



# BACM and BACT Determination Requirements per PM<sub>2.5</sub> Final Rule

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# Overview

- > Determinations **are to be “generally independent”** of attainment
- > Greater emphasis on identifying measures that are **“feasible”** to implement
- > Due 18 months after reclassification to Serious
- > De minimis cannot be used to eliminate source categories from consideration
- > Must be implemented no later than 4 years after reclassification to Serious
- > Additional feasible measures required if collectively they advance attainment by at least one year

# Selection Process Steps

- > *STEP 1: Develop comprehensive inventory of sources and source categories of directly emitted  $PM_{2.5}$  &  $PM_{2.5}$  precursors*
  - ❖ Start with base year emissions inventory submitted in the Moderate area SIP
  - ❖ Include: major stationary, non-major stationary, mobile and area source categories
  - ❖ Include estimates of both anthropogenic and non-anthropogenic emissions
  - ❖ Consistent with inventory plan requirements

Status: Draft base year inventory has been prepared.

# Selection Process Steps (cont.)

- > *STEP 2: Identify potential control measures*
  - ❖ Select measures/technologies not previously considered in RACM/RACT analysis
  - ❖ Evaluate measures implemented in other states and communities
  - ❖ Review measures summarized at EPA website
  - ❖ Include all measures identified as potential controls when classified as Moderate

Status: Draft list assembled.

## Selection Process Steps (cont.)

- > *STEP 3: Determine whether an available control measure or technology is technologically feasible*
  - ❖ Stationary sources – evaluation should consider processes, operating procedures, feasibility of adding process changes, etc.
  - ❖ Area and mobile sources – consider factors addressed in RACM/RACT determinations, local circumstances, etc.
  - ❖ Reasoned justification required for measures deemed technologically infeasible for area and mobile source categories

Status: In process, implementation requirements assembled for all identified measures.



# Selection Process Steps (cont.)

- > *STEP 4: Determine whether an available control technology or measure is economically feasible*
  - ❖ Control strategies must be more stringent than those identified in RACM/RACT analysis
  - ❖ Economic feasibility is a less significant consideration for BACM/BACT analysis
  - ❖ Need to consider capital costs, operating costs, maintenance costs and cost effectiveness (\$/ton)
  - ❖ No fixed \$/ton threshold established, analysis must be relative to RACM/RACT values
  - ❖ Transparency – measures determined to be too expensive, that have been implemented in other areas must include information that allow other parties to replicate analysis

Status: Not started.

## Selection Process Steps (cont.)

- > *STEP 5: Determine earliest date at which a control measure or technology can be implemented in whole or in part*
  - ❖ Partial implementation required if measure cannot be fully implemented within 4 years from reclassification
  - ❖ If earliest implementation date is beyond 4 year **window, measure may still qualify as an “additional** feasible measure if it occurs before the Serious attainment date

Status: Collecting information.

# Challenges

- > Review of control measures for area and mobile sources identified measures in 29 separate communities
  - ❖ Decisions on how to efficiently allocate analysis resources needed, challenges include:
    - ◆ Differentiation between measures with substantial and limited benefits
    - ◆ Agreement on level of effort needed to address measures with limited benefits (i.e., provide defensible determinations)
    - ◆ Agreement on methods for use in assessing measures with substantial benefits
    - ◆ Precursor evaluations for NO<sub>x</sub> and VOC controls appear unwarranted



# Challenges (cont.)

- > Process **for establishing “Best” unclear, criteria could include:**
  - ❖ Enforcement (personnel, budget, coverage, schedule, penalty, community outreach, etc.)?
  - ❖ Is selection based on a specific implementation or a blend of requirements from multiple areas?
- > **Guidance on “technical feasibility” is limited**
  - ❖ Focus is on issues to be considered for BACT determinations
  - ❖ Mobile/area source guidance addresses broad considerations
  - ❖ **Limited guidance on “reasoned justification” considerations, what information needs to be included?**
  - ❖ Many challenges to Moderate SIP determinations

# Challenges (cont.)

- > Additional guidance needed on how to assess economic feasibility
  - ❖ How should parallel implementation in Fairbanks be evaluated?
    - ◆ Total \$
    - ◆ \$/population
    - ◆ Total enforcement personnel
    - ◆ Change in compliance rate
    - ◆ ?

# Challenges (cont.)

- > Additional guidance needed on how to assess economic feasibility (cont.)
  - ❖ Core issue in quantifying cost effectiveness in wood burning restrictions is the impact of expanded enforcement/penalties on compliance rate (it determines the emission benefit)
    - ◆ Survey of current compliance rate in process
    - ◆ Method for quantifying change in the base compliance rate unclear
    - ◆ Need process for determining defensible methodology
    - ◆ Suggest presentation of proposed method and review/comment before use

# Challenges (cont.)

- > Additional guidance needed on how to assess economic feasibility (cont.)
  - ❖ Many challenges to Moderate SIP determinations
- > When assessing TCMs is anything beyond review of 108(f) category impacts on VMT needed?
  - ◆ Assume continuation of plug-ins to be quantified
  - ◆ Use of national metrics on TCM impacts on VMT planned
  - ◆ Discussion needed on level of effort needed for cost-effectiveness calculations

# Challenges (cont.)

- > Guidance on how to distinguish BACM/BACT from MSMs
  - ❖ Is the distinction simply due to implementation before/after Serious attainment date?
  - ❖ Do other criteria apply?



# Summary of PM<sub>2.5</sub> Control Measures Not Implemented in Fairbanks

Measure Category	# of Measures	Expected Benefit
Sale of Devices	4	Near term - low
Device Installation	19	Near term - low
Device Removal	4	Significant
Device Operation	18	Significant
Dry Wood	6	Significant
Open Burning	7	Limited
Curtailment	26	Significant
Coal	3	Limited
Coffee Roasters	1	Limited
Heating Oil	13+	Significant
Used Oil	2	Limited
Transportation	5+	Limited

# Zero Visible Wood Burning Emissions Curtailment

Measure	Comment	Implementing Agency
0% Opacity during a restricted-burn period	Threshold: 30 $\mu\text{g}/\text{m}^3$ $\text{PM}_{2.5}$ Penalty: \$50 for 2nd violation, \$100 3rd violation, \$250 4th & subsequent violations	Maricopa County Air Quality Department
Zero Visible Emissions during curtailment after 3-hours has elapsed from declaration	Threshold: Stage 1 is 35 $\mu\text{g}/\text{m}^3$ within 48-hours or 30 $\mu\text{g}/\text{m}^3$ within 72-hours, Stage 2 is 25 $\mu\text{g}/\text{m}^3$ within 24-hours Penalty: up to \$1,000 per violation	Puget Sound Clean Air Agency
No Visible Emissions during an air pollution Alert	Threshold: 21 $\mu\text{g}/\text{m}^3$ $\text{PM}_{2.5}$ Penalty: not to exceed \$500 each conviction	Missoula County

# Device Disclosure/Removal Restrictions

Measure	Comment	Implementing Agency
Disclosure of devices on property sale	Penalty: First violation – up to \$720 Further violations – up to \$1,000	Klamath County Environmental Health Division
Disclosure of devices on property sale	Must specify one of the following: a. EPA Phase II Certified + b. pellet-fueled wood burning c. Rendered permanently inoperable	San Joaquin Valley APCD
Date-certain removal or rendering inoperable of uncertified woodstove and coal-only devices in Tacoma by 9/30/15	Civil penalty in an amount not to exceed \$18,388.00, per day for each violation	Puget Sound Clean Air Agency
Require notice and proof of destruction or surrender of removed, uncertified devices	Civil penalty in an amount not to exceed \$18,388.00, per day for each violation	Puget Sound Clean Air Agency

# Dry Wood

Measure	Comment	Implementing Agency
Require sale of only dry (20% moisture) wood July 1 through end of February of following year.	Penalty: 1st time – complete wood smoke awareness course or \$50 2nd time – \$150 3rd + time – \$500	South Coast Air Quality Management District
Commercial Firewood Seller must attach a permanently affixed indelible label to each package.	<i>Use of this and other solid fuel products may be restricted at times by law. Please check (1-877-4NO-BURN) or (www.8774NOBURN.org) before burning.</i> Penalty: same as above	South Coast Air Quality Management District
Specify whether wood is seasoned (20% moisture) or unseasoned.	Unseasoned wood must include instructions on how to dry	Bay Area Air Quality Management District
Require distribution of information about curtailment requirements at time of sale	Attach a label Stating: <b>“Use of this and other solid fuels may be restricted at times by law”</b>	Bay Area Air Quality Management District

# Heating Oil

Measure	Comment	Implementing Agency
Low sulfur heating oil - 15 ppm, the same requirement as on ultra-low sulfur diesel (ULSD)	All will have this requirement in place by July 1, 2018	All Northeast and Mid-Atlantic States (12)



# Used Oil

Measure	Comment	Implementing Agency
Operation and sale of <b>small “pot burners”</b> prohibited	<b>Addresses both “pot burners “ and “vaporizing” burners</b> Implemented in 1997	State of Vermont Agency of Natural Resources

# Coal Restrictions

Measure	Penalty	Implementing Agency
Remove and dispose of coal-only heater located in the Tacoma by 9/30/15	Civil penalty in an amount not to exceed \$18,388.00, per day for each violation	Puget Sound Clean Air Agency, Washington
Prohibit solid/liquid fuels in excess of .28 lbs of sulfur per million BTU	Not to exceed \$500/day	Missoula, Montana
Coal with sulfur content less than 1.0% by weight can be burned in a coal only heater.	Civil penalty in an amount not to exceed \$18,388.00, per day for each violation	Puget Sound Clean Air Agency, Washington

# Coffee Roasters

Measure	Comment	Implementing Agency
Opacity Limit – 20%. Based on 24 consecutive opacity readings at 15-second intervals for six minutes. (EPA Method 9)	Penalty can be up to \$15,000/day	State of Colorado

# Control Measure Comparisons

- > Individual **components of community's rules cannot be** compared to existing Fairbanks controls in isolation due to differences in exemptions, approved equipment, thresholds for curtailment, enforcement protocols, penalties that increase or decrease rule effectiveness, etc.
- > Each **community's package of solid fuel regulations must be** evaluated as a complete package to assess impacts on emissions during FNSB design episodes relative to existing Fairbanks controls
- > Once an approach to previously listed challenges has been devised, the relative implementation of other community rules should be quantified using the control measure calculation procedures employed in the Moderate SIP (updated for inventories and baseline controls incorporated into the serious SIP)

# Control Measure Comparisons (cont.)

- > Differences between baseline measure control benefits from the Serious SIP should be contrasted with benefits of the packages of measures identified in the BACM analysis
- > To ensure transparency in this approach an example calculation of BACM package benefits should be prepared and presented for review/critique before continuing the BACM analysis



# Comparison of Space Heating Fuel/Device Emission Rates on an Equivalent Net Energy Basis

Baseline Wood Moisture Basis (36.5% MC)									
Fuel	Device	Net	Emission Factors (lb/net mmBTU)						
		Efficiency	VOC	NOX	SO2	PM10-PRI	PM25-PRI	NH3	CO
Wood	Fireplace, No Insert	7%	258.080	2.930	0.451	38.994	38.994	2.029	284.677
Wood	Fireplace, With Insert - Non-EPA Certified	40%	10.453	0.552	0.079	6.035	6.035	0.335	45.519
Wood	Fireplace, With Insert - EPA Certified Non-Catalytic	66%	1.434	0.239	0.048	1.434	1.434	0.108	16.830
Wood	Fireplace, With Insert - EPA Certified Catalytic	70%	1.690	0.225	0.045	1.465	1.465	0.101	12.059
Wood	Woodstove - Non-EPA Certified	54%	7.743	0.212	0.058	1.774	1.774	0.058	17.702
Wood	Woodstove - EPA Certified Non-Catalytic	68%	1.392	0.187	0.046	0.919	0.919	0.029	14.344
Wood	Woodstove - EPA Certified Catalytic	72%	1.644	0.176	0.044	0.964	0.964	0.027	13.547
Wood	Pellet Stove (Exempt)	56%	0.338	0.590	0.047	0.436	0.436	0.011	1.465
Wood	Pellet Stove (EPA Certified)	78%	0.243	0.424	0.034	0.313	0.313	0.008	1.051
Wood	OWB (Hydronic Heater) - 80/20 Unqual/Phase 2 Wtd	43%	8.329	0.296	0.073	1.811	1.811	0.045	11.112
Wood	OWB (Hydronic Heater) - Unqualified	43%	9.724	0.271	0.073	2.027	2.027	0.050	10.145
Wood	OWB (Hydronic Heater) - Phase 1	43%	2.202	0.396	0.073	1.786	1.786	0.023	19.713
Wood	OWB (Hydronic Heater) - Phase 2	43%	2.752	0.396	0.073	0.948	0.948	0.023	14.981
Coal	Coal Boiler (bituminous/subbituminous, hand-fed)	43%	1.530	0.722	1.423	1.222	1.222	0.194	19.978
Oil	Central Oil (Weighted # 1 & #2), Residential	81%	0.007	0.102	0.281	0.004	0.004	0.000	0.004
Oil	Central Oil (#1 distillate), Residential	81%	0.007	0.110	0.126	0.005	0.005	0.000	0.004
Oil	Central Oil (#2 distillate), Residential	81%	0.006	0.100	0.325	0.004	0.004	0.000	0.004
Oil	Portable: 43% Kerosene & 57% Fuel Oil	81%	0.006	0.162	0.277	0.004	0.004	0.000	0.004
Oil	Direct Vent	81%	0.007	0.110	0.126	0.005	0.005	0.000	0.004
Gas	Natural Gas - Residential	81%	0.007	0.114	0.001	0.002	0.002	0.024	0.049
Gas	Natural Gas - Commercial, small uncontrolled	81%	0.007	0.122	0.001	0.002	0.002	0.024	0.049

# PM<sub>2.5</sub> Emission Factors by Device/Fuel (lb/heating mmBTU, baseline moisture, 36.5%)

