601 Wythe Street
Alexandria, VA 22314

November 29, 2010

Attention: Docket ID No.EPA-HQ-OAR-2009-0559
EPA Docket Center
Environmental Protection Agency
Mailcode: 6012T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: WEF Comments on the Proposed Rule on Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units, Docket ID No. EPA–HQ–OAR–2009–0559 (Federal Register / Vol. 75, No. 198 / Thursday, October 14, 2010 / Proposed Rules, pages 63260-63344)

Sent electronically to a-and-r-Docket@epa.gov Attention: Docket ID No.EPA-HQ-OAR-2009-0559

Dear Sir or Madam,

The Water Environment Federation (WEF) respectfully submits comments on the proposed rule for Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units. Formed in 1928, WEF is a not-for-profit technical and educational organization with 36,000 individual members and 75 affiliated Member Associations who support its mission to preserve and enhance the global water environment. WEF is supportive of regulations that are science based, achievable, and protective of human health and the environment.

These comments were developed by an expert Work Group composed of WEF members from a variety of disciplines and working in all aspects of wastewater and solids management. These comments represent the consensus views of Work Group members and are provided to assist US EPA staff as they sort through the complex technical issues associated with this rulemaking. Work Group members are ready to provide additional information and assistance to US EPA staff as they work to finalize this rule under a very tight court-imposed deadline.

Wastewater solids contain important recyclable resources, including, nutrients, organic matter, and potential energy. WEF advocates for sound management of wastewater solids in full compliance with all applicable regulations and utilizing best practices. Further, WEF believes solids management options including end use/disposal should be determined based on the needs and priorities of the local community. WEF endorses the beneficial recycling of biosolids. Decades of scientific research have clearly established the value and environmental benefits of recycling biosolids, when properly treated and managed. Although beneficial use of wastewater solids has focused for many years on using biosolids to improve soils, there is an increasing recognition of the possibilities for recovering the energy

value in these materials and the potential to recover that energy. WEF encourages Federal and state regulations that promote the use of biosolids as a renewable energy source.

Summary of Comments and Recommendations

1. **Proposed Rule does not Promote Resource Recovery from Wastewater Solids.** The proposed ruling does not promote the recovery of the energy resource inherent in wastewater solids.
2. **Current Analysis Mercury Emissions are Overestimated.** EPA has overestimated the mercury emissions from incinerators and has ignored the impact of future dental amalgam regulations that will further reduce mercury concentrations in wastewater solids.
3. **EPA's Control Methods and Economic Analyses Are Erroneous.** EPA has significantly underestimated the control methods and costs for mercury control and the cost-benefit analysis should be revisited.
4. **MACT Floor Determination is Erroneous.** The proposal does not reflect the variability of wastewater solids composition; EPA has not collected and analyzed enough data to properly develop achievable standards.
5. **Emission Regulations and Testing is Burdensome.** EPA has not taken into account the normal variations in feed quality and quantity to develop achievable regulations. All EPA data was collected at "steady state" conditions and there is no data for periods of startup, shutdown, malfunction, or feed rate change. EPA needs to collect more data before promulgating proposed regulation.
6. **The Proposed Criteria for New Sewage Sludge Incinerators Do Not Meet the Intent of the MACT Standards as the Criteria Are Unachievable.** EPA has not collected enough data to develop achievable regulations. Many proposed parameters are based on a single test. This does not allow for the variability in sludge constituents or normal operating changes. WEF is concerned that not a single existing incinerator can meet the proposed regulations on a continuous basis and that the proposed regulations for new units are so restrictive that they will effectively end incineration as a future biosolids management alternative.
7. **Greater Clarity of Sector Operations is Needed.** EPA has asked for opinion on over 24 items in this proposed ruling suggesting they are not ready to finalize this regulation. WEF is concerned that premature regulations will become a burden for the sector as occurred for medical and hazardous waste incinerators.
8. **Proposed Regulations are Most Restrictive in the World and Would Effectively Eliminate Incineration as an Option for the Wastewater Sector.** The proposed rules are the most restrictive in the world, for example as compared to European and Canadian limits. WEF is concerned that the limits are so restrictive that manufacturers will not guarantee performance and this will effectively end incineration as a future biosolids management alternative. Not even the units considered to have the most advanced emission control equipment would be able to comply with the proposed regulation. Incinerator vendors may not guarantee the proposed emissions during all operating conditions, and therefore, incineration may effectively be removed as a wastewater solids management option.

Our detailed c**omments are as follows:**

1. **Proposed Rule Limits Resource Recovery from Biosolids Management Practices**

   WEF requests that EPA take the following items into consideration:

Intent of Regulations

WEF acknowledges that the intent of this regulation is just to further regulate sewage sludge incinerator (SSI) units. WEF is concerned with the unintended consequences that the Solid Waste ruling may have on other biosolids management practice**s**. WEF encourages EPA to confirm in the final rule that the proposed ruling is not intended to impact other biosolids management practices.

Landfilling

The proposed regulation could be perceived as promoting landfilling as a solids management practice over other effective and responsible biosolids management practices such as land application or Class A products.

- WEF requests that EPA confirm that the "haul to landfill" option was only used as an example, and that wastewater plants need to select the solids management practice most effective for their local conditions.
- WEF requests that EPA include both fugitive and captured landfill gas emissions in its comparison emission calculations. The effect on greenhouse gas (GHG) emissions should not be ignored.
- WEF is concerned that EPA has overestimated the availability of landfills near large urban areas where incineration is more prominent. Dewatered solids can reduce the slope stability, and many landfills have capacity restrictions on the quantity of wastewater solids they will accept.
- WEF is concerned that EPA has not taken into account the cost for stabilization and on-site storage of dewatered solids. Many landfills require stabilization that will require the addition of digestion, thermal drying, or lime stabilization that will greatly affect the capital and operating costs.

Energy Value of Wastewater Solids

EPA appears to ignore the energy value of wastewater solids. Approximately 17 percent of the 7 million dry tons of wastewater solids produced in the United States each year are incinerated, which could generate a net energy of approximately 360 kWh per dry ton of wastewater solids or 2,900 GWh. This represents a significant renewable energy source that the EPA should be encouraging and promoting.

Other Combustion Processes

There are other emerging technologies that focus on beneficial reuse of wastewater solids for energy production and recovery.

- Several energy producing processes such as gasification, pyrolysis, boilers, and fluid bed combustors may be affected by the proposed regulation. WEF requests that EPA clarify the impact on these technologies.
- The proposed regulations also do not address energy recovery options from heat dried Class A biosolids. Class A biosolids should be classified as a legitimate, renewable, biogenic fuel that can be beneficially reused to reduce carbon footprint and dependence on fossil fuels. Heat dried biosolids can be beneficially reused directly at the waste water plant to produce heat or electricity or by third party users such as power plants and cement

kilns. WEF requests clarification on how the regulation will impact the use of dried biosolids as a fuel source.

Redundant Regulations

Sewage Sludge Incinerators (SSI) are already regulated under 40 CFR 503. The new regulation is therefore redundant, and could cause confusion in the sector. The 503 regulations use total hydrocarbons (THC) or carbon monoxide (CO) as a surrogate for complete combustion. The proposed regulations would require both THC and CO continuous emission monitors for most existing multiple hearth SSIs. WEF requests that EPA resolve these conflicts before promulgation, not after, as is proposed.

Subcategorization

WEF agrees with EPA's approach of separate categories for multiple hearth and fluid bed incineration units for a technology based regulation.

Recommendation

WEF recommends EPA take into consideration how the proposed ruling limits the likelihood that energy and other resources will be recovered from wastewater solids.

2. Current Analysis Mercury Emissions are Overestimated

Sources of Mercury in Wastewater

Five studies between 2002 and 2007 found that between 11 and 50 percent of mercury entering POTWs was contributed by dental offices. Therefore, dental amalgams[1] are a significant source of mercury in POTWs. According to the Northeast Waste Management Officials' Association (NEWMOA), the sale of mercury in dental amalgams has reduced drastically (a 46% reduction)[2] from 2001 to 2007. In addition, the EPA is initiating an effluent guideline rulemaking[3] for dental facilities to reduce discharges of mercury to the environment. EPA expects to propose a rule in 2011 and finalize in 2012. This rule would substantially affect the beyond-the-floor (BTF) MACT calculus in determining the cost-benefit analysis for mercury controls on SSIs. Based on an EPA report from August 2008, "*Health Services Industry Detailed Study: Dental Amalgam*[4]", mandatory installation of amalgam separators would reduce the quantity of mercury entering POTWs by 93%. Since at least 90% of the influent mercury is captured in the wastewater treatment process and a significant portion of this is transferred into the biosolids, this measure should also reduce mercury emissions from SSIs by 93% without the addition of BTF MACT controls for mercury.

Based on the above information, it is apparent that the usage of mercury dental amalgams is declining dramatically and other regulatory programs are already underway that will significantly reduce the mercury emissions from SSIs. We disagree with the mercury BTF MACT limit analysis and believe it is will overestimate the level of mercury reductions achievable by additional air pollution control measures on SSIs by failing to recognize certain key developments in the area of mercury reductions from dental amalgams.

[1] http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/upload/2008_09_08_guide_304m_2008_hsi-dental-200809.pdf

[2] http://www.newmoa.org/prevention/mercury/imerc/factsheets/dental_amalgam.cfm

[3] http://water.epa.gov/scitech/wastetech/guide/dental/index.cfm

[4] http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/upload/2008_09_08_guide_304m_2008_hsi-dental-200809.pdf

Estimate of Mercury Emissions from SSIs

In the federal register, EPA states "We estimate that this source category is currently the sixth highest Hg emitting source category in the United States, emitting about 3.1 TPY of Hg (or about 3 percent of the total Hg emissions from anthropogenic sources in the United States)." However, based on EPA report from August 2008, "*Health Services Industry Detailed Study: Dental Amalgam*" [1], EPA estimates that a total of 4.5 TPY of mercury is contained within the liquid influent stream entering POTWs. Utilizing the 90% removal rate indicated in the report, a total of 4.05 TPY of mercury should be present in municipal wastewater solids. However, based on the fact that less than 50% of the wastewater solids produced in the US are incinerated in SSIs, the actual value of mercury being fed to SSIs (uncontrolled emissions) should be estimated to be no more than 2.02 TPY. In addition, over 70% of the existing incinerators have at least a venturi scrubber and impingement tray scrubber which are at least 80% efficient at reducing the particulate bound and ionized mercury. By accounting for the existing control technologies on the existing SSIs, a conservative (high) estimate of mercury emissions from SSIs should be no more than1.3 TPY. This value is 58% lower than EPA's estimated 3.1 TPY of mercury which also seems to be an overestimate given that the 2005 National Emissions Inventory Data compiled by EPA (latest values currently available) indicate that the total mercury emissions nationwide for existing SSIs (SCC IDs 50100515 to 520) are 0.067 TPY.

The gross overestimate of the level of mercury emissions from existing SSIs skews the BTF MACT cost-benefit analysis towards emission reduction benefits that will not be realized because the emissions do not currently exist. A more reasonable estimate of the mercury emissions reduction (if any) due to the implementation of the costly beyond the floor mercury MACT limits would indicate that the costs are far greater than the derived benefits. As such, we do not support the BTF mercury MACT limits.

[1] http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/upload/2008_09_08_guide_304m_2008_hsi-dental-200809.pdf

[2] http://www.epa.gov/ttn/chief/net/2005inventory.html

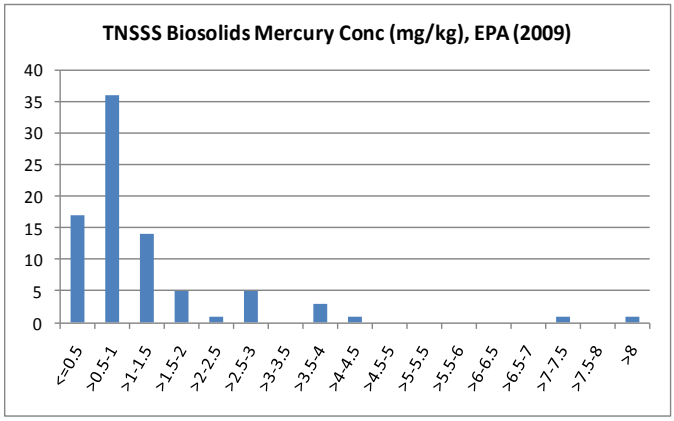
Variability of Mercury Levels in Wastewater Solids

According to the January 2009 EPA report, "*Targeted National Sewage Sludge Survey Statistical Analysis Report*" (TNSSS Report) [1], there is a large variability in the level of mercury in biosolids. This variability exists not only from plant to plant (as indicated in the TNSSS report), but also from day to day. It is generally held that mercury in the incinerator feed materials passes through the incineration process and exits in the flue gases (with very little mercury contained within the ash), so the concentration of mercury in the feed materials has a direct impact on the flue gas mercury concentrations. This is commonly known within the sector and requires that a large number of samples be used to characterize both the level of mercury and the potential variability in the feed stock (which provides the design criteria for the selected air pollution control equipment).

A summary of the mercury data is presented in the table below:

Table 1. Summary of Data from the 2009 TNSSS Report

Number of Samples	84 samples
Minimum Value	0.17 mg/kg
Maximum Value	8.26 mg/kg
Average Value	1.27 mg/kg
Median Value	0.845 mg/kg
Standard Deviation	1.35 mg/kg



Based on the very limited number of samples utilized to generate the proposed MACT and the beyond the floor MACT standards, and the inherent variability in the feed material, it is our opinion that the MACT analyses performed by EPA specifically with respect to mercury concentration limits are incomplete and based on an inadequate number of data points.

It is worth noting that the average mercury concentration in sludge recorded during EPA National Sewage Sludge Survey of 479 POTWs taken in 1988 was 5.22 mg/kg. The average mercury value obtained from the above latest survey is 1.27 mg/kg, one-fourth of the previous average value. These data would tend to give credence to the statement that EPA is not using current mercury sludge data and has over-estimated mercury emissions from SSIs.

Review of Costs for Mercury Controls

There are a number of errors in the data and equations for the beyond the floor MACT costs for mercury. In a review of algorithms utilized in the costing "Model Plant Description and Control Cost Report for HMIWI" (Hospital/Medical/Infectious Waste Incinerators), EPA failed to identify key differences between the processes of incinerating hospital waste and biosolids. A number of the key differences and the implications on the cost model are outlined below:

Table 2. Cost Model Implications on SSI's

Hospital/Medical/Infectious Waste Incinerator	Biosolids Incinerator	Implication
Cost model assumes flue gas is 10% moisture.	Typical SSIs have flue gases that are approximately 30 % to 50% moisture due to the high moisture content in the feed materials.	SSIs operating and capital costs for quenchers will be higher due to high sensible and latent heat. SSI materials of construction may be more expensive (increased use of stainless steel) due to the high flue gas moisture content and probability of acidic flue gas condensation. SSI's may require flue gas reheating prior to fabric filter to prevent bag blinding and premature fouling.
Cost model assumes a generic cost for "dust disposal".	Since SSIs will be utilizing activated carbon injection (ACI), the particulate matter will be contaminated with mercury residues.	Costs for mercury contaminated particulate matter will likely be much higher than predicted in the HMIWI model.
Cost model is based on typical HMIWI operations which should include both fly ash and bottom ash. Therefore, the fabric filter only has to process the fly ash which is a small percentage of the total ash.	FBIs do not have bottom ash. All of the ash residues leave the process as fly ash.	FBIs have very high fly ash loading rates. These are much higher than HMIWI. Although a fabric filter can handle the high ash loading rates, the capital, operating, and maintenance costs must be modified to account for the higher solids throughput per unit of flue gas flow.
HMIWI (>95% of units) typically run in a controlled air (or starved air) mode of operation.	SSIs run with excess air.	Comparisons based on exhaust flow will not be fully transferrable as the levels of excess air and flue gas moisture content will skew the results.

Due to the inappropriate usage of HMIWI cost model and the absence of several major cost factors, the costs for both MACT compliance and BTF MACT compliance are under-estimated and thus skewed the cost-benefit ratio.

Summary of Current Mercury Emissions

It is our opinion that a true cost accounting based on actual mercury control technologies currently in operation (including all ancillaries) should be performed. These revised costs should then be compared to the revised emission reduction levels taking into account a realistic baseline of the current mercury emissions and the new mercury source control measures already underway (in particular, new regulations concerning dental amalgams). Once the costs and benefits are revised, we are confident that the EPA will be in a position to reconsider the BTF MACT emission limits and determine that the benefits do not justify the costs.

With respect to the MACT levels, the mercury variability data presented in the TNSSS report indicate that insufficient emissions data have been collected by EPA to fully characterize the range of mercury emissions from all SSIs in the United States. This is especially true for mercury because the flue gas mercury emission levels are highly dependent on the mercury

concentrations within the SSI feed. Selected emission tests from only a few installations combined with the assumption that wastewater solids are a homogeneous feed material are not a scientifically accurate approach. The usage of the Upper Prediction Limit (UPL) statistical method takes some of this variability in to account for between-test variability but it has failed to fully account for the variability of the mercury concentrations in the biosolids. This shortcoming is primarily due to the fact that each test run was considered to be a distinct data point even though the three tests typically comprise a single compliance test. This approach limits the geographic distribution of the data set to a very small sample even though the TNSSS Report shows high mercury concentration variability from plant to plant. Before the MACT levels are determined, additional emissions data are required or the biosolids mercury variability from the TNSSS report needs to be incorporated into the UPL method to ensure that the MACT levels are fair for all jurisdictions.

Recommendation

WEF recommends that EPA reconsider the cost-benefit analysis for the below the floor control of mercury.

3. EPA's Control Methods and Economic Analyses Are Erroneous

Hospital, Medical, and Infections Waste Incinerators vs. Sewage Sludge Incinerators

EPA used the air pollution control methods and cost algorithms from Hospital, Medical and Infectious Waste Incinerators (HMIWI) to generate cost analyses for the SSI source category. EPA did not realize that the two wastes (HMIW and Sewage Sludge - SS) and the methods used to control emissions from combustion of these wastes are fundamentally different. HMIW has a relatively low moisture content (approximately 10% to 20%), whereas sewage sludge (SS), as fed to a combustion unit, is 70% to 80% water. This means that the flue gas from a SSI has a much higher water vapor content than that form an HMIWI.

The size, configuration, and air pollution control methods of an HMIWI are markedly different than that for an SSI. The Code of Federal Regulations[1] describes some of the basic attributes of an HMIWI: *"A HMIWI typically is a small, dual-chamber incinerator that burns on average about 800 pounds per hour (lb/hr) of waste… HMIWI are typically controlled by wet scrubbers or dry sorbent injection fabric filters (dry scrubbers)*." Whereas, SSIs are of the multiple hearth or fluid bed configuration and burn on average approximately 16,000 wet lbs/hr (2 dry tons/hr). Practically all SSIs have some type of wet scrubbing system (or wet scrubber in combination with wet electrostatic precipitator) to control their emissions. There are only three SSIs in the US that use fabric filters for emission control and they are located at the same treatment plant.

[1] *40 CFR, Part 60, P. 51369, Oct. 6, 2009*

Fabric Filters

EPA assumed that SSIs could achieve improved control of cadmium, lead, and particulate matter (PM) by simply adding a fabric filter. In order to use a fabric filter, the temperature of the incineration flue gas is typically reduced to less than 400°F to prevent burning or damaging the filter media. Unlike HMIWI, which can cool their small flue gas volumes by bringing in ambient air or using water conditioning sprays, a SSI must use a waste heat boiler to reliably cool its flue gas. Waste heat boilers are used on the three SSIs with fabric filters at the St. Paul Metro WWTP. In its economic analysis, EPA did not include the cost of waste heat boilers, condensers, deaerators, boiler feed water pumps, boiler feed water treatment or auxiliary equipment in those cases where a fabric filter was added.

Methods of Controlling Mercury Emissions from SSIs

EPA assumed that activated carbon can simply be injected upstream of the particulate control device on existing MH and FB incinerators to achieve 85% to 95% control of mercury. If the flue gas from a SSI is cooled in a waste heat boiler prior to a fabric filter, then activated carbon injection (ACI) upstream of the fabric filter is an effective means of mercury control. If, however, the carbon is injected into the hot incinerator flue gas without an upstream waste heat boiler, then the carbon will simply burn up. If the carbon is injected downstream of a quencher or in the wet scrubber, then the pores of the activated carbon will be saturated with moisture, rendering it unable to capture mercury.

There are two methods of controlling mercury emissions from SSIs: ACI combined with a fabric filter, and carbon adsorption. Both methods require the flue gas to be conditioned. In the first case, the flue gas must be cooled to about 400°F.

- Activated carbon is then injected into the flue gas stream either dry or as carbon slurry. The flue gas then enters the fabric filter where the carbon and particulate matter in the flue gas form a coating on the bags of the fabric filter. As the flue gas passes through the coating, the mercury in the flue gas is adsorbed on to the carbon. The bags are shaken periodically, and the collected PM and mercury-laden carbon fall into hoppers at the bottom of the fabric filter.
- A carbon adsorber can be used on an SSI with a wet scrubbing system. Since most SSIs have wet scrubbing systems, a carbon adsorber is a simpler and more economical means of adding mercury control to an existing SSI. The control system would consist of a flue gas conditioner followed by a carbon adsorption vessel. The wet saturated flue gas from the scrubber of an SSI would enter the conditioning unit where water droplets in the flue gas would be removed and the flue gas would be heated to 150°F to 180°F. The conditioned flue gas would then enter the carbon adsorption vessel which contains three beds of filter media: a zeolite bed for additional removal of fine particulate and two beds of sulfur impregnated activated carbon with an inert admixture. The mercury is captured as mercuric sulfide and is eventually converted to mercuric sulfate.
- In either case, specialized equipment is required to accomplish mercury removal. EPA's cost estimates for mercury removal do not include the appropriate control methods, and therefore are erroneous.

Beyond-The-Floor MACT Limit for Existing MH Incinerators

EPA concludes that for existing MH incinerators ACI can achieve a BTF MACT limit of 0.02 mg/dscm corrected to 7% O2, and that it is economically justifiable at an estimated cost of $12 million per ton of mercury removed (or $6,000/lb) (40 CFR, Part 60, P. 63276, 63277). Furthermore, EPA calculates that the incremental BTF cost of adding activated carbon injection to all existing MH units would be $5,000,000, and the incremental total annual cost would be $32 million (40 CRF, Part 60, P. 63276 & 63277). As discussed above, EPA did not choose a feasible technology for controlling mercury emissions from existing MH units. Furthermore, activated carbon cannot simply be injected into the wet scrubbing system of existing MH units. If a fabric filter was added to an existing MH, then both a waste heat boiler and an afterburner would be required on the MH. The afterburner would be required to burn out the unburned carbon and soot that exit a typical MH unit. Additionally, the space required for the afterburner, waste heat boiler, and fabric filter would be approximately three times the space of the existing

MH unit. Very few WWTPs have this much available space in or around their sludge incineration facilities. The whole concept of adding afterburners, waste heat boilers, and fabric filters to existing MHs is impractical, and in most cases, physically impossible.

The most reasonable way to add mercury control to the existing MHs is to use a carbon adsorber downstream of the existing wet scrubbing systems. An economic analysis of adding carbon adsorption systems on the existing MHs is presented in Table 3. A budgetary price for the purchased equipment was obtained from a major equipment supplier. The direct installation costs and indirect costs were taken from standard cost estimating procedures. The annual O&M costs were based on the cost factors and algorithms used by EPA in its cost development documents. Based on this analysis, total annual cost to the 163 MH incinerators to meet the BFT mercury limit is $470,740,000, and the cost per ton of mercury removed is $179,673,000/ton (or $90,000/lb). These costs are clearly excessive and not justifiable. This is particularly true when one considers that EPA will be proposing this year new Effluent Guidelines for dental offices, which are expected to remove approximately half of the mercury entering WWTPs, as previously discussed.

Table 3. Compliance Cost for Multiple Hearth Incinerators

Capital Cost		
Equipment	$	5,184,000
Installation	$	7,201,000
Total Capital	$	12,385,000
Annual Costs		
Capital (15 Y @ 7%)	$	1,360,000
Operating	$	1,528,000
Total Annual Cost(one medium capacity unit)	$	2,888,000
Total Annual Cost for 163 MHIs	$	470,744,000
Tons Mercury Removed per Year		2.62
Total Cost of Hg Removed	$	179,673,000
Total Cost per Hg Removed	$	90,000

Cost Estimates for MH and FB Incinerators to Meet All MACT Emissions

WEF has estimated the total cost for all incineration facilities to comply with all requirements of the MACT standard. This cost accounts for the addition of caustic to existing wet scrubbers, a wet electrostatic precipitator for fine particulate removal, a heat recovery device to increase the flue gas temperature above the dew point, and an increase in the size of the ID fan. The results, as indicated in the following table, estimate a total capital cost of $2.6 billion which is much higher than the Eastern Research Group, Inc's erroneous estimate.

Table 4. Compliance Costs for MH and FB Incinerators

Item		MHI MACT		FB MACT		Total
Capital Cost						
Equipment	$	6,318,000	$	6,318,000		
Installation	$	8,778,000	$	8,778,000		
Total Capital	$	15,096,000	$	15,096,000		
Annualized Capital (15 Y @ 7%)	$	1,657,000	$	1,657,000		
Operating Costs	$	1,887,000	$	1,900,000		
Total Annual Cost(one medium capacity unit)	$	3,544,000	$	3,557,000		
No. of Units		163		51		
Total Capital Investment Cost	$	2,460,648,000	$	769,896,000	$	3,230,544,000
Total Annual Cost	$	577,672,000	$	181,407,000	$	759,079,000

Table 4. Assumptions: 2 Operator hours per 8 hour shift, 15% supervision, 0.5 maintenance hours per 8 shift, 2% maintenance materials, increased electrical charges, landfilling of carbon, and indirect costs.

Estimate Impacts of Landfilling if Incineration is Shut Down due to MACT Compliance

EPA has assumed that POTWs which are forced to shut down their SSIs will simply switch to landfilling their sludge. While this may be implementable in some rural parts of the country, it would impose severe economic hardship on most of the heavily populated areas. Due to limited landfill capacity, incineration of sludge is widely practiced in the northeast and in large cities. EPA assumes that a landfill willing to take sludge is available within 100 miles of all POTWs except in the states of New Jersey and Connecticut. We believe that a more realistic assessment of landfill availability should be made. For instance, we believe that most POTWs in metropolitan areas would have to need their wastewater solids hauled several hundred miles to find a suitable landfill. In addition, EPA does not recognize the need for stabilizing the raw sludge prior to hauling and the need for controlling odors at the plant site and during sludge hauling.

Recommendation

WEF recommends that the BTF limit on mercury for new and existing incinerators be eliminated.

4. MACT Floor Determination is Erroneous.

EPA used erroneous assumptions, inaccurate or out-of-date information, and insufficient data to determine MACT Limits. The following bullets detail areas in which these errors or misinformation are noted.

Erroneous Assumption of Biosolids being a Homogenous Type of Feed

- One assumption used in determining MACT limits was that the SSI "*receive a homogenous type of waste to burn*". This is erroneous in that the characteristics of the wastewater solids are highly dependent on location, season, and client makeup (client makeup represents the industrial and commercial contributors to the sanitary stream to be treated by the plant). These factors result in varying characteristics to the wastewater and eventually the wastewater solids. In addition, the various effluent permits require different treatment methodologies which result in chemical (e.g., adding ferric chloride to help meet

phosphorus effluent limits) and biological (e.g., denitrification) differences in the composition of sewage solids among the various POTWs.

- EPA's Office of Water sludge composition data presented in the "*Targeted National Sewage Sludge Survey Sampling and Analysis Technical Report*" (January 2009) is summarized in Table 5. The data indicates the highly variable composition of the biosolids: more than a log difference between minimum and maximum concentrations. As quoted from the EPA Office of Water Overview Report (contained in the January 2009 document), EPA states "*From an analytical methods standpoint, sewage sludge is a challenging matrix because it is not uniform in its composition or ratio of water to solids.*"

Table 5. Sludge Composition Variability for Selected Constituents

		Observed Dry Weight Concentration	
Constituent	**No. of Detects**	**Minimum**	**Maximum**
Cadmium, mg/kg	84	0.21	11.8
Lead, mg/kg	84	5.81	450
Mercury, mg/kg	84	0.17	8.3

- EPA has not considered the variability in the feed from facility to facility, or even from day to day within the same facility. Moreover, virtually every facility experiences seasonal and shorter-term variations in feed characteristics because the plant influent is in a constant state of flux, and there is generally very limited storage or capacitance to equalize these inevitable changes. Weather can also significantly impact plant influent and resultant incinerator feed characteristics. The emissions are dependent upon the characteristics of the feed, and thus, EPA should also consider the feed characteristics in the determination of MACT. Since most technologies reduce particulate and metal emissions by percentages, an emission level from a facility may be a result of a very low level of metal content in its solids and not due to MACT. For example, if the best available control technology could reduce lead by 99.9%, then the lowest lead content reported on the included table might be emitted at 0.005. In this same example, the highest content would emit 0.45 using the same control technology ("maximum degree of reduction of emissions") and would fail because of a larger concentration of lead in the feed. By overlooking the variability in the feed, EPA cannot consider the variability in establishing "a uniform standard to be capable of being met under most adverse conditions which can reasonably be expected to occur".

<u>Insufficient Data to Determine a Proper MACT Standard</u>

- The data set used to develop the MACT floor for new or existing units is too limited to generate revised emission limitations for SSIs. The use of such a limited data set will substantially impact the entire industry. The June 2010 Eastern Research Group, Inc. (ERG) Memorandum documented the methodology used for the MACT Floor Analysis stating: "*EPA does not have that data at this time, the statistical technique described below is the only manner in which we can establish the existing source floor on that basis*."[1] Although such a methodology generates numbers, the selected statistical technique is not referenced and precedence for using this particular technique is not provided. A regulation that is this important to the sector and to the adequate protection of public health and the environment should be based on sound assumptions and data. We have concerns the approach used results in considerable uncertainty due to the small data set and

assumptions used. EPA could choose to gather more "real" data and only rely on alternate statistical approaches to extend the results to reflect the known variability in feed characteristics that are not captured using snapshot testing data from one or two days at only a handful of sites.

[1] MACT Floor Analysis for the Sewage Sludge Incinerator Source Category, Memorandum from Eastern Research Group, Inc. to Amy Hambrick, U.S. EPA, June 2010, page 8.

- The intent of the regulation is to develop a MACT floor for existing SSIs that cannot be less stringent than the average emission limitation achieved by the best performing 12% of units in the category. The amount of data that was obtained and evaluated to develop the proposed EGs is not providing a reasonable data set. As indicated by EPA, there are a total of 218 SSIs of which 55 are FB units and 163 are MH units and 12% would correspond to 7 FB units and 20 MH units. As indicated in Table 4-1 of the June 2010 ERG Memorandum[2] it is apparent that an inadequate number of data was available to set the floor limits. The maximum number of units evaluated when establishing EGs for FB units ranged from 3 to 5 for each pollutant. For MH units the number of units evaluated for each pollutant ranged from 5 to 19. In particular, for subcategory FB there were only 3 units with data for CDD/CDF, SO_2 and opacity and only five listed as reporting data for the remainder of the parameters listed. Therefore, to obtain a data set that conforms to the intent of the CAA, additional data are required.
- This analysis also needs to account for emissions variability[2], which is difficult to do with a limited data set. Statistical analysis can be performed to "make up" for lack of data; however, this introduces many uncertainties especially since multiple methods of conducting statistical analysis exist. This coupled with the fact that available data represents short-term emissions (or a snapshot of a point in time), compounds the need for a larger data set when establishing requirements that must be met on a day to day basis by the industry. Although the June 2010 ERG memorandum indicates that through statistical analysis the population size of the data set was justified[3], compliance with established limits for SSIs will be judged based on the average of three valid test runs. This fact illustrates the importance of having data from the appropriate amount of units, which the current data set is lacking. In our opinion, this data set is too small to confidently apply statistics and set levels. A larger more robust data set should be developed before the MACT limits are finalized. As an aside, the June 2010 Memorandum states that SO_2 data from the Ypsilanti, MI, facility were eliminated because they were two orders of magnitude greater than other available test data[4] given that a different test method was used. Provided that the test method used is allowed by regulation, these data points should not be discarded simply because they are higher. We request further justification as to why this data set was eliminated. Consideration should also be given if currently available test methods are able to show compliance with the proposed limitations. For example, a limitation that is below a method detection limit should not be established since there would be no valid way to determine compliance.

[2]MACT Floor Analysis for the Sewage Sludge Incinerator Source Category, Memorandum from Eastern Research Group, Inc. to Amy Hambrick, U.S. EPA, June 2010, page 2.

[3]MACT Floor Analysis for the Sewage Sludge Incinerator Source Category, Memorandum from Eastern Research Group, Inc. to Amy Hambrick, U.S. EPA, June 2010, page 9.

- We question the validity of selecting the best performance on a parameter-by-parameter basis from different facilities, as performance is an overall function of the facility design, operating parameters, feed characteristics and other considerations. In essence, picking performance for one parameter from one group of units and for another parameter from another group of units will likely ensure that there will be no facility capable of meeting all of the final emission limits. It would be more appropriate to determine performance that is actually "achievable" by the best performing 12% of the units in each subcategory (FB and MH). This may require compromising performance in one pollutant to achieve performance in another pollutant. For example, units having the lowest emissions of CO may have higher emissions of NOx, as these emissions are typically controlled based on operating conditions within the combustion process and not through post-combustion control devices. Emissions of CDD/CDF are also controlled through combustion process operating conditions and, based on the reported data, appear minimal throughout the SSI industry.

  Emissions of Cd, Pb and PM are generally all related, as the metals tend to condense on the particulate matter and removal efficiency of particulate governs the removal of these and other semivolatile metals. Emissions of HCl and SO_2 are generally related to the performance of the wet scrubbing systems in an SSI installation and performance is governed more by the requirements of the facility's emission permit limits than the control technology. Thus simply looking through the inventory of SSI units for those with control devices that are "expected to have the lowest emissions" may not capture the best performing units, as performance is influenced more by operating parameters (some in the combustion system and some in the emissions control system) than on the particular technology employed. Similarly, if a particular pollutant is removed through wet scrubbing, selecting systems with elaborate configurations of fabric filters and carbon injection will not necessarily identify the best performing systems for those pollutants. Systems with nothing more than a simple venturi and impingement tray scrubber, operating under appropriate conditions, can often achieve equal or better results than those using more complex control devices for many pollutants.

- The single pollutant that must be handled in a completely separate manner is mercury, This is because the prevailing emission limits in most jurisdictions do not require specific control devices or technology for compliance and conventional emissions control systems do little to remove some forms of mercury. Levels in most SSI feeds are sufficiently low that even if all of the mercury in the feed is emitted, it has generally complied with the regulatory requirements. Very few units have been designed with mercury removal in place and the performance of these systems has not been trouble-free. The assumption that one simply needs to add some form of activated carbon injection (ACI) or a granular activated carbon (GAC) unit to meet mercury limits is also an oversimplification. Both of these technologies require pre-cooling of the exhaust gases to 300-400°F, either through addition of a cooling unit upstream of the wet scrubber or of a re-heating unit after the wet scrubber, in order to perform effectively. With ACI, appropriate contact time is required for reaction and a means for separating the carbon from the flue gases, such as a fabric filter (baghouse), is required to prevent the mercury from being returned to the wastewater influent with the wet scrubber drainage. The latter would result in an increase in the mercury load to the plant and to the SSI feed. Return of the mercury-laden carbon slurry to the wet processing systems at the plant does not address the overall environmental and health impacts as

mercury moves from one media to another. Further, the use of fabric filters in SSI applications has not been generally practiced, due to the high moisture content of the flue gases and the potential for plugging of the fabric filter due to condensation. Without an intervening dry-cooling system, such as a waste heat recovery boiler, one would have to pre-cool using water injection, which would aggravate the flue gas moisture problems even more. The only fabric filter units in SSI installations of which we are aware are on FB units with none on MH units at this time. Wet electrostatic precipitators (WESP) have been used on some of both subcategories, but they typically follow the wet scrubber and would have the same problem of returning mercury to the plants influent stream. We submit that this is an area where having data from the largest population of available units will be critical to enable the selection of the full required complement of units (20 MH and 7 FB) to ascertain average of the best performing 12% of the units in each subcategory, along with representative data on mercury content in the feed to these units when tested. The mercury content of wastewater solids varies with and can be greatly influenced by prevailing pretreatment and source control programs. In fact, it is entirely likely that source control could represent MACT for the SSI category, as any control technology applied to SSI units simply will transfer the mercury from one medium to another and all environmental and health implications of these transfers need to be assessed and considered.

- We believe that the proposed rule incorrectly estimates that the 218 existing SSIs emit 3.1 tons of mercury per year to the atmosphere. In 2009, the Water Environment Research Foundation released a report titled *Minimizing Mercury Emissions in Biosolids Incinerators*. The report conservatively determined that SSIs collectively emit less than one ton of mercury to the atmosphere each year. Thus all of the related cost-benefit analyses have likely grossly overestimated the benefits (by a factor of more than 3 times). In addition, the failure to consider all of the real modifications that will be needed to existing SSI units to comply with the proposed limits has likely grossly underestimated the costs for making these modifications. We are aware of one MH installation that calculated a cost per pound of mercury removed of roughly 17 times that assumed in the EPA cost analysis. We consider this to be a fairly representative case for that subcategory and that it would be comparable for FB units, as similar modifications would be required.
- Review of the spreadsheets in the attachments to the proposed rule suggests that the baseline values for mercury may have been overestimated either systematically for all units or at least anecdotally for some units. Apparently, the emission calculations have used the concentration data corrected to 7% O_2 in conjunction with the raw uncorrected gas flow rate. One either has to use the corrected concentration and the corrected gas flow rate (both to 7% O_2) or the raw uncorrected concentration and gas flow rate to yield an accurate result. This has the greatest impact on the estimated emissions from MH units, which typically operate at 12-15% O_2, and would overstate their Hg emissions by a factor of about 1.5 to 2.5 times. With this level of error, we would strongly recommend that all of the baseline emissions, the MACT floor assessment, and BTF MACT assessments be re-evaluated.
- We contend that all of the pollutants covered by the proposed regulation have been adequately managed under the limits and technological requirements of the EPA 503 regulations, coupled with NESHAPS, NSPS and parallel regulations in individual jurisdictions that may be more stringent or encompass additional pollutants. Before implementing extreme reductions to these emissions levels or introducing the requirement to install

mercury removal systems, we believe that a full complement of data needs to be collected; accurate calculations need to be made using this data; and a valid cost-benefit analysis needs to be conducted, in light of the true potential environmental and health effects of the proposed regulations.

- Section 4.4 of the June 2010 Eastern Research Group, Inc. memorandum discusses the use of non-detect values in the development of the MACT floor levels and the EPA methodology used in an attempt to account for the imprecision introduced by incorporating non-detect data into the MACT floor calculations. In our opinion an inadequate number of data (for most parameters much less than 12%) were used to develop the MACT floor calculations, and the excessive amount of non-detect data (more than 50%) adds to the uncertainly of the proposed MACT floor levels. It is our understanding that statistical methods are effective only for data sets having a high proportion of detects[4]. Per section 4.4 of the memorandum "*Non-detect values comprise more than 50 percent of the emission data for HCL from FB units and CDD/CDF from both MH and FB units*." The large numbers of non-detect results, the assumptions made in section 4.4 regarding the handling of the non-detect data and establishment of a representative method detection limit used in the data pool outlined in this section have a profound impact upon the final calculated MACT floor levels presented in this report and introduce uncertainty regarding the validity of the proposed calculated MACT floor levels.

[5] http://www.epa.gov/reg3hwmd/risk/human/info/guide3.htm

- The determination and definition of detection levels is considered as controversial[5]. In some cases, this is due to inadequate definition and confusion of terms as well as differences in practices employed when setting detection limits. Detection limits will vary widely between testing methods, instruments, and facilities. As discussed in section 4.4 of the memorandum, data near or close to the detection level are imprecise. Before a limit is set for a particular criteria based upon a data set, it is important to first define how the measurements were made and to adequately validate the data set. It should be documented that each facility reporting results used in the data pool properly determined the associated method detection limits. Furthermore, it is imperative that a robust data set be established and fully validated before the final MACT floor levels are set.

[6] 1030C. Method Detection Level, Standard Methods For the Examination of Water & Wastewater, 21st Edition, 2005

- Data reported at or near instrument detection limits, in some cases, may actually be below the lowest instrument or method calibration point or outside the instrument calibration range. In our opinion, the data used to calculate the MACT floor levels should be examined to verify how the instruments employed were properly calibrated to verify the accuracy of the data. In particular, results reported below the lowest calibration point should be not be considered in the data set employed to set the MACT floor levels, as they are unreliable. It is recommended that EPA gather more actual test data as well as standardize testing or, at a minimum, validate the data gathered. EPA has Unfounded Conclusions that all Facilities ould meet the MACT Floor Levels of Control for NOx, CO and PM without any Additional Control

It has been stated that "*The results of the analysis indicate that all existing FB and MH units would meet the MACT floor levels of control for NOx, CO and PM without applying any additional control*." However in the short time that the MACT standard had for review once published, numerous facilities have reviewed past emission test results, and have indicated that they would require additional emission control equipment. This statement does not represent the real impact and underestimates the true costs. It is recommended that EPA obtain more wastewater solids and emission data to be able to determine the top 12 percent of the facilities and be able to conclude what the MACT is when considering the variability of the biosolids characteristics.

Insufficient and Erroneous information has Lead EPA to include Start Up, Shutdown and Malfunction (SSM) under MACT Standards

- Under the MACT standard, EPA has stated "*Based on the information available at this time, we believe that SSI units will be able to meet the emission limits during periods of startup*." EPA has used combustion of other fuels as sufficient information for making this determination when there appears to be no data on SSI emissions under these conditions.
- The most notable lack of information is for emissions during a malfunction. Typically under these conditions the SSI is in an emergency situation where shut down is required to protect equipment or personnel. Under these conditions all equipment is shutdown including air to the material in the SSI unit. This results in an uncontrolled incomplete combustion which may not be able to meet MACT standards. For equipment and personnel protection, the inventory of material in an SSI must be burned out of the system as effectively as possible; however, it is unlikely that MACT standards could be met consistently by any SSI during an emergency or abnormal shutdown condition. This is particularly true of MH units, as these have inventories of unburned fuel on the order of 30-60 minutes, whereas FB systems typically only have a minute or two of unburned feed inventory.
- The other erroneous assumption is that on start up only fossil fuel is needed. EPA needs to consider that at some point during start up of the SSI units the introduction of wastewater solids, which are also fuel, is helpful to bring the combustion temperatures up to normal operating temperatures. Until operating temperatures are reached, it is doubtful that this interim condition can meet all proposed MACT standards. Shutdown may be similar; however, since no emission data has been needed during these brief and interim conditions, insufficient testing has been done to support EPA's assumption that start up and shut down will meet MACT standards.
- Periods of start up, shutdown, and malfunctions are transition operating modes that, while often pseudo-controlled, are basically unstable conditions and elevated emissions would be expected under these conditions. SSI processes are controlled, but not inherently stable, particularly for MH systems. Even FB systems are only somewhat stable processes, though they are more able to accommodate sudden or rapid changes than MH systems. This is one of the reasons that it is necessary to average three one to two-hour or longer test runs in order to generate a single representative performance test measurement that can be reasonably used as evidence of system performance capability under the particular test conditions. To extrapolate test performance to a level that can be met continuously requires some adjustment to allow for changing conditions beyond the envelope described by those in effect during the more ideal steady-state performance test. We do not believe that all of the proposed limits can be met during these transient operations and they should be excluded from compliance enforcement periods.

Recommendation

WEF recommends the EPA:

- Re-evaluate its statement that wastewater solids are homogenous and take into account how the solids characteristics might impact the determination of a MACT Floor.
- Collect enough data to determine a proper MACT standard including the variability of wastewater solids
- Reconsider the parameter-by-parameter basis for each pollutant as few existing and no new facility will be able to comply.
- Reconsider the transition periods of startup, shutdown, or malfunction be included in permits. These periods should be excluded since EPA has no data to support MACT floor.

5. Emission Regulations and Testing are Burdensome

The key issues related to the emissions regulations and testing center around the exclusive use of concentration limits, rather than control efficiencies or total daily mass emissions in appropriate instances; the use of an unachievable "zero" limit for opacity; requirement for CEMS monitoring of all individual pollutant emissions, in lieu of annual testing, with no subset of representative surrogates available to monitor multiple parameters; and the onerous annual testing requirements. The following bullets describe these areas in greater detail.

- The use of concentration limits, rather than control efficiencies or total daily mass emissions, is not appropriate for certain of the regulated pollutants. Concentration limits do not reflect the unique feed conditions present in each SSI unit and may unfairly penalize units with very low or very high feed concentrations of certain pollutants, such as mercury, cadmium, or lead. Units with very high feed concentrations may not be able to comply with the proposed limits, as the requisite control efficiency needed for compliance may be unattainable. Certain emissions control devices are limited in terms of achievable control efficiencies and cannot meet a pure concentration limit unless feed concentration is likewise limited. Units with very low feed concentrations of a particular pollutant may be able to comply without installing any control device. To make the latter units conduct annual tests or install and maintain CEMS to monitor a parameter that is not present in sufficient quantity to result in an emissions violation is similarly unfair. The EPA 503 regulations took these differences into account for many of the regulated metals and created emission limits based on control efficiencies, coupled with feed concentration limits, to provide adequate protection of health and the environment. WEF recommends that consideration be given to establishing limits based on a similar approach and allowing a calculation method to be available as a substitute for annual testing or CEMS monitoring to demonstrate unit compliance.
- The proposed PM limits for existing SSI units appear reasonable but the fact that limits for FB units are much lower than those for MH units is somewhat unexpected. Since the particulate mass loading on the emissions control system of an FB unit is 6-10 times higher than that of a comparably sized MH unit, it would appear that FB units have been designed with more comprehensive and effective PM control technologies than MH units. This is expected as many of the FB systems are newer and have conventional venturi/impingement tray tower wet scrubbing systems, sometimes augmented with WESP systems. In general, the use of fabric filters in SSI units has been limited due to

the high moisture content of the exhaust gases and potential operating problems with fabric filter collection systems. The proposed regulations should not force the use of fabric filters in lieu of a well designed wet scrubbing system, due to these potential problems, which would severely impact performance and reliability. We concur with the fact that the proposed rule regulates PM limits and PM_{10} and does not limit $PM_{2.5}$.

- The proposed regulations contain a limit of 0% for opacity for existing FB units and all new SSI units, which implies perfection. Obviously this is not achievable by any real-world unit and, while most SSI units exhibit very low stack opacity, no unit can achieve 0%, even with an averaging period, as the instant a measurable reading is detected, the limit is violated. We recommend that the limits for existing FB units and all new SSI units be established at 10%, which are more attainable as a regulatory limit. The equipment available for continuously monitoring opacity in SSI exhaust gases is notoriously inaccurate and unreliable. Further, visual measurements are somewhat arbitrary at best. Generally, we believe that this emission parameter is of limited usefulness from a regulatory perspective and that if all other emission parameters, particularly PM, NOx, HCl and SO_2 are controlled to the proposed levels, opacity will not be present to an objectionable or measurable degree. From the perspective of opacity as it relates to ash handling systems, this is more appropriately regulated as a fugitive dust emission than under the guise of opacity.
- The proposed emission limits for CDD/CDF, as noted elsewhere, were based on extremely limited data, more than half of which was as non-detect data. After all of the data manipulations to create an imaginary MACT performance level, the regulations purport to produce total annual reductions of 0.000020 TPY or roughly 0.04 pounds per year from a combined universe of 218 units (less than 0.1 grams per year for each single unit). It is highly likely that even this estimate is too high, based on the handling of the non-detect data. There appears to be no evidence to support the regulation of CDD/CDF from SSI units, much less require the expense of initial and annual testing for a parameter that is essentially absent from SSI emissions.
- By selecting the best performing 12% of the units in each subcategory on a pollutant by pollutant basis, the proposed limits fail to recognize the interrelationships between certain emissions, which can only be minimized individually (not simultaneously) on the basis of the operating conditions within the combustion process. An example of this is the relationship between CO and NOx in many systems. To achieve very low CO emissions, operating temperatures are often increased, which can result in increased NOx emissions. This phenomenon strongly supports the approach of selecting the best performing 12% of the units on an overall basis, considering all of the regulated pollutants as a whole for each unit.
- The proposed CO limits for existing FB and MH units appear to be both achievable and reasonable for existing SSI units. Some MH units may have opted to monitor and control to a THC limit of 100 ppmvd as propane at 7% O_2 under the EPA 503 regulations for SSI units. We recommend that these existing MH units be allowed to continue using this THC limit in lieu of the proposed CO limit of 3,900 ppmvd at 7% O_2. Most existing SSI units already have CEMS for either CO or THC, as required under the EPA 503 regulations and these should be considered acceptable under the proposed regulations.

- The proposed NOx limits were based on a limited data set and we contend that they are not truly representative of actual long-term system performance. Specific control devices or processes to control or reduce NOx are virtually non-existent in SSI installations, despite the fact that some units have existing permit limits related to NOx emissions. These historical limits have been based more on what has typically been observed for each subcategory of SSI unit than on any underlying theory or control mechanism. It is true that FB units are more effective than MH units in controlling NOx; however, there is a significant performance disparity among units in this subcategory. Historical limits have often been expressed in terms of pounds emitted per pound of feed processed or in terms of concentration limits, but they are not overly restrictive as we believe the proposed limits are for SSI units. When mass emissions are exceeded, the purchase of offsets is often required. Achievable NOx emissions are influenced by the type of SSI used; the operating conditions in the combustion process; the amount of fuel bound nitrogen in the feed sludge; and the amount of auxiliary fuel required to support the combustion process, all of which vary among SSI sites and are site-specific. We believe that the proposed limits for existing and new SSI units are overly restrictive (particularly the limits for new SSI units) and would require the use of add-on control technology that has not been proven in SSI applications. Some existing units may be capable of meeting the proposed limits occasionally; however, there is no operational evidence that these can be reliably achievable on a long-term basis. The proposed limits for CO emissions have an impact on the NOx emissions as well, and we recommend that a balance be struck between these two interrelated emission parameters in setting final limits. We believe that NOx emissions are adequately managed under the PSD requirements that consider the local impact of emissions in establishing NOx emissions.
- Existing MH units could not meet the proposed NOx emission limit of 210 ppmdv corrected to 7% O_2 on a continuous basis. This is due to the fact that NOx is a combustion parameter which is largely determined by combustion conditions, namely: localized peak temperatures and oxygen concentrations in the MH incinerator. As such NOx emissions can increase significantly with fluctuations in the sludge feed characteristics (percent solids and percent volatile content) and with incinerator operating conditions (i.e. variations or interruptions in sludge feed rate). The sludge feed to a SSI is subject to variations in the upstream dewatering operations as well as other operations at the WWTP. For instance, the age of the sludge (which is affected by its residence time in the sewer system and in clarifiers, thickeners and holding tanks at the WWTP) can affect its dewaterability and volatile content. Hence NOx emissions from SSIs are highly variable. Most NOx emission data from SSIs has been from controlled emission tests which are typically run when all upstream WWTP processes are steady and uniform and sludge characteristics are consistent. Continuous real time NOx emission data would show the inherent variability in NOx emissions from SSIs. Niessen evaluated 154 sets of SSI emission data taken from the EPA Sewage Sludge Test Programs, Sites 1-4 conducted by Radian[1], and found that the average NOx emission from a MH incinerator was 283.6 ppmdv corrected to 7% O_2 with a standard deviation of 165.2 ppmdv.

[1]Niessen, Walter, R., The MHF Model; A Tool for Evaluation and Optimization of Multiple Hearth incineration Systems, WPCF residuals Management Conference, New Orleans, Louisiana, Dec. 2-5, 1990.

- We agree with EPA's assessment that add-on NOx controls for MH incinerators are not economically feasible or appropriate. Based on the large variations in NOx emissions from MH incinerators, our recommendation is to set a more realistic NOx emission limit which MH units could achieve on a continuous basis. A NOx emission limit of 365 ppmdv corrected to 7% O_2 is proposed for existing MH incinerators which is the average value from the above data base plus half of the standard deviation (283.6 + 165.2/2).
- Similarly, we have found that the NOx emissions from a FB incinerator are greatly affected by the solids content of the feed sludge. At solids concentrations below 23%, NOx emissions below the proposed limit of 63 ppmdv are possible. However, as solids concentrations rise, the NOx emissions rise. This effect has become more noticeable and problematic as more plants have installed high solids centrifuges to minimize fuel usage. To illustrate this point, the following example is offered. During an emissions test on a FB incinerator when the sludge feed was 27% solids, the NOx emissions concentration during one test was 153 ppm. When the sludge solids were purposely lowered to 24%, the NOx emissions dropped to 35 ppm. During one of the one-hr test runs when the operators let the centrifuge operate at its maximum operating efficiency and cake solids of 33% to 34% were achieved, the NOx emissions were as high as 340 ppm. . Given the high variability of NOx emissions from FB incinerators and the affect of solids concentration on NOx emissions, a more realistic NOx emission limit of 150 ppmdv corrected to 7% O2 is recommended. Note that this is about the lowest level which a fluidized bed supplier is willing to guarantee on a new FB incinerator.
- The proposed limits for SO_2 are extremely low, given that a typical feed contains 1-2% (but sometimes as high as 5%) Sulfur. This translates to an uncontrolled SO_2, concentration on the order of 1,000 ppm or more prior to scrubbing. We believe that the limit would be more appropriately expressed as a control efficiency to allow for those units with high sulfur content in the feed. Further, the selection of the best performing 12% of units should be based on removal efficiency and sulfur content in the feed, not just reported final emissions, as emissions alone do not necessarily reflect good performance. We would consider a control efficiency of 97% to be reasonably achievable, but would suggest that the actual data be used to define an appropriate emission limit for SO_2. Similarly, HCl emissions reflect chlorine content in the feed; however, this is typically low and not subject to as large a variation as is observed for sulfur content. The proposed emissions limit for existing units, based solely on reported final emissions concentration, is therefore not unreasonable, though an emission rate expressed in pounds per ton of feed would be more appropriate. The proposed limits for new units should also be based either on a control efficiency or a mass per unit feed processed, to account for potential differences in feed characteristics.
- We concur with the proposed use of a 24-hour block average for reporting CEMS data is appropriate. We do not recommend the use of a 12-hour rolling average for this purpose. For the monitoring of operating parameters, as described in Table 4 to Subpart MMMM of Part 60 (page 63340), we concur with the use of a 4-hour rolling averaging time for performance. The proposed requirements of this same Table 4 related to sampling of sludge moisture content require composites of three samples taken 6 hours apart. This is acceptable for units operating on a continuous basis; however, for units that may only operate on an intermittent basis, the timing of the

three daily samples should be spread roughly equally throughout the operating period, which may require sampling more frequently than 6-hour intervals.

- We note that most, but not all, of the emissions tests for units in the SSI database were conducted using the test methods listed in Table 11 – Summary of SSI Test Methods and Approved Alternative Test Methods (page 63281). We recommend that all data used for establishing the best performing 12% of existing SSI units should use only the approved test methods. For example:
    - Hg - St Paul, MN and Columbia Metro, SC used Method 101A for some of the analyses
    - NOx - Central Contra Costa, CA used BAAQMD ST-13A, which is a NOx CEMS method.
    - PM - Hartford, CT and Central Contra Costa, CA used OTM 27/28 and Mountain View, NJ used NJ ATM 1 and EPA 5.
    - CO - Central Contra Costa, CA used BAAQMD ST-6, which is a CO CEMS method.
    - SO_2 - Central Contra Costa, CA used BAAQMD ST-19A, which is an SO_2 CEMS method.
- We believe that the intent of the Waste Management Plan used in previous CAA section 129 standards is not relevant to SSI units and should not be required. These plans relate more to solid waste incineration systems, where the feed can actually be separated prior to processing than to a POTW, where all incoming materials are co-mingled on a molecular level. There are many jurisdictions that have implemented pretreatment ordinances or plans and some with active source control programs to reduce the discharge of various metals to the POTW, most notably Hg source control programs. These programs have been extremely effective in gradually reducing the levels of metals in the SSI feed stream over the past decades. While we would not recommend including these as mandatory elements of the proposed regulations, there should be some consideration given to designating mercury source control as the most appropriate and effective technique for reducing mercury emissions from SSI units and, hence MACT for mercury control.

Recommendation

WEF recommends EPA review the criteria to ensure it is achievable during all operating conditions using the proposed test methods listed in Table 11.

6. The Proposed Criteria for New Sewage Sludge Incinerators Do Not Meet the Intent of the MACT Standards as the Criteria Are Unachievable.

EPA Methodology

The use of hourly runs instead of an average of three hourly tests is not valid. The average of three hourly runs is for "steady state" operations conducted in one day with similar wastewater solids quality and quantity, and scrubber water temperatures and pressures and conducted most likely by a single operator. Solids quantity and quality changes, operator variances, and seasonal temperature variances have *not* been factored into criteria. The same unit may not meet the limit for the same test one week, one month, or one year later.

EPA Statistical Analysis

The use of only three hour runs is not valid. The three one-hour runs compose one test, and therefore, the statistical analysis is meaningless. A minimum of 30 tests are needed to be significantly valid (this would correspond to 90-hour runs). The approach used is analogous to measuring the thickness of one piece of wood three times when trying to calculate the thickness variance between different pieces of wood.

EPA Testing Quantity and Quality

EPA has not conducted enough testing to promulgate emission limits for new units. This is shown by EPA data indicated in the proposed regulation, as compared to the changes when Late Data was added (see ERG memo dated June 2010 "MACT Floor Analyses for Sewage Sludge Incinerator Source Category, Appendix I "Variability analysis for existing FB units if later-arriving data are incorporated into the analyses). The following changes occur:

- Tenfold (log) change of emission standard for CCD/CCF TMB (0.061 to 0.51 ng/dscm at 7% O_2).
- Doubling of emission standard for NOx (63 to 130 ppmv at 7% O_2).
- 25% increase of emission standard for PM (12 to 15 mg/dscm at 7% O_2).

Operational Impacts

Impacts are not representative of an 8760 hour annual operating time with variations in wastewater solids quantity and quality, and normal operating variations, let alone the high variances during startup, shutdown, and malfunction.

Below the Floor for Dioxin and Furan

The proposed dioxin and furan regulations are not met by the best performing unit, and are therefore technologically unachievable.

Impact on Municipalities and the Sector

The proposed regulation would effectively eliminate the option of incineration because not even the units considered to have the most advanced emission control equipment (i.e., three units in St Paul, MN and one unit in Ypsilanti, MI, both equipped with state of the art WESPs and carbon injection or polishing units) would be able to comply with the proposed regulation. Incinerator vendors may not guarantee the proposed emissions during all operating conditions, and therefore, incineration may effectively be removed as a wastewater solids management option. EPA must collect enough data to provide emission limits that are achievable by at least one operating unit under all normal operating scenarios.

Table 6. Comparison of Proposed MACT limits for New Units

Parameter @ 7% O2	Proposed New MACT Standard	Unit Used for Proposed Regulation	Att C "Sample Size"	Emission Train
Cd (mg/dscm)	0.00051	NCTZOsborne	3	abd - vs - imp - hss - cs
dioxins, furans, TMB (ng/dscm)	0.024	MIYpsilanti	3	vs - imp - wesp - ac polish
dioxins, furans, TEQ (ng/dscm)	0.0022	MIYpsilanti	3	vs - imp - wesp - ac polish

CO (ppmv)	7.4	MIYpsilanti	6	vs - imp - wesp - ac polish
HCl (ppmv)	0.12	NCTZOsborne	3	abd - vs - imp - hss - cs
Hg (mg/dscm)	0.001	MNStPaulMetro FBR3	36	ac inject. - bag - vs(ad) - wesp
NOx (ppmv)	26	NCTZOsborne	3	abd - vs - imp - hss - cs
Opacity, %	0	All FB units		
Pb (mg/dscm)	0.0053	NCTZOsborne	3	abd - vs - imp - hss - cs
PM, filterable (mg/dscm)	4.1	MNStPaulMetro FBR2	12	ac inject. - bag - vs(ad) - wesp
SO2 (ppmv)	2.0	MNStPaulMetro FBR1	3	ac inject. - bag - vs(ad) - wesp

Recommendation

WEF recommends that the EPA use the performance from the three units in St. Paul, MN as the floor for best unit technology. These units have the most data, have identical equipment and have been tested at several times so that variations in feed sludge may be observed. Emission limits where all three identical units can achieve should be used.

7. Greater Clarity of Industry Operations is Needed.

EPA requested comment on over 24 items. The quantity of requested comments seems to indicate that EPA does not have a full understanding of the variations of wastewater solids, incineration, or emission compliance equipment.

Performance Testing and Monitoring Requirements

- Incinerator Emissions. The proposed annual emission testing is costly and overly burdensome. WEF recommends that emission testing be conducted every five years, which matches the Title V requirements.
- Ash Handling. SSIs are typically located at POTWs with a large majority of these units having wet ash systems that would slurry the ash and decant in a lagoon prior to hauling ash offsite for reuse or disposal. The hauled ash has a total solids content of approximately 60 percent (40 percent moisture); as such the proposed standards for dust control would not be applicable. WEF recommends that dry ash systems be tested every five years, which matches the incinerator emissions above.
- Parameter Monitoring. Parameter monitoring of control devices is used as a surrogate for continuous emission monitoring equipment. WEF is concerned that this is often misapplied by state or local authorities who sometimes want exact numbers to be replicated. WEF recommends that parameter ranges of ± 10 percent from those numbers gathered during the compliance test be considered compliant (e.g., capacity, temperatures, flows pressure drops, oxygen concentrations). Most SSIs have a once-through water system, and pH is already measured and regulated under the NPDES permit so is not required here.
- Bypass Stacks. Bypass stacks are only found on multiple hearth incinerators and are typically only used during emergency malfunctions (loss of power). Solids are not fed during startup and shutdown periods, and only burner emissions would be measured. WEF recommends that the bypass stack not be monitored.

- CEMS. WEF recommends 24-hour block averages for CO measurements. Some multiple hearth facilities may elect to continue with THC monitoring and not provide a CO CEMS. EPA should allow a surrogate THC value that would either be consistent with the EPA 503 Regulations or could be demonstrated to correspond to the existing 3900 ppmv CO for existing units.
- Repeated Performance Test. The proposed rules require repeated performance tests for: (1) a change in process employed at the wastewater treatment facility that affects the SSI unit; and (2) an increase in allowable wastewater received from an industrial source to the wastewater treatment facility. These rules should only apply if the process change affects the fate of the regulated material. As written, the rules are vague and open to misinterpretation by state and local authorities. EPA needs to provide definition and examples.

Waste Management Plan

This is not needed for SSIs because all POTWs are required to have a pretreatment program which reduces or eliminates toxic emissions from the incinerated waste.

Modification

The proposed rule requires a modified unit to meet the more stringent regulations for new units. EPA has defined the modification and SSI unit as follows: *"Modification means a change to an SSI unit later than {THE DATE 6 MONTHS AFTER THE DATE OF PUBLICATION OF THE FINAL RULE IN GTHE FEDERAL REGISTER] and that meets one of two criteria: (1) The cumulative cost of the changes over the life of the unit exceeds 50 percent of the original cost of building and installing the SSI unit (not including the cost of land) updated to current costs (current dollars). To determine what systems are within the boundary of the SSI unit used to calculate these costs see the definition of SSI unit. (2) Any physical change in the SSI unit or change in the method of operating it that increases the amount of any air pollutant emitted for which section 129 of section 111 of the Clean Air Act has established standards."*

"Sewage sludge incineration (SSI) unit mean an incineration unit combusting sewage sludge for the purpose of reducing the volume of sewage sludge by removing combustible matter. Sewage sludge incineration unit designs include fluidized bed and multiple hearth."

- Definition. WEF requests that EPA clarify whether this applies to the multiple hearth or fluid bed "reactor" or whether this includes the entire "system" including all air emission controls and auxiliary equipment.
- Cumulative Cost. WEF requests that EPA clarify what types of modifications are to be used in the determining the cumulative costs. WEF recommends that only modification costs required to comply with the proposed ruling be included. Routine maintenance or equipment in-kind replacement costs are not included.

Space Constraints

Most existing SSI facilities do not have adequate space to install additional emission control devices. This proposed regulation could lead to the closure of several of these facilities.

Recommendation

WEF recommends that the EPA review the performance testing and monitoring requirements and further clarify what is constitutes a modification.

8. Proposed Regulations are Most Restrictive in the World and Would Effectively Eliminate Incineration as an Option for the Wastewater Sector

The European Union and Canadian Provinces have the same challenges as the United States in finding environmentally acceptable methods for managing wastewater treatment plant residual materials and protecting the public health. Due to the limited information collected by the U.S. EPA in preparing its proposed air emissions standards, it is reasonable and appropriate to compare the proposed emission limits to those established by other regulatory authorities. This comparison is provided in Table 7 below.

Table 7. Comparison of Proposed Emission Limits to International Standards

Parameter @ 7% O2	Proposed Existing MHI MACT Standard	Proposed Existing FBI MACT Standard	Proposed New MHI or FBI MACT Standard	European Commission Directive 2000/76/EC Annex V	Ontario, Canada Ministry of the Environment Guideline A-7/8
HCl (ppmv)	1.0	0.49	0.12	8.6	25.7
CO (ppmv)	3900	56	7.4	56	n/a
Pb (mg/dscm)	0.30	0.0098	0.0053	1.3	0.2
Cd (mg/dscm)	0.095	0.0019	0.00051	0.13	0.02
Hg (mg/dscm)	0.02	0.0033	0.001	0.13	0.1
PM, filterable (mg/dscm)	80	12	4.1	13	13
Dioxins, furans, total (ng/dscm)	5.0	0.061	0.024	n/a	n/a
Dioxins, furans, TEQ (ng/dscm)	0.32	0.056	0.0022	0.13	0.14 / 0.11
NOx (ppmv)	210	63	26	137	154
SO2 (ppmv)	26	22	2.0	24	30
Opacity, %	10	0	0	n/a	n/a

The units for the emission limits contained in the European Commission Directive 2000/76/EC, Annex V and the Ontario Ministry of the Environment (MoE), Guideline A-7 and A-8 have been adjusted to be consistent with respect to reference temperature and pressure and corrections for excess air as expressed as percentage of oxygen. For some compounds, the mass per unit volume concentrations has also be changed to a molar ratio, parts per million (ppm).

Two major differences in the European Commission and Ontario Ministry of Environment standards are that they are not combustion technology specific and that existing facilities are given an extended period (3 or more years) to implement the changes needed to meet these limits. There are also differences in monitoring and reporting requirements.

Another clear difference is that EPA's the proposed new emission limits for new MH and FB incinerators are lower than the limits established by the European and Canadian agencies by one or more orders of magnitude. The emission limit for mercury is 2 orders of magnitude lower than the comparable standards in Europe and Canada. The emission limits for lead, cadmium, mercury and dioxin (TEQ) for existing FB incinerators are also lower than comparable European and Canadian limits by 1 to 2 orders of magnitude.

While the U.S. EPA is not bound to the European and Canadian limits, the wide disparity in the regulatory limits does suggest that the proposed MACT standards are not achievable.

Recommendation

WEF requests that the EPA review the need for promulgating the most stringent SSI regulations in the world. The net effect of the proposed regulations would make compliance extremely difficult for existing units and impossible for new units. Not even the units considered to have the most advanced emission control equipment (e.g., St. Paul, MN and Ypsilanti, MI) would be able to comply with the proposed regulation. Incinerator vendors may not guarantee the proposed emissions during all operating conditions. For new facilities, vendors would require overly restrictive inlet metals and moisture concentrations that would make any guarantee ineffective. The net result is that incineration may effectively be removed as a wastewater solids management option.

In providing these comments, WEF's intent is to help improve this proposed rule and help assure implementation of the rule does not inadvertently eliminate incineration as an option for US communities. WEF supports science-based, achievable incineration standards that help improve protection of human health and the environment.

In conclusion, we believe EPA should focus on acceptable methods for managing wastewater solids that are protective of the environment, socially and economically beneficial, and achievable. We encourage you to consider these comments in your final regulations. WEF thanks EPA for the opportunity to submit comments. If you have questions or require additional information concerning WEF's position on this issue, please contact Tim Williams at 703-684-2437 or Sam Hadeed at 703-684-2418.

Sincerely,

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