Attachment 2

COMMENTS ON EPA's ASSESSMENT OF THE POTENTIAL COSTS, BENEFITS, AND OTHER IMPACTS OF THE EXPANSION OF THE RCRA COMPARABLE FUEL EXCLUSION – PROPOSED RULE

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FOR

THE CEMENT KILN RECYCLING COALITION

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COMMENTS ON EPA's ASSESSMENT OF THE POTENTIAL COSTS, BENEFITS, AND OTHER IMPACTS OF THE EXPANSION OF THE RCRA COMPARABLE FULE EXCLUSION – PROPOSED RULE

The Cement Kiln Recycling Coalition (CKRC) asked Environomics to assess the regulatory impact analysis[1] (RIA) and related analyses supporting EPA's proposed expansion of the emission-comparable fuel (hereinafter ECF) exclusion. Our assessment focuses on whether EPA has accurately estimated: 1) the extent to which the proposed rule will reduce the volume of hazardous wastes burned for energy recovery in cement kilns; and 2) the various impacts that will result from the reduction in this activity. Our evaluation was prepared in conjunction with a technical assessment for CKRC by Schreiber, Yonley and Associates (SYA). Both Environomics' and SYA's evaluations were informed by the results of a survey of selected fuel blenders and cement kiln operators, as described in SYA's comments. We provide in this assessment several suggestions about further analyses that EPA should perform to more fully and more accurately identify the impacts that will result from the proposed rule.

We identified six areas in which the supporting analyses for the proposed ECF rule fail to address its likely adverse consequences. In our view, these unaddressed adverse consequences are so substantial as to greatly outweigh the modest positive net benefits that EPA claims for the rule. We believe that EPA, if the Agency were to fully analyze these six areas, would agree. The six areas are:

1. EPA underestimates the proposed rule's impact on the volume of the hazardous waste-derived fuels (HWDF) that cement kilns receive and manage, and therefore underestimates the cost to cement plants as well as the increase in emissions that will result when kilns replace this lost HWDF with coal. EPA underestimates the impact in two ways:

- First, cement kilns use more ECF than is estimated by EPA.
- Second, for energy recovery at cement kilns, ECF is typically blended with an additional 50%-100% of other hazardous wastes. ECF represents a high quality blend stock that exceeds kilns' quality requirements, and it is usually mixed with some quantity of less suitable wastes in order to produce a larger quantity of acceptable blended fuel for burning. When ECF is diverted from energy recovery at kilns, kilns' ability to accept the lower quality wastes that would have been blended with the ECF will be reduced. This will result in an additional loss of HWDF at kilns by a factor of 50% - 100% beyond that for the ECF alone. The additional lower-quality wastes that would have been blended with the ECF will likely instead be incinerated.

EPA estimates in the RIA that 123,300 tons/year of wastes that qualify for the proposed ECF exclusion are currently managed through energy recovery at kilns or fuel blending prior to energy recovery at kilns. EPA further estimates that 48,400 tons of these wastes (39% of the 123,300 eligible tons) will be diverted away from kilns as a result of the proposed rule. We estimate instead based on the survey of fuel blenders/kilns that kilns burn 146,000 tons/year of hazardous wastes that would qualify as proposed ECF. If the proposed rule causes 39% of this

1 USEPA, OSW. Assessment of the Potential Costs, Benefits, and Other Impacts of the Expansion of the RCRA Comparable Fuel Exclusion – Proposed Rule (ECF RIA). June, 2007.

volume to shift away from kilns as EPA estimates, then kilns will lose 85,000 – 114,000 tons/year of HWDF, consisting of 57,000 tons/year in direct losses of ECF (39% of 146,000) and 28,000 – 57,000 tons/year[2] in additional lower quality wastes that will no longer be blended for energy recovery with the lost ECF. Correcting EPA's estimate for the total ECF used at cement kilns and for additional hazardous waste that is blended with ECF for kilns, but retaining EPA's estimate that 39% will be diverted, the resulting estimate of 85,000 – 114,000 tons/year in total hazardous waste-derived fuels lost to kilns due to the proposed rule is 76% to 136% greater than EPA's estimate in the RIA.

This greater quantity of wastes that we estimate the rule will cause to shift away from kilns will increase all the impacts of the rule beyond what EPA has estimated. Kilns will need to buy more coal to replace the energy from the lost HWDF, with increased emissions, increased costs for replacement coal, and reductions in the hazardous waste tipping fees they receive. Both industrial boilers and commercial incinerators also will experience greater waste shifts than EPA has predicted, with impacts on both emissions and costs and revenues at these facilities. Incinerators in particular will experience a 28,000 – 57,000 ton/year increase in other wastes received (in the form of those lower quality hazardous wastes no longer blended into HWDF for kilns) that substantially exceeds the 12,500 ton/year reduction in ECF that EPA projects in the RIA they will experience as a result of the proposed rule.

We also believe that the fraction of ECF currently used by kilns for energy recovery that will be lost as a result of the proposed rule would likely be greater than EPA's estimate of 39%, for reasons that will be discussed below.

2. EPA assumes that the proposed rule will not cause any change in human health and environmental outcomes, and the Agency therefore did not conduct any analysis of the change in human health and ecological risks associated with the rule. EPA says in the RIA for the proposed rule:

> Because emissions associated with the combustion of the excluded waste are expected to be comparable to those associated with conventional fossil fuels, we assume that the proposed rule will lead to no changes in human health and environmental outcomes, and that the human health and ecological impacts of the rule are zero.[3]... Therefore, we did not conduct an in-depth analysis of the change in human health and ecological risk associated with the proposed rule.[4]

To the contrary, it is clear that the proposed rule ***will*** result in substantial increases in pollutant emissions and risks, at each of HWDF-burning cement kilns, industrial boilers, and commercial incinerators:

- At HWDF-burning cement kilns, the lost ECF and lost wastes formerly blended with the ECF will be replaced by coal. Cement kilns emit a greater quantity of NOx and SO_2 and similar quantities of other air pollutants when burning coal in comparison to their emissions when burning HWDF.

- At industrial boilers, the newly excluded fuels will largely replace natural gas. EPA believes that it has defined ECF such that emissions from burning ECF in industrial boilers will be comparable to those from burning fuel oil. Replacing clean-burning natural gas with fuel oil, however, would clearly increase emissions at gas-fired industrial boilers. Since the Agency believes that ECF would produce

2 50% of 57,000 tons/year to 100% of 57,000 tons/year

3 USEPA, OSW. ECF RIA. Page 5.

4 USEPA, OSW. ECF RIA. Page 28. Similar statements are made on page 31 of the RIA, and at several points in the preamble to the proposed rule.

similar emissions as fuel oil, it follows that replacing natural gas with ECF would increase emissions.

- At commercial incinerators, the increase in volume of wastes managed -- as incinerators receive for disposal additional wastes that formerly were blended with ECF for energy recovery in cement kilns -- will cause emissions to increase also.

At cement kilns, we have estimated the monetary damages resulting from these increased emissions by applying damage per ton figures developed by EPA's Air Office to estimates developed by SYA for the quantity of increased emissions due to the proposed rule. We estimate that the increased emissions at cement kilns alone due to the proposed rule will cause annual damages valued at $137.8 - $471.2 million per year, far outweighing the net benefits of $23.4 million per year that EPA estimates for the proposed rule in total (note, however, that EPA ignored emissions impacts in its estimates). Or, looking at this impact in another way, every ton of ECF that the proposed rule diverts from energy recovery at kilns will result in $2,400 to $3,200 in additional damages from increased kiln emissions.

At industrial boilers, the proposed rule will cause increased emissions resulting in damages valued at $2.4 - $6.2 million per year. At incinerators, there will also be further increases in emissions, increasing social costs by a further $0.5 - $2.5 million per year.

Thus, the social costs associated with the increased emissions at kilns, industrial boilers and incinerators resulting from the diversion of ECF from kilns -- costs that EPA has not considered in the RIA -- are six or more times larger than EPA's estimate of $23.4 million per year in net benefits for the proposed rule. In our view, the net "benefits" of the proposed rule are highly negative, not modestly positive.

3. There are important additional indirect negative health and safety impacts associated with producing and transporting the increased amount of coal that kilns will use if the proposed rule is finalized. EPA should analyze these impacts and reflect them in the Agency's estimated social costs and benefits. We estimate that these indirect costs will amount to $0.5 - $2.3 million per year -- this is in addition to the amounts estimated in #2 above.

To properly assess the rule's social costs and benefits, EPA should perform a life cycle analysis of the impact of the proposed rule not only for cement kilns, but also for the industrial boilers that will substitute the newly excluded fuels for conventional fuels (largely natural gas), and for the incinerators that will receive additional hazardous wastes that would otherwise have been blended with ECF and used for energy recovery at kilns.

4. EPA does not consider the joint impact of this proposed rule with another recently proposed EPA rule -- the Expansion of the RCRA Definition of Solid Waste (DSW) -- that will also reduce energy recovery at kilns. EPA should evaluate the joint impact of these two rules on fuel blenders and on energy recovery at kilns. When doing so, it is not sufficient simply to add the impacts of these two rules, because they could have a combined synergistic impact. For generators, increasing the total amount of waste qualifying as ECF or qualifying for exclusion under a revised definition of solid waste could make it more likely that the generator would change the way wastes are managed rather than, as often happens now, sending all hazardous wastes with fuel value to a single fuel blender. While this may be regarded by some as a positive development and by others as negative, it nevertheless suggests that the combined impact of the ECF and DSW rules may be greater than the summed impacts of each of the rules alone.

5. EPA underestimates the economic impact of the rule on the cement kilns that burn HWDF by

underestimating the volume of ECF and other wastes blended with ECF that kilns will lose, and the amount of coal needed to replace the lost HWDF. EPA also underestimates the cost of coal to cement kilns.

6. EPA has not evaluated the adverse consequences to national waste management networks if some states do not adopt this rule.

Each of these points is discussed in detail later in this paper. First, though, we begin by providing an overview of energy recovery in cement kilns and the impact of the proposed rule.

Overview of Energy Recovery in Cement Kilns

Fourteen cement plants currently burn for energy recovery nearly 1 million metric tons per year of hazardous waste-derived fuels (HWDF), of which over 90% is liquid waste.[5] This beneficial waste recycling practice is highly regulated. The 14 cement plants meet the requirements of the Hazardous Waste Combustor MACT (HWC MACT) and many other rules regarding emissions of hazardous and non-hazardous air pollutants, along with RCRA rules regarding safe transportation, storage and handling of the fuels.

The cement plants procure HWDF in a variety of ways, from a variety of sources. Some plants contract with independent fuel blenders who acquire wastes from generators and blend it to the plants' specifications. Other plants perform the fuels management function themselves and acquire the wastes directly from generators as well as from independent fuel blenders. The typical Btu content of the HWDF as-fired in the kilns is between 10,000 and 11,000 Btu/lb, with regulated metals content of well below 2%, halogens at less than 2%, and moisture content of less than 25%. The composition of individual waste streams that comprise the eventual HWDF burned in kilns, however, can diverge substantially from this overall, as-fired average. Individual waste streams that eventually become a part of the HWDF may have lower Btu content and higher metals, halogen or moisture content. In general, waste streams that are not directly usable as fuel in cement kilns (i.e., because they have lower Btu content, higher metals, halogen or moisture content, or do not have the necessary physical characteristics) may be accommodated as part of the HWDF if they are blended with a sufficient quantity of waste streams that have higher Btu content, lower levels of impurities, and appropriate physical properties, resulting in an acceptable average quality for the HWDF as-fired.

Based on a recent survey of fuel blenders and HWDF-burning cement kilns, SYA estimates that 15.5% of the liquid hazardous wastes that these facilities received would qualify as ECF under the proposed rule.[6] This corresponds to 146,000 tons per year of ECF currently

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5 In 2006, these 14 plants burned 938,114 tons of liquid HWDF, 37,736 tons of solid hazardous wastes, and 58,989 tons of nonhazardous wastes such as tires, plastics, waste oil, etc. Source: CKRC survey of its membership, June, 2007.

6 Survey of fuel blenders and HWDF-burning cement kilns conducted by SYA and Environomics during the summer of 2007. The survey respondents included fuel blenders and kilns accounting for roughly 1/3 of the nearly 1 million MT of HWDF burned in cement kilns in 2006. The kilns and blenders queried their databases on the wastes they had received in 2006 in order to identify the specific wastes that would meet the proposed concentration limits defining ECF and the volumes of such wastes that were received. Additional questions were asked in the survey about wastes received for energy recovery that might instead be subjected to materials recovery processes (e.g., solvent recovery) as would be encouraged by EPA's recently proposed regulations revising the definition of solid waste (DSW). The survey was intended to inform the industry's comments on both the ECF and DSW rules. The information obtained from the survey with regard to DSW wastes is, however, somewhat less reliable than the information regarding ECF. This is because ECF is defined by specific concentration limits against which fuel blenders and kiln operators could directly query their databases to identify qualifying wastes. "DSW wastes", in contrast were defined less precisely as those wastes that had characteristics that appeared to make them good

managed for energy recovery in cement kilns. These ECF wastes are among the higher quality and higher Btu wastes that kiln operators use. Based on the survey responses, the average Btu content of the ECF that fuel blenders and kilns receive is estimated at 12,750 Btu/lb. Appendix A to these comments provides a summary of the major findings from the survey.

As discussed in SYA's comments, fuel blenders and kilns use ECF as blend stock. Its Btu content is higher than the average for blended HWDF, and its levels of undesirable constituents (e.g., water, halogens, metals) are lower. For every ton of ECF, approximately one-half to an equivalent amount of other hazardous wastes are blended with it to provide HWDF that meets the kilns' fuel specifications.

Kiln operators and/or their fuel managers charge fees for acceptance of different waste streams that reflect their relative utility as components of HWDF. Lower prices, for example, are charged for high Btu, relatively "clean" wastes, and higher prices are charged for lower Btu wastes with higher levels of impurities or with difficult physical properties (e.g., higher solids content, higher viscosity, or non-pumpable). Kiln operators manage their tipping fees ("price sheets") and fuel acquisition efforts to obtain a mix of wastes that enables them to meet their overall HWDF quality and quantity requirements. Because acquisition of "clean" blending stock is critical, in some cases kilns charge nothing or even pay for particularly desirable waste streams.

Because kilns need to maintain a certain quality in their as-fired HWDF, a loss to kilns of high Btu, relatively "clean" wastes, such ECF, will mean that kilns can no longer accept some amount of other, lower Btu, less "clean" wastes. These lower Btu wastes still have recoverable energy, but the opportunity to blend some of these wastes into HWDF will be lost if some of the cleaner, high Btu waste streams are diverted from cement kilns to energy recovery at industrial boilers. Loss of these higher quality wastes from kilns to industrial boilers thus has a leveraged effect. Based on the survey responses, SYA estimates that one ton less of higher Btu waste available to kilns for HWDF likely means that kilns will burn roughly 1.5 – 2.0 fewer tons of total wastes; they will no longer burn both the 1 ton of the ECF and the 0.5-1.0 ton of the other, less desirable wastes that would have been burned had the ECF been available as blend stock.

Thus, if the rule were to cause kilns to lose all the ECF they currently receive (146,000 tons/year), the result would be an overall loss of 219,000 - 292,000 tons of HWDF to cement kilns. Or, if one were to apply EPA's estimate that the rule will result in kilns losing only 39% rather than 100% of the ECF they receive, one would estimate that kilns would lose 85,000 to 114,000 tons per year of HWDF (0.39 x [150% to 200%] x 146,000 tons/year).

Cement kiln operators realize two major benefits from burning HWDF. They are typically paid a tipping fee for accepting the waste, and the energy content of the waste when burned in the kiln reduces the amount of fossil fuel (nearly always coal) needed in their production process. Various costs partly offset these benefits: the kiln operator incurs costs to acquire the waste (e.g., sharing the tipping fee with a HWDF fuel blender/manager), costs to comply with the requirements of operating a regulated storage and combustion facility, and some costs in terms of reduced production efficiency (e.g., a "clinker penalty"). In terms of environmental impacts, burning HWDF will typically substantially reduce a kiln's emissions of NOx and SO_2 compared to burning coal alone,[7] and will leave emissions of most other air

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candidates for materials recovery processes, and the survey respondents' identification of DSW wastes was thus much more judgmental. The survey and findings from it are described more fully in SYA's comments and in Appendix A to these comments.

7 NOx emissions are reduced when kilns burn HWDF for two reasons. The higher water content in HWDF relative to conventional fuels slightly reduces the peak flame temperature in the kiln burning zone, which decreases thermal

pollutants and generation of solid waste largely unchanged. Metal emissions may increase somewhat when a kiln burns HWDF, but the HWC MACT standards require and site-specific risk assessments confirm that metal emissions are limited to levels that are protective of human health and the environment.

CKRC is concerned about both the negative financial and environmental impacts that the proposed ECF regulation will cause as some of the most desirable wastes are shifted away from energy recovery at kilns. This will be further aggravated by the loss of additional relatively clean high Btu materials that will result from EPA's proposed supplemental revisions to the Industrial Recycling Exclusions of the RCRA Definition of Solid Waste. Recovering the energy content of hazardous wastes in cement kilns has substantial environmental advantages relative to other means of managing the wastes and relative to other means of meeting cement kilns' energy needs. CKRC estimates that the cement kiln recycling industry has invested hundreds of millions of dollars in meeting regulatory requirements as permitted RCRA storage facilities and as combustion units regulated under the Clean Air Act HWC MACT standards. If they are to remain in this business and provide the associated environmental and energy advantages, the cement companies that burn HWDF must acquire and use a sufficient amount of suitable wastes to cover the continuing costs of meeting these regulatory requirements. The leveraged impact of the proposed ECF regulation – shifting some of the highest quality hazardous wastes away from energy recovery and thus also reducing the quantity of other hazardous wastes that kilns can burn – may jeopardize some kilns' continuing participation in this activity. EPA should more thoroughly analyze the degree to which the proposed rule will shift wastes away from energy recovery in cement kilns, and the economic, environmental and health impacts that will result. We believe the environmental and health impacts of the rule, which EPA has not examined at all, are overwhelmingly negative, and clearly far outweigh the modestly positive net social benefits ($23.4 million/year) that EPA estimates for the other aspects of the proposed rule.

Exhibit 1 shows the pre-rule and post-rule flows of materials (based on the maximum potential impact associated with diverting from kilns all of the 146,000 tons per year of ECF they now receive), and highlights the increases in social costs due to increased emissions at kilns, increased emissions at incinerators, changed emissions at industrial boilers, and indirect effects associated with the production and transportation of coal, all of which EPA has failed to consider. If the reader wishes to assume that the fraction of ECF received that kilns will lose as a result of the rule will be less than 100% (e.g., EPA's estimate of 39%), the post-rule impacts shown in the exhibit can be scaled directly.

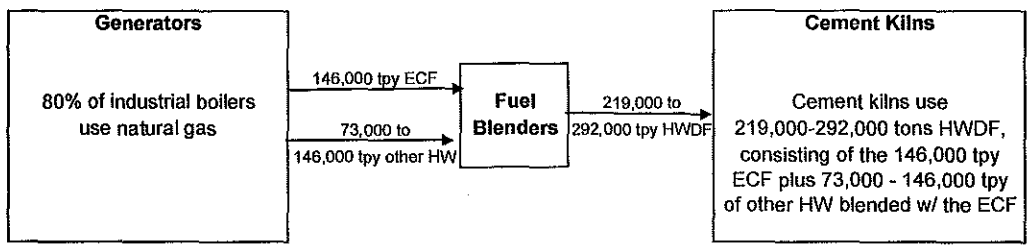
In the remainder of this paper we describe in more detail the six areas where we believe that EPA should perform additional analyses, and we provide estimates in many of these areas.

NOx formation. Second, HWDF, in contrast to conventional fuels, may be introduced in locations in the kiln other than the primary burning zone, such as mid-kiln in the calcining zone. This also tends to reduce peak kiln temperatures. SO_2 emissions are reduced because HWDF typically has lower sulfur content per Btu than does the coal used in cement kilns.

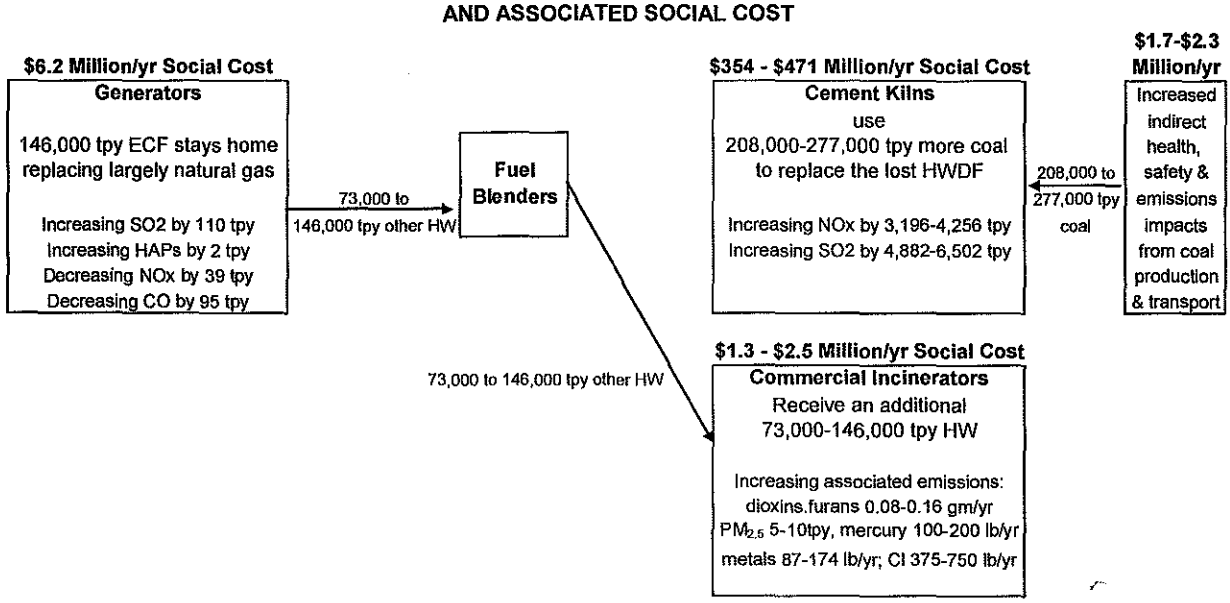
Exhibit 1

IMPACT OF THE RULE DUE TO SHIFTING ECF AWAY FROM CEMENT KILNS

PRE-RULE



MAXIMUM POST-RULE IMPACT ON FUEL USE, EMISSIONS, ADDITIONAL INDIRECT EFFECTS AND ASSOCIATED SOCIAL COST



OVERALL EFFECT OF THE RULE IS TO INCREASE ADVERSE ENVIRONMENTAL, HEALTH & SAFETY IMPACTS

One effect of the rule is to increase the use of coal (in kilns) while decreasing the use of natural gas (in boilers). This results in adverse environmental, health and safety impacts that EPA failed to recognize. This exhibit shows the social loss associated with the maximum diversion of 146,000 tpy ECF. The amounts in the exhibit can be directly scaled to show the impact of diverting less than 100% of the ECF, such as EPA's estimated 39%.

The rule allows industrial boilers to replace current fuels (largely natural gas) with ECF. But when the ECF is obtained by diverting it from cement kilns, the kilns will need to replace the lost ECF with coal. Moreover, ECF that is used at cement kilns is typically blended for energy recovery with another 50%-100% of other hazardous wastes. If the ECF is not available to kilns these additional wastes will not be blended into HWDF, but instead will likely be sent to incinerators for disposal. Thus kilns will lose 1.5 - 2 tons of fuel for every ton of ECF lost due to the rule. The results when 1 ton of ECF is diverted from cement kilns to industrial boilers are as follows: 1) Kilns lose the ECF and no longer accept the other hazardous wastes formerly blended with the ECF, necessitating use of roughly 1.5 - 2 tons of coal to replace the lost fuel value of the HWDF; 2) Industrial boilers burn the ECF, backing out an equivalent amount of fossil fuel energy, largely consisting of natural gas; and 3) Commercial hazardous waste incinerators receive and manage an additional 0.5 - 1 ton of lower quality hazardous wastes.

1. EPA underestimates in two ways the proposed rule's impact on the volume of hazardous waste-derived fuels that cement kilns will use, and therefore underestimates the amount of replacement coal needed, the cost to cement plants, and the increase in emissions from using coal.

The volume of ECF used by kilns

It is clear from the RIA that EPA concluded that the databases available to the Agency do not provide an adequate basis for estimating the volume of ECF that is used for energy recovery by kilns. EPA's methodology applied to the available databases resulted initially in an estimate that only 3.0% of the volume of wastes managed in the baseline through energy recovery or fuel blending prior to energy recovery would qualify for the ECF exclusion.[8] This estimate is, on its face, not plausible relative to EPA's estimate that a far higher 11.1% of the volume of waste managed by incineration in the baseline would qualify as ECF. We find it difficult to believe that the hazardous wastes burned for energy recovery -- largely by cement kilns, who specifically target wastes suitable for energy recovery -- should consist of ECF to a far smaller degree than the wastes received by incinerators, who have traditionally sought to avoid wastes with a high heat content and have generally served as the destination for the least desirable hazardous wastes.

In the RIA, though, EPA decided to reject the initial, analytically derived estimate that only 3.0% of the waste managed in the baseline through energy recovery would qualify as ECF, and instead assumed a higher figure of 10%. No analytical basis is offered for the 10% assumption; EPA says only:

> "EPA staff familiar with the waste streams in Group 2 have suggested that this 3 percent value in all likelihood underestimates the proportion of potentially affected ... waste [managed in the baseline through energy recovery] that would qualify for the proposed ECF exclusion, and have indicated that a 10 percent value would be more appropriate." (RIA, page 17)

EPA's 10% assumption results in the estimate that about 123,000 tons per year of waste managed in the baseline for energy recovery would qualify for the proposed exclusion. EPA does not indicate what fraction the Agency believes that cement kilns account for out of this estimated 123,000 tons per year that is burned for energy recovery. We presume that EPA would estimate that cement kilns account for a far greater share of this energy recovery than other sorts of facilities (e.g., light weight aggregate kilns). In any case, we believe that EPA's rejection of the 3% calculation and substitution of a 10% assumption goes a long way toward correcting the flawed methodology and databases, but still does not go far enough. As detailed in SYA's comments, we estimate based on more up-to-date and relevant survey data that cement kilns actually use approximately 146,000 tons per year of ECF. EPA's estimate of 123,000 tons per year of ECF that is currently managed for energy recovery, even if we assume that all of this quantity is attributable to cement kilns, still underestimates the amount of ECF that kilns use by 16%. Rather than rely on an assumption applied to an inadequate database to correct an obvious error,[9] EPA should adopt the more accurate and better supported estimate of 146,000 tons per

8 USEPA OSW, ECF RIA, Page 17

9 We believe that EPA's methodology underestimates the quantity of wastes that can qualify for the ECF exclusion because the Agency used old data (1996 National Hazardous Waste Constituent Survey) in overestimating the fraction of all wastes managed for energy recovery that would fail one or more of the various requirements defining ECF. The NHWCS is likely inaccurate in two important respects. First, it overestimates the halogen content of many wastes relative to current levels -- over the years there has been a declining halogen content in hazardous waste due to the substitution of non-halogenated and aqueous materials. Second, the NHWCS characterized only the

year of ECF used by cement kilns, as estimated by SYA. The 146,000 tons per year of ECF represents 15.5% of all the liquid HWDF that kilns now use, and a substantially larger fraction of the higher quality HWDF that kilns use as blend stock -- blended with an additional 50%-100% of lower quality hazardous waste as discussed below.

Kilns will lose 1.5 - 2.0 tons of HWDF for every ton of ECF that is diverted from kilns.

As discussed previously, ECF represents a high quality, high Btu waste that kiln operators or fuel blenders blend with lower quality, lower Btu waste. If the ECF is unavailable, then the additional waste that would have been blended with it would not be suitable for energy recovery and instead would be destined for incineration or perhaps land disposal. The blend ratio varies, depending on the energy content of the available ECF compared to the energy content and quality of the other wastes. As discussed in more detail in the SYA comments, generally, a ton of ECF is blended with 0.5 - 1 ton of other hazardous waste. Thus, diverting one ton of ECF from energy recovery at kilns results in the loss of 1.5 - 2.0 tons of HWDF, all of which would need to be replaced by coal.

Overall loss of HWDF and increased coal use as a result of the proposed ECF rule

As estimated by SYA, each year kilns could lose as much as 146,000 tons of ECF and an additional 73,000 to 146,000 tons of other wastes that would have been blended with the ECF, for a total of 219,000 to 292,000 tons of HWDF. SYA estimates that approximately 208,000 to 277,000 tons per year of coal would be needed to replace this lost HWDF.

EPA appears to estimate that the rule would result in diversion of 39% of the ECF that kilns and fuel blenders currently receive (48,400 tons per year – see page 35 of the RIA – out of the 123,000 tons per year of ECF burned for energy recovery in the baseline). Applying the 39% to the 146,000 tpy of ECF estimated by SYA yields a loss of 57,000 tpy of ECF as a result of the rule. Further, kilns would lose an additional 28,000 – 57,000 of HWDF because of the wastes that could no longer be blended for energy recovery at kilns. Thus, EPA's estimate that kilns would lose 39% of the ECF they use indicates that kilns would lose 85,000 to 114,000 total tons of HWDF. SYA estimates that approximately 81,000 to 108,000 tons of coal would be needed to replace the lost HWDF at a rate of 0.95 tons of replacement coal per ton of HWDF.

We believe that EPA's simulation in the RIA (pages 18 – 26) of decisions by generators of ECF and facilities with boilers that might potentially use the ECF represents a reasonable approach for estimating how much ECF would be excluded under the proposed rule and burned on- and off-site in industrial boilers. This analysis also yields EPA's projection that 48,400 tons per year of ECF would no longer be sent to kilns for energy recovery as a result of the rule, representing a loss of 39% of the ECF that EPA estimates kilns use for HWDF in the baseline.

Although EPA's simulation is reasonable in concept, we believe that one key aspect of the simulation causes the benefits to generators or nearby facilities of using ECF in an industrial boiler to be underestimated, leading EPA to underestimate the amount and fraction of ECF that the proposed rule would cause to be pulled back from cement kilns. Specifically, in calculating the fuel cost savings that a generator or nearby qualified facility might realize by using the

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higher volume waste streams from the major generators, but the ECF that fuel blenders and kilns now obtain derives increasingly from smaller generators in smaller loads. EPA's estimates also depend on the waste quantities reported in the 2003 BRS. BRS omits SQG wastes, which account for a not insignificant fraction of the ECF now being received by fuel blenders and kilns.

exclusion and burning ECF for its fuel value, EPA assumes wrongly that the generator or facility will figure this savings based on the "weighted average value of the fuels (per MMBtu) used by each facility in the baseline."[10] We believe, to the contrary, that any facility considering burning ECF for its fuel value will use the ECF to back out its most expensive fuel first, figuring the fuel cost savings relative to the cost of only that most expensive fuel. Only after backing out all of the most expensive fuel, and only if more ECF is then available, will the facility proceed to consider using additional ECF to back out the second-most expensive fuel used at the facility. In the example that EPA presents in the footnote on page 20 of the RIA involving a facility with two gas-fired boilers and one coal-fired boiler, in our opinion the facility will use the ECF to back out the natural gas first, saving $8.22 per MMBtu rather than the $6.08 per MMBtu that EPA calculates as the weighted average cost of all the fuels used by the facility in the baseline. We believe that EPA in this manner has systematically underestimated the fuel cost savings that facilities can realize by burning ECF, and the Agency thus underestimates the degree to which the proposed rule will cause ECF to be burned in industrial boilers and pulled away from cement kilns. Kilns are likely to lose a higher percentage of their ECF than the 39% that EPA estimates.

2. EPA incorrectly assumed that there will be no adverse health or environmental effects from the proposed rule, and therefore performed no analysis of health and environmental impacts. To the contrary, shifting energy recovery from cement kilns to industrial boilers will result in increased emissions at both the boilers and at the kilns, as well as at incinerators; and the damages associated with these increased emissions far outweigh the rule's net social benefits as estimated by EPA. These adverse consequences must be evaluated and included in EPA's estimate of the social costs and benefits of the rule.

As delineated in SYA's comments, there will be substantial increases in NOx and SO_2 emissions at cement kilns when kiln operators replace their lost HWDF with coal, and there will also be changes in emissions at industrial boilers where the ECF that is used will largely replace natural gas. There will also be increased emissions at commercial incinerators as they incinerate the additional quantity of wastes that had previously been blended with ECF into HWDF and burned by cement kilns. Each of these impacts is discussed further below.

We note that the great majority of the emissions damages that we estimate here are due to increased emissions of criteria air pollutants, and only a small fraction is due to HAPs. In contrast, EPA's discussion on potential air emissions impacts of the proposed rule in the preamble and in several supporting documents (e.g., the peer review material) focuses exclusively on HAPs. In our view, EPA's failure to consider the criteria air pollutant impacts of the regulation represents a serious error. It has become quite clear from the series of EAP/OAR RIAs supporting major recent EPA air pollution regulations that the great majority of the monetized benefits of further air emission controls involves criteria air pollutants rather than HAPs. Recent epidemiological studies have found substantial premature mortality due to exposure to $PM_{2.5}$ and ozone. Emissions of SO_2, NOx, $PM_{2.5}$ and VOCs also are estimated to cause a substantial amount of premature mortality, either directly (in the case of $PM_{2.5}$ emissions), or indirectly as these pollutants combine and react to form ozone and secondary particulates which in turn cause excess mortality. The impact of these pollutants on mortality as estimated through epidemiological studies is far greater than the quantifiable impacts of HAPs on mortality (typically due to HAPs' impact as carcinogens).

10 USEPA OSW, ECF RIA, Page 20, footnote 18.

Values Per Ton for Abating Air Emissions

Exhibit 2 summarizes the values per ton we used to monetize the social costs associated with the additional emissions that result when ECF is diverted away from energy recovery at kilns. We have attempted to draw these values from the most recent available EPA sources; in most cases from the EPA/OAR RIAs for recent major air regulations. We have selected particular values from these references that are best suited for application to emissions from cement kilns, industrial boilers and commercial incinerators – generally the values developed for abating a ton of pollutant emissions from "non-EGU" (non-electric generating unit) sources located in the particular regions of the country where most of the hazardous waste-burning cement kilns, industrial boilers and commercial incinerators that will be affected by the proposed ECF regulation are actually located. Each of these value per ton estimates is discussed further below.

Exhibit 2
Values Per Ton for Abating Air Emissions

Pollutant	Value/ton	Basis
SO_2	$62,000	U.S. EPA. *Regulatory Impact Analysis for 2006 Revisions to the National Ambient Air Quality Standards for Particle Pollution.* October 6, 2006, page 3-4. The benefit/ton values given for Non-EGU sources (such as cement plants, industrial boilers and commercial incinerators) in the RIA have been averaged for the South, Midwest and East.
$PM_{2.5}$	$200,000	
NOx	$16,000	U.S. EPA. *Regulatory Impact Analysis of the Proposed Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone.* August, 2007. Page 5-3. Benefit/ton values are for Non-EGU sources (such as cement plants, industrial boilers and commercial incinerators) for areas other than the Western U.S.
VOCs	$6,000	
HAPs	$6,000	U.S. Office of Management and Budget. *Draft 2005 Report to Congress on the Costs and Benefits of Federal Regulations.* Page 66. (Hazardous Organic NESHAP Rule). The particular HAPs at issue in burning ECF are largely VOCs. These HAPs' impact in terms of direct inhalation risks (cancer and non-cancer impacts) is expected to be far less significant monetarily than their impact in contributing to ozone formation. Accordingly, we have valued abatement of these HAPs at an identical value per ton as has been estimated by EPA for VOCs.
CO	$0	In general, the benefits per ton for CO control are far lower than for the other air pollutants listed in this table because: 1) CO is not linked to excess mortality at typical ambient concentrations; and 2) CO does not contribute significantly to atmospheric formation of other pollutants that are linked to excess mortality (PM, ozone).
Mercury	$5.0 million	U.S. EPA, *Regulatory Impact Analysis for the Clean Air Mercury Rule, Final Report*, March 2005. Present value of foregone net earnings due to mercury-related IQ decrements in 2001: $238,627,000 (Table 10-14, page 10-55). U.S. EPA, *Preamble for the Clean Air Mercury Rule, Final Report*, page 70: 48 tons of mercury emissions in 1999. $238 million ÷ 48 = $5 million/ton, approximately.

Social cost due to increased NOx and SO_2 emissions at cement kilns

Exhibit 3 provides a range of estimates for: A) the loss of HWDF at kilns due to the proposed rule; B) the associated increase in coal use; C) the resulting increase in NOx and SO_2 emissions due to replacing HWDF with coal; and D) the monetized social cost associated with these increased emissions. Overall, we estimate that the social cost due to increased emissions at

cement kilns resulting from the diversion of ECF away from energy recovery at these kilns exceeds $138 million per year and could be as high as $471 million per year. This amounts to about $2,400 to $3,200 in emissions-related social cost at cement kilns for each ton of ECF that is diverted away from energy recovery at cement kilns. The steps leading to this result are discussed below.

Exhibit 3
Range of Increased NOx and SO_2 Emissions and the Associated Social Cost From Diversion of ECF and Blended HWDF Away from Energy Recovery at Cement Kilns

Amt of HWDF Lost to Kilns Increased Coal Use Increased SO_2 & NOx Social Cost $	EPA: 39% ECF Shift			Maximum (100%) ECF Shift	
	Amount of HW Blended			Amount of HW Blended	
	EPA: 0%	50%	100%	50%	100%
A. HWDF lost to kilns					
Amt of shifted ECF (tpy)	57,000	57,000	57,000	146,000	146,000
Amt HW blended (tpy)	0	28,000	57,000	73,000	146,000
Total HWDF lost (tpy)	57,000	85,000	114,000	219,000	292,000
B. Increased coal use (tpy)	54,000	81,000	108,000	208,000	277,000
C. Increased NOx & SO_2					
NOx (tpy)	830	1,245	1,660	3,196	4,256
SO_2 (tpy)	1,268	1,902	2,536	4,882	6,502
D. Monetized social cost					
NOx emissions increase ($/yr)	$13,280,000	$19,920,000	$26,560,000	$51,133,458	$68,096,000
SO_2 emissions increase ($/yr)	$78,616,000	$117,924,000	$157,232,000	$302,706,830	$403,124,000
Total social cost ($/yr)	$91,896,000	$137,844,000	$183,792,000	$353,840,289	$471,220,000
Monetized Social Cost Per Ton ECF Shifted	$2,400 to $3,200 social cost per ton ECF diverted				

A. HWDF lost

The range in Exhibit 3 for HWDF lost is bounded on the low side by EPA's estimated 39% shift in the 146,000 tons of materials that CKRC estimates as qualifying as ECF, amounting to 57,000 tpy. This lower end is unrealistic in part because it fails to consider the additional HWDF that would be lost because it could no longer be blended with the diverted ECF, which we estimate as an additional 50-100% of the diverted ECF. We provide the results for 0% blending in Table 3 only to show that even in this unrealistically low case, the social cost is still over $91 million/year, about 4 times larger than the net benefits of $23.4 million per year that EPA estimates for the proposed rule.

We provide a more realistic estimate for the minimum quantity of lost HWDF by applying the estimate of lost ECF from our survey and increasing it to account for the fact that each ton of ECF used by fuel blenders or cement kilns as blend stock is blended with ½ to 1 ton of other wastes to producing "as-fired" HWDF. Thus, a more realistic estimate for the minimum loss of HWDF associated with EPA's estimated 39% diversion of ECF is 85,000 – 114,000 tpy, consisting of the 57,000 tpy of diverted ECF plus the 28,000 – 57,000 tpy of additional wastes that will no longer be blended with that ECF.

However, we believe that the diversion of ECF could substantially exceed EPA's

estimated 39%. The upper end of the possible range reflects the diversion of all 146,000 tpy of ECF, blended with an additional 50% -100% of other hazardous wastes representing an additional 73,000 – 146,000 tpy. Therefore, the upper-end loss of HWDF to cement kilns due to the proposed rule is 219,000 to 292,000 tpy. Overall, the loss of HWDF to kilns due to the proposed rule is likely to be between 85,000 tpy and 292,000 tpy.

B. Increased coal use to replace the lost HWDF

As discussed in SYA's comments, 0.95 tons of coal will be needed to replace a ton of lost HWDF. This factor was applied to the quantity of HWDF lost to estimate the associated increased coal use shown in section B of Exhibit 3. Reflecting the likely range of lost HWDF due to the proposed rule, the resulting increase in coal use will range from 81,000 tpy to 277,000 tpy.

C. Increased NOx and SO_2 resulting from replacing HWDF with coal

As discussed earlier and detailed in the SYA comments, the use of HWDF instead of coal at cement kilns has substantial benefits in terms of reduced NOx and SO_2 emissions.[11] Consequently, the loss of HWDF at cement kilns and its replacement with coal will result in increased emissions of these two pollutants, with substantial social cost as shown in Exhibit 3. Reflecting the likely range of loss of HWDF due to the proposed rule, the resulting increases at cement kilns in NOx emissions is 1,245 to 4,256 tpy and the increase in SO_2 emissions is 1,902 to 6,502 tpy.

D. Monetized social cost associated with the increased NOx and SO_2 emissions

Applying the per ton values from Exhibit 2 to the increased emissions of NOx and SO_2 in section C of Table 3 results in estimated social costs ranging from $138 million to $472 million per year for the likely range of HWDF that will be lost at cement kilns due to the proposed rule. This reflects about $2,400 to $3,200 in social cost per ton of ECF that is diverted from energy recovery at cement kilns.

Note that even EPA's unrealistic assumption of 39% diversion of ECF with no proportionate loss of blended fuels results in a social cost of nearly $92 million per year, which is about 4 times greater than EPA's estimated net benefits for the proposed rule as a whole (prior to consideration of emissions-related impacts) of $23.4 million per year. Using more realistic assumptions would yield social costs from increased emissions at cement kilns that are 6 – 20 times greater than EPA's estimated net benefits.

Increased emissions at industrial boilers

As detailed in SYA's comments, 80% of industrial boilers burn natural gas as their primary fuel. The substitution of ECF (which EPA has defined to be comparable to fuel oil) for natural gas will result in changes in emissions as shown in Exhibit 4. While emissions of some pollutants will increase and some will decrease, the increase in SO_2 emissions from ECF relative to natural gas dominates, with a resulting net social cost of $2.4 - $6.2 million per year for the ECF that is diverted from cement kilns as shown in Exhibit 4. This amounts to a social cost of

11 Note that these increases in NOx and SO_2 emissions occur within the kilns' permit limits. HWDF-burning cement kilns are permitted to emit criteria pollutants up to the levels that would prevail if the kilns were to use 100% conventional fuels.

about $42.50 per ton of ECF that is substituted for natural gas at industrial boilers.

In addition, we note that when estimating the impact of these emissions increases on risks, EPA should consider the location of these emissions as well as their volume. We believe that industrial boilers are generally located in more densely populated areas than are HWDF-burning cement kilns and commercial incinerators. Increased emissions at industrial boilers resulting from substituting ECF for natural gas should be of particular concern to EPA from a risk perspective.

Exhibit 4
Social Cost Associated with Changed Emissions at Industrial Boilers
Due to the Diversion of ECF from Cement Kilns

POLLUTANT	CHANGE IN EMISSIONS (tpy)		SOCIAL COST (+) & BENEFIT (-)	
	39% shift of ECF (57,000 tpy ECF)	100% shift of ECF (146,000 tpy ECF)	39% shift of ECF (57,000 tpy ECF)	100% shift of ECF (146,000 tpy ECF)
NOx	-15.2	-39	($243,360)	($624,000)
SO_2	42.9	110	$2,659,800	$6,820,000
CO	-37.1	-95	---	---
$PM_{2.5}$	0	0	---	---
HAPs	0.8	2	$4,680	$12,000
		Total Social Cost	$2,421,120	$6,208,000
	Social Cost per ton ECF substituted for natural gas		About $42.50 per ton substituted	

Increased emissions at commercial incinerators

As discussed previously and illustrated in Exhibit 1, the hazardous waste that was previously blended with ECF into HWDF would instead be sent to commercial incinerators. These wastes amount to about 50%-100% of the volume of ECF that is diverted from energy recovery at cement kilns. We estimate the amount of these wastes that will be sent to commercial incinerators as a minimum of 28,000 tpy (from blending EPA's estimated 39% ECF shift with half as much other wastes) and a maximum of 146,000 tpy (assuming 100% ECF shift and blending with it an equal quantity of other wastes).

Notably, this volume of wastes that would have been blended into HWDF for cement kilns that will instead be sent to commercial incinerators far exceeds the 12,500 tpy loss in volume managed by commercial incinerators that EPA estimated would result from the rule.

Exhibit 5 shows our estimate of the increase in emissions and social costs at commercial incinerators as they burn for destruction the additional 28,000 to 146,000 tpy of hazardous wastes that were formerly burned for energy recovery in cement kilns.

Exhibit 5
Additional Emissions from Commercial Incinerators and Resulting Social Costs

	Dioxins/ Furans (g/year)	$PM_{2.5}$ (pounds per year)	Mercury (pounds per year)	Semi- and Low Volatile Metals (pounds per year)	Chlorine (pounds per year)
Calculation of Emission Factors for Commercial Incinerators					
Total national emissions prior to MACT Replacement Standards [1]	0.6	63,000	620	911	106,000
Emission reduction due to MACT Replacement Standards [2]	17.5%	0%	0%	40.9%	98%
Estimated post-MACT emissions	0.495	63,000	620	538	2,332
Volume of waste incinerated (tons in 1999) [3]	452,200	452,200	452,200	452,200	452,200
Emission factor per 1000 tons of waste incinerated	0.00109	139.3	1.371	1.190	5.157
Estimated Additional Emissions/yr					
For 28,000 tpy of wastes incinerated	0.031	3,900	38.4	33.3	144
For 146,000 tpy of wastes incinerated	0.160	20,341	200	174	753
Estimated Social Costs/yr					
For 28,000 tpy of wastes incinerated	?	$390,000	$96,000	?	?
For 146,000 tpy of wastes incinerated	?	$2,034,000	$500,000	?	?

[1] MACT Replacement Addendum, Exhibit 2, page 6.
[2] MACT Replacement Addendum, Exhibit 3, page 8 and Exhibit C-1, page 59.
[3] MACT Replacement Assessment, Exhibit 2-7, page 2-10.

Additional annual emissions at commercial incinerators resulting from the proposed rule would include 0.03 - 0.16 grams of dioxins/furans; 2 to 10 tons of $PM_{2.5}$; 38 to 200 pounds of mercury; 33 - 174 pounds of semi- and low volatile metals; and 144 - 753 pounds of chlorine. We further estimate that the social costs due to the increased $PM_{2.5}$ emissions would be approximately $0.39 to $2.0 million per year. Additionally, the social costs due to the increased mercury emissions would be $0.1 million to $0.5 million per year. We were unable to find appropriate damage per ton figures for dioxins/furans, semi- and low volatile metals and chlorine, and hence could not estimate the social costs from emissions of these pollutants. The social costs that we could monetize produce a total estimate of about $0.5 to $2.5 million from the additional emissions from commercial incinerators.

We derived our estimates of the emissions from commercial hazardous waste incinerators using EPA documents supporting the Hazardous Waste Combustion MACT Replacement Standards Rule.[12] The estimated national baseline emissions of key pollutants (dioxins/furans, $PM_{2.5}$, mercury, semi- and low volatile metals, and chlorine) from commercial incinerators prior

12 USEPA, Office of Solid Waste, March 2004, *Assessment of the Potential Costs, Benefits, and Other Impacts of the Hazardous Waste Combustion MACT Replacement Standards: Proposed Rule.* Also, USEPA, Office of Solid Waste, March 2004, *Addendum to the Assessment of the Potential Costs, Benefits, and Other Impacts of the Hazardous Waste Combustion MACT Replacement Standards: Proposed Rule.*

to compliance with this rule are shown on the first row in Exhibit 5. The next rows show the estimated reductions in emissions due to the MACT Replacement Rule and the resulting estimated post-MACT national emissions. We then convert these national emission estimates to emission factors by dividing by the corresponding annual tonnage of hazardous wastes incinerated at commercial incinerators. We then apply these emission factors to the tonnage of additional wastes that we estimate will be incinerated as a result of ECF shifting away from cement kilns under the current proposed rule.

Total direct social costs from additional emissions when cement kilns lose ECF

Exhibit 6 shows the total direct social costs at cement kilns, industrial boilers and commercial incinerators associated with emission changes that will result when the proposed rule shifts ECF away from energy recovery at cement kilns. These estimates have been developed for the minimum possible loss of HWDF to kilns of 85,000 tpy (consisting of 57,000 tpy of ECF based on EPA's 39% loss estimate, plus half of this quantity of additional lower quality wastes that would have been blended with the ECF) and for the maximum possible loss of 292,000 tpy (consisting of all of the ECF burned by kilns, 146,000 tpy, plus an equal quantity of other wastes that would have been blended with the ECF).

Exhibit 6
Total Direct Social Costs When Cement Kilns Lose ECF ($ in millions/year)

	Loss of 85,000 tpy	Loss of 292,000 tpy
Increased emissions at cement kilns	$137.8	$471.2
Increased emissions at industrial boilers	$2.4	$6.2
Increased emissions by commercial incinerators	$0.5	$2.5
Total social costs	$140.7	$479.9

These social costs of $141 to $480 million per year far outweigh the net benefits of $23.4 million per year that EPA estimates for the proposed rule in total (note, however, that EPA ignored emissions impacts in its estimates).

3. There are additional significant indirect health and safety impacts associated with production and transportation of the replacement coal that cement kilns will need. These impacts also should be reflected in EPA's analysis of social costs and benefits.

EPA's ECF RIA correctly assumes that if cement plants are forced to reduce their use of HWDF for energy recovery, they will meet their needs for replacement energy with coal.[13] However, the RIA does not address the additional adverse health and safety impacts that will result from the increased production, transportation and use of this additional coal. These damages were extensively described in CKRC's August, 1996 comments on the Hazardous Waste Combustion MACT Proposed Rule.[14] In that assessment, CKRC found that reducing the use of hazardous waste-derived fuels and substituting coal would increase fatalities and injuries due to more coal mining accidents, lung cancer among miners, black lung disease among miners, coal train accidents, coal truck accidents, and increased emissions from coal transportation. These resulting additional coal-related damages that might be induced by the ECF rule, in our

13 USEPA OSW, ECF RIA. Page 38.
14 Cement Kiln Recycling Coalition, "Comments, Hazardous Waste Combustion MACT Proposed Rule." August 19, 1996. Pages 64-85.

view, are likely significant compared with the net social benefits that EPA estimates for the ECF rule. EPA should estimate these damages and consider them in evaluating the proposed rule. Such an analysis is required by OMB Circular A-4:

> "Ancillary Benefits and Countervailing Risks
>
> Your analysis should look beyond the direct benefits and direct costs of your rulemaking and consider any important ancillary benefits and countervailing risks. An ancillary benefit is a favorable impact of the rule that is typically unrelated or secondary to the statutory purpose of the rulemaking ... while a countervailing risk is an adverse economic, health, safety or environmental consequence that occurs due to a rule and is not already accounted for in the direct cost of the rule ...
>
> You should begin by considering and perhaps listing the possible ancillary benefits and countervailing risks. However, highly speculative or minor consequences may not be worth further formal analysis. Analytic priority should be given to those ancillary benefits and countervailing risks that are important enough to potentially change the rank ordering of the main alternatives in the analysis. In some cases the mere consideration of these secondary effects may help in the generation of a superior regulatory alternative with strong ancillary benefits and fewer countervailing risks. ...
>
> Like other benefits and costs, an effort should be made to quantify and monetize ancillary benefits and countervailing risks. If monetization is not feasible, quantification should be attempted through use of informative physical units. ... The same standards of information and analysis quality that apply to direct benefits and costs should be applied to ancillary benefits and countervailing risks."[15]

It appears clear that if a regulatory alternative has the potential to have a significant indirect effect, the indirect effect should be analyzed and considered in the regulatory decision. As demonstrated below, to the extent that EPA's ECF rule will result in increased use of coal by cement plants, increased indirect damages will ensue that are significant relative to the net social benefits for the regulatory options under consideration.

Potential health and safety impacts from production and transportation of coal

CKRC's August 1996 comments estimated the increased health and safety damages from coal production and transportation that would result from substituting coal for HWDF at cement kilns. That analysis was based on the impacts associated with substituting 890,000 tons of coal annually.[16] The resulting increased damages were:

- 214 – 581 deaths per 1000 years ; and
- 16,000 – 20,000 injuries per 1,000 years.

Converting this to an annual basis per 100,000 tons of coal:

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15 OMB, "Circular A-4." Page26.
16 CKRC August 1996 Comments. Page 67.

- 0.024-0.065 deaths per 100,000 tons of coal; and
- 1.8 – 2.25 injuries per 100,000 tons of coal.

The associated social cost at values of $6.1 million per statistical life and $17,098 per injury[17] are:

- $146,674 - $398,213 for deaths per 100,000 tons of coal; and
- $30,738 - $38,422 for injuries per 100,000 tons of coal.

Consequently, the additional annual social cost for deaths and injuries from the production and transportation of 100,000 tons of coal is about $177,000 to $437,000.

Potential emissions resulting from transporting coal

SYA estimated (SYA Table 13) the additional emissions that will result from transporting the additional coal that will be needed at cement kilns due to the proposed rule. For SO_2 and NOx alone, this will result in additional emissions of 0.3 tons per year of SO_2 and 23 tons per year of NOx for every 100,000 tons of coal transported. Applying the per ton values shown in Table 2, this amounts to an annual social cost of $19,800 for SO_2 and $368,000 for NOx, for a total of about $388,000 per year per 100,000 tons of coal.

Potential total indirect damages resulting from increased coal use due to the rule

The total indirect damages from the increased health, safety and transportation impacts associated with an additional 100,000 tons of coal annually is about $565,000 - $825,000. For the likely range for increased coal use of 81,000 to 277,000 tons per year, the social cost for the associated indirect damages resulting from the increased coal use at cement kilns due to the proposed ECF rule would be about $460,000 to $2,300,000.

4. EPA underestimates the impacts of the rule on cement kilns.

As discussed in #1 and #2, EPA underestimates the volume of HWDF that will be diverted from cement kilns due to the proposed rule, as well as the amount of coal that will be needed to replace it. In addition, EPA underestimates the cost of coal – while EPA assumed the cost of coal to be $1.80 / MMBtu[18], cement kilns surveyed by Environomics and SYA reported 2006 coal cost at $2.56-3.00 / MMBtu. Thus, EPA underestimates both the impact on waste management revenues earned by cement kilns and the cost of the coal needed to replace the HWDF that will be lost due to the rule.

5. EPA does not consider the joint impact with another recently proposed EPA rule -- the

17 The values we used in monetizing these damages are as follows. Death: $6.1 million in 1999 dollars (USEPA, Guidelines for Preparing Economic Analyses," page 90). Injury: $17,098 in 2004 dollars (Moore, Bauer and Steiner. NIOSH. Prevalence and Cost of Cumulative Injuries over Two Decades of Technological Advances: a Look at Underground Coal Mining in the U.S.). Note that we have not inflated these figures to more current dollars for comparison with the cost figures in the RIA.

18 USEPA OSW, ECF RIA June 2007, Page 53.

Revision of the RCRA Definition of Solid Waste (DSW) -- that will also reduce energy recovery at kilns.

The ECF RIA recognizes a requirement to analyze the joint impacts of rules.[19] However, the ECF RIA fails even to mention EPA's proposed revision to the RCRA definition of solid waste, another significant EPA regulation that EPA recently proposed that would directly impact energy recovery at cement kilns in a similar way as the ECF rule. Both of these rules would divert higher Btu, higher quality materials away from kilns. The cement kilns and fuel blenders surveyed by Environomics and SYA reported that ECF comprised about 15.5% of the HWDF used by cement kilns, and that wastes that would be excluded by the revised DSW comprised 10%-30% of the HWDF used by cement kilns; and in both cases a ton of ECF or DSW waste that is diverted would result in an overall loss of 1.5- 2.0 tons of HWDF to kilns. When analyzing the impacts of the proposed ECF rule, it is important for EPA to consider the joint impact of other Agency rules that also can affect the RCRA-regulated wastes available to cement plants for energy recovery. The joint impact of EPA's DSW and ECF rules might be sufficiently large to affect EPA's choice of regulatory alternatives. Both EPA's Guidelines for Preparing Economic Analyses[20] and Executive Order 12866[21] state the importance of explicitly evaluating the combined impact when multiple regulations affect a particular economic sector or activity.

EPA's Guidelines for Preparing Economic Analyses emphasizes the importance of taking into account combined impacts in its section on Multiple Rules or Regulations and Baseline Specification.[22] The guidelines state that "there is no theoretically correct order for conducting a sequential analysis of multiple overlapping policies that are promulgated simultaneously," and that "an idealized approach would attempt to analyze all of the policies together when assessing the total costs and benefits resulting from the package of policies."

Likewise, Executive Order 12866, Regulatory Planning and Review, states that regulatory analyses should be prepared "... taking into account, among other things, and to the extent practicable, the costs of cumulative regulations."[23] A combined analysis of the impact from the DSW and ECF rules on energy recovery by cement plants appears to be especially appropriate and feasible because:

- The DSW and ECF rules are being considered in the same time frame and clearly affect many of the same sectors and activities;

- There may be some synergistic effects between the two rules that increase beyond the effect of either rule alone the incentives for generators to manage on-site (recycle or burn for energy recovery) the cleaner, higher energy content RCRA-regulated wastes that are essential components of the energy recovery programs at HWDF-burning cement kilns. Thus, separate analyses of the two rules may underestimate the total volume of wastes that will be diverted from kilns; and

- The DSW and ECF RIAs share some of the same authors (Industrial Economics, Inc.)

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19 USEPA OSW, ECF RIA June 2007, Page 43.
20 USEPA, "Guidelines for Preparing Economic Analyses." September, 2000.
21 Federal Register, Vol. 58, No. 190, Executive Order 12866, October 4, 1993.
22 USEPA, "Guidelines for Preparing Economic Analyses." September 2000. Page 25
23 Federal Register, Vol. 58, No. 190, Executive Order 12866, October 4, 1993. Page 51736

and analytical approaches, and thus a combined analysis can be coordinated relatively smoothly.

At a minimum, EPA's Guidelines state that analyses should "...be clear as to the baseline for the analysis, and to present a justification for making this choice. This can include providing information on the status of other regulatory actions that may have some effect on the baseline, and conducting sensitivity analyses that test for the implications of including or omitting other regulations."[24]

The combined impact analysis should estimate the total volume of HWDF shifted away from cement kilns, the combined economic impact to cement plants, the cost of increased coal use, the impact of the waste shift on the overall cost or cost savings from the rules, the additional health and safety impacts associated with increased coal use, and the loss of hazardous waste fees to states.

6. The RIA has not evaluated all the adverse consequences if some states do not adopt this rule.

To the extent that some states do not adopt the regulation, which we believe is likely, the ECF rule will lead to inconsistent requirements across state lines. It is well understood that consistent requirements across state lines have promoted the development of a fully integrated national system to manage hazardous wastes in a manner that is both protective of human health and the environment and economically efficient. However, because uneven adoption of this rule is likely, it may result in creating a patchwork of inconsistent state solid and hazardous waste regulations. CKRC is concerned that inconsistent state regulations could undermine the viability of long established national waste management networks, such as the nationally integrated recycling programs of the type operated by cement kiln operators and fuel blenders. The RIA includes a simple scaling analysis in which the estimated impacts of the rule are proportionally scaled back if only some states adopt the rule. This analysis is not adequate to reflect the confusion and disruption of existing relationships and higher costs that will ensue when states adopt substantially differing requirements about whether particular wastes may or may not be managed on- or off-site for energy recovery in industrial boilers and whether they are regulated or largely unregulated.

24 USEPA, "Guidelines for Preparing Economic Analyses." September 2000. Page 25.

Appendix A
Summary of Findings from Survey of Fuel Blenders and HWDF-Using Cement Kilns

The survey conducted during the summer of 2007 covered fuel blenders and kilns accounting for roughly 1/3 of the 938,114 tons of liquid HWDF burned in cement kilns in 2006. Blenders represented in our survey accounted for 268,524 tons of blended HWDF. The 7 HWDF-burning cement plants represented in the survey account for 403,000 tons of HWDF burned. These kilns receive roughly 10% of their HWDF directly from generators, the remainder from their fuel managers or fuel blenders. Thus, the total amount of HWDF received from generators that is covered in our survey is equal to 268,524 + 10%*403,000 = 308,800 tons, or roughly 1/3 of the industry total. The surveyed blenders comprise a representative cross section of those companies operating in the industry, including ones receiving largely bulk materials, and others receiving mostly drummed wastes in smaller quantities. The 7 cement plants that were surveyed constitute half of the 14 HWDF-burning cement plants, and 43% of the total tons of HWDF burned.

Kilns and blenders queried their databases on wastes received in order to identify the specific wastes that would meet the proposed concentration limits defining ECF and the volumes of such wastes that were received during 2006. In general, kilns received little of such ECF wastes, largely because most kilns receive the bulk of their HWDF in an already-blended form from fuel blenders. The already-blended HWDF received by kilns typically does not meet the ECF specifications because of chlorine (above the ECF limit, but less than 2%) or metals (relatively low levels that will not cause the kilns to exceed metals emission limits, but still higher than the ECF limits). ECF constitutes a much higher fraction of the wastes received by kilns directly from generators and of the wastes received by fuel blenders. The survey results showed that 15.5% of the wastes received by blenders from generators would qualify under the proposed rule as ECF. Kilns cited a roughly similar percentage of the wastes they receive directly from generators as likely qualifying as ECF. We thus estimate that 15.5% of all the liquid HWDF burned by kilns would qualify as ECF under the proposed rule, for a total of 146,000 tons per year (15.5% of the 938,000 total tons of liquid HWDF burned in cement kilns).

Each of the responding fuel blenders and cement kiln operators provided examples of the specific wastes they received and identified as ECF and also examples of some of the specific streams that they would likely no longer be able to accept and blend if they lost the ECF. Survey respondents also reported that there are signs that chlorine levels in wastes are declining (probably due to significant reductions in use of chlorinated solvents), and a lesser fraction of hazardous waste now seems to fail the proposed ECF specifications because of chlorine content than was the case previously (the proposed chlorine specification for ECF is the same as for the existing comparable fuel exclusion). Among the sorts of higher Btu wastes that kilns seek as HWDF, the concentration of metals is rarely sufficiently high as to make the waste unsuitable for burning.

The Btu value of the specific wastes that the blenders/kilns received and identified as ECF averaged about 12,750 Btu/lb. This is higher than the average Btu content of the HWDF burned by kilns, consistent with the observation by every one of the respondents to the effect that ECF is

used and has significant value as blend stock. The actual blending ratio of ECF to lower quality wastes in making the HWDF used by kilns varied across respondents, ranging from approximately ½ to 1 ton of lower quality waste blended with each ton of ECF.

Fuel blenders said overwhelmingly that if they were to lose ECF as a blend stock, they would send to incinerators the poorer quality wastes that they formerly blended with the ECF.

The survey of HWDF-using kilns asked several questions about the coal they would use to replace any ECF that might be lost. Respondents indicated that they would need replacement coal on a nearly 1:1 ratio in terms of Btus, which translates into very slightly less than 1 ton of coal needed to replace 1 ton of ECF lost. Inability to accept lower quality wastes blended with the ECF would increase the tonnage of replacement coal needed. The price paid for coal in 2006 ranged across the plants from $2.56 - $3.00 per million Btu.