Fixing MACT -- The LMWC Rule

Big Picture – EPA Discretion

- Congress gave EPA enormous authority that, if exercised to its fullest extent, could have imposed enormous costs on 88% of industry.

- At the time, EPA did not have a lot of data on harm from toxics so it's not surprising that EPA chose a minimalist approach to begin with.

- But there is no reason to stick with that first go forever. At this point, much as the Acid Rain Program was a one-shot deal, current EPA policy on air toxics is pretty much a dead end.

- Much as EPA has with motor source regulation, EPA should adopt policies that allow for incremental improvement, at a reasonable pace, within the very broad discretion EPA has been given.

- Thus, instead of standards that only affect the worst 5 -10%, the EPA should over time aim to affect the worst 25%, then worst 30% etc.

Big Picture – Define “Achieved”

- As applied, the 99th percentile UPL is highly flawed:
  - It assumes that test results are randomly distributed around some mean
  - It often uses small sample sizes
  - It assumes that differences in performance between the best and worst of the top 12 percent are random and not the result of better pollution controls
  - It assumes that units in the bottom half of the top 12% must comply
  - It often results in no or only minimal control in sectors.

- The 99th percentile UPL is based on the argument that the CAA must be complied with “all the time”:
  - However, the EPA defines “compliance all the time” to mean passing a reference method test once every few years (with notice of the test date).

- If the EPA persists in relying on the argument that the 99th percentile UPL is appropriate because sources must "comply all the time", then, per the “Credible Evidence Rule”, it should provide for enforcement based on the 99th percentile UPL of compliance data.

Big Picture - Long term policy - the EPA should

- Update any MACT subcategory where a lack of data resulted in a lax standard.

- Revise calculation to look at how the "average" will change based on variability of individual units - not the difference in performance between units in the top 12 percent.

- We now have 20 years of performance data for these sources - the UPL “predictive” approach is no longer needed or appropriate

- Round down (consistent with the "no less stringent" language of the statute) not up.

3 Major Problems with The LMWC Rule

Problem 1: EPA Backdates Emission Data to 1990. The public interest should not suffer from EPA's earlier failures to act in a timely manner.

Solution: Use Original Data.

“Adjusting” Data to 1990 levels means weaker emission limits.

Actual 2000-2009 dioxin emission data

Facility Name	Pollutant	Average	avg adjusted to 1990
Kent Co. WTE Facility / Unit #1	Dioxins/Furans	2.73333333	11.48
Kent Co. WTE Facility / Unit #1	Dioxins/Furans	0.915	3.843
Kent Co. WTE Facility / Unit #1	Dioxins/Furans	0.01666667	0.07
Kent Co. WTE Facility / Unit #1	Dioxins/Furans	0.0063	0.02646
Kent Co. WTE Facility / Unit #1	Dioxins/Furans	0.03916667	0.1645
Kent Co. WTE Facility / Unit #2	Dioxins/Furans	6.4	26.88
Kent Co. WTE Facility / Unit #2	Dioxins/Furans	2.73333333	11.48
Kent Co. WTE Facility / Unit #2	Dioxins/Furans	0.30666667	1.288
Kent Co. WTE Facility / Unit #2	Dioxins/Furans	7.23	30.366
Kent Co. WTE Facility / Unit #2	Dioxins/Furans	4.95	20.79

EPA “adjusts” actual dioxin data by multiplying by 4.2. EPA then uses this higher number to calculate the MACT floor emission limit.

“Adjustments” result in unreliable data

- Proposed Rule assumes all units with same control technology have same control efficiency, but:
- D.C. Circuit (*Cement Kiln Recycling Coal. v. EPA*, 255 F.3d at 864–65):

  [t]he data in the expanded MACT pools ... do not provide meaningful information because many factors, other than the type of control device, significantly affect HWCs' emissions. Obvious examples of such factors include feedrates, various operating parameters, operator training and behavior, and variations between similar (but not identical) control devices.... Because many variables significantly influence emission rates, identifying the emissions rates associated with a particular type of control device indicates very little about the actual capability of that type of control device.
- EPA (EPA-HQ-OAR-2003-0119-2711 at 2):

  This variability occurs due to a number of factors, including measurement variability (both sampling and analysis) and short term fluctuations in the emission levels that result from short-term changes in fuels, processes, combustion conditions, and controls. Second, because the

Time travelling to 1990 leaves out one of best-controlled LMWCs

- Proposed MACT calculation does NOT include emissions from Palm Beach 2 LMWC, which started operation in 2015 as one of best controlled facilities (e.g. only LMWC with SCR).
- Instead, MACT floors are being determined by LMWCs that closed down over a decade ago (Commerce and Maine Energy Recovery LWMCs).
- CAA requires floors to be calculated using all “existing” units.

Solution: EPA must use most reliable data, even if it's post-compliance data

- Proposed Rule says EPA took this approach because "LMWC facilities have taken steps to reduce emissions since the EPA first promulgated 1995 standards." (89 Fed. Reg. at 4,251)
- But D.C. Circuit already found that setting floors using post-compliance data is no problem. The problem would be choosing to use less reliable data instead of more reliable data, as EPA is proposing here. (Med. Waste Inst. & Energy Recovery Council v. EPA, 645 F.3d at 425-6)
- And rationale doesn't apply at all to emission limits for future (new) LMWCs

Problem #2: Results from “Upper Prediction Limit” Calculations Are Not Protective and Inconsistent With Congressional Intent

Solution: Ground Truth/Limit UPL

CAA says “average” but EPA uses “UPL”

- CAA: MACT floor for existing LMWCs is “average” emissions achieved by the top 12% of units.

But instead of calculating the floor using arithmetic average like here:

Pollutant	EPA 99th percentile UPL	Average of Lowest Test Result	Average Test Result	Average of Highest Test Result
Cd	1.44	0.19	0.59	1.2
Pb	54.74	1.78	7.45/7.1/7.92[6]	17.6/25.9[7]
PM	7.36	0.98[8]	2.9	5.25
Hg	10.291	0.93	3.27	7.89
DF	7.18	0.77/0.40[9]	2.81/1.35[10]	5.42/2.59[11]
HCl	12.49	1.9	5.28	10.46[12]

EPA instead uses UPL formula to calculate the floors,

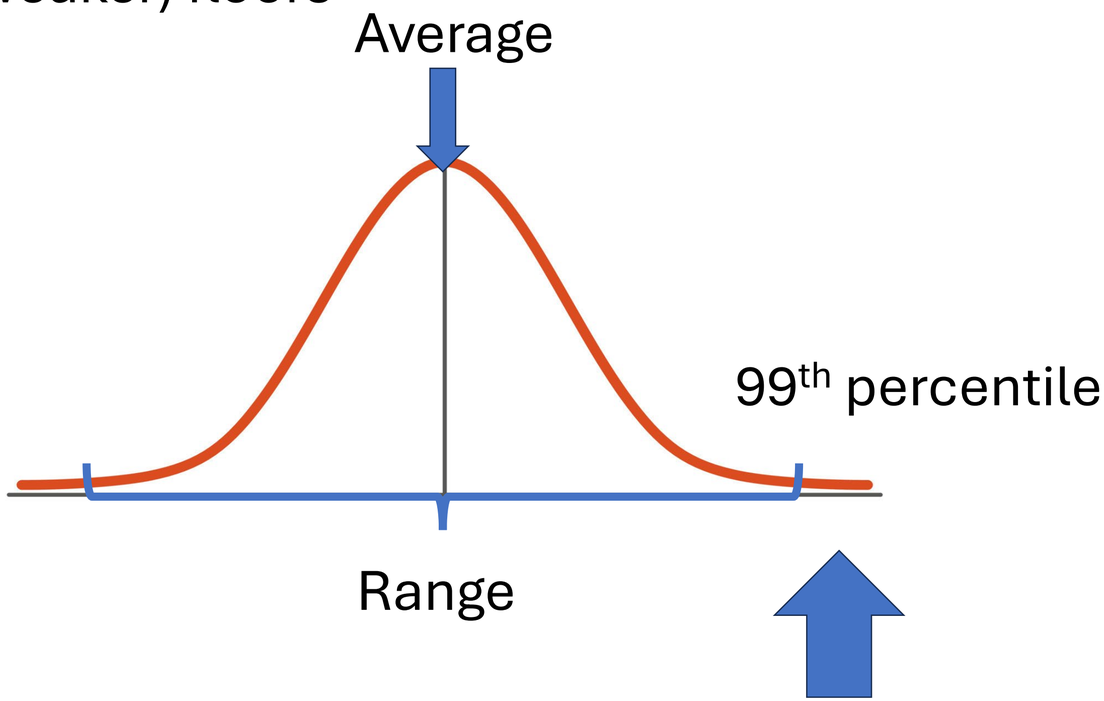
always resulting in floors higher than the average

EPA's use of the UPL results in weak floors

- EPA's UPL formula always results in higher (weaker) floors

$$UPL = \bar{x} + t(0.99, n-1) \times \sqrt{s^2 \times \left(\frac{1}{n} + \frac{1}{m}\right)}$$

Average + Range of possible future values



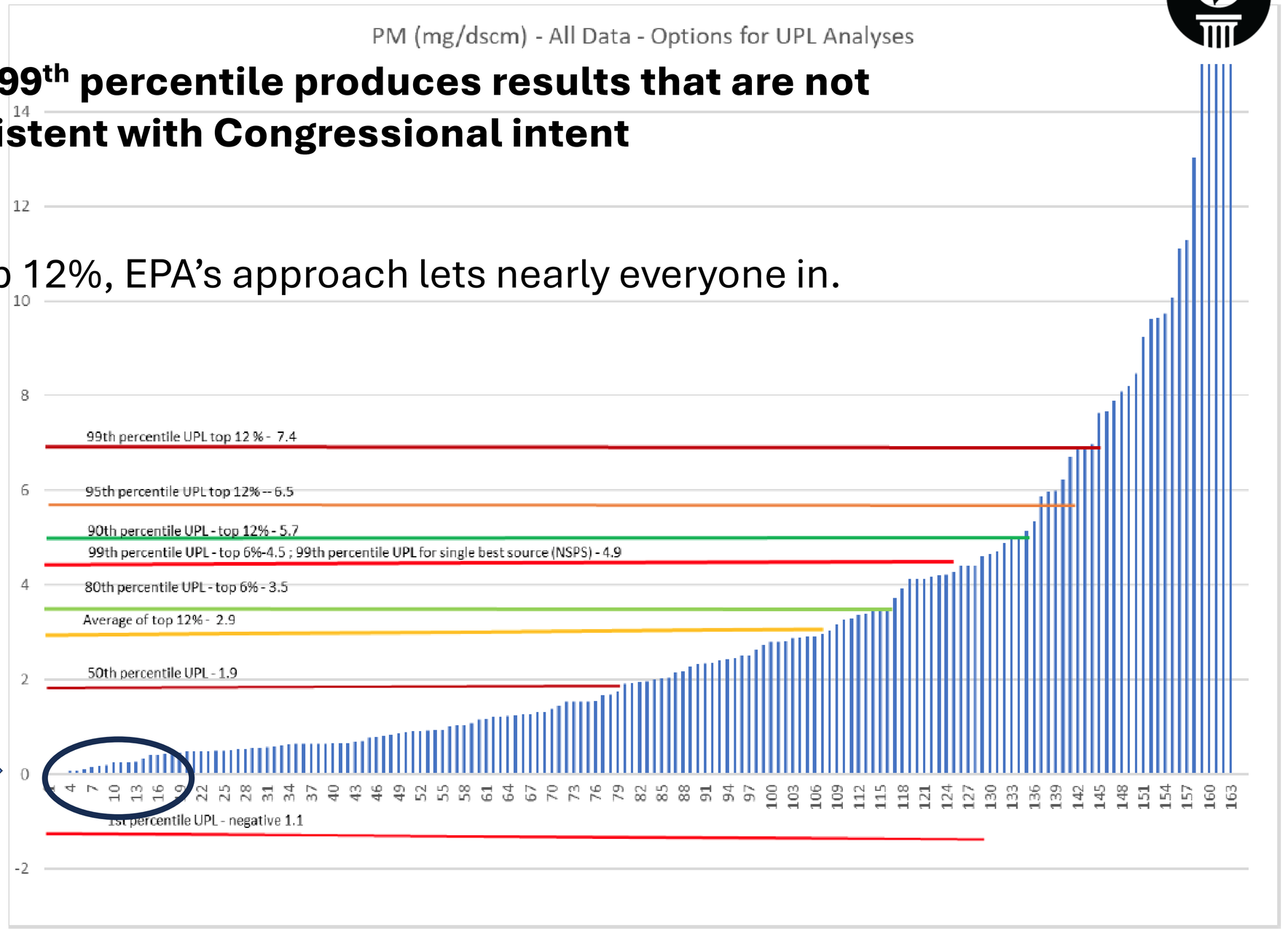
From within that range, EPA always chooses the highest (weakest) emission floor possible.

EPA's choice of upper 99th percentile produces results that are not protective and inconsistent with Congressional intent

- Instead of only top 12%, EPA's approach lets nearly everyone in.

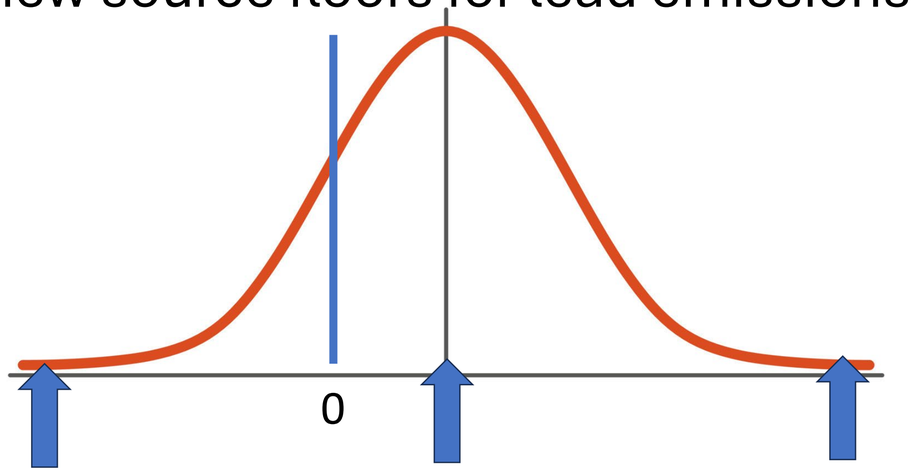
PM Proposed Rule Floor

PM Top 12%



EPA's choice of the 99th percentile produces absurd results

- Using 99th-percentile results in expected *negative* emissions at equivalent lower prediction limit, e.g. new source floors for lead emissions (also PM, HCl, Hg)



99th percentile LPL = -9.7

Mean = 3.50

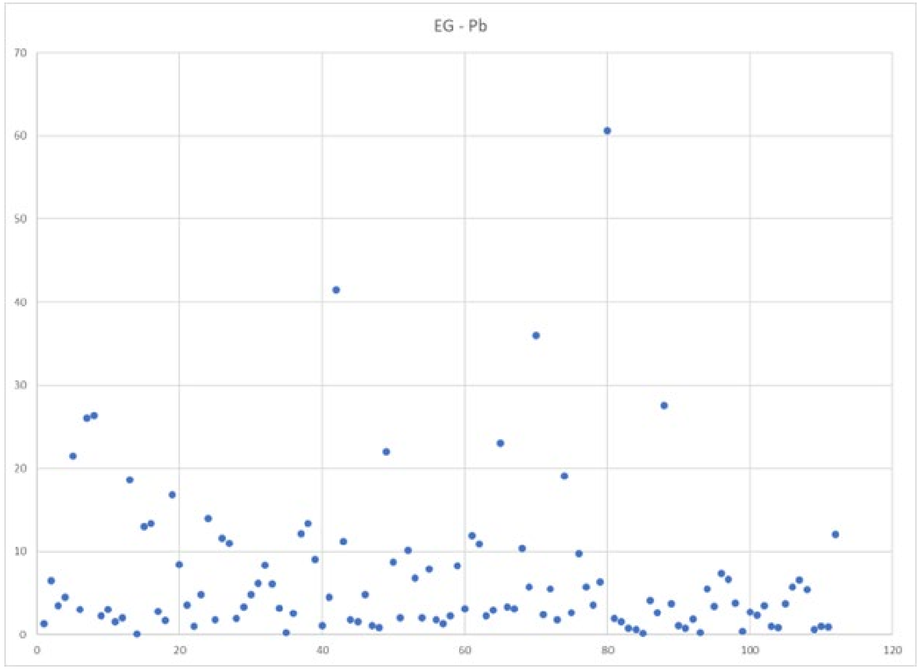
99th percentile UPL = 12.2

Solution: EPA must ground truth its use of UPL to avoid absurd results

- EPA should abandon the UPL where is has actual performance data spanning more than a decade for individual units.
- If EPA's choice of UPL strays far from the "average of top 12%," EPA should adjust its methodology so that its result is closer to the top 12%.
- If EPA's choice of UPL percentile would result in negative emissions at the equivalent LPL percentile, EPA should lower the UPL percentile to avoid this.

Solution: EPA must ground truth its choice of UPL to avoid absurd results

- EPA should use standard statistical tests to eliminate statistical “outliers”



Problem#3: 3 Big Problems with Beyond-The-Floor Analysis

Solution: Fix BTF Analysis

Problem 1: BTF of Individual Pollutants Ignored

- EPA's 3 BTF "options" ignore BTF of all individual pollutants except NOx.
- No "option" looking at just particulates, Hg dioxins, acid gases, or CO.

Cost Effectiveness

Pollutant Grouping	Option 1 (MACT Floor)[a]				Option 2 (Beyond-the-Floor/5-Year Review)[b]				Option 3 -Preferred Approach (MACT/5-Year Review)[c]			
	Total Capital Cost *($)*	Total Annual Cost *($/yr)*	Associated Emission Reductions[d]	Cost Effectiveness[e]	Total Capital Cost *($)*	Total Annual Cost *($/yr)*	Associated Emission Reductions[d]	Cost Effectiveness[e]	Total Capital Cost *($)*	Total Annual Cost *($/yr)*	Associated Emission Reductions[d]	Cost Effectiveness[e]
Particulates (PM, Cd, Pb)	$35,712,988	$5,463,935	24.6	$222,037	$113,495,576	$16,422,335	88.6	$185,439	$35,712,988	$5,463,935	24.6	$222,037
Mercury and Dioxins/furans	$16,378,797	$22,019,347	57.1	$385,526	$64,965,165	$120,771,411	333.3	$362,298	$16,378,797	$22,019,347	57.1	$385,526
Acid gases (HCl, SO_2)	$0	$12,856,407	2,766	$4,648	$1,123,641,123	$385,625,257	5,275	$73,098	$0	$12,856,407	2,766	$4,648
Nitrogen oxides	$50,763,823	$10,808,624	2,227	$4,854	$256,536,985	$59,432,922	11,449	$5,191	$256,536,985	$59,432,922	11,449	$5,191
Carbon monoxide	$0	-	-	n/a	$0	-	-	n/a	$0	-	-	n/a
Overall	**$102,855,609**	**$51,148,313**	**5,018**		**$1,558,638,849**	**$582,251,925**	**16,814**		**$308,628,771**	**$99,772,611**	**14,240**	

Option 1: All MACT Floor

Option 2: All BTF

Option 3: NOx BTF

All others MACT Floor

Problem 2: BTF Analysis Includes Floor Costs

- BTF cost calculation includes costs already needed to meet MACT Floors (e.g. Hudson Falls LMWC baghouse)

Particulate Control (MACT Floor)

: filters (FF). Note that Wheelabrator Baltimore is currently retrofitting to FF, so we have not assumed any FF retrofit costs

assumed for FF-equipped units that cannot meet the new limits for one of the three pollutants. Did not assume ID fan

Lead (Pb) *ug/dscm@7%O2* EG limit: 56			Particulate matter (PM) *mg/dscm@7%O2* EG limit: 7.4			Control Cost ($)	
Avg conc. (2000-2015)	% Improvement needed	Control Measure	Avg conc. (2000-2015)	% Improvement needed	Control Measure	TCI ($)	TAC ($/yr)
71.55	22%	FF retrofit	5.58	-33%	-	$ 4,336,674	$ 590,565
95.53	41%	FF retrofit	6.81	-9%	-	$ 4,336,674	$ 547,656
4.57	-1124%	-	1.92	-286%	-	-	-

Particulate Control - BTF (NSPS-based limits)

s requiring more than 33% improvement to meet the NSPS-based limit.
meet the NSPS-based limit. Note that Wheelabrator Baltimore is currently retrofitting to FF, so we have not assumed any FF retrofit

at required FF retrofit to meet the MACT Floor limit are assumed to need a better filter bag beyond the retrofit to meet the NSPS-based

assumed for FF-equipped units that cannot meet the new limits for one of the three pollutants. Did not assume ID fan replacement is

Lead (Pb) *ug/dscm@7%O2* NSPS Limit: 13			Particulate matter (PM) *mg/dscm@7%O2* NSPS Limit: 4.9			Control Cost ($)	
Avg conc. (2000-2015)	% Improvement needed	Control Measure	Avg conc. (2000-2015)	% Improvement needed	Control Measure	TCI ($)	TAC ($/yr)
71.55	82%	FF retrofit + improvement	5.58	12%	FF retrofit	$ 4,336,674	$ 590,565
95.53	86%	FF retrofit + improvement	6.81	28%	FF retrofit	$ 4,336,674	$ 590,565
4.57	-184%	-	1.92	-155%	-	-	-
3.92	-232%	-	1.81	-171%	-	-	-
3.82	-240%	-	1.35	-262%	-	-	-
6.71	-94%	-	1.28	-283%	-	-	-
11.85	-10%	-	4.59	-7%	-	-	-

Problem 1+2 = Cost-Effective BTF Overlooked

- Some pollutants are *more* cost-effective at BTF than at MACT Floor

Cost Effectiveness

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Nitrogen oxides	$50,763,823	$10,808,624	2,227	[illegible]	$256,536,985	$59,432,922	11,449	[illegible]	$256,536,985	$59,432,922	11,449	$5,191
Carbon monoxide	$0	-	-	[illegible]/a	$0	-	-	[illegible]	$0	-	-	n/a
Overall	**$102,855,609**	**$51,148,313**	**5,018**		**$1,558,638,849**	**$582,251,925**	**16,814**		**$308,628,771**	**$99,772,611**	**14,240**	

Particulates $36,598/ton cheaper at BTF levels

Hg Dioxins $23,228/ton cheaper at BTF levels

- But EPA's methodology hides these cost-effective BTF options.

Problem 3: BTF Defined as New-Unit MACT Floor

- EPA defines BTF level as the new-unit MACT Floor, and assumes many existing units will have to buy expensive new equipment to meet this limit

Acid Gas Control - BTF (NSPS-based limits)

- All LMWCs have spray dryer absorbers or dry sorbent injection towers, so units that can meet the MACT floor limit are assumed to require increased lime use and disposal costs as needed to meet the NSPS-based limits. Units that already require an increased lime rate to meet the proposed MACT floor limits are assumed to require a retrofit circulating fluidized bed scrubber (CFBS) to meet the proposed NSPS-based limits.
- Hillsborough Co. RRF Unit 4 and all Palm Beach Renewable Energy Facility#2 units are equipped with state of the art SDA and are assumed to need no further control to meet limits.
- Assumes baseline Ca:Acid Gas (CAG) ratio of 2 for 29 ppmdv limit.
- SO_2 data are annual highest CEMS reading averages, with several data gaps (grey are unknowns, so use an average). Therefore use approach that likely gives conservatively high increased lime estimate

Hydrogen Chloride (HCl) *ppmdv@7%O2* NSPS Limit: 7.8			Sulfur dioxide (SO2) *ppmdv@7%O2* NSPS Limit: 14			Control Cost ($)	
Avg conc. (2000-2015)	% Improvement needed	Control Measure	Average of Annual Max	% Improvement needed	Control Measure	TCI ($)	TC
10.55	26%	Increase Lime rate	28.7	51%	CFBS	$10,122,893	$3,448,544
10.66	27%	Increase Lime rate	31.76667	56%	CFBS	$10,122,893	$3,448,544
11.91	35%	Increase Lime rate	29.38333	52%	CFBS	$10,122,893	$3,448,544
13.22	41%	Increase Lime rate	34.93333	60%	CFBS	$10,122,893	$3,448,544
12.96	39.79%	Increase Lime rate	27.4	49%	CFBS	$10,122,893	$3,448,544
13.24	41%	Increase Lime rate	36.2	61%	CFBS	$10,122,893	$3,448,544
8.85	12%	match unit	52.375	73%	CFBS	$10,122,893	$3,448,544
5.75	-36%	-	53.375	74%	CFBS	$10,122,893	$3,448,544
7.08	-10%	-	53	74%	CFBS	$10,122,893	$3,448,544
7.40	-5%	-	59.875	77%	CFBS	$10,122,893	$3,448,544
8.57	9%	match unit	56	75%	CFBS	$10,122,893	$3,448,544
9.10	14%	match unit	54.25	74%	CFBS	$10,122,893	$3,448,544
16.06	51%	CFBS	25.675	45%	CFBS	$10,122,893	$3,448,544
17.28	55%	CFBS	27.25	49%	CFBS	$10,122,893	$3,448,544
14.64	47%	CFBS	24.85	44%	CFBS	$10,122,893	$3,448,544
6.94	-12%	-	22.14286	37%	CFBS	$10,122,893	$3,448,544
6.03	-29%	-	39.28571	64%	CFBS	$10,122,893	$3,448,544
7.10	-10%	-	26.28571	47%	CFBS	$10,122,893	$3,448,544
6.36	-23%	-	24	42%	CFBS	$10,122,893	$3,448,544
8.31	6%	match unit	53.2	74%	CFBS	$10,122,893	$3,448,544
7.50	-4%	-	48	71%	CFBS	$10,122,893	$3,448,544

- But EPA ignores possible cost-effective BTF emission limits that could be met with e.g. increased lime injection rates.

EPA assumes nearly all units will need new $10 million scrubbers for its Acid Gas BTF limit

But other BTF limits could be achieved with cheaper methods that don't require expensive new equipment, like increased lime injection

Solution: Fix BTF Methodology

- 1) Disaggregate cost-effectiveness data from the 3 arbitrary “options”
- 2) Don’t include MACT-floor compliance costs in BTF cost calculation
- 3) Consider range of BTF options that result in lower emissions without expensive equipment.
- This way, cost-effective BTF options are not hidden by EPA’s methodology.

EARTHJUSTICE

BECAUSE THE EARTH NEEDS A GOOD LAWYER