RTI INTERNATIONAL | Memorandum

Date: October 24, 2008

Subject: Comparison of Regulatory Limits with Emissions Test Data
EPA Contract No. EP-D-06-118; Work Assignment No. 2-03; SPPD No. 02/30
RTI Project No. 0210426.002.003

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I. Background

Sections 111 and 129 of the Clean Air Act (CAA), as amended November 1990, require the U.S. Environmental Protection Agency (EPA) to develop new source performance standards (NSPS) and emission guidelines limiting emissions of nine air pollutants and opacity from hospital/medical/infectious waste incinerators (HMIWI). The nine air pollutants are hydrogen chloride (HCl), carbon monoxide (CO), lead (Pb), cadmium (Cd), mercury (Hg), particulate matter (PM), dioxins/furans (CDD/CDF), nitrogen oxides (NO_X), and sulfur dioxide (SO_2).

The NSPS and emission guidelines are based on maximum achievable control technology (MACT). Consequently, as stated in section 129, the emissions standards for new HMIWI subject to the NSPS must be no less stringent than the average emissions limitation achieved in practice by the best-controlled similar unit in the category, and the emissions standards for existing HMIWI subject to the emission guidelines must be no less stringent than the average emissions limitation achieved in practice by the best-performing 12 percent of units in the category. Regulations for the HMIWI category were promulgated on September 15, 1997.

In a decision issued March 2, 1999, the U.S. Court of Appeals for the D.C. Circuit remanded the standards to EPA for a better explanation of how the new and existing source MACT floors were derived from the information in the administrative record.[1] On February 6, 2007, EPA published a proposal that responded to the questions raised in the Court's remand. However, recent Court decisions that impact that proposal, as well as issues raised in the public comments regarding the proposal, necessitate a re-proposal of responses to the questions raised in the Court's remand and a re-development of the HMIWI regulation.

One issue regards the use of regulatory limits included in State regulations and State-issued permits as surrogates for estimated actual emissions limitations achieved. We used regulatory limits in our MACT floor determinations supporting the 1997 rulemaking for

HMIWI.[2] At that time, we believed this information could be expected to reliably reflect levels of performance achieved by HMIWI on a continuous basis. In our 2007 proposed response to the Court's remand, with some adjustments to our methodology, we continued to use some of the regulatory limits to estimate achieved MACT floor emissions limitations. In this memorandum, we are reassessing the regulatory limits based on the emissions test data in the 1997 record.[3] See Tables 1 through 3 at the end of this memorandum for the comparison of these data for small, medium, and large HMIWI.

II. Comparison Results

As shown in Tables 1 through 3, some HMIWI for which emissions data were available in 1997 significantly outperformed their regulatory limits, by more than 90 percent. However, in some cases (especially PM), HMIWI outperformed their limits by only 5 to 30 percent, and in other cases, HMIWI appeared to exceed their limits.

Based on this reassessment, it is not certain that the regulatory limits adequately represented the performance of each HMIWI. Given this uncertainty and our inability to gather additional data for non-operational units (since 98 percent of HMIWI shut down or obtained exemptions since 1997) and given the collection of actual emissions data from the HMIWI remaining in operation, we have decided that the best course of action is to re-propose our response to the remand based on emissions data from the 57 currently operating HMIWI. The data we have in hand for those 57 units are the most reliable data we have obtained that reflect the emissions levels achieved in practice by the best-performing HMIWI.

III. References

1. United States Court of Appeals for the District of Columbia Circuit. 1999. *Sierra Club and Natural Resources Defense Council, Petitioners v. United States Environmental Protection Agency and Carol M. Browner, Administrator, United States Environmental Protection Agency, Respondents*. Argued November 9, 1998. Decided March 2, 1999. No. 97-1686.

2. Memorandum from Suzanne. Shoraka-Blair and Brian Strong, MRI, to Rick Copland, EPA. June 15, 1994. *Determination of the Maximum Achievable Control Technology (MACT) Floor for Existing Medical Waste Incinerators that Incinerate General Medical Waste*.

3. Memorandum from Thomas Holloway, RTI, to Mary Johnson, EPA. January 12, 2007. *Remand Standards--Methodology and Results*. Attachment A.

Table 1. Comparison of Regulatory Limits and Test Data - Small HMIWI

Id#	Facility	City	State	Zip	Size	Charge rate, lb/hr	Control	Regulatory limit	Test data	Percent difference	In top 12%?	Operating in 2007?	Notes
Particulate matter, gr/dscf													
1119	Memorial Hospital & Medical	Cumberland	MD	21502	S	175	2-sec combustion	**0.03**	**0.0583**	**-94%**	Yes	No	Results from test have limited acceptability (1st and 3rd test runs). Different PM limits handwritten in test report (0.1 gr/dscf) and permit (0.03 gr/dscf). PM limit is at 12% CO_2, so entered test results at 12% CO_2 for direct comparison. (Test results are 0.04375 gr/dscf at 7% O_2.)
1891.1	Weeks Memorial Hospital	Lancaster	NH	03584	S	147.5	2-sec combustion	0.3	0.0058	98%	Yes	Yes	Regulatory limit is State regulation.

Notes:
1. Regulatory limits are permit limits, except where otherwise specified in Notes.
2. Bolded values indicate that test results exceed regulatory limit.

Source:
Memorandum from Thomas Holloway, RTI, to Mary Johnson, EPA. January 12, 2007. Remand Standards--Methodology and Results. Attachment A.

Table 2. Comparison of Regulatory Limits and Test Data - Medium HMIWI

Id#	Facility	City	State	Zip	Size	Charge rate, lb/hr	Control	Regulatory limit	Test data	Percent difference	In top 12%?	Operating in 2007?	Notes
Hydrogen chloride, ppm													
130	Norwalk Hospital	Norwalk	CT	06856	M	385	2-sec combustion, VS/PB (high-eff)	312	3.04	99%	Yes	No	
2432	Memorial City Medical Center	Houston	TX	77024	M	300	1-sec combustion, WS (low-eff)	31	3.61	88%	Yes	No	
Lead, ug/dscm													
130	Norwalk Hospital	Norwalk	CT	06856	M	385	2-sec combustion, VS/PB (high-eff)	**287**	**826**	**-188%**	Yes	No	Based on compliance test report, facility appeared to exceed its permit limit for Pb. Test conducted after permit (Jul 1993 vs May 1992). Conversion of Pb limit to ug/dscm assumes 3.16 dscfm/(lb/hr) and 14% O_2 in exhaust.
Particulate matter, gr/dscf													
130	Norwalk Hospital	Norwalk	CT	06856	M	385	2-sec combustion, VS/PB (high-eff)	0.015	0.005	67%	Yes	No	
310.1	V.A. Center Palm Beach	West Palm Beach	FL		M	500	1-sec combustion, WS (high-eff)	0.1	0.005	95%	Yes	No	Regulatory limit is State regulation.
1012	Massachusetts General Hospital	Boston	MA	02114	M	500	1-sec combustion, VS/PB (high-eff)	0.1	0.004	96%	Yes	No	Regulatory limit is State regulation.
1730	Cape Fear Memorial Hospital	Wilmington	NC	28403	M	385	1-sec combustion	**0.148**	**0.157**	**-6%**	No	No	Test results based on EPA-sponsored test, not compliance test. Test conducted prior to permit (Aug 1990 vs Sep 1990), and test average includes results from 3 test conditions. Conversion of PM limit to gr/dscf assumes 3.16 dscfm/(lb/hr) and 14% O_2 in exhaust.
2432	Memorial City Medical Center	Houston	TX	77024	M	300	1-sec combustion, WS (low-eff)	0.04	0.038	5%	Yes	No	
Sulfur dioxide, ppm													
1730	Cape Fear Memorial Hospital	Wilmington	NC	28403	M	385	1-sec combustion	1,241	23.1	98%	Yes	No	

Notes:
1. Regulatory limits are permit limits, except where otherwise specified in Notes.
2. Bolded values indicate that test results exceed regulatory limit.
3. Calculations:

Norwalk Hospital
Pb
6.53E-04 lb/hr limit
287 ug/dscm conv.

Cape Fear Memorial
PM
0.77 lb/hr limit
0.148 gr/dscf conv.

Source:
Memorandum from Thomas Holloway, RTI, to Mary Johnson, EPA. January 12, 2007. Remand Standards--Methodology and Results. Attachment A.

Table 3. Comparison of Regulatory Limits and Test Data - Large HMIWI

Id#	Facility	City	State	Zip	Size	Charge rate, lb/hr	Control	Regulatory limit	Test data	Percent difference	In top 12%?	Operating in 2007?	Notes
Hydrogen chloride, ppm													
161	Bayfront Medical Center	St. Petersburg	FL	33701	L	1,251	2-sec combustion, WS (high-eff)	71	1.08	98%	Yes	Yes	
168	Boca Raton Community Hospital	Boca Raton	FL	33486	L	730	1-sec combustion, WS (mod-eff)	610	0.765	99.9%	Yes	Yes	
225	John F. Kennedy Memorial Hospital	Atlantis	FL	33462	L	810	1-sec combustion, WS (high-eff)	549	1.21	99.8%	Yes	No	
243	Mercy Hospital	Miami	FL	33133	L	900	1-sec combustion, WS (mod-eff)	495	0.5	99.9%	Yes	Yes	
294	St. Vincent's Medical Ctr	Jacksonville	FL	32204	L	765	1-sec combustion, WS (mod-eff)	582	3.6	99%	Yes	Yes	
968	Boston University Medical Center	Boston	MA	02118	L	1,000	2-sec combustion, DIFF/PB	78	1.03	99%	Yes	No	
1595	The Mayo Clinic	Rochester	MN	55901	L	1,910	1-sec combustion, DIFF w/ carbon	310	101	67%	No	No	
1925	Morristown Memorial Hospital	Morristown	NJ	07962	L	800	2-sec combustion, SDFF	98	16	84%	Yes	No	
1937	Rahway Hospital	Rahway	NJ	07065	L	600	1-sec combustion, WS (high-eff)	56	0.8	99%	Yes	No	
1997	BFI Medical Waste Systems (Bronx)	New York City	NY	10457	L	2,000	1-sec combustion, DIFF w/ carbon	310	0.12	99.96%	Yes	No	Regulatory limit is State regulation.
1998	BFI Medical Waste Systems (Bronx)	New York City	NY	10457	L	2,000	1-sec combustion, DIFF w/ carbon	310	0.09	99.97%	Yes	No	Regulatory limit is State regulation.
2011	Rochester General Hospital	Rochester	NY	14621	L	1,000	1-sec combustion, DIFF w/ carbon	310	5	98%	Yes	No	Regulatory limit is State regulation.
2013	SUNY-Stony Brook	Stony Brook	NY	11794	L	750	1-sec combustion, WS (high-eff)	310	1.75	99%	Yes	No	Regulatory limit is State regulation.
2262	Hamot Medical Center	Erie	PA	16550	L	1,060	2-sec combustion, DIFF/VS	128	8.85	93%	Yes	Yes	
2462	University of Texas Medical Branch Hospitals	Galveston	TX	77555	L	1,500	1-sec combustion, WS (mod-eff)	297	1.49	99%	Yes	Yes	Regulatory limit is State regulation.
2609	Waste Management of North Amer	Germantown	WI	53022	L	3,200	2-sec combustion, DIFF	139	11.6	92%	Yes	No	
Carbon monoxide													
1925	Morristown Memorial Hospital	Morristown	NJ	07962	L	800	2-sec combustion, SDFF	100	11.7	88%	Yes	No	
1997	BFI Medical Waste Systems (Bronx)	New York City	NY	10457	L	2,000	1-sec combustion, DIFF w/ carbon	150	5.45	96%	Yes	No	Regulatory limit is State regulation.
1998	BFI Medical Waste Systems (Bronx)	New York City	NY	10457	L	2,000	1-sec combustion, DIFF w/ carbon	150	2.26	98%	Yes	No	Regulatory limit is State regulation.
Lead, ug/dscm													
1925	Morristown Memorial Hospital	Morristown	NJ	07962	L	800	2-sec combustion, SDFF	486	4.1	99%	Yes	No	
1937	Rahway Hospital	Rahway	NJ	07065	L	600	1-sec combustion, WS (high-eff)	605	74	88%	Yes	No	
Cadmium, ug/dscm													
1925	Morristown Memorial Hospital	Morristown	NJ	07962	L	800	2-sec combustion, SDFF	57	1.3	98%	Yes	No	
1937	Rahway Hospital	Rahway	NJ	07065	L	600	1-sec combustion, WS (high-eff)	**0.36**	**17**	**-4653%**	Yes	No	Based on compliance test report, facility appeared to exceed its permit limit for Cd. However, permit is undated. Conversion of Cd limit to ug/dscm assumes 3.16 dscfm/(lb/hr) and 14% O_2 in exhaust.
Mercury, ug/dscm													
1595	The Mayo Clinic	Rochester	MN	55901	L	1,910	1-sec combustion, DIFF w/ carbon	150	12	92%	Yes	No	
1925	Morristown Memorial Hospital	Morristown	NJ	07962	L	800	2-sec combustion, SDFF	1331	284	79%	Yes	No	

Table 3. Comparison of Regulatory Limits and Test Data - Large HMIWI

Id#	Facility	City	State	Zip	Size	Charge rate, lb/hr	Control	Regulatory limit	Test data	Percent difference	In top 12%?	Operating in 2007?	Notes
1937	Rahway Hospital	Rahway	NJ	07065	L	600	1-sec combustion, WS (high-eff)	**0.30**	**62**	**-20284%**	Yes	No	Based on compliance test report, facility appeared to exceed its permit limit for Hg. However, permit is undated. Conversion of Hg limit to ug/dscm assumes 3.16 dscfm/(lb/hr) and 14% O_2 in exhaust.
Particulate matter, gr/dscf													
141	Veterans Administration Hospital	West Haven	CT	06516	L	3,000	2-sec combustion, VS/PB (high-eff)	0.015	0.005	67%	Yes	No	
161	Bayfront Medical Center	St. Petersburg	FL	33701	L	1,251	2-sec combustion, WS (high-eff)	0.03	0.005	83%	Yes	Yes	
168	Boca Raton Community Hospital	Boca Raton	FL	33486	L	730	1-sec combustion, WS (mod-eff)	0.03	0.018	40%	Yes	Yes	
225	John F. Kennedy Memorial Hospital	Atlantis	FL	33462	L	810	1-sec combustion, WS (high-eff)	0.03	0.013	57%	Yes	No	
243	Mercy Hospital	Miami	FL	33133	L	900	1-sec combustion, WS (mod-eff)	0.03	0.012	60%	Yes	Yes	
294	St. Vincent's Medical Ctr	Jacksonville	FL	32204	L	765	1-sec combustion, WS (mod-eff)	0.03	0.011	63%	Yes	Yes	
311	V.A. Med. Ctr-Miami	Miami	FL	33125	L	1,750	1-sec combustion, VS/PB (mod-eff)	0.03	0.014	53%	Yes	No	
968	Boston University Medical Center	Boston	MA	02118	L	1,000	2-sec combustion, DIFF/PB	0.015	0.0102	32%	Yes	No	
1240	Borgess Medical Center	Kalamazoo	MI	49001	L	680	2-sec combustion, DIFF	0.11	0.0025	98%	Yes	No	Regulatory limit is State regulation.
1471	University of Michigan Hospitals	Ann Arbor	MI	48109	L	1,500	2-sec combustion, VS/PB (low-eff)	0.11	0.0463	58%	No	No	Regulatory limit is State regulation.
1925	Morristown Memorial Hospital	Morristown	NJ	07962	L	800	2-sec combustion, SDFF	0.015	0.00245	84%	Yes	No	
1937	Rahway Hospital	Rahway	NJ	07065	L	600	1-sec combustion, WS (high-eff)	0.015	0.005	67%	Yes	No	
1997	BFI Medical Waste Systems (Bronx)	New York City	NY	10457	L	2,000	1-sec combustion, DIFF w/ carbon	0.015	0.000588	96%	Yes	No	Regulatory limit is State regulation.
1998	BFI Medical Waste Systems (Bronx)	New York City	NY	10457	L	2,000	1-sec combustion, DIFF w/ carbon	0.015	0.000716	95%	Yes	No	Regulatory limit is State regulation.
2011	Rochester General Hospital	Rochester	NY	14621	L	1,000	1-sec combustion, DIFF w/ carbon	0.03	0.001	97%	Yes	No	Regulatory limit is State regulation.
2013	SUNY-Stony Brook	Stony Brook	NY	11794	L	750	1-sec combustion, WS (high-eff)	0.03	0.011	63%	Yes	No	Regulatory limit is State regulation.
2262	Hamot Medical Center	Erie	PA	16550	L	1,060	2-sec combustion, DIFF/VS	0.029	0.0034	88%	Yes	Yes	
2609	Waste Management of North Amer	Germantown	WI	53022	L	3,200	2-sec combustion, DIFF	0.015	0.004	73%	Yes	No	
Dioxins/furans, total, ng/dscm													
1595	The Mayo Clinic	Rochester	MN	55901	L	1,910	1-sec combustion, DIFF w/ carbon	100	0.5	99.5%	Yes	No	
1925	Morristown Memorial Hospital	Morristown	NJ	07962	L	800	2-sec combustion, SDFF	16,709	3.3	99.98%	Yes	No	
1937	Rahway Hospital	Rahway	NJ	07065	L	600	1-sec combustion, WS (high-eff)	486	110.8	77%	No	No	
Dioxins/furans, TEQ, ng/dscm													
1595	The Mayo Clinic	Rochester	MN	55901	L	1,910	1-sec combustion, DIFF w/ carbon	2	0.02	99%	Yes	No	
1925	Morristown Memorial Hospital	Morristown	NJ	07962	L	800	2-sec combustion, SDFF	398	0.058	99.99%	Yes	No	
1937	Rahway Hospital	Rahway	NJ	07065	L	600	1-sec combustion, WS (high-eff)	12	2.06	82%	No	No	
Nitrogen oxides, ppm													
1925	Morristown Memorial Hospital	Morristown	NJ	07962	L	800	2-sec combustion, SDFF	684	83.8	88%	Yes	No	

Table 3. Comparison of Regulatory Limits and Test Data - Large HMIWI

Id#	Facility	City	State	Zip	Size	Charge rate, lb/hr	Control	Regulatory limit	Test data	Percent difference	In top 12%?	Operating in 2007?	Notes
Sulfur dioxide, ppm													
1925	Morristown Memorial Hospital	Morristown	NJ	07962	L	800	2-sec combustion, SDFF	98	6.55	93%	Yes	No	

Notes:
1. Regulatory limits are permit limits, except where otherwise specified in Notes.
2. TEQ limits estimated by multiplying total CDD/CDF limits by ratio of TEQ to total CDD/CDF (1/42) using methodology described in 6/15/94 MACT floor memo (II-B-97).
3. Bolded values indicate that test results exceed regulatory limit.
4. Calculations:

Rahway Hospital
Cd
1.27E-06 lb/hr
0.36 ug/dscm

Hg
1.08E-06 lb/hr
0.30 ug/dscm

Source:
Memorandum from Thomas Holloway, RTI, to Mary Johnson, EPA. January 12, 2007.
Remand Standards--Methodology and Results. Attachment A.