



The Utility MACT

How Did EPA Arrive at the Floors/Limits for Existing Sources and Can We Expect Changes

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CAA on MACT Emission Limits

■ Floors - 112(d)(3)

- ◆ Existing: The MACT standards can be no less stringent than the average emission limitation achieved by the best 12 percent of existing sources *for which the administrator has emissions information* (if >30 sources) or by the best 5 percent of existing sources *for which the administrator has emissions information* (if <30 sources)
- ◆ New: The MACT standards can be no less stringent than the best controlled similar source

■ EPA can consider alternatives to floors

- ◆ Beyond the floor
- ◆ Work practices
- ◆ Health thresholds

Overview of Floor Development – Existing Sources

1. Develop a “pool” of EGUs representing the top 12% (i.e. the “top performers”)
2. Average the emissions for the top performers
3. Address variability
4. Set the floor

Coal Units – Pool for Floors

- PM, Non-Hg Metals, HCl, and SO₂
 - ◆ EPA pre-selected top performers as part of developing the ICR
 - ◆ EPA selected units with the newest controls installed for emissions testing
 - ◆ Floor pool (all coal) = 12% of national EGUs in the subcategory (1,091) → 131 units for both PM/TSM and HCl/SO₂

Coal Units – Pool for Floors

■ Hg

- ◆ EPA did not pre-select units as part of the ICR (i.e. random)
- ◆ Coal $>8,300$ Btu/lb = 12% of all units $>8,300$ Btu/lb represented by the ICR (330) \rightarrow 40 units
- ◆ Coal $<8,300$ Btu/lb
 - Less than 30 sources, so floor must be based on top 5 sources for which EPA has data
 - EPA used 2 units since the top 12% of all test runs belonged to two units

Floors – Existing Coal Units

- Averaged data for EGUs in the pool
 - ◆ Used the single test run with the lowest average emissions for each unit in pool (except for coal <8,300 Btu/lb, EPA averaged 11 test runs* for the 2 units in the pool)
- Addressed statistical variability as 99% UPL based on normal/lognormal distribution (Central Limit Theorem???)
 - ◆ PM and TSM – Used only the single test runs used to calculate the mean
 - ◆ HCl and Hg – used all runs for EGUs in the pool (HCl = 171 tests from 131 units; Hg = 80 tests from 40 units)

*FR 25045 says EPA used 11 data points, but a review of the spreadsheet shows only 5 data points

Floors – Existing Coal Units PM and Non-Hg Metals

Pollutant	Mean (lb/MMBtu)	UPL (lb/MMBtu)	Number of units in the floor	UPL (lb/Tbtu)	Floor value	
PM total	0.0116	0.0264	131		0.03	lb/MMBtu
Metal total	0.0000142	0.0000376	131		0.00004	lb/MMBtu
Antimony (Sb)	2.0981E-07	5.4934E-07	131	0.549338529	0.6	lb/TBtu
Arsenic (As)	4.1029E-07	1.0816E-06	131	1.081629882	2.0	lb/TBtu
Beryllium (Be)	4.8952E-08	1.3337E-07	131	0.133372821	0.2	lb/TBtu
Cadmium (Cd)	9.8523E-08	2.1212E-07	131	0.212120593	0.3	lb/TBtu
Chromium (Cr)	1.2160E-06	2.8157E-06	131	2.815717862	3	lb/TBtu
Cobalt	2.8224E-07	7.1184E-07	131	0.711841054	0.8	lb/TBtu
Lead (Pb)	5.3617E-07	1.2792E-06	131	1.279165372	2	lb/TBtu
Manganese (Mn)	1.6846E-06	4.1963E-06	131	4.196344044	5	lb/TBtu
Nickel (Ni)	1.4138E-06	3.3913E-06	131	3.391265314	4	lb/TBtu
Selenium (Se)	1.6204E-06	5.5311E-06	131	5.531080708	6	lb/TBtu

Floors – Existing Coal Units Pool for PM/TSM (top 20/131)

PM		
Plant	Unit	Ranked Emissions (lb/MMBtu)
Bonanza Power Plant	1-1	8.6037E-06
Dunkirk Generating Plant	1	2.8211E-03
Martin Drake	Unit 5 - Coal	3.0755E-03
Bridgeport Station	BHSEMU3OS3-#2	3.2963E-03
Roxboro Steam Electric Plant	Rox_Cfg_2c	3.4217E-03
Springerville	4	3.7344E-03
Havana	Boiler 9	3.8254E-03
Dunkirk Generating Plant	4	3.8498E-03
J K Spruce	1	3.8651E-03
Reid Gardner	1	4.3292E-03
San Juan	Unit 3	4.3628E-03
Roxboro Steam Electric Plant	Rox_Cfg_1b	4.9481E-03
Dallman	34	5.0000E-03
Walter Scott Jr. Energy Center	4	5.0613E-03
Weston	W4	5.2819E-03
Clover	Unit 2	5.3145E-03
Gerald Gentleman	U1	5.4900E-03
AES Hawaii	001	5.7893E-03
Crist	Unit 4	5.8071E-03
Crist	Unit 5	5.8071E-03

TSM		
Plant	Unit	Ranked Emissions (lb/MMBtu)
Chambers Cogeneration LP	Boil 2	1.32711E-06
Weston	W4	1.50078E-06
Rawhide	Rawhide101	1.51459E-06
Logan Generating Plant	Unit1	1.63523E-06
Northampton Generating Company, L.P.	GEN1	1.81939E-06
Wygen 1	WYG1Cfg	2.02798E-06
AES Shady Point,LLC	Unit 1	2.09913E-06
AES Shady Point,LLC	Unit 2	2.09913E-06
Havana	Boiler 9	2.14923E-06
Martin Drake	Unit 5 - Coal	2.20757E-06
Reid Gardner	1	2.32771E-06
Neil Simpson II	NS2Cfg	2.68727E-06
Cedar Bay Generating Company L.P.	CBA1	2.94244E-06
Cedar Bay Generating Company L.P.	CBB1	3.43571E-06
TransAlta Centralia Generation	BW21CONFIG	3.44699E-06
R D Green	2	3.62895E-06
J K Spruce	1	3.72133E-06
AES Warrior Run Cogeneration Facility	BLR1	3.94935E-06
Chambers Cogeneration LP	Boil 1	3.98947E-06
TransAlta Centralia Generation	BW22CONFIG	4.19508E-06

Floors – Existing Coal Units HCl and SO₂

Pollutant	Mean (lb/MMBtu)	UPL (lb/MMBtu)	Number of units in the floor	Floor value (lb/MMBtu)
HCl	0.000219	0.001250	131	0.002
SO ₂	0.0740	0.1699	131	0.2

HCL floor – rounded up or 3*DL?

Floors – Existing Coal Units

Pool for HCl/SO2 (top 20/131)

HCl

Plant	Unit	Ranked Emissions (lb/MMBtu)
Logan Generating Plant	Unit1	1.28728E-05
Spruance Genco, LLC	GEN3	1.61176E-05
Spruance Genco, LLC	GEN2	1.6933E-05
Seward	SEW-1	1.92667E-05
Seward	SEW-2	1.92667E-05
Sadow Station	5A	2.11859E-05
TS Power Plant	TSPower	2.17094E-05
Sadow Station	5B	2.55238E-05
Holcomb	SGU1	0.000026
Roanoke Valley II	Boiler 2	3.21748E-05
Indiantown Cogeneration L.P.	001	3.57665E-05
Rawhide	Rawhide101	3.6081E-05
Walter Scott Jr. Energy Center	4	0.000038
Spruance Genco, LLC	GEN4	3.84204E-05
Chambers Cogeneration LP	Boil 1	4.23995E-05
Navajo Generating Station	001	0.00005
Chambers Cogeneration LP	Boil 2	5.60089E-05
Colstrip	Unit3	6.2094E-05
Navajo Generating Station	002	6.66667E-05
Cross	C3	6.89398E-05

SO2

Plant	Unit	Ranked Emissions (lb/MMBtu)
Stanton	u10	0.007393938
Port of Stockton District Energy Facility	1	0.008
Coffeen	001	0.008466667
AES Puerto Rico Cogeneration Facility	Unit_2	0.00871
Elm Road Generating Station	ERGS-B1	0.009
AES Puerto Rico Cogeneration Facility	Unit_1	0.009
Sadow Station	5A	0.011155326
Boswell Energy Center	BEC3	0.011666667
TransAlta Centralia Generation	BW21CONFIG	0.0213
Spruance Genco, LLC	GEN3	0.0227
Hopewell	1 & 2	0.023157477
Rio Bravo Jasmin	Config 1	0.0232
TransAlta Centralia Generation	BW22CONFIG	0.023333333
Spruance Genco, LLC	GEN2	0.0241
Rio Bravo Poso	Config 1	0.0245
Crist	Unit 7	0.025
Crist	Unit 6	0.025
Crist	Unit 4	0.025
Crist	Unit 5	0.025
Edgecombe Genco, LLC	Gen 1	0.0278

Floors – Existing Coal Units

Hg

Pollutant	Mean (lb/MMBtu)	UPL (lb/MMBtu)	Number of units in the floor	Floor value	
Mercury - All coal	2.1250E-08	1.1812E-06	40	1.20	lb/TBtu
Mercury - Coal > 8,300 Btu/lb	2.1250E-08	1.1812E-06	40	1.20	lb/TBtu
Mercury - Coal < 8,300 Btu/lb	1.0672E-06	1.0574E-05	2	11	lb/TBtu
Mercury - ACI	3.9568E-08	1.5002E-06	6	2	lb/TBtu

Note - EPA made a data conversion error that resulted in erroneous limits for Hg being published in the proposed rule. Thus, EPA revised the Hg limits after publication. This table reflects the revised analysis

Floors – Existing Coal Units >8,300 Pool for Hg (top 20/40)

Hg		
Plant	Unit	Ranked Emissions (lb/MMBtu)
Spruance Genco, LLC	GEN2	2.6333E-09
Spruance Genco, LLC	GEN3	4.6900E-09
Nucla	001	5.3333E-09
Logan Generating Plant	Unit1	5.3333E-09
Seward	SEW-1	6.3500E-09
AES Greenidge	Unit 4	6.4602E-09
Roanoke Valley I	Boiler 1	7.2633E-09
AES Westover, LLC	8	8.1456E-09
Indiantown Cogeneration, L.P.	001	8.5384E-09
Northampton Generating Company, L.P.	GEN1	1.0397E-08
Roanoke Valley II	Boiler 2	1.0760E-08
AES Hawaii	001	1.1711E-08
Spruance Genco, LLC	GEN4	1.1770E-08
Ebensburg Power Company	EPC01	1.2483E-08
AES Hawaii	002	1.2994E-08
Colver Power Project	AAB01	1.4594E-08
Birchwood Power Facility	1A	1.5476E-08
Cedar Bay Generating Company L.P.	CBB1	1.9031E-08
Valley	VAPP-B1	1.9300E-08
Chambers Cogeneration LP	Boil 1	1.9307E-08

Floors – Existing Coal Units <8,300 Pool for Hg (5 data points)

Hg				
Plant	Unit	Data Point 1 (lb/MMBtu)	Data Point 2 (lb/MMBtu)	Data Point 3 (lb/MMBtu)
Sadow Station	5B	1.0232E-06	1.2386E-06	5.6000E-06
Oak Grove	OG1	1.1113E-06	3.8710E-06	-

Liquid Oil Units – Pool for Floors

- EPA did not pre-select top performers as part of developing the ICR
- EPA reviewed data from 1998 ICR and determined that the only controls in operation for EGUs include ESPs
 - ◆ No correlation between PM control and emissions of metallic HAPs
 - ◆ Randomly selected units for testing as part of ICR

Floors – Existing Liquid Oil Units

- Averaged data for EGUs in the pool
 - ◆ Used the single test run with the lowest average emissions for each unit in pool
- Addressed statistical variability as 99% UPL based on normal/lognormal distribution (Central Limit Theorem???)
 - ◆ Only used one test run for each EGU in the pool in the variability analysis (7 runs each for TSM, HCl, and HF)

*FR 25045 says EPA used 11 data points were used, but a review of the spreadsheet shows only 5 data points

Floors – Existing Liquid Oil Units TSM

	Mean (lb/MMBtu)	UPL (lb/MMBtu)	Number of units in the floor	Floor value, lb/TBtu
Antimony (Sb)	8.6708E-08	1.9652E-07	7	0.2
Arsenic (As)	2.7023E-07	5.4091E-07	7	0.6
Beryllium (Be)	2.7199E-08	5.6981E-08	7	0.06
Cadmium (Cd)	4.3958E-08	9.2940E-08	7	0.1
Chromium (Cr)	7.8696E-07	1.5677E-06	7	2
Cobalt	5.8610E-07	2.0215E-06	7	3
Lead (Pb)	6.4748E-07	1.9103E-06	7	2
Manganese (Mn)	1.4568E-06	4.3093E-06	7	5
Nickel (Ni)	2.3887E-06	7.2536E-06	7	8
Selenium (Se)	5.0320E-07	1.0922E-06	7	2

TSM is from the same pool, Mean = 11.0 lb/TBtu, UPL = 21.3 lb/TBtu, Floor = 30 lb/TBtu
 Hg is from the same pool, Mean = 1.99 E-02 lb/TBtu, Floor = 5.0E-02 lb/TBtu

Floors – Existing Liquid Oil Units Pool for TSM

Plant	Unit	Ranked Emissions (lb/MMBtu)
Harding Street	09	7.058570E-06
Port Everglades	PPE04	8.669772E-06
Mitchell Power Station	003	8.763471E-06
Port Everglades	PPE03	1.099941E-05
Eagle Valley	1	1.293532E-05
Eagle Valley	2	1.293532E-05
Mitchell Power Station	001	1.580483E-05

Floors – Existing Liquid Oil Units

HCl and HF

- No EPA summary table similar to others shown
- HCl
 - ◆ Mean = $9.25 \text{ E-}05 \text{ lb/MMBtu}$
 - ◆ UPL = $2.2956 \text{ E-}04 \text{ lb/MMBtu}$
 - ◆ Number of units in the floor = 7
 - ◆ Floor value = $3.0 \text{ E-}04 \text{ lb/MMBtu}$
- HF
 - ◆ Mean = $6.17\text{E-}05 \text{ lb/MMBtu}$
 - ◆ UPL = $1.576 \text{ E-}4 \text{ lb/MMBtu}$
 - ◆ Number of units in the floor = 7
 - ◆ Floor value $2.0\text{E-}04\text{lb/MMBtu}$

Floors – Existing Liquid Oil Units Pools for HCl and HF

HCl		
Plant	Unit	Ranked Emissions (lb/MMBtu)
East River	60	1.0200E-05
Eagle Valley	1	9.3457E-05
Eagle Valley	2	9.3457E-05
Harding Street	09	9.5896E-05
Kahe	K1	9.6790E-05
Harding Street	10	1.1276E-04
Waiau	W7	1.4510E-04

HF		
Plant	Unit	Ranked Emissions (lb/MMBtu)
East River	60	1.0500E-05
Suwannee River Plant	Suw_Cfg_1	4.5011E-05
C D McIntosh Jr	Unit 2	5.7150E-05
BL England	3	5.9031E-05
Manatee	PMT01	8.1140E-05
Northside Generating Station	3	8.5359E-05
Suwannee River Plant	Suw_Cfg_2	9.3639E-05

Emission Limits

- Limits for existing units are in units of lbs per electric output OR lbs per heat input
- Utilities can average emissions from all existing EGUs

Questions?

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