

Appendix C

DETAILED COST MODEL RESULTS

This appendix contains model results for sixty versions of the HWC MACT replacement standards that EPA considered in developing the proposed HWC MACT replacement standards. The first section of this appendix presents model results used in the development of the main body of this assessment. These results reflect potential price increases for hazardous waste incineration services in response to the HWC MACT replacement standards, as well as the most recent estimates of waste quantities, government costs, and monitoring/performance testing costs. In addition, this section presents results for both the primary analysis and the sensitivity analysis described in Chapter 5. For the primary analysis, we assume that commercial kilns and incinerators charge the same premium for treating halogenated waste and that commercial facilities pass 100 percent of their compliance costs on to their customers. In contrast, our sensitivity analysis assumes that commercial facilities do not increase prices in response to the standards and that commercial kilns charge lower prices than commercial incinerators for the treatment of halogenated waste. Only those versions of the standards analyzed in the main body of the assessment are presented in this section of the appendix.

The second section of this appendix provides cost model results for all sixty versions of the HWC MACT replacement standards that EPA considered in developing the proposed HWC MACT replacement standards. However, model results presented in the second section of the appendix do not reflect potential price increases or the most recent estimates of waste quantities, government administrative costs, or monitoring/performance testing costs.

MODEL RESULTS SUPPORTING THE DEVELOPMENT OF THIS ASSESSMENT

Primary Analysis

Net Private Costs, by Unit Type				
	SDL Option 1 Floor	Agency Preferred Approach	SDL Option 2 Floor	SDL Option 3 Floor
Commercial Incinerators	-\$10,821,290.61	-\$11,570,116.56	-\$14,888,516.54	-\$14,567,119.64
Cement Kilns	-\$2,404,504.35	-\$5,076,487.72	\$27,862.36	\$661,893.38
LWAKs	-\$220,000.14	\$3,169,558.03	-\$1,055,820.51	-\$743,412.06
Onsite Incinerators	\$10,220,330.48	\$10,222,423.41	\$12,488,850.09	\$11,834,229.60
Phase 1 Subtotal	-\$3,225,464.62	-\$3,254,622.84	-\$3,427,624.59	-\$2,814,408.72
Pre-existing customers of commercial combustion facilities	\$12,914,697.33	\$16,503,976.89	\$34,500,130.70	\$33,223,790.10
Liquid Boilers	\$35,324,735.84	\$35,481,322.78	\$45,848,148.37	\$54,659,516.09
Coal Boilers	\$1,542,757.23	\$5,024,179.25	\$1,544,514.47	\$1,544,410.39
HCl Production Furnaces	\$1,470,615.58	\$3,359,378.01	\$1,842,814.77	\$1,825,249.10
Phase 2 Subtotal	\$38,338,108.65	\$43,864,880.04	\$49,235,477.61	\$58,029,175.58
Total	\$48,027,341.36	\$57,114,234.09	\$80,307,983.72	\$88,438,556.96

Upgrade Expenditures, by Unit Type				
	SDL Option 1 Floor	Agency Preferred Approach	SDL Option 2 Floor	SDL Option 3 Floor
Commercial Incinerators	\$3,466,831.25	\$3,466,831.25	\$4,392,290.64	\$4,446,412.59
Cement Kilns	\$8,524,798.12	\$8,524,798.12	\$28,896,076.56	\$27,148,245.21
LWAKs	\$546,721.96	\$4,136,001.52	\$932,042.59	\$1,173,408.45
Onsite Incinerators	\$10,115,944.40	\$10,115,944.40	\$12,285,520.01	\$11,632,637.70
Phase 1 Subtotal	\$22,654,295.73	\$26,243,575.29	\$46,505,929.80	\$44,400,703.95
Liquid Boilers	\$33,212,344.89	\$33,365,511.21	\$40,746,594.64	\$51,734,745.94
Coal Boilers	\$1,412,664.59	\$4,893,793.90	\$1,412,664.59	\$1,412,664.59
HCl Production Furnaces	\$1,470,615.58	\$3,359,378.01	\$1,842,814.77	\$1,825,249.10
Phase 2 Subtotal	\$36,095,625.07	\$41,618,683.12	\$44,002,074.00	\$54,972,659.62
Total	\$58,749,920.80	\$67,862,258.40	\$90,508,003.80	\$99,373,363.57

Engineering Costs				
	SDL Option 1 Floor	Agency Preferred Approach	SDL Option 2 Floor	SDL Option 3 Floor
Commercial Incinerators	\$3,965,327.07	\$3,965,327.07	\$4,901,758.50	\$5,060,575.11
Cement Kilns	\$8,524,798.12	\$8,524,798.12	\$28,896,076.56	\$27,148,245.21
LWAKs	\$546,721.96	\$4,136,001.52	\$932,042.59	\$1,173,408.45
Onsite Incinerators	\$14,499,813.07	\$14,499,813.07	\$17,718,133.64	\$16,631,863.95
Phase 1 Subtotal	\$27,536,660.22	\$31,125,939.77	\$52,448,011.29	\$50,014,092.71
Liquid Boilers	\$43,433,811.04	\$43,608,921.16	\$59,202,114.50	\$67,595,056.06
Coal Boilers	\$1,899,440.95	\$6,864,742.06	\$1,899,440.95	\$1,899,440.95
HCl Production Furnaces	\$1,470,615.58	\$3,359,378.01	\$1,842,814.77	\$1,825,249.10
Phase 2 Subtotal	\$46,803,867.57	\$53,833,041.23	\$62,944,370.21	\$71,319,746.11
Total	\$74,340,527.78	\$84,958,981.00	\$115,392,381.50	\$121,333,838.82

Number of Closed Systems, by Unit Type					
	SDL Option 1 Floor	Agency Preferred Approach	SDL Option 2 Floor	SDL Option 3 Floor	Baseline Total
Commercial Incinerators	2	2	2	2	15
Cement Kilns	0	0	0	0	26
LWAKs	0	0	0	0	7
Onsite Incinerators	32	32	33	33	92
Liquid Boilers	22	22	29	27	107
Coal Boilers	2	2	2	2	12
HCl Production Furnaces	0	0	0	0	17
Total	58	58	66	64	276

Quantity of Waste Sent Offsite or Rerouted (tons)				
	SDL Option 1 Floor	Agency Preferred Approach	SDL Option 2 Floor	SDL Option 3 Floor
To Commercial Incinerators	44,548	44,548	48,230	48,230
To Cement Kilns or LWAKs	9,041	9,041	16,087	11,577
Non-commercial Consolidation	67,266	67,266	67,266	67,266
Total	120,855	120,855	131,582	127,072

Available Capacity at Commercial Facilities		
	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
SDL Option 1 Floor	116,547.89	495,834.52
Agency Preferred Approach	116,547.89	495,834.52
Post-MACT (tons)		
SDL Option 2 Floor	112,866.84	488,788.88
SDL Option 3 Floor	112,866.84	493,298.55

Government Costs	
	Annual Cost
SDL Option 1 Floor	\$447,479.75
Agency Preferred Approach	\$447,479.75
SDL Option 2 Floor	\$419,512.27
SDL Option 3 Floor	\$427,502.98

Number of Jobs Lost and Gained, by Unit Type									
	SDL Option 1 Floor		Agency Preferred Approach		SDL Option 2 Floor		SDL Option 3 Floor		
	<i>Lost</i>	<i>Gained</i>	<i>Lost</i>	<i>Gained</i>	<i>Lost</i>	<i>Gained</i>	<i>Lost</i>	<i>Gained</i>	
Commercial Incinerators	47.8	14.0	47.8	14.0	47.8	18.2	47.8	18.3	
Cement Kilns	0.0	42.5	0.0	42.5	0.0	149.0	0.0	141.1	
LWAKs	0.0	2.9	0.0	29.0	0.0	5.5	0.0	7.0	
Onsite Incinerators	237.2	42.5	237.2	42.5	245.2	51.2	245.2	48.2	
Liquid Boilers	92.0	201.3	92.0	200.9	119.3	234.0	113.3	303.8	
Coal Boilers	9.5	10.8	9.5	32.7	9.5	10.8	9.5	10.8	
HCl Production Furnaces	0.0	11.7	0.0	23.8	0.0	13.8	0.0	13.6	
APCD Industry	-	176.6	-	191.8	-	294.8	-	308.3	
Total	386.5	502.4	386.5	577.2	421.8	777.3	415.8	851.0	

Sensitivity Analysis

Net Private Costs, by Unit Type				
	SDL Option 1 Floor	Agency Preferred Approach	SDL Option 2 Floor	SDL Option 3 Floor
Commercial Incinerators	-\$8,505,235.00	-\$8,505,235.00	-\$7,579,775.60	-\$7,525,653.66
Cement Kilns	\$7,002,701.35	\$7,002,701.35	\$25,920,944.37	\$25,341,532.79
LWAKs	\$473,665.54	\$4,062,945.10	\$858,986.17	\$1,100,352.03
Onsite Incinerators	\$10,197,656.77	\$10,197,656.77	\$12,432,066.18	\$11,779,183.87
Phase 1 Subtotal	\$9,168,788.67	\$12,758,068.23	\$31,632,221.11	\$30,695,415.03
Liquid Boilers	\$35,279,313.21	\$35,432,479.53	\$45,388,962.55	\$54,459,477.09
Coal Boilers	\$1,541,708.68	\$5,022,837.99	\$1,541,708.68	\$1,541,708.68
HCl Production Furnaces	\$1,470,615.58	\$3,359,378.01	\$1,842,814.77	\$1,825,249.10
Phase 2 Subtotal	\$38,291,637.47	\$43,814,695.52	\$48,773,486.00	\$57,826,434.87
Total	\$47,460,426.15	\$56,572,763.75	\$80,405,707.11	\$88,521,849.90

Upgrade Expenditures, by Unit Type				
	SDL Option 1 Floor	Agency Preferred Approach	SDL Option 2 Floor	SDL Option 3 Floor
Commercial Incinerators	\$3,466,831.25	\$3,466,831.25	\$4,392,290.64	\$4,446,412.59
Cement Kilns	\$8,524,798.12	\$8,524,798.12	\$28,896,076.56	\$27,148,245.21
LWAKs	\$546,721.96	\$4,136,001.52	\$932,042.59	\$1,173,408.45
Onsite Incinerators	\$9,871,491.15	\$9,871,491.15	\$12,105,900.55	\$11,453,018.24
Phase 1 Subtotal	\$22,409,842.48	\$25,999,122.03	\$46,326,310.34	\$44,221,084.49
Liquid Boilers	\$32,876,495.75	\$33,029,662.07	\$40,574,399.89	\$51,557,168.88
Coal Boilers	\$1,412,664.59	\$4,893,793.90	\$1,412,664.59	\$1,412,664.59
HCl Production Furnaces	\$1,470,615.58	\$3,359,378.01	\$1,842,814.77	\$1,825,249.10
Phase 2 Subtotal	\$35,759,775.93	\$41,282,833.98	\$43,829,879.25	\$54,795,082.57
Total	\$58,169,618.40	\$67,281,956.01	\$90,156,189.59	\$99,016,167.06

Engineering Costs				
	SDL Option 1 Floor	Agency Preferred Approach	SDL Option 2 Floor	SDL Option 3 Floor
Commercial Incinerators	\$3,965,327.07	\$3,965,327.07	\$4,901,758.50	\$5,060,575.11
Cement Kilns	\$8,524,798.12	\$8,524,798.12	\$28,896,076.56	\$27,148,245.21
LWAKs	\$546,721.96	\$4,136,001.52	\$932,042.59	\$1,173,408.45
Onsite Incinerators	\$14,499,813.07	\$14,499,813.07	\$17,718,133.64	\$16,631,863.95
Phase 1 Subtotal	\$27,536,660.22	\$31,125,939.77	\$52,448,011.29	\$50,014,092.71
Liquid Boilers	\$43,433,811.04	\$43,608,921.16	\$59,202,114.50	\$67,595,056.06
Coal Boilers	\$1,899,440.95	\$6,864,742.06	\$1,899,440.95	\$1,899,440.95
HCl Production Furnaces	\$1,470,615.58	\$3,359,378.01	\$1,842,814.77	\$1,825,249.10
Phase 2 Subtotal	\$46,803,867.57	\$53,833,041.23	\$62,944,370.21	\$71,319,746.11
Total	\$74,340,527.78	\$84,958,981.00	\$115,392,381.50	\$121,333,838.82

Quantity of Waste Sent Offsite or Rerouted (tons)				
	SDL Option 1 Floor	Agency Preferred Approach	SDL Option 2 Floor	SDL Option 3 Floor
To Commercial Incinerators	55,751	55,751	55,751	55,751
To Cement Kilns or LWAKs	9,936	9,936	16,415	11,906
Intra-Facility Consolidation	67,266	67,266	67,266	67,266
Total	132,953	132,953	139,432	134,923

Available Capacity at Commercial Facilities		
	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
SDL Option 1 Floor	105,344.96	494,939.68
Agency Preferred Approach	105,344.96	494,939.68
SDL Option 2 Floor	105,344.96	488,460.19
SDL Option 3 Floor	105,344.96	492,969.86

Number of Closed Systems, by System Type					
	SDL Option 1 Floor	Agency Preferred Approach	SDL Option 2 Floor	SDLOption 3 Floor	Baseline Total
Commercial Incinerators	2	2	2	2	15
Cement Kilns	0	0	0	0	26
LWAKs	0	0	0	0	7
Onsite Incinerators	34	34	34	34	92
Liquid Boilers	25	25	30	28	108
Coal Boilers	2	2	2	2	17
HCl Production Furnaces	0	0	0	0	11
Total	63	63	68	66	276

Government Costs	
	Annual Cost
SDL Option 1 Floor	\$435,493.69
Agency Preferred Approach	\$435,493.69
SDL Option 2 Floor	\$415,516.91
SDL Option 3 Floor	\$423,507.62

Number of Jobs Lost and Gained, by System Type								
	SDL Option 1 Floor		Agency Preferred Approach		SDL Option 2 Floor		SDL Option 3 Floor	
	<i>Lost</i>	<i>Gained</i>	<i>Lost</i>	<i>Gained</i>	<i>Lost</i>	<i>Gained</i>	<i>Lost</i>	<i>Gained</i>
Commercial Incinerators	47.8	14.0	47.8	14.0	47.8	18.2	47.8	18.3
Cement Kilns	0.0	42.5	0.0	42.5	0.0	149.0	0.0	141.1
LWAKs	0.0	2.9	0.0	29.0	0.0	5.5	0.0	7.0
Onsite Incinerators	253.2	41.4	253.2	41.4	253.2	50.2	253.2	47.2
Liquid Boilers	106.7	198.6	106.7	198.2	125.0	232.7	119.0	302.5
Coal Boilers	9.5	10.8	9.5	32.7	9.5	10.8	9.5	10.8
HCl Production Furnaces	0.0	11.7	0.0	23.8	0.0	13.8	0.0	13.6
APCD Industry	-	175.1	-	190.3	-	293.9	-	307.4
Total	417.2	497.1	417.2	571.9	435.5	774.2	429.5	847.8

MODEL RESULTS FOR SIXTY VERSIONS OF THE HWC MACT REPLACEMENT STANDARDS

Results: SDL Option 1 with Chlorine Controls

Net Private Costs, by Unit Type: SDL Option 1					
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls
Commercial Incinerators	-\$2,768,627.65	-\$2,768,627.65	-\$2,768,627.65	-\$2,768,627.65	-\$2,768,627.65
Cement Kilns	\$5,981,005.36	\$5,981,005.36	\$4,732,844.99	\$4,732,844.99	\$4,732,844.99
LWAKs	\$327,612.44	\$327,612.44	\$170,928.54	\$2,046,412.27	\$3,760,208.10
Onsite Incinerators	\$9,959,698.77	\$9,959,698.77	\$9,959,698.77	\$9,959,698.77	\$9,959,698.77
Phase 1 Subtotal	\$13,499,688.93	\$13,499,688.93	\$12,094,844.65	\$13,970,328.38	\$15,684,124.21
Boilers	\$34,497,216.70	\$35,603,037.20	\$36,326,279.20	\$36,326,279.20	\$36,378,273.33
Halogen-Acid Furnaces	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$3,190,517.56
Process Heaters	\$1,530,046.37	\$1,530,046.37	\$1,530,046.37	\$1,530,046.37	\$1,530,046.37
Phase 2 Subtotal	\$37,329,018.21	\$38,434,838.71	\$39,158,080.71	\$39,158,080.71	\$41,098,837.27
Total	\$50,828,707.14	\$51,934,527.64	\$51,252,925.36	\$53,128,409.09	\$56,782,961.47

Number of Closed Systems, by Unit Type: SDL Option 1						
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls	Baseline Total
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	32	32	32	32	32	92
Boilers	23	23	27	27	27	108
Halogen-Acid Furnaces	0	0	0	0	0	17
Process Heaters	4	4	4	4	4	11
Total	59	59	63	63	63	276

Upgrade Expenditures, by Unit Type: SDL Option 1					
	SDL Floor: w/ CI	SDL BTF-A: w/ CI	SDL BTF-B: w/ CI	SDL BTF-C: w/ CI	SDL BTF-D: w/ CI
	Controls	Controls	Controls	Controls	Controls
Commercial Incinerators	\$3,902,747.07	\$3,902,747.07	\$3,902,747.07	\$3,902,747.07	\$3,902,747.07
Cement Kilns	\$8,416,326.12	\$8,416,326.12	\$8,416,326.12	\$8,416,326.12	\$8,416,326.12
LWAKs	\$517,517.96	\$517,517.96	\$517,517.96	\$2,393,001.69	\$4,106,797.52
Onsite Incinerators	\$9,862,642.68	\$9,862,642.68	\$9,862,642.68	\$9,862,642.68	\$9,862,642.68
Phase 1 Subtotal	\$22,699,233.83	\$22,699,233.83	\$22,699,233.83	\$24,574,717.56	\$26,288,513.39
Boilers	\$31,520,937.78	\$32,626,758.27	\$31,920,035.64	\$31,920,035.64	\$31,972,029.77
Halogen-Acid Furnaces	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$3,190,517.56
Process Heaters	\$1,067,436.51	\$1,067,436.51	\$1,067,436.51	\$1,067,436.51	\$1,067,436.51
Phase 2 Subtotal	\$33,890,129.43	\$34,995,949.92	\$34,289,227.29	\$34,289,227.29	\$36,229,983.85
Total	\$56,589,363.26	\$57,695,183.75	\$56,988,461.12	\$58,863,944.85	\$62,518,497.23

Engineering Costs: SDL Option 1					
	SDL Floor: w/ CI	SDL BTF-A: w/ CI	SDL BTF-B: w/ CI	SDL BTF-C: w/ CI	SDL BTF-D: w/ CI
	Controls	Controls	Controls	Controls	Controls
Commercial Incinerators	\$3,902,747.07	\$3,902,747.07	\$3,902,747.07	\$3,902,747.07	\$3,902,747.07
Cement Kilns	\$8,416,326.12	\$8,416,326.12	\$8,416,326.12	\$8,416,326.12	\$8,416,326.12
LWAKs	\$517,517.96	\$517,517.96	\$517,517.96	\$2,393,001.69	\$4,106,797.52
Onsite Incinerators	\$14,115,989.07	\$14,115,989.07	\$14,115,989.07	\$14,115,989.07	\$14,115,989.07
Phase 1 Subtotal	\$26,952,580.22	\$26,952,580.22	\$26,952,580.22	\$28,828,063.95	\$30,541,859.77
Boilers	\$43,720,112.03	\$44,888,874.49	\$48,786,585.32	\$48,786,585.32	\$48,860,523.27
Halogen-Acid Furnaces	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$3,190,517.56
Process Heaters	\$1,917,592.40	\$1,917,592.40	\$1,917,592.40	\$1,917,592.40	\$1,917,592.40
Phase 2 Subtotal	\$46,939,459.57	\$48,108,222.03	\$52,005,932.87	\$52,005,932.87	\$53,968,633.23
Total	\$73,892,039.78	\$75,060,802.24	\$78,958,513.08	\$80,833,996.81	\$84,510,493.00

Quantity of Waste Sent Offsite or Rerouted (in tons): SDL Option 1					
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls
To Commercial Incinerators	27,654	27,654	27,654	27,654	27,654
To Cement Kilns or LWAKs	14,152	14,152	16,492	16,492	16,492
Total	41,806	41,806	44,147	44,147	44,147

Available Capacity at Commercial Facilities: SDL Option 1		
	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
SDL Floor w/ CI Controls	160,538.55	490,723.83
SDL BTF-A w/ CI Controls	160,538.55	490,723.83
Post-MACT (tons)		
SDL BTF-B w/ CI Controls	160,538.55	488,383.30
SDL BTF-C w/ CI Controls	160,538.55	488,383.30
SDL BTF-D w/ CI Controls	160,538.55	488,383.30

Government Costs: SDL Option 1	
	Annual Cost
SDL Floor w/ Chlorine Controls	\$963,345.77
SDL BTF-A w/ Chlorine Controls	\$963,345.77
SDL BTF-B w/ Chlorine Controls	\$927,993.63
SDL BTF-C w/ Chlorine Controls	\$927,993.63
SDL BTF-D w/ Chlorine Controls	\$927,993.63

Number of Jobs Lost and Gained, by Unit Type: SDL Option 1										
	SDL Floor w/ CI Controls		SDL BTF-A w/ CI Controls		SDL BTF-B w/ CI Controls		SDL BTF-C w/ CI Controls		SDL BTF-D w/ CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	17.4	0.0	17.4	0.0	17.4	0.0	17.4	0.0	17.4
Cement Kilns	0.0	41.4	0.0	41.4	0.0	41.4	0.0	41.4	0.0	41.4
LWAKs	0.0	2.6	0.0	2.6	0.0	2.6	0.0	16.9	0.0	28.7
Onsite Incinerators	236.4	40.8	236.4	40.8	236.4	40.8	236.4	40.8	236.4	40.8
Boilers	95.9	192.8	95.9	196.6	110.1	190.9	110.1	190.9	110.1	190.9
Halogen-Acid Furnaces	0.0	11.9	0.0	11.9	0.0	11.9	0.0	11.9	0.0	24.0
Process Heaters	18.0	7.7	18.0	7.7	18.0	7.7	18.0	7.7	18.0	7.7
APCD Industry	-	168.0	-	174.4	-	172.2	-	173.3	-	179.8
Total	350.3	482.6	350.3	492.8	364.5	485.0	364.5	500.3	364.5	530.7

Results: SDL Option 1 without Chlorine Controls

Net Private Costs, by Unit Type: SDL Option 1					
	SDL Floor: w/o CI Controls	SDL BTF-A: w/o CI Controls	SDL BTF-B: w/o CI Controls	SDL BTF-C: w/o CI Controls	SDL BTF-D: w/o CI Controls
Commercial Incinerators	-\$5,387,147.53	-\$5,387,147.53	-\$5,387,147.53	-\$5,387,147.53	-\$5,387,147.53
Cement Kilns	\$6,131,454.76	\$6,131,454.76	\$6,131,454.76	\$6,131,454.76	\$6,131,454.76
LWAKs	\$402,801.90	\$402,801.90	\$402,801.90	\$402,801.90	\$2,116,597.72
Onsite Incinerators	\$2,105,785.00	\$2,105,785.00	\$2,105,785.00	\$2,105,785.00	\$2,105,785.00
Phase 1 Subtotal	\$3,252,894.12	\$3,252,894.12	\$3,252,894.12	\$3,252,894.12	\$4,966,689.95
Boilers	\$31,028,277.09	\$32,187,323.34	\$32,187,323.34	\$32,187,323.34	\$32,240,735.16
Halogen-Acid Furnaces	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$3,190,517.56
Process Heaters	\$1,318,099.00	\$1,318,099.00	\$1,318,099.00	\$1,318,099.00	\$1,318,099.00
Phase 2 Subtotal	\$33,648,131.22	\$34,807,177.48	\$34,807,177.48	\$34,807,177.48	\$36,749,351.72
Total	\$36,901,025.35	\$38,060,071.60	\$38,060,071.60	\$38,060,071.60	\$41,716,041.66

Upgrade Expenditures, by Unit Type: SDL Option 1					
	SDL Floor: w/o CI Controls	SDL BTF-A: w/o CI Controls	SDL BTF-B: w/o CI Controls	SDL BTF-C: w/o CI Controls	SDL BTF-D: w/o CI Controls
Commercial Incinerators	\$1,284,227.18	\$1,284,227.18	\$1,284,227.18	\$1,284,227.18	\$1,284,227.18
Cement Kilns	\$7,866,856.62	\$7,866,856.62	\$7,866,856.62	\$7,866,856.62	\$7,866,856.62
LWAKs	\$517,517.96	\$517,517.96	\$517,517.96	\$517,517.96	\$2,231,313.79
Onsite Incinerators	\$2,008,728.91	\$2,008,728.91	\$2,008,728.91	\$2,008,728.91	\$2,008,728.91
Phase 1 Subtotal	\$11,677,330.67	\$11,677,330.67	\$11,677,330.67	\$11,677,330.67	\$13,391,126.49
Boilers	\$29,501,007.80	\$30,660,054.05	\$30,660,054.05	\$30,660,054.05	\$30,713,465.86
Halogen-Acid Furnaces	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$3,190,517.56
Process Heaters	\$955,910.65	\$955,910.65	\$955,910.65	\$955,910.65	\$955,910.65
Phase 2 Subtotal	\$31,758,673.58	\$32,917,719.84	\$32,917,719.84	\$32,917,719.84	\$34,859,894.08
Total	\$43,436,004.25	\$44,595,050.50	\$44,595,050.50	\$44,595,050.50	\$48,251,020.57

Engineering Costs: SDL Option 1					
	SDL Floor: w/o CI	SDL BTF-A: w/o CI	SDL BTF-B: w/o CI	SDL BTF-C: w/o CI	SDL BTF-D: w/o
	Controls	Controls	Controls	Controls	CI Controls
Commercial Incinerators	\$1,284,227.18	\$1,284,227.18	\$1,284,227.18	\$1,284,227.18	\$1,284,227.18
Cement Kilns	\$7,866,856.62	\$7,866,856.62	\$7,866,856.62	\$7,866,856.62	\$7,866,856.62
LWAKs	\$517,517.96	\$517,517.96	\$517,517.96	\$517,517.96	\$2,231,313.79
Onsite Incinerators	\$2,975,689.14	\$2,975,689.14	\$2,975,689.14	\$2,975,689.14	\$2,975,689.14
Phase 1 Subtotal	\$12,644,290.90	\$12,644,290.90	\$12,644,290.90	\$12,644,290.90	\$14,358,086.72
Boilers	\$39,108,586.51	\$40,330,574.73	\$40,330,574.73	\$40,330,574.73	\$40,383,986.54
Halogen-Acid Furnaces	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$1,301,755.14	\$3,190,517.56
Process Heaters	\$1,644,420.72	\$1,644,420.72	\$1,644,420.72	\$1,644,420.72	\$1,644,420.72
Phase 2 Subtotal	\$42,054,762.36	\$43,276,750.58	\$43,276,750.58	\$43,276,750.58	\$45,218,924.82
Total	\$54,699,053.26	\$55,921,041.48	\$55,921,041.48	\$55,921,041.48	\$59,577,011.54

Number of Closed Combustion Systems, by Unit Type: Option 1						
	SDL Floor: w/o	SDL BTF-A: w/o	SDL BTF-B:	SDL BTF-C: w/o	SDL BTF-D:	Baseline
	CI Controls	CI Controls	w/o CI	CI Controls	w/o CI	
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	29	29	29	29	29	92
Boilers	20	20	20	20	20	108
Halogen-Acid Furnaces	0	0	0	0	0	17
Process Heaters	3	3	3	3	3	11
Total	52	52	52	52	52	276

Quantity of Waste Sent Offsite or Rerouted (in tons): Option 1

	SDL Floor: w/o CI Controls	SDL BTF-A: w/o CI Controls	SDL BTF-B: w/o CI Controls	SDL BTF-C: w/o CI Controls	SDL BTF-D: w/o CI Controls
To Commercial Incinerators	27,654	27,654	27,654	27,654	27,654
To Cement Kilns or LWAKs	8,776	8,776	8,776	8,776	8,776
Total	36,430	36,430	36,430	36,430	36,430

Available Capacity at Commercial Facilities: Option 1

	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
Post-MACT (tons)		
SDL Floor w/o CI Controls	160,538.55	496,099.88
SDL BTF-A w/o CI Controls	160,538.55	496,099.88
SDL BTF-B w/o CI Controls	160,538.55	496,099.88
SDL BTF-C w/o CI Controls	160,538.55	496,099.88
SDL BTF-D w/o CI Controls	160,538.55	496,099.88

Government Costs: SDL Option 1

	Annual Cost
SDL Floor w/o Chlorine Controls	\$998,697.90
SDL BTF-A w/o Chlorine Controls	\$998,697.90
SDL BTF-B w/o Chlorine Controls	\$998,697.90
SDL BTF-C w/o Chlorine Controls	\$998,697.90
SDL BTF-D w/o Chlorine Controls	\$998,697.90

Number of Jobs Lost and Gained, by Unit Type: Option 1										
	SDL Floor w/o CI Controls		SDL BTF-A w/o CI Controls		SDL BTF-B w/o CI Controls		SDL BTF-C w/o CI Controls		SDL BTF-D w/o CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	5.19	0.00	5.19	0.00	5.19	0.00	5.19	0.00	5.19
Cement Kilns	0.0	38.58	0.00	38.58	0.00	38.58	0.00	38.58	0.00	38.58
LWAKs	0.0	2.65	0.00	2.65	0.00	2.65	0.00	2.65	0.00	14.39
Onsite Incinerators	215.5	6.22	215.47	6.22	215.47	6.22	215.47	6.22	215.47	6.22
Boilers	83.4	182.80	83.42	186.55	83.42	186.55	83.42	186.55	83.42	186.71
Halogen-Acid Furnaces	0.0	11.89	0.00	11.89	0.00	11.89	0.00	11.89	0.00	24.02
Process Heaters	12.3	7.40	12.35	7.40	12.35	7.40	12.35	7.40	12.35	7.40
APCD Industry	-	125.26	-	131.72	-	131.72	-	131.72	-	138.24
Total	311.2	379.97	311.24	390.19	311.24	390.19	311.24	390.19	311.24	420.74

Results: 70 Percent Design Level Option 1 with Chlorine Controls

Net Private Costs, by Unit Type: 70% DL Option 1					
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
Commercial Incinerators	-\$3,092,600.34	-\$3,092,600.34	-\$3,092,600.34	-\$3,092,600.34	-\$3,092,600.34
Cement Kilns	\$3,643,484.69	\$3,550,062.59	\$2,301,902.21	\$2,301,902.21	\$2,301,902.21
LWAKs	-\$113,595.01	-\$125,832.45	-\$282,516.36	\$1,531,987.61	\$3,387,535.48
Onsite Incinerators	\$9,198,942.01	\$9,198,942.01	\$9,198,942.01	\$9,198,942.01	\$9,198,942.01
Phase 1 Subtotal	\$9,636,231.35	\$9,530,571.81	\$8,125,727.53	\$9,940,231.49	\$11,795,779.36
Boilers and Process Heaters	\$34,106,018.67	\$34,380,214.84	\$35,391,707.38	\$35,391,707.38	\$35,463,419.34
Halogen-Acid Furnaces	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$2,730,068.72
Phase 2 Subtotal	\$35,234,734.83	\$35,508,930.99	\$36,520,423.54	\$36,520,423.54	\$38,193,488.06
Total	\$44,870,966.18	\$45,039,502.80	\$44,646,151.07	\$46,460,655.03	\$49,989,267.43

Upgrade Expenditures, by Unit Type: 70% DL Option 1					
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
Commercial Incinerators	\$3,554,845.16	\$3,554,845.16	\$3,554,845.16	\$3,554,845.16	\$3,554,845.16
Cement Kilns	\$5,985,383.35	\$5,985,383.35	\$5,985,383.35	\$5,985,383.35	\$5,985,383.35
LWAKs	\$64,073.06	\$64,073.06	\$64,073.06	\$1,878,577.03	\$3,734,124.90
Onsite Incinerators	\$9,110,535.15	\$9,110,535.15	\$9,110,535.15	\$9,110,535.15	\$9,110,535.15
Phase 1 Subtotal	\$18,714,836.73	\$18,714,836.73	\$18,714,836.73	\$20,529,340.69	\$22,384,888.56
Boilers and Process Heaters	\$30,796,172.62	\$30,941,326.05	\$30,522,853.97	\$30,522,853.97	\$30,594,565.92
Halogen-Acid Furnaces	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$2,730,068.72
Phase 2 Subtotal	\$31,924,888.78	\$32,070,042.21	\$31,651,570.12	\$31,651,570.12	\$33,324,634.64
Total	\$50,639,725.50	\$50,784,878.93	\$50,366,406.84	\$52,180,910.81	\$55,709,523.20

Number of Closed Systems, by Unit Type: 70% DL Option 1						
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls	Baseline Total
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	29	29	29	29	29	92
Boilers	22	23	27	27	27	108
Halogen-Acid Furnaces	0	0	0	0	0	17
Process Heaters	4	4	4	4	4	11
Total	55	56	60	60	60	276

Engineering Costs: 70% DL Option 1					
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
Commercial Incinerators	\$3,554,845.16	\$3,554,845.16	\$3,554,845.16	\$3,554,845.16	\$3,554,845.16
Cement Kilns	\$5,985,383.35	\$5,985,383.35	\$5,985,383.35	\$5,985,383.35	\$5,985,383.35
LWAKs	\$64,073.06	\$64,073.06	\$64,073.06	\$1,878,577.03	\$3,734,124.90
Onsite Incinerators	\$12,326,428.12	\$12,326,428.12	\$12,326,428.12	\$12,326,428.12	\$12,326,428.12
Phase 1 Subtotal	\$21,930,729.69	\$21,930,729.69	\$21,930,729.69	\$23,745,233.66	\$25,600,781.53
Boilers and Process Heaters	\$43,184,626.31	\$43,478,195.85	\$47,270,892.92	\$47,270,892.92	\$47,366,377.34
Halogen-Acid Furnaces	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$2,730,068.72
Phase 2 Subtotal	\$44,313,342.46	\$44,606,912.00	\$48,399,609.08	\$48,399,609.08	\$50,096,446.06
Total	\$66,244,072.15	\$66,537,641.70	\$70,330,338.77	\$72,144,842.74	\$75,697,227.59

Quantity of Waste Sent Offsite or Rerouted (in tons): 70% DL Option 1

	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
To Commercial Incinerators	25,378	25,378	25,378	25,378	25,378
To Cement Kilns or LWAKs	13,400	14,152	16,492	16,492	16,492
Total	38,778	39,530	41,870	41,870	41,870

Available Capacity at Commercial Facilities: 70% DL Option 1

	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
70% DL Floor w/ CI Controls	162,814.78	491,475.42
70% DL BTF-A w/ CI Controls	162,814.78	490,723.83
Post-MACT (tons) 70% DL BTF-B w/ CI Controls	162,814.78	488,383.30
70% DL BTF-C w/ CI Controls	162,814.78	488,383.30
70% DL BTF-D w/ CI Controls	162,814.78	488,383.30

Government Costs: 70% DL Option 1

	Annual Cost
70% DL Floor w/ CI Controls	\$972,183.80
70% DL BTF-A w/ CI Controls	\$963,345.77
70% DL BTF-B w/ CI Controls	\$927,993.63
70% DL BTF-C w/ CI Controls	\$927,993.63
70% DL BTF-D w/ CI Controls	\$927,993.63

Number of Jobs Lost and Gained, by Unit Type: 70% DL Option 1

	70% DL Floor w/ CI		70% DL BTF-A w/ CI		70% DL BTF-B w/ CI		70% DL BTF-C w/ CI		70% DL BTF-D w/ CI	
	Controls		Controls		Controls		Controls		Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	17.7	0.0	17.7	0.0	17.7	0.0	17.7	0.0	17.7
Cement Kilns	0.0	27.7	0.0	27.7	0.0	27.7	0.0	27.7	0.0	27.7
LWAKs	0.0	0.1	0.0	0.1	0.0	0.1	0.0	14.1	0.0	26.4
Onsite Incinerators	214.5	39.1	214.5	39.1	214.5	39.1	214.5	39.1	214.5	39.1
Boilers	90.2	183.1	95.9	183.7	110.1	180.3	110.1	180.3	110.1	180.3
Halogen-Acid Furnaces	0.0	10.5	0.0	10.5	0.0	10.5	0.0	10.5	0.0	20.7
Process Heaters	18.0	7.1	18.0	7.1	18.0	7.1	18.0	7.1	18.0	7.1
APCD Industry	-	147.1	-	147.7	-	146.6	-	147.4	-	154.1
Total	322.7	432.3	328.4	433.5	342.6	429.1	342.6	443.9	342.6	473.1

Results: 70 Percent Design Level Option 1 without Chlorine Controls

Net Private Costs, by Unit Type: 70%DL Option 1					
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
Commercial Incinerators	-\$5,152,474.87	-\$5,152,474.87	-\$5,152,474.87	-\$5,152,474.87	-\$5,152,474.87
Cement Kilns	\$3,784,621.05	\$3,691,198.94	\$3,691,198.94	\$3,691,198.94	\$3,691,198.94
LWAKs	-\$38,405.56	-\$50,643.00	-\$50,643.00	-\$50,643.00	\$1,804,904.87
Onsite Incinerators	\$2,397,585.08	\$2,397,585.08	\$2,397,585.08	\$2,397,585.08	\$2,397,585.08
Phase 1 Subtotal	\$991,325.70	\$885,666.16	\$885,666.16	\$885,666.16	\$2,741,214.03
Boilers	\$25,869,347.38	\$26,143,543.54	\$28,856,498.77	\$28,856,498.77	\$28,938,989.19
Halogen-Acid Furnaces	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$2,730,068.72
Process Heaters	\$1,171,810.76	\$1,171,810.76	\$1,208,119.03	\$1,208,119.03	\$1,208,119.03
Phase 2 Subtotal	\$28,169,874.29	\$28,444,070.45	\$31,193,333.96	\$31,193,333.96	\$32,877,176.95
Total	\$29,161,199.99	\$29,329,736.61	\$32,079,000.11	\$32,079,000.11	\$35,618,390.97

Upgrade Expenditures, by Unit Type: 70%DL Option 1					
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
Commercial Incinerators	\$1,518,631.91	\$1,518,631.91	\$1,518,631.91	\$1,518,631.91	\$1,518,631.91
Cement Kilns	\$5,426,600.80	\$5,426,600.80	\$5,426,600.80	\$5,426,600.80	\$5,426,600.80
LWAKs	\$64,073.06	\$64,073.06	\$64,073.06	\$64,073.06	\$1,919,620.93
Onsite Incinerators	\$2,397,585.08	\$2,397,585.08	\$2,397,585.08	\$2,397,585.08	\$2,397,585.08
Phase 1 Subtotal	\$9,406,890.85	\$9,406,890.85	\$9,406,890.85	\$9,406,890.85	\$11,262,438.72
Boilers	\$24,471,120.82	\$24,616,274.25	\$27,329,229.48	\$27,329,229.48	\$27,411,719.90
Halogen-Acid Furnaces	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$2,730,068.72
Process Heaters	\$809,622.41	\$809,622.41	\$845,930.68	\$845,930.68	\$845,930.68
Phase 2 Subtotal	\$26,409,459.38	\$26,554,612.81	\$29,303,876.32	\$29,303,876.32	\$30,987,719.31
Total	\$35,816,350.23	\$35,961,503.66	\$38,710,767.17	\$38,710,767.17	\$42,250,158.03

Engineering Costs: 70% DL Option 1					
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
Commercial Incinerators	\$1,518,631.91	\$1,518,631.91	\$1,518,631.91	\$1,518,631.91	\$1,518,631.91
Cement Kilns	\$5,426,600.80	\$5,426,600.80	\$5,426,600.80	\$5,426,600.80	\$5,426,600.80
LWAKs	\$64,073.06	\$64,073.06	\$64,073.06	\$64,073.06	\$1,919,620.93
Onsite Incinerators	\$3,282,760.41	\$3,282,760.41	\$3,282,760.41	\$3,282,760.41	\$3,282,760.41
Phase 1 Subtotal	\$10,292,066.19	\$10,292,066.19	\$10,292,066.19	\$10,292,066.19	\$12,147,614.06
Boilers	\$32,614,753.35	\$32,908,322.89	\$36,404,856.54	\$36,404,856.54	\$36,487,346.96
Halogen-Acid Furnaces	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$1,128,716.15	\$2,730,068.72
Process Heaters	\$1,419,715.03	\$1,419,715.03	\$1,509,194.79	\$1,509,194.79	\$1,509,194.79
Phase 2 Subtotal	\$35,163,184.54	\$35,456,754.08	\$39,042,767.48	\$39,042,767.48	\$40,726,610.47
Total	\$45,455,250.72	\$45,748,820.26	\$49,334,833.67	\$49,334,833.67	\$52,874,224.53

Number of Closed Systems, by Unit Type: 70% DL Option 1						
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls	Baseline Total
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	27	27	27	27	27	92
Boilers	19	20	20	20	20	108
Halogen-Acid Furnaces	0	0	0	0	0	17
Process Heaters	3	3	3	3	3	11
Total	49	50	50	50	50	276

Quantity of Waste Sent Offsite or Rerouted (in tons): 70 %DL Option 1

	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
To Commercial Incinerators	20,279	20,279	20,279	20,279	20,279
To Cement Kilns or LWAKs	8,024	8,776	8,776	8,776	8,776
Total	28,303	29,055	29,055	29,055	29,055

Available Capacity at Commercial Facilities: 70%DL Option 1

	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
70% DL Floor w/o CI Controls	167,914.01	496,851.46
70% DL BTF-A w/o CI Controls	167,914.01	496,099.88
Post-MACT (tons) 70% DL BTF-B w/o CI Controls	167,914.01	496,099.88
70% DL BTF-C w/o CI Controls	167,914.01	496,099.88
70% DL BTF-D w/o CI Controls	167,914.01	496,099.88

Government Costs: 70%DL Option 1

	Annual Cost
70% DL Floor w/o CI Controls	\$1,007,535.94
70% DL BTF-A w/o CI Controls	\$998,697.90
70% DL BTF-B w/o CI Controls	\$998,697.90
70% DL BTF-C w/o CI Controls	\$998,697.90
70% DL BTF-D w/o CI Controls	\$998,697.90

Number of Jobs Lost and Gained, by Unit Type: 70% DL Option 1										
	70% DL Floor w/o		70% DL BTF-A w/o		70% DL BTF-B w/o		70% DL BTF-C w/o		70% DL BTF-D w/o	
	CI Controls		CI Controls		CI Controls		CI Controls		CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	8.0	0.0	8.0	0.0	8.0	0.0	8.0	0.0	8.0
Cement Kilns	0.0	24.8	0.0	24.8	0.0	24.8	0.0	24.8	0.0	24.8
LWAKs	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	12.4
Onsite Incinerators	199.5	9.8	199.5	9.8	199.5	9.8	199.5	9.8	199.5	9.8
Boilers	77.7	149.2	83.4	149.8	83.4	171.5	83.4	171.5	83.4	171.7
Halogen-Acid Furnaces	0.0	10.5	0.0	10.5	0.0	10.5	0.0	10.5	0.0	20.7
Process Heaters	12.3	6.4	12.3	6.4	12.3	6.7	12.3	6.7	12.3	6.7
APCD Industry	-	106.1	-	106.7	-	106.7	-	106.7	-	113.4
Total	289.5	315.0	295.2	316.2	295.2	338.2	295.2	338.2	295.2	367.6

Results: SDL Option 2 with Chlorine Controls

Net Private Costs, by Unit Type: SDL Option 2					
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls
Commercial Incinerators	-\$1,832,196.21	-\$1,832,196.21	-\$1,832,196.21	-\$1,832,196.21	-\$1,832,196.21
Cement Kilns	\$24,505,300.49	\$24,505,300.49	\$23,831,885.46	\$23,831,885.46	\$23,257,140.11
LWAKs	\$691,405.99	\$691,405.99	\$606,870.94	\$2,037,809.85	\$3,728,471.43
Onsite Incinerators	\$12,176,052.80	\$12,176,052.80	\$12,176,052.80	\$12,176,052.80	\$12,176,052.80
Phase 1 Subtotal	\$35,540,563.06	\$35,540,563.06	\$34,782,612.98	\$36,213,551.89	\$37,329,468.13
Boilers	\$43,925,089.33	\$44,819,616.89	\$45,581,980.57	\$45,581,980.57	\$45,682,829.52
Halogen-Acid Furnaces	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$3,461,116.34
Process Heaters	\$1,737,852.22	\$1,737,852.22	\$1,737,852.22	\$1,737,852.22	\$1,737,852.22
Phase 2 Subtotal	\$47,522,705.31	\$48,417,232.87	\$49,179,596.56	\$49,179,596.56	\$50,881,798.07
Total	\$83,063,268.37	\$83,957,795.93	\$83,962,209.54	\$85,393,148.45	\$88,211,266.20

Upgrade Expenditures, by Unit Type: SDL Option 2					
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls
Commercial Incinerators	\$4,839,178.50	\$4,839,178.50	\$4,839,178.50	\$4,839,178.50	\$4,839,178.50
Cement Kilns	\$28,787,604.56	\$28,787,604.56	\$28,787,604.56	\$28,787,604.56	\$28,787,604.56
LWAKs	\$902,838.59	\$902,838.59	\$902,838.59	\$2,333,777.50	\$4,096,587.94
Onsite Incinerators	\$12,078,996.70	\$12,078,996.70	\$12,078,996.70	\$12,078,996.70	\$12,078,996.70
Phase 1 Subtotal	\$46,608,618.36	\$46,608,618.36	\$46,608,618.36	\$48,039,557.27	\$49,802,367.71
Boilers	\$38,312,857.40	\$39,207,384.96	\$39,234,050.51	\$39,234,050.51	\$38,640,632.95
Halogen-Acid Furnaces	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$3,461,116.34
Process Heaters	\$993,951.45	\$993,951.45	\$993,951.45	\$993,951.45	\$993,951.45
Phase 2 Subtotal	\$41,166,572.62	\$42,061,100.18	\$42,087,765.74	\$42,087,765.74	\$43,095,700.74
Total	\$87,775,190.98	\$88,669,718.54	\$88,696,384.09	\$90,127,323.00	\$92,898,068.45

Engineering Costs: SDL Option 2					
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls
Commercial Incinerators	\$4,839,178.50	\$4,839,178.50	\$4,839,178.50	\$4,839,178.50	\$4,839,178.50
Cement Kilns	\$28,787,604.56	\$28,787,604.56	\$28,787,604.56	\$28,787,604.56	\$28,787,604.56
LWAKs	\$902,838.59	\$902,838.59	\$902,838.59	\$2,333,777.50	\$4,096,587.94
Onsite Incinerators	\$17,334,309.64	\$17,334,309.64	\$17,334,309.64	\$17,334,309.64	\$17,334,309.64
Phase 1 Subtotal	\$51,863,931.29	\$51,863,931.29	\$51,863,931.29	\$53,294,870.20	\$55,057,680.64
Boilers	\$58,829,959.56	\$59,787,429.08	\$61,829,864.49	\$61,829,864.49	\$63,904,818.09
Halogen-Acid Furnaces	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$3,461,116.34
Process Heaters	\$2,390,238.89	\$2,390,238.89	\$2,390,238.89	\$2,390,238.89	\$2,390,238.89
Phase 2 Subtotal	\$63,079,962.21	\$64,037,431.74	\$66,079,867.15	\$66,079,867.15	\$69,756,173.32
Total	\$114,943,893.50	\$115,901,363.03	\$117,943,798.44	\$119,374,737.35	\$124,813,853.96

Number of Closed Combustion Systems, by Unit Type: SDL Option 2						
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls	Baseline Total
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	32	32	32	32	32	92
Boilers	28	28	31	31	32	108
Halogen-Acid Furnaces	0	0	0	0	0	17
Process Heaters	6	6	6	6	6	11
Total	66	66	69	69	70	276

Quantity of Waste Sent Offsite or Rerouted (in tons): SDL Option 2

	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls
To Commercial Incinerators	27,654	27,654	27,654	27,654	27,654
To Cement Kilns or LWAKs	21,197	21,197	22,460	22,460	23,538
Total	48,852	48,852	50,115	50,115	51,192

Available Capacity at Commercial Facilities: SDL Option 2

	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
SDL Floor w/ CI Controls	160,538.55	483,678.20
SDL BTF-A w/ CI Controls	160,538.55	483,678.20
Post-MACT (tons) SDL BTF-B w/ CI Controls	160,538.55	482,415.42
SDL BTF-C w/ CI Controls	160,538.55	482,415.42
SDL BTF-D w/ CI Controls	160,538.55	481,337.67

Government Costs: SDL Option 2

	Annual Cost
SDL Floor w/ Chlorine Controls	\$901,479.52
SDL BTF-A w/ Chlorine Controls	\$901,479.52
SDL BTF-B w/ Chlorine Controls	\$874,965.42
SDL BTF-C w/ Chlorine Controls	\$874,965.42
SDL BTF-D w/ Chlorine Controls	\$866,127.39

Number of Jobs Lost and Gained, by Unit Type: SDL Option 2

	SDL Floor w/ CI Controls		SDL BTF-A w/ CI Controls		SDL BTF-B w/ CI Controls		SDL BTF-C w/ CI Controls		SDL BTF-D w/ CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	21.70	0.00	21.70	0.00	21.70	0.00	21.70	0.00	21.70
Cement Kilns	0.0	147.92	0.00	147.92	0.00	147.92	0.00	147.92	0.00	147.92
LWAKs	0.0	5.15	0.00	5.15	0.00	5.15	0.00	15.97	0.00	28.61
Onsite Incinerators	236.4	49.46	236.36	49.46	236.36	49.46	236.36	49.46	236.36	49.46
Boilers	114.1	222.29	114.08	224.59	124.54	224.43	124.54	224.43	128.32	220.24
Halogen-Acid Furnaces	0.0	14.00	0.00	14.00	0.00	14.00	0.00	14.00	0.00	24.24
Process Heaters	27.0	6.61	27.05	6.61	27.05	6.61	27.05	6.61	27.05	6.61
APCD Industry	-	285.68	-	291.85	-	290.76	-	291.66	-	295.96
Total	377.5	752.8	377.5	761.3	388.0	760.0	388.0	771.8	391.7	794.8

Results: SDL Option 2 without Chlorine Controls

Net Private Costs, by Unit Type: SDL Option 2					
	SDL Floor: w/o CI Controls	SDL BTF-A: w/o CI Controls	SDL BTF-B: w/o CI Controls	SDL BTF-C: w/o CI Controls	SDL BTF-D: w/o CI Controls
Commercial Incinerators	-\$4,492,487.20	-\$4,492,487.20	-\$4,492,487.20	-\$4,492,487.20	-\$4,492,487.20
Cement Kilns	\$16,522,697.94	\$16,522,697.94	\$16,522,697.94	\$16,522,697.94	\$16,397,553.43
LWAKs	\$754,413.62	\$754,413.62	\$754,413.62	\$754,413.62	\$2,072,679.24
Onsite Incinerators	\$3,767,618.93	\$3,767,618.93	\$3,767,618.93	\$3,767,618.93	\$3,767,618.93
Phase 1 Subtotal	\$16,552,243.29	\$16,552,243.29	\$16,552,243.29	\$16,552,243.29	\$17,745,364.39
Boilers	\$31,376,860.97	\$32,467,350.78	\$32,467,350.78	\$32,467,350.78	\$32,586,462.55
Halogen-Acid Furnaces	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$3,461,116.34
Process Heaters	\$1,318,793.53	\$1,318,793.53	\$1,318,793.53	\$1,318,793.53	\$1,318,793.53
Phase 2 Subtotal	\$34,555,418.27	\$35,645,908.08	\$35,645,908.08	\$35,645,908.08	\$37,366,372.43
Total	\$51,107,661.56	\$52,198,151.37	\$52,198,151.37	\$52,198,151.37	\$55,111,736.82

Upgrade Expenditures, by Unit Type: SDL Option 2					
	SDL Floor: w/o CI Controls	SDL BTF-A: w/o CI Controls	SDL BTF-B: w/o CI Controls	SDL BTF-C: w/o CI Controls	SDL BTF-D: w/o CI Controls
Commercial Incinerators	\$2,178,887.51	\$2,178,887.51	\$2,178,887.51	\$2,178,887.51	\$2,178,887.51
Cement Kilns	\$18,515,822.16	\$18,515,822.16	\$18,515,822.16	\$18,515,822.16	\$18,515,822.16
LWAKs	\$902,838.59	\$902,838.59	\$902,838.59	\$902,838.59	\$2,221,104.20
Onsite Incinerators	\$3,670,562.84	\$3,670,562.84	\$3,670,562.84	\$3,670,562.84	\$3,670,562.84
Phase 1 Subtotal	\$25,268,111.10	\$25,268,111.10	\$25,268,111.10	\$25,268,111.10	\$26,586,376.71
Boilers	\$29,244,729.37	\$30,335,219.17	\$30,335,219.17	\$30,335,219.17	\$30,215,045.94
Halogen-Acid Furnaces	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$3,461,116.34
Process Heaters	\$956,605.19	\$956,605.19	\$956,605.19	\$956,605.19	\$956,605.19
Phase 2 Subtotal	\$32,061,098.32	\$33,151,588.13	\$33,151,588.13	\$33,151,588.13	\$34,632,767.46
Total	\$57,329,209.42	\$58,419,699.23	\$58,419,699.23	\$58,419,699.23	\$61,219,144.18

Engineering Costs: SDL Option 2					
	SDL Floor: w/o CI	SDL BTF-A: w/o CI	SDL BTF-B: w/o CI	SDL BTF-C: w/o CI	SDL BTF-D: w/o
	Controls	Controls	Controls	Controls	CI Controls
Commercial Incinerators	\$2,178,887.51	\$2,178,887.51	\$2,178,887.51	\$2,178,887.51	\$2,178,887.51
Cement Kilns	\$18,515,822.16	\$18,515,822.16	\$18,515,822.16	\$18,515,822.16	\$18,515,822.16
LWAKs	\$902,838.59	\$902,838.59	\$902,838.59	\$902,838.59	\$2,221,104.20
Onsite Incinerators	\$5,400,166.56	\$5,400,166.56	\$5,400,166.56	\$5,400,166.56	\$5,400,166.56
Phase 1 Subtotal	\$26,997,714.81	\$26,997,714.81	\$26,997,714.81	\$26,997,714.81	\$28,315,980.43
Boilers	\$39,712,905.35	\$40,866,337.12	\$40,866,337.12	\$40,866,337.12	\$40,999,636.96
Halogen-Acid Furnaces	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$1,859,763.77	\$3,461,116.34
Process Heaters	\$1,645,115.25	\$1,645,115.25	\$1,645,115.25	\$1,645,115.25	\$1,645,115.25
Phase 2 Subtotal	\$43,217,784.37	\$44,371,216.14	\$44,371,216.14	\$44,371,216.14	\$46,105,868.55
Total	\$70,215,499.18	\$71,368,930.95	\$71,368,930.95	\$71,368,930.95	\$74,421,848.97

Number of Closed Combustion Systems, by Unit Type: SDL Option 2						
	SDL Floor: w/o	SDL BTF-A: w/o	SDL BTF-B:	SDL BTF-C: w/o	SDL BTF-D:	Baseline
	CI Controls	CI Controls	w/o CI	CI Controls	w/o CI	Total
			Controls		Controls	
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	30	30	30	30	30	92
Boilers	21	21	21	21	22	108
Halogen-Acid Furnaces	0	0	0	0	0	17
Process Heaters	3	3	3	3	3	11
Total	54	54	54	54	55	276

Quantity of Waste Sent Offsite or Rerouted (in tons): SDL Option 2					
	SDL Floor: w/o CI Controls	SDL BTF-A: w/o CI Controls	SDL BTF-B: w/o CI Controls	SDL BTF-C: w/o CI Controls	SDL BTF-D: w/o CI Controls
To Commercial Incinerators	27,654	27,654	27,654	27,654	27,654
To Cement Kilns or LWAKs	10,792	10,792	10,792	10,792	11,658
Total	38,447	38,447	38,447	38,447	39,312

Available Capacity at Commercial Facilities: SDL Option 2		
	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
Post-MACT (tons)		
SDL Floor w/o CI Controls	160,538.55	494,083.41
SDL BTF-A w/o CI Controls	160,538.55	494,083.41
SDL BTF-B w/o CI Controls	160,538.55	494,083.41
SDL BTF-C w/o CI Controls	160,538.55	494,083.41
SDL BTF-D w/o CI Controls	160,538.55	493,217.61

Government Costs: SDL Option 2	
	Annual Cost
SDL Floor w/o Chlorine Controls	\$989,859.87
SDL BTF-A w/o Chlorine Controls	\$989,859.87
SDL BTF-B w/o Chlorine Controls	\$989,859.87
SDL BTF-C w/o Chlorine Controls	\$989,859.87
SDL BTF-D w/o Chlorine Controls	\$981,021.83

Number of Jobs Lost and Gained, by Unit Type: SDL Option 2

	SDL Floor w/o CI Controls		SDL BTF-A w/o CI Controls		SDL BTF-B w/o CI Controls		SDL BTF-C w/o CI Controls		SDL BTF-D w/o CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	9.62	0.00	9.62	0.00	9.62	0.00	9.62	0.00	9.62
Cement Kilns	0.0	99.03	0.00	99.03	0.00	99.03	0.00	99.03	0.00	99.03
LWAKs	0.0	5.15	0.00	5.15	0.00	5.15	0.00	5.15	0.00	14.33
Onsite Incinerators	222.6	13.63	222.60	13.63	222.60	13.63	222.60	13.63	222.60	13.63
Boilers	87.9	182.45	87.92	186.05	87.92	186.05	87.92	186.05	91.35	184.86
Halogen-Acid Furnaces	0.0	14.00	0.00	14.00	0.00	14.00	0.00	14.00	0.00	24.24
Process Heaters	12.3	7.40	12.35	7.40	12.35	7.40	12.35	7.40	12.35	7.40
APCD Industry	-	167.18	-	173.43	-	173.43	-	173.43	-	178.22
Total	322.9	498.5	322.9	508.3	322.9	508.3	322.9	508.3	326.3	531.3

Results: 70 Percent Design Level Option 2 with Chlorine Controls

Net Private Costs, by Unit Type: 70%DL Option 2					
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
Commercial Incinerators	-\$2,354,222.18	-\$2,354,222.18	-\$2,354,222.18	-\$2,354,222.18	-\$2,354,222.18
Cement Kilns	\$13,436,191.54	\$13,342,769.44	\$12,094,609.06	\$12,094,609.06	\$12,094,609.06
LWAKs	\$195,975.09	\$183,737.65	\$27,053.75	\$1,841,557.71	\$3,666,564.60
Onsite Incinerators	\$11,958,459.57	\$11,958,459.57	\$11,958,459.57	\$11,958,459.57	\$11,958,459.57
Phase 1 Subtotal	\$23,236,404.02	\$23,130,744.48	\$21,725,900.20	\$23,540,404.16	\$25,365,411.05
Boilers	\$40,603,852.82	\$40,836,423.11	\$42,010,664.51	\$42,010,664.51	\$42,017,111.09
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$1,673,255.68	\$1,673,255.68	\$1,673,255.68	\$1,673,255.68	\$1,673,255.68
Phase 2 Subtotal	\$44,101,812.33	\$44,334,382.62	\$45,508,624.03	\$45,508,624.03	\$47,116,423.17
Total	\$67,338,216.35	\$67,465,127.10	\$67,234,524.22	\$69,049,028.19	\$72,481,834.23

Upgrade Expenditures, by Unit Type: 70%SDL Option 2					
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
Commercial Incinerators	\$4,839,371.35	\$4,839,371.35	\$4,839,371.35	\$4,839,371.35	\$4,839,371.35
Cement Kilns	\$17,466,490.46	\$17,466,490.46	\$17,466,490.46	\$17,466,490.46	\$17,466,490.46
LWAKs	\$395,170.25	\$395,170.25	\$395,170.25	\$2,209,674.22	\$4,034,681.11
Onsite Incinerators	\$11,655,314.40	\$11,655,314.40	\$11,655,314.40	\$11,655,314.40	\$11,655,314.40
Phase 1 Subtotal	\$34,356,346.47	\$34,356,346.47	\$34,356,346.47	\$36,170,850.43	\$37,995,857.32
Boilers	\$35,382,948.42	\$35,486,475.98	\$35,230,752.75	\$35,230,752.75	\$35,237,199.33
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$929,354.92	\$929,354.92	\$929,354.92	\$929,354.92	\$929,354.92
Phase 2 Subtotal	\$38,137,007.18	\$38,240,534.73	\$37,984,811.50	\$37,984,811.50	\$39,592,610.65
Total	\$72,493,353.64	\$72,596,881.20	\$72,341,157.97	\$74,155,661.94	\$77,588,467.97

Engineering Costs: 70%DL Option 2					
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
Commercial Incinerators	\$4,839,371.35	\$4,839,371.35	\$4,839,371.35	\$4,839,371.35	\$4,839,371.35
Cement Kilns	\$17,466,490.46	\$17,466,490.46	\$17,466,490.46	\$17,466,490.46	\$17,466,490.46
LWAKs	\$395,170.25	\$395,170.25	\$395,170.25	\$2,209,674.22	\$4,034,681.11
Onsite Incinerators	\$17,420,742.15	\$17,420,742.15	\$17,420,742.15	\$17,420,742.15	\$17,420,742.15
Phase 1 Subtotal	\$40,121,774.22	\$40,121,774.22	\$40,121,774.22	\$41,936,278.18	\$43,761,285.07
Boilers	\$53,618,442.08	\$53,870,385.74	\$57,825,831.68	\$57,825,831.68	\$57,879,823.18
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$2,243,655.69	\$2,243,655.69	\$2,243,655.69	\$2,243,655.69	\$2,243,655.69
Phase 2 Subtotal	\$57,686,801.60	\$57,938,745.26	\$61,894,191.20	\$61,894,191.20	\$63,549,535.27
Total	\$97,808,575.81	\$98,060,519.48	\$102,015,965.41	\$103,830,469.38	\$107,310,820.34

Number of Closed Combustion Systems, by Unit Type: 70%DL Option 2						
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls	Baseline Total
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	34	34	34	34	34	92
Boilers	25	26	30	30	30	108
Halogen-Acid Furnaces	0	0	0	0	0	17
Process Heaters	6	6	6	6	6	11
Total	65	66	70	70	70	276

Quantity of Waste Sent Offsite or Rerouted (in tons): 70%DL Option 2

	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
To Commercial Incinerators	30,190	30,190	30,190	30,190	30,190
To Cement Kilns or LWAKs	19,348	20,100	22,440	22,440	22,440
Total	49,539	50,290	52,631	52,631	52,631

Available Capacity at Commercial Facilities: 70%DL Option 2

	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
70% DL Floor w/ CI Controls	158,002.65	485,527.35
70% DL BTF-A w/ CI Control	158,002.65	484,775.76
Post-MACT (tons) 70% DL BTF-B w/ CI Control	158,002.65	482,435.23
70% DL BTF-C w/ CI Control	158,002.65	482,435.23
70% DL BTF-D w/ CI Control	158,002.65	482,435.23

Government Costs: 70%DL Option 2

	Annual Cost
70% DL Floor w/ CI Controls	\$927,993.63
70% DL BTF-A w/ CI Controls	\$919,155.59
70% DL BTF-B w/ CI Controls	\$883,803.45
70% DL BTF-C w/ CI Controls	\$883,803.45
70% DL BTF-D w/ CI Controls	\$883,803.45

Number of Jobs Lost and Gained, by Unit Type: 70% DL Option 2										
	70% DL Floor w/ CI Controls		70% DL BTF-A w/ CI Controls		70% DL BTF-B w/ CI Controls		70% DL BTF-C w/ CI Controls		70% DL BTF-D w/ CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	23.89	0.00	23.89	0.00	23.89	0.00	23.89	0.00	23.89
Cement Kilns	0.0	87.32	0.00	87.32	0.00	87.32	0.00	87.32	0.00	87.32
LWAKs	0.0	2.24	0.00	2.24	0.00	2.24	0.00	16.25	0.00	16.25
Onsite Incinerators	251.8	49.58	251.77	49.58	251.77	49.58	251.77	49.58	251.77	49.58
Boilers	100.4	207.64	106.15	208.23	120.39	204.88	120.39	204.88	120.39	204.88
Halogen-Acid Furnaces	0.0	13.66	0.00	13.66	0.00	13.66	0.00	13.66	0.00	13.66
Process Heaters	27.0	6.23	27.05	6.23	27.05	6.23	27.05	6.23	27.05	6.23
APCD Industry	-	228.37	-	228.97	-	227.89	-	229.50	-	229.50
Total	379.3	618.9	385.0	620.1	399.2	615.7	399.2	631.3	399.2	631.3

Results: 70 Percent Design Level Option 2 without Chlorine Controls

Net Private Costs, by Unit Type: 70%DL Option 2					
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
Commercial Incinerators	-\$4,301,337.91	-\$4,301,337.91	-\$4,301,337.91	-\$4,301,337.91	-\$4,301,337.91
Cement Kilns	\$10,439,886.09	\$10,346,463.98	\$10,346,463.98	\$10,346,463.98	\$10,346,463.98
LWAKs	\$292,691.63	\$280,454.19	\$280,454.19	\$280,454.19	\$2,105,461.08
Onsite Incinerators	\$4,587,714.12	\$4,587,714.12	\$4,587,714.12	\$4,587,714.12	\$4,587,714.12
Phase 1 Subtotal	\$11,018,953.93	\$10,913,294.38	\$10,913,294.38	\$10,913,294.38	\$12,738,301.27
Boilers	\$28,483,193.03	\$28,757,389.19	\$28,757,389.19	\$28,757,389.19	\$28,878,364.50
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$1,224,093.38	\$1,224,093.38	\$1,224,093.38	\$1,224,093.38	\$1,224,093.38
Phase 2 Subtotal	\$31,531,990.24	\$31,806,186.40	\$31,806,186.40	\$31,806,186.40	\$33,528,514.28
Total	\$42,550,944.17	\$42,719,480.79	\$42,719,480.79	\$42,719,480.79	\$46,266,815.55

Upgrade Expenditures, by Unit Type: 70%DL Option 2					
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
Commercial Incinerators	\$2,494,817.58	\$2,494,817.58	\$2,494,817.58	\$2,494,817.58	\$2,494,817.58
Cement Kilns	\$12,081,865.84	\$12,081,865.84	\$12,081,865.84	\$12,081,865.84	\$12,081,865.84
LWAKs	\$395,170.25	\$395,170.25	\$395,170.25	\$395,170.25	\$2,220,177.14
Onsite Incinerators	\$4,579,064.89	\$4,579,064.89	\$4,579,064.89	\$4,579,064.89	\$4,579,064.89
Phase 1 Subtotal	\$19,550,918.56	\$19,550,918.56	\$19,550,918.56	\$19,550,918.56	\$21,375,925.45
Boilers	\$27,084,966.47	\$27,230,119.90	\$27,230,119.90	\$27,230,119.90	\$27,351,095.21
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$861,905.03	\$861,905.03	\$861,905.03	\$861,905.03	\$861,905.03
Phase 2 Subtotal	\$29,771,575.33	\$29,916,728.76	\$29,916,728.76	\$29,916,728.76	\$31,639,056.64
Total	\$49,322,493.89	\$49,467,647.33	\$49,467,647.33	\$49,549,493.64	\$53,014,982.09

Engineering Costs: 70%DL Option 2					
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
Commercial Incinerators	\$2,494,817.58	\$2,494,817.58	\$2,494,817.58	\$2,494,817.58	\$2,494,817.58
Cement Kilns	\$12,081,865.84	\$12,081,865.84	\$12,081,865.84	\$12,081,865.84	\$12,081,865.84
LWAKs	\$395,170.25	\$395,170.25	\$395,170.25	\$395,170.25	\$2,220,177.14
Onsite Incinerators	\$6,751,166.00	\$6,751,166.00	\$6,751,166.00	\$6,751,166.00	\$6,751,166.00
Phase 1 Subtotal	\$21,723,019.67	\$21,723,019.67	\$21,723,019.67	\$21,723,019.67	\$23,548,026.56
Boilers	\$36,088,392.73	\$36,381,962.27	\$36,381,962.27	\$36,381,962.27	\$36,502,937.57
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$1,525,169.14	\$1,525,169.14	\$1,525,169.14	\$1,525,169.14	\$1,525,169.14
Phase 2 Subtotal	\$39,438,265.70	\$39,731,835.24	\$39,731,835.24	\$39,731,835.24	\$41,454,163.12
Total	\$61,161,285.37	\$61,454,854.91	\$61,454,854.91	\$61,454,854.91	\$65,002,189.67

Number of Closed Combustion Systems, by Unit Type: 70%DL Option 2						
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls	Baseline Total
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	30	30	30	30	30	92
Boilers	19	20	20	20	20	108
Halogen-Acid Furnaces	0	0	0	0	0	17
Process Heaters	3	3	3	3	3	11
Total	52	53	53	53	53	276

Quantity of Waste Sent Offsite or Rerouted (in tons): 70%DL Option 2

	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
To Commercial Incinerators	23,677	23,677	23,677	23,677	23,677
To Cement Kilns or LWAKs	8,024	8,776	8,776	8,776	8,776
Total	31,701	32,453	32,453	32,453	32,453

Available Capacity at Commercial Facilities: 70%DL Option 2

	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
70% DL Floor w/o CI Controls	164,515.97	496,851.46
Post-MACT Capacity (tons)		
70% DL BTF-A w/o CI Controls	164,515.97	496,099.88
70% DL BTF-B w/o CI Controls	164,515.97	496,099.88
70% DL BTF-C w/o CI Controls	164,515.97	496,099.88
70% DL BTF-D w/o CI Controls	164,515.97	496,099.88

Government Costs: 70%DL Option 2

	Annual Cost
70% DL Floor w/o CI Controls	\$1,007,535.94
70% DL BTF-A w/o CI Controls	\$998,697.90
70% DL BTF-B w/o CI Controls	\$998,697.90
70% DL BTF-C w/o CI Controls	\$998,697.90
70% DL BTF-D w/o CI Controls	\$998,697.90

Number of Jobs Lost and Gained, by Unit Type: 70% DLOption 2										
	70% DL Floor w/o CI Controls		70% DL BTF-A w/o CI Controls		70% DL BTF-B w/o CI Controls		70% DL BTF-C w/o CI Controls		70% DL BTF-D w/o CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	12.98	0.00	12.98	0.00	12.98	0.00	12.98	0.00	12.98
Cement Kilns	0.0	61.05	0.00	61.05	0.00	61.05	0.00	61.05	0.00	61.05
LWAKs	0.0	2.24	0.00	2.24	0.00	2.24	0.00	2.24	0.00	2.24
Onsite Incinerators	221.6	19.67	221.60	19.67	221.60	19.67	221.60	19.67	221.60	19.67
Boilers	77.7	170.45	83.42	171.05	83.42	171.05	83.42	171.05	83.42	171.05
Halogen-Acid Furnaces	0.0	13.66	0.00	13.66	0.00	13.66	0.00	13.66	0.00	13.66
Process Heaters	12.3	6.80	12.35	6.80	12.35	6.80	12.35	6.80	12.35	6.80
APCD Industry	-	140.55	-	141.14	-	141.14	-	141.14	-	141.14
Total	311.7	427.4	317.4	428.6	317.4	428.6	317.4	428.6	317.4	428.6

Results: SDL Option 3 with Chlorine Controls

Net Private Costs, by Unit Type: SDL Option 3					
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls
Commercial Incinerators	-\$1,673,379.61	-\$1,673,379.61	-\$1,673,379.61	-\$1,673,379.61	-\$1,673,379.61
Cement Kilns	\$24,150,100.26	\$24,150,100.26	\$23,476,685.23	\$23,476,685.23	\$22,707,353.91
LWAKs	\$932,771.85	\$932,771.85	\$848,236.80	\$2,157,543.87	\$4,676,637.97
Onsite Incinerators	\$11,523,577.29	\$11,523,577.29	\$11,523,577.29	\$11,523,577.29	\$11,523,577.29
Phase 1 Subtotal	\$34,933,069.80	\$34,933,069.80	\$34,175,119.72	\$35,484,426.79	\$37,234,189.56
Boilers	\$50,846,367.65	\$52,031,683.10	\$52,679,031.55	\$52,679,031.55	\$52,765,396.98
Halogen-Acid Furnaces	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$4,073,421.61
Process Heaters	\$2,853,183.76	\$2,853,183.76	\$2,853,183.76	\$2,853,183.76	\$2,853,183.76
Phase 2 Subtotal	\$55,541,749.51	\$56,727,064.96	\$57,374,413.41	\$57,374,413.41	\$59,692,002.36
Total	\$90,474,819.31	\$91,660,134.76	\$91,549,533.13	\$92,858,840.21	\$96,926,191.92

Upgrade Expenditures, by Unit Type: SDL Option 3					
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls
Commercial Incinerators	\$4,997,995.11	\$4,997,995.11	\$4,997,995.11	\$4,997,995.11	\$4,997,995.11
Cement Kilns	\$27,039,773.21	\$27,039,773.21	\$27,039,773.21	\$27,039,773.21	\$27,039,773.21
LWAKs	\$1,144,204.45	\$1,144,204.45	\$1,144,204.45	\$2,453,511.52	\$5,044,754.48
Onsite Incinerators	\$11,426,521.20	\$11,426,521.20	\$11,426,521.20	\$11,426,521.20	\$11,426,521.20
Phase 1 Subtotal	\$44,608,493.97	\$44,608,493.97	\$44,608,493.97	\$45,917,801.04	\$48,509,043.99
Boilers	\$47,370,601.53	\$48,555,916.97	\$48,467,567.30	\$48,467,567.30	\$47,859,666.23
Halogen-Acid Furnaces	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$3,796,819.17
Process Heaters	\$2,109,283.00	\$2,109,283.00	\$2,109,283.00	\$2,109,283.00	\$2,109,283.00
Phase 2 Subtotal	\$51,322,082.63	\$52,507,398.08	\$52,419,048.40	\$52,419,048.40	\$53,765,768.40
Total	\$95,930,576.60	\$97,115,892.04	\$97,027,542.37	\$98,336,849.44	\$102,274,812.39

Engineering Costs: SDL Option 3					
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls
Commercial Incinerators	\$4,997,995.11	\$4,997,995.11	\$4,997,995.11	\$4,997,995.11	\$4,997,995.11
Cement Kilns	\$27,039,773.21	\$27,039,773.21	\$27,039,773.21	\$27,039,773.21	\$27,039,773.21
LWAKs	\$1,144,204.45	\$1,144,204.45	\$1,144,204.45	\$2,453,511.52	\$5,044,754.48
Onsite Incinerators	\$16,248,039.95	\$16,248,039.95	\$16,248,039.95	\$16,248,039.95	\$16,248,039.95
Phase 1 Subtotal	\$49,430,012.71	\$49,430,012.71	\$49,430,012.71	\$50,739,319.79	\$53,330,562.74
Boilers	\$65,819,582.29	\$67,067,839.70	\$68,995,259.88	\$68,995,259.88	\$70,982,953.80
Halogen-Acid Furnaces	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$4,107,524.18
Process Heaters	\$3,793,557.72	\$3,793,557.72	\$3,793,557.72	\$3,793,557.72	\$3,793,557.72
Phase 2 Subtotal	\$71,455,338.11	\$72,703,595.52	\$74,631,015.70	\$74,631,015.70	\$78,884,035.70
Total	\$120,885,350.82	\$122,133,608.23	\$124,061,028.42	\$125,370,335.49	\$132,214,598.44

Number of Closed Combustion Systems, by Unit Type: SDL Option 3						
	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls	Baseline Total
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	32	32	32	32	32	92
Boilers	27	27	30	30	31	108
Halogen-Acid Furnaces	0	0	0	0	1	17
Process Heaters	6	6	6	6	6	11
Total	65	65	68	68	70	276

Quantity of Waste Sent Offsite or Rerouted (in tons): SDL Option 3

	SDL Floor: w/ CI Controls	SDL BTF-A: w/ CI Controls	SDL BTF-B: w/ CI Controls	SDL BTF-C: w/ CI Controls	SDL BTF-D: w/ CI Controls
To Commercial Incinerators	27,654	27,654	27,654	27,654	27,654
To Cement Kilns or LWAKs	16,688	16,688	17,950	17,950	19,718
Total	44,342	44,342	45,605	45,605	47,372

Available Capacity at Commercial Facilities: SDL Option 3

	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
SDL Floor w/ CI Controls	160,538.55	488,187.87
SDL BTF-A w/ CI Controls	160,538.55	488,187.87
Post-MACT (tons) SDL BTF-B w/ CI Controls	160,538.55	486,925.09
SDL BTF-C w/ CI Controls	160,538.55	486,925.09
SDL BTF-D w/ CI Controls	160,538.55	485,157.75

Government Costs: SDL Option 3

	Annual Cost
SDL Floor w/ Chlorine Controls	\$910,317.56
SDL BTF-A w/ Chlorine Controls	\$910,317.56
SDL BTF-B w/ Chlorine Controls	\$883,803.45
SDL BTF-C w/ Chlorine Controls	\$883,803.45
SDL BTF-D w/ Chlorine Controls	\$866,127.39

Number of Jobs Lost and Gained, by Unit Type: SDL Option 3										
	SDL Floor w/ CI Controls		SDL BTF-A w/ CI Controls		SDL BTF-B w/ CI Controls		SDL BTF-C w/ CI Controls		SDL BTF-D w/ CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	22.61	0.00	22.61	0.00	22.61	0.00	22.61	0.00	22.61
Cement Kilns	0.0	140.00	0.00	140.00	0.00	140.00	0.00	140.00	0.00	140.00
LWAKs	0.0	6.65	0.00	6.65	0.00	6.65	0.00	17.14	0.00	34.83
Onsite Incinerators	236.4	46.47	236.36	46.47	236.36	46.47	236.36	46.47	236.36	46.47
Boilers	111.7	280.87	111.70	285.01	122.17	283.56	122.17	283.56	125.95	279.37
Halogen-Acid Furnaces	0.0	13.74	0.00	13.74	0.00	13.74	0.00	13.74	3.35	26.21
Process Heaters	27.0	12.79	27.05	12.79	27.05	12.79	27.05	12.79	27.05	12.79
APCD Industry	-	297.17	-	303.79	-	302.62	-	302.70	-	309.71
Total	375.1	820.3	375.1	831.1	385.6	828.4	385.6	839.0	392.7	872.0

Results: SDL Option 3 without Chlorine Controls

Net Private Costs, by Unit Type: SDL Option 3					
	SDL Floor: w/o CI Controls	SDL BTF-A: w/o CI Controls	SDL BTF-B: w/o CI Controls	SDL BTF-C: w/o CI Controls	SDL BTF-D: w/o CI Controls
Commercial Incinerators	-\$4,318,928.45	-\$4,318,928.45	-\$4,318,928.45	-\$4,318,928.45	-\$4,318,928.45
Cement Kilns	\$14,004,346.91	\$14,004,346.91	\$14,004,346.91	\$14,004,346.91	\$13,809,760.93
LWAKs	\$932,771.85	\$932,771.85	\$932,771.85	\$932,771.85	\$3,018,817.91
Onsite Incinerators	\$3,196,141.68	\$3,196,141.68	\$3,196,141.68	\$3,196,141.68	\$3,196,141.68
Phase 1 Subtotal	\$13,814,332.00	\$13,814,332.00	\$13,814,332.00	\$13,814,332.00	\$15,705,792.08
Boilers	\$37,864,604.97	\$39,032,165.34	\$39,032,165.34	\$39,032,165.34	\$39,137,200.07
Halogen-Acid Furnaces	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$4,073,421.61
Process Heaters	\$1,904,740.56	\$1,904,740.56	\$1,904,740.56	\$1,904,740.56	\$1,904,740.56
Phase 2 Subtotal	\$41,611,543.63	\$42,779,103.99	\$42,779,103.99	\$42,779,103.99	\$45,115,362.24
Total	\$55,425,875.62	\$56,593,435.99	\$56,593,435.99	\$56,593,435.99	\$60,821,154.32

Upgrade Expenditures, by Unit Type: SDL Option 3					
	SDL Floor: w/o CI Controls	SDL BTF-A: w/o CI Controls	SDL BTF-B: w/o CI Controls	SDL BTF-C: w/o CI Controls	SDL BTF-D: w/o CI Controls
Commercial Incinerators	\$2,352,446.27	\$2,352,446.27	\$2,352,446.27	\$2,352,446.27	\$2,352,446.27
Cement Kilns	\$16,767,990.80	\$16,767,990.80	\$16,767,990.80	\$16,767,990.80	\$16,767,990.80
LWAKs	\$1,144,204.45	\$1,144,204.45	\$1,144,204.45	\$1,144,204.45	\$3,230,250.51
Onsite Incinerators	\$3,099,085.59	\$3,099,085.59	\$3,099,085.59	\$3,099,085.59	\$3,099,085.59
Phase 1 Subtotal	\$23,363,727.11	\$23,363,727.11	\$23,363,727.11	\$23,363,727.11	\$25,449,773.17
Boilers	\$34,626,041.25	\$35,793,601.61	\$35,793,601.61	\$35,793,601.61	\$35,898,636.35
Halogen-Acid Furnaces	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$3,796,819.17
Process Heaters	\$1,160,839.80	\$1,160,839.80	\$1,160,839.80	\$1,160,839.80	\$1,160,839.80
Phase 2 Subtotal	\$37,629,079.14	\$38,796,639.50	\$38,796,639.50	\$38,796,639.50	\$40,856,295.31
Total	\$60,992,806.25	\$62,160,366.61	\$62,160,366.61	\$62,160,366.61	\$66,306,068.48

Engineering Costs: SDL Option 3					
	SDL Floor: w/o CI	SDL BTF-A: w/o CI	SDL BTF-B: w/o CI	SDL BTF-C: w/o CI	SDL BTF-D: w/o
	Controls	Controls	Controls	Controls	CI Controls
Commercial Incinerators	\$2,352,446.27	\$2,352,446.27	\$2,352,446.27	\$2,352,446.27	\$2,352,446.27
Cement Kilns	\$16,767,990.80	\$16,767,990.80	\$16,767,990.80	\$16,767,990.80	\$16,767,990.80
LWAKs	\$1,144,204.45	\$1,144,204.45	\$1,144,204.45	\$1,144,204.45	\$3,230,250.51
Onsite Incinerators	\$4,546,278.71	\$4,546,278.71	\$4,546,278.71	\$4,546,278.71	\$4,546,278.71
Phase 1 Subtotal	\$24,810,920.23	\$24,810,920.23	\$24,810,920.23	\$24,810,920.23	\$26,896,966.29
Boilers	\$45,126,485.97	\$46,356,988.30	\$46,356,988.30	\$46,356,988.30	\$46,468,954.41
Halogen-Acid Furnaces	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$1,842,198.10	\$4,107,524.18
Process Heaters	\$2,451,885.08	\$2,451,885.08	\$2,451,885.08	\$2,451,885.08	\$2,451,885.08
Phase 2 Subtotal	\$49,420,569.15	\$50,651,071.48	\$50,651,071.48	\$50,651,071.48	\$53,028,363.67
Total	\$74,231,489.38	\$75,461,991.71	\$75,461,991.71	\$75,461,991.71	\$79,925,329.96

Number of Closed Combustion Systems, by Unit Type: SDL Option 3						
	SDL Floor: w/o	SDL BTF-A: w/o	SDL BTF-B:		SDL BTF-D:	Baseline
	CI Controls	CI Controls	w/o CI	SDL BTF-C: w/o	w/o CI	
			Controls	CI Controls	Controls	Total
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	29	29	29	29	29	92
Boilers	25	25	25	25	25	108
Halogen-Acid Furnaces	0	0	0	0	1	17
Process Heaters	6	6	6	6	6	11
Total	60	60	60	60	61	276

Quantity of Waste Sent Offsite or Rerouted (in tons): SDL Option 3					
	SDL Floor: w/o CI Controls	SDL BTF-A: w/o CI Controls	SDL BTF-B: w/o CI Controls	SDL BTF-C: w/o CI Controls	SDL BTF-D: w/o CI Controls
To Commercial Incinerators	27,654	27,654	27,654	27,654	27,654
To Cement Kilns or LWAKs	15,815	15,815	15,815	15,815	16,505
Total	43,470	43,470	43,470	43,470	44,159

Available Capacity at Commercial Facilities: SDL Option 3		
	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
Post-MACT (tons)		
SDL Floor w/o CI Controls	160,538.55	489,060.12
SDL BTF-A w/o CI Controls	160,538.55	489,060.12
SDL BTF-B w/o CI Controls	160,538.55	489,060.12
SDL BTF-C w/o CI Controls	160,538.55	489,060.12
SDL BTF-D w/o CI Controls	160,538.55	488,370.54

Government Costs: SDL Option 3	
	Annual Cost
SDL Floor w/o Chlorine Controls	\$927,993.63
SDL BTF-A w/o Chlorine Controls	\$927,993.63
SDL BTF-B w/o Chlorine Controls	\$927,993.63
SDL BTF-C w/o Chlorine Controls	\$927,993.63
SDL BTF-D w/o Chlorine Controls	\$919,155.59

Number of Jobs Lost and Gained, by Unit Type: SDL Option 3

	SDL Floor w/o CI Controls		SDL BTF-A w/o CI Controls		SDL BTF-B w/o CI Controls		SDL BTF-C w/o CI Controls		SDL BTF-D w/o CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	10.60	0.00	10.60	0.00	10.60	0.00	10.60	0.00	10.60
Cement Kilns	0.0	91.10	0.00	91.10	0.00	91.10	0.00	91.10	0.00	91.10
LWAKs	0.0	6.65	0.00	6.65	0.00	6.65	0.00	6.65	0.00	20.82
Onsite Incinerators	215.5	10.64	215.47	10.64	215.47	10.64	215.47	10.64	215.47	10.64
Boilers	103.8	218.07	103.79	222.21	103.79	222.21	103.79	222.21	103.79	222.21
Halogen-Acid Furnaces	0.0	13.74	0.00	13.74	0.00	13.74	0.00	13.74	3.35	26.21
Process Heaters	27.0	7.85	27.05	7.85	27.05	7.85	27.05	7.85	27.05	7.85
APCD Industry	-	168.24	-	174.86	-	174.86	-	174.86	-	182.20
Total	346.3	526.9	346.3	537.7	346.3	537.7	346.3	537.7	349.7	571.6

Results: 70 Percent Design Level Option 3 with Chlorine Controls

Net Private Costs, by Unit Type: 70% DL Option 3					
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
Commercial Incinerators	-\$1,967,561.26	-\$1,967,561.26	-\$1,967,561.26	-\$1,967,561.26	-\$1,967,561.26
Cement Kilns	\$14,083,862.55	\$13,990,440.44	\$12,742,280.07	\$12,742,280.07	\$12,742,280.07
LWAKs	\$247,881.16	\$235,643.72	\$78,959.81	\$1,893,463.78	\$4,110,219.93
Onsite Incinerators	\$11,944,655.77	\$11,944,655.77	\$11,944,655.77	\$11,944,655.77	\$11,944,655.77
Phase 1 Subtotal	\$24,308,838.22	\$24,203,178.67	\$22,798,334.39	\$24,612,838.36	\$26,829,594.51
Boilers	\$51,583,192.06	\$51,890,041.28	\$52,951,906.60	\$52,951,906.60	\$52,974,488.06
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$3,038,505.01	\$3,038,505.01	\$3,038,505.01	\$3,038,505.01	\$3,038,505.01
Phase 2 Subtotal	\$56,446,400.89	\$56,753,250.12	\$57,815,115.44	\$57,815,115.44	\$59,439,049.47
Total	\$80,755,239.11	\$80,956,428.79	\$80,613,449.84	\$82,427,953.80	\$86,268,643.98

Upgrade Expenditures, by Unit Type: 70% DL Option 3					
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
Commercial Incinerators	\$4,703,813.45	\$4,703,813.45	\$4,703,813.45	\$4,703,813.45	\$4,703,813.45
Cement Kilns	\$16,683,832.23	\$16,683,832.23	\$16,683,832.23	\$16,683,832.23	\$16,683,832.23
LWAKs	\$447,076.32	\$447,076.32	\$447,076.32	\$2,261,580.29	\$4,478,336.44
Onsite Incinerators	\$11,847,599.68	\$11,847,599.68	\$11,847,599.68	\$11,847,599.68	\$11,847,599.68
Phase 1 Subtotal	\$33,682,321.68	\$33,682,321.68	\$33,682,321.68	\$35,496,825.64	\$37,713,581.79
Boilers	\$48,638,731.61	\$48,816,538.10	\$48,448,438.79	\$48,448,438.79	\$48,471,020.25
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$2,294,604.25	\$2,294,604.25	\$2,294,604.25	\$2,294,604.25	\$2,294,604.25
Phase 2 Subtotal	\$52,758,039.69	\$52,935,846.18	\$52,567,746.87	\$52,567,746.87	\$54,191,680.89
Total	\$86,440,361.37	\$86,618,167.86	\$86,250,068.55	\$88,064,572.51	\$91,905,262.69

Engineering Costs: 70%DL Option 3					
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
Commercial Incinerators	\$4,703,813.45	\$4,703,813.45	\$4,703,813.45	\$4,703,813.45	\$4,703,813.45
Cement Kilns	\$16,683,832.23	\$16,683,832.23	\$16,683,832.23	\$16,683,832.23	\$16,683,832.23
LWAKs	\$447,076.32	\$447,076.32	\$447,076.32	\$2,261,580.29	\$4,478,336.44
Onsite Incinerators	\$16,942,179.41	\$16,942,179.41	\$16,942,179.41	\$16,942,179.41	\$16,942,179.41
Phase 1 Subtotal	\$38,776,901.41	\$38,776,901.41	\$38,776,901.41	\$40,591,405.37	\$42,808,161.52
Boilers	\$66,086,401.84	\$66,412,624.44	\$70,245,989.35	\$70,245,989.35	\$70,278,967.88
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$3,886,402.90	\$3,886,402.90	\$3,886,402.90	\$3,886,402.90	\$3,886,402.90
Phase 2 Subtotal	\$71,797,508.56	\$72,123,731.17	\$75,957,096.07	\$75,957,096.07	\$77,591,427.17
Total	\$110,574,409.97	\$110,900,632.57	\$114,733,997.48	\$116,548,501.45	\$120,399,588.69

Number of Closed Combustion Systems, by Unit Type: 70%DL Option 3						
	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls	Baseline Total
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	32	32	32	32	32	92
Boilers	24	25	29	29	29	108
Halogen-Acid Furnaces	0	0	0	0	0	17
Process Heaters	6	6	6	6	6	11
Total	62	63	67	67	67	276

Quantity of Waste Sent Offsite or Rerouted (in tons): 70%DL Option 3

	70% DL Floor: w/ CI Controls	70% DL BTF-A: w/ CI Controls	70% DL BTF-B: w/ CI Controls	70% DL BTF-C: w/ CI Controls	70% DL BTF-D: w/ CI Controls
To Commercial Incinerators	27,654	27,654	27,654	27,654	27,654
To Cement Kilns or LWAKs	14,578	15,329	17,670	17,670	17,670
Total	42,232	42,984	45,324	45,324	45,324

Available Capacity at Commercial Facilities: 70%DL Option 3

	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
70% DL Floor w/ CI Controls	160,538.55	490,297.93
70% DL BTF-A w/ CI Control	160,538.55	489,546.34
Post-MACT (tons) 70% DL BTF-B w/ CI Control	160,538.55	487,205.81
70% DL BTF-C w/ CI Control	160,538.55	487,205.81
70% DL BTF-D w/ CI Control	160,538.55	487,205.81

Government Costs: 70%DL Option 3

	Annual Cost
70% DL Floor w/ CI Controls	\$936,831.66
70% DL BTF-A w/ CI Controls	\$927,993.63
70% DL BTF-B w/ CI Controls	\$892,641.49
70% DL BTF-C w/ CI Controls	\$892,641.49
70% DL BTF-D w/ CI Controls	\$892,641.49

Number of Jobs Lost and Gained, by Unit Type: 70% DL Option 3										
	70% DL Floor w/ CI Controls		70% DL BTF-A w/ CI Controls		70% DL BTF-B w/ CI Controls		70% DL BTF-C w/ CI Controls		70% DL BTF-D w/ CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	22.53	0.00	22.53	0.00	22.53	0.00	22.53	0.00	22.53
Cement Kilns	0.0	84.31	0.00	84.31	0.00	84.31	0.00	84.31	0.00	84.31
LWAKs	0.0	2.55	0.00	2.55	0.00	2.55	0.00	16.55	0.00	30.86
Onsite Incinerators	236.4	51.50	236.36	51.50	236.36	51.50	236.36	51.50	236.36	51.50
Boilers	96.8	284.89	102.45	285.45	116.69	282.13	116.69	282.13	116.69	282.13
Halogen-Acid Furnaces	0.0	13.66	0.00	13.66	0.00	13.66	0.00	13.66	0.00	23.90
Process Heaters	27.0	13.59	27.05	13.59	27.05	13.59	27.05	13.59	27.05	13.59
APCD Industry	-	266.26	-	266.80	-	265.78	-	266.55	-	274.39
Total	360.2	739.3	365.9	740.4	380.1	736.0	380.1	750.8	380.1	783.2

Results: 70 Percent Design Level Option 3 without Chlorine Controls

Net Private Costs, by Unit Type: 70% DL Option 3					
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
Commercial Incinerators	-\$4,288,905.79	-\$4,288,905.79	-\$4,288,905.79	-\$4,288,905.79	-\$4,288,905.79
Cement Kilns	\$8,995,007.06	\$8,901,584.96	\$8,901,584.96	\$8,901,584.96	\$8,901,584.96
LWAKs	\$269,408.24	\$257,170.80	\$257,170.80	\$257,170.80	\$2,473,926.95
Onsite Incinerators	\$4,737,846.51	\$4,737,846.51	\$4,737,846.51	\$4,737,846.51	\$4,737,846.51
Phase 1 Subtotal	\$9,713,356.03	\$9,607,696.48	\$9,607,696.48	\$9,607,696.48	\$11,824,452.63
Boilers	\$35,512,096.04	\$35,776,587.27	\$35,776,587.27	\$35,776,587.27	\$35,798,613.87
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$1,805,171.90	\$1,805,171.90	\$1,805,171.90	\$1,805,171.90	\$1,805,171.90
Phase 2 Subtotal	\$39,141,971.77	\$39,406,463.00	\$39,406,463.00	\$39,406,463.00	\$41,029,842.17
Total	\$48,855,327.80	\$49,014,159.48	\$49,014,159.48	\$49,014,159.48	\$52,854,294.80

Upgrade Expenditures, by Unit Type: 70% DL Option 3					
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
Commercial Incinerators	\$2,359,259.68	\$2,359,259.68	\$2,359,259.68	\$2,359,259.68	\$2,359,259.68
Cement Kilns	\$11,299,207.60	\$11,299,207.60	\$11,299,207.60	\$11,299,207.60	\$11,299,207.60
LWAKs	\$447,076.32	\$447,076.32	\$447,076.32	\$447,076.32	\$2,663,832.47
Onsite Incinerators	\$4,640,790.42	\$4,640,790.42	\$4,640,790.42	\$4,640,790.42	\$4,640,790.42
Phase 1 Subtotal	\$18,746,334.02	\$18,746,334.02	\$18,746,334.02	\$18,746,334.02	\$20,963,090.17
Boilers	\$32,804,837.99	\$32,940,286.49	\$32,940,286.49	\$32,940,286.49	\$32,962,313.09
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$1,342,562.04	\$1,342,562.04	\$1,342,562.04	\$1,342,562.04	\$1,342,562.04
Phase 2 Subtotal	\$35,972,103.86	\$36,107,552.35	\$36,107,552.35	\$36,107,552.35	\$37,730,931.52
Total	\$54,718,437.88	\$54,853,886.37	\$54,853,886.37	\$54,853,886.37	\$58,694,021.69

Engineering Costs: 70%DL Option 3					
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls
Commercial Incinerators	\$2,359,259.68	\$2,359,259.68	\$2,359,259.68	\$2,359,259.68	\$2,359,259.68
Cement Kilns	\$11,299,207.60	\$11,299,207.60	\$11,299,207.60	\$11,299,207.60	\$11,299,207.60
LWAKs	\$447,076.32	\$447,076.32	\$447,076.32	\$447,076.32	\$2,663,832.47
Onsite Incinerators	\$6,535,974.55	\$6,535,974.55	\$6,535,974.55	\$6,535,974.55	\$6,535,974.55
Phase 1 Subtotal	\$20,641,518.15	\$20,641,518.15	\$20,641,518.15	\$20,641,518.15	\$22,858,274.30
Boilers	\$42,422,801.16	\$42,706,665.77	\$42,706,665.77	\$42,706,665.77	\$42,739,089.44
Halogen-Acid Furnaces	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$1,824,703.83	\$3,426,056.40
Process Heaters	\$2,247,728.28	\$2,247,728.28	\$2,247,728.28	\$2,247,728.28	\$2,247,728.28
Phase 2 Subtotal	\$46,495,233.27	\$46,779,097.88	\$46,779,097.88	\$46,779,097.88	\$48,412,874.12
Total	\$67,136,751.42	\$67,420,616.03	\$67,420,616.03	\$67,420,616.03	\$71,271,148.42

Number of Closed Combustion Systems, by Unit Type: 70%DL Option 3						
	70% DL Floor: w/o CI Controls	70% DL BTF-A: w/o CI Controls	70% DL BTF-B: w/o CI Controls	70% DL BTF-C: w/o CI Controls	70% DL BTF-D: w/o CI Controls	Baseline Total
Commercial Incinerators	0	0	0	0	0	15
Cement Kilns	0	0	0	0	0	26
LWAKs	0	0	0	0	0	7
Onsite Incinerators	29	29	29	29	29	92
Boilers	23	24	24	24	24	108
Halogen-Acid Furnaces	0	0	0	0	0	17
Process Heaters	4	4	4	4	4	11
Total	56	57	57	57	57	276

Quantity of Waste Sent Offsite or Rerouted (in tons): 70%DL Option 3					
	70% DL Floor:		70% DL BTF-B:		70% DL BTF-D:
	w/o CI Controls	w/o CI Controls	w/o CI Controls	70% DL BTF-C: w/o CI Controls	w/o CI Controls
To Commercial Incinerators	27,642	27,642	27,642	27,642	27,642
To Cement Kilns or LWAKs	13,139	13,891	13,891	13,891	13,891
Total	40,781	41,533	41,533	41,533	41,533

Available Capacity at Commercial Facilities: 70%DL Option 3		
	Commercial Incinerators	Cement Kilns/LWAKs
Pre-MACT Capacity (tons)	188,193.00	504,875.53
70% DL Floor w/o CI Control:	160,550.93	491,736.33
Post-MACT Capacity (tons)		
70% DL BTF-A w/o CI Contr	160,550.93	490,984.74
70% DL BTF-B w/o CI Contr	160,550.93	490,984.74
70% DL BTF-C w/o CI Contr	160,550.93	490,984.74
70% DL BTF-D w/o CI Contr	160,550.93	490,984.74

Government Costs: 70%DL Option 3	
	Annual Cost
70% DL Floor w/o CI Controls	\$963,345.77
70% DL BTF-A w/o CI Controls	\$954,507.73
70% DL BTF-B w/o CI Controls	\$954,507.73
70% DL BTF-C w/o CI Controls	\$954,507.73
70% DL BTF-D w/o CI Controls	\$954,507.73

Number of Jobs Lost and Gained, by Unit Type: 70% DL Option 3										
	70% DL Floor w/o CI Controls		70% DL BTF-A w/o CI Controls		70% DL BTF-B w/o CI Controls		70% DL BTF-C w/o CI Controls		70% DL BTF-D w/o CI Controls	
	<i>Lost</i>	<i>Gained</i>								
Commercial Incinerators	0.0	11.63	0.00	11.63	0.00	11.63	0.00	11.63	0.00	11.63
Cement Kilns	0.0	58.05	0.00	58.05	0.00	58.05	0.00	58.05	0.00	58.05
LWAKs	0.0	2.55	0.00	2.55	0.00	2.55	0.00	2.55	0.00	2.55
Onsite Incinerators	215.5	19.11	215.47	19.11	215.47	19.11	215.47	19.11	215.47	19.11
Boilers	92.4	207.47	98.09	208.04	98.09	208.04	98.09	208.04	98.09	208.04
Halogen-Acid Furnaces	0.0	13.66	0.00	13.66	0.00	13.66	0.00	13.66	0.00	13.66
Process Heaters	18.0	9.40	18.05	9.40	18.05	9.40	18.05	9.40	18.05	9.40
APCD Industry	-	148.38	-	148.92	-	148.92	-	148.92	-	148.92
Total	325.9	470.3	331.6	471.4	331.6	471.4	331.6	471.4	331.6	471.4

Appendix D

**DESCRIPTION OF HAZARDOUS WASTE
COMBUSTION ECONOMIC MODEL**

Appendix D

**DESCRIPTION OF HAZARDOUS WASTE
COMBUSTION ECONOMIC MODEL**

INTRODUCTION

To analyze the incremental costs and economic impacts of the proposed HWC MACT replacement standards, we developed a spreadsheet model of the hazardous waste combustion market. This model simulates the decision-making process of the different types of combustion facilities included in the regulatory universe. For industrial waste generators that treat waste on site in incinerators, boilers, or industrial furnaces, the model compares the potential compliance costs with the costs of disposing waste off site at a commercial incinerator or a commercial kiln. This decision is based on the tipping fees charged by commercial incinerators and kilns, transport costs associated with off site disposal, potential O&M savings associated with exiting the market, and (in the case of boilers and industrial furnaces) the cost of replacing hazardous waste fuel with other energy sources such as coal or natural gas. For commercial incinerators, the model examines system-level profitability after implementation of the proposed HWC MACT replacement standards. If systems become unprofitable because of the standards, the model closes that system and adjusts market capacity accordingly. The model also examines changes in waste-burning profits for cement and lightweight aggregate kilns.¹

MODEL STRUCTURE

The combustion market model is made up of three types of sheets: input sheets, calculation sheets, and output sheets. Input sheets contain all data inputs for the model including baseline waste quantities, baseline capacity, engineering costs associated with full compliance, alternative fuel prices, and the distances between each waste generator and each commercial facility. Calculation sheets use information from input sheets and intermediate outputs from other calculation sheets to identify the least-cost option for each combustion system. For example, the calculation sheets estimate the transport and disposal costs associated with sending waste off site. Output sheets synthesize outputs generated on the calculation sheets, based on the least cost option for each combustion system. The model is run by a Microsoft Excel macro that calculates these sheets in an iterative process to ensure that the amount of waste sent off site in each defined region does not exceed available capacity in that region.

¹ Because our model predicts that all cement kiln and LWAK hazardous waste burning operations will remain profitable, we did not include a mechanism for cement kiln or LWAK system closure in the model.

The model divides the United States into two geographically defined regional markets, one made up of states in the Gulf of Mexico region (name states) and the other comprised of the rest of the country. These regional designations reflect the concentration of hazardous waste combustion facilities in the Gulf region and are consistent with input from industry sources. In the baseline, regional prices are assumed to be the same across all regions. However, the model adjusts prices in each region to ensure that regional demand does not exceed capacity available in the region. Facilities that close one or more combustion systems are assumed to send waste to the nearest facility in the region with available capacity.

MODEL MACRO

The Excel macro that runs the combustion market model is structured as a series of programming loops that generate final outputs only when the model reaches an equilibrium (e.g, when prices reach a level where incremental demand does not exceed capacity currently available in each region). In this section we outline the steps that the macro goes through to reach equilibrium.

The first step of the macro is to introduce engineering costs (as estimated by EERGC) to each combustion system. Next, assuming baseline combustion prices, the model calculates the potential costs that would be incurred by generators if they were to send waste off site. These costs include transportation of waste, disposal fees, and alternative fuel costs (for HW boilers). For on-site incinerators, these costs are partially offset by O&M savings associated with the closure of the incinerator. For each system, the model then compares these incremental off-site disposal costs with the cost of complying with the proposed HWC MACT replacement standards. Each system is assumed to choose the less costly of these two options.

After simulating this decision-making process, the model compares the incremental increase in demand with the capacity available in each region. If available capacity exceeds the incremental change in demand in each region, the macro analyzes commercial incinerator profitability (see below). If there is not enough regional capacity to accommodate the increase in regional demand, the model increases combustion prices in that region by two percent and re-simulates the decision-making process. The macro continues to increase prices by two percent until incremental demand no longer exceeds available capacity.

The next step of the macro is an analysis of commercial incinerator profitability, given any price or demand increases simulated in the previous loop of the macro. This analysis also accounts for baseline compliance costs, as well as costs associated with complying with the proposed HWC MACT replacement standards. If a commercial incinerator system is predicted to be unprofitable, the model closes that system and redistributes its waste to other commercial systems in the same region. The revenues and variable costs of other systems in the region are then adjusted accordingly.

If the model simulates the closure of a commercial incinerator system, capacity has changed, which may affect pricing. Therefore, when the model predicts the closure of a commercial system, it reexamines capacity in each region to make sure incremental demand does not exceed available capacity. If the closure of a commercial incinerator leads to capacity constraints, the model increases regional waste burning prices and reassesses the decisions of waste generators. The model continues to raise combustion prices until it finds a price where incremental demand does not exceed available capacity. If all remaining commercial incinerator systems are still profitable, the model then generates output sheets. Otherwise, the model closes unprofitable commercial incinerator systems, and the process of simulating generator decisions and commercial system profitability begins again. This iterative process of simulating waste generator decisions, adjusting prices, and estimating commercial system profitability is repeated until incremental demand does not exceed available capacity and all commercial incinerator systems that remain open are profitable.

DESCRIPTION OF HWC-MACT MODEL BY SHEET

The hazardous waste combustion market model is made up of several spreadsheets in a Microsoft Excel workbook. In this section we describe the role of each sheet in the model and provide an explanation of the programming logic embedded in several sheets.

Input Sheets

1. **Inputs:** This sheet is the home sheet for key model inputs, such as incineration prices, inflation, transportation cost inputs, etc. In addition, BRS waste forms are matched with waste forms the Hazardous Waste Resource Center uses in its online incineration price listings.² In addition, users specify which version of the standards they want to examine on this sheet.
2. **Regions:** In this sheet, each state assigned a specific regional designation. Model users can change regional specifications as they see fit.
3. **Commercial Unit Baseline Costs:** Contains baseline cost data for commercial incinerators and commercial kilns.
4. **Upgrade2:** The compliance cost scenario being used for a given model run is displayed on this sheet, along with several other data relevant to the regulatory scenario under examination. Based on user input, this sheet draws from one of five sheets (version1, version2, version3, version4, or version5) that coincide with different versions of the replacement standards.

² Refer to the Hazardous Waste Resource Center website to view these listings: <http://www.etc.org/costsurvey6.cfm>.

5. **version1:** Users may enter data related to one regulatory scenario on this sheet. If the user specifies 1 as the version number on the Inputs sheet, all data from version1 appear in Upgrade2.
6. **version2:** Users may enter data related to one regulatory scenario on this sheet. If the user specifies 2 as the version number on the Inputs sheet, all data from version2 appear in Upgrade2.
7. **version3:** Users may enter data related to one regulatory scenario on this sheet. If the user specifies 3 as the version number on the Inputs sheet, all data from version3 appear in Upgrade2.
8. **version4:** Users may enter data related to one regulatory scenario on this sheet. If the user specifies 4 as the version number on the Inputs sheet, all data from version4 appear in Upgrade2.
9. **version5:** Users may enter data related to one regulatory scenario on this sheet. If the user specifies 5 as the version number on the Inputs sheet, all data from version5 appear in Upgrade2.
10. **OnsiteWaste:** BRS estimates of the amount of waste (by waste form) generated and treated at each facility appear on this sheet.
11. **Current_Receive:** BRS estimates of the amount of waste (by waste form) received and treated at each facility appear on this sheet.
12. **GenUnits:** This sheet lists the system number, EPA ID, source type, and auxiliary fuel of each on-site system (e.g., onsite incinerator, boiler, etc.). We use this sheet as a reference in other sheets.
13. **CommercialUnits:** This sheet lists the system number, EPA ID, and source type of all waste receivers--commercial incinerators, cement kilns, and LWAKs. We use this sheet as a reference in other sheets.
14. **AllUnits:** This sheet lists the system number, EPA ID, and source type of all waste generators and receivers. We use this sheet as a reference in other sheets.

Calculation Sheets

- 15. **Feedrate:** This sheet estimates the total capacity of each facility in the regulatory universe. These estimates are based on system-level feedrate estimates provided by EERGC.
- 16. **PriceIndex:** This sheet extracts the 2002 incineration prices (by waste form and by region) from the inputs sheet. For each waste form and region, the model specifies a price multiplier; the prices the model actually uses are the product of these multipliers and the 2002 prices provided on the Inputs sheet. Initial multiplier values are set to 1 so that the model macro uses 2002 prices on the first iteration of the model. As the model macro goes through additional iterations, it adjusts the price multipliers as necessary, thereby changing the prices the model actually uses.
- 17. **Wasteratio:** Since BRS reports waste quantities at the facility level instead of the system level, we needed a way to distribute waste to different systems at the same facility. To do this, we weight each system on this sheet by dividing its hourly capacity by the facility's total hourly capacity, as estimated on the Feedrate sheet.
- 18. **WasteVolume:** Drawing from the sheets OnsiteWaste and wasteratio, this sheet calculates the amount of waste (by waste form) at each generating system. The #N/A errors in columns U through AW indicate that a particular waste form is not treated at a given facility. Also, the syntax in columns U through AW represent a command for running a two-criteria VLOOKUP using the Index and Match functions of Excel. Below is an example using cell AB4.

Cell AB4 =
VLOOKUP(\$B4, ratio, 9, FALSE)*INDEX(OnsiteWaste!\$H\$2:\$H\$479, MATCH(\$A4, IF(OnsiteWaste!\$G\$2:\$G\$479=AB\$1, OnsiteWaste!\$A\$2:\$A\$479), 0))

The VLOOKUP(\$B4, ratio, 9, FALSE) part of the command references the weight of the system specified in cell B4 relative to other systems at the same facility, as calculated on the waste ratio sheet. The remainder of the command is the two-criteria VLOOKUP, with the two criteria being EPA ID and waste form.
- 19. **Waste_by_Phase_ID:** This sheet lists the quantity of waste generated and treated at each on-site system.
- 20. **Waste_by_EPA_ID:** This sheet lists the quantity of waste generated and treated at each on-site facility by EPA ID.

21. **FuelCosts:** This sheet calculates how much boilers and industrial furnaces would spend on fuel if they chose to send their waste off site. For on-site incinerators, this value is assumed to be zero since they burn mostly low-Btu waste.
22. **Distance_Calculation:** This sheet calculates the distance between each on-site facility and each commercial facility, with the exception of ICI explosives in Joplin, MO.³ For each generating facility, the sheet then identifies the six closest commercial incinerators and the seven closest cement kilns or LWAKs.

This sheet estimates distance by calculating the great circle distance between two points.

The formula is

$$d = R * \text{Arccos}(c) * \text{Pi} / 180,$$

where $c = \sin(\text{lat}1) * \sin(\text{lat}2) + \cos(\text{long}1 - \text{long}2) * \cos(\text{lat}1) * \cos(\text{lat}2)$

Formula source: <http://mathforum.org/library/drmath/view/54680.html>

23. **Minimum Distance_Iter1:** Drawing from the distance calculations on the Distance_Calculation sheet, this sheet is an intermediate step in determining which commercial facility a waste generator would send its waste to if it were to stop burning hazardous waste. The programming steps on this sheet are as follows:
 - a. First, this sheet examines the three commercial incinerators closest to each generator, determining whether they are in the same region as the generator and whether they have enough capacity available to accommodate the generator's waste.
 - b. Next, the sheet examines the fourth, fifth, and sixth closest commercial incinerators and determines whether they have enough capacity, regardless of what region they are in.
 - c. After examining commercial incinerators, the sheet finds the seven closest commercial kilns and establishes whether they are in the same region as the generator and whether they have enough capacity for the generator's waste.
24. **TransportCosts:** Using transport cost inputs from the Inputs sheet, this sheet calculates likely transport costs incurred by on-site systems if they choose to send their waste off site. As part of this process, the TransportCosts sheet determines which commercial facility a generator would send its waste to. On-site incinerators are assumed to send waste to commercial incinerators, and boilers and industrial furnaces are assumed to send their waste to cement or lightweight aggregate kilns. The programming logic for determining where an on-site incinerator would send waste is as follows:

³ We exclude ICI because it specializes in the incineration of explosives and does not compete for other forms of waste.

If the closest incinerator is in the same region and has enough capacity,

Then distance=the distance to the closest incinerator.

Else

 If the second closest CINC is in the same region and has enough capacity,

 Then distance=the distance to the 2nd closest incin.

 Else

 If the third closest CINC is in the same region and has enough capacity,

 Then distance=the distance to the 3rd closest incin.

 Else

 If the 4th closest CINC has enough capacity,

 Then distance=the distance to the 4th closest incin.

 Else

 If the 5th closest CINC has enough capacity,

 Then distance=the distance to the 5th closest incin.

 Else

 If the 6th closest CINC has enough capacity,

 Then distance=the distance to the 6th closest incin.

 Else distance=99999999

The distance estimate will be 999999999 only for those incinerators that have too much waste to send to any one commercial incinerator. Inserting a prohibitively large distance number for these systems helps avoid error results later in the model.

The logic for the determining the commercial kiln nearest to boilers and industrial furnaces is similar, except that it looks at the nearest seven facilities, instead of six.

25. **Disposal Costs:** This sheet calculates the tipping fee costs incurred by a waste generator should it decide to send its waste off site.
26. **ConsolidatedUnitCosts:** This sheet compares each generator's potential compliance costs with the potential costs of sending waste off site (e.g, alternative fuel, transport, and disposal costs) and determines whether systems will stop burning hazardous waste or remain open. In addition, the sheet calculates available capacity at those systems that decide to comply with the HWC MACT replacement standards.
27. **Consolidation2:** This sheet examines systems that will stop burning hazardous waste and determines whether it can consolidate to other systems at the same facility. At each facility, the routine assumes that consolidation starts at the biggest system expected to close and moves on to successively smaller units. Since this sheet is fairly complex, we provide descriptions of several columns in the sheet below.

Available Capacity at complying systems at the facility: For each system, this column specifies how much capacity is available for consolidation by looking at the capacity of systems that will remain open.

Complete Consolidation:

If the system is expected to send waste off site,

Then

If available on-site capacity at the facility exceeds the total tonnage of waste at systems expected to close,

Then cell=1 (signifying that the system is at a facility where systems remaining open can take all waste from systems that will be shut down.)

Else cell=0

Largest System Examination:

Returns a 1, signifying that the system is consolidated to other systems at the same facility if ALL of the following conditions are met. Otherwise it returns a 0:

- A. The system will not continue to burn hazardous waste.
- B. There is not “complete consolidation” at the facility (e.g, there is not enough capacity for all waste from closed systems at systems remaining open at the same facility).
- C. The system is the largest among those not remaining open at the facility.
- D. There is enough capacity at systems remaining open to take all the waste from this particular system.

Examination of Second Largest System:

Returns a 1, signifying that the system is consolidated to other systems at the same facility, if ALL of the following conditions are met. Otherwise it returns a 0:

- A. The system will not continue to burn hazardous waste.
- B. There is not “complete consolidation” at the facility (e.g, there is not enough capacity for all waste from closed systems at systems remaining open at the same facility).
- C. There are at least two systems at the facility.
- D. The system is the second largest among those not remaining open at the facility.
- E. Capacity at systems remaining open minus any consolidated waste from the largest system exceeds the waste quantity at this particular system.

Examination of Third Largest System:

Returns a 1, signifying that the unit is consolidated to other units at the same facility, if ALL of the following conditions are met. Otherwise it returns a 0:

- A. The system will not continue to burn hazardous waste.
- B. There is not “complete consolidation” at the facility (e.g, there is not enough capacity for all waste from closed systems at systems remaining open at the same facility).
- C. There are at least three systems at the facility.
- D. The system is the third largest among those not remaining open at the facility.
- E. Capacity at systems remaining open minus any consolidated waste from the largest two systems exceeds the waste quantity at this particular system.

Examination of Fourth Largest System: Follows similar pattern as second and third largest systems.

Examination of Fifth Largest System: Follows similar pattern as second and third largest systems.

Examination of Sixth Largest System: Follows similar pattern as second and third largest systems.

- 28. **Total Unit Costs:** This sheet calculates on-site generator costs for the first loop of the model, accounting for any intra-facility consolidation that may take place. If a system decides to send waste off site, the sheet calculates how much of each waste form the system will be sending offsite. The sheet also keeps track of how much of each waste form will be going to commercial incinerators and how much will be going to cement and lightweight aggregate kilns.
- 29. **Capacity:** Information related to available capacity at commercial incinerators and cement kilns is on this sheet, at the facility, system, and regional level. This sheet is only used in the first loop of the model.
- 30. **CINCRenue:** This sheet calculates how much of each waste form each commercial incinerator system receives in the baseline and as the result of on-site incinerator closures. It then calculates how much revenue is generated from each waste form in the first loop of the model. The commands for drawing waste quantities from the Current_Receive sheet are in columns DB through DN. They use the two criteria vlookup described on sheet 18, the waste volume sheet. See the Waste Volume sheet for an explanation of the syntax.

31. **CINCosts:** For the first loop of the model, this sheet calculates total incinerator costs, including baseline costs, compliance costs, and additional O&M associated with new waste sent to commercial incinerators from on-site facilities.
32. **CK_LWAK_Rev:** Calculates cement kiln and LWAK revenue from baseline waste and from new waste sent to them as the result of on-site facilities closing. This sheet is only used for the first loop of the model.
33. **CK_LWAK_Costs:** For the first loop of the model, this sheet calculates the change in cement kiln and LWAK costs resulting from compliance with the HWC MACT replacement standards and from new waste received from on-site facilities that decide to send their waste off site.
34. **CINCprofits:** Estimates commercial incinerator profits at the system level, for the first loop of the model. Cost and revenue information is drawn from the CINCREvenue and CINCost sheets.
35. **Equilibrium:** The purpose of this sheet is to determine whether further iterations are required for the first loop of the model macro. For each region, the sheet looks at how much capacity was available at commercial incinerators, cement kilns, and LWAKs at the beginning of the iteration and how much waste on-site facilities send to commercial systems during this iteration of the model. If waste sent exceeds available capacity for a given region, the model macro then increases prices runs the initial loop again.
36. **CINCbank:** The closure of commercial incinerator systems in the mode is recorded on this sheet. Having this information recorded allows for automated capacity adjustment on the Capacity2 sheet. It also allows the model to reroute waste from commercial incinerators that shut down as the result of the rule to those that remain open.
37. **Capacity2:** This sheet tracks commercial incinerator and CK/LWAK capacity as on-site systems and other commercial incinerators shut down. In addition, the sheet tracks capacity at the regional, facility, and system level. The model uses this sheet instead of the Capacity sheet after the first loop of the model macro.
38. **Minimum_Distance_Iter2:** This sheet's logic is the same as Minimum_Distance_Iter1. It serves the same purpose in later loops that Minimum_Distance_Iter1 serves in the first loop.
39. **Transport2:** This sheet's logic is the same as Transport_Costs, which is used in the first loop of the model.

40. **ConsolidateUnitCosts2:** This sheet's logic is the same as ConsolidateUnitCosts, which is used in the first loop of the model.
41. **Consolidation2B:** This sheet's logic is the same as Consolidation2, which is used in the first loop of the model.
42. **TotalUnitCosts2:** This sheet's logic is the same as TotalUnitCosts, which is used in the first loop of the model.
43. **CINCRenue2:** Same as CINCRenue except for the fact that it doesn't include CINC baseline revenues and it includes revenue from closed CINCs. The latter was not necessary for the first loop.
44. **CINCCosts2:** This sheet's logic is the same as CINCCosts, which is used in the first loop of the model, except for the fact that it includes O&M costs associated with waste rerouted from closed commercial incinerators.
45. **CKLWAKRev2:** This sheet is a replica of CKLWAKRev to be used after the first loop of the model macro.
46. **CKLWAKCosts2:** This sheet is a replica of CKLWAKCosts to be used after the first loop of the model macro.
47. **CINCP Profits2:** This sheet is a replica of CINCP Profits to be used after the first loop of the model macro.
48. **Equilibrium2:** This sheet is a replica of Equilibrium to be used after the first loop of the model macro.

Output Sheets

49. **CK_LWAK_Welfare:** Measures the regulation's net welfare impact on cement kilns and LWAKs. Welfare changes for cement kilns and LWAKs equal revenues gained and fuel savings associated with new waste minus MACT compliance costs and incremental O&M costs associated with new waste.
50. **Net_CINC_Costs:** This sheet calculates changes in commercial incinerator welfare at the unit level. For commercial incinerators that remain open, net costs equal MACT compliance costs plus additional O&M associated with new waste minus incremental revenue associated with new waste.

51. **Employment:** This sheet calculates employment gains and losses and system closures resulting from the HWC MACT replacement standards.
52. **Outputs:** Results of the model are displayed on this sheet.

Appendix E

METHODOLOGY FOR EMPLOYMENT IMPACTS ANALYSIS

Appendix E

METHODOLOGY FOR EMPLOYMENT IMPACTS ANALYSIS

INTRODUCTION

The proposed HWC MACT replacement standards are likely to cause sectoral shifts in employment. As some combustion facilities find that it is no longer economical to continue burning hazardous waste in some or all of their systems, workers at these locations may be displaced. While the wastes diverted to other facilities may create a need for additional staff, economies of scale and current capacity utilization in the hazardous waste combustion market suggest that, within the combustion sector, these additions will not offset expected dislocations. Employment gains from the proposed HWC MACT replacement standards, however, are likely in the pollution control equipment sector, as new purchases of equipment to comply with the MACT replacement standards stimulate additional hiring.

In this appendix we present the methodology for calculating the employment impacts likely to result from implementation of the proposed HWC MACT replacement standards. In the first section, we discuss the overall framework of the methodology and highlight a number of important simplifications we made in analyzing employment impacts. We then provide detailed discussions regarding the methodologies used for the calculation of job dislocation and job gain estimates.

GENERAL FRAMEWORK FOR ANALYZING EMPLOYMENT IMPACTS

In the employment impact analysis, we evaluate national, primary impacts of the proposed HWC MACT replacement standards within the hazardous waste combustion sector and the pollution control equipment manufacturing industry. This approach is based on a number of assumptions and simplifications that are detailed below. One of the most significant simplifications is that the methodology ignores potential secondary spill-over effects. For example, as increased demand stimulates additional hiring at pollution control equipment manufacturers, the employees may contribute more resources to the local economy through the purchase of goods and services. Such purchases may, in turn, generate additional jobs. At the same time, an opposite effect may occur in conjunction with job dislocations at combustion facilities, as displaced workers have less money to spend within the local economy. It is important to note that many of these potential secondary impacts will likely be transitory; for example, the secondary impacts of employment dislocations at combustion facilities will decrease as workers find other jobs.

Focusing on the hazardous waste combustion sector and the pollution control equipment industry, we do not calculate employment impacts within the fuel blending sector. We do not expect the total quantity of hazardous waste that is blended to change substantially due to the proposed

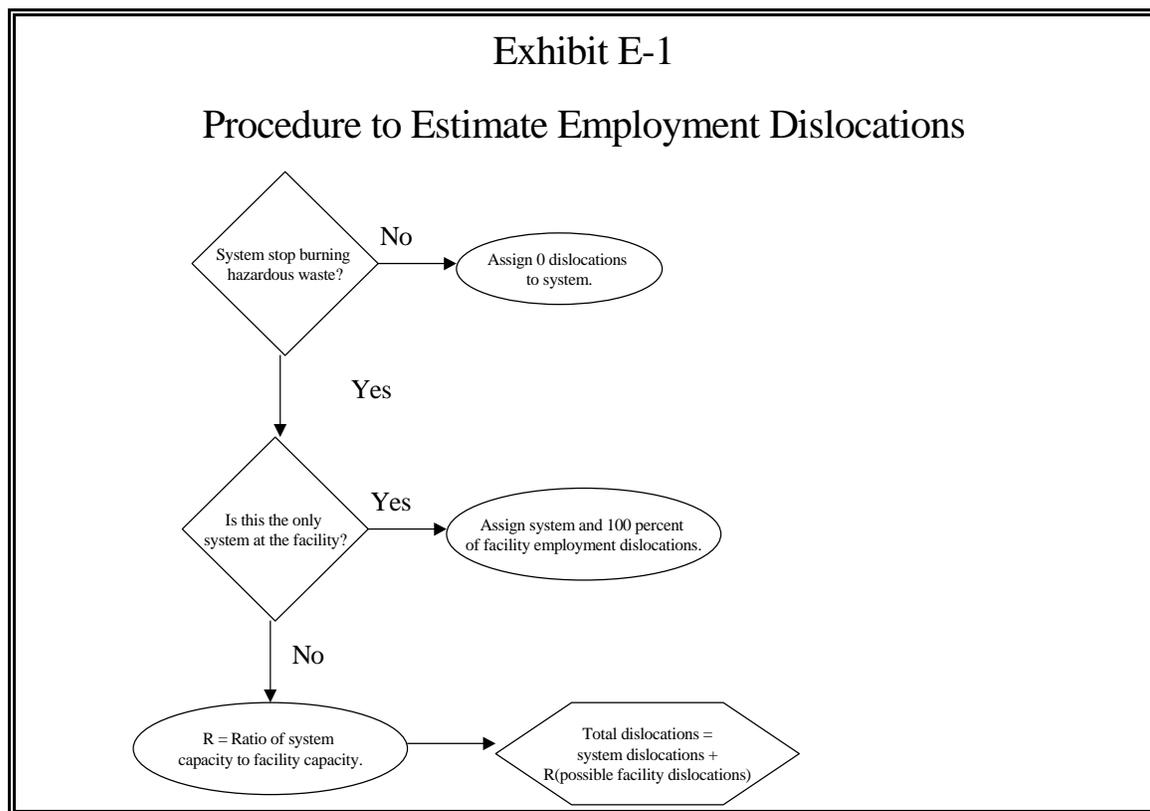
HWC MACT replacement standards. As a result, we anticipate that job dislocations and gains in the fuel blending sector will roughly offset each other as facilities divert wastes to other combustion facilities and to other waste management alternatives.

Another simplification in the analysis involves the geographic dimension of the employment impacts. Because we estimate national values for employment changes, our analysis cannot predict the geographic distribution of employment impacts. It is probable, however, that the job gains will not occur in the same localities as do the job dislocations. The proposed HWC MACT replacement standards will likely affect regions of the country in different ways not only due to the potentially unequal distribution of job gains and dislocations but also as a result of regional secondary impacts as displaced workers move to find work in other locations. Additionally, some portion of jobs created from the increased demand for pollution control equipment may occur outside of the United States entirely.

Finally, the analysis does not attempt to include a precise time component for the employment estimates. Employment impacts may not all occur immediately, and job gains and dislocations may not occur concurrently. For example, short-term employment surges may occur in the pollution control equipment industry as combustion facilities make their initial equipment purchases. In addition, job dislocations in the combustion industry may initially be lower than we estimate, as some combustion systems will continue burning until they need to reinvest in capital equipment. The estimates we present are based on long-term averages because these provide an upper-bound estimate of primary employment dislocations and gains associated with the rule.

ESTIMATING JOB DISLOCATIONS

Primary employment dislocations in the combustion industry are likely to occur when combustion systems consolidate waste burning or when a facility exits the hazardous waste combustion market entirely. The methodology we used to estimate employment dislocations within the combustion industry is described below. Exhibit E-1 also provides an illustration of the approach.



Methodology

Employees Involved with Hazardous Waste Burning Operations in the Baseline

The first step in estimating employment dislocations is to assign baseline employment estimates to each system.¹ Employment estimates include only the employees involved with hazardous waste burning operations; we exclude employees in affiliated activities (e.g., cement production personnel at waste-burning cement kilns). Two major employment groupings are associated with the burning of hazardous waste: system requirements and facility requirements. Employees who operate the equipment at individual combustion systems are classified under system requirements, while employees who fulfill facility-wide duties, such as clerical support and safety coordination, are categorized under facility requirements.² Average system and facility employment

¹ Baseline employment estimates are assigned to individual modeled systems and were provided by Bruce Springsteen, EERGC, June 1998.

² Facility employment requirements are assigned to each combustion system based on type and other system-specific parameters, but we assume that these employees are shared across multiple systems within a particular facility.

requirements are shown in Exhibit E-2 by sector. It is important to note that these estimates assume full capacity utilization (e.g, three eight-hour shifts per day) and will therefore steer the analysis towards more conservative or upper-bound job loss estimates.

Calculating the Job Dislocation Estimates

Once baseline employment estimates are assigned to each combustion system, we run the economic impact model to determine which systems are expected to stop burning waste under each regulatory option. For each system that stops burning hazardous waste, we assign employment dislocations corresponding with its system requirements. We also estimate the expected reduction in facility requirements associated with the closure of a combustion system. When a combustion system closes, we assume that facility employment requirements fall in proportion with the resulting decline in facility capacity. For example, if the closure of a combustion system reduces the facility’s hazardous waste treatment capacity by 20 percent, facility employment requirements also fall by 20 percent.

Exhibit E-2		
AVERAGE ESTIMATES OF EMPLOYEES ASSOCIATED WITH HAZARDOUS WASTE COMBUSTION OPERATIONS (System and Facility Employment Requirements)^a		
Combustion Sector	System Requirements (Average # of Employees)^b	Facility Requirements (Average # of Employees)^c
Commercial Incinerators	22.5	5.8
On-Site Incinerators	6.6	1.4
Cement Kilns	7.2	2.7
LWAKs, Boilers, and Industrial Furnaces	3.3	2.4
<p>Notes:</p> <p>^a Employment requirement estimates assume full capacity utilization (three eight-hour shifts per day).</p> <p>^b Employment requirements are assigned based on system-specific parameters (e.g., sector type, size).</p> <p>^c Employees who operate individual combustion systems are classified under system requirements, while employees who fulfill facility-wide duties (e.g., clerical support, safety coordination) are categorized under facility requirements. We assume facility employees to be shared across multiple systems within a particular facility.</p> <p>Source: Estimates prepared by Bruce Springsteen, EERGC Corporation, June 1998. We assume that employment requirements for boilers and industrial furnaces are the same as those for LWAKs. Boiler and industrial furnace estimates were not provided by EERGC.</p>		

Caveats and Limitations

As discussed earlier in the general methodology framework section, the employment dislocation impacts analysis is subject to several key caveats and limitations:

- First, as previously mentioned, the approach does not address potential secondary employment effects, either within the local economies of communities with closing combustion facilities (as earnings decline) or within the generators' operations (as combustion prices increase).
- Second, employment dislocation estimates are sensitive to waste quantity data assumptions. Substantial changes in waste quantities would alter employment dislocation estimates because market exit patterns would change.
- Third, as facilities exit the waste burning market, wastes are likely to be diverted to other combustion systems. Depending on the utilization of labor at these systems, additional staff could be required to handle these incremental quantities. However, as mentioned earlier, we do not anticipate significant offsets to job dislocations from this waste diversion given the economies of scale in the hazardous waste combustion market, the existence of slack capacity across all combustion sectors, and the relatively small quantities of waste expected to be diverted.
- Finally, many combustion facilities (excluding commercial incinerators that will shut down if they stop burning wastes) may be able to transfer waste handling employees to other areas of the business. While this scenario could prevent specific individuals from being displaced, it would not change hazardous waste treatment employment losses attributable to the proposed HWC MACT replacement standards.

ESTIMATING EMPLOYMENT GAINS

In addition to employment dislocations, the proposed HWC MACT replacement standards will also lead to job gains as firms invest to comply with the various requirements of the standards. Employment increases are expected in the following areas:³

- Pollution control equipment industry -- purchase and installation of new

³ Small incremental gains associated with transporting wastes from on-site incinerators to commercial facilities are also possible; we do not evaluate these gains in this analysis.

pollution control devices.

- Labor within the combustion facility:
 - Operation and maintenance of the new pollution control equipment.
 - Permitting requirements.

Described below is the methodology we used to estimate these types of employment gains. Exhibit E-3 also illustrates the approach.

Methodology

Employment gains are determined by estimating the labor requirement for each of the categories described above. The labor requirement is calculated as follows:

$$\text{NewEmployees} = \frac{\text{cost of the requirement (annualized)} * \% \text{ of costs spent on labor}}{\text{average hourly wage rate} * \text{hours worked per year}}$$

To perform the calculation shown above, we need the following data associated with each compliance requirement:

- Percentage of total compliance costs expected to be spent on labor
- Average wage rate associated with performing the given compliance task or producing the piece of equipment

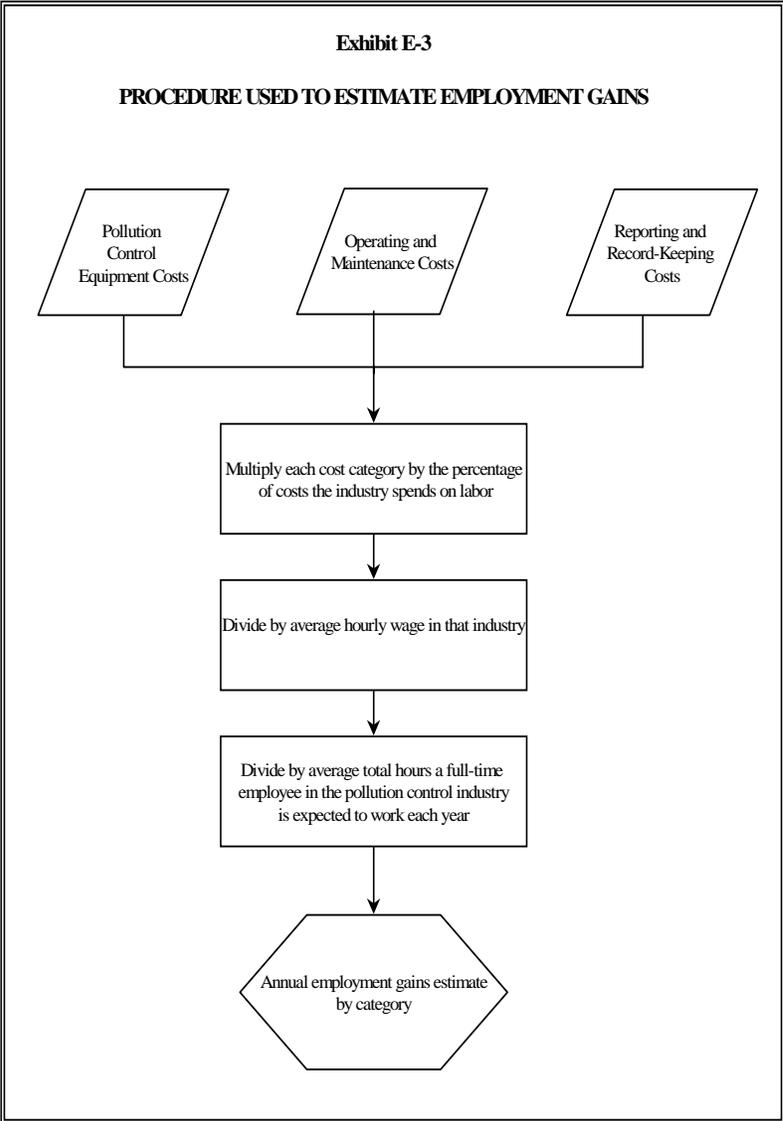
The assumptions we use for these data inputs are shown in Exhibit E-4. We assume, for instance, that a full-time employee works 2,080 hours per year.⁴

For each combustion sector, we calculate employment gains associated with each of the three types of compliance requirements -- pollution control equipment, operation and maintenance, and incremental permitting costs. We do not need to calculate employment gains associated with the compliance requirements for *each* combustion system that continues burning. Rather, we use *total* annualized costs of the requirement because a significant portion of the employment gain estimates are provided for the pollution control equipment industry and need not be associated with specific combustion systems.⁵ For example, to calculate total employment gains associated with the

⁴ This number of hours per year assumes 52 weeks per year, five days per week, and eight hour days. We do not subtract any vacation time nor do we add any additional hours to account for overtime.

⁵ Total annual costs account for system closure and intra-facility consolidation.

purchase of the pollution control equipment for the cement kiln sector, we first determine total annualized compliance costs. We then multiply this figure by the percentage of compliance costs expected to be spent on labor (50 percent). Next, we divide by the average hourly wage rate (\$23.69/hour) and the total hours a worker in the pollution control industry is expected to work in a typical year (2,080 hours/year). From these calculations, we estimate the number of full-time employees that will be hired in the pollution control equipment industry to accommodate the additional purchases by cement kilns continuing to burn hazardous waste. Employment gain estimates are similarly calculated for the other compliance requirements and combustion sectors.



Caveats and Limitations

- We assume that pollution control equipment is purchased only from domestic producers. This assumption provides a fair estimation of employment impacts. While many foreign firms produce pollution control equipment, the bulk of their production capacity is in the United States, using domestic labor.⁶
- As with job dislocations, job gains are driven by the number of systems that remain in the combustion market. As a result, substantial shifts in waste quantities would alter market exit patterns and therefore, primary job gains.
- Estimates of employment gains do not include secondary employment effects.

Exhibit E-4		
ASSUMPTIONS USED TO ESTIMATE EMPLOYMENT GAINS		
Category of Employment Gains	Average Wage Rate- includes benefits (2002\$)^a	Percent of Compliance Costs Spent on Labor^b
Pollution Control Equipment (purchase and installation)	\$23.69 per hour †	50%
Operating and Maintenance ^c	\$25.05 per hour ‡	42%
Permitting Requirements ^d	\$42.37 per hour ◆	90%

Notes:

^a Wage rates determined as follows:

^b The percentage of pollution control equipment expenditures spent on labor is based on analysis in *Business Opportunities of the New Clean Air Act: The Impact of the CAAA of 1990 on the Air Pollution Control Industry*, prepared by ICF Resources Incorporated and Smith Barney, Harris Upham and Company Incorporated, for the Office of Air and Radiation, U.S. Environmental Protection Agency, August 1992. Includes labor associated with both the equipment manufacture and other work that typically falls under subcontracts, e.g., work on foundations, electrical, fabrication and installation, piping and fitting.

^c We anticipate that the labor content of operation and maintenance will be higher than that assumed for manufacture of pollution control equipment. Lacking specific data on this subject, EPA invited industry to provide comments on this assumption in 1999 but did not receive any.

^d The ICR for the hazardous waste combustion rulemaking assumes that 100 percent of the permitting expenditures are spent on labor. Since materials (postage and paper) and equipment (phones and computers) are also necessary to perform the requirements, we decreased this figure to 90 percent.

† Total employer costs for employee compensation, specific to the manufacturing sector. Costs are fully burdened and include employee benefits and other legally required costs. Source: U.S. Bureau of Labor Statistics, "Table 10. Private Industry by Occupational and Industrial Categories: March 1997." (<http://stats.bls.gov/news.release/ecec.t10.htm> - May 1, 1998.)

‡ Wage rate of \$18 per hour burdened at 23 percent rate to account for taxes, insurance, benefits, etc. results in an average wage rate of \$22.14. Estimate from Gardner, Pearson, and Moyeda, *Development of Baseline Costs for Hazardous Waste Incineration*, prepared by Energy and Environmental Research Corporation, April 18, 1995. (We then converted wage rate to 1996 dollars.)

◆ Estimate calculated from results in ICF Kaiser, *Supporting Statement for EPA Information Collection Request #XXXX [sic] "Reporting and Recordkeeping Requirements for National Emissions Standards for Hazardous Air Pollutants from Hazardous Waste Combustors,"* October 4, 1995. In the ICF report, average hourly labor rates for respondents are \$91.23 for legal staff, \$69.47 for managerial staff, \$45.47 for technical staff, and \$23.78 for clerical staff. The figure shown in the table is a weighted average of these wage rates, calculated by dividing the total annual cost of permitting requirements by the total hours per year spent complying with these requirements.

⁶ ICF Resources, Incorporated, 1992.

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