Appendix J

MULTI-RULE ANALYSIS

RESEARCH TRIANGLE INSTITUTE

Center for Economics Research

MEMORANDUM

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FROM: Tyler J. Fox

DATE: September 15, 1998

SUBJECT: Joint Economic Impacts of the Hazardous Waste Combustion MACT Standards

This memorandum summarizes the projected national-level economic impacts of joint implementation of the final hazardous waste combustion (HWC) MACT standards with the non-hazardous combustion MACT standards (or PC MACT) and the Cement Kiln Dust (CKD) rulemaking. Hazardous waste burning cement kilns, lightweight aggregate kilns (LWAKs), and commercial and on-site incinerators will be subject to the HWC MACT standards, while non-hazardous waste burning cement kilns will be subject to the PC MACT standards. All cement kilns will be subject to the CKD rule. Figure 1 illustrates the interactions between the EPA regulations and the affected producers.

The measures of economic impact presented here are a result of incorporating the costs of compliance for each affected kiln and incinerator into the integrated Portland cement/hazardous waste incineration market models developed by RTI for EPA/OSW. Tables A and B are attached to the end of this memo and summarize the costs and affected entities for each regulation. These model results are projected for joint imposition of each of the three HWC MACT regulatory alternatives (MACT Floor, Recommended Beyond-the-Floor, ACI Beyond-the-Floor) with:

- the PC MACT only; and
- both the PC MACT and CKD rule.

These model results are summarized below as the market-, industry-, and social-level impacts for each joint implementation scenario.

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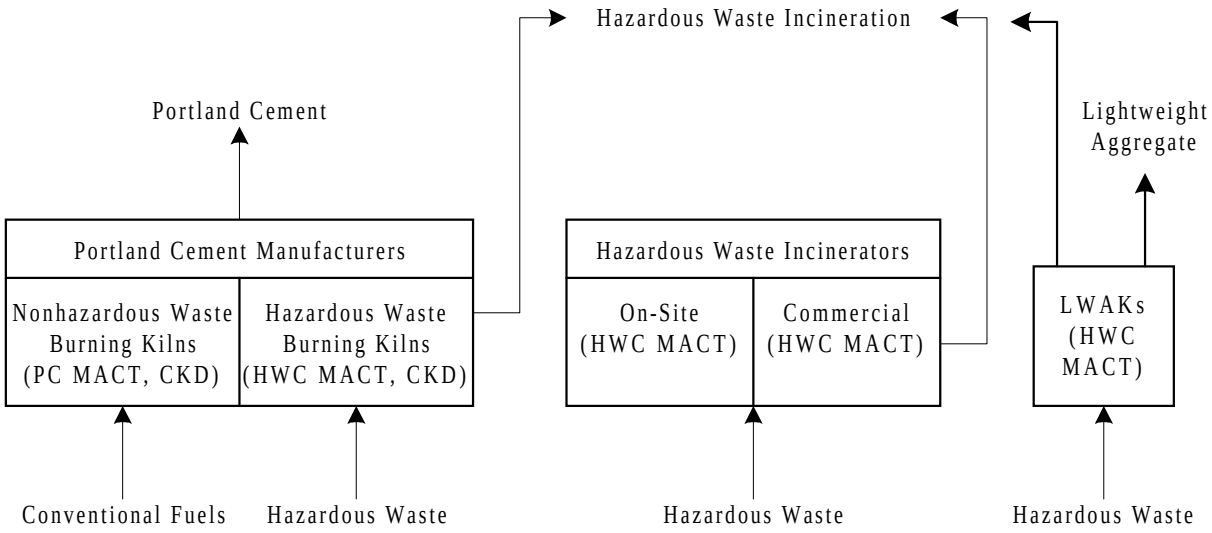

Figure 1. Market Interactions Between Portland Cement and Hazardous Waste Incineration

Joint Impact Results: HWC MACT options with PC MACT

This section presents the market- and industry-level impacts, as well as the social costs of joint implementation of the HWC MACT alternatives with the PC MACT standards. Therefore, there are three scenarios of joint impacts presented below--one for each HWC MACT regulatory option.

Market-Level Impacts

Market-level impacts include the regional market adjustments in price and quantity for Portland cement and liquid and solid hazardous waste incineration. Table 1 provides the projected market adjustments for joint implementation of the regulatory alternatives and PC MACT standard as imposed on cement kilns, LWAKs, and incinerators that compete in the affected regional markets for Portland cement and hazardous waste incineration services. For the joint scenario with the MACT Floor, the increased cost of cement production and burning hazardous waste at affected cement kilns causes the national market price of Portland cement to increase by 1.1 percent, or $0.72 per metric ton, while reducing domestic production by 2.2 percent, or

Table 1. Summary of Market Impacts of the Joint Implementation of the HWC MACT Standards with the PC MACT Standard: National

		MACT Floor		Beyond-the-Floor Recommended		Beyond-the-Floor ACI	
Market Impacts	**Baseline**	**Absolute Change**	**Percent Change**	**Absolute Change**	**Percent Change**	**Absolute Change**	**Percent Change**
Portland Cement							
Market price ($/metric ton)	$68.27	$0.72	1.1%	$0.72	1.1%	$0.92	1.3%
Market output (10^3 metric tpy)	85,144	-792	-0.9%	-791	-0.9%	-995	-1.2%
Domestic production	71,412	-1,591	-2.2%	-1,586	-2.2%	-2,110	-3.0%
Foreign imports	13,732	799	5.8%	796	5.8%	1,114	8.1%
Hazardous Waste: Liquids							
Market price ($/metric ton)	$192.70	$7.83	4.1%	$8.10	4.2%	$17.58	9.1%
Market output (10^3 metric tpy)	1,029.9	-33.7	-3.3%	-34.8	-3.4%	-74.0	-7.2%
Portland cement kilns	729.7	-15.5	-2.1%	-15.2	-2.1%	-48.2	-6.6%
Commercial incinerators	241.6	-12.8	-5.3%	-14.2	-5.9%	-20.4	-8.4%
Lightweight aggregate kilns	58.5	-5.4	-9.3%	-5.4	-9.3%	-5.4	-9.3%
Hazardous Waste: Solids							
Market price ($/metric ton)	$1,164.51	$16.66	1.4%	$30.19	2.6%	$39.81	3.4%
Market output (10^3 metric tpy)	261.8	-2.4	-0.9%	-4.6	-1.8%	-5.9	-2.3%
Portland cement kilns	65.5	-6.4	-9.8%	-6.4	-9.8%	-7.6	-11.6%
Commercial incinerators	196.3	4.0	2.0%	1.8	0.9%	1.7	0.9%
Lightweight aggregate kilns	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%

roughly 1.6 million metric tons per year. For comparison purposes, the HWC MACT Floor option is only projected to increase prices by 0.2 percent and reduce domestic production by 0.4 percent, while the PC MACT is projected to increase prices by 0.8 percent and reduce domestic production by 1.6 percent. As shown, the joint market impacts for the Recommended BTF alternative and PC MACT are virtually the same as for the MACT Floor and PC MACT. Alternatively, under the joint scenario with the ACI BTF alternative, the national market price of Portland cement is projected to increase by 1.3 percent, or $0.92 per metric ton, while reducing domestic production by 3 percent, or roughly 2.1 million metric tons per year. These national

level impacts are also larger than the individual impacts of the ACI BTF alternative and the PC MACT standards.

Cement kilns, LWAKs, and commercial incinerators compete in the markets for incineration of liquid and solid hazardous wastes. The relative cost differential imposed by the regulation across kilns and incinerators is the determining factor in the market impacts shown in Table 1 for the liquid and solid hazardous waste incineration markets and determines the outcomes within each regional market. Under the joint scenario with the MACT Floor, as shown in Table 1, the market prices for both liquid and solid hazardous waste incineration are projected to increase by 4.1 percent and 1.4 percent, respectively. These price changes are similar to the 5 percent and 1.5 percent increases observed for the HWC MACT Floor only. For cement kilns, the increased costs associated with the regulation and their reductions in cement production cause their supply of hazardous waste incineration to fall by 2.1 percent for liquids and 9.8 percent for solids. In response to the regulatory costs, LWAKs also reduce their supply of liquid hazardous waste incineration by 9.3 percent (same as under HWC MACT only scenario). For commercial incinerators, the supply of hazardous waste incineration falls by 5.3 percent for liquids but increases by 2 percent for solids. As shown, the joint market impacts for the Recommended BTF alternative and PC MACT are virtually the same as those for the MACT Floor and PC MACT. One exception is the market price for solids, which increases by a greater percentage due to increased compliance costs for commercial incinerators under the Recommended BTF option.

Under the joint scenario with the ACI BTF alternative, the market prices for both liquid and solid hazardous waste incineration are projected to increase by 9.1 percent and 3.4 percent, respectively. In comparison with the ACI BTF option only, the projected price increase for liquids is slightly lower (9.9 percent), while the increase for solids is virtually the same (3.3 percent). For cement kilns, the increased costs associated with the regulation and their reductions in cement production cause their supply of hazardous waste incineration to fall by 6.6 percent for liquids and 11.6 percent for solids. As under the joint scenarios for the MACT Floor and Recommended BTF alternatives, LWAKs reduce their supply of liquid hazardous waste incineration by 9.3 percent (i.e., same LWAK stops burning liquid hazardous waste). For commercial incinerators, the supply of hazardous waste incineration falls by 8.4 percent for liquids but increases by almost 1 percent for solids.

Industry-Level Impacts

Industry-level impacts include an evaluation of the changes in revenue, cost, and earnings before interest and taxes (EBIT); the post-regulatory compliance cost; closures; and the change in employment attributable to the change in industry output. In addition, the model projects the number of kilns and LWAKs that will discontinue burning hazardous waste due to the regulation. Table 2 summarizes these national, industry-level impacts for cement producers, LWAKs, and commercial incinerators.

The economic model generates information on the change in individual and market quantities and market prices. As shown in Table 2, this allows computation of the change in total revenue and total cost for each supplier group. Under the joint scenario with the MACT Floor, Portland cement plants are projected lose $41.2 million in total revenues, which reflects a 0.8 percent decrease from their baseline level. This decline in total revenue results from the forgone revenues associated with producing Portland cement ($34.9 million) and burning hazardous waste ($6.3 million). The total costs for these cement plants are projected to decrease by $14.4 million and reflects the increase in costs of burning hazardous waste (net change of $8.2 million) and the decrease in costs of producing cement due to the lower output rate ($22.4 million). These changes in total revenues and total costs indicate a loss of $26.9 million in industry earnings due to regulation, or a 2 percent decline from baseline. As shown in Table 2, LWAKs are also projected to incur a decline in hazardous waste-related earnings of 27.7 percent. Alternatively, as a group, the commercial incinerators are expected to experience a net gain of 8.8 percent in annual earnings under the joint scenario with the MACT Floor, or $14.9 million. This net gain results from the offsetting increases in the prices for liquid and solid hazardous waste and the shift from burning liquids to burning solids. As shown in Table 2, these joint industry-level impacts on revenues and costs show a similar pattern across each regulatory scenario.

The economic model also projects closures of cement kilns, LWAKs, and commercial incinerators in moving from the baseline to with-regulation market equilibrium. Under the joint scenario with the MACT Floor and Recommended BTF option, Table 2 shows that five kilns are expected to cease cement production and 3 cement kilns are predicted to stop burning hazardous waste as a result of the regulatory alternatives. This compares to the 1 projected kiln closure and 2 kilns ceasing to burn hazardous waste under the HWC MACT Floor and

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Table 2. Summary of Industry Impacts of Joint Implementation of the HWC MACT Standards with the PC MACT Standard: National

		MACT Floor		Beyond-the-Floor Recommended		Beyond-the-Floor ACI	
Industry Impacts	**Baseline**	**Absolute Change**	**Percent Change**	**Absolute Change**	**Percent Change**	**Absolute Change**	**Percent Change**
Portland Cement Industry							
Revenues (10^3/yr)	$5,040,227	-$41,224	-0.8%	-$40,740	-0.8%	-$65,743	-1.3%
Cement Production	$4,833,193	-$34,911	-0.7%	-$34,621	-0.7%	-$60,036	-1.2%
Hazardous waste	$207,033	-$6,313	-3.0%	-$6,119	-3.0%	-$5,706	-2.8%
Costs (10^3/yr)	$3,726,730	-$14,355	-0.4%	-$14,131	-0.4%	-$38,890	-1.0%
Hazardous waste	$56,926	$8,226	14.5%	$8,229	14.5%	$15,910	27.9%
CKD management	$54,853	-$191	-0.3%	-$191	0.3%	-$191	0.3%
Cement production	$3,614,951	-$22,390	-0.6%	-$22,168	-0.6%	-$54,609	-1.5%
EBIT (10^3/yr)	$1,313,496	-$26,869	-2.0%	-$26,609	-2.0%	-$26,852	-2.0%
Operating entities							
Plants	110	0	0.0%	0	0.0%	1	0.9%
Kilns	203	-5	-2.5%	-5	-2.5%	-7	-3.4%
Kilns burning hazardous waste	38	-3	-7.9%	-3	-7.9%	-3	-7.9%
Employment	14,257	-367	-2.6%	-364	-2.6%	-520	-3.6%
Commercial Incinerators							
Revenues (10^3/yr)	$196,986	$7,411	2.5%	$7,348	2.5%	$11,326	3.8%
Costs (10^3/yr)	$128,082	-$7,454	-5.8%	-$10,384	-8.1%	-$4,012	-3.1%
Post-regulatory	$0	$2,064	NA	$1,836	NA	$6,013	NA
Incineration	$128,082	-$9,518	-7.4%	-$12,220	-9.5%	-$10,024	-7.8%
EBIT (10^3/yr)	$168,903	$14,864	8.8%	$17,732	10.5%	$15,337	9.1%
Operating incinerators	20	-1	-5.0%	-2	10.0%	-2	-10.0%
Employment	2,769	-296	-10.7%	-298	-10.8%	-315	-11.4%
LWAKS							
Revenues (10^3/yr)	$11,540	-$856	-7.4%	-$809	-7.0%	-$456	-4.0%
Costs (10^3/yr)	$7,221	$342	4.7%	$367	5.1%	$1,378	19.1%
Post-regulatory	$0	$1,111	NA	$1,136	NA	$2,147	NA
Incineration	$7,221	-$769	-10.6%	-$769	-10.6%	-$769	-10.6%
EBIT (10^3/yr)	$4,319	-$1,198	-27.7%	-$1,176	-27.2%	-$1,834	-42.5%
LWAKS burning hazardous waste	8	-1	12.5%	-1	12.5%	-1	12.5%

the Recommended BTF option only scenarios and 4 projected kiln closures and zero kilns ceasing to burn hazardous waste under the PC MACT only scenario. The analysis also indicates that 1 of the 8 LWAKs (12.5 percent) will discontinue burning hazardous waste and 1 to 2 of the 20 commercial incinerators (5 to 10 percent) will close operations and stop burning hazardous

waste. Alternatively, under the joint scenario with the ACI BTF option, there is a significant increase in the closure estimates for the U.S. cement industry. As shown in Table 2, the joint analysis indicates that 1 cement plant and 7 kilns are expected to cease cement production and 3 cement kilns are projected to stop burning hazardous waste.

Social-Level Impacts

The value of a regulatory policy is traditionally measured by the change in economic welfare that it generates. The market adjustments in price and quantity were used to estimate the changes in economic welfare absent benefits associated with environmental improvements using applied welfare economics principles. This measure is referred to as "social cost." Table 3 presents the estimates of the social costs under the joint scenarios and their distribution across consumers and producers. For both Portland cement and hazardous waste incineration services, consumers are worse off due to the increase in prices and reductions in consumption. For producers of Portland cement and incineration services, cement kilns and LWAKs are worse of due to the decline in market share, while commercial incinerators are better off due to the increase in prices and market share. The social cost estimates shown in Table 3 are similar to the sum of the estimates for each HWC MACT regulatory alternative (i.e., $21.2 million for the MACT Floor, $21.7 million for the Recommended BTF option, $46.6 million for the ACI BTF option) and the estimate for the PC MACT (i.e., $53.6 million per year).

Joint Impact Results: HWC MACT options with PC MACT and CKD Rule

This section presents the market- and industry-level impacts, as well as the social costs of joint implementation of the HWC MACT alternatives with the PC MACT standards and the CKD Rule. As in the previous section, there are three scenarios of joint impacts presented below—one for each HWC MACT regulatory alternative.

Market-Level Impacts

Table 4 provides the projected market adjustments for joint implementation of the HWC MACT regulatory alternatives with the PC MACT standards and the CKD rule. For the joint scenario with the MACT Floor, the increased cost of cement production and burning hazardous waste at affected cement kilns causes the national market price of Portland cement to increase by 2 percent, or $1.35 per metric ton, while reducing domestic production by 4.1 percent, or roughly 2.9 million metric tons per year. For comparison purposes, the HWC

Table 3. Distribution of the Social Costs of the Joint Implementation of the HWC MACT Standards with the PC MACT Standard: National (10^3)

Social Cost Impacts	MACT Floor	Beyond-the-Floor Recommended	Beyond-the-Floor ACI
Change in consumer surplus	-$73,382	-$76,968	-$104,710
Portland cement	-$61,193	-$61,068	-$77,177
Liquid hazardous waste	-$7,884	-$8,153	-$17,356
Solid hazardous waste	-$4,304	-$7,747	-$10,177
Change in producer surplus	-$5,247	-$2,124	-$2,039
Portland cement producers	-$18,914	-$18,681	-$15,542
Domestic	-$26,869	-$26,609	-$26,852
Foreign	$7,955	$7,928	$11,310
Commercial incinerators	$14,864	$17,732	$15,337
LWAKs	-$1,198	-$1,176	-$1,834
Social cost of regulation	$78,629	$79,093	$106,749

MACT Floor option is only projected to increase prices by 0.2 percent and reduce domestic production by 0.4 percent; the PC MACT is projected to increase prices by 0.8 percent and reduce domestic production by 1.6 percent; and the CKD rule is project to increase prices by 1.2 percent and reduce domestic production by 2.4 percent. As shown, the market impacts for the joint scenario with the Recommended BTF alternative and ACI BTF alternative are virtually the same as for that with the MACT Floor.

Cement kilns, LWAKs, and commercial incinerators compete in the markets for incineration of liquid and solid hazardous wastes. Under the joint scenario with the MACT Floor, as shown in Table 4, the market prices for both liquid and solid hazardous waste incineration are projected to increase by 8.6 percent and 1.4 percent, respectively. The price change for liquids is higher than that observed for the HWC MACT Floor only (i.e., 5 percent), while the price change for solids is virtually the same. For cement kilns, the increased costs associated with the regulation and

Table 4. Summary of Market Impacts of the Joint Implementation of the HWC MACT Standards with the PC MACT Standard and CKD Rule: National

		MACT Floor		Beyond-the-Floor Recommended		Beyond-the-Floor ACI	
Market Impacts	**Baseline**	**Absolute Change**	**Percent Change**	**Absolute Change**	**Percent Change**	**Absolute Change**	**Percent Change**
Portland Cement							
Market price ($/metric ton)	$68.27	$1.35	2.0%	$1.34	2.0%	$1.36	2.0%
Market output (10^3 metric tpy)	85,144	-1,476	-1.7%	-1,475	-1.7%	-1,481	-1.7%
Domestic production	71,412	-2,929	-4.1%	-2,924	-4.1%	-2,897	-4.1%
Foreign imports	13,732	1,453	10.6%	1,450	10.6%	1,417	10.3%
Hazardous Waste: Liquids							
Market price ($/metric ton)	$192.70	$16.48	8.6%	$16.76	8.7%	$26.09	13.5%
Market output (10^3 metric tpy)	1,029.9	-68.5	-6.7%	-69.6	-6.8%	-108.1	-10.5%
Portland cement kilns	729.7	-77.0	-10.5%	-76.8	-10.5%	-102.1	-14.0%
Commercial incinerators	241.6	13.9	5.8%	12.5	5.2%	-0.6	-0.2%
Lightweight aggregate kilns	58.5	-5.4	-9.3%	-5.4	-9.3%	-5.4	-9.3%
Hazardous Waste: Solids							
Market price ($/metric ton)	$1,164.51	$15.89	1.4%	$29.52	2.5%	$38.30	3.3%
Market output (10^3 metric tpy)	261.8	-2.2	-0.8%	-4.4	-1.7%	-5.5	-2.1%
Portland cement kilns	65.5	-7.4	-11.2%	-7.4	-11.3%	-8.1	-12.4%
Commercial incinerators	196.3	5.2	2.7%	3.0	1.6%	2.6	1.5%
Lightweight aggregate kilns	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%

their reductions in cement production cause their supply of hazardous waste incineration to fall by 10.5 percent for liquids and 11.2 percent for solids. In response to the regulatory costs, LWAKs also reduce their supply of liquid hazardous waste incineration by 9.3 percent (same as under HWC MACT only scenario). For commercial incinerators, the supply of hazardous waste incineration increases by 5.8 percent for liquids and increases by 2.7 percent for solids. As shown, the market impacts for the joint scenario with the Recommended BTF alternative and the ACI BTF alternative are similar to those for shown for the MACT Floor. One exception is the market price for liquids, which increases by a greater percentage under the joint scenario with the

ACI BTF alternative corresponding to the greater reduction in liquid hazardous waste burned at cement kilns and decreases in liquids incinerated at commercial incinerators.

Industry-Level Impacts

Industry-level impacts include an evaluation of the changes in revenue, cost, and earnings before interest and taxes (EBIT); the post-regulatory compliance cost; closures; and the change in employment attributable to the change in industry output. In addition, the model projects the number of kilns and LWAKs that will discontinue burning hazardous waste due to the regulation. Table 5 summarizes these national, industry-level impacts for cement producers, LWAKs, and commercial incinerators.

The economic model generates information on the change in individual and market quantities and market prices. As shown in Table 5, this allows computation of the change in total revenue and total cost for each supplier group. Under the joint scenario with the MACT Floor, Portland cement plants are projected lose $137.5 million in total revenues, which reflects a 2.7 percent decrease from their baseline level. This decline in total revenue results from the forgone revenues associated with producing Portland cement ($125.9 million) and burning hazardous waste ($11.7 million). The total costs for these cement plants are projected to decrease by a net of $63.7 million and reflects the increase in costs of burning hazardous waste (net change of $21.5 million), the increase in CKD management costs (net change of $30.3 million), and the decrease in costs of producing cement due to the lower output rate ($115.5 million). These changes in total revenues and total costs indicate a loss of $73.8 million in industry earnings due to regulation, or a 5.6 percent decline from baseline. As shown in Table 5, LWAKs are also projected to incur a decline in hazardous waste-related earnings of 5.5 percent, which is much less than the 27.7 percent decline under the HWC MACT only scenario. Alternatively, as a group, the commercial incinerators are expected to experience a net gain of 10.8 percent in annual earnings under the joint scenario with the MACT Floor, or $18.2 million. This net gain results from the offsetting increases in the prices for liquid and solid hazardous waste and the shift from burning liquids to burning solids. As shown in Table 5, these joint industry-level impacts on revenues and costs show a similar pattern across each regulatory scenario.

The economic model also projects closures of cement kilns, LWAKs, and commercial incinerators in moving from the baseline to with-regulation market equilibrium. As shown in Table 5, the joint analysis for each scenario indicates that 3 cement plants, 14 to 15 kilns are

Table 5. Summary of Industry Impacts of Joint Implementation of the HWC MACT Standards with the PC MACT Standard and CKD Rule: National

		MACT Floor		Beyond-the-Floor Recommended		Beyond-the-Floor ACI	
Industry Impacts	**Baseline**	**Absolute Change**	**Percent Change**	**Absolute Change**	**Percent Change**	**Absolute Change**	**Percent Change**
Portland Cement Industry							
Revenues (10^3/yr)	$5,040,227	-$137,523	-2.7%	-$137,138	-2.7%	-$137,376	-2.7%
Cement Production	$4,833,193	-$125,873	-2.6%	-$125,696	-2.6%	-$122,983	-2.5%
Hazardous waste	$207,033	-$11,651	-5.6%	-$11,442	-5.5%	-$14,393	-7.0%
Costs (10^3/yr)	$3,726,730	-$63,687	-1.7%	-$63,610	-1.7%	-$54,734	-1.5%
Hazardous waste	$56,926	$21,505	37.8%	$21,510	37.8%	$28,253	49.6%
CKD management	$54,853	$30,281	55.2%	$30,247	55.1%	$30,824	56.2%
Cement production	$3,614,951	-$115,473	-3.2%	-$115,368	-3.2%	-$113,811	-3.1%
EBIT (10^3/yr)	$1,313,496	-$73,836	-5.6%	-$73,528	-5.6%	-$82,643	-6.3%
Operating entities							
Plants	110	-3	-2.7%	-3	-2.7%	-3	-2.7%
Kilns	203	-15	-7.4%	-15	--7.4%	-14	-6.9%
Kilns burning hazardous waste	38	-5	-13.2%	-5	-13.2%	-5	-13.2%
Employment	14,257	-947	-6.6%	-946	-6.6%	-990	-6.9%
Commercial Incinerators							
Revenues (10^3/yr)	$196,986	$17,077	5.8%	$17,023	5.7%	$18,363	6.2%
Costs (10^3/yr)	$128,082	-$1,149	-0.9%	-$4,073	-3.2%	$1,653	1.3%
Post-regulatory	$0	$2,164	NA	$1,936	NA	$6,268	NA
Incineration	$128,082	-$3,313	-2.6%	-$6,009	-4.7%	-$4,615	-3.6%
EBIT (10^3/yr)	$168,903	$18,226	10.8%	$21,095	12.5%	$16,709	9.9%
Operating incinerators	20	-1	-5.0%	-2	-10.0%	-2	-10.0%
Employment	2,769	-119	-4.3%	-273	-4.3%	-100	-3.6%
LWAKS							
Revenues (10^3/yr)	$11,540	$106	0.9%	$156	1.4%	$783	6.8%
Costs (10^3/yr)	$7,221	$342	4.7%	$367	5.1%	$1,378	19.1%
Post-regulatory	$0	$1,111	NA	$1,136	NA	$2,147	NA
Incineration	$7,221	-$769	-10.6%	-$769	-10.6%	-$769	-10.6%
EBIT (10^3/yr)	$4,319	-$236	-5.5%	-$211	-4.9%	-$595	-13.8%
LWAKS burning hazardous waste	8	-1	12.5%	-1	12.5%	-1	12.5%

expected to cease cement production, and 5 cement kilns are projected to stop burning hazardous waste. This compares to the 1 projected kiln closure and 2 to 3 kilns ceasing to burn hazardous waste under the HWC MACT only scenarios, the 4 projected kiln closures and zero kilns ceasing to burn hazardous waste under the PC MACT only scenario, and the 5 projected kiln closures and

3 kilns ceasing to burn hazardous waste under the CKD rule. The analysis also indicates that 1 of the 8 LWAKs (12.5 percent) will discontinue burning hazardous waste and 1 to 2 of the 20 commercial incinerators (5 to 10 percent) will close operations and stop burning hazardous waste.

Social-Level Impacts

The value of a regulatory policy is traditionally measured by the change in economic welfare that it generates. The market adjustments in price and quantity were used to estimate the changes in economic welfare absent benefits associated with environmental improvements using applied welfare economics principles. This measure is referred to as "social cost." Table 3 presents the estimates of the social costs under the joint scenarios and their distribution across consumers and producers. For both Portland cement and hazardous waste incineration services, consumers are worse off due to the increase in prices and reductions in consumption. For producers of Portland cement and incineration services, cement kilns and LWAKs are worse of due to the decline in market share, while commercial incinerators are better off due to the increase in prices and market share. The social cost estimates shown in Table 6 are slightly greater than the sum of the estimates for each HWC MACT regulatory alternative (i.e., $21.2 million for the MACT Floor, $21.7 million for the Recommended BTF option, $46.6 million for the ACI BTF option), the estimate for the PC MACT (i.e., $53.6 million per year),and the estimate for the CKD rule (i.e., 91.6 million per year).

Table 6. Distribution of the Social Costs of Joint Implementation of the HWC MACT Standards with the PC MACT Standard and CKD Rule: National (10^3)

Social Cost Impacts	MACT Floor	Beyond-the-Floor Recommended	Beyond-the-Floor ACI
Change in consumer surplus	-$133,361	-$136,975	-$149,556
Portland cement	-$112,960	-$112,839	-$114,438
Liquid hazardous waste	-$16,286	-$16,553	-$25,316
Solid hazardous waste	-$4,115	-$7,583	-$9,802
Change in producer surplus	-$40,773	-$37,603	-$51,807
Portland cement producers	-$58,763	-$58,487	-$67,921
Domestic	-$73,836	-$73,528	-$82,643
Foreign	$15,073	$15,041	$14,721
Commercial incinerators	$18,226	$21,095	$16,709
LWAKs	-$236	-$211	-$595
Social cost of regulation	$174,134	$174,578	$201,363

Attachments: Tables A and B

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Table A. Summary of Affected Entities and Compliance Costs for CKD Rule and PC MACT: 1995

		CKD Rule				PC MACT			
		Affected		Engineering Costs		Affected		Engineering Costs	
Item	Baseline	Number	Percentage	(10^3)	$/metric ton	Number	Percentage	(10^3)	$/metric ton
Cement plants									
Total	110	68	61.8%	$43,685	$0.83	107	97.3%	$32,584	$0.46
Waste burning status:									
Hazardous waste	18	17	94.4%	$18,954	$1.70	18	100.0%	$2,160	$0.18
Nonhazardous waste	92	51	55.4%	$24,731	$0.67	89	96.7%	$30,424	$0.51
Cement kilns									
Total	203	139	68.5%	$43,685	$0.91	199	98.0%	$32,584	$0.46
Waste burning status:									
Hazardous waste	38	35	92.1%	$18,954	$1.70	38	100.0%	$2,160	$0.18
Nonhazardous waste	165	104	63.0%	$24,731	$0.67	161	97.6%	$30,424	$0.51
Process									
Wet	69	58	84.1%	$26,333	$1.55	67	97.1%	$11,725	$0.62
Dry	67	51	76.1%	$8,494	$0.71	65	97.0%	$9,413	$0.64
Dry—preheater	39	17	43.6%	$3,334	$0.45	39	100.0%	$6,226	$0.41
Dry—precalciner	28	13	46.4%	$5,524	$0.48	28	100.0%	$5,219	$0.24
Commercial incinerators	20	NA	NA	NA	NA	NA	NA	NA	NA
LWAKs	8	NA	NA	NA	NA	NA	NA	NA	NA

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Table B. Summary of Affected Entities and Compliance Costs for HWC MACT Options: 1995

Item	Baseline	Affected		HWC MACT Floor[a]			HWC MACT BTF Recommended[b]			HWC MACT BTF ACI[c]		
		Number	Percentage	Compliance Cost (10^3)	Per Cement Ton ($/metric ton)	Per HW Ton ($/metric ton)	Compliance Cost (10^3)	Per Cement Ton ($/metric ton)	Per HW Ton ($/metric ton)	Compliance Cost (10^3)	Per Cement Ton ($/metric ton)	Per HW Ton ($/metric ton)
Cement plants												
Total	110	18	16.4%	$10,881	$0.93	$13.68	$10,881	$0.93	$13.68	$19,940	$1.70	$25.07
Waste burning status												
Hazardous waste	18	18	100.0%	$10,881	$0.93	$13.68	$10,881	$0.93	$13.68	$19,940	$1.70	$25.07
Nonhazardous waste	92	0	0.0%	$0	$0.00	$0.00	$0	$0.00	$0.00	$0	$0.00	$0.00
Cement kilns												
Total	203	38	18.7%	$10,881	$0.93	$13.68	$10,881	$0.93	$13.68	$19,940	$1.70	$25.07
Waste burning status												
Hazardous waste	38	38	100.0%	$10,881	$0.93	$13.68	$10,881	$0.93	$13.68	$19,940	$1.70	$25.07
Nonhazardous waste	165	0	0.0%	$0	$0.00	$0.00	$0	$0.00	$0.00	$0	$0.00	$0.00
Process												
Wet	69	27	39.1%	$9,297	$1.15	$14.17	$9,297	$1.15	$14.17	$14,357	$1.77	$21.89
Dry	67	9	13.4%	$1,449	$0.75	$19.29	$1,449	$0.75	$19.29	$2,277	$1.18	$30.30
Dry–preheater	39	1	2.6%	$40	$0.00	$0.00	$40	$0.00	$0.00	$1,673	$0.00	$0.00
Dry–precalciner	28	1	3.6%	$94	$0.09	$2.48	$94	$0.09	$2.48	$1,633	$1.59	$42.90
Commercial incinerators	20	20	100.0%	$2,619	NA	$5.84	$3,130	NA	$6.98	$7,637	NA	$17.04
LWAKs	8	8	100.0%	$1,111	NA	$27.40	$1,185	NA	$29.24	$2,197	NA	$54.18

[a] Total compliance costs equal $14,611,000.
[b] Total compliance costs equal $15,196,000.
[c] Total compliance costs equal $29,773,000.