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How do the mass emissions from hazardous waste combustors compare with other stationary combustion sources?

The first step in answering this question is to define the list of source categories that will be used for the comparison. The source categories considered in this discussion are:

- Cement kilns (CK);
- Hospital/medical/infectious waste incinerators (HMIWI);
- Sewage sludge incinerators (SSI);
- Electric generation units (EGU);
- Industrial boilers (Boilers);
- Commercial and industrial solid waste incinerators (CISWI);
- Municipal waste combustors (MWC); and
- Hazardous waste combustors (HWC).

The second step is determined where to find emissions data for each of these sources. We have been able to locate three sources of data that can be used to answer this question: the support documents for each source category's MACT rule; the Toxics Release Inventory database (https://iaspub.epa.gov/triexplorer/tri_release.chemical); and National Emissions Inventory database (https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data). The references used for each source category MACT rule is listed at the end of this document.

Finding reasonably accurate estimates for emissions from various sources is difficult. It should be noted that the data quality for each of these three sources present challenges. In addition, each of the databases may not contain information for all pollutants emitted.

With those caveats, Table 1 compares the mass emissions per year for particulate matter (PM), hydrogen chloride (HCl), mercury (Hg), semi-volatile metals (SVW – a sum of lead and cadmium), and dioxins and furans (D/F) based on the support documents for each of their MACT rules. As one can see, the mass emissions of PM and HCl are predominated by the EGU and Boiler source categories. The two big sources for mercury emissions are EGUs and MWCs. From these data sources, it is difficult to make a comparison for SVMs and D/F because not all

source categories have data and where there are data, it is not in the same format (Total D/F instead of TEQ and all metals instead of just lead and cadmium for CISWI sources).

Table 1. Mass emissions for combustion sources based on data used to develop each source category's MACT standards.

Source	PM (t/yr)	HCl (t/yr)	Hg (t/yr)	SVM (t/yr)	D/F (g TEQ/yr)
CK	1,012	161	0.7		
HMIWI	31.3	7	0.02	0.04	0.06
SSI	326	11	1.1	2	0.5
EGU	218,000	5,500	6.6		
Boilers	31,026	39,389	1.57	2,474[a]	0
CISWI	479.6	206	0.4	0.76	206[b]
MWC	780	3,200	2.3	5.9	15
HWC	2,219	1,219[c]	0.3	3	0.7

a. Total metals, not broken up into lead and cadmium.
b. Total dioxin and furans, not TEQ.
c. This is a total chlorine (HCl and chlorine), not just HCl.

Table 2 shows the mass emissions per year for certain combustion sources based on the 2011 NEI database. The source categories in the NEI database do not match up exactly with the source categories from Table 1 but one can get some general ideas of the rankings using the NEI data. In addition, the NEI data base does not contain emissions of D/Fs. Since the NEI data does not contain a source category for HWCs, the data from the last line of Table 1 is incorporated into Table 2. The first thing one notices in comparing Tables 1 and 2 are that the estimated emissions for the same source categories can be quite a bit different. For example, the PM emission estimate for boilers from Table 1 is 31,026 tons per year while the estimate from the NEI database is 201,600. Similar differences show up for other pollutants (e.g., HCl from Table 1 for EGUs is 5,500 tons per year and 68,323 tons per year from the NEI database). Some of these differences can be attributed to different methods for gathering or generating the data or the number of sources that are actually included in in developing the estimates. Given these inconsistencies, the general rankings are somewhat similar: i.e., the PM and HCl emissions are predominately from the EGU and boiler source categories and the mercury and SVM emissions are predominately from the EGUs, cement kilns, and boilers.

Table 2. Mass emissions from combustion sources using point source NEI data, excluded agricultural, fires, and mobile sources.

Source	PM (t/yr)	HCl (t/yr)	Hg (t/yr)	SVM (t/yr)
CK	30,048	2,487	4.2	12.5
EGU	168,058	68,323	28.7	44.4
Boilers	201,600	13,458	2.7	38.9
Com/ind fuel	23,506	1,573	0.6	8.1
HWC	2,219	1,219[c]	0.3	3
Total	1,407,900	102,813	56.4	350

Table 3 shows a comparison of the total mass emissions from combustion sources for the five pollutants based on the TRI and NEI databases. This gives one an idea of some of the challenges in trying to make this kind of a comparison. For example, PM is not tracked by TRI and D/F is not tracked by NEI. For the three pollutants tracked by both databases, the differences vary from a 50% different for HCl to an 18 fold difference for SVMs. The last line is included to show the relative size of the emissions from HWCs.

Table 3. A comparison of the total emissions from combustion sources between the NEI and TRI databases.

Source	PM (t/yr)	HCl (t/yr)	Hg (t/yr)	SVM (t/yr)	D/F (g TEQ/yr)
TRI Total		53,985	3.3	19.2	184.3
NEI totals	1,407,900	102,813	55.2	350	
HWC	2,219	1,219[c]	0.3	3	0.7

While it is obvious that there are several inconsistencies in the data used, it can easily be concluded that emissions from HWCs are quite small when compared to other combustion point sources.

References

Cement kilns (CK) – “Summary of Environmental and Cost Impacts for Final Portland Cement NESHAP and NSPS August 6, 2010,” Docket ID No. EPA-HQ-OAR-2007-0877-0113.

Hospital/medical/infectious waste incinerators (HMIWI) – “Baseline Emissions and Emissions Reductions for Existing and New HMIWI.” Docket ID No. EPA-HQ-OAR-2006-0534-0322.

Sewage sludge incinerators (SSI) – March 21, 2011, final rule (76 FR 15,372), Table 9 (76 FR 15,393) and Table 12 (76 FR 15,398).

Electricity generation units (EGUs) – "BCa Executive Summary Interagency Comments Under EO 13563 December 15, 2011 EPA Response," Docket ID No. EPA-HQ-OAR-2009-0234-20090.

Boilers – "Revised (August 2012) Methodology for Estimating Cost and Emissions Impacts for Industrial, Commercial, Institutional Boilers and Process Heaters National Emission Standards for Hazardous Air Pollutants - Major Source; Corrected SO2 Emission Reductions, Appendix B-3." Docket ID No. EPA-HQ-OAR-2002-0058-3879.

Commercial and industrial solid waste incinerators (CISWI) – "Final Reconsideration Baseline Emissions and Emissions Reductions Estimates for Existing CISWI Units." Docket ID No. EPA-HQ-OAR-2003-0119-2660.

Large and small municipal waste combustion (MWC) units – "Emissions from Large and Small MWC Units at MACT Compliance." Docket ID No. EPA-HQ-OAR-2005-0117-0164.

Hazardous waste combustors (HWC) – Table 3.2 of the Technical Support Document for the 2005 permanent replacement rule, Volume 5, page 3-12.