

COMPLIANCE WITH THE NEW EMISSIONS GUIDELINES FOR EXISTING MUNICIPAL WASTE COMBUSTION FACILITIES

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Discussion by

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The authors have done a yeoman's job of making the guidelines generally understandable. Their paper provides an interested reader with a good overview and understanding so that wading through the entire regulation becomes much more meaningful.

There are a number of hypotheses repeated in this paper that may or may not be true and the authors are asked to comment on the basis for their belief that the following statements are meaningful:

1. "at low temperatures, dioxins and furans are sorbed onto particulate matter"—Since the available data I am aware of show that dioxin concentrations are well below saturation, why is this likely to be true?
2. "Recent test data supports the fact that emissions guidelines can be met with existing technology"—The data for the referenced facilities show considerable variability. When that is considered, are the dioxin emission limitations still routinely achievable?
3. "Cadmium and lead compounds also have a strong affinity to adsorb onto particulate matter"—My understanding is that this is a chemisorption phenomenon and may not be either absorption or adsorption. If we can identify the mechanism, then meaningful design decisions can be made. If the mechanism is misidentified, even phenomenologically, then we have no assurance that the money spent on any particular intervention will be effective.

4. "At lower temperatures mercury will be sorbed onto particulate matter and collected as fly ash" and "have vapor pressures of approximately 4 mm mercury"—So what? 4 mm of mercury is approximately 5,260 mg/dsm³ @ 7% O₂ and uncontrolled mercury concentrations (elemental, chloride, oxide and all the others) are reported at around 0.20 to 1.4 mg/dsm³ @ 7% O₂. This means that the system is no where near saturation and any removal phenomena are not really associated with the vapor pressure. At what temperature, for example, does saturation become an important factor in the removal of Section 129 metals (Hg, Pb and Cd)?

5. Are the EPA's cost estimates any good? What is Burns & McDonnell's experience?

6. "Meeting the limits of the emission guidelines for sulfur dioxide and hydrogen chloride will typically require a spray dryer"—While probably true for large plants, why is this true for small plants? Greater than 50 percent removal of SO₂ and HCl are routinely demonstrated at dry injection facilities. Also, "European Flakt" type systems that employ spray humidification followed by dry sorbent injection and fabric filters have set some of the lowest emissions ever measured in North America; specifically Burnaby, Peel and Quebec City.

7. The Bartok reference for NO_x control assumes fossil fuel fired boilers. Since MWCs are much smaller, but the NO_x control equipment is set by commercial considerations like tank-truck delivery of reagent and practical compressor sizes, why is this estimate any good for guideline affected facilities?

8. "Implementation of these regulations will result in relatively uniform emission standards for all MWCs" —So what? I have reviewed the actual emissions of most of the MWCs in the United States. There are differences associated with whether or not they have advanced acid gas control systems or not and whether or not they have state and federally mandated high temperature ESPs (high dioxin emissions), but otherwise they are already pretty uniform within chronological blocks. While this will cause a few bad-actors to clean-up, will there really be anything environmentally beneficial (considering sinking of sunk capital and secondary contaminant emissions from suppliers) or necessarily more uniform about the result?

The authors are to be commended for sticking their necks out. The summary is very useful and the questions raised are to promote continued discourse among qualified professionals.

AUTHORS' REPLY

1. The writer is not familiar enough with dioxin formation and behavior to provide any meaningful analysis of the data. The hypotheses is merely a reflection of existing data and explanations for the data based on the literature.

2. Same response as Number 1.

3. Again, the hypotheses is merely reflection of existing data on cadmium and lead emissions and explanation based on the literature. The statement is an oversimplification of the chemisorption phenomena.

4. The statement is based on the premise that vapor pressure of a compound is a good indicator of how much of a compound is emitted as vapor in the combustion process. The writer agrees that this premise is not sound since concentrations are not anywhere close to saturation. The writer has no data to indicate what temperature saturation becomes an important factor.

5. We believe that EPA's cost estimate reported in the Emission Guidelines are "reasonably accurate", generally on the low side, with the exception of the "good combustion practices" and modifications required to meet carbon monoxide. Costs

associated with good combustion practice are highly site-specific and any attempt to provide an across-the-board estimate is futile.

6. Uncontrolled emissions of acid gases will typically exceed the regulatory limits for small and large facilities. The statement should have read: "Meeting the limits of the emission guidelines for sulfur dioxide and hydrogen chloride will typically require some reduction below uncontrolled baseline levels. A spray dryer can be used to meet these limits. Some facilities have been able to meet the limit with spray humidification followed by carbon injection."

7. Obviously, a reference that provided cost estimates at municipal waste combustion plants would have been preferred, but the writer could not identify such a reference at the time of publication. The NO_x control technology reference is for the same technology most likely to [be applied] at municipal waste combustion facilities, namely SCR. SCR is an end-of-pipe technology and should, therefore, be influenced by the emission rates not whether emissions are from a power plant boiler or municipal waste combustor. Cost estimates in the reference are based on a \$/kw. The assumption that costs will be comparable for municipal waste combustor and will be proportional to the power generated is an oversimplification but still provides a reasonable "ball-park" estimate.

8. The writer was not trying to comment on the benefits or cost-effectiveness of the Emission Guidelines. The statement is merely an explanation of what the "Emission Guidelines" accomplish in terms of the emission limits that facilities will be required to meet.

Discussion by

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It is a difficult task to take a volume of regulatory rhetoric entitled 40CFR Subpart Cb and all its references, and reduce it to 133

column inches of intelligent analysis. The authors' approach is a tribute to the organized mind of the professional engineer.

I read with particular interest the review of the section entitled "Good Combustion Practices". As the authors' emphasize, the capital cost for most small plants and perhaps all of the newly reclassified large plants will indeed be significantly higher than EPA estimates. Some combustion systems will not only require major changes, many will need to be redesigned to meet the requirements of Cb.

This paper provides management with a valuable tool. It can and will be used to communicate the stringent requirements of Subpart Cb to all levels of our organizations.

AUTHORS' REPLY

No response.

Discussion by

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The authors are to be commended for their excellent summary of the retrofit requirements mandated by Section 129 of the Clean Air Act Amendments of 1990. The US Environmental Protection Agency took an inordinate amount of time in promulgating the regulations required to implement Section 129 and finally did so under court order. Those of us that have participated since 1984 in the development of these regulations are pleased that the ordeal is over and are grateful in transferring the implementation of retrofits to the engineers, constructors, and permit writers.

While the paper digests the many pages of the regulation very well, I would like to make a few clarifying points.

The abstract indicates that "...major modifications EPA based the guidelines on..." would be SDA's etc. The guidelines were based on the "emission limitations" (read permit conditions) of the best performing 12% of the units in the category, ratcheted down from this MACT "floor" based on what retrofitted air pollution control equipment could

achieve. Had EPA based the guidelines on "modifications" that had been accomplished, the numbers would have been quite different. The rescinded subpart Ca was based on "modifications".

The introduction states that Federal standards in existence prior to 1990 only limited particulate emissions. While this is true, there were two major Federal policy guidance documents published in 1987 that established emission control requirements for MWC's.

In the "Sources Affected" section the authors state that the CAA "required EPA to promulgate regulations for units larger than 250..." the CAA required EPA to promulgate regulations for small units on a different schedule than for large units, but the mandate is moot as EPA was late for all categories. The <250 TPD/>250 TPD issue is for timing only. This issue (<250/<250 TPD Units) has been challenged by the owners of the Davis County, Utah facility and others will be resolved by the courts.

Under "Mercury" the authors indicated that mercury can be controlled by "cooling the flue gas entering the particulate control device". Data indicates that cooling alone from 4 to 600 F to 250 to 350 F does not increase Hg capture. Carbon must be present either as high carbon fly ash or injected.

The last point is one of caution. Owners/Operator of MWC's subject to the emission guidelines should not rely on a summary of the regulations to determine their future. Rather, they should carefully study the rule and all of its background documents prior to making any retrofit decisions. Do not rely on EPA's economics. They are low averages and are good only for press release purposes.

AUTHORS' REPLY

The writers agree with the comments.