

Appendix I

Detailed Cost Estimates for Each
Corrective Measures Alternative

Tables

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TABLE I-1
SUMMARY OF CORRECTIVE MEASURES ALTERNATIVE (CMA) COSTS¹
DRAFT - MAY 2011
CMS FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION - MIDDLEPORT, NEW YORK

Description	Estimated Cost of Corrective Measures Alternative (CMA)																		
	CMA 1	CMA 2		CMA 3		CMA 4		CMA 5		CMA 6A		CMA 6B		CMA 7A		CMA 7B		CMA 8	
ESTIMATED CAPITAL COSTS																			
1. Capital Costs (Excluding T&D and Culvert Removal and Replacement)²																			
R1 Grid and L-Block Properties (large open areas)	\$0	\$11,514,850		\$2,159,000		\$1,013,900		\$512,050		\$2,931,750		\$2,931,750		\$3,893,250		\$3,893,250		\$7,323,950	
NORCO Parcels (treated as 1 property)	\$0	\$921,450		\$539,400		\$531,200		\$531,200		\$539,400		\$539,400		\$539,400		\$539,400		\$921,450	
Roy Hart School Property	\$0	\$3,279,180		\$5,000		\$0		\$0		\$5,000		\$2,254,700		\$5,000		\$2,973,200		\$2,973,200	
Other Properties South of Erie Canal (primarily residential)	\$0	\$15,095,800		\$7,911,100		\$3,725,850		\$2,033,750		\$8,828,650		\$8,828,650		\$10,048,450		\$10,048,450		\$11,822,400	
Properties North of Erie Canal (along Culvert open ditch)	\$0	\$6,517,450		\$4,313,750		\$2,906,950		\$2,468,100		\$4,844,250		\$4,844,250		\$4,989,600		\$4,989,600		\$5,496,400	
Subtotal	\$0	\$37,328,730		\$14,928,250		\$8,177,900		\$5,545,100		\$17,149,050		\$19,398,750		\$19,475,700		\$22,443,900		\$28,537,400	
2. Culvert Capital Costs³																			
Other Properties South of Erie Canal (primarily residential)	\$0	\$127,800		\$88,200		\$88,200		\$88,200		\$88,200		\$88,200		\$88,200		\$88,200		\$382,500	
Properties North of Erie Canal (along Culvert open ditch)	\$0	\$211,050		\$211,050		\$148,200		\$148,200		\$211,050		\$211,050		\$211,050		\$211,050		\$407,250	
Subtotal	\$0	\$338,850		\$299,250		\$236,400		\$236,400		\$299,250		\$299,250		\$299,250		\$299,250		\$789,750	
Capital Costs (Excluding T&D) Subtotal	\$0	\$37,667,580		\$15,227,500		\$8,414,300		\$5,781,500		\$17,448,300		\$19,698,000		\$19,774,950		\$22,743,150		\$29,327,150	
3. Transportation and Disposal Capital Costs⁴																			
Subtotal	\$0	\$13,701,000	\$25,762,500	\$3,622,500	\$7,762,500	\$1,995,000	\$4,275,000	\$1,470,000	\$3,150,000	\$4,462,500	\$9,562,500	\$5,145,000	\$11,025,000	\$5,302,500	\$11,362,500	\$6,339,000	\$13,387,500	\$9,241,500	\$18,225,000
SUBTOTAL ESTIMATED CAPITAL COSTS	\$0	\$51,368,580	\$63,430,080	\$18,850,000	\$22,990,000	\$10,409,300	\$12,689,300	\$7,251,500	\$8,931,500	\$21,910,800	\$27,010,800	\$24,843,000	\$30,723,000	\$25,077,450	\$31,137,450	\$29,082,150	\$36,130,650	\$38,568,650	\$47,552,150
4. OM&M Costs⁵																			
Subtotal	\$362,608	\$2,814,632	\$1,440,632	\$3,226,663	\$2,812,663	\$1,962,639	\$1,734,639	\$1,902,639	\$1,734,639	\$3,028,657	\$2,518,657	\$3,008,655	\$2,420,655	\$3,124,657	\$2,518,657	\$3,134,655	\$2,420,655	\$1,334,608	\$362,608
5. Engineering and Coordination (10%)⁶																			
Subtotal	\$0	\$3,766,758	\$3,766,758	\$1,522,750	\$1,522,750	\$841,430	\$841,430	\$578,150	\$578,150	\$1,744,830	\$1,744,830	\$1,969,800	\$1,969,800	\$1,977,495	\$1,977,495	\$2,274,315	\$2,274,315	\$2,932,715	\$2,932,715
TOTAL ESTIMATED COST	\$362,608	\$57,949,970	\$68,637,470	\$23,599,413	\$27,325,413	\$13,213,369	\$15,265,369	\$9,732,289	\$11,244,289	\$26,684,287	\$31,274,287	\$29,821,455	\$35,113,455	\$30,179,602	\$35,633,602	\$34,491,120	\$40,825,620	\$42,835,973	\$50,847,473

- Notes:**
1. Refer to Table H-1 for a summary of the CMA elements.
 2. Refer to Table I-2 for detailed breakdown of capital costs (excluding transportation and disposal (T&D) and culvert removal and replacement).
 3. Refer to Table I-3 for detailed breakdown of culvert removal and replacement costs.
 4. Refer to Table I-4 for detailed breakdown of transportation and disposal costs.
 5. Refer to Table I-5 for detailed breakdown of operation, monitoring and maintenance (OM&M) costs.
 6. Engineering and coordination costs only apply to capital costs (excluding T&D)
 7. Costs do not include contingency costs except for CAMU disposal costs (construction and OM&M) which include a 10-percent contingency.

TABLE I-2
ESTIMATED CAPITAL COSTS (EXCLUDING TRANSPORTATION & DISPOSAL AND CULVERT REMOVAL & REPLACEMENT)^{1,2}
DRAFT - MAY 2011
CMS FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION - MIDDLEPORT, NEW YORK

Activity	Unit	Unit Cost	CMA 1		CMA 2		CMA 3		CMA 4		CMA 5		CMA 6A		CMA 6B		CMA 7A		CMA 7B		CMA 8	
			Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
R1 Grid and L-Block Properties (large open areas)																						
- Mobilization/Demobilization ³	LS	(See Note 3)	0	\$0	1	\$367,000	1	\$70,800	1	\$32,600	1	\$16,500	1	\$94,500	1	\$94,500	1	\$124,500	1	\$124,500	1	\$235,800
- Construction Field Oversight/Community Relations ⁴	day	\$5,520	0	\$0	690	\$3,808,800	120	\$662,400	60	\$331,200	30	\$165,600	170	\$938,400	170	\$938,400	230	\$1,269,600	230	\$1,269,600	430	\$2,373,600
- Site Preparation ⁵	property	\$12,000	0	\$0	6	\$72,000	5	\$60,000	3	\$36,000	2	\$24,000	5	\$60,000	5	\$60,000	5	\$60,000	5	\$60,000	6	\$72,000
- Soil Excavation ⁶	CY	\$20	0	\$0	102,090	\$2,041,800	17,660	\$353,200	7,700	\$154,000	3,640	\$72,800	24,390	\$487,800	24,390	\$487,800	33,010	\$660,200	33,010	\$660,200	64,350	\$1,287,000
- Sampling and Analysis (pre-remediation) ⁷	property	\$6,000	0	\$0	6	\$36,000	5	\$30,000	3	\$18,000	2	\$12,000	5	\$30,000	5	\$30,000	5	\$30,000	5	\$30,000	6	\$36,000
- Air Monitoring ⁸	day	\$1,385	0	\$0	690	\$955,650	120	\$166,200	60	\$83,100	30	\$41,550	170	\$235,450	170	\$235,450	230	\$318,550	230	\$318,550	430	\$595,550
- Backfill/Topsoil ⁹	CY	\$40	0	\$0	102,090	\$4,083,600	17,660	\$706,400	7,700	\$308,000	3,640	\$145,600	24,390	\$975,600	24,390	\$975,600	33,010	\$1,320,400	33,010	\$1,320,400	64,350	\$2,574,000
- Property Restoration ¹⁰	property	(See Note 10)	0	\$0	6	\$150,000	5	\$100,000	3	\$51,000	2	\$34,000	5	\$100,000	5	\$100,000	5	\$100,000	5	\$100,000	6	\$150,000
- Establish Deed Restriction	property	\$5,000	0	\$0	0	\$0	2	\$10,000	0	\$0	0	\$0	2	\$10,000	2	\$10,000	2	\$10,000	2	\$10,000	0	\$0
Subtotal			\$0		\$11,514,850		\$2,159,000		\$1,013,900		\$512,050		\$2,931,750		\$2,931,750		\$3,893,250		\$3,893,250		\$7,323,950	
NORCO Parcels (treated as 1 property)																						
- Mobilization/Demobilization ³	LS	(See Note 3)	0	\$0	1	\$25,500	1	\$15,000	1	\$14,800	1	\$14,800	1	\$15,000	1	\$15,000	1	\$15,000	1	\$15,000	1	\$25,500
- Construction Field Oversight/Community Relations ⁴	day	\$5,520	0	\$0	70	\$386,400	40	\$220,800	40	\$220,800	40	\$220,800	40	\$220,800	40	\$220,800	40	\$220,800	40	\$220,800	70	\$386,400
- Site Preparation ⁵	property	\$12,000	0	\$0	1	\$12,000	1	\$12,000	1	\$12,000	1	\$12,000	1	\$12,000	1	\$12,000	1	\$12,000	1	\$12,000	1	\$12,000
- Soil Excavation ⁶	CY	\$20	0	\$0	6,160	\$123,200	3,420	\$68,400	3,420	\$68,400	3,420	\$68,400	3,420	\$68,400	3,420	\$68,400	3,420	\$68,400	3,420	\$68,400	6,160	\$123,200
- Sampling and Analysis (pre-remediation) ⁷	property	\$6,000	0	\$0	1	\$6,000	1	\$6,000	1	\$6,000	1	\$6,000	1	\$6,000	1	\$6,000	1	\$6,000	1	\$6,000	1	\$6,000
- Air Monitoring ⁸	day	\$1,385	0	\$0	70	\$96,950	40	\$55,400	40	\$55,400	40	\$55,400	40	\$55,400	40	\$55,400	40	\$55,400	40	\$55,400	70	\$96,950
- Backfill/Topsoil ⁹	CY	\$40	0	\$0	6,160	\$246,400	3,420	\$136,800	3,420	\$136,800	3,420	\$136,800	3,420	\$136,800	3,420	\$136,800	3,420	\$136,800	3,420	\$136,800	6,160	\$246,400
- Property Restoration ¹⁰	property	(See Note 10)	0	\$0	1	\$25,000	1	\$20,000	1	\$17,000	1	\$17,000	1	\$20,000	1	\$20,000	1	\$20,000	1	\$20,000	1	\$25,000
- Establish Deed Restriction	property	\$5,000	0	\$0	0	\$0	1	\$5,000	0	\$0	0	\$0	1	\$5,000	1	\$5,000	1	\$5,000	1	\$5,000	0	\$0
Subtotal			\$0		\$921,450		\$539,400		\$531,200		\$531,200		\$539,400		\$539,400		\$539,400		\$539,400		\$921,450	
Roy Hart School Property																						
- Mobilization/Demobilization ³	LS	(See Note 3)	0	\$0	1	\$103,580	0	\$0	0	\$0	0	\$0	0	\$0	1	\$70,600	0	\$0	1	\$94,300	1	\$94,300
- Construction Field Oversight/Community Relations ⁴	day	\$5,520	0	\$0	200	\$1,104,000	0	\$0	0	\$0	0	\$0	0	\$0	140	\$772,800	0	\$0	180	\$993,600	180	\$993,600
- Site Preparation ⁵	property	\$12,000	0	\$0	1	\$12,000	0	\$0	0	\$0	0	\$0	0	\$0	1	\$12,000	0	\$0	1	\$12,000	1	\$12,000
- Soil Excavation ⁶	CY	\$20	0	\$0	19,110	\$382,200	0	\$0	0	\$0	0	\$0	0	\$0	13,490	\$269,800	0	\$0	17,800	\$356,000	17,800	\$356,000
- Sampling and Analysis (pre-remediation) ⁷	property	\$6,000	0	\$0	1	\$6,000	0	\$0	0	\$0	0	\$0	0	\$0	1	\$6,000	0	\$0	1	\$6,000	1	\$6,000
- Air Monitoring ⁸	day	\$1,385	0	\$0	200	\$277,000	0	\$0	0	\$0	0	\$0	0	\$0	140	\$193,900	0	\$0	180	\$249,300	180	\$249,300
- Backfill/Topsoil ⁹	CY	\$40	0	\$0	19,110	\$764,400	0	\$0	0	\$0	0	\$0	0	\$0	13,490	\$539,600	0	\$0	17,800	\$712,000	17,800	\$712,000
- Property Restoration ¹⁰	LS	(See Note 10)	0	\$0	1	\$630,000	0	\$0	0	\$0	0	\$0	0	\$0	1	\$390,000	0	\$0	1	\$550,000	1	\$550,000
- Establish Deed Restriction	property	\$5,000	0	\$0	0	\$0	1	\$5,000	0	\$0	0	\$0	1	\$5,000	0	\$0	1	\$5,000	0	\$0	0	\$0
Subtotal			\$0		\$3,279,180		\$5,000		\$0		\$0		\$5,000		\$2,254,700		\$5,000		\$2,973,200		\$2,973,200	
Other Properties South of the Erie Canal																						
- Mobilization/Demobilization ³	LS	(See Note 3)	0	\$0	1	\$567,200	1	\$320,100	1	\$151,400	1	\$78,700	1	\$351,400	1	\$351,400	1	\$391,100	1	\$391,100	1	\$465,800
- Construction Field Oversight/Community Relations ⁴	day	\$5,520	0	\$0	570	\$3,146,400	200	\$1,104,000	90	\$496,800	60	\$331,200	250	\$1,380,000	250	\$1,380,000	320	\$1,766,400	320	\$1,766,400	370	\$2,042,400
- Site Preparation ⁵	property	\$12,000	0	\$0	160	\$1,920,000	133	\$1,596,000	70	\$840,000	34	\$408,000	138	\$1,656,000	138	\$1,656,000	144	\$1,728,000	144	\$1,728,000	153	\$1,824,000
- Soil Excavation ⁶	CY	\$35	0	\$0	55,370	\$1,937,950	19,600	\$686,000	8,840	\$309,400	5,370	\$187,950	24,680	\$863,800	24,680	\$863,800	31,170	\$1,090,950	31,170	\$1,090,950	36,990	\$1,270,150
- Sampling and Analysis (pre-remediation) ⁷	property	\$3,000	0	\$0	160	\$480,000	133	\$399,000	70	\$210,000	34	\$102,000	138	\$414,000	138	\$414,000	144	\$432,000	144	\$432,000	153	\$456,000
- Air Monitoring ⁸	day	\$1,385	0	\$0	570	\$789,450	200	\$277,000	90	\$124,650	60	\$83,100	250	\$346,250	250	\$346,250	320	\$443,200	320	\$443,200	370	\$512,450
- Backfill/Topsoil ⁹	CY	\$40	0	\$0	55,370	\$2,214,800	19,600	\$784,000	8,840	\$353,600	5,370	\$214,800	24,680	\$987,200	24,680	\$987,200	31,170	\$1,246,800	31,170	\$1,246,800	36,990	\$1,451,600
- Property Restoration ¹⁰	property	(See Note 10)	0	\$0	160	\$4,000,000	133	\$2,660,000	70	\$1,190,000	34	\$578,000	138	\$2,760,000	138	\$2,760,000	144	\$2,880,000	144	\$2,880,000	153	\$3,800,000
- Establish Deed Restriction	property	\$5,000	0	\$0	8	\$40,000	17	\$85,000	10	\$50,000	10	\$50,000	14	\$70,000	14	\$70,000	14	\$70,000	14	\$70,000	0	\$0
Subtotal			\$0		\$15,095,800		\$7,911,100		\$3,725,850		\$2,033,750		\$8,828,650		\$8,828,650		\$10,048,450		\$10,048,450		\$11,822,400	

See notes at bottom of Page 2.

TABLE I-2
ESTIMATED CAPITAL COSTS (EXCLUDING TRANSPORTATION & DISPOSAL AND CULVERT REMOVAL & REPLACEMENT)^{1,2}
DRAFT - MAY 2011
CMS FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION - MIDDLEPORT, NEW YORK

Activity	Unit	Unit Cost	CMA 1		CMA 2		CMA 3		CMA 4		CMA 5		CMA 6A		CMA 6B		CMA 7A		CMA 7B		CMA 8	
			Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
Properties North of the Erie Canal																						
- Mobilization/Demobilization ³	LS	(See Note 3)	0	\$0	1	\$191,400	1	\$132,900	1	\$90,600	1	\$76,900	1	\$145,400	1	\$145,400	1	\$149,700	1	\$149,700	1	\$168,600
- Construction Field Oversight/Community Relations ⁴	day	\$5,520	0	\$0	450	\$2,484,000	290	\$1,600,800	190	\$1,048,800	160	\$883,200	330	\$1,821,600	330	\$1,821,600	340	\$1,876,800	340	\$1,876,800	360	\$1,987,200
- Site Preparation ⁵	property	\$12,000	0	\$0	13	\$156,000	13	\$156,000	12	\$144,000	11	\$132,000	13	\$156,000	13	\$156,000	13	\$156,000	13	\$156,000	18	\$204,000
- Soil Excavation ⁶	CY	\$20	0	\$0	44,730	\$894,600	28,390	\$567,800	18,340	\$366,800	15,240	\$304,800	32,420	\$648,400	32,420	\$648,400	33,620	\$672,400	33,620	\$672,400	36,700	\$734,000
- Sampling and Analysis (pre-remediation) ⁷	property	\$3,000	0	\$0	13	\$39,000	13	\$39,000	12	\$36,000	11	\$33,000	13	\$39,000	13	\$39,000	13	\$39,000	13	\$39,000	18	\$51,000
- Air Monitoring ⁸	day	\$1,385	0	\$0	450	\$623,250	290	\$401,650	190	\$263,150	160	\$221,600	330	\$457,050	330	\$457,050	340	\$470,900	340	\$470,900	360	\$498,600
- Backfill/Topsoil ⁹	CY	\$40	0	\$0	44,730	\$1,789,200	28,390	\$1,135,600	18,340	\$733,600	15,240	\$609,600	32,420	\$1,296,800	32,420	\$1,296,800	33,620	\$1,344,800	33,620	\$1,344,800	36,700	\$1,428,000
- Property Restoration ¹⁰	property	(See Note 10)	0	\$0	13	\$325,000	13	\$260,000	12	\$204,000	11	\$187,000	13	\$260,000	13	\$260,000	13	\$260,000	13	\$260,000	18	\$425,000
- Establish Deed Restriction	property	\$5,000	0	\$0	3	\$15,000	4	\$20,000	4	\$20,000	4	\$20,000	4	\$20,000	4	\$20,000	4	\$20,000	4	\$20,000	0	\$0
Subtotal				\$0		\$6,517,450		\$4,313,750		\$2,906,950		\$2,468,100		\$4,844,250		\$4,844,250		\$4,989,600		\$4,989,600		\$5,496,400
Total Capital Cost				\$0		\$37,328,730		\$14,928,250		\$8,177,900		\$5,545,100		\$17,149,050		\$19,398,750		\$19,475,700		\$22,443,900		\$28,537,400

Notes:

- Estimated capital costs associated with culvert removal and replacement are provided on Table I-3.
- Estimated capital costs associated with transportation and disposal are provided on Table I-4.
- Mobilization and demobilization cost estimate includes the annual mobilization and demobilization of all equipment, materials, and labor necessary to perform remedial activities, conduct site/topographic surveys, complete shop drawings, obtain permits, and perform geo-technical testing. Cost estimate is calculated using 5% of the sum of site preparation, soil excavation, sampling and analysis (pre-remediation), air monitoring, and backfill and restoration.
- Construction oversight/community relations cost estimate includes third party construction oversight labor associated with one full-time employee (FTE) at a rate of \$1,400 per day, one and a half full-time equivalent engineering oversight employees at a rate of \$2,100 per day, and community relations at a rate of \$2,000 per day. Cost is consistent with 2007 Early Actions remedial work.
- Site preparation cost estimate includes equipment, materials, and labor necessary to prepare each property for remedial activities. Site preparation includes, but is not limited to, property inspection, clearing and grubbing, utility markout, documentation of landscapes and yard structures, and building foundation inspections.
- Soil excavation cost estimate includes all labor, equipment, and materials necessary to excavate soils during remedial activities. Based on past experience with 2007 Early Actions, soil excavation at the Properties South of the Erie Canal is estimated \$35 per cubic yard and \$20 per cubic yard in all other areas.
- Sampling and analysis (pre-remedial) cost estimate includes sample collection and laboratory analytical costs associated with the sampling and analysis at each property, sample location survey, and related reporting to both the Agencies and property owner.
- Air monitoring cost estimate includes equipment, labor, and analytical costs associated with air monitoring during remedial activities. The equipment rental cost was obtained from Pine Environmental and includes the rental of five dust monitoring stations and a photoionization detector. Labor includes one FTE at a rate of \$100 per hr for 10 hours a day. Analytical costs include a daily sample for total dust and arsenic at \$50 per sample.
- Backfill cost estimate includes all labor, equipment, and materials necessary to purchase, place, compact and grade general fill and/or top soil to match surrounding grade.
- Restoration cost estimate includes all labor, equipment, and materials necessary to provide in-kind restoration to properties disturbed during remedial activities. Cost estimate is approximate based on previous work conducted during the 2003 ICM. Unit costs per CMA are: Alternative 2 - \$25,000, Alternative 3 - \$20,000, Alternative 4 - \$17,000, Alternative 5 - \$17,000, Alternative 6A - \$20,000, Alternative 6B - \$20,000, Alternative 7A - \$20,000, Alternative 7B - \$20,000, and Alternative 8 - \$25,000. The variation in the unit costs is based on the extent of property disturbance for the CMAs. For the Roy Hart School property, restoration was calculated based on \$1/square foot of disturbed area.
- Estimated capital costs (excluding transportation & disposal and culvert removal & replacement) do not include engineering costs. Engineering costs are added to the costs in Table I-1.

**TABLE I-3
ESTIMATED CAPITAL COSTS FOR CULVERT REMOVAL AND REPLACEMENT
DRAFT - MAY 2011
CMS FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION - MIDDLEPORT, NEW YORK**

Activity	Unit	Unit Cost	CMA 1		CMA 2		CMA 3		CMA 4		CMA 5		CMA 6A		CMA 6B		CMA 7A		CMA 7B		CMA 8	
			Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
Other Properties South of the Erie Canal																						
- Soil Excavation ³	CY	\$35	0	\$0	840	\$29,400	560	\$19,600	560	\$19,600	560	\$19,600	560	\$19,600	560	\$19,600	560	\$19,600	560	\$19,600	2,600	\$91,000
- Culvert Water Management ⁴	LF	\$25	0	\$0	420	\$10,500	280	\$7,000	280	\$7,000	280	\$7,000	280	\$7,000	280	\$7,000	280	\$7,000	280	\$7,000	1,300	\$32,500
- Culvert Removal and Replacement ⁵	LF	\$65	0	\$0	420	\$27,300	280	\$18,200	280	\$18,200	280	\$18,200	280	\$18,200	280	\$18,200	280	\$18,200	280	\$18,200	1,300	\$84,500
- Catch Basin/Manhole Replacement ⁶	EA	\$3,000	0	\$0	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000	6	\$18,000
- Sampling and Analysis ⁷	property	\$3,000	0	\$0	7	\$21,000	5	\$15,000	5	\$15,000	5	\$15,000	5	\$15,000	5	\$15,000	5	\$15,000	5	\$15,000	15	\$45,000
- Backfill ⁸	CY	\$40	0	\$0	840	\$33,600	560	\$22,400	560	\$22,400	560	\$22,400	560	\$22,400	560	\$22,400	560	\$22,400	560	\$22,400	2,600	\$104,000
- Restoration ⁹	LF	\$60	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	125	\$7,500
Subtotal				\$0		\$127,800		\$88,200		\$88,200		\$88,200		\$88,200		\$88,200		\$88,200		\$88,200		\$382,500
Properties North of the Erie Canal																						
- Soil Excavation ³	CY	\$20	0	\$0	1,810	\$36,200	1,810	\$36,200	1,240	\$24,800	1,240	\$24,800	1,810	\$36,200	1,810	\$36,200	1,810	\$36,200	1,810	\$36,200	3,450	\$69,000
- Culvert Water Management ⁴	LF	\$25	0	\$0	905	\$22,625	905	\$22,625	620	\$15,500	620	\$15,500	905	\$22,625	905	\$22,625	905	\$22,625	905	\$22,625	1,725	\$43,125
- Culvert Removal and Replacement ⁵	LF	\$65	0	\$0	905	\$58,825	905	\$58,825	620	\$40,300	620	\$40,300	905	\$58,825	905	\$58,825	905	\$58,825	905	\$58,825	1,725	\$112,125
- Catch Basin/Manhole Replacement ⁶	EA	\$3,000	0	\$0	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000
- Sampling and Analysis ⁷	property	\$3,000	0	\$0	5	\$15,000	5	\$15,000	4	\$12,000	4	\$12,000	5	\$15,000	5	\$15,000	5	\$15,000	5	\$15,000	9	\$27,000
- Backfill ⁸	CY	\$40	0	\$0	1,810	\$72,400	1,810	\$72,400	1,240	\$49,600	1,240	\$49,600	1,810	\$72,400	1,810	\$72,400	1,810	\$72,400	1,810	\$72,400	3,450	\$138,000
- Restoration ⁹	LF	\$60	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	200	\$12,000
Subtotal				\$0		\$211,050		\$211,050		\$148,200		\$148,200		\$211,050		\$211,050		\$211,050		\$211,050		\$407,250
Total Culvert Removal and Replacement Capital Cost¹⁰						\$338,850		\$299,250		\$236,400		\$236,400		\$299,250		\$299,250		\$299,250		\$299,250		\$789,750

Notes:

- Estimated capital costs (excluding transportation and disposal, and culvert removal and replacement) are provided in Table I-2.
- Estimated capital costs for transportation and disposal are provided in Table I-4.
- Soil excavation cost estimate includes additional labor, equipment, and materials necessary to excavate soils during culvert removal activities.
- Culvert water management cost estimate includes all labor, equipment, and materials necessary to provide by-pass for water within the culvert (if necessary) during remediation. Remedial activities will take place during dry-periods to minimize the need for temporary water by-pass. For purposes of this cost estimate, stormwater management is presented on a per linear foot basis and includes labor, materials and equipment (by-pass pumps and temporary by-pass piping.)
- Culvert removal and replacement cost estimate includes all labor, equipment, and materials necessary to remove and replace buried culvert where necessary. Remedial activities taking place around and/or near the buried pipe will result in the removal and in-kind replacement of the culvert pipe.
- Catch basin/manhole replacement cost estimate includes all labor, equipment, and materials necessary to provide in-kind replacement to catch basins and/or manholes removed during remedial activities related to culvert removal.
- Sampling and analysis (pre-remedial) cost estimate includes sample collection and laboratory analytical costs associated with the sampling and analysis at each property where culvert removal and replacement are planned under the CMA.
- Backfill cost estimate includes additional labor (including hand placement of backfill in relatively tight areas), equipment, and materials necessary to place, compact and grade general fill during culvert removal and replacement activities.
- Cost estimate includes restoration of 4-inch thick pavement (at \$4 per square foot) and 6-inch subbase material (at \$2 per square foot). The unit rate is based on a 10-foot wide surface area of disturbance resulting in a total unit cost of \$60 per linear foot where public roadways are crossed (applicable to CMA 8 only). Lengths of piping to be removed from within the roadways are depicted on the table.
- Culvert removal capital costs do not include engineering costs. Engineering costs are added to the costs in Table I-1.

**TABLE I-4
ESTIMATED CAPITAL COSTS FOR TRANSPORTATION AND DISPOSAL
DRAFT - MAY 2011
CMS FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION - MIDDLEPORT, NEW YORK**

CAMU Disposal Option^{3,4,5}

Description	CMA1		CMA 2		CMA 3		CMA 4		CMA 5		CMA 6A		CMA 6B		CMA 7A		CMA 7B		CMA 8		
	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	
Total CAMU Transportation and Disposal Option Costs	Unit Cost (per ton)																				
CAMU Disposal (Phase 1)	\$35	0	\$0	169,350	\$5,927,250	103,500	\$3,622,500	57,000	\$1,995,000	42,000	\$1,470,000	127,500	\$4,462,500	147,000	\$5,145,000	151,500	\$5,302,500	169,350	\$5,927,250	169,350	\$5,927,250
CAMU Disposal (Phase 2)	\$45	0	\$0	172,500	\$7,762,500	--	---	--	---	--	---	--	---	--	---	--	---	9,150	\$411,750	73,650	\$3,314,250
Landfill Disposal	\$75	0	\$0	150	\$11,250	--	---	--	---	--	---	--	---	--	---	--	---	---	---	---	---
CAMU Disposal Option Subtotal		0	\$0	342,000	\$13,701,000	103,500	\$3,622,500	57,000	\$1,995,000	42,000	\$1,470,000	127,500	\$4,462,500	147,000	\$5,145,000	151,500	\$5,302,500	178,500	\$6,339,000	243,000	\$9,241,500

Landfill Disposal Option^{5,6}

Description	CMA1		CMA 2		CMA 3		CMA 4		CMA 5		CMA 6A		CMA 6B		CMA 7A		CMA 7B		CMA 8		
	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	Estimated Soil Quantity	Cost	
Total Landfill Transportation and Disposal Option Costs	Unit Cost (per ton)																				
Landfill Disposal ⁶	\$75	0	\$0	343,500	\$25,762,500	103,500	\$7,762,500	57,000	\$4,275,000	42,000	\$3,150,000	127,500	\$9,562,500	147,000	\$11,025,000	151,500	\$11,362,500	178,500	\$13,387,500	243,000	\$18,225,000
Landfill Disposal Option Subtotal		0	\$0	343,500	\$25,762,500	103,500	\$7,762,500	57,000	\$4,275,000	42,000	\$3,150,000	127,500	\$9,562,500	147,000	\$11,025,000	151,500	\$11,362,500	178,500	\$13,387,500	243,000	\$18,225,000

Notes:

1. Assumed soil quantity is in tons. Assumed 1.5 tons/cy for the weight of soil.
2. Estimated capital costs (excluding transportation and disposal, and culvert removal and replacement) are provided in Table I-2.
3. Estimated capital costs associated with culvert removal and replacement are provided on Table I-3.
4. CAMU disposal costs assume Phase I portion of CAMU would be filled to capacity (169,350 tons or approximately 112,900 cy) followed by the Phase 2 area (172,500 tons or approximately 115,000 cy). If the CAMU is completely filled to capacity (both Phase I and Phase 2), then any remaining soil would be disposed of off-site at a commercial landfill. Based on this, CMA 2 requires landfill disposal to satisfy the disposal of soils exceeding the capacities of both the Phase 1 and Phase 2 CAMU.
5. Refer to Tables I-6 through I-8 for CAMU construction detail and cost breakdown.
6. Landfill disposal unit cost represents 75% disposal in a commercial landfill as non-hazardous waste at a cost of \$80/ton and 25% beneficially reused as daily cover material at a commercial landfill at a cost of \$60/ton.

**TABLE I-5
ESTIMATED OPERATION, MAINTENANCE AND MONITORING (OM&M) COSTS
DRAFT - MAY 2011
CMS FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION - MIDDLEPORT, NEW YORK**

Item #	Description	Unit	Unit Cost (materials and labor)	CMA1		CMA 2		CMA 3		CMA 4		CMA 5		CMA 6A		CMA 6B		CMA 7A		CMA 7B		CMA 8	
				Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
1	Wooded Parcel & MH-N9 ³	LS	\$18,500	1	\$18,500	1	\$18,500	1	\$18,500	1	\$18,500	1	\$18,500	1	\$18,500	1	\$18,500	1	\$18,500	1	\$18,500	1	\$18,500
2	Culvert Properties Not Remediated	Property	\$5,000	0	\$0	11	\$55,000	13	\$65,000	14	\$70,000	14	\$70,000	13	\$65,000	13	\$65,000	13	\$65,000	13	\$65,000	0	\$0
3	Non-Residential Properties Remediated to Alternative Goals	Property	\$5,000	0	\$0	0	\$0	12	\$60,000	0	\$0	0	\$0	9	\$45,000	8	\$40,000	9	\$45,000	8	\$40,000	0	\$0
4	CAMU (for CAMU Disposal Option) ⁴	Ton	\$4	0	\$0	343,500	\$1,374,000	103,500	\$414,000	57,000	\$228,000	42,000	\$168,000	127,500	\$510,000	147,000	\$588,000	151,500	\$606,000	178,500	\$714,000	243,000	\$972,000
Subtotal Annual OM&M Cost					\$18,500		\$73,500		\$143,500		\$88,500		\$88,500		\$128,500		\$123,500		\$128,500		\$123,500		\$18,500
30-Year Present Worth of Annual OM&M Cost					\$362,608		\$1,440,632		\$2,812,663		\$1,734,639		\$1,734,639		\$2,518,657		\$2,420,655		\$2,518,657		\$2,420,655		\$362,608
Subtotal CAMU OM&M Cost					\$0		\$1,374,000		\$414,000		\$228,000		\$168,000		\$510,000		\$588,000		\$606,000		\$714,000		\$972,000
Total Estimated Cost For Landfill Disposal Option					\$362,608		\$1,440,632		\$2,812,663		\$1,734,639		\$1,734,639		\$2,518,657		\$2,420,655		\$2,518,657		\$2,420,655		\$362,608
Total Estimated Cost For CAMU Disposal Option							\$2,814,632		\$3,226,663		\$1,962,639		\$1,902,639		\$3,028,657		\$3,008,655		\$3,124,657		\$3,134,655		\$1,334,608

1. Cost estimate is based on past experience and vendor estimates using 2011 dollars.
2. The cost estimate has been prepared to correspond with a 30-year time period beginning in 2012.
3. OM&M activities for the Wooded Parcel include semi-annual visual inspections, mowing activities during the growing season, annual certification report and stormwater sampling. OM&M activities for MH-N9 include collecting and analyzing stormwater samples, monitoring the thickness of sediment in the base of the sediment chamber, collecting and analyzing samples of the sediment, and removing sediment when necessary.
4. Refer to Table I-6 for detailed CAMU OM&M Costs.
5. OM&M activities for culvert and non-residential properties include preparation of soil or site management plans, semi-annual visual inspections, and an annual certification report.
6. A 3% interest rate has been assumed for the present worth analysis of all post-closure costs. Per the Office of Management and Budget website (<http://www.whitehouse.gov/omb/circulars/a094/a094.html#8>), the real discount rate as of December 2010 is 2.3% (i.e., conservatively 3%).

**TABLE I-6
ESTIMATED CAMU COST SUMMARY
DRAFT - MAY 2011
CMS FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION - MIDDLEPORT, NEW YORK**

Description	Phase 1 Area	Phase 2 Area	Maximum Build-Out Condition
Footprint Area (ac) ⁵	10.6	8.5	16.9
Maximum Height/Elevation (ft)	28/565.0	28/565.0	28/565.0
Final Cover Thickness (ft)	2.25	2.25	2.25
Baseliner Thickness (ft)	0	2.5	0/2.5
Net Available Airspace (cy) ⁶	112,900	115,000	227,900
TOTAL CAPITAL COST:	\$6,010,000	\$7,830,000	\$13,840,000
CAPITAL DISPOSAL COST PER TON (1.5 TON/CY) ⁷:	\$35	\$45	\$40

Annual Post-Closure OM&M Costs			
	Estimated Quantity	Unit Cost	Cost
Leachate Collection System Maintenance ⁸	1	\$2,000	\$2,000
Leachate Treatment ⁹	1	\$0	\$0
CAMU Operation & Maintenance ¹⁰	1	\$5,000	\$5,000
Environmental Monitoring ¹¹	5	\$5,000	\$25,000
Annual Reporting ¹²	1	\$20,000	\$20,000
		Subtotal Cost:	\$52,000
		Contingency (10%):	\$5,200
		TOTAL OM&M COST (30-year present worth):	\$1,122,000
		TOTAL OM&M COST (PER TON):	\$4

Notes:

1. This preliminary cost estimate is based on conceptual CAMU design information presented in the Draft CMS Report. Monitoring and maintenance activities for the proposed CAMU would be conducted in conjunction with the existing monitoring and maintenance activities associated with the North Site Cover and the Facility's Groundwater Monitoring Program (GMP).
2. All costs represent 2011 dollars.
3. Refer to Table 1-7 for Phase 1 Area Estimated Capital Costs.
4. Refer to Table 1-8 for Phase 2 Area Estimated Capital Costs.
5. Indicates actual footprint at the base of the CAMU. The total footprint does not include 2.2-acre overlap of Phase 2 into the Phase 1 Area.
6. All volumes represent in-place measurements.
7. Note that estimated per-ton disposal costs are based on full utilization of the net available airspace. Per-ton cost increases as available airspace and/or utilization of available airspace decreases.
8. Leachate collection system maintenance includes costs to manage leachate water that collects within the footprint of the Phase 2 base liner system as a result of infiltrating precipitation, and provide a means for removing and transferring the collected leachate water to an on-site storage facility (tank system) prior to treatment at the Facility's Water Treatment Plant (WTP).
9. Collected leachate would be treated at the FMC Facility's WTP and therefore no additional cost would be incurred for leachate treatment.
10. Operation and Maintenance includes: periodic inspection of the CAMU final cover for signs of erosion and/or damage, and maintenance as required; period inspection and maintenance of the CAMU leachate collection system (e.g., maintenance of the pumps and cleanout of the collection pipes); and pumping/treatment of CAMU Phase 2 leachate, if any.
11. Environmental Monitoring includes costs associated with additional groundwater monitoring relative to FMC's existing GMP.
12. Annual Reporting includes preparation of an annual report to the Agencies documenting the OM&M activities associated with the CAMU.
13. A 3% interest rate has been assumed for the present worth analysis of all post-closure costs. Per the Office of Management and Budget website (<http://www.whitehouse.gov/omb/circulars/a094/a094.html#8>), the discount rate as of December 2010 is 2.3% (i.e., conservatively 3%).
14. ARCADIS prepared this estimate using current and generally accepted engineering cost estimation methods.

TABLE I-7
ESTIMATED CAPITAL COSTS FOR CAMU - PHASE 1
DRAFT - MAY 2011
CMS FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION - MIDDLEPORT, NEW YORK

ITEM	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL ITEM COST
I. CONSTRUCTION COSTS					
<i>Site Preparation</i>					
1	Pre-Construction Site Survey	1	EA	\$5,000	\$5,000
2	Perimeter Access Road Subgrade (general fill)	1,400	CY	\$25	\$35,000
3	Perimeter Access Road Gravel	330	CY	\$32	\$10,560
4	Perimeter Access Road Non-Woven Geotextile (8-oz.)	10,400	SF	\$0.17	\$1,768
5	Perimeter Access Road Sideslope Topsoil	270	CY	\$30	\$8,100
6	Temporary Erosion and Sediment Control	10.6	AC	\$3,000	\$31,800
7	Stormwater Management (basins, culverts, etc.)	1	LS	\$200,000	\$200,000
8	Operating Support Facilities	1	LS	\$100,000	\$100,000
9	Utility Installations and Connections	1	LS	\$10,000	\$10,000
10	Existing Groundwater Conveyance System (reroute/retrofit)	1	LS	\$10,000	\$10,000
11	Monitoring Well Decommissioning	19	EA	\$1,500	\$28,500
<i>Waste Filling Operations</i>					
12	Consolidation Material Placement	112,900	CY	\$5	\$564,500
13	Interim Cover (general fill)	34,200	CY	\$25	\$855,000
14	As-Built Consolidation Surveys	4	EA	\$5,000	\$20,000
15	Environmental Monitoring	4	YR	\$30,000	\$120,000
16	Utility Services	4	YR	\$5,000	\$20,000
<i>Final Cover Construction</i>					
17	Final Cover Anchor Trench	2,700	LF	\$30	\$81,000
18	Final Cover Drainage Features (perimeter ditch, mid-slope swales, etc.)	1	LS	\$50,000	\$50,000
19	Passive Gas Vents	9	EA	\$750	\$6,750
<i>Final Cover System Components</i>					
20	4" Top Soil	5,700	CY	\$30	\$171,000
21	20" General Fill	28,600	CY	\$25	\$715,000
22	Geosynthetic Drainage Composite	563,000	SF	\$1	\$563,000
23	60-mil HDPE Flexible Membrane Liner	563,000	SF	\$0.70	\$394,100
24	3" Select Fill Layer	4,300	CY	\$30	\$129,000
<i>Restoration</i>					
25	Vegetative Cover (hydroseed, mulch, fertilizer)	10.6	AC	\$3,000	\$31,800
26	Misc. Site Restoration	1	LS	\$10,000	\$10,000
27	Installation of additional Monitoring Wells	5	EA	\$5,000	\$25,000
28	Final As-Built Survey	1.0	EA	\$8,000	\$8,000
Subtotal Cost:					\$4,204,878
Mobilization/Demobilization (5%):					\$211,000
CAMU-Related: Permitting, Administration, and Construction Oversight (25%):					\$1,052,000
Subtotal Cost:					\$5,467,878
Contingency (10%):					\$547,000
TOTAL ESTIMATED CAPITAL COSTS:					\$6,010,000

Note:

1. Cost estimate based on previous experience and vendor estimates.

TABLE I-8
ESTIMATED CAPITAL COSTS FOR CAMU - PHASE 2
DRAFT - MAY 2011
CMS FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION - MIDDLEPORT, NEW YORK

ITEM	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL ITEM COST
I. CONSTRUCTION COSTS					
<i>Site Preparation</i>					
1	Pre-Construction Site Survey	1	EA	\$5,000	\$5,000
2	Clearing and Grubbing	3.2	AC	\$1,700	\$5,440
3	Perimeter Access Road Subgrade (general fill)	4,200	CY	\$25	\$105,000
4	Perimeter Access Road Gravel	800	CY	\$32	\$25,600
5	Perimeter Access Road Non-Woven Geotextile (8-oz.)	24,900	SF	\$0.17	\$4,233
6	Perimeter Access Road Sideslope Topsoil	630	CY	\$30	\$18,900
7	Temporary Erosion and Sediment Control	8.5	AC	\$3,000	\$25,500
8	Existing Groundwater Conveyance System (retrofit)	1	LS	\$10,000	\$10,000
9	100,000-gallon Storage Tank	1	EA	\$500,000	\$500,000
10	Stormwater Management (basins, culverts, etc.)	1	LS	\$10,000	\$10,000
<i>Base Liner Construction</i>					
11	Subgrade Excavation	38,700	CY	\$5	\$193,500
12	Perimeter Berm (general fill)	15,500	CY	\$25	\$387,500
13	Perimeter Berm (sideslope topsoil)	1,000	CY	\$30	\$30,000
14	Liner System Anchor Trench	2,000	LF	\$30	\$60,000
15	Leachate Collection/Management System	1	LS	\$25,000	\$25,000
16	Base Liner As-Built Survey	2	EA	\$2,000	\$4,000
<i>Base Liner System Components</i>					
17	12" Select Fill (operations layer)	8,500	CY	\$30	\$255,000
18	8-oz. Non-Woven Geotextile	286,000	SF	\$0.17	\$48,620
19	12" Granular Drainage Layer (1 layer - to contain leachate piping)	7,000	CY	\$32	\$224,000
20	Leachate Collection Piping (1 layer)	2,600	LF	\$17	\$44,200
21	Geosynthetic Drainage Composite (1 layer)	286,000	SF	\$1.03	\$294,580
22	60-mil HDPE Flexible Membrane Liner (1 layer)	286,000	SF	\$0.70	\$200,200
23	Geosynthetic Clay Liner (1 layer)	286,000	SF	\$0.65	\$185,900
24	6" Select Fill	4,300	CY	\$30	\$129,000
<i>Waste Filling Operations</i>					
25	Consolidation Material Placement	115,000	CY	\$5	\$575,000
26	Leachate Management (collection and transfer)	1	LS	\$60,000	\$60,000
27	Interim Cover (general fill)	16,900	CY	\$25	\$422,500
28	As-Built Consolidation Surveys	4	EA	\$5,000	\$20,000
29	Environmental Monitoring	4	YR	\$30,000	\$120,000
30	Utility Services	4	YR	\$5,000	\$20,000
<i>Final Cover Construction</i>					
31	Final Cover Anchor Trench	2,300	LF	\$30	\$69,000
32	Final Cover Drainage Features (perimeter ditch, mid-slope swales, etc.)	1	LS	\$50,000	\$50,000
33	Passive Gas Vents	7	EA	\$750	\$5,250
<i>Final Cover System Components</i>					
34	4" Top Soil	3,900	CY	\$30	\$117,000
35	20" General Fill	19,700	CY	\$25	\$492,500
36	Geosynthetic Drainage Composite	359,000	SF	\$1	\$359,000
37	60-mil HDPE Flexible Membrane Liner	359,000	SF	\$0.70	\$251,300
38	3" Select Fill Layer	2,800	CY	\$30	\$84,000
<i>Restoration</i>					
39	Vegetative Cover (hydroseed, mulch, fertilizer)	8.5	AC	\$3,000	\$25,500
40	Misc. Site Restoration	1	LS	\$10,000	\$10,000
41	Final As-Built Survey	1.0	EA	\$5,000	\$5,000
Subtotal Cost:					\$5,477,223
Mobilization/Demobilization (5%):					\$274,000
CAMU-Related: Permitting, Administration, and Construction Oversight (25%):					\$1,370,000
Subtotal Cost					\$7,121,223
Contingency (10%):					\$713,000
TOTAL ESTIMATED CAPITAL COSTS:					\$7,830,000

Note:

1. Cost estimate based on previous experience and vendor estimates.