

**Preliminary Draft**  
**Best Available Control Measures Analysis for Fairbanks**  
**PM<sub>2.5</sub> Nonattainment Area**

**March 22, 2018**

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# 1. Introduction

In November 2009, Fairbanks North Star Borough was designated as a Moderate nonattainment area for the 2006 24-hour Fine Particulate (PM<sub>2.5</sub>) National Ambient Air Quality Standard (NAAQS).<sup>1</sup> On April 28, 2017, EPA officially re-classified the Fairbanks from “Moderate” to “Serious” nonattainment for the 24-Hour PM<sub>2.5</sub> standard.<sup>2</sup> The design value for the 2013-2015 period is 124 µg/m<sup>3</sup>. The difference between this value and the ambient standard is 89µg/cubic meter, which means that 98th percentile concentrations (the form of the standard) need to be reduced by 72% to demonstrate attainment.

The purpose of this document is to describe the process of identification and selection of Best Available Control Measures (BACM) for the PM<sub>2.5</sub> Attainment Plan for the Fairbanks North Star Borough (FNSB, or Fairbanks) in Alaska.

Presented below is a review of the regulatory requirements that need to be addressed in the review, analysis and selection of BACM. Also presented is a summary of revisions made to strengthen both FNSB and ADEC PM<sub>2.5</sub> regulatory controls, independent of the BACM selection process. This summary is relevant as it documents revisions made since the adoption of the Moderate Fairbanks PM<sub>2.5</sub> SIP which was approved by EPA on September 8, 2017.<sup>3</sup> Those revisions form the baseline set of controls against which control measures adopted in other communities and agencies are examined for BACM selection. A brief outline of the remainder of the Section is also included.

## Requirements for BACM Analysis

The process for selecting BACM is defined in a series of steps detailed in the Final PM<sub>2.5</sub> Rule.<sup>4</sup> Those steps clarify and update PM<sub>10</sub> control measure selection guidance presented in the Addendum to the General Preamble<sup>5</sup> for the selection of PM<sub>2.5</sub> controls for both Reasonably Available Control Measures (RACM), required for Moderate nonattainment areas and BACM for Serious nonattainment areas. Presented below is a summary of the BACM selection guidance presented in the Final PM<sub>2.5</sub> Rule.

- **Step 1: Develop a Comprehensive Inventory of Sources and Source Categories of Directly Emitted and PM<sub>2.5</sub> and PM<sub>2.5</sub> Precursors** – The inventory identifies the contribution of each source category to directly emitted PM<sub>2.5</sub> and precursor emissions. This information is needed to understand the relative contribution and significance of

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<sup>1</sup> <https://www.gpo.gov/fdsys/pkg/FR-2009-11-13/pdf/E9-25711.pdf>

<sup>2</sup> <https://www.federalregister.gov/documents/2017/05/10/2017-09391/determinations-of-attainment-by-the-attainment-date-determinations-of-failure-to-attain-by-the>

<sup>3</sup> <https://www.federalregister.gov/documents/2017/09/08/2017-18768/air-plan-approval-ak-fairbanks-north-star-borough-2006-pm25>

<sup>4</sup> <https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf>

<sup>5</sup> [https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19940816\\_59fr\\_41998-42017\\_addendum\\_general\\_preamble.pdf](https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19940816_59fr_41998-42017_addendum_general_preamble.pdf)

each source to the overall burden on the nonattainment area. EPA requires the identification of both anthropogenic (man-made) and nonanthropogenic (natural) emissions. It also requires the analysis to start with the base year emissions inventory submitted with the Moderate area attainment plan and to update it as necessary to reflect growth, construction, shutdowns, roadway improvements and other relevant changes that affect activity within the nonattainment area. EPA also requires the Step 1 inventory to be consistent with the emissions inventory requirements for Serious area plans.

- **Step 2: Identify Potential Control Measures** – Consistent with earlier guidance, the PM<sub>2.5</sub> Final Rule requires states to identify controls for each of the primary and secondary emission sources developed to represent activity within the subject nonattainment area. The starting point for assembling a list of controls is the RACM analysis prepared for the Moderate SIP. All controls considered, but not adopted must be identified. States are required to examine a wide range of information sources on existing and potential control measures. Measures and technologies considered and implemented in attainment plans are a significant source of information. Other information sources include summaries of control measures assembled by regional planning organizations and local air quality consortiums. EPA also maintains online links to a variety of control programs. States are required to identify both existing and potential new measures for the source categories identified in the base emissions inventory. The goal is to identify a list of control measures that are more stringent than those adopted in the Moderate SIP.
- **Step 3: Determine Whether an Available Control Measure or Technology is Technologically Feasible** – This requires the consideration of many factors including impacts on the environment (e.g., air, water, noise, etc.) and energy (e.g., consumption, availability, etc.). Measures targeting area and mobile sources need to consider infrastructure, population size, workforce type and habits, etc. In addition the critical source parameters needed to assess the impacts of the technology need to be identified (e.g., fuel specifications, travel activity, EPA certification, etc.). A key consideration is whether the identified measure provides an emissions benefit beyond those provided by existing federal, state and local controls (i.e., is it more stringent?). Another consideration is the availability of information to contrast and quantify the emission impacts of identified measure relative to existing control programs (i.e., again, is it more stringent).
- **Step 4: Determine Whether an Available Control Technology or Measure is Economically Feasible** – This step requires an explicit examination of the costs and emission benefits of the measure leading to an assessment of the \$/ton of pollutant reduced. In contrast to the criteria employed in the RACM determination process, economic feasibility “is a less significant factor”. States “may not eliminate a particular control measure as potential BACM if similar sources have successfully implemented such a measure.” States are also required to consider technologically feasible measures that have not been implemented by similar sources, but can reduce emissions at a cost that is not prohibitive. The Final PM<sub>2.5</sub> Rule does not establish a specific \$/ton threshold for economic feasibility. More expensive control measures must be adopted unless it can be demonstrated that costs and cost effectiveness are prohibitive relative to existing controls.

- **Step 5: Determine the Earliest Date by Which a Control Measure or Technology can be Implemented in Whole or in Part** – The CAA requires Serious area attainment plans to provide for the implementation of BACM no later than 4 years after reclassification of the area to Serious or prior to the statutory attainment date for the area. If a state determines that technologically and economically feasible measures can be implemented in whole or in part during this period they must be adopted and implemented as expeditiously as possible. Since Fairbanks was classified nonattainment for PM<sub>2.5</sub> in December, 2009 the statutory attainment date is December, 2019.

## Revisions to Strengthen PM<sub>2.5</sub> Regulatory Controls

Recognizing the need to make continued progress towards attainment both the Borough and the state continued to evaluate and adopt regulatory controls after the submission of the Moderate area SIP. Since these controls form the baseline against which BACM technical and economic feasibility is to be assessed, a summary of the measures adopted is presented below.

### Borough Ordinance Revisions

The PM<sub>2.5</sub> Air Quality Control Program is codified in Chapter 21.28. Numerous changes to the program have been debated within the Assembly leading to the adoption of ten separate Ordinances amending the program since the submission of the Moderate Area Plan to EPA December 31, 2014 and January 29, 2015. Collectively, the changes have significantly increased the coverage and authority of the program to control emissions within the nonattainment area. Presented below is a summary of the three primary ordinance revisions.

Ordinance 2015-01 (Adopted February 27, 2015) added the following amendments:

- Section 2 Definitions
  - Following terms were added/modified – advisory, air quality control zone, Alert, clean wood, construction and demolition debris, episode, forecast, opacity.
- Section 3 Borough Listed Appliances
  - Solid fuel burning appliances is EPA certified as meeting the federal emissions rate of 2.5 grams of PM<sub>2.5</sub> per hour or less;
  - Alternately a test method using a handheld or other portable device or accredited laboratory can be used to establish that a hydronic heater meets an PM<sub>2.5</sub> emission rate of 2.5 grams per hour or less;
  - Added variance for installation of hydronic heater requirements.
- Section 4 Prohibited Acts
  - Installation of solid fuel burning devices exceeding an EPA PM<sub>2.5</sub> emission rating of 2.5 gm/hr;
  - Disclosure to buyers and the Borough Air Quality Division prior to closure that the property contains a solid fuel burning appliance not listed by the Borough as complying with a 2.5 gm/hr rating;<sup>6</sup>

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<sup>6</sup> This provision was deleted by Ordinance 2017-18.

- Visible emission standard limiting opacity to less than 20 percent for periods of more than 10 minutes in any hour except during the first 30 minutes after firing of a cold start-up when opacity is limited to less than 50 percent;
- PM<sub>2.5</sub> emissions crossing property lines shall not be observable using EPA Method 22 and have a concentration no greater than 25µg/m<sup>3</sup> within an area measured 1,200 feet in all directions from boundaries of the emitting property;
- Hydronic heaters installation setback restrictions (330 feet from the closest property line and 660 feet from a school, clinic, hospital, or senior housing unit) and removal requirements;
- Prohibited burning of coal to appliances designed to use coal, burning wood with a moisture content exceeding 20% and a wide variety of products (e.g., garbage, tires, paint, chemicals, plywood, animal carcasses, etc.);
- Sales or leasing of solid fuel burning appliance restrictions including codified emission limits, notification of Borough restrictions, related signature and documentation submission to the Borough;
- Nuisance restrictions prohibiting the operation of a solid fuel or waste oil burning appliance creating a public or private nuisance; and
- Penalties for first and subsequent convictions.
- Section 5 Forecasting Exceedances and Restrictions in the Air Quality Control Zone During an Alert
  - Restrictions within air quality control zones – established three levels of episodes/restrictions:
    - a. Stage 1 concentrations forecasted to exceed 25µg/m<sup>3</sup> – residents requested to voluntarily stop operation of solid fuel devices;
    - b. Stage 2 concentrations forecasted to exceed 35µg/m<sup>3</sup> – burning is permitted for borough listed appliances;
    - c. Stage 3 concentrations forecasted to exceed 55µg/m<sup>3</sup> – no fuel may be added to solid fuel burning devices, except for buildings with approved NOASH designation or when the temperature is below -15° F as recorded at Fairbanks International Airport.
- Section 6 Powers and Duties of the Air Pollution Control Commission
  - After a hearing determine whether a person may receive a variance allowing them to install a hydronic heater
- Section 7 No Other Adequate Source of Heat (NOASH) determination (NOASH)
  - Application by building owner using Borough form;
  - Affidavit that the structure has no other source of heat except a solid fuel or waste fuel burning device or that economic hardship requires the use of these appliances;
  - Appeal process
- Section 8 Fine Schedule
  - Specified penalties for installation of an unlisted appliance, failure to remove an unlisted appliance, violation of visible emissions standard, emissions crossing property lines, illegal installation of hydronic heaters, failure to remove hydronic heaters, use of prohibited fuels, violation of commercial fuel sale requirements, violation of stage 2 alert restriction, violation of a stage 3 restriction, filing a false affidavit.

Ordinance 2017-18 (Adopted March 9, 2017), added the following modifications:

- Section 2 Definitions
  - Following terms were added/modified – air quality index, Alert, appliance, clean wood, construction and demolition debris, cook stove, emergency power system, EPA, EPA certified, fireplace, fireplace insert, heating appliances, hydronic, hydronic heater, masonry heater, nonattainment area, nowcast, opacity, particulate matter, pellet fuel burning device, PM<sub>2.5</sub>, sale, solid fuel burning appliance, and waste oil burning appliance;
- Section 3 Borough Listed Appliances
  - Solid fuel burning appliance is a masonry heater or cook stove;
- Section 4 Prohibited Acts
  - No person who has been convicted/pled no contest to two or more violations of emissions crossing property lines shall operate, use or keep installed a hydronic heater unless the device was Borough listed, a closed combustion system or connected to thermal mass certified by the contractor to burn at maximum capacity minimizing on/off cycling
- Section 5 (New) Enhanced Voluntary Removal Replacement and Repair Program
  - Subject to funding availability, the borough shall, to the extent possible offer an enhanced removal, replacement and repair program subject to specified eligibility requirements, conditions, and criteria, including:
    - a. Application,
    - b. Priority ranking,
    - c. Eligibility,
    - d. Additional requirements (e.g., inspection process, removal, delivery, etc).
    - e. Payment limits for hydronic heaters, masonry heaters, alternate fuel heaters, an emergency power system and EPA certified pellet stove with emission rate less than or equal to two grams of PM<sub>2.5</sub> per hour.
- Section 6 Forecasting Exceedances and Restrictions in the Air Quality Zone During an Alert
  - Reduced stage restrictions from 3 to 2
    - a. Stage 1 is implemented when concentrations exceed or are forecasted to exceed 25 µg/m<sup>3</sup>, which allows burning in all EPA-certified solid fuel burning devices, certified hydronic heaters with an emission rating of 2.5 grams per hour, masonry heaters and cook stoves; and properties with certified NOASH designation.
    - b. Stage 2 is implemented when concentrations exceed or are forecasted to exceed 35 µg/m<sup>3</sup>, all solid fuel burning is prohibited except properties with certified NOASH designation.
    - c. Removal of the -15° F temperature burn ban exemption threshold
- Section 7 No Other Adequate Source of Heat Determination
  - The solid fuel burning appliance is only allowed if it is EPA certified unless an application has been made to remove or replace the non-certified SFBA and it has been denied, a pellet burning appliance installed prior to April 1, 2017, a masonry heater or a cook stove.
  - An applicant denied NOASH determination, may apply for a variance and receive a temporary NOASH determination pending decision of the commission.

- Section 8 Voluntary Burn Cessation Program is repealed
- Section 9 Fine Schedule – penalties and mandatory warning requirements are modified.

#### Ordinance 2017-44 (Adopted June 19, 2017)

- Section 2 Definitions
  - Following terms were added/modified – commerce, new construction, proper wood storage,
- Section 3 Borough Listed Appliances
  - Added requirements for installation of solid fuel burning appliances in new construction, including:
    - a. Meeting all federal, state and borough regulations
    - b. Meeting Chapter requirements
    - c. Proper sizing
    - d. Installation by Borough listed vendor/installer, validation of proper wood storage and training
    - e. Installation permit
    - f. Air Pollution Control Commission variance
- Section 4 Enhanced Voluntary Removal, Replacement and Repair Program
  - Addition of Borough listed vendor/installment requirements, including:
    - a. Compliance with manufacturer and building code specs
    - b. Demonstration of proper wood storage
    - c. Training and demonstration of understanding of device operation
    - d. Requirement that all aspects of the Section must be performed by borough-approved personnel or vendor.
- Section 5 Forecasting Exceedances and Restrictions in the Air Quality Control Zone During an Alert
  - Modified Stage 1 restriction to prohibit addition of any fuel to a solid fuel burning appliance or waste oil burning appliance until the Alert is cancelled (i.e., deleted the previous language allowing operation of EPA certified solid fuel burning appliances, EPA certified hydronic heaters, masonry heaters, cook stoves, etc.)
  - Modified Stage 1 waiver allowing a solid fuel burning appliance that can be operated to be a borough listed appliance.
  - Addition of Stage 1 documentation requirements (i.e., pictures, make, model, wood storage and wood burning training techniques)
- Section 6 No Other Adequate Source of Heat Determination
  - Addition of documentation requirements (i.e., pictures, make, model, wood storage and wood burning training techniques)
  - Addition of documentation requirements for economic hardship
- Subsection G of FNSBC 4.12.110 was amended to require the commission to hear variance requests.
- Section 9 Fine Schedule – penalties and mandatory warning requirements are modified.

#### Alaska Administrative Code Revisions

Amendments were adopted in 2016 and 2017 to reflect locally-adopted control measures.

With an effective date of November 26, 2016, the SIP was adopted by reference. In addition, the following sections of Chapter 50, the Air Quality Code were amended:

- Section 50.025: Visibility and other special protection areas to establish three “air quality control zones” within the Fairbanks PM<sub>2.5</sub> Nonattainment Area: Goldstream, Fairbanks, and North Pole;
- Section 50.030: State air quality plan to adopt revisions to the State Air Quality Control Plan in Volume II Section III.D.5: Fairbanks North Star Borough PM-2.5 Control Plan;
- Section 50.075: Wood-fired heating device visible emission standards to lower visible emission standards for solid fuel-fired heating devices during air quality advisories and to allow the Department discretion to prohibit operation of solid fuel-fire heating devices during air quality episodes;
- Section 50.076: Solid fuel-fired heating device fuel requirements to add the list of materials that cannot be burned in a solid fuel-fired heating device,
- Section 50.077: Standards for wood-fired heating devices to prohibit the reinstallation of wood-fired hydronic heaters and wood stoves that do not meet emission standards within a nonattainment area.

With an effective date of January 2, 2018, the following Sections of Chapter 50 of the Air Quality Code were amended:

- Section 50.030: State air quality plan to adopt revisions to the Control Plan and add language addressing nonattainment area permit requirements;
- Section 50.075: Wood-fired heating device visible emission standards to add new language on visible emissions standards and to remove language that is no longer applicable;
- Section 50.077: Standards for wood-fired heating devices to address requirements for wood-fired heating devices, heating device test methods and address heating devices located in the FNSB nonattainment area;
- Section 50.079: (New) to address requirements for coal-fired heating devices;
- Section 50.990: to add definitions

In addition to the code revisions noted above, the Serious designation triggered the implementation of contingency measures contained in the Moderate PM<sub>2.5</sub> SIP. Alaska's regulations contain two contingency measures for the Fairbanks PM<sub>2.5</sub> nonattainment area. The first addressed property transactions and went into effect immediately. It requires removal or replacement of older, more polluting, solid fuel-fired devices when a property is sold, leased, or conveyed which will accelerate turnover and result in fewer of these devices operating in the area and reduce wood smoke emissions. Solid fuel-fired devices that appear on any of DEC's [lists of EPA-certified and Phase 2 “White Tag” devices](#) do not need to be removed or replaced. The second requires commercial wood sellers to register with the state and disclose the moisture content of wood they sell; it went into effect after a 60-day public notice period. This information aids consumers to make educated decisions about whether wood needs to be seasoned to reduce its moisture content to less than 20%, or if the wood is dry and can be burned right away.

## Outline for Remainder of the Section

The remainder of this document is organized to present the findings of analyses addressing each of the 5 BACM steps outlined above. Section 2 presents a summary of the calculations prepared to quantify the baseline emission inventory (Step 1). A summary of the process followed to identify potential control measures is presented in Section 3 (Step 2). Section 4 presents the results of the technological feasibility analysis prepared for each of the measures identified in Section 3 (Step 3). Section 5 will present the results of the economic feasibility analysis for each measure determined in Step 3 to be technologically feasible (Step 4). Step 4 is under construction. Section 6 will present information on the earliest date at which measures determined to be technologically feasible in Step 3 can be implemented (Step 5). Step 5 is under construction. Section 7 will present a summary of the selected BACM measures. Section 7 is under construction. Appendix A lists the contents of each of the spreadsheets prepared for the control measures analyzed in Step 4.

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## 2. Step 1 – Develop a Comprehensive Inventory of Sources and Source Categories of Directly Emitted and PM<sub>2.5</sub> and PM<sub>2.5</sub> Precursors

The first element in the multi-step BACM process consists of the development of an emission inventory (EI) of sources of directly-emitted PM<sub>2.5</sub> and PM<sub>2.5</sub> precursors within the nonattainment area. This section describes that process. It includes a list of all source categories reflected in the inventory and a summary of the sources and activities in the nonattainment area. It also includes a summary of emissions by source category of both directly emitted PM<sub>2.5</sub> and its precursors.

### Source Categories Inventoried

Overview - The inventory supporting the BACM analysis was developed in a manner consistent with the EI requirements for Serious area plans specified in EPA's PM Implementation Rule<sup>7</sup> (or PM Rule). This included representation of source activity and emissions on a seasonal, rather than annual basis as provided for under the PM Rule. As discussed in the separate Emission Inventory document, use of seasonal estimates is appropriate for the 24-hour PM<sub>2.5</sub> standard in Fairbanks since violations of the standard are confined to winter months (October through March) and source activity that triggers these violations peaks during that time.

The inventory was developed using the 2008 base year emission inventory for the Fairbanks PM<sub>2.5</sub> nonattainment area from the approved Moderate SIP as its starting point and then updated based on additional source and activity data collected since preparation of that inventory. The inventory was also projected forward to calendar year 2013, the baseline year for the Serious SIP.

This inventory covers activity and emissions across the following source types:

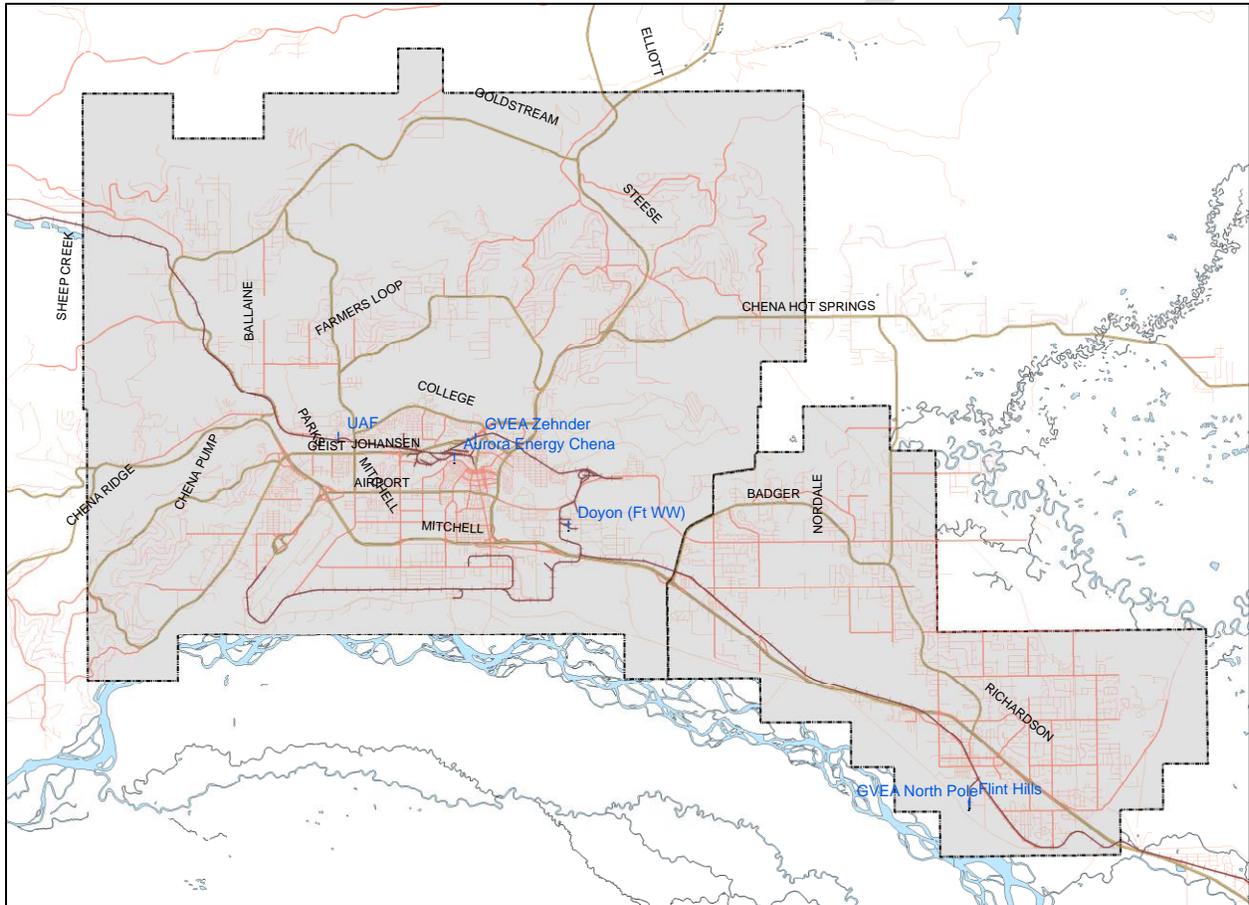
1. *Stationary Point Sources* – Industrial facility emissions for major stationary sources based on the major source reporting threshold of 70 tons/year as required for Serious plan inventories under the PM Rule;
2. *Stationary Nonpoint (or Area) Sources* – Includes all remaining stationary sources, including both industrial facilities below the major source reporting threshold above as well as “traditionally” defined area sources such as residential and commercial space heating and other disperse stationary emission sources;
3. *On-Road Mobile Sources* – Represents activity and emissions from on-road motor vehicles which includes gasoline and diesel-powered passenger cars, light-duty trucks/vans, buses and heavy-duty trucks; and

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<sup>7</sup> Federal Register, Vol. 81, No. 164, August 24, 2016 (FR 81 58010).

4. *Non-Road Mobile Sources* – Emissions from all remaining mobile sources than are not on-road certified vehicles. This includes non-road vehicles/equipment such as construction/mining equipment, off-highway vehicles, snowmobiles and other recreational vehicles, aircraft and airfield equipment and locomotives.

Figure 1 shows the boundaries of the Fairbanks PM<sub>2.5</sub> nonattainment area (shaded region) along overlaid on the roadway system in the area. The nonattainment area covers 271 square miles. Figure 1 also shows the names and locations of the six major point sources located within the nonattainment area (using blue dots).



**Figure 1. Fairbanks PM<sub>2.5</sub> Non-Attainment Area**

Sources Included and Pollutants Covered – The inventory included a review of all anthropogenic and biogenic emission sources within the nonattainment area. As described in greater detail in the Emission Inventory document, it was determined that biogenic emissions were negligible during the winter season represented in the inventory. In addition, fugitive dust sources of PM<sub>2.5</sub> were also estimated to be negligible under the snow/ice bound conditions reflected in the winter seasonal inventory.

Pollutants represented in the inventory consisted of both direct PM<sub>2.5</sub> as well as emissions of potential precursor pollutants: sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), volatile organic compounds (VOC), and ammonia (NH<sub>3</sub>).

Summary of Inventory Data Sources and Methods – Table 1 briefly summarizes the data sources and methods used to develop the emissions inventory by source type. It also highlights those elements based on locally-collected data. As shown by the shaded regions in Table 1, the majority of wintertime activity and emission factor data supporting the inventory was developed based on local data and test measurements.

**Table 1. Summary of Data/Methods Used in Serious SIP Inventory**

Source Type/Category	Source Activity	Emission Factors
Point Sources	Facility and stack-level fuel use and process throughput	Continuous emissions monitoring or facility/fuel-specific factors
Area (Nonpoint) Sources, Space Heating	Detailed wintertime Fairbanks non-attainment area residential heating device activity measurements and surveys	- Test measurements of common Fairbanks wood and oil heating devices using local fuels - AP-42 factors for local devices or fuels not tested (natural gas, coal)
Area Sources, All Others	- Seasonal, source category-specific activity from a combination of State/Borough sources - National Emission Inventory (NEI)-based activity for commercial cooking	AP-42 emission factors
On-Road Mobile Sources	Local estimates of seasonal vehicle miles traveled	- MOVES2014a emission factors based on local fleet/fuel characteristics - Augmented with Fairbanks wintertime vehicle warmup and plug-in emission testing data
Non-Road Mobile Sources	- Local activity estimates for key categories such as snowmobiles, aircraft and rail - MOVES2014a model-based activity for Fairbanks for other categories	- MOVES2014a model factors for non-road equipment - AEDT model factors for aircraft - EPA factors for locomotives

For all inventory sectors, emissions were calculated using a “bottom-up” approach that relied heavily on an exhaustive set of locally measured data used to support the emission estimates. For source types for which local data were not available, estimates relied on EPA-developed NEI

county-level activity data and emission factors from EPA's *Compilation of Air Pollutant Emission Factors*,<sup>8</sup> AP-42 database.

Within the inventory, activity and emissions were represented at the individual Source Classification Code (SCC) level, with the exception of the major point sources. Major point source emissions were compiled by SCC, facility and emission unit.

Updating Moderate SIP Estimates – The Moderate SIP contained a 2008 base year inventory. This inventory was updated to the 2013 baseline year of the Serious Plan based on a combination of activity projections (for example population/housing growth) from 2008 to 2013 and new or revised activity estimates and emission factors/models which are summarized below for the key elements.

- *Point Sources* – 2008 activity and emissions data were projected to 2013 based on annual fuel use/process throughput by individual facility and emission unit. Fuel-based ammonia emissions for point sources were also included in the 2013 inventory.
- *Space Heating Area Sources* – Additional home heating survey data collected in winters 2012 through 2015 were used to augment the estimates of residential space heating device/fuel mix and usage in the Moderate SIP based on the singular 2011 Home Heating survey. This broader sample of survey data was combined to more robustly reflect residential space heating activity within the nonattainment area for calendar year 2013 (which is centered in the combined 2011-2015 home heating survey period). Additional survey data were also collected from commercial businesses in the nonattainment area to estimate the extent of space heating from solid fuel burning devices (wood or coal) in commercial buildings. (The Moderate SIP assumed all commercial space heating used only liquid (heating oil) or gaseous (natural gas) fuels).
- *Mobile Sources* – For both on-road and non-road vehicles, EPA's latest vehicle emissions model, MOVES2014a was used to replace emission estimates from the Moderate SIP based on its predecessor, MOVES2010a.<sup>9</sup> On-road vehicle activity (VMT and speeds) was based on 2013 baseline travel demand model outputs from the Fairbanks Metropolitan Area Transportation System (FMATS) 2040 Metropolitan Transportation Plan (MTP). (The Moderate SIP used travel model estimates for 2008 from a prior transportation plan.) For non-road vehicles/equipment MOVES2014a was used to calculate 2013 calendar year emissions. The Federal Aviation Administration's AEDT model was used to estimate aircraft/airfield emissions in 2013 based on activity data collected for that year. (The Moderate SIP used the predecessor model to AEDT, EDMS, based on 2008 activity).

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<sup>8</sup> "Compilation of Air Pollutant Emission Factors," Fifth Edition and Supplements, AP-42, U.S. EPA, Research Triangle Park, NC. January 1995.

<sup>9</sup> MOVES2014a models both on-road and non-road vehicles/equipment. MOVES2010a only modeled emissions from on-road vehicles; a separate model NONROAD2008 was used in the Moderate SIP to address non-road vehicle emissions.

## Summary of Emissions

Emissions for the 2013 baseline inventory within the Fairbanks PM<sub>2.5</sub> nonattainment area were updated from the 2008 Moderate SIP base year inventory as summarized in the preceding section and tabulated by key source sector. Table presents the resulting emission estimates, expressed as average day emissions within the winter season. Emissions of direct PM<sub>2.5</sub> are highlighted in the first column. Precursors pollutant emissions are also shown. As seen in Table, the largest share of direct PM<sub>2.5</sub> comes from space heating, with wood-burning being the dominant fuel type. For NO<sub>x</sub> and SO<sub>2</sub>, point sources are the dominant contributor. (The majority of VOC and NH<sub>3</sub> precursors emissions also come from space heating).

**Table 2. 2013 Baseline Winter Season Nonattainment Area Emissions (tons/day) by Source Sector**

Source Sector	Nonattainment Area Winter Season Emissions (tons/day)				
	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	NH <sub>3</sub>
Point	1.25	10.58	7.44	0.21	0.051
Area, Space Heating, All	2.62	2.32	3.62	9.56	0.137
Area, Space Heat, Wood	2.46	0.39	0.08	9.35	0.092
Area, Space Heat, Oil	0.06	1.72	3.42	0.10	0.003
Area, Space Heat, Coal	0.09	0.05	0.10	0.11	0.013
Area, Space Heat, Other	0.01	0.16	0.02	0.01	0.028
Area, Other	0.05	0.00	0.00	0.33	0.000
On-Road Mobile	0.26	3.63	0.04	4.41	0.055
Non-Road Mobile	0.03	0.03	0.00	1.32	0.000
<b>TOTALS</b>	<b>4.20</b>	<b>16.56</b>	<b>11.10</b>	<b>15.82</b>	<b>0.244</b>

To provide a clearer understanding of the significance of each source sector, Table provides a breakdown of the percentage contributions of each sector (or subcategory) to total emissions for each pollutant. As shown in Table over 62% of direct PM<sub>2.5</sub> comes from space heating. Point sources contribute just under 30% of direct PM<sub>2.5</sub>, with other area sources and mobile sources accounting for the remaining 8%. For NO<sub>x</sub>, point sources are the major contributor, accounting for roughly 64% of total emissions. On-road vehicles are the second largest NO<sub>x</sub> source, representing 22%. SO<sub>2</sub> emissions come primarily from point sources (67%), with heating oil-based space heating contributing the next largest share (31%).

Since the portion of emission sources encompassing all categories except point sources are subject to BACM (point sources are addressed under BACT), these tabulations show that space heating is the dominant, but not singular source of emissions under BACM.

**Table 3. 2013 Baseline Winter Season Nonattainment Area Emission Contributions by Source Sector (% of total pollutant emissions)**

Source Sector	Nonattainment Area Winter Season Emissions (tons/day)				
	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	NH <sub>3</sub>
Point	29.7%	63.9%	67.0%	1.3%	21.1%
Area, Space Heating, All	62.4%	14.0%	32.6%	60.4%	56.2%
Area, Space Heat, Wood	58.6%	2.3%	0.8%	59.1%	37.9%
Area, Space Heat, Oil	1.5%	10.4%	30.8%	0.6%	1.4%
Area, Space Heat, Coal	2.0%	0.3%	0.9%	0.7%	5.5%
Area, Space Heat, Other	0.3%	1.0%	0.2%	0.1%	11.4%
Area, Other	1.1%	0.0%	0.0%	2.1%	0.0%
On-Road Mobile	6.1%	21.9%	0.4%	27.8%	22.6%
Non-Road Mobile	0.6%	0.2%	0.0%	8.3%	0.2%
<b>TOTALS</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

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### 3. Step 2 – Identify Potential Control Measures

The second step in the BACM identification and evaluation process is to identify candidate control measures. In this step, a list of control measures potentially applicable to the mobile and area source PM<sub>2.5</sub> source categories is developed for consideration as BACM. States are required to examine a wide range of information sources on existing and potential control measures in the search for candidate BACM. The Final PM<sub>2.5</sub> Rule requires the list of potential controls to include “options not previously considered as RACM/RACT”, control measures being implemented in other nonattainment areas, and measures considered by regional planning organizations and state and local air quality consortiums. The goal is to identify a list of control measures that are more stringent than those adopted in the Moderate Area SIP. Presented below is a summary of agencies and measures considered, and the measures selected for consideration as BACM. RACT-related sources and control technologies are addressed in the Moderate SIP.

#### RACM

As noted earlier, the starting point for assembling a list of controls is the RACM analysis prepared for the Moderate Area SIP. All controls that were considered, but not adopted, must be identified. Table 4 lists the measures the RACM analysis determined to be technologically infeasible (Table 5.7-6. Candidate Control Measures Considered for RACM) and economically infeasible (Table 5.7-7. Technologically Feasible Control Measures). Many of the measures determined to be technologically infeasible were rejected because of a referendum that was in place prohibiting the Borough from regulating home heating systems and fuels. The referendum has since lapsed; however, a replacement initiative is set for a vote in the 2018 fall election. Several measures were rejected because they were determined to be not practically enforceable in the Borough. The Final PM<sub>2.5</sub> Rule eliminated this criterion as a basis for infeasibility. Two of the measures were determined to be economically infeasible. The first provided economic incentives to switch to lower sulfur fuel oil. The second addressed expansion of the District heating system. Both measures are considered here as candidate measures for BACM.

Table 4 lists source categories, the titles of control measure and the disposition/Measure # of each. The title of the control measure includes a sequence number identifying its place in the RACM analysis. The disposition/Measure # column lists each of the sequence numbers assigned to measures evaluated in the BACM analyses. Those starting with the letter R indicate that it is RACM measure. The measure sequence numbers not preceded by the letter R (e.g., Ban on green wood sales is listed as 36) indicate the candidate BACM measures identified in the review of regulations adopted by other jurisdictions that address the same source category. Some of the RACM measures deemed infeasible are addressed in multiple control strategies identified in the regulations of other jurisdictions and include multiple measure sequence numbers (e.g., Mandatory curtailment on Air Quality Advisory Days is addressed in Measures 19, 22 and 35). Measure “19. Use stove change outs to generate NSR offsets” is addressed as a candidate BACT measure in the BACT report. Each of the other measures listed in Table 4 is analyzed for technical feasibility in Step 3.

**Table 4. Fairbanks RACM Controls Found to be Technologically Infeasible**

Source Category	Control Measure	Disposition/ Measure #
Dry Wood	1. Regional kiln	R1
	2. Ban on green wood sales	36
Hydronic Heaters	3. Mandatory curtailment on Air Quality Advisory Days	19, 22, 35
	4. All units must be certified	R4
	5. Ban new installations	R5
	6. Remove at time of home sale	R6
	7. Ban use	R7
Wood Stoves	8. Mandatory curtailment on Air Quality Advisory days	19, 22, 35
	9. All units must be certified	R9
	10. Replace uncertified units at time of sale	R10
	11. Replace uncertified units at time of significant remodeling	R11
	12. Replace uncertified stoves in rental units	R12
	13. Require alternate heat source in rental units	24
	14. Require alternate heat source in new construction	8
	15. Ban new installations	R15
	16. Disincentives to sell used stoves	R16
	17. Ban use	R17
Fireplace	18. Use stove change outs to generate NSR offsets	BACT Measure
	19. Mandatory curtailment on Air Quality Advisory days	19, 22, 35
Transportation*	20. HOV lanes	R20
	21. Traffic flow improvement program	R20
	22. Create non-motorized traffic zones	R20
	23. Employer-sponsored flexible work schedules	R20
	24. Retrofit diesel fleet (school buses, transit fleets)	R20
	25. On-road vehicle I/M program	R20
	26. Heavy-duty vehicle I/M program	R20
27. State LEV program	R20	
<b>Fairbanks RACM Controls Found to be Economically Infeasible</b>		
Residential Fuel Oil Combustion	28. Provide economic incentives to switch to low sulfur fuel	51
	29. Increase Coverage of District Heating Systems	R29

\* All listed transportation measures are addressed as a single measure – R20.

## Control Measures Implemented in Other Nonattainment Areas

A wide range of rules implementing SIP controls was examined to identify control measures for consideration as BACM. Table 5 lists the local jurisdictions and states whose regulations were examined to identify potential PM<sub>2.5</sub> control measures. It also lists the links to 33 separate websites containing rules and regulations adopted by these jurisdictions to control PM<sub>2.5</sub> emissions. Several states and local jurisdictions have multiple rules addressing PM<sub>2.5</sub> control. Most rules are extensive and contain separate sections addressing definitions, prohibitions, stage restrictions, exemptions, penalties, etc. Use of these links facilitated the comparative evaluation of control program requirements in the Fairbanks North Star Borough and State of Alaska to those of other jurisdictions to determine if those of other jurisdictions are potentially more stringent than corresponding Fairbanks' requirements - the screening qualification for consideration as BACM.

After reviewing the range of PM<sub>2.5</sub> control programs in place across the country, it became apparent that many had similar structures, and detailed requirements reflecting local decisions about how best to implement needed controls. Since the programs reviewed did not fit into a uniform template, evaluations of them had to be conducted in a careful manner to understand requirement nuances. Definitions differ, prohibitions and thresholds for implementation differ, exemptions frequently differ, etc. Thus, while it was tempting to contrast entire regulatory packages to determine which provided the largest reduction in emissions, quantification of reductions was found to be a complex exercise because of the numerous regulatory differences between these packages and that of Fairbanks. Several of the findings made during this initial approach were that:

1. Considerable effort would be required to develop separate spreadsheets for each regulatory package to quantify overall emission benefits in Fairbanks;
2. Individual components of regulatory packages that could provide benefits in Fairbanks could be missed if other components of the same packages offset these benefits when packages were considered in toto (i.e., throwing the baby out with the bathwater);
3. Comparisons of individual regulatory elements is easier to analyze and present for review;
4. Comparisons of individual regulatory elements do not require spreadsheet analysis to determine which elements are more stringent;
5. Frequently, the data or estimates needed to contrast measures quantitatively do not exist: impacts on emissions due to differences in exemption details, approved device categories, installation requirements, curtailment requirements, enforcement policies, shifts in behavior, etc.

Collectively, the issues listed above led to a decision to contrast elements of regulatory packages with those of the Borough and the State of Alaska. The search for regulatory elements that appeared to be more stringent than those in Fairbanks and Alaska regulations first produced a list of jurisdictions implementing them and weblinks to the applicable regulations. This list is presented in Table 5.

**Table 5. Programs Examined to Identify Candidate PM<sub>2.5</sub> Control Measures**

<b>Location/Information Sources</b>
Arvada, CO - <a href="https://yosemite.epa.gov/r8/r8sips.nsf/e5e850cc767bc8b3872573a9004cad73/bd3b257587d4a7de87257e0c00703faf/\$FILE/ATTBMOIH.pdf/(c)(1)%205%20CCR%201001-6,%20Reg%204.8.1.%20Arvada%20Ord%202451.pdf">https://yosemite.epa.gov/r8/r8sips.nsf/e5e850cc767bc8b3872573a9004cad73/bd3b257587d4a7de87257e0c00703faf/\$FILE/ATTBMOIH.pdf/(c)(1)%205%20CCR%201001-6,%20Reg%204.8.1.%20Arvada%20Ord%202451.pdf</a>
Georgia, GA - <a href="https://epd.georgia.gov/air/sites/epd.georgia.gov/air/files/related_files/document/narrative_08.16.12%20atlanta.pdf">https://epd.georgia.gov/air/sites/epd.georgia.gov/air/files/related_files/document/narrative_08.16.12%20atlanta.pdf</a>
Alaska, AK - <a href="http://dec.alaska.gov/commish/regulations/pdfs/18-AAC-50.pdf">http://dec.alaska.gov/commish/regulations/pdfs/18-AAC-50.pdf</a>
Aurora, CO - <a href="https://library.municode.com/co/aurora/codes/building_and_zoning?nodeId=BUZOCO_CH146ZO_ART12SURESPUSAC_DIVIGEUS_S146-1204BURE">https://library.municode.com/co/aurora/codes/building_and_zoning?nodeId=BUZOCO_CH146ZO_ART12SURESPUSAC_DIVIGEUS_S146-1204BURE</a>
Idaho, ID - <a href="https://www.deq.idaho.gov/media/930589-cache_valley_pm2_5_nonattainment_state_implementation_plan_1212.pdf">https://www.deq.idaho.gov/media/930589-cache_valley_pm2_5_nonattainment_state_implementation_plan_1212.pdf</a> - <a href="https://adminrules.idaho.gov/rules/2014/58/0101.pdf">https://adminrules.idaho.gov/rules/2014/58/0101.pdf</a> - <a href="http://www.deq.idaho.gov/media/930593-cache-valley-pm2-5-sip-appendices-1212.pdf">http://www.deq.idaho.gov/media/930593-cache-valley-pm2-5-sip-appendices-1212.pdf</a>
Colorado, CO - <a href="https://yosemite.epa.gov/R8/R8Sips.nsf/PrintSips/C5D17E5CB9461F8587257EED004BBD82?OpenDocument">https://yosemite.epa.gov/R8/R8Sips.nsf/PrintSips/C5D17E5CB9461F8587257EED004BBD82?OpenDocument</a> - <a href="https://www.colorado.gov/pacific/cdphe/aqcc-regs">https://www.colorado.gov/pacific/cdphe/aqcc-regs</a> - <a href="https://www.colorado.gov/pacific/sites/default/files/5-CCR-1001-6_1.pdf">https://www.colorado.gov/pacific/sites/default/files/5-CCR-1001-6_1.pdf</a>
Delaware, DE - <a href="http://regulations.delaware.gov/AdminCode/title7/1000/1100/1113.shtml">http://regulations.delaware.gov/AdminCode/title7/1000/1100/1113.shtml</a>
Fairbanks North Star Borough, AK - <a href="http://www.codepublishing.com/AK/FairbanksNorthStarBorough/#!/FNSBC21/FNSBC2128.html#21.28">http://www.codepublishing.com/AK/FairbanksNorthStarBorough/#!/FNSBC21/FNSBC2128.html#21.28</a>
Feather River AQMD, CA - <a href="https://www.arb.ca.gov/drdb/fr/cur.htm">https://www.arb.ca.gov/drdb/fr/cur.htm</a>
Imperial County, CA - <a href="https://www.arb.ca.gov/drdb/imp/cur.htm">https://www.arb.ca.gov/drdb/imp/cur.htm</a>
Kern County, CA - <a href="https://www.arb.ca.gov/drdb/ker/cur.htm">https://www.arb.ca.gov/drdb/ker/cur.htm</a>
Klamath County, OR - <a href="http://www.co.klamath.or.us/EH/Air%20Quality%20&amp;%20Burning/Klamath%20County%20Clean%20Air%20Ordinance.htm">http://www.co.klamath.or.us/EH/Air%20Quality%20&amp;%20Burning/Klamath%20County%20Clean%20Air%20Ordinance.htm</a>
Lincoln County, MT - <a href="http://lincolncountymt.us/images/departments/environmental_health/pdf/air_quality/AirOrdinanceRev_10MAY2017.pdf">http://lincolncountymt.us/images/departments/environmental_health/pdf/air_quality/AirOrdinanceRev_10MAY2017.pdf</a>
Maine, ME - <a href="https://www.maine.gov/sos/cec/rules/06/096/096c150.doc">https://www.maine.gov/sos/cec/rules/06/096/096c150.doc</a>
Maricopa County, AZ - <a href="http://www.maricopa.gov/DocumentCenter/View/5332">http://www.maricopa.gov/DocumentCenter/View/5332</a> - <a href="http://www.maricopa.gov/DocumentCenter/View/5252">http://www.maricopa.gov/DocumentCenter/View/5252</a> - <a href="http://www.maricopa.gov/DocumentCenter/View/5200">http://www.maricopa.gov/DocumentCenter/View/5200</a>
Missoula City-County, MT - <a href="https://www.missoulacounty.us/home/showdocument?id=8452">https://www.missoulacounty.us/home/showdocument?id=8452</a>

**Table 5. Programs Examined to Identify Candidate PM<sub>2.5</sub> Control Measures**

<b>Location/Information Sources</b>
New York State, NY - <a href="https://govt.westlaw.com/nycrr/Browse/Home/NewYork/NewYorkCodesRulesandRegulations?guid=I591033205f9311e0b70f0000845b8d3e&amp;originationContext=documenttoc&amp;transitionType=Default&amp;contextData=(sc.Default)">https://govt.westlaw.com/nycrr/Browse/Home/NewYork/NewYorkCodesRulesandRegulations?guid=I591033205f9311e0b70f0000845b8d3e&amp;originationContext=documenttoc&amp;transitionType=Default&amp;contextData=(sc.Default)</a> - <a href="http://www.dec.ny.gov/chemical/51986.html">http://www.dec.ny.gov/chemical/51986.html</a>
Ada County, ID - <a href="http://www.sterlingcodifiers.com/codebook/index.php?book_id=447">http://www.sterlingcodifiers.com/codebook/index.php?book_id=447</a>
Lane Regional APA, OR - <a href="http://www.lrapa.org/DocumentCenter/View/253">http://www.lrapa.org/DocumentCenter/View/253</a> - <a href="https://www.lanecounty.org/UserFiles/Servers/Server_3585797/File/Government/County%20Departments/County%20Counsel/Lane%20Code/LC09.pdf">https://www.lanecounty.org/UserFiles/Servers/Server_3585797/File/Government/County%20Departments/County%20Counsel/Lane%20Code/LC09.pdf</a>
Pennsylvania, PA - <a href="https://www.pacode.com/secure/data/025/chapter123/s123.14.html">https://www.pacode.com/secure/data/025/chapter123/s123.14.html</a>
Utah, UT - <a href="https://rules.utah.gov/publicat/code/r307/r307-302.htm">https://rules.utah.gov/publicat/code/r307/r307-302.htm</a>
Puget Sound CAA, WA - <a href="http://www.pscleanair.org/219/PSCAA-Regulations">http://www.pscleanair.org/219/PSCAA-Regulations</a>
Bay Area AQMD, CA - <a href="https://www.arb.ca.gov/DRDB/BA/CURHTML/R6-3.PDF">https://www.arb.ca.gov/DRDB/BA/CURHTML/R6-3.PDF</a>
San Joaquin Valley APCD, CA - <a href="https://www.valleyair.org/rules/currnrules/r4901.pdf">https://www.valleyair.org/rules/currnrules/r4901.pdf</a>
South Coast AQMD, CA - <a href="https://www.arb.ca.gov/DRDB/SC/CURHTML/R445.PDF">https://www.arb.ca.gov/DRDB/SC/CURHTML/R445.PDF</a> - <a href="https://www.arb.ca.gov/DRDB/SC/CURHTML/R444.PDF">https://www.arb.ca.gov/DRDB/SC/CURHTML/R444.PDF</a>
Vermont, VT - <a href="http://dec.vermont.gov/sites/dec/files/aqc/laws-regs/documents/Statutes07-01-2014.pdf#zoom=100">http://dec.vermont.gov/sites/dec/files/aqc/laws-regs/documents/Statutes07-01-2014.pdf#zoom=100</a>
Washington, WA - <a href="http://apps.leg.wa.gov/WAC/default.aspx?cite=173-400">http://apps.leg.wa.gov/WAC/default.aspx?cite=173-400</a>

The next step was to isolate the specific elements in these rules and regulatory packages that appeared to be more stringent than the corresponding elements in FNSB and Alaska regulations. These elements were assigned short descriptive titles and then organized into groups of common functionality. In other words, all of the specific elements that regulated device installation were grouped together under the group title of “Device Installation – General”. Element groups were then organized in a sequence that followed the chronological events in device acquisition, use, and retirement, such as sale, installation, permitting, exemption granting, operation, curtailment during air quality advisories, and removal. Because the analysis of source categories contributing to PM<sub>2.5</sub> nonattainment in the Borough identified coal burning, heating oil combustion, and motor vehicle travel as being significant, elements of regulations implemented by other jurisdictions that addressed these sources were grouped together in separate categories. The list of these functionality groups and individual regulatory elements evaluated is presented in Table 6. Listed with each regulatory element are the jurisdictions implementing these elements.

**Table 6. Control Measures Implemented in PM<sub>2.5</sub> Nonattainment Areas That Have Not Been Implemented in FNSB**

<b>Measure Description</b>	<b>Areas Implementing Measure</b>
<b>Sale of Devices - New</b>	
1. Surcharge on Device Sales	Washington, WA
<b>Sale of Devices – Used</b>	
2. Prohibit advertising used devices that do not meet emission criteria for new device sales	Ada County ID Utah, UT Colorado, CO
<b>Device Installation – General</b>	
3. Require building or other permit	Missoula City-County MT Ada County ID Klamath County OR
4. Require confirmation of proper installation by requiring professional installation or on-site inspection	San Joaquin Valley APCD CA
5. Register/require industry certification of heating professionals	San Joaquin Valley APCD CA
6. Prohibit installation of flue dampers unless device was certified using a flue damper	Missoula City-County MT
7. Require devices meet stricter emission criteria in high pollution zones.	Missoula City-County MT
8. Prohibit installation of Solid Fuel Heating Device (SFHD) in new construction	South Coast AQMD CA San Joaquin Valley APCD CA Bay Area AQMD CA
9. Limit the density of SFHD in new developments	San Joaquin Valley APCD CA East Kern AQMD CA
10. Install EPA-certified device whenever a fireplace or chimney is remodeled	Bay Area AQMD CA
<b>Device Installation - Hydronic Heaters</b>	
11. Prohibit use of rain caps on stacks	Maine, ME
12. Require minimum stack height relative to rooflines of nearby unserved buildings	Maine, ME New York, NY Utah, UT
13. Submit sale and installation information to Air Program	New York, NY
14. Require installation of thermal mass to improve efficiency and prevent frequent cycling in selected new units	U.S. Environmental Protection Agency
<b>Device Removal</b>	
15. Disclosure of devices on property sale	Lane Regional APA OR San Joaquin Valley APCD CA
16. Require notice and proof of destruction or surrender of removed, uncertified devices	Puget Sound CAA WA
17. Require Removal of Uncertified Solid Fuel Burning Devices Upon Sale of Property	Puget Sound CAA WA

**Table 6. Control Measures Implemented in PM<sub>2.5</sub> Nonattainment Areas That Have Not Been Implemented in FNSB**

<b>Measure Description</b>	<b>Areas Implementing Measure</b>
<b>Device Operation – Opacity</b>	
18. No Visible Emissions during Curtailment Periods	Puget Sound CAA WA Maricopa County AZ
<b>Device Operation – Permits</b>	
19. Require registration of devices to qualify for exemption from curtailments	Missoula City-County MT San Joaquin Valley APCD CA
20. Require renewals with inspection requirements	San Joaquin Valley APCD CA
21. Optional device registration for curtailment exemptions	San Joaquin Valley APCD CA Maricopa County AZ
22. Require registration of all devices	Missoula City-County MT
23. Require exempt households to display a decal visible from a point of public access	Ada County ID
<b>Device Operation – NOASH</b>	
24. Require Permanent Installed Alternative Heating Method in Rental Units	Bay Area AQMD CA Klamath County OR Aurora CO
25. Require detailed application or inspection to verify need	Puget Sound CAA WA
26. Require inspection of device and installation	San Joaquin Valley APCD CA
27. Require annual renewal of waiver	Maricopa County AZ
28. Set income threshold	Missoula City-County MT Maricopa County AZ
29. Allow only NOASH households to burn during curtailment periods	Utah, UT
<b>Fuels</b>	
30. Distribution of Curtailment Information at Time of Sale of Wood-Burning Device	South Coast Air Quality AQMD CA, Bay Area AQMD CA
31. Require sale of only dry wood during late summer to end of winter	South Coast AQMD CA
32. Require dry wood to be clearly labeled to prohibit marketing of non-dry wood as dry wood	San Joaquin Valley APCD CA Bay Area AQMD CA
<b>Open Burning</b>	
33. Burn permits required	Klamath County OR Feather River AQMD CA
34. Prohibit burn barrels and other outdoor equipment	Klamath County OR
35. Restrict burning during air pollution events	Ada County ID Klamath County OR
36. Prohibit residential open burning	South Coast AQMD CA
37. Periodic burn windows	Klamath County OR
<b>Curtailment Programs – Averaging Period</b>	
38. Ambient PM <sub>2.5</sub> concentration (1-hr average)	Idaho, ID

**Table 6. Control Measures Implemented in PM<sub>2.5</sub> Nonattainment Areas That Have Not Been Implemented in FNSB**

<b>Measure Description</b>	<b>Areas Implementing Measure</b>
<b>Curtailement Programs – Thresholds</b>	
39. Use of AQI as Basis for Curtailement Threshold	Idaho, ID
<b>Curtailement Programs – Stages</b>	
40. Single stage ban	Ada County ID Idaho, ID Maricopa County AZ Utah, UT Lane Regional APA OR Feather River AQMD CA Arvada CO Aurora CO
<b>Curtailement Program – Exemptions</b>	
41. Special needs permit	Missoula City-County MT
42. Burn down period	Puget Sound CAA WA Maricopa County AZ
43. Exempt ceremonial or religious fires	South Coast AQMD CA
44. Alternative heating appliance failure	Missoula City-County MT Maricopa County AZ Klamath County OR
45. Elevation-based	South Coast AQMD CA
46. Lack of electrical or natural gas service availability	Utah, UT South Coast AQMD CA San Joaquin Valley APCD CA
<b>Curtailement Program – Inspections</b>	
47. Inspection warrants	Aurora CO
<b>Coal</b>	
48. Date certain removal of “coal only heater”	Puget Sound CAA WA
49. Prohibit use of coal burning heaters	Longmont CO
50. Require low sulfur content coal	Missoula City-County MT Puget Sound CAA WA
51. Ultra-low Sulfur Heating Oil	Missoula City-County MT New York, NY Pennsylvania, PA
<b>Used Oil</b>	
52. Operation and sale of small “pot burners” prohibited	Vermont, VT
53. No se Sale or Exchange of Used Oil for Fuel, unless it Meets Constituent Property Limits	Vermont, VT
<b>Transportation</b>	
54. Adopt CARB vehicle standards	Pennsylvania, PA Klamath County OR
55. School bus retrofits	Klamath County OR
56. Road paving	Nogales AZ

**Table 6. Control Measures Implemented in PM<sub>2.5</sub> Nonattainment Areas That Have Not Been Implemented in FNSB**

Measure Description	Areas Implementing Measure
	Pinal County AZ Klamath County OR
57. Transportation Control Measures (TCMs)	South Coast AQMD CA
58. Controls on road sanding and salting	Utah, UT
59. I/M Program	Pennsylvania, PA

It should be noted that the analysis presented in Steps 2-5 address only residential and mobile source controls. Measures addressing small sources requiring permits and businesses have not yet been prepared – they should be considered Under Construction.

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#### **4. Step 3 – Determine Whether an Available Control Measure or Technology is Technologically Feasible**

The third step in the BACM Identification and evaluation process is the analysis of the technological feasibility of each of the candidate measures identified in Step 2. As noted above, it requires the consideration of many factors including impacts on the environment (e.g., air, water, noise, etc.) and energy (e.g., consumption, availability, etc.). Measures targeting area and mobile sources need to consider infrastructure, population size, workforce type and habits, etc. In addition, the critical source parameters needed to assess the impacts of the technology need to be identified (e.g., fuel specifications, travel activity, EPA certification, etc.). A key consideration is whether the identified measure provides an emissions benefit beyond those provided by existing federal, state and local controls (i.e., is it more stringent). Another consideration is the availability of information to contrast and quantify the emission impacts of the identified measure relative to existing control programs (i.e., again, is it more stringent).

As discussed in Step 2 the approach employed in selecting measures for analysis focused on differences between elements of individual rules implemented in PM<sub>2.5</sub> nonattainment areas and those currently implemented by the Borough and the State for the Fairbanks PM<sub>2.5</sub> nonattainment area. This section provides the results of detailed comparisons between the selected candidate measures and existing Fairbanks measures to determine if the candidate measures are more stringent and can provide emission reductions beyond those of currently implemented measures. Presented below are the findings of technological feasibility for 29 technologically and economically infeasible Fairbanks PM<sub>2.5</sub> RACM and 59 candidate measures identified in Step 2. As noted in Step 2 there is overlap between several of the infeasible RACM and Step 2 candidate measures, therefore the number of measures analyzed is less than the total of 88 listed measures. One category of common measures is transportation, which includes 11 separate measures (RACM #'s 20 – 27 candidate #'s 54, 57 and 59); all are analyzed as a single measure R20 (consistent with the approach employed in the RACM technological feasibility analysis). RACM #'s 3, 8 and 19 are addressed in elements of candidate measure #'s 19, 22 and 35. Measure R19, “Use stove change outs to generate NSR offsets,” is analyzed as a BACT measure in the BACT report.

The findings of technological feasibility are divided into three separate sections. Each section begins with a table listing the measure # and the title of the measure addressed. Listed below are the sections and number of measures addressed in each. Findings are presented for a total of 71 measures. Measures addressed in the first two sections are technologically infeasible, because they provide no emission benefits relative to current Borough and State measures impacting the Fairbanks PM<sub>2.5</sub> nonattainment area.

1. Measures Determined to be Less or No More Stringent than Existing Controls – (45)
2. Measures Determined to be Marginal/Unquantifiable Benefit – (12)
3. Measures Determined to be More Stringent than Existing Controls (14).

The presentation of the analysis findings follows a generic format which includes the following components:

- Measure #, Title
- Implementing Jurisdiction
- Regulation Weblink(s)
- Background
- Analysis
- Conclusion

This format is designed to provide transparency in the information used to prepare the analysis. The weblink(s) allow easy access to the referenced rules discussed in the background and analysis presentations.

### Analysis of Measures Determined to be Less or No More Stringent than Existing Controls

**Table 7. List of Measures Determined to be Less or No More Stringent than Existing Controls**

<b>Number &amp; Title</b>	
Measure 2	Prohibit Advertising Used Devices that Do Not Meet Emission Criteria for New Device Sales
Measure 4	Require Confirmation of Proper Installation by Requiring Professional Installation or On-Site Inspection
Measure 5	Register/Require Industry Certification of Heating Professionals
Measure 7	Require Devices Meet Stricter Emission Criteria in High Pollution Zones
Measure 13	Submit Sale and Installation Information to Air Program
Measure 14	Require Installation of Thermal Mass to Improve Efficiency and Prevent Frequent Cycling in Selected New Units
Measure 15	Disclosure of Devices on Property Sale
Measure 16	Require Notice and Proof of Destruction or Surrender of Removed, Uncertified Devices
Measure 19	Require Registration of Devices to Qualify for Exemption from Curtailments
Measure 20	Require Renewals with Inspection Requirements
Measure 21	Optional Device Registration for Curtailment Exemptions
Measure 25	Require Detailed Application or Inspection to Verify Need for No Other Adequate Source of Heat (NOASH) Permit
Measure 26	Require Inspection of Device and Installation [to Verify Need for a No Other Adequate Source of Heat (NOASH) Permit]
Measure 27	Require Annual Renewal of Waiver
Measure 28	Set Income Threshold [for Curtailment Exemption]
Measure 31	Require Sale of Only Dry Wood during Late Summer to the End of Winter

**Table 7. List of Measures Determined to be  
Less or No More Stringent than Existing Controls**

<b>Number &amp; Title</b>	
Measure 32	Require Dry Wood to be Clearly Labeled to Prohibit Marketing of Non-Dry Wood as Dry Wood
Measure 33	Burn Permits Required
Measure 34	Prohibit Burn Barrels and Other Outdoor Equipment
Measure 35	Restrict Burning During Air Pollution Events
Measure 36	Prohibit Residential Open Burning
Measure 37	Periodic Burn Windows
Measure 41	Special Needs Permit
Measure 42	Burn Down Period
Measure 43	Exempt Ceremonial or Religious Fires
Measure 44	Alternative Heating Appliance Failure
Measure 45	Elevation Exemption from Wood Burning Curtailments
Measure 46	Lack of Electrical or Natural Gas Service Availability
Measure 49	Prohibit Use of Coal Burning Heaters
Measure 50	Require Low Sulfur Content Coal
Measure 55	School Bus Retrofits
Measure 56	Road Paving
Measure 58	Controls on Road Sanding and Salting
Measure R1	Regional Kilns
Measure R4	All Wood Stoves Must be Certified
Measure R6	Remove Hydronic Heaters at Time of Home Sale
Measure R7	Ban Use of Hydronic Heaters
Measure R9	All Wood Stoves Must be Certified
Measure R10	Replace Uncertified Units at the Time of Sale
Measure R11	Replace Uncertified Stoves at the Time of Significant Remodeling
Measure R12	Replace Uncertified Stoves in Rental Units
Measure R15	Ban New Installations – Wood Stoves
Measure R16	Disincentives to Sell Used Stoves
Measure R17	Ban Use of Wood Stoves
Measure R20	Transportation Control Measures

Measure 2: Prohibit Advertising Used Devices that Do Not Meet Emission Criteria for New Device Sales

**Implementing Jurisdiction(s)**

- State of Colorado

**Regulation Weblink(s)**

- [https://www.colorado.gov/pacific/sites/default/files/5-CCR-1001-6\\_1.pdf](https://www.colorado.gov/pacific/sites/default/files/5-CCR-1001-6_1.pdf)

## **Background**

Section II of Regulation 4 Limitation on the Sale and Installation of Wood-Burning Stoves states:

*On and after January 1, 1993 no person shall sell or install a used wood-burning device within those portions of the counties of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson which are located in the AIR program area, as such area is defined in Section 42-4-304(20)(a) (2006), C.R.S., unless it meets the requirements set forth in Section II.A.*

Section II.A states:

*No person shall advertise to sell, offer to sell, sell, or install a new wood-burning stove in Colorado unless it has been tested, certified, and labeled for emission performance in accordance with applicable criteria and procedures specified in 40 CFR Part 60 ... Section 60.532(a) (2015) and Section (b) or (c) (2015) (emphasis added).*

- 40 CFR Part 60, Section 60.532(a) (2015) - 4.5 g/hr (0.010 lb/hr)
- 40 CFR Part 60, Section 60.532(b) or (c) (2015) - 2.0 g/hr (0.0044 lb/hr) using crib wood and 2.5 g/hr (0.0055 lb/hr) using cord wood, both effective in 2020.

Neither the Borough nor the State have regulations restricting or prohibiting advertising of used wood burning devices. The State and Borough, however, have several regulations that directly affect used wood burning appliances.

Alaska recently implemented regulations that require wood-fired heating devices including wood stoves, pellet stoves, and hydronic heaters, to be removed from a property before sale, lease, or conveyance in the Fairbanks North Star Borough PM<sub>2.5</sub> Nonattainment Area unless they are EPA-certified (wood and pellet stoves), have a qualifying Phase 2 “White Tag” (hydronic heaters), or meet current emission standards.

Section 21.28.030 Prohibited acts of the Borough’s air quality code prohibits the installation of unlisted solid fuel burning appliances.<sup>10</sup> It also restricts the sale or lease of an unlisted [solid fuel burning appliance](#) or barrel stove kit in the borough unless the buyer signs an affidavit, on a form prescribed by the borough, attesting that the [appliance](#) will not be installed or used in the [air quality control zone](#). The Borough’s voluntary removal, replacement and repair program (Section 21.28.040) requires applicants to remove and deliver the appliance to an authorized decommission station and deliver to the Borough a certificate of destruction. Furthermore,

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<sup>10</sup> The [solid fuel burning appliance](#) is [EPA certified](#) as meeting the federal emissions rate of 2.5 grams of [PM<sub>2.5</sub>](#) per hour or less, or, for [hydronic heaters](#), is [EPA certified](#) and has an emission rating of 0.10 pounds per million BTU or less.

Borough regulations prohibit the use of unlisted solid fuel burning appliances during Stage 1 Alerts (Section 21.28.050.C.4).

### **Analysis**

While neither the State nor the Borough have regulations prohibiting advertising of used wood burning devices that do not meet applicable EPA standards, Alaska has the following restrictions that address used wood burning devices:

- Prohibition of the transfer of wood fired devices not meeting current emission standards when a house is sold or leased within the nonattainment area;
- Prohibition of the installation of unlisted solid fuel burning appliances within the nonattainment area; and
- Destruction of qualifying used appliances replaced under the Borough's change out program.

Collectively, these programs prohibit the transfer and installation of used wood burning devices not meeting current emission standards, which are consistent with the Colorado program requirements. In addition, the primary source of used wood burning appliances, generated by the Borough's solid fuel burning appliance replacement program, requires all qualifying devices to be destroyed.

The stringency of current Borough and State regulations addressing the installation and transfer of used wood burning devices exceeds that imposed by Colorado advertising restriction on used wood burning devices prior to 2020. After 2020 the Colorado regulations have a more stringent wood burning appliance certification standard.

Borough regulations ban the use of unlisted appliances during Stage 1 Alerts. As a result, a ban on advertising such devices for sale will not reduce allowable PM<sub>2.5</sub> emissions during Stage 1 Alerts.

### **Conclusion**

The implementation of the Colorado advertising restrictions will have no effect on the sale or transfer of used wood burning devices though 2019, the statutory year of attainment of the 24-hr PM<sub>2.5</sub> standard in Fairbanks. Additionally, the adoption of this measure by the Borough will provide no emissions reductions during burning curtailment periods. This measure is not more restrictive than existing Fairbanks regulations and, thus, is not eligible for consideration as BACM.

## **Measure 4: Require Confirmation of Proper Installation by Requiring Professional Installation or On-Site Inspection**

### **Implementing Jurisdiction(s)**

- San Joaquin Valley APCD

### **Regulation Weblink(s)**

- <http://www.valleyair.org/rules/currnrules/r4901.pdf>

### **Background**

San Joaquin Valley APCD requires that applications for wood burning device registration contain certifications by District Registered Wood Burning Heater Professionals verifying that the wood burning heaters meet device eligibility requirements (Sections 4901.5.7.3.1.2).

Fairbanks requires installations of solid fuel burning appliances in new construction and replacement appliances in subsidized change-outs be performed by Borough-listed vendor/installers using Borough-listed appliances (Sections 21.28.030.E.1.b.ii, 21.28.030.E.b.iv, 21.28.040.A.4.f, and 21.28.040.A.5.b).

### **Analysis**

The San Joaquin Valley measure requires that devices applying for registration be inspected by District-registered professional to confirm that the devices are District-listed as low emission units. The Fairbanks' regulations require devices applying for registration to be device-eligible and inspected by Borough-registered professionals to certify that the device installation is proper based on the manufacturer's installation manual.

The Fairbanks' regulation requires devices to be Borough-listed and written certification of appliance installation by registered professionals, and the San Joaquin Valley measure requires only that registered professionals certify that devices applying for District registration satisfy device eligibility requirements.

### **Conclusion**

This measure is not more stringent than the corresponding requirement in Fairbanks' regulations and, thus, is not eligible for consideration as BACM.

Measure 5: Register/Require Industry Certification of Heating Professionals

### **Implementing Jurisdiction(s)**

- San Joaquin Valley APCD

### **Regulation Weblink(s)**

- <http://www.valleyair.org/rules/currnrules/r4901.pdf>

## **Background**

San Joaquin Valley APCD requires that applications for wood burning device registration and registration renewal contain certifications by District Registered Wood Burning Heater Professionals (Rule 4901 Sections 5.7.3.1.2 and 5.8.2.1). Section 5.10 of the Rule specifies the requirements for registration by the District of Wood Burning Heater Professionals. The primary requirement is to hold a current Fireplace Investigation Research and Education Certified Inspector registration, Chimney Safety Institute of America certificate, or National Fireplace Institute certificate.

Fairbanks requires installations of solid fuel burning appliances in new construction and replacement appliances in subsidized change-outs be performed by borough-listed vendor/installers (Sections 21.28.030.E1.b.iv and 21.28.040.A.4.f). The Borough requires applicants for installer-listing to be certified by the National Fireplace Institute for installations of wood stoves, pellet stoves, and gas inserts; certified by the Masonry Heaters Association for installations of masonry heaters; and possess either an Alaska mechanical or general contractors license for installations of oil-fired and propane fired heaters.<sup>11</sup>

## **Analysis**

The San Joaquin Valley measure is essentially equivalent to the corresponding requirements in Fairbank's regulation with respect to the registration of professional wood heater installers.

## **Conclusion**

This measure is not more stringent than the corresponding requirement in Fairbank's regulations and, thus, is not eligible for consideration as BACM.

## **Measure 7: Require Devices Meet Stricter Emission Criteria in High Pollution Zones**

### **Implementing Jurisdiction(s)**

- Missoula City-County MT

### **Regulation Weblink(s)**

- <https://www.missoulacounty.us/home/showdocument?id=8452>

## **Background**

The Missoula City-County wood heating control regulations require installation permits for the installation and use of all wood heating devices after July 1, 1986 in the Air Stagnation Zone

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<sup>11</sup> Email from Nicholas Czarnecki, FNSB Air Quality Division, to Bob Dulla, Trinity Consultants, on December 19, 2017

(Section 9.202.1) and May 14, 2010 in the remainder of Missoula County (Section 9.202.2). The categories of devices authorized for installation differ between the two areas. Within the Air Stagnation Zone, installation permits are authorized only for pellet stoves emitting no more than 1.0 gm/hr (Section 9.203.1.a). In the remainder of Missoula County, installation permits can be issued to devices complying with 40 CFR 60 AAA (effective February 26, 1988), pellet stoves emitting no more than 4.1 gm/hr, and outdoor wood-fired hydronic heaters emitting no more than 7.5 gm/hr (Section 9.204.1.a-d).

Fairbanks currently enforces a single set of approved device types for installation (Sections 21.28.020, 21.28.030.A) within a single nonattainment area.

### **Analysis**

Under the current Fairbanks regulations, the single standard for device categories eligible to receive installation permits means that—in comparison—this measure that allows higher emitting devices to be installed and used in one portion of the regulated area is less stringent than the Borough regulation that does not allow higher emitting devices to be installed in any portion of the PM<sub>2.5</sub> nonattainment area.

### **Conclusion**

This measure is not more stringent than the current Fairbanks regulation with respect to enforcing different emission limits for wood heating devices installed in different portions of the nonattainment area, and is not eligible for consideration as BACM.

## Measure 13: Submit Sale and Installation Information to Air Program

### **Implementing Jurisdictions**

- State of New York

### **Regulation Weblink(s)**

- [https://govt.westlaw.com/nycrr/Browse/Home/NewYork/NewYorkCodesRulesandRegulations?guid=I591033205f9311e0b70f0000845b8d3e&originationContext=documenttoc&transitionType=Default&contextData=\(sc.Default\)](https://govt.westlaw.com/nycrr/Browse/Home/NewYork/NewYorkCodesRulesandRegulations?guid=I591033205f9311e0b70f0000845b8d3e&originationContext=documenttoc&transitionType=Default&contextData=(sc.Default))

### **Background**

The New York Department of Environmental Conservation requires the distributor of new outdoor wood boilers (OWB) to provide prospective buyers with a written notice of fuels allowed to be burned in OWBs and a statement that OWBs cannot be operated in locations where emissions unreasonably interfere with the public health of and enjoyment of property by others (6 CRR-NY 247.9.a). This regulation also requires the distributor to submit to the Department a statement signed by the OWB buyer acknowledging receipt of the written notice provided by the distributor and containing information on the location, manufacturer, stack height, and distance

to the nearest property boundary of the installed OWB (6 CRR-NY 247.9.b). To be certified for sale in the State of New York, OWBs must be certified to emit not more than 0.32 lb/MMBTU PM<sub>2.5</sub> using year-round weighting factors specified in the listed test method (6 CRR-NY 247.5.a). OWBs must be installed at least 100 feet from the nearest property boundary (6 CRR-NY 247.5.b).

Fairbanks requires commercial seller of solid fuel burning appliances to provide the prospective buyer with a written notice that summarizes Borough fuel restrictions; installation, property location, operation and maintenance requirements, and an advisory that installation in some areas may not be appropriate (Section 21.28.030.H.2). The regulation requires the buyer to sign a statement acknowledging receipt of the summary information, and requires the commercial seller to submit this signed statement to the Borough within 30 days of device sale (Section 21.28.030.H.4). Borough regulations do require OWBs to be certified to an emission limit of 0.10 lb/MMBTU PM<sub>2.5</sub> (Section 21.28.020.A) for Borough-listing, be installed no less than 330 feet from the closest property line (Section 21.28.030.F.1.a), and obtain an installation permit prior to installation in new construction (Section 21.28.030.E.1.a).

### **Analysis**

The New York DEC measure allows for the installation of OWBs emitting 0.32 lb/MMBTU PM<sub>2.5</sub> or less, whereas the existing Fairbanks regulation limits OWBs emitting 0.10 lb/MMBTU or less to be installed in new construction. The Fairbanks requirements for submittal of a signed statement by the buyer acknowledging receipt of summary information on Borough regulations and for obtaining an installation permit serves essentially the same function as the New York DEC measure in assuring compliance with setback requirements and buyer education. During Stage 1 Alerts, the existing Fairbanks regulation would allow less PM<sub>2.5</sub> emissions from new OWBs than would be allowed if the Borough adopted the New York DEC measure.

### **Conclusion**

This measure is not more restrictive than the corresponding requirements in existing Fairbanks regulations and, thus, is not eligible for consideration as BACM.

## **Measure 14: Require Installation of Thermal Mass to Improve Efficiency and Prevent Frequent Cycling in Selected New Units**

### **Implementing Jurisdiction(s)**

- None

### **Regulation Weblink(s)**

- None

## **Background**

The initial review of applicable SIPs and EPA guidance documents mistakenly identified a measure requiring the installation of thermal mass to prevent frequent burn cycling in hydronic heaters.

## **Analysis**

A review of the literature, applicable SIPs, EPA guidance documents, hydronic heater certification documents and the final rule for hydronic heaters issued in 2015 (Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces)<sup>12</sup> could find no requirements for installing thermal mass in hydronic heaters. The final rule for hydronic heaters and forced air furnaces discussed concerns about cycling conditions, operations, etc., but included no requirement for the addition of thermal mass to reduce cycling.

## **Conclusion**

No SIPs or EPA guidance was identified requiring the addition of thermal mass to reduce hydronic heater cycling; therefore, this measure is not eligible for consideration as BACM.

## Measure 15: Disclosure of Devices on Property Sale

### **Implementing Jurisdiction(s)**

- Lane Regional APA

### **Regulation Weblink(s)**

- <https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=1567>

## **Background**

The Lane Regional Air Protection Agency enforces regulations adopted by the State of Oregon with respect to the transfer of residential property containing SFBDs. Oregon Administrative Rule 340-262-0700 requires the removal and destruction of all devices not certified for sale as new by the Oregon Department of Environmental Quality or the USEPA, and those devices not permanently labeled as certified, upon the transfer of residential property. This Rule also requires disclosure to Oregon Department of Environment Quality of the removal and destruction of uncertified devices. The Rule does not exempt uncertified devices in NOASH households from removal and destruction requirements. Certified devices are defined in Oregon Administrative Rule 340-262-0500 as devices certified by USEPA as of July 1, 2010. The USEPA certification PM2.5 emission limits in 2010 were 4.1 gm/hr for catalyst-equipped wood stoves and 7.5 gm/hr for non-catalyst wood stoves.

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<sup>12</sup> <https://www.gpo.gov/fdsys/pkg/FR-2015-03-16/pdf/2015-03733.pdf>

Alaska regulations prohibit the conveying of ownership of any wood stove not certified by USEPA to meet a PM<sub>2.5</sub> emission limit of 2.5 gm/hr in the Fairbanks nonattainment area as part of a property sale (Section 18 AAC 50.077.c). As this emission limit is more stringent than 2010 USEPA certification standards, the ODEQ measure is less stringent than existing Fairbanks regulations with respect to wood stove removal upon the transfer of residential property ownership. Fairbanks prohibits the installation of a solid fuel burning appliance in new construction without an installation permit issued by the Borough (Section 21.28.030.E.1.a). Fairbanks also prohibits the sale of appliances not certified by USEPA to meet a PM<sub>2.5</sub> emission limit of 2.5 gm/hr unless the buyer signs an affidavit attesting that the appliance will not be installed or used in the nonattainment area, and submits the affidavit to the Borough (Section 21.28.030.H.1).

### **Analysis**

The Oregon DEQ regulation causes devices certified by USEPA to meet PM<sub>2.5</sub> emission limits up to 7.5 gm/hr to remain in residences during property transfers. By comparison, Alaska DEC regulations cause devices certified by USEPA to meet PM<sub>2.5</sub> emission limits up to 2.5 gm/hr to remain in residences during property transfers. ODEQ regulations require the disclosure of device removal and destruction to be reported to the state. Neither Alaska nor Fairbanks regulations require the disclosure of device removal and destruction to any air quality regulatory agency.

In order to be used during a curtailment period in Fairbanks, non-certified appliances would have to have received a household NOASH designation from the Borough (Section 21.28.050.C.3). In order to receive a NOASH designation from the Borough, a property owner must document that the wood heating appliance is Borough-listed or certified by USEPA to meet a PM<sub>2.5</sub> emission limit of 7.5 gm/hr (Section 21.28.060.A.1). Therefore, non-certified devices remaining in a Fairbanks residence after a transfer of property would be prohibited from receiving a NOASH designation and would not be allowed to be operated during a curtailment period.

### **Conclusion**

This measure is not more restrictive than the current Fairbanks requirements applicable to the fate of uncertified devices during a transfer of residential property. This measure, therefore, is not eligible for consideration as BACM.

## **Measure 16: Require Notice and Proof of Destruction or Surrender of Removed, Uncertified Devices**

### **Implementing Jurisdiction(s)**

- Puget Sound CAA

### **Regulation Weblink(s)**

- <https://www.pscleanair.org/DocumentCenter/Home/View/557>

## **Background**

The Puget Sound Clean Air Agency in the State of Washington requires the removal of, or modification to render permanently inoperable, all uncertified wood stoves in residences and commercial establishments within the Tacoma, Pierce County PM<sub>2.5</sub> nonattainment area by January 1, 2015. (Section 13.07.a.1) To assure compliance, the agency also requires the person removing or modifying an uncertified wood stove to provide to the agency documentation of the removal and disposal or rendering permanently inoperable of each affected device.

Documentation of such actions must conform to agency requirements and procedures and be provided to the agency within 30 days of wood stove removal or modification. (Section 13.07.a.4)

During a first stage of impaired air quality as declared by PSCAA, all solid fuel burning devices within the affected geographical area must cease operating except for (a) nonaffected pellet stoves; (b) wood stoves certified under 40 CFR 60 Subpart AAA (7/1/1990); wood stoves meeting Oregon DEQ Phase 2 emission standards (November 1984); (c) solid fuel burning devices certified by Washington Department of Ecology, or devices in residences or commercial buildings deemed exempt from curtailment requirements by PSCAA due to having no other adequate source of heat (NOASH). (Section 13.05.a.1, 13.05.d.1)

Fairbanks does not require the removal of uncertified wood stoves by a fixed date, but does prohibit their use during a Stage 1 Alert (Section 21.28.050.C.2). During a Stage 1 Alert, only Borough-listed wood heating devices granted Stage 1 waivers and devices in households granted NOASH waivers are allowed to continue operating (Section 21.28.050.C.4). Borough-listing is limited to (a) solid fuel burning appliances certified by USEPA as meeting a 2.5 gm/hr PM<sub>2.5</sub> emission limit, and hydronic heaters certified by USEPA as meeting a 0.10 lb/MMBTU PM<sub>2.5</sub> emission limit; (b) masonry heaters, cook stoves and US EPA-certified appliances manufactured after 1998; and (c) appliances certified by an independent laboratory as meeting a 2.5 gm/hr PM<sub>2.5</sub> emission limit (Section 21.28.020). NOASH waivers can be granted only to Borough-listed appliances (Section 21.28.060.A.2.a).

## **Analysis**

The adoption by the Borough of this PSCAA proof-of-destruction measure would cause the removal of non-Borough-listed appliances from residences and commercial buildings. During a Stage 1 Alert, however, these non-Borough-listed appliances are not allowed, under existing regulations, to be operated. Thus, the removal of such appliances would not reduce PM<sub>2.5</sub> emissions allowed during a Stage 1 Alert.

## **Conclusion**

This measure is not more restrictive than the current Fairbanks requirements applicable to the presence and use of uncertified devices during a Stage 1 Alert. This measure, therefore, is not eligible for consideration as BACM.

## Measure 19: Require Registration of Devices to Qualify for Exemption from Curtailments

### **Implementing Jurisdiction(s)**

- Missoula City-County MT, San Joaquin Valley APCD

### **Regulation Weblink(s)**

- <https://www.missoulacounty.us/home/showdocument?id=8452>
- <https://www.valleyair.org/rules/currnrules/r4901.pdf>

### **Background**

Missoula City-County requires woodstoves to have a valid alert permit in order to continue operating during a Stage 1 Alert (Section 9.205.1). Wood heating devices eligible to receive alert permits include pellet stoves; woodstoves meeting a 6.0 gm/hr PM<sub>2.5</sub> emission limit that were installed prior to June 30, 1988 and continuously enrolled in the alert permit program since installation; and woodstoves meeting a 4.1 gm/hr emission limit that were installed and continuously enrolled in the alert permit program since October 1, 1994 (Sections 9.205.2 through 9.205.4). Alert permits are valid for five years, except those issued to woodstoves with catalytic converters, which are valid for two years (Section 9.205.7). Permit renewal requires submittal of an application and inspection by the agency or submittal of documentation of adequate maintenance of non-durable parts sufficient to meet applicable emission limitations (Section 9.205.5).

Missoula City-County also allows wood heating devices with valid sole source permits to be operated during Stage 1 Alerts (Section 9.206.1). Wood heating devices eligible to receive new sole source permits are limited to pellet stoves. Devices eligible to receive sole source permit renewals are limited to (1) pellet stoves and (2) woodstoves continuously enrolled in the sole source permit program since July 1, 1985 (Sections 9.206.2 and 9.206.4). Similar exemptions to curtailment requirements are also allowed for wood heating devices with special need permits and with temporary sole source permits (Sections 9.207 and 9.208). All wood heating devices are eligible to receive special need and temporary sole source permits. To qualify, the owners of such devices must qualify for energy assistance under the federal Low-Income Energy Assistance Program – in the case of special need permits – or have a temporarily inoperable primary heating system and satisfy other requirements in the case of temporary sole source permits. Applications documenting compliance with the requirements of either program must be submitted to the agency in order to qualify for the applicable permit (Section 9.209).

San Joaquin Valley APCD prohibits wood-fired heating devices from being operated during a Level One Episodic Wood Burning Curtailment except for USEPA Phase II certified devices and pellet stoves, provided that these are registered with the District (Rule 4901 Section 5.6.1). In areas where natural gas service is not available, registration is not required for a device to be operated during a Burning Curtailment.

Registrations are valid for a period of up to three years. Registration may be renewed by submitting a Registration Renewal application with verification that the wood burning device has been inspected by a Registered Professional to verify that it is maintained pursuant to manufacturer specifications (Section 5.8).

Fairbanks allows Borough-listed devices to continue operating during a Stage 1 air alert if such devices have approved Stage 1 waivers (Section 21.28.050.C.4). Borough-listed devices include USEPA Phase II certified wood stoves, USEPA certified hydronic heaters, masonry heaters, cook stoves, or other devices emitting 2.5 gm/hr or less as documented by accepted testing (Section 21.28.020). Stage 1 waivers do not have expiration dates.

### **Analysis**

All three jurisdictions require the registration of permitting of wood heating devices in order to be operated during burning curtailment periods. In that regard, neither of the Missoula City-County or San Joaquin Valley APCD measures is more stringent than the corresponding requirements of the existing Fairbanks regulation.

While Fairbanks currently has natural gas service, it is capacity constrained and will not be in a position to expand service to new customers until 2020 (i.e., after the designated attainment year).<sup>13</sup> Thus, the San Joaquin Valley APCD regulation, which exempts unregistered wood heating devices from curtailment requirements in areas with no natural gas service, is less stringent than the Fairbanks regulation.

### **Conclusion**

Neither of these measures is more restrictive than the corresponding Fairbanks regulation and, thus, are not eligible for consideration as BACM.

## Measure 20: Require Renewals with Inspection Requirements

### **Implementing Jurisdiction(s)**

- San Joaquin Valley APCD

### **Regulation Weblink(s)**

- <https://www.valleyair.org/rules/currnrules/r4901.pdf>

### **Background**

San Joaquin Valley APCD prohibits wood-fired heating devices from being operated during a Level One Episodic Wood Burning Curtailment except for USEPA Phase II certified devices and pellet stoves, provided that these are registered with the District (Rule 4901 Section 5.6.1).

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<sup>13</sup> Appendix A of the Financing Agreement between AIDEA and IGU, December 13, 2017

Qualifying wood heaters are eligible for registration by submitting a completed application and supplemental documentation to the District including certification by a District Registered Wood Burning Heater Professional that the device is either a Phase II certified device or a pellet stove (Section 5.7.3.1). If the device for which registration is being sought is more than one year old at the time of initial registration, the application for registration must include proof of inspection by a Registered Professional (Section 5.7.3.1.3). In areas where natural gas service is not available, registration is not required for a device to be operated during a Burning Curtailment.

Registrations are valid for a period of up to three years. Registration may be renewed by submitting a Registration Renewal application with verification that the wood burning device has been inspected by a Registered Professional to verify that it is maintained pursuant to manufacturer specifications (Section 5.8).

Fairbanks allows Borough-listed devices to continue operating during a Stage 1 air alert if such devices have approved Stage 1 waivers (Section 21.28.050.C.4). Borough-listed devices include USEPA Phase II certified wood stoves, USEPA certified hydronic heaters, masonry heaters, cook stoves, or other devices emitting 2.5 gm/hr or less as documented by accepted testing (Section 21.28.020). Stage 1 waivers do not have expiration dates.

### **Analysis**

While Fairbanks currently has natural gas service, it is capacity constrained and will not be in a position to expand service to new customers until 2020 (i.e., after the designated attainment year).<sup>14</sup> Thus, implementation of this measure would have no impact in Fairbanks as all wood-fired heating devices would be exempt from registration and registration renewal. Since Fairbanks requires devices to be Borough-listed and to have Stage 1 waivers in order to continue operating during a Stage 1 air alert, the existing Fairbanks regulation is more restrictive than the San Joaquin Valley APCD measure with respect to this requirement.

### **Conclusion**

This measure is not more restrictive than the corresponding Fairbanks regulation and, thus, is not eligible for consideration as BACM.

## Measure 21: Optional Device Registration for Curtailment Exemptions

### **Implementing Jurisdiction(s)**

- San Joaquin Valley APCD; Maricopa County

### **Regulation Weblink(s)**

- <https://www.valleyair.org/rules/currentrules/r4901.pdf>
- <http://www.maricopa.gov/DocumentCenter/View/5332>

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<sup>14</sup> AIDEA IGU Financing Agreement op. cit., Appendix A

## **Background**

San Joaquin Valley APCD prohibits wood-fired heating devices from being operated during a Level One Episodic Wood Burning Curtailment except for USEPA Phase II certified devices and pellet stoves, provided that these are registered with the District (Rule 4901 Section 5.6.1). Registration is not required for operation of a USEPA Phase II certified device or pellet stove during non-curtailment periods, nor is registration required for operation of non-District-listed devices during non-curtailment periods. Thus, owners of District-listed devices have the option of registering their devices with the District, and are only required to register if the owners want to operate these devices during curtailment periods.

Maricopa County does not require the registration of approved wood-heating devices in order for these to be used during curtailment periods. (Section P-26.3.C.2) This regulation requires only that such devices operate with no visible emissions during curtailment periods except during 20 minute startup and refueling periods.

Fairbanks requires the registration of wood heating devices that qualify as Borough-listed appliances if the owners of such devices desire to operate them during Stage 1 air alert periods (Section 21.28.050.C.4).

## **Analysis**

Although small differences exist between the lists of agency-listed devices eligible for curtailment waivers, there is no essential difference between Fairbanks and San Joaquin Valley regulations in not requiring registration of eligible devices that are not operated during Stage 1 air alerts. Additionally, the exemption from registration of approved wood heating devices allowed to operate during curtailment periods in Maricopa County is less restrictive than the corresponding requirement in the Borough for such devices to be registered in order to be operated during curtailment periods.

## **Conclusion**

The San Joaquin Valley and Maricopa County measures are not more restrictive than the corresponding Fairbanks regulation, and do not qualify for consideration as BACM.

**Measure 25: Require Detailed Application or Inspection to Verify Need for No Other Adequate Source of Heat (NOASH) Permit**

## **Implementing Jurisdiction(s)**

- Puget Sound Clean Air Agency (PSCAA)

## **Regulation Weblink(s)**

- <http://www.pscleanair.org/219/PSCAA-Regulations>

## **Background**

The Puget Sound Clean Air Agency (PSCAA) exempts households with no other adequate source of heat (NOASH) from curtailment requirements if the residences or commercial buildings were constructed prior to July 1, 1992 and not substantially remodeled after that date, and the households have been granted exemptions by the agency (Section 13.05.d.1.a). PSCAA grants NOASH exemption only after receipt and review of a detailed application form.<sup>15</sup>

Fairbanks exempts NOASH households from having to cease burning wood during Stage 1 Alerts provided that such households have registered with the Borough (Section 21.28.050.C.3). The Borough grants NOASH determinations only after receipt and review of detailed application form that must be notarized before submittal<sup>16</sup> (Section 21.28.060.A).

## **Analysis**

Both of the PSCAA and Fairbanks NOASH application forms request information beyond that listed in the relevant regulations adopted by each agency. The topical areas covered in the application forms of both agencies address all of the regulatory requirements for obtaining a NOASH permit in each jurisdiction. The level of detail required in portions of the PSCAA application form is greater than that required in the Fairbanks application, such as details on household insulation and documentation of the year of construction of the structure. The Fairbanks application requires photographs of wood heating device placards and wood storage areas, and requires the certification of a notary public with respect to the information contained in the application, which are not requirements of the PSCAA application form.

On balance, the requirements of the PSCAA application form are not substantially more numerous or detailed than those of the Fairbanks application form. Nor does the information provided in a PSCAA application reduce the probability that a NOASH permit will be erroneously approved in comparison to such probability under the Fairbanks application form.

## **Conclusion**

This PSCAA practice is not more stringent than the corresponding practice followed in Fairbanks and, thus, is not a candidate for consideration as BACM.

## **Measure 26: Require Inspection of Device and Installation**

### **Implementing Jurisdiction(s)**

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<sup>15</sup> Personal communication between Amy Warren, PSCAA, and Meena Rezaei, Trinity Consultants, on December 15, 2017. Application available for download at: <http://www.pscleanair.org/DocumentCenter/View/163>; accessed on January 14, 2018.

<sup>16</sup> Application was for download at: <http://fnsb.us/transportation/Pages/Change-Out-Program.aspx>; accessed on January 14, 2018

- San Joaquin Valley APCD

### **Regulation Weblink(s)**

- <https://www.valleyair.org/rules/currnrules/r4901.pdf>

### **Background**

San Joaquin Valley APCD requires that applications for wood burning device registration contain certifications by District Registered Wood Burning Heater Professionals verifying that the wood burning heaters meet device eligibility requirements (Section 4901.5.7.3.1.2). This regulation also requires applications for registration renewal to include verifications that the wood burning heaters have been inspected by District Registered Wood Burning Heater Professionals and found to be maintained pursuant to manufacturer specifications (Section 4901.5.8.2.1).

Fairbanks requires installations of solid fuel burning appliances in new construction and replacement appliances in subsidized change-outs be performed by Borough-listed vendor/installers using Borough-listed appliances (Sections 21.28.030.E.1.b.ii, 21.28.030.E.b.iv, 21.28.040.A.4.f, and 21.28.040.A.5.b).

### **Analysis**

The San Joaquin Valley measure requires that devices applying for registration be inspected by District-registered professional to confirm that the devices are District-listed as low emission units. The Fairbanks' regulations require devices applying for registration to be device-eligible and inspected by Borough-registered professionals to certify that the device installation is proper based on the manufacturer's installation manual.

The Fairbanks' regulation requires devices to be Borough-listed and written certification of appliance installation by registered professionals, and the San Joaquin Valley measure requires only that registered professionals certify that devices applying for District registration satisfy device eligibility requirements.

### **Conclusion**

This measure is not more stringent than the corresponding requirement in Fairbanks' regulations and, thus, is not eligible for consideration as BACM.

## **Measure 27: Require Annual Renewal of Waiver**

### **Implementing Jurisdiction(s)**

- Maricopa County

### **Regulation Weblink(s)**

- <http://www.maricopa.gov/DocumentCenter/View/5332>

## **Background**

Maricopa County AZ requires that residential sole source of heat (NOASH) permits be renewed annually (Ordinance P-26, Section 4.A). This regulation is intended to annually confirm compliance of the permitted household with NOASH requirements and minimize the number of permits issued to non-compliant households. Section 4.A also prohibits the initial issuance of a NOASH permit after December 31, 1995, and allows for annual permit renewal if the initial permit was issued before December 31, 1995 and the household and device continue to meet permit requirements.

Fairbanks requires that NOASH households apply and be approved in order to continue burning during curtailment periods (Section 21.28.050.C.3). NOASH designations are valid for one year and require renewal to remain valid.<sup>17</sup> NOASH designations are allowed only for buildings constructed before January 1, 2017 (Section 21.28.060.A.4). NOASH approvals are also limited to use of Borough-listed wood heating devices (Section 21.28.060.A.2.a).

## **Analysis**

The Maricopa County and Fairbanks requirements for renewal of a NOASH designation are very similar with two exceptions: (1) the Maricopa County measure prohibits initial NOASH approvals after 1996 rather than for structures constructed after 2016, and (2) Maricopa County requires NOASH approvals to be continuous since the initial approval deadline (1995). The difference in initial approval deadlines is not significant as the Maricopa County measure was not a retroactive regulation (i.e., in setting a deadline that had already passed), just as adoption of this measure by Fairbanks would not include a past deadline. However, the Maricopa County requirement for continuous possession of a NOASH approval since 1995, if adopted by the Borough with a 2018 initial approval deadline and a similar continuous possession requirement, would probably cause the number of NOASH approvals in the Borough to decline at about the same rate as Maricopa County experienced. Since NOASH approvals under current Fairbanks regulations require the use of Borough-listed devices, households losing NOASH permits could only continue to heat with wood during Stage 1 Alerts by securing Stage 1 waivers, which require the use of Borough-listed devices. Thus, during Stage 1 alerts, the replacement of a NOASH approval with a Stage 1 waiver would result in no reduction in allowable PM<sub>2.5</sub> emissions.

## **Conclusion**

The Maricopa County measure is not more stringent than the corresponding requirement in existing Fairbanks regulations and, thus, is not eligible for consideration as BACM.

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<sup>17</sup> Personal communication between Nicholas Czarnecki, FNSB Air Quality Division, and Bob Dulla, Trinity Consultants, on December 19, 2017.

## Measure 28: Set Income Threshold [for Curtailment Exemption]

### **Implementing Jurisdiction(s)**

- Missoula MT; Maricopa County AZ

### **Regulation Weblink(s)**

- <https://www.missoulacounty.us/home/showdocument?id=8452>
- <http://www.maricopa.gov/DocumentCenter/View/5332>

### **Background**

The Missoula City-County Air Pollution Control Program exempts households qualifying for energy assistance from burning curtailment requirements (Section 9.207). Maricopa County grants temporary exemptions from curtailment requirements to households qualifying for energy assistance (Section 4.B).

Fairbanks does not exempt households from curtailment requirements solely on the basis of income, but does allow the granting of sole-source-of-heat exemptions to households in which “economic hardships require the applicant’s use of a solid fuel burning appliance” provided that the appliance is Borough-listed, in addition to other requirements (Section 21.28.060.A). Economic hardship is defined in this section as qualifying for assistance under HHS poverty guidelines. These are the same guidelines that are referenced in the Missoula City-County and Mariposa County regulations.

### **Analysis**

The Missoula City-County measure allows low income households to continue burning during curtailment periods. Maricopa County exempts low income households from curtailment requirements for temporary periods of time. The Fairbanks regulation does not authorize an exemption from curtailment requirements solely on the basis of low income.

### **Conclusion**

Neither of these measures is more stringent than the corresponding requirement in existing Fairbanks regulations and, thus, are not eligible for consideration as BACM.

## Measure 31: Require Sale of Only Dry Wood during Late Summer to the End of Winter

### **Implementing Jurisdiction(s)**

- South Coast Air Quality Management District

### **Regulation Weblink(s)**

- <https://www.arb.ca.gov/drdb/sc/curhtml/R445.PDF>

## **Background**

SCAQMD's Rule 445 limits the sale of commercial firewood to seasoned only firewood from July 1 through the end of February the following year. Seasoned firewood is defined to have a moisture content of 20 percent or less by weight as determined by approved hand held moisture meters or an alternate method defined by the California Air Resources Board. Commercial wood sellers are free to sell both seasoned and non-seasoned firewood during the remaining months of the year. The goal is to restrict the supply of unseasoned wood available for use during winter months.

## **Analysis**

Fairbanks North Star Borough Code<sup>18</sup> does not allow burning of firewood with a moisture content exceeding 20%:

*No person shall burn in the borough any fuel, except coal in an [appliance](#) designed to use coal, which is not listed in the manufacturer's owner's manual as an acceptable fuel for that device or any of the following items in a [solid fuel burning appliance](#):*

1. *Any wood that does not meet the definition of [clean wood](#) or has more than 20 percent moisture content;*

Alaska regulations<sup>19</sup> require mandatory registration of commercial wood sellers, the use of uniquely numbered three-part moisture disclosure forms, which document the date the wood was cut and findings of moisture measurements of three pieces of wood for each cord sold. The wood seller is required to sign the form, date when it was delivered and obtain signature of the customer purchasing the wood. The wood seller is also required to provide the customer with a copy of the signed disclosure form and submit to the state the department's copy of the completed disclosure form. The state is assembling the submitted forms into an electronic data base to track the moisture levels and volume of wood sold. Separate requirements address wood measurements and deliveries at temperatures below 32° F. All wood with measurements exceeding 20% is assumed to be wet.

The moisture disclosure forms require the buyer to declare:

*I understand that starting October 2015, only dry wood may be burned between October 1 and March 31.*

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<http://www.codepublishing.com/AK/FairbanksNorthStarBorough/#!/FNSBC21/FNSBC2128.html#21.28>

<sup>19</sup> <https://dec.alaska.gov/air/burnwise/regulations>

Fairbanks does not regulate the sale of firewood; the State of Alaska does. While the state does not prohibit the sale of unseasoned firewood, it requires the buyer to sign a statement acknowledging the moisture measurements of the wood being purchased and that unseasoned wood may not be burned during the winter. The Borough code is more restrictive in that it prohibits the burning of unseasoned wood year-round.

### **Conclusion**

Both the Borough and the state prohibit the burning of unseasoned wood during winter months when elevated PM<sub>2.5</sub> concentrations occur in Fairbanks. This requirement is more stringent and provides more benefits than a regulation that restricts the sale of unseasoned firewood during a period of elevated PM<sub>2.5</sub> concentrations; therefore, this measure is not eligible for consideration as BACM.

### **Measure 32: Require Dry Wood to be Clearly Labeled to Prohibit Marketing of Non-Dry Wood as Dry Wood**

#### **Implementing Jurisdiction(s)**

- South Coast Air Quality Management District; San Joaquin Valley Air Pollution Control District; Bay Area Air Quality Management District

#### **Regulation Weblinks(s)**

- <https://www.arb.ca.gov/drdb/sc/curhtml/R445.PDF>
- <http://www.valleyair.org/rules/currnrules/r4901.pdf>
- <http://www.baaqmd.gov/~media/files/planning-and-research/rules-and-regs/reg-06/rg0603.pdf?la=en>

#### **Background**

SCAQMD's Rule 445 limits the sale of commercial firewood to be seasoned only firewood from July 1 through the end of February the following year. Seasoned firewood is defined to have a moisture content 20 percent or less by weight as determined by approved hand held moisture meters or an alternate method defined by the California Air Resources Board. Rule 445 also contains labeling requirements:

*Effective November 4, 2013, no commercial firewood seller shall sell, offer for sale, or supply wood-based fuel without first attaching a permanently affixed indelible label to each package or providing written notice to each buyer at the time of purchase of bulk firewood that at a minimum, states the following:*

*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.*

San Joaquin Valley AQMD's Rule 4901 has firewood marketing restrictions:

*No person shall sell, offer for sale, or supply any wood which is orally or in writing, advertised, described, or in any way represented to be “seasoned wood” unless the wood has a moisture content of 20 percent or less by weight*

Bay Area AQMD Regulation 6 also has requirements governing the sale of wood:

*Any person offering for sale, selling or providing solid fuel or wood intended for use in a wood-burning device within District boundaries shall:*

*Attach a label to each package of solid fuel or wood sold that states the following:*

*“Use of this and other solid fuels may be restricted at times by law. Please check 1-877-4-NO-BURN or <http://www.8774noburn.org/> before burning.”*

*If wood is seasoned (not to include manufactured logs), then the label must also state the following:*

*“This wood meets air quality regulations for moisture content to be less than 20 % (percent) by weight for cleaner burning.”*

### **Analysis**

Alaska regulations<sup>20</sup> require mandatory registration of commercial wood sellers, the use of uniquely numbered three-part moisture disclosure forms, which document the date the wood was cut and findings of moisture measurements of three pieces of wood for each cord sold. The wood seller is required to sign the form, date when it was delivered and obtain signature of the customer purchasing the wood. The wood seller is also required to provide the customer with a copy of the signed disclosure form and submit to the state the department’s copy of the completed disclosure form. The state is assembling the submitted forms into an electronic data base to track the moisture levels and volume of wood sold. Separate requirements address wood measurements and deliveries at temperatures below 32° F. All wood with measurements exceeding 20% is assumed to be wet.

The moisture disclosure forms require the buyer to declare:

*I understand that starting October 2015, only dry wood may be burned between October 1 and March 31.*

While Alaska does not require firewood to be labeled, it does require buyer to sign a form documenting whether the wood is seasoned or unseasoned.

### **Conclusion**

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<sup>20</sup> <https://dec.alaska.gov/air/burnwise/regulations>

Alaska's requirement to have the customer sign a form documenting whether the wood is seasoned or unseasoned ensures that the customer has seen information about the moisture content of the wood being purchased. This requirement is more stringent than labeling requirements which the customer may or may not see, let alone acknowledge; therefore this measure is not eligible as BACM.

## Measure 33: Burn Permits Required

### **Implementing Jurisdictions**

- Klamath County, Feather River AQMD

### **Regulation Weblink(s)**

- <http://www.co.klamath.or.us/EH/Air%20Quality%20&%20Burning/Klamath%20County%20Clean%20Air%20Ordinance.htm>
- <https://www.arb.ca.gov/drdb/fr/curhtml/r3-17.pdf>

### **Background**

Klamath County OR requires persons conducting open burning to adhere to all local and state fire protection rules and restrictions, including possession of any required local burn permit issued by a local fire agency (Section 406.100.4.c). This regulation also prohibits open burning during burning curtailment periods (Section 406.100.4.a).

Feather River Air Quality Management District CA requires valid burn permits issued by the agency for all open burning with the exception of the burning of vegetation at one- or two-family residences on parcels less than two acres in size provided that requirements of fire protection services are met. (Section 2.0.H) Burn permits are invalid on No Burn Days declared by the agency. (Section 2.0.J.6)

The Alaska Department of Environmental Conservation requires written approval from the agency for the open burning of woody debris removed from sites greater than 40 acres in size on land being cleared for farming or development, prescribed burning of sites greater than 40 acres in size by land management agencies, fire fighter training burns, and the burning of materials that produce black smoke (Section 18 AAC 50.065.g/h/i). Department regulations also prohibit open burning in PM<sub>2.5</sub> nonattainment areas between November 1 and March 31 (Section 18 AAC 50.065.f).

Fairbanks prohibits open burning during Stage 1 Alerts, except for recreational fires such as bonfires, campfires, or ceremonial fires and use of fire pits (Section 21.28.050.A).

### **Analysis**

Although the requirement to possess burn permits for open burning are more restrictive in Klamath County and in the Feather River AQMD, such a permit program – if adopted by Fairbanks – would not reduce PM<sub>2.5</sub> emissions during Stage 1 Alerts as existing Alaska DEC and Fairbanks regulations ban open burning both during the winter heating season and during Stage 1 Alert. Although Fairbanks exempts recreational fires from the open burning ban during Stage 1 Alerts, the only use of such fires during the winter heating season is for a handful of very small ice fishing huts for warming purposes. Emissions from these warming fires occur only a few hours per day during daylight hours.<sup>21</sup>

### **Conclusion**

These measures as adopted by Klamath County and Feather River AQMD are effectively not more stringent than the corresponding requirements in existing Fairbanks and Alaska DEC regulations with respect to reducing emissions during burning curtailment periods and, thus, are not eligible for consideration as BACM.

### **Measure 34: Prohibit Burn Barrels and Other Outdoor Equipment**

#### **Implementing Jurisdiction(s)**

- Klamath County

#### **Regulation Weblink(s)**

- <http://www.co.klamath.or.us/EH/Air%20Quality%20&%20Burning/Klamath%20County%20Clean%20Air%20Ordinance.htm>

#### **Background**

Klamath County OR prohibits the use of burn barrels and other outdoor burning devices. (Section 406.150.2.c)

Fairbanks prohibits the use of burn barrels and non-permitted incinerators during Stage 1 Alerts. (Section 21.28.050.A)

#### **Analysis**

Although Klamath County bans use of burn barrels and other outdoor burning devices throughout the year, the Fairbanks ban on the use of burn barrels and non permitted incinerators during Stage 1 Alert results in the same level of emission control from these devices during burning curtailment periods.

### **Conclusion**

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<sup>21</sup> Personal communication between Nicholas Czarnecki, FNSB Air Quality Division, and Bob Dulla, Trinity Consultants, on January 25, 2018.

This measure as adopted by Klamath County is effectively not more stringent than the corresponding requirement in existing Fairbanks regulations and, thus, is not eligible for consideration as BACM.

## Measure 35: Restrict Burning During Air Pollution Events

### **Implementing Jurisdiction(s)**

- Klamath County; Ada County

### **Regulation Weblink(s)**

- <http://www.co.klamath.or.us/EH/Air%20Quality%20&%20Burning/Klamath%20County%20Clean%20Air%20Ordinance.htm>
- [http://www.sterlingcodifiers.com/codebook/index.php?book\\_id=447](http://www.sterlingcodifiers.com/codebook/index.php?book_id=447)

### **Background**

Klamath County OR prohibits open burning during burning curtailment periods (Section 406.100.4.a). Oregon Department of Environmental Quality regulations exempt recreational fires and ceremonial fires from open burning requirements (Section 340-264-0040).

Ada County ID prohibits the open burning of refuse or solid fuel during declared air quality alerts (Section 5-10-8.C). County regulations also exempt recreational or warming fires from open burning restrictions provided that such fires do not violate air pollution alerts (Section 5-2-7-2.D).

Alaska Department of Environmental Conservation prohibits open burning in PM<sub>2.5</sub> nonattainment areas between November 1 and March 31 (Section 18 AAC 50.065.f). These regulations also exempt ceremonial fires from open burning restrictions (Section 18 AAC 50.990.65.B). Fairbanks prohibits open burning during Stage 1 Alerts, except for recreational fires such as bonfires, campfires, or ceremonial fires and use of fire pits (Section 21.28.050.A).

### **Analysis**

The measures adopted by Klamath County and Ada County contain essentially the same exemptions from open burning restrictions for recreational fires as are contained in the Fairbanks regulations.

### **Conclusion**

These measures as adopted by Klamath County and by Ada County are not more stringent than the corresponding requirements in existing Fairbanks regulations and, thus, are not eligible for consideration as BACM.

## Measure 36: Prohibit Residential Open Burning

### **Implementing Jurisdiction(s)**

- South Coast AQMD

### **Regulation Weblink(s)**

- <http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-444.pdf>
- <http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-445.pdf?sfvrsn=4>

### **Background**

The South Coast Air Quality Management District prohibits residential open burning within its jurisdiction (Section 444.d.3.A). This rule also exempts recreational fires and ceremonial fires from the prohibition on residential open burning (Section 444.h.6.A). South Coast AQMD regulations also prohibit the operation of wood burning devices during mandatory winter burning curtailment periods (Section 445.e) but exempts ceremonial fires, as exempted under Rule 444, from curtailment requirements (Section 445.f.7.E).

Alaska Department of Environmental Conservation prohibits open burning in PM<sub>2.5</sub> nonattainment areas between November 1 and March 31 (Section 18 AAC 50.065.f). These regulations also exempt ceremonial fires from open burning restrictions (Section 18 AAC 50.990.65.B). Fairbanks prohibits open burning during Stage 1 Alerts, except for recreational fires such as bonfires, campfires, or ceremonial fires and use of fire pits (Section 21.28.050.A).

### **Analysis**

The South Coast AQMD measure authorizes ceremonial fires during a mandatory winter burning curtailment period. However, the South Coast AQMD regulations do not contain definitions of either “ceremonial fires” or “recreational fires”. Although the Fairbanks exemptions from open burning for bonfires, campfires, or ceremonial fires and use of fire pits appears to be less restrictive than the South Coast exemption for ceremonial fires, the very cold weather conditions that typically occur during Fairbanks curtailment periods significantly discourages any outdoor exposure for any length of time. Given this condition somewhat unique to Fairbanks, the effect of adopting this measure by Fairbanks on Stage 1 Alert period emissions would be extremely small if not zero.

### **Conclusion**

This measure as adopted by South Coast AQMD is effectively not more stringent than the corresponding requirements in existing Fairbanks regulations and, thus, is not eligible for consideration as BACM.

## Measure 37: Periodic Burn Windows

### **Implementing Jurisdictions**

- Klamath County

### **Regulation Weblink(s)**

- <http://www.co.klamath.or.us/EH/Air%20Quality%20&%20Burning/Klamath%20County%20Clean%20Air%20Ordinance.htm>
- <https://secure.sos.state.or.us/oard/viewSingleRule.action?ruleVrsnRsn=76168>

### **Background**

Klamath County OR authorizes the Environmental Health Division Manager, in consultation with specified county, city, and local fire officials, to limit residential open burning to two 15-day periods each year (Section 406.150.2.a). If declared, one window must occur in the spring and one in the fall. Open burning is prohibited during burning curtailment periods (Section 406.100.4.1). The definition of residential open burning in Oregon Department of Environmental Quality regulations excludes recreational fires and ceremonial fires (Section 340 264-0040.1).

Alaska Department of Environmental Conservation prohibits open burning in PM<sub>2.5</sub> nonattainment areas between November 1 and March 31 (Section 18 AAC 50.065.f). These regulations also exempt ceremonial fires from open burning restrictions (Section 18 AAC 50.990.65.B). Fairbanks prohibits open burning during Stage 1 Alerts, except for recreational fires such as bonfires, campfires, or ceremonial fires and use of fire pits (Section 21.28.050.A).

### **Analysis**

The Klamath County and Oregon DEQ regulations authorize the setting of residential open burning windows to limit the days each year when such open burning may be conducted, but the requirement limiting these to the spring and fall means that none of these windows will occur during the winter heating season. Regardless, Klamath County prohibits residential open burning during burning curtailment periods. Neither the FNSB nor Alaska Department of Environmental Conservation regulations governing residential open burning authorize either agency to limit residential open burning to short periods during the spring and fall, but Alaska DEC bans all open burning during the winter heating season in the Fairbanks PM<sub>2.5</sub> nonattainment area, and FNSB's regulations prohibit residential open burning during Stage 1 Alerts. Both Oregon and FNSB regulations exempt recreational and ceremonial fires from residential open burning prohibitions. Adoption of the Klamath County residential open burning window authorization by the Borough would not result in any reduction in emissions during Stage 1 Alerts.

### **Conclusion**

This measure as adopted by Klamath County is not more stringent than the corresponding requirements in existing Fairbanks regulations and, thus, is not eligible for consideration as BACM.

## Measure 41: Special Needs Permit

### **Implementing Jurisdiction(s)**

- Missoula City-County MT

### **Regulation Weblink(s)**

- <https://www.missoulacounty.us/home/showdocument?id=8452>

### **Background**

The Missoula City-County Air Pollution Control Program exempts households with valid Special Needs Permits from curtailment burning bans (Section 9.207). To qualify for a Special Needs Permit, an applicant must demonstrate an economic need to burn solid fuel for space heating purposes by qualifying for energy assistance according to economic guidelines of the federal Low-Income Energy Assistance Program. Special Need Permits are valid for one year and may be renewed if the applicant continues to meet the applicable heating need and qualifies for energy assistance.

Fairbanks does not exempt households from curtailment requirements solely on the basis of income, but does allow the granting of sole-source-of-heat exemptions to households in which “economic hardships require the applicant’s use of a solid fuel burning appliance” provided that the appliance is Borough-listed, in addition to other requirements (Section 21.28.060.A). Economic hardship is defined in this section as qualifying for assistance under federal Health and Human Service’s poverty guidelines.

### **Analysis**

The economic need guidelines that are referenced in the Missoula City-County are the same ones used by Fairbanks to qualify households with economic hardships for sole-source-of-heat exemptions from curtailment requirements.

### **Conclusion**

As the Missoula City-County measure allows Special Need Permit households to continue burning during curtailment periods, and as the Fairbanks regulation does not authorize an exemption from curtailment requirements solely on the basis of low income but also requires use of a Borough-listed wood heating device, this measure is less stringent than the corresponding portion of the existing Fairbanks regulation and, thus, is not a candidate for consideration as BACM.

## Measure 42: Burn Down Period

### **Implementing Jurisdiction(s)**

- Puget Sound CAA; Maricopa County

### **Regulation Weblink(s)**

- <http://www.pscleanair.org/219/PSCAA-Regulations>
- <http://www.maricopa.gov/DocumentCenter/View/5332>

### **Background**

The Puget Sound Clean Air Agency requires solid fuel burning devices to be shut down when a First Stage of Impaired Air Quality (curtailment) has been declared (Sections 13.05.a.1 and 13.05.d.1.a). Certain categories of devices, such as pellet stoves, Oregon DEQ-certified Phase 2 devices, Washington DOE-certified devices, and devices in households with no other adequate source of heat, are allowed to continue operating during a curtailment period provided that all applicable registration requirements are met. When a curtailment period is declared, fuel to non-exempt devices must be withheld, and combustion in these devices – as evidenced by visible smoke from a chimney – must cease within three hours after the declaration is issued (Section 13.05.b).

Maricopa County defines “Burn-Down Period” as “That period of time, not to exceed three hours after declaring a restricted-burn period, required for the cessation of combustion within any residential wood-burning device, outdoor fire pit, wood-burning chimenea, or similar outdoor fire by withholding fuel or by modifying the air-to-fuel-ratio” (Section P-26.2.D). This regulation also stays enforcement of visible emission limits for three hours after a curtailment declaration is issued (Section P-26.3.D.4).

Fairbanks’ regulations do not specifically exempt smoke emitted during burn down periods from compliance with opacity limits, but do exempt visible emissions from a chimney in excess of the opacity standard for a period not to exceed 30 minutes during a curtailment period before citing unauthorized wood heating devices for unlawful operation during a curtailment period (Section 21.28.030.C.2).

### **Analysis**

Both the PSCAA and Maricopa County measures allow for an exemption from opacity limits for a longer period of time to allow for burn down in non-exempt wood heating devices at the commencement of a curtailment period than is allowed under the corresponding Fairbanks regulation. As a result, the PSCAA and Maricopa County measures are less restrictive than the existing Fairbanks regulation in this regard.

### **Conclusion**

This measure is less restrictive than the corresponding requirement in Fairbanks and, thus, is not eligible for consideration as BACM.

## Measure 43: Exempt Ceremonial or Religious Fires

### **Implementing Jurisdictions**

- South Coast AQMD

### **Regulation Weblink(s)**

- <http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-444.pdf>
- <http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-445.pdf?sfvrsn=4>

### **Background**

The South Coast Air Quality Management District prohibits residential open burning within its jurisdiction (Section 444.d.3.A). This rule also exempts recreational fires and ceremonial fires from the prohibition on residential open burning (Section 444.h.6.A). South Coast AQMD regulations also prohibit the operation of wood burning devices during mandatory winter burning curtailment periods (Section 445.e) but exempts ceremonial fires, as exempted under Rule 444, from curtailment requirements (Section 445.f.7.E).

Alaska Department of Environmental Conservation prohibits open burning in PM<sub>2.5</sub> nonattainment areas between November 1 and March 31 (Section 18 AAC 50.065.f). These regulations also exempt ceremonial fires from open burning restrictions (Section 18 AAC 50.990.65.B). Fairbanks prohibits open burning during Stage 1 Alerts, except for recreational fires such as bonfires, campfires, or ceremonial fires and use of fire pits (Section 21.28.050.A).

### **Analysis**

The South Coast AQMD measure authorizes ceremonial fires during a mandatory winter burning curtailment period. However, the South Coast AQMD regulations do not contain definitions of either “ceremonial fires” or “recreational fires”. Fairbanks regulations exempt bonfires, campfires, and ceremonial fires, and use of fire pits from the ban on open burning during Stage 1 Alerts. The adoption by Fairbanks of the South Coast AQMD exemption granted to ceremonial or religious fires would not reduce emissions during Stage 1 Alerts since Fairbanks currently exempts ceremonial and recreational fires from burning curtailment requirements.

### **Conclusion**

This measure as adopted by South Coast AQMD is not more stringent than the corresponding requirements in existing Fairbanks regulations and, thus, is not eligible for consideration as BACM.

## Measure 44: Alternative Heating Appliance Failure

### **Implementing Jurisdiction(s)**

- Missoula City-County, Maricopa County, Klamath County

### **Regulation Weblink(s)**

- <https://www.missoulacounty.us/home/showdocument?id=8452>
- <http://www.maricopa.gov/DocumentCenter/View/5332>
- <http://www.co.klamath.or.us/EH/Air%20Quality%20&%20Burning/Klamath%20County%20Clean%20Air%20Ordinance.htm>

### **Background**

The Missoula City-County Air Pollution Control Program allows residents to apply for a temporary sole source permit in an emergency situation where the resident demonstrates his furnace or central heating system is inoperable other than through his own actions, where the furnace or central heating system is involuntarily disconnected from its energy source by a utility or fuel supplies, or where the normal fuel or energy source is unavailable for any reason (Section 9.208.2). The temporary sole source permit allows a household to continue burning wood for heating purposes during burning curtailment periods (Section 9.208.1). Conditions related to public health endangerment and economic hardship also apply to the approval of a temporary sole source permit, and the permit is valid for a period determined by the agency but may not exceed one year (Sections 9.208.3 through 9.208.7).

Maricopa County authorizes the agency director to issue emergency exemptions from curtailment requirements to households demonstrating that the alternative heating system is inoperable for reasons other than the occupants' own actions or demonstrating that the heating system has been involuntarily disconnected by a utility company or fuel provider (Section P-26.4.C). An emergency exemption is valid only for the period determined by the agency director, but shall not exceed one year from the date of issuance.

Klamath County authorizes the Environmental Health Division to issue Emergency Condition exemptions from burning curtailment requirements when utility suppliers declare energy shortages, electric power outages occur, interruptions of natural gas supply occur, or when there is an immediate need to operate a wood heating device to protect family or individual health and safety (Section 406.150.1.f).

Fairbanks does not exempt households from curtailment requirements due to failure of alternative heating systems except when a power failure occurs (Section 21.28.050.A). During such times, the Borough allows all wood heating devices affected by the power failure to be used for space heating purposes during Stage 1 alerts. No permits are issued by the Borough for such use, and the exemption terminates when power is fully restored.

### **Analysis**

The use of wood heating devices during periods of alternative heating appliance failure in Missoula City-County, Maricopa County, and Klamath County is allowed under more failure modes than is allowed under the existing Fairbanks regulations. Similarly, the term of exemption permits issued by these other agencies can be significantly longer than the allowance for power failure authorized by Fairbanks regulations. As a result, the Missoula City-County, Maricopa County, and Klamath County exemptions for alternative heating appliance failure are not more stringent than the exemption authorized in the Fairbanks regulations.

### **Conclusion**

This measure is not more stringent than the corresponding requirement in the existing Fairbanks regulations and, thus, is not eligible for consideration as BACM.

## Measure 45: Elevation Exemption from Wood Burning Curtailments

### **Implementing Jurisdiction(s)**

- South Coast Air Quality Management District; Utah Department of Environmental Quality

### **Regulation Weblink(s)**

- <http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-444.pdf>
- <https://rules.utah.gov/publicat/code/r307/r307-302.htm#T3>

### **Background**

In the South Coast, Mandatory Winter Burning Curtailment is defined to occur:

*...during the consecutive months of November through February where the burning of solid fuels is restricted for portions of the South Coast Air Basin at elevations below 3,000 feet above Mean Sea Level (MSL) based on air quality criteria contained in AQMD Rule 445 (Wood Burning Devices). (emphasis added)*

Utah's Rule 307 (Solid Fuel Burning) provides exemption from wood burning restrictions for sources located at elevations above 7,000 feet.

Neither Fairbanks nor Alaska provide an elevation exemption from Air Quality Alerts.

### **Analysis**

A review of topographical maps found that no portion of the Fairbanks PM<sub>2.5</sub> nonattainment area is at an elevation above 3,000 feet MSL. This finding was confirmed by the Borough's Air Quality Division. The existing Fairbanks air quality regulations do not provide an elevation

exemption from Air Quality Alerts. The inclusion of an elevation exemption would diminish the benefits from this control measure

### **Conclusion**

This measure is less restrictive than the corresponding requirement in Fairbanks and thus is not eligible for consideration as BACM.

## Measure 46: Lack of Electrical or Natural Gas Service Availability

### **Implementing Jurisdiction(s)**

- South Coast Air Quality Management District; San Joaquin Valley Air Pollution Control District

### **Regulation Weblink(s)**

- <http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-445.pdf?sfvrsn=4>
- <https://www.valleyair.org/rules/currnrules/r4901.pdf>

### **Background**

The South Coast Air Quality Management District exempts wood heating devices from burning curtailment requirements in households where there is no existing infrastructure for natural gas service within 150 feet of the property line (Section 445.f.7.C).

San Joaquin Valley Air Pollution Control District exempts wood burning fireplaces and wood burning heaters from burning curtailment requirements in areas where natural gas service is not available (Section 4901.5.6.3.1).

Fairbanks does not exempt households from curtailment requirements due to a lack of natural gas service but it does allow all wood heating devices affected by an electrical power failure to be used for space heating purposes during Stage 1 alerts (Section 21.28.050.A).

### **Analysis**

The exemption of wood heating devices from burning curtailment requirements in areas not served by natural gas infrastructure allows devices with higher PM<sub>2.5</sub> emission rates than Borough-listed devices that were installed prior to 2008 (South Coast measure), to operate continuously during curtailment periods. The Fairbanks regulation limits the exemption of wood heating devices from curtailment requirements only during electrical power outages. Thus, higher PM<sub>2.5</sub> emissions are allowed by this measure than under existing Fairbanks regulations.

### **Conclusion**

This measure is not more stringent than the corresponding requirement in the existing Fairbanks regulations and, thus, is not eligible for consideration as BACM.

## Measure 49: Prohibit Use of Coal Burning Heaters

### **Implementing Jurisdiction(s)**

- Town of Telluride and San Miguel County, Colorado

### **Regulation Weblink(s)**

- <https://yosemite.epa.gov/R8/R8Sips.nsf/PrintSips/C5D17E5CB9461F8587257EED004BBD82?OpenDocument>

### **Background**

The town of Telluride and San Miguel County adopted wood and coal burning emission reduction measures in the 1980's and 1990's, including provisions that:

- (1) Require the installation of cleaner burning devices in existing dwellings which have pre-existing solid fuel burning devices;*
- (2) prohibit solid fuel burning devices in new construction;*
- (3) ban coal burning; and*
- (4) limit the total number of fireplaces and woodstoves in the nonattainment area.*

These controls were approved by EPA into the Colorado PM<sub>10</sub> SIP in 1994.<sup>22</sup>

Fairbanks air quality regulations define coal stoves and coal burning hydronic heaters as Solid Fuel Burning Devices (SFBD). Coal burning stoves and hydronic heaters are not included as Borough-Listed Devices. Unlisted SFBDs cannot be installed, do not qualify for the Voluntary Replacement and Removal Program, and cannot be operated during either a Stage 1 or Stage 2 Alert. Unlisted devices cannot receive a NOASH certification. Alaska has adopted the Borough code defining Borough-Listed Devices.

Neither the Borough nor the State have regulations that ban coal burning.

### **Analysis**

Regulations banning coal burning are more restrictive than existing Borough and state air quality regulations. However, the regulations banning coal burning were implemented to control PM<sub>10</sub> emissions not PM<sub>2.5</sub> emissions.

### **Conclusion**

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<sup>22</sup> <https://www.gpo.gov/fdsys/pkg/FR-2001-06-15/pdf/01-15029.pdf#page=1>

The more restrictive PM<sub>10</sub> regulations from Telluride and San Miguel County, Colorado, are not eligible for consideration as PM<sub>2.5</sub> BACM.

## Measure 50: Require Low Sulfur Content Coal

### **Implementing Jurisdiction(s)**

- Puget Sound Clean Air Agency, State of Utah

### **Regulation Weblink(s)**

- <https://www.pscleanair.org/DocumentCenter/View/354>
- <https://yosemite.epa.gov/r8/r8sips.nsf/b2af5baa99cc429287256b5f0054df73/3f2ef963733afd5a87257ef30057c077!OpenDocument>

### **Background**

Section 13.04 of the Puget Sound CAA regulations restricts the sulfur content of coal burned in a solid fuel burning device. It allows only the burning of:

*Coal with sulfur content less than 1.0% by weight burned in a coal only heater.*

Utah regulates the sulfur and ash content of coal for residential use, with the following restrictions:

- (1) After July 1, 1987, no person shall sell, distribute, use or make available for use any coal or coal containing fuel for direct space heating in residential solid fuel burning devices and fireplaces which exceeds the following limitations as measured by the American Society for Testing Materials Methods:
  - (a) 1.0-pound sulfur per million BTU's, and
  - (b) 12% volatile ash content.
- (2) Any person selling coal or coal containing fuel used for direct residential space heating within the State of Utah shall provide written documentation to the coal consumer of the sulfur and volatile ash content of the coal being purchased.

Neither Fairbanks nor the State of Alaska restrict the sulfur content of coal burned in solid fuel burning appliances.

### **Analysis**

The Usibelli Coal Mine is the source of all coal marketed and burned in Fairbanks. Their factsheet<sup>23</sup> indicates the sulfur content of coal from the Healy mine is typically 0.2% with a range of 0.08% - 0.28%. The Healy mine supplies the coal burned in Fairbanks.

Fairbanks has no restriction on the sulfur content of coal marketed and burned within the PM<sub>2.5</sub> nonattainment area; therefore, the Puget Sound regulation is more restrictive. The sulfur content of Healy coal, however, is well below the 1% threshold mandated by Puget Sound. Therefore, while the Puget Sound regulation is more restrictive, its imposition in Fairbanks will have no effect on coal burning and no emissions benefit.

The Healy fact sheet indicates that the heat content of their coal is 7,560 BTU/lb. Using this value, 132.3 lbs. of coals is needed to produce 1 million BTU. This value combined with the 0.2% content of coal produces 0.26 lbs. of sulfur, which is well below Utah sulfur threshold 1.0 lb. per million BTU. The Healy coal has a 7% average ash content ranging from 4% - 12%, which falls below the 12% volatile ash content Utah threshold. Thus, while the Utah regulation is more restrictive than current Fairbanks regulations, its imposition, will have no effect on the coal burned in Fairbanks and no emissions benefit.

### **Conclusion**

The more restrictive Puget Sound and Utah coal content regulations will have no emissions benefit in Fairbanks; therefore, it is not eligible for consideration as BACM.

### **Measure 55: School Bus Retrofits**

#### **Implementing Jurisdiction(s)**

Oregon Department of Environmental Quality, Lane Regional Air Protection Agency

#### **Regulation Weblink(s)**

- <https://www.gpo.gov/fdsys/pkg/FR-2017-11-14/html/2017-24539.htm>
- <http://www.lrapa.org/DocumentCenter/View/2108>

### **Background**

The RACM analysis in the Oakridge, Oregon Moderate PM<sub>2.5</sub> attainment plan lists Diesel retrofits of school buses as a primary control measure. No specific emissions credit, however is listed for this measure. The 2016 update to the SIP, which EPA proposed for approval, lists implementing diesel retrofits of school buses as a local transportation control measure. It also states:

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<sup>23</sup> <http://www.usibelli.com/coal/data-sheet>

*No specific credit was taken for these mobile source programs in the 2015 attainment year emission inventory other than the normal reductions over time included in the MOVES2014a modeling.*

Neither Fairbanks nor the state has a regulation mandating the replacement of Diesel powered school buses. The Fairbanks RACM analysis evaluated *retrofit of diesel fleet (school buses, transit)* as a transportation control measure. The measure was determined to be technologically infeasible as were all measures listed in the category of transportation controls.

### **Analysis**

EPA offers funds for the replacement of Diesel school buses through its Clean Diesel Program. The Diesel Emissions Reduction Act (DERA) provides grants for projects that reduce emissions from existing diesel engines. DERA has funded numerous diesel replacement projects in Alaska. DERA funds are currently being used to replace five diesel generators in four rural communities in Alaska. Other programs have funded diesel garbage truck, power generation and school bus replacement projects. The most recent diesel replacement program conducted in Fairbanks is a joint DEC/DOT&PF project<sup>24</sup> that replaced three heavy duty construction trucks, placed in service by the State of Alaska in 1986. That project was completed in 2010.

Oregon has funded several school bus replacement programs and included them in the Oakridge RACM analysis for the Moderate SIP, which EPA has proposed to approve. That plan, however, takes no specific emissions credit for the program and states that its benefits are included in fleet turn over benefits tracked by EPA's motor vehicle emissions simulator model (MOVES)2014a.

### **Conclusion**

The benefits of the uncredited school bus replacement program are represented in fleet turnover calculations performed by MOVES. Since MOVES is used to represent changes in vehicle fleet emissions in Fairbanks over time, no emissions benefit is available for mandating diesel school bus replacement, therefore this measure is not eligible for consideration as BACM.

## Measure 56: Road Paving

### **Implementing Jurisdiction(s)**

Klamath Falls, Oregon

### **Regulation Weblink(s)**

- <http://www.oregon.gov/deq/FilterDocs/KFallsAttPlan2012.pdf>

### **Background**

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<sup>24</sup> <http://dec.alaska.gov/air/anpms/projects-reports/akdot>

The 2012 PM<sub>2.5</sub> attainment plan for Klamath Falls includes a road paving control measure. The analysis lists road paving as an existing control measure and states:

*PM<sub>2.5</sub> emissions generated by motor vehicle traffic have been reduced over the years through efforts to pave roads, minimize the use of sanding material, and to control mud and dirt track out from industrial, construction and agricultural operations. Six miles of unpaved road have been paved in the nonattainment area since 2008, resulting in reductions from re-suspended road dust.*

The PM<sub>2.5</sub> emission reduction benefit of road paving is listed as “minimal”.

Alaska does not have an emissions control measure addressing road paving in urban areas. An analysis<sup>25</sup> prepared in 2006 identified road paving as a fugitive dust control measure for implementation in rural communities in Alaska. Fairbanks has no control measures addressing road paving. Unlike many communities in the lower-48, roads in the Fairbanks nonattainment area remain frozen during winter months. The emissions inventory discussion in Step 1 noted that fugitive dust sources of PM<sub>2.5</sub> are estimated to be negligible under the snow/ice bound conditions reflected in the winter seasonal inventory.

### **Analysis**

The Klamath Falls SIP claims “minimal” PM<sub>2.5</sub> emission benefit for a fugitive dust control measure. Since fugitive dust emissions in Fairbanks are negligible during the winter, the application of fugitive dust controls with “minimal” benefits in a more moderate climate will produce no benefits.

### **Conclusion**

Fugitive dust control measures will provide no wintertime PM<sub>2.5</sub> benefit in Fairbanks, therefore this measure is not eligible for consideration as BACM.

## **Measure 58: Controls on Road Sanding and Salting**

### **Implementing Jurisdiction(s)**

Utah Department of Environmental Quality

### **Regulation Weblink(s)**

- <https://documents.deq.utah.gov/air-quality/pm25-serious-sip/DAQ-2017-011685.pdf>
- <https://documents.deq.utah.gov/air-quality/pm25-serious-sip/DAQ-2017-011686.pdf>
- <https://documents.deq.utah.gov/air-quality/pm25-serious-sip/DAQ-2017-011687.pdf>

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<sup>25</sup> [https://dec.alaska.gov/air/anpms/Dust/Dust\\_docs/DustControl\\_Report\\_032006.pdf](https://dec.alaska.gov/air/anpms/Dust/Dust_docs/DustControl_Report_032006.pdf)

## **Background**

Draft BACM analyses for the Logan, Provo, and Salt Lake Areas in Utah's Serious PM<sub>2.5</sub> SIP has identified Road Salting & Sanding as a control measure. The analysis prepared for each community included the following finding:

*R307-307 Road Salting & Sanding: The purpose of this rule is to establish emission control for winter time road salting. This is an existing rule that was part of the PM<sub>10</sub> SIP (Section IX, Part A, Page 57) that was approved by EPA on December 6, 1999 (64 FR 68031). A RACT analysis was conducted as part of that SIP. The rule was amended by expanding the applicability to include PM<sub>2.5</sub> nonattainment areas as part of the moderate PM<sub>2.5</sub> SIP. The actual PM emission reduction is unknown however, past UDAQ studies have indicated that road salt plays a minimal role related to this SIP. Consequently, no further analysis is warranted.*

Fairbanks and Alaska do not have an emissions control measure addressing either road sanding or road salting. Unlike many communities in the lower-48, roads in the Fairbanks nonattainment area remain frozen during winter months. The emissions inventory discussion in Step 1 noted that fugitive dust sources of PM<sub>2.5</sub> are estimated to be negligible under the snow/ice bound conditions reflected in the winter seasonal inventory.

## **Analysis**

Utah is planning to expand the applicability of the Road Sanding & Salting control measure, a PM<sub>10</sub> fugitive dust control measure, to the Logan, Provo and Salt Lake PM<sub>2.5</sub> nonattainment areas. The analysis states that the PM<sub>2.5</sub> benefit of the measure is "unknown" and no credit is taken for the measure.

Since fugitive dust emissions in Fairbanks are negligible during the winter, the application of fugitive dust controls with "unknown" benefits in Utah's more moderate climate will produce no benefits in Fairbanks.

## **Conclusion**

Fugitive dust control measures will provide no wintertime PM<sub>2.5</sub> benefit in Fairbanks, therefore this measure is not eligible for consideration as BACM.

Measure R1: Regional Kilns

## **Implementing Jurisdiction(s)**

- None

## **Regulation Weblink(s)**

- [http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix\\_III.D.5.07\\_Adopted\\_12.24.14.pdf](http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix_III.D.5.07_Adopted_12.24.14.pdf)

### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered funding the construction of a Regional Kiln to provide a source of dry wood. The RACM analysis determined the measure to be technologically infeasible because of concerns about the demand for dry wood and emissions from fuels used to dry the wood.

### **Analysis**

The review of SIP commitments did not identify a single program which mandates the construction of Regional Kilns to provide a source of dry wood. Instead, several programs implemented measures that require the use of dry wood in solid fuel burning devices. Fairbanks implemented a requirement that prohibits burning wood that “has more than 20 percent moisture content” in a solid fuel burning appliance.<sup>26</sup>

### **Conclusion**

No SIPs were found with mandates to construct Regional Kiln(s) to provide a source of dry wood. Therefore, this measure is not eligible for consideration as BACM.

### **Measure R4: All Wood Stoves Must be Certified**

#### **Implementing Jurisdiction(s)**

- None

#### **Regulation Weblink(s)**

- [http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix\\_III.D.5.07\\_Adopted\\_12.24.14.pdf](http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix_III.D.5.07_Adopted_12.24.14.pdf)

### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The RACM analysis listed a wood stove measure entitled “All Units Must be Certified”. While no analysis of the measure

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<sup>26</sup>

<http://www.codepublishing.com/AK/FairbanksNorthStarBorough/#!/FNSBC21/FNSBC2128.html#21.28.030>

was presented, it was determined to be technologically infeasible. Klamath County was the reference for the measure. The Klamath County Clean Air Ordinance<sup>27</sup> requires:

*Non-certified wood stoves and fireplace inserts must be removed from building upon sale any building containing them (Section 406.100(3)(c)).*

The Klamath County ordinance also addresses non-certified wood stoves by requiring:

*The resale or installation of a non-certified solid fuel-fired appliance or any appliance not meeting the requirements of Section 406.005(31) is prohibited<sup>28</sup> (Section 406.100(3)(a)(i)).*

*The resale, or installation of an exempt solid fuel-fired appliance, is allowed in accordance with state and local requirements (Section 406.100(3)(a)(ii)).*

### **Analysis**

The Klamath County exemption from the resale and installation ban granted to exempt solid fuel-fired appliances indicates that this measure does not uniformly treat certified appliances differently from non-certified appliances.

### **Conclusion**

The Klamath County measure does meet the goal of the requiring all wood stove units to be certified with respect to all requirements. Therefore, this measure was misrepresented in the RACM analysis and is not eligible for consideration as BACM.

## Measure R6: Remove Hydronic Heaters at Time of Home Sale

### **Implementing Jurisdiction(s)**

- None

### **Regulation Weblink(s)**

- <http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix III.D.5.07 Adopted 12.24.14.pdf>

### **Background**

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<sup>27</sup> <https://www.klamathcounty.org/DocumentCenter/Home/View/1020>

<sup>28</sup> Section 406.005(31) provides a definition of “Urban Growth Boundary” and appears to be an obsolete reference. Most probably, the reference should be to 406.005(10), which is a definition of “Certified Woodstove or Fireplace Insert”.

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered a measure requiring the removal of hydronic heaters at the time of home sale. Analysis of the measure was limited:

*A requirement to replace hydronic heaters at the time of home sale would not reduce emissions from hydronic heaters in the near term, but would ultimately reduce emissions as hydronic heaters were retired when residential property changed hands. As a result, this measure would not result in quantifiable reductions in the four years after designation. The cost of the measure would be borne by the seller, because the home’s sale price would be diminished by the value of the heater that must be removed.*

The analysis did not define or examine what the removed hydronic heaters should be replaced with. Klamath Falls was the reference for the measure. A review of the Klamath County Clean Air Ordinance<sup>29</sup> found a requirement to disclose the presence of all solid fuel-fired appliances upon sale of real property, including wood stoves, fireplace inserts, fireplaces and pellet stoves. The only removal requirement contained in the Ordinance states:

*Removal of Non-Certified Woodstoves and Fireplace Inserts upon Sale of Real-Property – Non-certified wood stoves and fireplace inserts must be removed from building upon sale of any building containing them. The removal shall be accomplished prior to the closing of any real estate transaction involving the building containing the non-certified wood stove(s) or fireplace insert(s).*

The RACM analysis determined the measure to be technologically infeasible because it lacked the authority to implement it. That finding no longer applies as the referendum prohibiting the Borough’s regulation of home heating and fuels is no longer in effect.

While the Borough has no Ordinance addressing the removal of uncertified heating devices from homes being sold, the state of Alaska has mandated a program to remove uncertified wood burning devices during property transactions in Fairbanks; this program became effective June 9, 2017.<sup>30</sup> The regulations require removal or replacement of non-compliant wood-fired heating devices before the sale, lease, or conveyance of property within the Nonattainment Area.

### **Analysis**

The State program requires the removal of all uncertified devices, not just the woodstove and fireplace inserts addressed in the referenced Klamath Falls regulations. Moreover, the State program requires the removal of uncertified hydronic heaters, the apparent original target of this measure.

### **Conclusion**

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<sup>29</sup> <https://www.klamathcounty.org/DocumentCenter/Home/View/1020>

<sup>30</sup> <http://dec.alaska.gov/air/anpms/comm/docs/18AAC50.077.pdf>

Since the state program requires the removal of a broader category of uncertified devices than the uncertified hydronic heaters specified in this measure, the adoption of this measure offers no emission benefits; therefore, this measure is not eligible for consideration as BACM.

## Measure R7: Ban Use of Hydronic Heaters

### **Implementing Jurisdiction(s)**

- None

### **Regulation Weblink(s)**

- [http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix\\_III.D.5.07\\_Adopted\\_12.24.14.pdf](http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix_III.D.5.07_Adopted_12.24.14.pdf)

### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered banning the use of hydronic heaters. The RACM analysis determined the measure to be technologically infeasible because it did not include a provision for homes with no other adequate source of heat. Another consideration was that on very cold days some residences with alternate heat sources find them to be inadequate and need to supplement with heat from wood combustion.

### **Analysis**

The review of SIP commitments did not identify a single program with unrestricted bans on using hydronic heaters. Instead, those programs with curtailments specify the conditions under which curtailments/Air Quality Alerts are called and those programs include a variety of exemptions for homes with NOASH certifications, economic hardship, etc. Fairbanks has implemented a measure mandating stage 1 and stage 2 alerts which restrict wood burning when concentrations are forecast to exceed established concentration thresholds (i.e., 25 and 35 µg/m<sup>3</sup> respectively). Under these conditions use of hydronic heaters are prohibited except under the exemptions specified in the rule.<sup>31</sup>

While a SIP commitment banning outdoor wood boilers (furnaces, etc.) was not identified, several communities in Connecticut (e.g. West Hartford, Hamden, Avon, etc.) were found to have ordinances banning outdoor wood boilers because of nuisance complaints. Commitments to implementing those ordinances, however are not contained in Connecticut’s PM<sub>2.5</sub> SIP.<sup>32</sup> The

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<sup>31</sup>

<http://www.codepublishing.com/AK/FairbanksNorthStarBorough/#!/FNSBC21/FNSBC2128.html#21.28.030>

<sup>32</sup> [http://www.ct.gov/deep/cwp/view.asp?A=2684&Q=419074&depnave\\_GID=1619](http://www.ct.gov/deep/cwp/view.asp?A=2684&Q=419074&depnave_GID=1619)

SIP references a state statute (Section 22a-174k),<sup>33</sup> which restricted the installation of new outdoor wood burning furnaces until EPA issued regulations for hydronic heaters; it also specified setback requirements for new installations.

### **Conclusion**

No SIPs were found banning outdoor wood boilers; therefore, this measure is not eligible for consideration as BACM.

### **Measure R9: All Wood Stoves Must be Certified**

#### **Implementing Jurisdiction(s)**

- None

#### **Regulation Weblink(s)**

- [http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix\\_III.D.5.07\\_Adopted\\_12.24.14.pdf](http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix_III.D.5.07_Adopted_12.24.14.pdf)

#### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The RACM analysis listed a wood stove measure entitled “All Units Must be Certified”. While no analysis of the measure was presented, it was determined to be technologically infeasible. Klamath County was the reference for the measure. The Klamath County Clean Air Ordinance<sup>34</sup> requires:

*Non-certified wood stoves and fireplace inserts must be removed from building upon sale any building containing them. (Section 406.100(3)(c))*

The Klamath County ordinance also addresses non-certified wood stoves by requiring:

*The resale or installation of a non-certified solid fuel-fired appliance or any appliance not meeting the requirements of Section 406.005(31) is prohibited.<sup>35</sup> (Section 406.100(3)(a)(i))*

*The resale, or installation of an exempt solid fuel-fired appliance, is allowed in accordance with state and local requirements. (Section 406.100(3)(a)(ii))*

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<sup>33</sup> <https://law.justia.com/codes/connecticut/2012/title-22a/chapter-446c/section-22a-174k/>

<sup>34</sup> <https://www.klamathcounty.org/DocumentCenter/Home/View/1020>

<sup>35</sup> Section 406.005(31) provides a definition of “Urban Growth Boundary” and appears to be an obsolete reference. Most probably, the reference should be to 406.005(10), which is a definition of “Certified Woodstove or Fireplace Insert”.

## **Analysis**

The Klamath County exemption from the resale and installation ban granted to exempt solid fuel-fired appliances indicates that this measure does not uniformly treat certified appliances differently from non-certified appliances.

## **Conclusion**

The Klamath County measure does not meet the goal of the requiring all wood stove units to be certified with respect to all requirements. Therefore, this measure was misrepresented in the RACM analysis and is not eligible for consideration as BACM.

## Measure R10: Replace Uncertified Units at the Time of Sale

### **Implementing Jurisdiction(s)**

- None

### **Regulation Weblink(s)**

- [http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix\\_III.D.5.07\\_Adopted\\_12.24.14.pdf](http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix_III.D.5.07_Adopted_12.24.14.pdf)

## **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered a measure requiring *replacement of a stove at the time of sale*. Analysis of this measure was limited:

*A requirement to replace uncertified stoves at the time of home sale would not reduce emissions from wood stoves in the near term, but would ultimately reduce emissions as wood stoves were retired when residential property changed hands. As a result, this measure would not result in quantifiable reductions in the four years after designation. The cost of the measure would be borne by the seller, because the home’s sale price would be diminished by the value of the stove that must be removed.*

The analysis did not define or examine what the removed uncertified wood stoves should be replaced with. Klamath Falls was the reference for the measure. A review of the Klamath County Clean Air Ordinance<sup>36</sup> found a requirement to disclose the presence of all solid fuel-fired appliances upon sale of real property, including wood stoves, fireplace inserts, fireplaces and pellet stoves. The only removal requirement contained in the Ordinance states:

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<sup>36</sup> <https://www.klamathcounty.org/DocumentCenter/Home/View/1020>

*Removal of Non-Certified Woodstoves and Fireplace Inserts upon Sale of Real-Property – Non-certified wood stoves and fireplace inserts must be removed from building upon sale of any building containing them. The removal shall be accomplished prior to the closing of any real estate transaction involving the building containing the non-certified wood stove(s) or fireplace insert(s).*

The RACM analysis determined the measure to be technologically infeasible because it lacked the authority to implement it. That finding no longer applies as the Borough the referendum prohibiting the Borough’s regulation of home heating and fuels is no longer in effect.

While the Borough has no Ordinance addressing the removal of uncertified heating devices from homes being sold, the state of Alaska has mandated a program to remove uncertified wood burning devices during property transactions in Fairbanks; this program became effective June 9, 2017.<sup>37</sup> The regulations require removal or replacement of non-compliant wood-fired heating devices before the sale, lease, or conveyance of property within the Nonattainment Area.

### **Analysis**

The State program requires the removal of all uncertified devices, not just the woodstove and fireplace inserts addressed in the referenced Klamath Falls regulations and the uncertified wood stoves addressed in this measure.

### **Conclusion**

Since the state program requires the removal or replacement of a broader category of uncertified devices than the uncertified wood stoves specified in this measure, the adoption of this measure offers no emission benefits; therefore, this measure is not eligible for consideration as BACM.

## **Measure R11: Replace Uncertified Stoves at the Time of Significant Remodeling**

### **Implementing Jurisdiction(s)**

- None

### **Regulation Weblink(s)**

- [http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix\\_III.D.5.07\\_Adopted\\_12.24.14.pdf](http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix_III.D.5.07_Adopted_12.24.14.pdf)

### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered

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<sup>37</sup> <http://dec.alaska.gov/air/anpms/comm/docs/18AAC50.077.pdf>

a measure requiring replacement of a stove when significant remodeling occurred. Analysis of the measure discussed:

*It would probably be enforced during the building permit review and issuance process. The scope and impact of this measure could be controlled by definition of “significant;” it could also be limited to situations where the remodeled room contains a stove. A requirement to replace uncertified stoves at the time of significant remodeling would not reduce emissions from wood stoves in the near term, but would ultimately reduce emissions as wood stoves were retired when residential property was remodeled. As a result, this measure would not result in quantifiable reductions in the four years after designation. The cost of the measure would be borne by the homeowner.*

The RACM analysis determined the measure to be technologically infeasible because it lacked the authority to implement it. That finding no longer applies as referendum prohibiting the Borough’s regulation of home heating and fuels is no longer in effect.

### **Analysis**

The review of SIP commitments did not identify a single program which requires the replacement of uncertified “stoves” when “significant remodeling” occurs. Fairbanks has implemented an enhanced voluntary removal, replacement and repair program for uncertified hydronic heaters and wood stoves.<sup>38</sup> The state of Alaska has mandated a program to remove uncertified wood burning devices during property transactions in Fairbanks; this program became effective June 9, 2017.<sup>39</sup> The regulations require removal or replacement of non-compliant wood-fired heating devices before the sale, lease, or conveyance of property within the Nonattainment Area.

### **Conclusion**

No SIPs mandate the replacement of uncertified units at the time of significant remodeling; therefore, this measure is not eligible for consideration as BACM.

## **Measure R12: Replace Uncertified Stoves in Rental Units**

### **Implementing Jurisdiction(s)**

- None

### **Regulation Weblink(s)**

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<http://www.codepublishing.com/AK/FairbanksNorthStarBorough/#!/FNSBC21/FNSBC2128.html#21.28.030>

<sup>39</sup> <http://dec.alaska.gov/air/anpms/comm/docs/18AAC50.077.pdf>

- <http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix III.D.5.07 Adopted 12.24.14.pdf>

### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered a measure requiring the replacement of uncertified units in rental units. Analysis of the measure was limited:

*A requirement to replace uncertified stoves in rental units would result in emission reductions upon replacement. The cost of the measure would be borne by the landlords, and presumably passed on to the renter.*

The RACM analysis determined the measure to be technologically infeasible because it lacked the authority to implement it. That finding no longer applies as the Borough referendum prohibiting the Borough’s regulation of home heating and fuels is no longer in effect.

### **Analysis**

The review of SIP commitments did not identify a single program which requires the replacement of uncertified units in rental units. Measures mandating the removal of uncertified devices have been identified and are being addressed separately in Measure #24.

### **Conclusion**

No SIP has been identified which mandates the replacement of uncertified stoves in rental units; therefore, this measure is not eligible for consideration as BACM.

### **Measure R15: Ban New Installations – Wood Stoves**

#### **Implementing Jurisdiction(s)**

- None

#### **Regulation Weblink(s)**

- <http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix III.D.5.07 Adopted 12.24.14.pdf>

### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered a measure requiring a ban on new installations of wood stoves. Analysis of the measure was limited:

*A ban on new installations would not reduce emissions from wood stoves in the near term, but would ultimately reduce emissions as wood stoves were retired; however, this approach could have the negative effect of prolonging the use of existing, dirty units because replacing them with newer, much cleaner units would not be allowed. This measure would not result in quantifiable reductions in the four years after designation.*

Discussion of other wood stove restrictions (e.g., limit the number of new installations allowed in new construction, allow new installations but only if one or more existing stoves were retired first, etc.) was also presented. Ultimately, the RACM analysis determined the measure to be technologically infeasible because it lacked the authority to implement it. That finding no longer applies as the referendum prohibiting the Borough's regulation of home heating and fuels is no longer in effect.

### **Analysis**

The review of SIP commitments did not identify a single program which bans new installations of wood stoves.

### **Conclusion**

Since no SIP was identified which bans new installations of wood stoves, this measure is not eligible for consideration as BACM.

## Measure R16: Disincentives to Sell Used Stoves

### **Implementing Jurisdiction(s)**

- None

### **Regulation Weblink(s)**

- [http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix\\_III.D.5.07\\_Adopted\\_12.24.14.pdf](http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix_III.D.5.07_Adopted_12.24.14.pdf)

### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered a measure imposing a financial penalty on the sale of a used stove to another user. Analysis of the measure was limited:

*This measure could apply to all sales of used stoves, or limited to uncertified stoves. There is little environmental benefit to discouraging the sale of a used certified stove; most of the incremental benefit of stove changeout is the difference between uncertified and certified stove emissions.*

*Enforcement of this measure would be much more difficult than enforcement of the requirement that all new stoves be certified. Enforcement of the latter measure requires that vendors be monitored. Enforcement of a penalty on resale would require that transactions involving individual sellers be monitored. This, in turn, might be addressed using a permit or registration system for stove owners.*

*The short-term effectiveness of this measure is low, as the turnover of wood stoves built before 1992 is very slow.*

The RACM analysis determined the measure to be technologically infeasible because it lacked the authority to implement it. That finding no longer applies as the Borough the referendum prohibiting the Borough's regulation of home heating and fuels is no longer in effect.

Borough Code<sup>40</sup> has been updated since the RACM analysis was prepared and Section 21.28.030 (Prohibited acts) mandates:

*No person shall sell or lease an unlisted [solid fuel burning appliance](#) or barrel stove kit in the borough unless the buyer signs an affidavit, on a form prescribed by the borough, attesting that the [appliance](#) will not be installed or used in the [air quality control zone \(Section 21.28.030\(H\)\(1\)\)](#)*

Uncertified wood stoves are not included as a Borough listed solid fuel burning appliance.

While this requirement does not apply to the transfer of property, the state of Alaska has mandated a program to remove uncertified wood burning devices during property transactions in Fairbanks; this program became effective June 9, 2017.<sup>41</sup> The regulations require removal or replacement of non-compliant wood-fired heating devices before the sale, lease, or conveyance of property within the Nonattainment Area.

## **Analysis**

Measures adopted by the Borough prohibit the sale of uncertified wood stoves. Measures adopted by the state require the removal of uncertified wood stoves from homes being sold, the only category of sale of uncertified wood burning devices not addressed by Borough Code. Collectively, these controls prohibit all sales of uncertified wood burning devices – new or used within the Fairbanks PM<sub>2.5</sub> nonattainment area. Thus, while they do not provide the financial disincentive addressed in the subject RACM measure for selling used uncertified wood stoves, they prohibit the opportunity for it to occur.

## **Conclusion**

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<sup>40</sup>

<http://www.codepublishing.com/AK/FairbanksNorthStarBorough/#!/FNSBC21/FNSBC2128.html#21.28>

<sup>41</sup> <http://dec.alaska.gov/air/anpms/comm/docs/18AAC50.077.pdf>

The benefits of the Borough prohibition on the sale of uncertified wood burning devices and the State mandate to remove uncertified wood burning devices from homes during property transactions far exceed the benefits expected from the financial penalties of the subject RACM measure; therefore this measure is not eligible for consideration as BACM.

## Measure R17: Ban Use of Wood Stoves

### **Implementing Jurisdiction(s)**

- None

### **Regulation Weblink(s)**

- [http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix\\_III.D.5.07\\_Adopted\\_12.24.14.pdf](http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix_III.D.5.07_Adopted_12.24.14.pdf)

### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered banning the use of wood stoves. The RACM analysis determined the measure to be technologically infeasible because it did not include an exemption for homes with no other adequate source of heat. Another consideration was that on very cold days some residences with alternate heat sources find those sources to be inadequate, and need to supplement with heat from wood combustion.

### **Analysis**

The review of SIP commitments did not identify a single program with unrestricted bans on using wood stoves. Instead, those programs with curtailments specify the conditions under which curtailments/Air Quality Alerts are called and those programs include a variety of exemptions for homes with NOASH certifications, economic hardship, etc. Fairbanks has implemented a measure mandating stage 1 and stage 2 alerts which restrict wood burning when concentrations are forecast to exceed established concentration thresholds (i.e., 25 and 35 µg/m<sup>3</sup> respectively). Under these conditions use of wood stoves are prohibited except under the exemptions specified in the rule.<sup>42</sup>

### **Conclusion**

No SIPs were found banning the use of wood stoves; therefore, this measure is not eligible for consideration as BACM.

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<http://www.codepublishing.com/AK/FairbanksNorthStarBorough/#!/FNSBC21/FNSBC2128.html#21.28.030>

## Measure R20: Transportation Control Measures

### **Implementing Jurisdiction(s)**

- None

### **Regulation Weblink(s)**

- <http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix III.D.5.07 Adopted 12.24.14.pdf>

### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered several transportation control measures, including:

- HOV lanes
- Traffic flow improvement program
- Create non-motorized traffic zones
- Employer-sponsored flexible work schedules
- Retrofit diesel fleet (school buses, transit fleets)
- On-road vehicle I/M program
- Heavy-duty vehicle I/M program
- State LEV program

Transportation control programs in place at the time included:

- Expanded availability of plug-ins; electrical outlets were installed on 1,500+ parking spaces between 2008 & 2015
- Ordinance mandating—for employers with 275+ parking spaces—electrification of outlets at temps < 21° F between November 1 and March 31
- Public education focused on the benefits of plugging-in and using the transit program called Metropolitan Area Commuter System (MACS)
- Expanded transit service includes improved service frequency on high ridership routes, new routes and better bus stop facilities; ridership increased 61% between 2008 & 2013
- Commuter Van Pool program, includes Van Tran program for elderly and disabled
- Anti-idling program for heavy-duty diesel vehicles started as a ADOT&PF program focused on dump trucks and tractors and has been expanded to a CMAQ-funded pilot program focused on the purchase and installation of auxiliary heaters to reduce idle time
- Federal Motor Vehicle Control Program

The analysis of these measures found:

*With the exception of the anti-idling program, the programs listed above have been in place for well over a decade and are working to reduce motor vehicle emissions under extreme winter operating conditions.*

*Measures focused on reducing traffic congestion offer limited benefits as the Fairbanks road network has few roads operating at Level of Service (LOS) levels D, E, or F.*

*Community-wide ridesharing programs offer few potential emission reduction benefits because of the low population and employment density in the nonattainment area (employer programs are operated where sufficient density supports participation).*

*Travel reduction programs have been found to have limited benefits on a national basis, with principal reductions coming from commute trips, which require high density employment to be successful.*

*EPA's motor vehicle emissions model MOVES, including the recently released version MOVES2014, does not provide a PM benefit for either light- or heavy-duty I/M programs. Thus, there is no way to quantify a particulate benefit from I/M, and EPA clearly does not recognize I/M as an appropriate PM control measure.*

This resulted in a finding that no additional TCMs appear viable for Fairbanks. Because TCMs are not expected to provide additional reductions, all TCMs are classified as “not technologically feasible.”

## **Analysis**

The Borough Transportation Department<sup>43</sup> provided the following update of trends in transportation activities since the submission of the Moderate SIP:

- Expanded availability of plug-ins; electrical outlets are continuing to be installed on parking spaces with new projects at the Carlson Center, Big Dipper Ice Arena and both public libraries underway. These are joint projects between DOT and FNSB and are funded in FFY17 and FFY18 in the FMATS 2017 – 2020 TIP.<sup>44</sup>
- Adoption of an ordinance mandating—for employers with 275+ parking spaces—electrification of outlets at temps < 21° F between November 1 and March 31, this requirement is listed in current FNSB Code<sup>45</sup> for the Vehicle Plug-in Program.
- Public education is focused on the benefits of plugging-in and using the transit program called Metropolitan Area Commuter System (MACS) – an outreach program continues to provide this information

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<sup>43</sup> Email from Glenn Miller, FNSB to Bob Dulla, Sierra Research, entitled Transportation Update, 1/23/18

<sup>44</sup> <http://fmats.us/wp-content/uploads/2017/06/2017-2020-TIP-Admin-Mod-1-Revised.pdf>

<sup>45</sup> <http://www.codepublishing.com/AK/FairbanksNorthStarBorough/#!/FNSBC21/FNSBC2124.html#21.24>

- Transit ridership in Fairbanks has been flat the past 3 years where national trends have been decreased ridership.
- Van Tran ridership in Fairbanks has closely followed fixed route ridership. However, the past year ridership has increased about 40% due to providing trips for Parks and Recreation participants
- Anti-idling program for heavy-duty diesel vehicles started as a ADOT&PF program focused on dump trucks and tractors and has been expanded to a CMAQ-funded pilot program focused on the purchase and installation of auxiliary heaters to reduce idle time. It is funded in FFY17 in the FMATS 2017 – 2020 TIP.<sup>46</sup>

FMATS has indicated<sup>47</sup> that VMT levels in Fairbanks continue to grow at 1.5% year over its long-range planning horizon through 2040, well below the national average. This supports the earlier finding that:

- *Measures focused on reducing traffic congestion offer limited benefits,*
- *Community-wide ridesharing programs offer few potential emission reduction benefits, and*
- *Travel reduction programs offer limited benefits.*

Finally, the latest version of EPA’s Motor Vehicle Emissions Simulator MOVES2014a continues to show no PM benefits for either light- or heavy-duty I/M programs. Thus, there is no way to quantify a particulate benefit from I/M, and EPA clearly does not recognize I/M as an appropriate PM control measure.

## **Conclusion**

Findings for the transportation controls examined in the RACM analysis have not changed, these measures are not technologically feasible for BACM.

## **Analysis of Marginal/Unquantifiable Benefit BACM Measures**

**Table 8. List of Measures Determined to be Marginal/Unquantifiable Benefit**

<b>Number &amp; Title</b>	
Measure 1	Surcharge on Device Sales
Measure 6	Prohibit Installation of Flue Dampers Unless Device was Certified Using Flue Damper
Measure 11	Prohibit Use of Rain Caps on Stacks
Measure 12	Require Minimum Stack Height for OWBs Relative to Nearby Rooflines

<sup>46</sup> <http://fmats.us/wp-content/uploads/2017/06/2017-2020-TIP-Admin-Mod-1-Revised.pdf>

<sup>47</sup> Analysis of Interim 2045 MTP Interim Travel Model Runs provided by Kittelson and Associates, January 12, 2018.

Measure 17	Require Removal of Uncertified Solid Fuel Burning Devices Upon Sale of Property
Measure 18	No Visible Emissions during Curtailment Periods
Measure 23	Require Exempt Household to Display a Decal Visible from a Point of Public Access
Measure 30	Distribution of Curtailment Information at Time of Sale of Wood-Burning Device
Measure 32	Distribution of Information Related to Moisture Content at Time of Sale of Wood
Measure 38	Ambient PM <sub>2.5</sub> Curtailment Threshold (1-Hr Average)
Measure 39	Use of AQI as Basis for Curtailment Threshold
Measure 40	Single Stage Curtailment

## Measure 1: Surcharge on Device Sales

### **Applicable Jurisdiction(s)**

- Washington State

### **Regulation Weblink(s)**

- <https://dor.wa.gov/find-taxes-rates/other-taxes/solid-fuel-burning-device-tax>

### **Background**

A Washington State regulation imposes a fee upon the sale of solid fuel wood burning devices within the state. This regulation was adopted in or prior to 1987.<sup>48</sup> The fee, originally established at \$15/unit, is currently set at \$30/unit.<sup>49</sup>

This regulation requires that revenues from the program be used solely for the purposes of public education and enforcement of the solid fuel burning device program,” with revenue distributed as follows:

- a) 34% of the funds shall be distributed to the Woodsmoke Education Program, run by the state air agency, the Washington Department of Ecology, for the purposes of enforcement and educating the public about the effects of solid fuel heating devices on air quality and methods for achieving better efficiency from solid fuel burning devices; and

<sup>48</sup> Washington Laws, 1990, available at <http://leg.wa.gov/CodeReviser/documents/sessionlaw/1990c128.pdf?cite=1990%20c%20128%20%20C%20A7%206>; Accessed 10/10/2017.

<sup>49</sup> Washington State Department of Revenue, available at <https://dor.wa.gov/find-taxes-rates/other-taxes/solid-fuel-burning-device-tax>; Accessed 10/10/2017.

- b) The remaining 66% of the funds are made available to local air authorities with enforcement programs under the Woodsmoke Enforcement Program on the basis of population.

If a local air authority is not in place, does not implement an enforcement program, or elects not to receive the funds, the funds that would otherwise be distributed under this subsection are transferred to the Department of Ecology. Businesses selling new wood stoves are also required to distribute and explain educational materials.

The biennial 2015-2017 budget for the Washington Department of Ecology estimated an income of \$547,000 from the combined Woodsmoke Education and Enforcement Program, with \$38,000 being allocated to the Department of Ecology for administration of affected programs and \$509,000 allocated to the Air Quality Program. Of this \$509,000, 34% (or roughly \$173,000) was used to fund the statewide Woodsmoke Education Program. \$274,000 of the remaining 66% (or \$336,000) was disbursed to local agencies to fund both woodstove education and enforcement grants.<sup>50</sup> (Not all of the available funds are requests.)

### **Analysis**

Discussions with Washington Department of Ecology staff<sup>51</sup> found that surveys they conducted were not able to clearly estimate emission benefits from state-level education/outreach, nor were they able to provide quantitative estimates of their emission benefits based on how funds were pooled and used by local agencies. Similar findings were confirmed based on communication with the Puget Sound Clean Air Agency, one of the local air authorities that receives funding from the Department of Ecology. They too combine funds received from the Wood Stove Education and Enforcement program with revenues from other sources and use the funding for education and enforcement related to burn restrictions, but they could not easily quantify the benefits of the specific funded programs. In addition, the revenues received from this program by the local agencies are small relative to the funds received from other sources.<sup>52</sup>

Given the co-mingling of monies from device sale surcharges with other funding sources, both Washington State and its local air agencies cannot easily estimate emission benefits attributed to either education or enforcement-related programs. This finding is consistent with the Borough's decision to treat public education as a voluntary control measure in the Fairbanks PM<sub>2.5</sub> SIP with no specific estimate of an emission benefit. The maximum level of revenue that could be expected from the implementation of this measure in Fairbanks is \$24,000/year (assuming sales

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<sup>50</sup> State of Washington Department of Ecology, Budget & Program Overview 2015-2017, available at <https://fortress.wa.gov/ecy/publications/documents/1501007.pdf>; accessed 10/12/2017.

<sup>51</sup> Personal communication with Stuart Clark, Washington Department of Ecology, 10/12/2017. Personal communication with Matthew Vandrush, Washington Department of Ecology, 10/12/2016.

<sup>52</sup> Personal communication with Amy Warren, Puget Sound Clean Air Agency, October 13, 2017.

of 800 units/year using a very conservative life span of 15 years for current population of 12,200 wood heating devices located in the nonattainment area). The impact of that revenue increase on the emission benefits produced by existing well-funded state and Borough education programs, after accounting for administrative fees, is negligible and would be difficult to quantify.

Other agencies, such as the Utah Department of Environmental Quality, have, in fact, discontinued their education programs when they realized that the magnitude of a second (repeat) fine was more of a deterrent (i.e., emission benefit) than education.<sup>53</sup> The benefits from an education program funded by a tax on solid fuel burning devices in Alaska would be negligible and difficult to quantify.

### **Conclusion**

Potential benefits from a device sale surcharge are difficult to quantify based on information collected in Washington State, where such a measure has been implemented. Moreover, at the \$30/unit surcharge currently imposed in the State of Washington, emission benefits would be negligible and difficult to quantify with any degree of confidence in the estimate. While this measure offers the potential of increased revenue, it does not directly control emissions, therefore the adoption of the Washington regulation would provide a benefit that is marginal/unquantifiable making it technologically infeasible.

## **Measure 6: Prohibit Installation of Flue Dampers Unless Device was Certified Using Flue Damper**

### **Applicable Jurisdiction(s)**

- Missoula, Montana

### **Regulation Weblink(s)**

- <https://www.missoulacounty.us/home/showdocument?id=8452>

### **Background**

With respect to enclosed combustion devices, the term “draft” refers to the negative pressure created at the air inlet to the combustion chamber by the buoyancy of hot combustion gases exiting the combustion chamber through a vertical stack or chimney. The magnitude of stack draft is primarily governed by the difference in temperature between outdoor air and the combustion gases within the stack, and the volume of the stack (or chimney). Since outdoor air and stack gas temperatures change both seasonally and during a typical diurnal heating cycle, the amount of draft can vary similarly.

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<sup>53</sup> Personal communications with Bo Call, Utah Department of Environmental Quality, October 4, 2017

In residential wood stoves and inserts, inlet air and combustion gas flow rates are generally controlled by a damper installed at the inlet air ports to the combustion chamber. Where building codes and wood burning regulations allow, dampers can also be installed downstream of the combustion chamber in the exhaust stack to directly regulate combustion gas flow rates. Many dampers require manual adjustment, but some are thermostatically controlled to open the damper when combustion chamber temperatures decline during the burndown phase.

Solid fuel burning appliances are designed to operate within an optimum draft range. If the draft is set too low, insufficient air is available to sustain combustion except when very small quantities of fuel are present in the combustion chamber. If the draft is set too high, excess air (beyond what is needed for proper combustion) is allowed into the combustion chamber which reduces combustion temperatures and reduces the device's heating efficiency (resulting in increased fuel use) and may also result in unsafe operation. The optimum range of draft for properly installed and operated residential wood-burning devices such as wood stoves and fireplace inserts typically falls in the negative pressure range of minus 0.04 to 0.08 inches of water column.

### **Analysis**

Missoula, Montana is the only jurisdiction to enforce a regulation prohibiting the installation of a flue (exhaust stack) damper unless the device is specifically certified with a flue damper. The staff from the Montana Department of Environmental Quality could not locate a staff report associated with the adoption of this regulation by their Board in 1986 as part of the Montana Clean Air Act. They also suggested that no analysis was conducted to review the likely impact of flue damper installation on emissions prior to adoption.<sup>54</sup>

During wintertime conditions in Fairbanks flue draft varies dramatically beyond the optimal range due to wider temperature differences between flue gases and ambient air. When outdoor temperatures fall to the -10 to -20°F range typical of ambient PM<sub>2.5</sub> violations in Fairbanks, draft negative pressures can reach or exceed minus 0.20 inches of water column, which is well in excess of the typical design ranges for wood stoves and inserts.<sup>55</sup> Under these conditions, a flue damper has the potential to reduce inlet air and exhaust gas flowrates and the resulting draft to within the designed operating ranges of woodstoves and fireplace inserts and provide an emissions reduction benefit through reduced fuel consumption.

Thus, under cold arctic winter temperatures typical of high ambient PM<sub>2.5</sub> concentrations in Fairbanks, a flue damper might actually serve to make combustion more efficient, thus reducing PM<sub>2.5</sub> emissions relative to devices operated without them. Given the fact that no analysis of flue damper benefits is available from the jurisdiction with this regulation in place (Missoula, MT), the benefits of prohibiting flue dampers in woodstoves and fireplace inserts in Fairbanks are

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<sup>54</sup> Personal communication with Julie Mohr, Montana Department of Environmental Quality, October 5, 2017; Personal communication with Benjamin Schmidt, Missoula City/County Health Department, October 6, 2017.

<sup>55</sup> Personal communication with Kent Severns, The Woodway, Fairbanks, AK, October 6, 2017.

difficult to quantify, and under typically cold wintertime temperatures in Fairbanks may actually have detrimental impacts.

### **Conclusion**

The benefits of this measure in an arctic environment are at best uncertain and likely to increase emissions through increased fuel combustion. With regard to the installation of new wood burning devices, the 2015 NSPS mandates that owner manuals specify whether flue dampers are required and professional installers are required to observe installation instructions; thus this rule has no benefit for new installations; therefore the measure is technologically infeasible.

## Measure 11: Prohibit Use of Rain Caps on Stacks

### **Implementing Jurisdiction(s)**

- State of Maine

### **Regulation Weblink(s)**

- <https://www1.maine.gov/sos/cec/rules/06/096/096c150.doc>

### **Background**

Outdoor wood boilers (OWBs) are generally used to provide heat for residential structures. Firewood is burned in the unit, sited outside the residence, with the energy released by combustion transferred to the residence through circulation of a thermal fluid.

In some locations, operators of outdoor wood boilers attach a rain cap (or weather cap) to the stack from which emissions produced by the outdoor wood boiler are released. This rain cap is attached to prevent moisture (rain, snow, etc.) from entering the stack during periods of non-operation and causing exposed surfaces to rust.

### **Analysis**

Maine is the only jurisdiction that currently enforces a regulation related to the use of rain caps on outdoor wood boiler stacks, prohibiting the installation of caps unless specifically required by the manufacturer of the boiler.<sup>56</sup> Personal communications with staff members of the Maine Department of Environmental Protection indicated that the regulation was adopted in Maine between 2007 and 2008 primarily in response to complaints from citizens about the use of boilers by neighbors.<sup>57</sup> More than one staff member indicated that no scientific or statistical

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<sup>56</sup> Regulation can be downloaded at

<http://www.maine.gov/dep/air/woodsmoke/woodcombustion.html>

<sup>57</sup> Personal communication on October 4, 2017 with Jeff Crawford, Air Bureau, Maine Department of Environmental Protection; Personal communication on October 5, 2017 with Tom Graham, Air Bureau, Maine Department of Environmental Protection.

analysis was conducted by the staff during development of the regulation. One said specifically that he “did not know if the rule had worked well,” and one said that only one comment was entered into testimony in the meeting at which the Maine DEQ Board adopted the regulation; the only responsive in the record mentioned that the use of a rain cap impeded buoyant plume rise of smoke exiting a stack and resulted in higher ground-interior level impacts at downwind residences.

The average precipitation rate in Fairbanks is much lower than that of Maine, particularly in the winter months. Whereas Maine averages more than forty inches of precipitation per year, Fairbanks averages less than eleven.<sup>58,59</sup> In addition, whereas ~54%, or 22 inches, of Maine’s precipitation falls during the winter nonattainment months (October through March), only 31%, or 3 inches, of precipitation in Fairbanks falls during those months. Discussions with Fairbanks North Star Borough Air Quality Program staff found that rain caps are not used in Fairbanks, and thus a regulation prohibiting rain caps would have no impact on emissions.<sup>60</sup>

### **Conclusion**

Since the need for rain caps in Fairbanks is limited and Borough staff have indicated that existing OWBs are not equipped with them, a regulation prohibiting rain caps on OWB stacks would produce little or no emission benefit. Thus, the adoption of the Maine regulation would provide a benefit that is marginal/unquantifiable, making it technologically infeasible.

## **Measure 12: Require Minimum Stack Height for OWBs Relative to Nearby Rooflines**

### **Applicable Jurisdiction(s)**

- State of Maine

### **Regulation Weblink(s)**

- <http://www.maine.gov/dep/air/woodsmoke/woodcombustion.html>

### **Background**

Outdoor wood boilers (OWBs) are generally used to provide heat for residential structures. Firewood is burned in the unit, located outside the residence, with the energy released by the

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<sup>58</sup> Data collected for Portland, ME; Augusta, ME; and Lewiston, ME from U.S. Climate Data at <https://www.usclimatedata.com/climate/maine/united-states/3189>; Accessed 10/12/2017.

<sup>59</sup> Data collected for Fairbanks, AK from U.S. Climate Data at <https://www.usclimatedata.com/climate/fairbanks/alaska/united-states/usak0083>; Accessed 10/12/2017.

<sup>60</sup> Personal communication with Todd Thompson, Fairbanks Borough Air Quality Department, October 10, 2017.

combustion process transferred into the interior of the residence through circulation of a thermal fluid.

The boilers generate emissions by the combustion of wood fuel, and those emissions can be transported to impact neighboring residences. Ground-level concentrations of emissions at downwind residences can be influenced by the heights at which emissions exit exhaust stacks and whether wind flows at exit points are impacted by the heights of structures near these exhaust stacks.<sup>61</sup>

Maine is the only state that currently regulates the minimum height of exhaust stacks serving newly-installed OWBs. The regulation specifies a minimum stack height of ten feet or “two feet higher than the peak of the roof of the structure being served by the OWB” if:

- 1) the OWB has a particulate emission rating greater than 0.60 lbs/MMBtu and is within 500 feet of any nearby residence, or
- 2) the OWB has a particulate emission rating of 0.60 lbs/MMBtu or less and is within 300 feet of any nearby residence.<sup>62</sup>

Additionally, the regulation requires the extension of an existing OWB exhaust stack if a new residence is constructed within the setback distances specified in the regulation.

### **Analysis**

As with the Maine-only regulation prohibiting the use of rain caps on OWB exhaust stacks, staff members of the Maine Department of Environmental Protection reported that the regulation was adopted in Maine between 2007 and 2008 primarily in response to nuisance complaints from citizens about the use of OWB by neighbors.<sup>63</sup> More than one staff member indicated that no scientific or statistical analysis was conducted by the staff during development of the regulation to estimate its benefits. One said specifically that he “did not know if the rule had worked well,” and one said that no public comments were received in relation to the stack height requirements prior to or during the public hearing at which the Maine DEQ Board adopted the regulation.

Maine adopted this rule to minimize disputes between neighbors; the rule has no effect on emissions and was not developed to reduce ambient PM<sub>2.5</sub> concentrations other than at downwind residences. The rule predates federal regulation of OWBs, which mandated that

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<sup>61</sup> Minnesota Pollution Control Agency, AERMOD Evaluation of Outdoor Wood Boiler Stack Height and Setback

<sup>62</sup> Regulation can be downloaded at <http://www.maine.gov/dep/air/woodsmoke/woodcombustion.html>

<sup>63</sup> Personal communication on October 4, 2017 with Jeff Crawford, Air Bureau, Maine Department of Environmental Protection; Personal communication on October 5, 2017 with Tom Graham, Air Bureau, Maine Department of Environmental Protection.

owner manuals provide “guidance on proper installation information, including stack height”.<sup>64</sup> A survey of owner manuals found installation instructions specifying that chimney height extend above the roofs of surrounding buildings.<sup>65</sup> Industry guidance contained in Best Burn Practice for Wood Burning Outdoor Furnace recommends that stack extend 2 feet above surrounding roof top peaks.<sup>66</sup>

The addition of a regulation specifying minimum stack heights for OWBs would not lead to a reduction in PM<sub>2.5</sub> emissions but could reduce PM<sub>2.5</sub> concentrations downwind of newly-installed OWBs or newly-constructed residences near OWBs. However, current Fairbanks North Star Borough (FNSB) regulations (FNSB Chapter 21.28.030.F.1) already prohibit the installation of an OWB within 330 feet of the closest property line, which effectively eliminates such installations on any parcel smaller than 10 acres in area.

### **Conclusion**

Because of the property line protections incorporated into Borough Code, this measure is less stringent than the existing Borough measure. This finding demonstrates this measure is technologically infeasible.

### **Measure 17: Require Removal of Uncertified Solid Fuel Burning Devices Upon Sale of Property**

#### **Applicable Jurisdiction(s)**

- State of Oregon

#### **Regulation Weblink(s)**

- [https://www.oregonlegislature.gov/bills\\_laws/ors/ors468A.html](https://www.oregonlegislature.gov/bills_laws/ors/ors468A.html)
- <http://www.deq.state.or.us/regulations/rules/excerpt/262-20110309-Rule.pdf>

#### **Background**

The Oregon legislative body, under Senate Bill 102,<sup>67</sup> in 2009 extended legislation relating to solid fuel burning devices to reduce the number of uncertified wood burning devices in the state. Among other additions, they included the requirement that sellers of properties that contain

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<sup>64</sup> <https://www.federalregister.gov/documents/2015/03/16/2015-03733/standards-of-performance-for-new-residential-wood-heaters-new-residential-hydrionic-heaters-and>

<sup>65</sup> [https://centralboiler.com/media/1803/9000166\\_manual\\_classic\\_27-jan-2014.pdf](https://centralboiler.com/media/1803/9000166_manual_classic_27-jan-2014.pdf)

<sup>66</sup>

<https://www.hpba.org/Portals/26/Documents/Government%20Affairs/NSPS%20Members/HPBA%202014%20NSPS/Attachment13TechEnvironmentalAirDispersionModelingReportofEClassc2300July2012.PDF?ver=2016-11-21-105529-197>

<sup>67</sup> <https://olis.leg.state.or.us/liz/2009R1/Measures/Overview/SB102>

uncertified solid fuel burning devices bear the responsibility of the removal and destruction of those devices unless the seller and buyer agree in writing that the responsibility was to become the buyer's. If the seller retains responsibility, the device need be removed from the structure prior to the closing date of sale of the structure. If the buyer is to accept responsibility, the buyer must remove and destroy the device within 30 days of closure of sale of the property. In addition, the person responsible for removal and destruction of the device must show proof of such to the Oregon Department of Environmental Quality (ODEQ).

Following enactment of this legislation, the ODEQ also adopted a series of regulations in 2011 to implement the requirements of Senate Bill 102.<sup>68</sup> ODEQ Regulation 340-262-0700<sup>69</sup> requires the same procedure for uncertified solid fuel burning devices in Oregon prior to or shortly after sale of a property. The resulting program came to be known as Oregon's Heat Smart program.<sup>70</sup>

### **Analysis**

Regulations affecting the removal of uncertified wood burning devices during property transactions in Fairbanks became effective June 9, 2017.<sup>71</sup> Those regulations require removal or replacement of non-compliant wood-fired heating devices before the sale, lease, or conveyance of property within the Nonattainment Area. The regulations are intended to improve air quality by reducing the number of older, more polluting wood-fired heating devices in the area over time. Wood-fired devices that appear on any of DEC's [lists of EPA-certified and Phase 2 "White Tag" devices](#) do not need to be removed or replaced.

Wood-fired heating devices including wood and pellet stoves, hydronic heaters, fireplace inserts, and large devices with greater than 350,000 Btu per hour heat output are affected by this measure. If the device is one of these types and is not EPA-certified, Phase 2 "White Tag" qualifying or exempted, it must be removed from the property before the property is sold, leased, or conveyed.

A wood-fired heating device that is removed under this requirement, is not required to be replaced. However, if it is replaced with another wood-fired heating device it must be replaced with a new device that meets [current emission standards](#) for new installations. Re-installations of removed devices are not allowed within the Fairbanks Nonattainment area under 18 AAC 50.077.

There are some exceptions and the ability for temporary waivers under 18 AAC 50.077. 18 AAC 50.077(h) allows for temporary waivers. A temporary waiver is envisioned to allow additional time for removal or replacement of the device without adversely impacting the real estate transaction. The Division of Air Quality needs documented information in order to grant a temporary waiver. 18 AAC 50.077(h) has three areas that must be considered when making a determination on a waiver request:

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<sup>68</sup> <http://www.oregondeq.com/regulations/rules/summary/262-20110121-Summary.htm>

<sup>69</sup> <http://www.deq.state.or.us/regulations/rules/excerpt/262-20110309-Rule.pdf>

<sup>70</sup> <http://www.oregon.gov/deq/Residential/Pages/heatsmart.aspx>

<sup>71</sup> <http://dec.alaska.gov/air/anpms/comm/docs/18AAC50.077.pdf>

- 1) The financial hardship information provided by the owner or operator
- 2) The technical feasibility information provided by the owner or operator; and
- 3) Potential impact to locations with populations sensitive to exposure to PM<sub>2.5</sub>; locations include hospitals, schools, child care facilities, health clinics, long-term care facilities, assisted living homes, and senior centers

The following information must be provided to the Division of Air Quality in order for the review of a temporary waiver to proceed:

- a) Make and model of device including a description and pictures of the device. Pictures should include any labels or device identification
- b) Date installed at residence
- c) Address of residence where the device is installed and an attestation that the device location does not adversely impact a sensitive population (see #3 above)
- d) Financial feasibility information should document proof of hardship. Examples include, but not limited to: proof of public assistance, engineer report and cost estimates, cost quotes, property evaluation, etc.
- e) Technical feasibility information should document proof of issue. Examples include, but not limited to; engineer report and time estimates, engineer report on structural issues, order form and delivery/installation date quotes from installers, etc.
- f) A temporary waiver will need to have an end date. Please include the date requested for the temporary waiver to expire. Waiver length request should not exceed 6 months

### **Conclusion**

Both programs require the removal of uncertified wood burning devices during a real estate transaction. Oregon allows the purchaser up to 30-days to remove uncertified devices after the transaction is completed; Fairbanks does not. Fairbanks allows a temporary waiver that increases the time for removal; Oregon does not. The impact of these differences on air quality is insignificant and difficult to quantify; therefore, this measure is technologically infeasible.

### **Measure 18: No Visible Emissions during Curtailment Periods**

#### **Applicable Jurisdiction(s)**

- Maricopa County, Arizona

#### **Regulation Weblink(s)**

- <https://www.maricopa.gov/DocumentCenter/View/5332>

## **Background**

A Maricopa County ordinance<sup>72</sup> allows wood stoves certified as the sole source of heat in a residential dwelling to continue operating during curtailment periods provided that these stoves emit no visible emissions, i.e. 0% opacity. Most other jurisdictions with wood burning regulations limit visible emissions from wood stoves permitted to operate during curtailment periods to 20% opacity.

Communication with staff members from Maricopa County's Air Quality Department indicated that no staff report was prepared when the "no visible emission" regulation was first adopted in 1994.<sup>73</sup> Communication with a staff member from Montana's Department of Environmental Quality indicated that Montana, where ambient temperatures during the winter nonattainment season can drop to low levels that approach those in Fairbanks, maintains a restriction that allows visibility up to 20%.<sup>74</sup> Historical EPA literature states that "It can be difficult to distinguish pollutant-containing mists from innocuous water droplets that are generated from steam condensation,"<sup>75</sup> and advises inspectors that "if the temperature is low...consider the possibility of a steam plume that does not evaporate easily."<sup>76</sup> Academic literature summarizing EPA's Method 9 states:

## **Analysis**

In cold weather, steam is often a part of the emission. In order to make an accurate reading, opacity must be read after the steam has dissipated. This change is readily visible as the apparent opacity will drop significantly but stay constant after that.<sup>77</sup>

Two additional considerations in Fairbanks are that (1) daylight is limited during winter months to no more than 5 hours/day in December, January and February, the period when elevated PM<sub>2.5</sub> concentrations are most likely to occur, and (2) oil- and gas-fired heating devices generate condensing moisture plumes but are not required to cease operation during curtailment periods.

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<sup>72</sup> Ordinance P-26, Section 3.C.1 of Maricopa County Ordinance P-26: Residential Woodburning Restriction, available at <https://www.maricopa.gov/DocumentCenter/View/5332>; accessed October 12, 2017.

<sup>73</sup> Personal communication with Johann Kuspert, Maricopa County Air Quality Department, September 28, 2017.

<sup>74</sup> Personal communication with Benjamin Schmidt, Montana Department of Environmental Quality, October 6, 2017.

<sup>75</sup> Rose, Thomas H, Visible Emission Evaluation Procedures Course Student Manual APT/ Course 325 Final Review Draft, 1995, available at <https://www3.epa.gov/ttnemc01/methods/VECourse.pdf>; accessed October 12, 2017.

<sup>76</sup> Eastern Technical Associates and Entrophy Environmentalist, Inc., Visible Emissions Field Manual EPA Methods 9 and 22, EPA 340/1-92-004, 1993, available at <https://www3.epa.gov/ttnemc01/methods/VEFieldManual.pdf>; accessed 10-12-2017

<sup>77</sup> University of Nebraska-Lincoln, Safe Operating Procedure: Opacity of Emissions from Combustion Sources and Operating Log Record, 2017, available at [https://ehs.unl.edu/sop/s-opacity\\_emissions.pdf](https://ehs.unl.edu/sop/s-opacity_emissions.pdf); accessed October 12, 2017.

These factors have led the Borough to develop a checklist of considerations to differentiate between wood/coal stoves and oil/gas furnaces. These considerations include:

- Odor – smelling the smoke is often the first and best indication of wood or coal burning;
- Multiple Stacks – frequently an indication of a secondary heating device besides a furnace;
- Location of Stack – stacks located over a garage connected to the house is typically for an oil/gas furnace; stacks over separated garages and sheds/shops is an indication of a SFBD; stacks located above a common area, such as a living room, are an indication of a SFBD;
- Black Soot around Stack – black residue over snow & around stacks indicates solid fuel burning;
- Dark or Colored Smoke – darker colored smoke can be an indication of low temperature wood burning and coal burning;
- Cycling Smoke Plumes – an abrupt change in the plume is an indication of an oil/gas furnace;
- Piles or Stacked Cut Wood – are a clear indication of a wood burning device;
- Exterior chutes – are an indication of a coal burning device;
- Property Database Check – the Borough’s database can provide information on original installations, Deed Restrictions, etc.

This checklist allows Borough field personnel to efficiently determine whether plumes are coming from homes violating Stage 1 or Stage 2 Alerts. Borough personnel are currently able to survey 40 homes per day during a 5-hour shift (8 homes per hour) to determine compliance with Stage 1 or Stage 2 Alerts. Compliance is determined by observing a SFBD in operation, without the need for an opacity observation. Opacity observations during stage restrictions would add the problem of differentiating steam from particles on top of the previously identified difficulties of limited daylight and differentiating from oil and gas fired heating devices. A reduction in the limit to zero visibility would require field staff to monitor each home for a minimum of 20 minutes to identify if a continuous plume with decreasing opacity represents a wood-fired device during startup, and to record the minimum number of observations required by EPA Method 9. Enforcing a zero opacity standard during curtailment would limit the number of homes observed per hour to 2 or less (20+ minutes opacity reading time plus travel time, identification of stacks, etc.). The reduction in the number of homes observed would significantly reduce the identification of Alert violations and benefits of the enforcement program. As a result, implementation of this measure would result in increased emissions during curtailment periods as fewer homes would be inspected for compliance. This measure is technologically infeasible because the more stringent visibility requirement would reduce enforcement benefits and allow for an increase in wood burning emissions.

### **Conclusion**

This measure is technologically infeasible because a more stringent visibility standard would reduce the number of homes inspected, reduce the number of violations identified and allow for an increase in wood burning emissions.

## Measure 23: Require Exempt Households to Display a Decal Visible from a Point of Public Access

### **Implementing Jurisdiction(s)**

- Ada County, Idaho

### **Regulation Weblink(s)**

- [http://www.sterlingcodifiers.com/codebook/index.php?book\\_id=447](http://www.sterlingcodifiers.com/codebook/index.php?book_id=447)

### **Background**

The Ada County Development Services Department exempts NOASH households and Department-listed low emission wood heating devices from having to cease operation during curtailment periods (Section 5-10-8.A). One of the requirements for a valid exemption is that each affected household display an exemption decal visible from a point of public access.

Fairbanks exempts households with NOASH waivers, wood burning appliances with Stage 1 waivers, and wood burning appliances in households affected by power failures from similar curtailment requirements during Stage 1 Alerts (Sections 21.28.050.A, 21.28.050.C.3, and 21.29.050.C.4). The Fairbanks regulations require the registration of NOASH households and Borough-listed appliances as a condition of receiving a waiver that allows for continued wood burning during curtailment periods.

### **Analysis**

The Fairbanks regulations establish a database of addresses for enforcement inspectors to use during Stage 1 Alerts in the identification of exempt and non-exempt households for curtailment compliance purposes. The Ada County measure adds visible decals on or near exempt residences to assist enforcement inspectors in compliance determinations. These visible decals will complement or substitute for written lists of exempt household addresses during daylight inspections, but do not appear to be as effective during nighttime inspections. During winter months in Fairbanks, daylight hours extend an average of five hours per day. The numbers of compliance inspections that could be performed using only visible decals specified in the measure would be less than the number that could be performed per winter day using the printouts of exempt household addresses currently in use by inspectors in the Borough. As a result, if this measure was adopted by the Borough, compliance inspectors would probably continue to use exempt address printouts to assess compliance rather than relying on posted decals visible only during daylight hours. Under this assumption, the benefits, if any, from adoption and implementation of this measure would be marginal and difficult to quantify.

### **Conclusion**

This measure is slightly more restrictive than the corresponding requirement in the existing Fairbanks' regulations, but would not provide any quantifiable reduction in emissions during Stage 1 Alerts and, thus, is not technologically feasible.

## Measure 30: Distribution of Curtailment Information at Time of Sale of Wood-Burning Device

### **Applicable Jurisdiction(s)**

- Bay Area Air Quality Management District (SF Bay Area, CA)

### **Regulation Weblink(s)**

- <http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/Particulate%20Matter/rg0603.ashx>

### **Background**

In July 2008, the Board for the Bay Area Air Quality Management District (BAAQMD) adopted amendments to their regulation of wood-burning devices (Regulation 6, Rule 3). One amendment required that “any person offering for sale, selling or providing solid fuel or wood intended for use in a wood-burning device within District boundaries shall... attach a label to each package of solid fuel or wood sold that states the following: ‘Use of this and other solid fuels may be restricted at times by law. Please check [Toll-Free Number] or [Web Address] before burning.’”

The presumed intent of this regulation is to reduce PM<sub>2.5</sub> emissions from wood-burning devices either through reduced sale of the devices or through reduced use of the devices during periods of curtailment.

### **Analysis**

Examination of the BAAQMD staff report that accompanied consideration of this regulation by the BAAQMD Board revealed that no estimation was made as to the emission reduction that was likely to follow directly from adoption of this amendment.<sup>78</sup> In addition, it is unclear whether the release of a pamphlet or other form of information at the time of sale would increase the consumer's ability to comply with curtailment periods and even more difficult to quantify that level of compliance.

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<sup>78</sup> BAAQMD, 2008, Staff Report: Proposed New Regulation 6: Particulate Matter, Rule 3: Wood-burning Devices Amendments to Regulation 1: General Provisions and Definitions, and Regulation 5: Open Burning, received from personal correspondence with Marcy Hiratzka, BAAQMD, October 25, 2017.

Residents of the Fairbanks region already have numerous ways in which they can be informed as to the start of a curtailment period, ranging from text message to a mobile app than can be downloaded on their mobile devices to listening to the evening news, to radio, print and internet notifications.<sup>79</sup> Both the State and Borough maintain extensive public outreach programs announcing air quality advisories/episodes and Air Quality Alerts.<sup>80,81</sup>

## **Conclusion**

Adding a requirement to distribute information on Air Quality Alerts at the time of sale of wood will provide marginal emission benefits and be difficult to quantify; therefore, this measure is technologically infeasible.

## **Measure 32: Distribution of Information Related to Moisture Content at Time of Sale of Wood**

### **Applicable Jurisdiction(s)**

- Bay Area Air Quality Management District (SF Bay Area, CA)

### **Regulation Weblink(s)**

- <http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/Particulate%20Matter/rg0603.ashx>

## **Background**

In July 2008, the Board for the Bay Area Air Quality Management District (BAAQMD) adopted amendments to their regulation of wood-burning devices (Regulation 6, Rule 3). One amendment required that “if wood (not to include manufactured logs) is seasoned then the label must also state the following: ‘This wood meets air quality regulations for moisture content to be less than (sic) 20 % (percent) by weight for cleaner burning.’ ...if wood (not to include manufactured logs) is not seasoned, then the label must state the following: ‘This wood does NOT meet air quality regulations for moisture content and must be properly dried before burning.’ In addition to the disclosure listed above, any person offering for sale or selling wood that is not seasoned for use in a wood-burning device shall also provide written instructions on how to properly dry the wood to achieve a 20% (percent) by weight moisture content.”

The presumed intent of this regulation, as with the amendment to notify consumers of the potential curtailment of wood-burning devices, is to reduce PM<sub>2.5</sub> emissions from wood-burning

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<sup>79</sup> Fairbanks North Star Borough Air Quality Division, 2017, available at <http://fnsb.us/transportation/AQDocs/AQ%20resource%20guide%20April%202017.pdf>; accessed October 25, 2017.

<sup>80</sup> <http://dec.alaska.gov/Applications/Air/airtoolsweb/Advisories>

<sup>81</sup> <http://fnsb.us/transportation/Pages/Air-Quality.aspx>

devices. This could follow from the reduced use of wood that is not seasoned or the reduced use of wood due to uncertainty as to its moisture content.

### **Analysis**

Numerous studies have indicated that wood with moisture content greater than 20% can result in higher PM<sub>2.5</sub> emissions. A staff member from the Cold Climate Housing Research Center suggested that an increase in moisture content from 20% to 30% (what was stated as a 10% increase but is actually a 50% increase in moisture) would increase PM<sub>2.5</sub> emissions by 67%.<sup>82</sup>

The BAAQMD estimated that, in 2008, 6.5% of Bay Area wood burned by Bay Area residents was fresh-cut, non-seasoned, and thus of moisture content higher than 20%. In addition, “of those that were unsure of their firewood source, Air District (BAAQMD) staff approximated that half burned unseasoned wood.” They combined those two sets to estimate that 6.5% of annual emissions from wood burning is non-seasoned wood, to equal 417 tons per year of PM<sub>2.5</sub>.<sup>83</sup>

Surveys of the moisture content of commercial wood being sold in Fairbanks have been conducted. Under a 2011 CCHRC study, the average moisture content of commercially-sold wood was estimated to be 64% (on a dry basis). In 2016, ADEC analyzed data collected over a 12-month period from its then voluntary Wood Seller Moisture Disclosure program and found the average wood moisture content from this database was 33%, suggesting that initial participants in this program saw a benefit to drying their wood before offering it for sale.

To reduce the emission contribution from burning wet wood, Alaska has implemented several regulations targeting the moisture content of wood being sold and wood being burned. The first was adopted as a contingency measure in the Moderate Area SIP and codified as regulation in 2014 in [18 AAC 50.076\(d\)](#).<sup>84</sup> It became effective on August 15, 2017, after the borough was reclassified to Serious nonattainment status. The regulation requires commercial wood sellers to register with the State, defines the procedures to measure moisture content and to inform consumers of the moisture content of the wood purchased.<sup>85</sup> It also requires customers to sign/mark a moisture content disclosure form acknowledging receipt of the moisture content information. Wood sellers are required to submit copies of the disclosure forms completed during the previous month and maintain records for the previous 2-year period. Remedies for

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<sup>82</sup> Rozell, Ned, 2010, “Dry wood is good wood,” University of Alaska-Fairbanks, available at <https://news.uaf.edu/dry-wood-is-good-wood/>; accessed October 25, 2017.

<sup>83</sup> BAAQMD, 2008, Staff Report: Proposed New Regulation 6: Particulate Matter, Rule 3: Wood-burning Devices Amendments to Regulation 1: General Provisions and Definitions, and Regulation 5: Open Burning, received from personal correspondence with Marcy Hiratzka, BAAQMD, October 25, 2017.

<sup>84</sup> <http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/18AAC50.076.pdf#page=3>

<sup>85</sup> U.S. News and World Report, 2017, Fairbanks Area Residents Getting Notices on Wood Moisture, <https://www.usnews.com/news/best-states/alaska/articles/2017-08-16/moisture-disclosures-now-required-in-firewood-purchases>; accessed October 25, 2017.

failing to comply with these provisions, included remedial training, a notice of violation, loss of registration, etc.

The second regulation<sup>86</sup> adopted by the Borough in 2015 modified the list of prohibited fuels to include a mandate that between October 1 and March 31 each winter in the FNSB PM<sub>2.5</sub> Nonattainment Area, only wood that is dry with a moisture content less than 20% may be used as fuel in a heating device.

In summary both the Borough and the Bay Area require the distribution of information about the moisture content of wood being sold. The Bay Area requires the distribution of information about wood seasoning, the Borough does not. The Borough prohibits burning wood with a moisture content exceeding 20%, the Bay Area does not.

### **Conclusion**

A measure requiring information on wood seasoning practices with the sale of unseasoned wood will be redundant, offer marginal emission reductions and difficult to quantify; therefore, this measure is technologically infeasible.

### **Measure 38: Ambient PM<sub>2.5</sub> Curtailment Threshold (1-Hr Average)**

#### **Applicable Jurisdiction(s)**

- Cache Valley and Cities, Idaho

#### **Regulation Weblink(s)**

- <https://adminrules.idaho.gov/rules/2014/58/0101.pdf>

### **Background**

Many jurisdictions with wood smoke control programs have adopted specific air quality thresholds for triggering burn bans, or curtailments, during which certain activities that produce PM<sub>2.5</sub> emissions are prohibited, or at least severely restricted. The Idaho Department of Environmental Quality (IDEQ) is the only regulatory agency found to trigger curtailment periods on the basis of ambient PM<sub>2.5</sub> levels measured over 1-hour averaging periods. Most other air quality agencies with burn ban authority base curtailment decisions on PM<sub>2.5</sub> levels averaged over 12- to 24-hour periods. Most importantly, this local 1-hour threshold in the Cache Valley and cities of Idaho applies only to curtailment or cessation of open burning, not wood-based residential space heating.

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<http://www.codepublishing.com/AK/FairbanksNorthStarBorough/#!/FNSBC21/FNSBC2128.html#21.28.030>

Under the Idaho Administrative Code, IDEQ has the authority to issue a Stage 1 Forecast and Caution when “particulate concentrations reach, or are forecasted to reach, and persist, at or above the levels listed” in the table below.<sup>87</sup> Under the Stage 1 Air Pollution Forecast and Caution, “there shall be no new ignition of open burning of any kind.” In addition, the director of the IDEQ may request the cessation of open burning. (Again, this Stage 1 Forecast and Caution applies only to open burning and does not apply to residential wood heating.)

**Table 9. Stage 1 Forecast Levels**

Pollutant	Standard
PM <sub>2.5</sub>	80 µg/m <sup>3</sup> 1 hour average
PM <sub>2.5</sub>	50 µg/m <sup>3</sup> 24 hour average
PM <sub>10</sub>	385 µg/m <sup>3</sup> 1 hour average
PM <sub>10</sub>	150 µg/m <sup>3</sup> 24 hour average

This authority is also found in IDEQ’s Air Pollution Emergency Rule.<sup>88</sup>

### **Analysis**

Discussions with staff members of IDEQ<sup>89</sup> and the Utah Department of Environmental Quality (UDEQ)<sup>90</sup> found the jurisdictions share a common PM<sub>2.5</sub> nonattainment area and thus coordinate regulations on many air quality issues; they indicated that the 1-hour standard is outdated and no longer used. Staff members from UDEQ indicated that they had no regulations based upon 1-hour standards and that all regulations were based upon 24-hour averaging periods. The PM<sub>2.5</sub> thresholds, for example, have never been updated to correlate to the current NAAQS standards. Staff from IDEQ instead use a 24-hour concentration of 30 µg/m<sup>3</sup> as a curtailment threshold and are considering a lowering of their 24-hour standard if that proposed by Utah is accepted and required by EPA.

Moreover, the Alaska Department of Environmental Conservation (ADEC) already has a state regulation in place<sup>91</sup> that prohibits open burning in the Fairbanks PM<sub>2.5</sub> nonattainment area between November 1 and March 31, the period that essentially corresponds to historical PM<sub>2.5</sub> violations.

### **Conclusion**

<sup>87</sup> Idaho Department of Environmental Quality, Idaho Administrative Code, Rules for the Control of Air Pollution in Idaho, IDAPA 58.01.01, available at <https://adminrules.idaho.gov/rules/2014/58/0101.pdf>; Accessed October/10/2017.

<sup>88</sup> [https://www.deq.idaho.gov/media/344469-emerg\\_rule\\_fs.pdf](https://www.deq.idaho.gov/media/344469-emerg_rule_fs.pdf); Accessed October 10, 2017.

<sup>89</sup> Personal communication with Melissa Gibbs, Idaho Department of Environmental Quality, October 5, 2017.

<sup>90</sup> Personal communications with Bo Call, Utah Department of Environmental Quality, October 4, 2017; Personal communication with Joel Karmazyn, October 5, 2017.

<sup>91</sup> 18 AAC 50.065

The 1-hour concentration-based threshold adopted in Idaho applies to curtailment/cessation of open burning, not residential space heating. ADEC's existing regulation (18 AAC 50.065) prohibits open burning in the nonattainment area during the winter season. Thus, implementation of the Idaho 1-hour average threshold for curtailing open burning would have no impact on wood smoke emissions during the wintertime nonattainment season in Fairbanks, and is not applicable to curtailment or restrictions on residential space heating. In summary, ADEC's ban on open burning during the winter season is more stringent than this measure. This finding demonstrates the measure is technologically infeasible.

## Measure 39: Use of AQI as Basis for Curtailment Threshold

### **Applicable Jurisdiction(s)**

- Cache Valley and Cities, Idaho

### **Regulation Weblink(s)**

- <http://www.deq.idaho.gov/media/930593-cache-valley-pm2-5-sip-appendices-1212.pdf>

### **Background**

Franklin County and the Cache Valley cities in Idaho use a PM<sub>2.5</sub> Air Quality Index (AQI) level of 75 as the threshold for declaring a burn ban (curtailment) for residential wood stoves. This level is equivalent to an ambient concentration of 23.5 µg/m<sup>3</sup>.<sup>92</sup> Most other jurisdictions that regulate residential wood burning specify PM<sub>2.5</sub> concentration-based thresholds for a curtailment declaration (typically in the 25-35 µg/m<sup>3</sup> range) rather than specifying AQI levels.

The Cache Valley attainment plan submitted to the EPA by the Idaho Department of Environmental Quality states, in many locations, that burning is prohibited when the AQI for the region reaches 75 or higher.<sup>93</sup> The restriction applies, in one section, to “all wood burning, including but not limited to, within a solid fuel heating appliance designed for wood fuel (commonly known as a 'wood stove') or open fireplace” and in another to “any open burning of any kind.”

### **Analysis**

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<sup>92</sup> <https://airnow.gov/index.cfm?action=airnow.calculator>

<sup>93</sup> Idaho Department of Environmental Quality, Cache Valley Idaho PM<sub>2.5</sub> Nonattainment Area SIP, Appendix E: Reasonably Available Control Methods, 2006, available at <http://www.deq.idaho.gov/media/930593-cache-valley-pm2-5-sip-appendices-1212.pdf>; Accessed October 10, 2017.

Personal communication with Idaho DEQ<sup>94</sup> staff suggested that the adoption of an AQI-based threshold rather than a PM<sub>2.5</sub> concentration-based threshold was motivated solely by the desire to avoid having to rewrite regulations to modify the “trigger level” when EPA revised the NAAQS. The AQI is itself a function of the NAAQS standard and so, when the standard is reduced by EPA, the concentration equivalent to an AQI of 75 – or any other measure of AQI – would correspondingly be reduced as well.<sup>95</sup> Thus the jurisdiction would not need to modify its regulation in response to a NAAQS change. The staff member indicated that no documentation existed to suggest whether the use of AQI- or concentration-based thresholds would be more effective at reducing emissions.

Further communication with the Idaho DEQ suggested that the use of an AQI- rather than a concentration-based threshold did not likely affect the compliance rate of affected woodstoves and that the news release containing the curtailment order typically did not even mention the criteria used to initiate the curtailment.

### **Conclusion**

Given the equivalence between AQI and PM<sub>2.5</sub> concentrations thresholds the question of technological feasibility depends on the stringency of adopted AQI thresholds; therefore, this measure provides no emission benefit and is therefore technologically infeasible.

### **Measure 40: Single Stage Curtailment**

#### **Applicable Jurisdiction(s)**

- Bay Area Air Quality Management District (SF Bay Area, CA)

#### **Regulation Weblink(s)**

- <http://www.baaqmd.gov/~media/files/planning-and-research/rules-and-regs/reg-06/rg0603.pdf?la=en>

### **Background**

The Fairbanks Borough currently has two stages for the curtailment of wood stove activity in response to a decrease in air quality. Under Stage 1, the use of non-certified devices is banned within the nonattainment region. Under Stage 2, when elevated from Stage 1, the use of all

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<sup>94</sup> Personal communication with Melissa Gibbs, Idaho Department of Environmental Quality, October 5, 2017.

<sup>95</sup> Calculator for AQI maintained by EPA at <https://airnow.gov/index.cfm?action=airnow.calculator>

wood-burning devices is banned within the nonattainment region.<sup>96</sup> Thus, those with EPA-certified burning devices are allowed to use them during Stage 1 but not during Stage 2.

Other jurisdictions have mandatory burn bans, or curtailment periods, that consist of only one phase. Once the period has been initiated, activity is banned for all burning devices. One such jurisdiction is the Bay Area Air Quality Management District (BAAQMD). The initial regulation, adopted in 2008, makes mention of only one stage of curtailment. Upon proposal of the regulation for consideration by the BAAQMD Board, BAAQMD staff only estimated the overall emission reduction that could be anticipated from the mandatory curtailment provision; they made no comparison of those emission reductions to those that could be anticipated with a two-stage curtailment program.<sup>97</sup>

### **Analysis**

Other jurisdictions, however, have actually compared the single-stage and double-stage options. For example, the Sacramento Metropolitan Air Quality Management District, in 2009, conducted a direct comparison of both options. Staff evaluated the benefits of lowering stage thresholds to strengthen Rule 421. Two options were considered:

Option A – change to a single-stage program and eliminate the exemption for EPA certified wood stoves and pellet stoves. And, set the No Burn Threshold to 30  $\mu\text{g}/\text{m}^3$  and either maintain the voluntary threshold at 25  $\mu\text{g}/\text{m}^3$  or reduce it to 20  $\mu\text{g}/\text{m}^3$ .

Option B – reduce the Stage 1 threshold to 2  $\mu\text{g}/\text{m}^3$  and the Stage 2 threshold to 30  $\mu\text{g}/\text{m}^3$  to be consistent with San Joaquin Valley No Burn Threshold. Also reduce the voluntary threshold to 20  $\mu\text{g}/\text{m}^3$ .

The analysis led staff to recommend Option A. Public comment about the reduced incentive to convert to cleaner burning devices however caused staff to change their recommendation to maintain a two Stage program with reduced thresholds: Stage 1 lowered from 35 to 31  $\mu\text{g}/\text{m}^3$  and a Stage 2 threshold lowered from 40 to 35  $\mu\text{g}/\text{m}^3$ . The staff report noted the following:

*However, many comments at the workshop expressed concern that eliminating a two-stage program, with its exemption for EPA certified devices and pellet stoves on Stage 1*

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<sup>96</sup> Fairbanks North Star Borough Air Quality Division, 2017, available at <http://fnsb.us/transportation/AQDocs/AQ%20resource%20guide%20April%202017.pdf>; accessed October 25, 2017.

<sup>97</sup> BAAQMD, 2008, Staff Report: Proposed New Regulation 6: Particulate Matter, Rule 3: Wood-burning Devices Amendments to Regulation 1: General Provisions and Definitions, and Regulation 5: Open Burning, received from personal correspondence with Marcy Hiratzka, BAAQMD, October 25, 2017.

*days, would reduce the incentive for people to switch to cleaner devices and also be unfair to those who have already invested in cleaner devices.*<sup>98</sup>

While the analysis demonstrated an increase in the number of curtailment days at lower thresholds, the impact on the estimate of avoided exceedance days did not account for the reduced incentive to invest in cleaner devices. It also did not account for the impact of the increased # of curtailment days on the compliance rate (it was assumed to be unchanged).

### **Conclusion**

Strong public reaction to a staff recommendation to adopt a single stage program along with uncertainty about how to quantify the impact of a reduced incentive to invest in cleaner burning devices led Sacramento to maintain a two-stage program with more stringent thresholds. Fairbanks recently adopted stage thresholds more stringent than those adopted by Sacramento (Stage 1 was lowered from 35 to 25  $\mu\text{g}/\text{m}^3$  and the Stage 2 from 55 to 35  $\mu\text{g}/\text{m}^3$ ). The same uncertainty applies to adopting a single stage program in Fairbanks. An additional concern is the impact of increased burn ban days on the compliance rate. Without valid estimates of these factors, the benefits of adopting a single-stage program in Fairbanks will be highly uncertain with the potential to increase emissions; therefore, this measure is technologically infeasible.

### **Analysis of Measures Determined to be More Stringent than Existing Controls**

**Table 10. List of Measures Determined to be More Stringent than Existing Controls**

<b>Number &amp; Title</b>	
Measure 3	Require Building or Other Permit – More Limited Devices Allowed
Measure 8	Prohibit Installation of Solid Fuel Heating Device in New Construction
Measure 9	Limit the Density of Solid Fuel Heating Devices in New Construction
Measure 10	Install EPA-Certified Device Whenever a Fireplace or Chimney in Remodeled
Measure 22	Require Registration of All Devices
Measure 24	Require Permanent Installed Alternative Heating Method in Rental Units
Measure 29	Allow Only NOASH Households to Burn During Curtailment Periods
Measure 47	Inspection Warrants
Measure 48	Date Certain Removal of “Coal Only Heater”
Measure 51	Ultra-low Sulfur Heating Oil
Measure 52	Operation and Sale of Small “Pot Burners” Prohibited
Measure 53	No Use Sale or Exchange of Used Oil for Fuel, unless it Meets Constituent Property Limits
Measure R5	Ban New Installations – Hydronic Heaters

<sup>98</sup> Sacramento Metropolitan Air Quality Management District, 2009, Staff Report: Rule 421, Mandatory Episodic Curtailment of Wood and Other Solid Fuel Burning, available at <http://www.airquality.org/ProgramCoordination/Documents/Rule421%20StaffReport%20082409.pdf>; accessed October 25, 2017.

**Table 10. List of Measures Determined to be More Stringent than Existing Controls**

Number & Title	
Measure R29	Increase Coverage of the District Heating System

**Measure 3: Require Building or Other Permit**

**Implementing Jurisdiction(s)**

- Missoula City-County, Ada County, Klamath County

**Regulation Weblink(s)**

- <https://www.missoulacounty.us/home/showdocument?id=8452>
- [http://www.sterlingcodifiers.com/codebook/index.php?book\\_id=447](http://www.sterlingcodifiers.com/codebook/index.php?book_id=447)
- <http://www.co.klamath.or.us/EH/Air%20Quality%20&%20Burning/Klamath%20County%20Clean%20Air%20Ordinance.htm>

**Background**

Missoula City-County MT requires Installation Permits for the installation of solid fuel burning devices (SFBD) and allows Installation Permits only for pellet stoves in the Air Stagnation Zone (Section 9.203.1.a).

Ada County ID requires a solid fuel heating appliance permit for the installation of a SFBD in any new or existing building (Section 5-10-10.A). Solid fuel heating appliance permit are authorized only for clean burning appliance, which are defined as appliances certified under either the Oregon DEQ or U.S. EPA regulations and placed on the list of approved appliances by Ada County Development Services (Sections 5-10-4 and 5 10 11.A).

Klamath County OR requires a permit from the County Building Division for the installation of a solid fuel-fired appliance (Section 406.100.3.a.iii). Only appliances certified by the Oregon DEQ or U.S. EPA, and appliances that are designated exempt from Oregon DEQ or U.S. EPA regulations, are allowed to be installed with a Building Division permit (Sections 406.005.10, 406.005.12, 406.100.3.a.i, and 406.100.3.a.ii).

Fairbanks requires installation permits for the installation of solid fuel burning appliances (SFBA) in new construction (Section 21.28.030.E.1.a). Installation permits are authorized only for Borough-listed SFBA (Section 21.28.030.E.1.b.i). The Borough also prohibits installations of non-Borough-listed SFBA within the PM<sub>2.5</sub> nonattainment area (Section 21.28.030.A). Similarly, the Borough prohibits the sale or lease of non-listed SFBA unless the buyer signs an affidavit and files it with the Borough that such SFBA will not be installed within the air quality control zone (Section 21.28.030.H.1). The Borough listing of SFBA is limited to appliances certified by U.S. EPA to an emission limit of 2.5 gm/hr, hydronic heaters certified by U.S. EPA

to an emission limit of 0.10 lb/MMBTU, masonry heaters, cook stoves, and SFBAs certified by an accredited independent laboratory to an emission limit of 2.5 gm/hr of PM<sub>2.5</sub> (Section 21.28.020).

### **Analysis**

The Missoula City-County, Ada County, and Klamath County regulations require permits for the installation of SFBAs in any structure. Fairbanks regulations require permits only for installation of SFBAs in new construction, but also prohibit the installation of non-listed SFBAs within the PM<sub>2.5</sub> nonattainment area. With respect to protection against the installation of non-listed SFBAs, the Fairbanks regulations are effectively equivalent to those of Missoula City-County, Ada County, and Klamath County.

The requirement that installation permits be allowed only for listed SFBAs, however, does not result in the same levels of emissions from SFBAs that will be installed in the nonattainment area moving forward under the existing Fairbanks regulations than would occur if the Borough adopted any of the Missoula City-County, Ada County, or Klamath County measures. The Ada County and Klamath County measures allow SFBAs with emission limits up to 7.5 gm/hr of PM<sub>2.5</sub> to be installed, while Fairbanks currently limits SFBAs allowed for installation to an emission limit of 2.5 gm/hr. Fairbanks, however, allows installation permits to be issued to fireplaces that are neither certified under nor exempt from U.S. EPA emission limits. As a result, the Ada County and Klamath County measures are less restrictive than the existing Fairbanks regulations.

Missoula City-County authorizes installation permits only for pellet stoves. Total emissions from new SFBA installations in the Fairbanks PM<sub>2.5</sub> nonattainment area under existing regulations will be greater than would occur if the Borough adopted the Missoula City-County measure.

### **Conclusion**

The Missoula City-County measure is more stringent than the corresponding requirement in existing Fairbank's regulations and, thus, is eligible for consideration as BACM. The Ada County and Klamath County measures are less stringent than existing Fairbanks regulations.

## **Measure 8: Prohibit Installation of Solid Fuel Heating Device in New Construction**

### **Implementing Jurisdiction(s)**

- South Coast AQMD, Bay Area AQMD

### **Regulation Weblink(s)**

- <http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-445.pdf?sfvrsn=4>

- <http://www.baaqmd.gov/~media/files/planning-and-research/rules-and-regs/reg-06/rg0603.pdf?la=en>

## **Background**

The South Coast Air Quality Management District prohibits the installation of a wood-burning device into any new construction (Section 445.d.1) except in new developments where no natural gas service exists within 150 feet of the property line (Section 445.f.2). Devices installed in new construction without natural gas service are limited to USEPA certified wood-burning heaters, pellet stoves, masonry heater, or dedicated gaseous-fueled fireplaces (Section 445.d.2). South Coast AQMD does not require a permit for device installation or operation.

Bay Area Air Quality Management District prohibits the installation of a wood-burning device in any new construction building effective November 1, 2016 (Section 6-3-306). The Bay Area regulation does not provide an exemption from this requirement in areas not served by natural gas infrastructure.

Fairbanks allows for the installation of solid fuel burning devices in new construction provided that permits have been issued by the Borough, devices are Borough-listed, and installation is performed by a Borough-listed installer, among other requirements (Section 21.28.030.A and E.1).

## **Analysis**

While Fairbanks currently has natural gas service, it is capacity constrained and will not be in a position to expand service to new customers until 2020 (i.e., after the designated attainment year).<sup>99</sup> As a result, the installation requirements in the South Coast rule that would be applicable if adopted by the Borough would be limited solely to the type of device installed. Fairbanks limits installation of new devices to the same set of devices authorized by South Coast with very limited differences. As the existing Fairbank regulation for installation in new construction requires (1) a permit and (2) installation by a Borough-listed installer, the existing regulation is somewhat more restrictive than the South Coast measure.

Since the Bay Area measure does not contain an exemption for new construction in areas not served by natural gas infrastructure, this measure is more restrictive than the corresponding requirement in the existing Fairbanks regulations.

## **Conclusion**

This measure, as administered by the Bay Area Air Quality Management District, is more restrictive than the corresponding requirement in Fairbanks and, thus, is eligible for consideration as BACM. The corresponding measure administered by the South Coast Air Quality Management District is not more restrictive than the Fairbanks regulation and is not eligible for consideration as BACM.

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<sup>99</sup> AIDEA IGU Financing Agreement op. cit., Appendix A

## Measure 9: Limit the Density of Solid Fuel Heating Devices in New Construction

### **Implementing Jurisdiction(s)**

- San Joaquin Valley APCD, Eastern Kern APCD

### **Regulation Weblink(s)**

- <https://www.valleyair.org/rules/currnrules/r4901.pdf>
- [http://www.kernair.org/Rule%20Book/4%20Prohibitions/416\\_1%20Wood%20Burning%20Heaters%20and%20Fireplaces.pdf](http://www.kernair.org/Rule%20Book/4%20Prohibitions/416_1%20Wood%20Burning%20Heaters%20and%20Fireplaces.pdf)

### **Background**

The San Joaquin Valley Air Pollution Control District in California limits the number of wood burning heaters allowed in new residential developments. Two limits apply to developments with housing densities greater than 2 residences per acre: no wood burning fireplaces may be installed in these residences, and no more than two U.S. EPA Phase II-certified wood heaters may be installed per acre in these residences. For developments with housing densities less than or equal to two residences per acre, the regulation allows no more than one wood burning fireplace or U.S. EPA Phase II-certified wood heater per residence. (Section 4901.5.3.2)

The Eastern Kern Air Pollution Control District in California prohibits the installation of wood burning fireplaces in new residential subdivisions that consist of 10 or more dwellings. (Section 416.1.VI)

Fairbanks allows for the installation of solid fuel burning devices in new construction provided that permits have been issued by the Borough, devices are Borough-listed, and installation is performed by a Borough-listed installer, among other requirements (Section 21.28.030.A and .E.1).

### **Analysis**

Fairbanks does not limit the number of solid fuel burning devices that can be installed in single dwellings newly constructed, nor limit the number of devices that can be installed per acre in new residential developments. As a result, these measures, if adopted by Fairbanks, would place limits on the numbers and types of devices installed in new construction.

### **Conclusion**

These measures are more restrictive than the corresponding requirement in Fairbanks and, thus, are eligible for consideration as BACM.

## Measure 10: Install EPA-Certified Device Whenever a Fireplace or Chimney is Remodeled

### **Implementing Jurisdiction(s)**

- Bay Area AQMD

### **Regulation Weblink(s)**

- <http://www.baaqmd.gov/~media/files/planning-and-research/rules-and-regs/reg-06/rg0603.pdf?la=en>

### **Background**

The Bay Area AQMD requires that a gas-fueled, electric, or EPA-certified device be installed whenever a fireplace or chimney is remodeled at a cost that exceeds \$15,000 and requires a local building permit (Section 6-3-307).

Fairbanks limits wood heating devices in new construction to Borough-listed appliances (Section 21.28.030E), but does not require the replacement of non-Borough-listed appliances with listed versions upon the remodeling of a residence or of a fireplace or chimney.

### **Analysis**

The Bay Area AQMD measure would require the upgrading of wood heating appliances in affected Borough residences in which remodeling projects included fireplace or chimney modifications that exceeded \$15,000 in cost. Such a requirement is not contained within Borough regulations.

### **Conclusion**

This measure is more restrictive than the corresponding requirement in existing Fairbanks' regulations, and is eligible for consideration as BACM.

## Measure 22: Require Registration of All Devices

### **Implementing Jurisdiction(s)**

- Missoula City-County MT

### **Regulation Weblink(s)**

- <https://www.missoulacounty.us/home/showdocument?id=8452>

### **Background**

Missoula City-County requires Installation permits for the installation and use of any new solid fuel burning device in any structure within the Air Stagnation Zone effective July 1, 1986 (Section 9.202). This regulation limits the eligibility of Installation permits to pellet stoves certified to a PM<sub>2.5</sub> emission limit of 1.0 gm/hr (Section 9.203).

Fairbanks prohibits the installation of solid fuel burning devices (SFBD) that are not Borough-listed (Section 21.28.030.A). Borough-listed devices include USEPA Phase II SFBDs certified to a PM<sub>2.5</sub> emission limit of 2.5 gm/hr, masonry heaters, cook stoves, and other SFBDs certified to a PM<sub>2.5</sub> emission limit of 2.5 gm/hr (Section 21.28.020). During Stage 1 Alerts, only Borough-listed devices with Stage 1 waivers issued by the Borough and devices in households with no other adequate source of heat determinations are allowed to continue in operation during burning curtailment periods (Section 21.28.050.C.4).

### **Analysis**

If this Missoula City-County measure is adopted in Fairbanks, only USEPA-certified pellet stoves could be installed in newly constructed residences. Assuming, on a worse case basis, that all new residences with pellet stoves applied for and were given Stage 1 waivers, then during a curtailment period, these residences would continue to burn wood for heat in devices that emitted less PM<sub>2.5</sub> – on average – than new residences with Borough-listed devices.

### **Conclusion**

This measure is more stringent than the corresponding requirement in the existing Fairbanks regulations, and qualifies for consideration as BACM.

## **Measure 24: Require Permanent Installed Alternative Heating Method in Rental Units**

### **Implementing Jurisdiction(s)**

- Bay Area AQMD; Klamath County; City of Aurora CO

### **Regulation Weblink(s)**

- <http://www.baaqmd.gov/~media/files/planning-and-research/rules-and-regs/reg-06/rg0603.pdf?la=en>
- <http://www.co.klamath.or.us/EH/Air%20Quality%20&%20Burning/Klamath%20County%20Clean%20Air%20Ordinance.htm>
- [https://library.municode.com/co/aurora/codes/building\\_and\\_zoning?nodeId=BUZOCO\\_CH146ZO\\_ART12SURESPUSAC\\_DIV1GEUS\\_S146-1204BURE](https://library.municode.com/co/aurora/codes/building_and_zoning?nodeId=BUZOCO_CH146ZO_ART12SURESPUSAC_DIV1GEUS_S146-1204BURE)

### **Background**

The Bay Area AQMD requires that all real property offered for lease or rent must have a permanently-installed form of heat that does not burn solid fuel (Section 6-3-305). This

requirement becomes effective on November 1, 2018, and is not applicable to properties located in areas not served by natural gas infrastructure.

Klamath County prohibits a solid fuel-fired appliance from being the sole source of heat in any non-owner (tenant) occupied dwelling unit within the county (Section 406.100.3.d).

The City of Aurora, Colorado, also prohibits a solid fuel-fired heating device from being the sole source of heat in any non-owner-occupied dwelling unit (Section 146-1204.C).

Fairbanks does not enforce any wood heating device regulations that are specific to rental units. Nor has the Borough adopted any regulations that require the installation of alternative heating systems in either new construction or existing structures.

### **Analysis**

The Bay Area AQMD measure exempts areas not served by natural gas infrastructure from the requirement for rental units to have alternative heating systems. While Fairbanks currently has natural gas service, it is capacity constrained and will not be in a position to expand service to new customers until 2020 (i.e., after the designated attainment year).<sup>100</sup> Therefore, this measure would not reduce emissions during curtailment periods if adopted by the Borough.

Both of the Klamath County and City of Aurora measures would, if adopted by Fairbanks, require the retrofitting of applicable rental units with alternative heating systems and, thus, make such dwellings ineligible for no-other-adequate-source-of-heat (NOASH) determinations by the Borough. By reducing the number of dwellings eligible for NOASH exemptions from curtailment requirements, adoption of this measure could potentially reduce emissions during curtailment periods in Fairbanks.

### **Conclusion**

This measure, as adopted by Klamath County and the City of Aurora, is more restrictive than the corresponding requirement in existing Fairbanks' regulations, and is eligible for consideration as BACM.

## **Measure 29: Allow Only NOASH Households to Burn During Curtailment Periods**

### **Implementing Jurisdiction(s)**

- Utah Department of Environmental Quality

### **Regulation Weblink(s)**

- <https://rules.utah.gov/publicat/code/r307/r307-302.htm>

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<sup>100</sup> AIDEA IGU Financing Agreement op. cit., Appendix A

## **Background**

The Utah Department of Environmental Quality exempts only households with no other adequate source of heat (NOASH) from the requirement to cease operation of wood heating devices during curtailment periods in PM<sub>2.5</sub> nonattainment areas in the state (Section R307-302-3.4). Fairbanks exempts households with NOASH waivers, wood burning appliances with Stage 1 waivers, and wood burning appliances in households affected by power failures from similar curtailment requirements during Stage 1 Alerts (Sections 21.28.050.A, 21.28.050.C.3, and 21.29.050.C.4).

## **Analysis**

The Utah DEQ measure does not exempt USEPA-certified wood heating devices from being shut down during curtailment periods, whereas Fairbanks does exempt Borough-listed appliances that are registered and given Stage 1 waivers from having to cease operation during Stage 1 Alerts. Both jurisdictions exempt NOASH households from having to cease burning during curtailment periods. Utah DEQ allows any type of wood heating device to qualify for a NOASH permit, whereas Fairbanks authorizes NOASH waivers to households heated only with USEPA-certified wood stoves, masonry heaters, or cook stoves. Because the numbers of appliances granted Stage 1 waivers in Fairbanks is significantly greater than those granted NOASH waivers, the Utah DEQ measure would allow fewer wood heating devices to continue operation in the Borough during curtailment periods than would the existing Fairbanks regulations.

## **Conclusion**

This measure is more restrictive than the corresponding requirement in the existing Fairbanks' regulations, and is eligible for consideration as BACM.

## Measure 47: Inspection Warrants

### **Implementing Jurisdiction(s)**

- Aurora, CO

### **Regulation Weblink(s)**

- [https://library.municode.com/co/aurora/codes/building\\_and\\_zoning?nodeId=BUZOCO\\_CH146ZO\\_ART12SURESPUSAC\\_DIV1GEUS\\_S146-1204BURE](https://library.municode.com/co/aurora/codes/building_and_zoning?nodeId=BUZOCO_CH146ZO_ART12SURESPUSAC_DIV1GEUS_S146-1204BURE)

## **Background**

The City of Aurora, Colorado, authorizes the city manager, through authorized representatives, to make inspections of solid fuel heating devices that are being operated during curtailment periods. If any person refuses or restricts entry to the premises or refuses inspection of any device, the city manager is required to seek from the municipal court a warrant for inspection

and an order permitting inspection at a reasonable time without interference, restriction, or obstruction (Section. 146-1204.D).

Fairbanks requires installations of Borough-listed solid fuel burning appliances in new construction and replacement appliances in subsidized change-outs be performed by Borough-listed vendor/installers (Sections 21.28.030.E.1.b.ii, 21.28.030.E.b.iv, 21.28.040.A.4.f, and 21.28.040.A.5.b). Fairbanks regulations, however, do not require nor authorize Borough staff to perform inspections of appliance installations or operations.

### **Analysis**

The City of Aurora measure authorizes city staff to inspect wood heating devices in operation during curtailment periods and, if refused access by premises occupants, are required to seek inspection warrants from the municipal court. Fairbanks regulations do not authorize Borough staff to inspect devices in operation during curtailment periods, but instead require Borough inspectors to determine compliance with curtailment requirements by observing visible emission plumes from public rights-of-way and checking against waiver records.

### **Conclusion**

This measure is more stringent than the corresponding requirement in Fairbanks' regulations and, thus, is eligible for consideration as BACM.

## Measure 48: Date Certain Removal of "Coal Only Heater"

### **Implementing Jurisdiction(s)**

- Puget Sound Clean Air Agency

### **Regulation Weblink(s)**

- <https://www.pscleanair.org/DocumentCenter/View/354>

### **Background**

Puget Sound CAA Regulation 13.07 mandates the removal of coal-only heaters located in Tacoma:

*Any person who owns or is responsible for a coal-only heater located in the Tacoma, Washington fine particulate nonattainment area must remove and dispose of it or render it permanently inoperable by September 30, 2015.*

It also requires that owners provide documentation of the removal and disposal or rendering permanently inoperable of the coal heater to the Agency using the Agency's procedures within 30 days of the removal or rendering the heater permanently inoperable.

Fairbanks restricts the operation and installation of coal burning devices. Coal burning stoves, hydronic heaters and furnaces are defined as solid fuel burning appliances (SFBA). None of these appliances are Borough “listed appliances”. All listed appliances must be EPA-certified and have an annual average emission rating of 2.5 grams per hour or less or 0.10 lbs/mm Btu for hydronic heaters. This effectively prohibits the installation of other types of solid fuel-fired heating devices, including coal, unless the Borough approves an independent emission test showing the device meets the emission standards

Unlisted appliances cannot be installed, sold or leased for use within the Fairbanks PM<sub>2.5</sub> nonattainment area. They cannot be operated during Air Quality Alerts, do not qualify for NOASH certificates, and do not qualify for the Enhanced voluntary, removal, replacement and repair program.

The State of Alaska adopted these regulations and SIP amendments which became effective January 12, 2018.

Earlier Borough programs focused on using funds to remove or replace outdoor wood and coal boilers that were installed by residents seeking to reduce their heating costs. Participation in those programs was voluntary.

### **Analysis**

Regulations mandating the date certain removal of coal only heaters are more restrictive than existing coal burning restrictions in Fairbanks as coal only heaters are allowed to operate except during Air Quality Alerts.

### **Conclusion**

Regulations mandating date certain removal of coal only heaters are eligible for consideration as PM<sub>2.5</sub> BACM.

## Measure 51: Ultra-low Sulfur Heating Oil

### **Implementing Jurisdiction(s)**

- Northeast States and Alaska

### **Regulation Weblink(s)**

- [https://noraweb.org/wp-content/uploads/2014/11/NEMARegion\\_ULSDBioChart2014.pdf](https://noraweb.org/wp-content/uploads/2014/11/NEMARegion_ULSDBioChart2014.pdf)
- <https://www.epa.gov/sites/production/files/2015-04/documents/420f06040.pdf>

### **Background**

EPA mandated the production of ultra-low sulfur (15 ppm) Diesel fuel by domestic oil refineries in 2006. Since this mandate addressed only motor vehicle fuel, no reduction in the sulfur content

of home heating oil was required. Concerns about the need for reductions in ambient PM<sub>2.5</sub>, SO<sub>2</sub> and regional haze, however led the Northeast states, where most heating oil consumption in the U.S. occurs, to implement laws mirroring the federal Diesel-fuel standard for motor vehicles.

In 2012, New York, which at the time had over a million households using heating oil, was the first northeastern state to set a home heating oil sulfur content standard of 15 ppm. Massachusetts, New Jersey and Vermont followed suit with a less stringent 500 ppm standard in 2014, but are all scheduled to require 15 ppm sulfur levels for heating oil by 2018. In 2016, Maine instituted a 50 ppm standard but will also require 15 ppm levels by 2018.<sup>101</sup> In addition many of the Mid-Atlantic States (including the District of Columbia) have also mandated the use of 15 ppm heating oil by 2018. Overall, 10 states plus selected communities in other states (e.g., Philadelphia) have ultra-low sulfur heating oil requirements.<sup>102</sup>

During the development of the Nonroad Diesel rule, Alaska requested: 1) that June 1, 2010, be the deadline for conversion to 15 ppm sulfur highway Diesel fuel in rural Alaska; 2) that June 1, 2010, be the deadline for conversion of all nonroad, locomotive, and marine (NRLM) diesel fuel to 15 ppm sulfur content in rural Alaska; and 3) that the 15 ppm standard applicable to locomotive and marine diesel fuel produced in, imported into, and distributed or used within rural Alaska be moved up to June 1, 2010 (from the June 2012 nationwide date in the final Nonroad Diesel rule. Because the storage and distribution systems in rural Alaska are not capable of handling more than one grade of fuel, this rule effectively converted home heating fuel to a 15 ppm sulfur limit when it was implemented.

### **Analysis**

EPA mandated the production of ultra-low sulfur Diesel fuel in 2006; the northeast states have mandated the production and use of home heating oil with a 15 ppm sulfur limit. Storage limitations caused most communities in rural Alaska to shift all distillate fuel, including home heating oil, to a 15 ppm sulfur limit when the EPA mandate for ultra-low sulfur Diesel fuel was implemented. The use of 15 ppm home heating oil in an arctic environment has continued since 2010 without problems.

### **Conclusion**

A significant portion of the U.S., including rural Alaska, is using 15 ppm sulfur content heating oil; therefore, this measure is eligible for consideration as BACM.

## Measure 52: Operation and Sale of Small “Pot Burners” Prohibited

### **Implementing Jurisdiction(s)**

- State of Vermont

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<sup>101</sup> <http://blog.smarttouchenergy.com/ultra-low-sulfur-heating-oil-and-premium-fuels>

<sup>102</sup> <https://nefi.com/news/docs/heating-oil-standards-chart.pdf>

### **Regulation Weblink(s)**

- [http://dec.vermont.gov/sites/dec/files/aqc/laws-regs/documents/AQCD\\_Regulations\\_2016\\_Dec.pdf](http://dec.vermont.gov/sites/dec/files/aqc/laws-regs/documents/AQCD_Regulations_2016_Dec.pdf)

### **Background**

Section 5-221 Prohibition of Potentially Polluting Materials in Fuel, subsection 2. Used Oil, contains the following restriction:

*Effective July 1, 1997, the burning of used oil in small fuel burning equipment described as “pot burners” or “vaporizing” burners shall be prohibited, as shall the retail sale of these burners.*

Neither the Borough nor the State have any regulations restricting the sale of small waste or used oil burners. Borough regulations restrict the operation of waste oil appliances during Stage 1 and Stage 2 Alerts and that create a public nuisance. The State has no additional controls addressing the sale or operation of waste oil appliances.

### **Analysis**

Vermont regulations prohibit both the operation and sale of small waste oil burning devices. Neither Alaska nor the Borough prohibit the sale of small waste oil burning devices. Both agencies have regulations that restrict the operation of waste oil devices during Air Quality Alerts and appliances that create a public nuisance.

### **Conclusion**

The Vermont regulation prohibiting the operation and sale of small waste oil burning appliances is more restrictive than regulations in place in Alaska, therefore this measure is eligible for consideration as BACM.

Measure 53: No Use Sale or Exchange of Used Oil for Fuel, unless it Meets Constituent Property Limits

### **Implementing Jurisdiction(s)**

- State of Vermont

### **Regulation Weblink(s)**

- [http://dec.vermont.gov/sites/dec/files/aqc/laws-regs/documents/AQCD\\_Regulations\\_2016\\_Dec.pdf](http://dec.vermont.gov/sites/dec/files/aqc/laws-regs/documents/AQCD_Regulations_2016_Dec.pdf)

## **Background**

Section 5-221 Prohibition of Potentially Polluting Materials in Fuel, subsection 2. Used Oil, contains the following restriction:

*No person shall cause or permit the use, purchase, sale or exchange in trade for use as a fuel in fuel burning equipment in Vermont of any used oil unless:*

*(i) The used oil has constituents and properties within the allowable limits set forth in Table A of this section prior to blending except as provided in subsection (e) below. The Air Pollution Control Officer may prohibit the combustion of used oils containing constituents or properties not listed in Table A of this section if he/she determines that combustion of such used oil may present an unreasonable risk to public health or welfare*

**Table A: Used Oil Constituents and Properties  
(Prior to Blending)**

<b>Constituent/Property</b>	<b>Allowable<sup>1</sup></b>
<i>Arsenic</i>	<i>5 ppm maximum</i>
<i>Cadmium</i>	<i>2 ppm maximum</i>
<i>Chromium</i>	<i>10 ppm maximum</i>
<i>Lead</i>	<i>100 ppm maximum</i>
<i>Flash Point</i>	<i>Must be 100 degrees F or more</i>
<i>Total Halogens</i>	<i>1000 ppm maximum</i>
<i>Polychlorinated Biphenyls (PCBs)</i>	<i>&lt; 2 ppm maximum</i>
<i>Net Heat of Combustion</i>	<i>8000 BTU/lb minimum</i>
<i>1Note: units of parts per million (ppm) are by weight on a water free basis.</i>	

Neither the State nor the Borough have regulations addressing the purchase, sale or exchange of used oil. They also do not have regulations setting limits on waste or used oil properties.

## **Analysis**

Vermont regulations restrict the allowable content and transfer of waste oil used as heating fuel. There are no such restrictions governing waste or used oil as a heating fuel in Fairbanks.

## **Conclusion**

Alaska has no regulations governing the content, use or transfer of waste oil used as a heating fuel; therefore, the Vermont measures addressing waste oil are eligible for consideration as BACM.

## Measure R5: Ban New Installations – Hydronic Heaters

### **Implementing Jurisdiction(s)**

- None

### **Regulation Weblink(s)**

- <http://dec.alaska.gov/air/anpms/comm/docs/fbxSIPpm2-5/Appendix III.D.5.07 Adopted 12.24.14.pdf>

### **Background**

BACM analysis requirements specified in the final PM<sub>2.5</sub> rule mandate the consideration of “options not previously considered as RACM/RACT for the area”. The moderate SIP considered a measure requiring a ban on new installations of hydronic heaters. Analysis of the measure was limited:

*A ban on new installations would not reduce emissions from hydronic heaters in the near term, but would ultimately reduce emissions as hydronic heaters were retired. However, this approach could have the negative effect of prolonging the use of existing, dirty units because replacing them with newer, much cleaner units would not be allowed. As a result, this measure would not result in quantifiable reductions in the four years after designation.*

The RACM analysis determined the measure to be technologically infeasible because it lacked the authority to implement it. That finding no longer applies as the Borough the referendum prohibiting the Borough’s regulation of home heating and fuels is no longer in effect.

### **Analysis**

The review of SIP commitments determined that Utah Rule R-307-208-5 bans the installation of new OWBs; it allows the replacement of existing OWBs with an EPA Phase 2 qualified wood pellet outdoor wood boiler. This measure is more stringent than current Borough code which allows the installation of solid fuel burning appliances that are Borough listed (i.e., with an EPA certified emission rate of 2.5 gm/hr or less).

### **Conclusion**

The measure is technologically feasible and eligible for consideration as BACM.

## Measure R29: Increase Coverage of the District Heating System

### **Implementing Jurisdiction(s)**

- Fairbanks North Star Borough

## **Regulation Weblink(s)**

- None

## **Background**

Many residential, commercial, and institutional buildings within downtown Fairbanks are connected to a district heating system that supplies low pressure steam or hot water for space heating and domestic hot water use. Use of the district heating systems allows for the widespread use of energy produced by a central steam generating unit with effective emissions controls. These systems essentially eliminate the need for the operation of individual fuel combustion heating units in each of the facilities receiving heat from a central plant.

Even considering transmission losses, a well maintained and operated central heating facility can be much more efficient than individual combustion units, especially those that burn wood, coal, or oil. Emissions from a central facility are released into the atmosphere at a much greater height above grade than those of combustion units in individual buildings and, as a result, disperse more widely.

Aurora Energy operates a coal-fired cogeneration power plant that recycles low pressure steam for district heating use. Aurora Energy provides district heating (in the form of low-pressure steam or hot water) to approximately 180 customers. Customers range in size from small residential to large commercial/institutional loads.

## **Analysis**

Aurora commissioned a study<sup>103</sup> in 2008 to examine the feasibility of expanding the underground network of pipes that deliver steam and hot water. Based on the information presented in that study, the RACM analysis determined this measure to be technologically feasible.

## **Conclusion**

No information has become available to change the RACM analysis conclusion about the technological feasibility of this measure; therefore, this measure is technologically feasible and eligible for consideration as BACM.

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<sup>103</sup> PDC, Inc. Engineers, *Aurora Energy District Heat Capacity Study, Phase 2*, December 2008

**5. Step 4 – Determine Whether an Available Control Technology or Measure is Economically Feasible**

[UNDER CONSTRUCTION]

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**6. Step 5 – Determine the Earliest Date by Which a Control Measure or Technology can be Implemented in Whole or in Part**

[UNDER CONSTRUCTION]

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## 7. BACM Findings

[UNDER CONSTRUCTION]

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## Appendices

[UNDER CONSTRUCTION]

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