review conclusions and trial shutdown
			<i>Adjusted base year estimate</i>	\$ 1,280	
			<i>Inflation factor⁴</i>	1.119	Latest annual GNP deflator issued is for 2023.
				\$ 1,433	Costs in 2024 dollars
COMPLIANCE MONITORING					
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.
Lab Analysis (Annual)	1	LS	\$ 25,561	\$ 25,561	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.
GW Reports (Annual)	1	LS	\$ 22,612	\$ 22,612	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.
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	
				<i>Total base year cost</i>	\$ 226,426
				<i>Implementation Likelihood</i>	100%
				<i>Adjusted base year estimate</i>	\$226,426
				<i>Inflation factor⁴</i>	1.070
TOTAL OTHER ANNUAL COSTS				\$ 242,380	

Base Year 2023
Latest annual GNP issued for 2023
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