CKRC
CEMENT KILN RECYCLING COALITION

Reductions in Dioxin/Furan Emissions from HWC Cement Kilns

(Updated December 1, 2005)

The Cement Kiln Recycling Coalition (CKRC) is a national trade association representing cement kilns that recover energy from hazardous waste fuels to manufacture cement. CKRC and its members have compiled a significant emissions database comprised of EPA-approved test data; conducted testing to investigate and gain a thorough understanding of industry dioxin and furan (D/F) emissions; identified and made D/F emissions reduction modifications; and provided significant information to USEPA to assist the Agency in accurately characterizing D/F emissions from cement kilns burning hazardous wastes for energy recovery.[i]

Burning hazardous waste for energy recovery does not impact D/F emissions at cement kilns.

In the development of the hazardous waste combustor (HWC) Maximum Achievable Control Technology (MACT) rule, EPA "…considered both hazardous waste burning cement kiln and nonhazardous waste burning cement kiln data together because both data sets are adequately representative of general dioxin/furan behavior and control in either type of kiln. This similarity is based on our engineering judgement that hazardous waste burning does not have an impact on dioxin/furan formation, dioxin/furan is formed post-combustion." (See 64 FR 52876) (*emphasis added*)

The HWC cement industry has been thoroughly studied, its D/F emissions are well-understood, and significant emission reductions have been achieved.

Through compliance with the Boiler and Industrial Furnace Regulations and the development of the HWC MACT rule, CKRC and its members have amassed a comprehensive database characterizing emissions from cement plants that burn hazardous waste for energy recovery. Specifically, this industry has conducted testing to investigate the nature of D/F emissions, identified emissions reduction opportunities, and voluntarily implemented modifications to realize these reductions. As a result, this industry has decreased its estimated D/F emissions by 99.3% since 1990. (See USEPA OSW October 6, 2005 presentation entitled "Overview of Hazardous Waste Combustor MACT Rule and National Emissions Standards for HAPS: Final Standards for HAPS for Hazardous Waste Combustors, October 12, 2005, 70 FR 59402, and TSD Volume V, Appendix C) Because the HWC cement industry has been completely characterized, any uncertainty levels related to the emissions estimates should be relatively low. [ii]

Through the development of the HWC MACT rule, EPA's Office of Solid Waste's database has been corrected and updated. It accurately characterizes D/F emissions from cement kilns that recover energy from hazardous wastes.

Many of the Agency's early publications on this subject severely over-estimated D/F emissions from cement kilns that burn hazardous wastes for energy recovery because they were based on information that was inaccurate and/or outdated. For example, in 1994, when EPA began developing MACT standards for HWC cement kilns, the agency used a national dioxin emissions estimate of 860 g TEQ/yr for this sector. CKRC cooperated with EPA to improve the emissions database and, as a result, exposed numerous errors and inaccuracies. After making the appropriate corrections to its database, EPA revised its HWC cement industry D/F emissions estimate to 431 g TEQ/yr for 1990. Based on the growing database of D/F testing and HWC MACT Rule development, EPA's OSW estimates that "after compliance with interim standards and the 2005 final rule," annual estimates for HWC cement kilns will be "3.0 g TEQ/yr."

The HWC cement industry voluntarily reduced its D/F emissions significantly below 1990 levels.

Once USEPA's database was corrected, CKRC then made efforts to ensure EPA was in possession of the most recent test data and aware of significant voluntary D/F emission reductions made by the industry since 1990. Thus, in 1996, EPA further revised its D/F emissions estimate for HWC cement kilns to 23 g TEQ/yr.[iii] Throughout the development of the HWC MACT rule, the industry continued to keep EPA apprised of additional D/F emission reductions and it ensured the Agency database reflected the most current emissions information.

In the final HWC MACT rule published on September 30, 1999, EPA recognized the "significant reduction in national dioxin/furan emissions achieved over the past several years by hazardous waste burning cement kilns due to emissions improving modifications" and stated that "[t]he hazardous waste burning cement kiln national dioxin/furan emission estimate for 1997 decreased by nearly 97% since 1990, from 431 g TEQ/yr to 13.1 g TEQ/yr." (See 64 FR 52876) (emphasis added). Even when the 1999 Final HWC MACT Rule was vacated by the court, CKRC was an active participant in settlement negotiations that resulted in the industry's compliance with interim standards during the development of replacement standards and re-proposal effort. Voluntary participation in these negotiations ensured that facilities were in compliance with D/F standards that further reduced their emissions several years before the October 12, 2005 rule's compliance date.

Data supporting the recently promulgated HWC MACT Replacement Standards show further reductions in D/F emissions from HWC cement kilns.

HWC cement kilns are already complying with a stringent HWC MACT D/F standard of 0.20 ng TEQ/dscm or 0.40 ng TEQ/dscm with temperature at the inlet to the APCD limited to a maximum of 400 degrees F. EPA estimates that, as a result of this regulatory requirement, HWC cement kilns have

reduced their annual emissions to 3.0 g TEQ/yr, a 99.3% reduction below the 1990 baseline (See USEPA OSW October 6, 2005 presentation entitled "Overview of Hazardous Waste Combustor MACT Rule and National Emissions Standards for HAPS: Final Standards for HAPS for Hazardous Waste Combustors, October 12, 2005, 70 FR 59402, and TSD Volume V, Appendix C) .

---

[i] CKRC provided comments on a variety of regulatory efforts to assist EPA in accurately characterizing D/F emissions from HWC cement kilns including: January 13, 1995, 1994 Draft Dioxin Reassessment; 1996 HWC MACT Proposal and 1997 HWC MACT Notice of Data Availability; the Draft National Emissions Estimates 112(c)(6) document; the April 1998 Revised External Review Draft Inventory of Sources of Dioxin in the US and most recently EPA's May 6, 2005 draft external review document, *The Inventory of Sources and Environmental Releases of Dioxin-like Compounds in the United States: The Year 2000 Update*.

[ii] All HWC cement kilns either have been tested or an on-site 'twin' has been tested for D/F emissions. The remaining kilns have air pollution control system inlet operating temperatures below 400 degrees F and were not required to perform dioxin testing as part of the certification of compliance (COC) process under the Boiler and Industrial Furnace (BIF) rule. However, because all hazardous waste burning cement kilns did perform COCs by 1995, APCS operating temperature and flow rate data are available for all units in the industry category. Thus, there is no need to extrapolate these factors in a D/F emissions estimate calculation, they are known for all cement kiln units burning hazardous waste. (See CKRC comments on the HWC MACT rule proposal, August 19, 1996 at pp. 35-44 and CKRC comments on EPA's Draft Inventory of Sources of Dioxin in the US, May 29, 1998)

[iii] See EPA's published "Summary of Public Comments on the Section 112(c)(6) Draft Listing Notice" in which EPA agrees with CKRC that "the 1996 national dioxin TEQ emission estimate [for HWC cement kilns is] 23 g/yr…"