ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Amendments to:

State Air Quality Control Plan

Vol. II: III.D.7.7

Control Strategies

Public Notice Draft

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This document provides revised and/or new language proposed for inclusion in this section of the State Air Quality Control Plan addressing the Fairbanks North Star Borough $PM_{2.5}$ Serious nonattainment area. The revised and/or new proposed language is in bold and underlined format. Language proposed to be deleted or replaced is shown in strikeout format. These revisions are the only part of this section that are open for public review and comment in this update to the plan. To aid in the public comment process, the currently adopted sections of the air quality plan can be found and referenced at the following internet site: http://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/

7.7.12 Control Strategies – 189(d) and 40 CFR 51.1010(c) for 2020 Amendment

This section outlines the control strategies that were considered and selected by DEC and Borough in the Serious area plan. The process followed to identify and select control measures for the Serious area SIP was performed in accordance with 40 C.F.R. § 51.1010(a) and CAA Sec 189(b). CAA section 189(d) specifies the plan revisions required when a serious nonattainment area fails to attain by the applicable attainment date. It calls for annual reductions of not less then 5% of the most recent emissions inventory. This section also outlines the control strategies that were considered by DEC and the Borough for the 2020 Amendment to the Serious SIP (2020 Amendment). The process followed to identify and select control measures for the 2020 Amendment was performed in accordance with 40 C.F.R. § 51.1010(c) and CAA Sec. 189(d). As a result of the Serious and 2020 Amendment, ADEC has assembled the control strategies that collectively meet the BACM/BACT/MSM and 189(d) requirements.

7.7.12.2 BACM and 2020 Amendment Control Measure Requirements

Those emission sources that are not classified as large stationary sources and subject to BACT are subject to Best Available Control Measure requirements. These sources include smaller space heating sources, motor vehicles, other fuel burning equipment, and small industrial sources. The process for selecting BACM is defined in a series of steps detailed in the Final $PM_{2.5}$ Rule.[1] 40 C.F.R. 51.1010(c) defines the process for selecting 2020 Amendment control measures; it references the same section of the Final $PM_{2.5}$ Rule that defines the steps for selecting BACM (section VI.D.3). These steps clarify and update $PM_{2.5}$ control measure selection guidance presented in the Addendum to the General Preamble[2] for the selection of $PM_{2.5}$ controls for Reasonably Available Control Measures (RACM), required for Moderate nonattainment areas, BACM for Serious nonattainment areas and 2020 Amendment control measures providing 5% annual reductions for serious nonattainment areas that failed to attain by the applicable attainment date. Presented below is a summary of the 5-step BACM and 2020 Amendment control measure selection guidance presented in the Final $PM_{2.5}$ Rule:

- **Step 1: Develop a comprehensive inventory of sources and source categories of directly emitted $PM_{2.5}$ and $PM_{2.5}$ precursors.**
- **Step 2: Identify potential control measures.**
- **Step 3: Determine whether an available control measure or technology is technologically feasible.**
- **Step 4: Determine whether an available control technology or measure is economically feasible.**

1 https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf
[2] https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19940816_59fr_41998-42017_addendum_general_preamble.pdf

- **Step 5: Determine the earliest date by which a control measure or technology can be implemented in whole or in part.**

The following source categories were evaluated for BACM and 2020 Amendment control measures. This list is based on emissions inventory information and other technical analyses that identify the most important sources for $PM_{2.5}$ in the nonattainment area.

- **Solid Fuel Burning**
  - **Outdoor solid fuel-fired boilers (hydronic heater)**
  - **Solid fuel-fired heaters**
  - **Fireplaces**
  - **Burn barrels, residential open burning**
  - **Agricultural and forest burns**
- **Residential and Commercial Fuel Oil Combustion**
- **Transportation**
  - **Automobiles**
  - **Heavy-duty vehicles**
- **Commercial sources**
  - **Coffee roasters**
  - **Charbroilers**
  - **Incinerators**
  - **Used oil burners**

The inventory supporting the BACM and 2020 Amendment control measure analysis was developed in a manner consistent with the emissions inventory requirements for the Serious area and for the 2020 Amendments to the Serious plan as specified in the Final $PM_{2.5}$ Rule. This included representation of source activity and emissions on a seasonal, rather than annual basis as provided for under the Final PM Rule. As discussed in Section III.D.7.6 Emission Inventory, use of seasonal estimates is appropriate for the 24-hour $PM_{2.5}$ 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 majority of wintertime activity and emission factor data supporting the inventory was developed based on local data and test measurements.

7.7.12.3 Evidence of Compliance with the Serious SIP – Existing and Continuing Control Measures

The $PM_{2.5}$ Implementation Rule at 40 C.F.R. § 51.1005(b)(1)(ii) and 51.1005(d)(1) requires that the State show evidence that all controls submitted in the applicable attainment plan have been implemented. DEC and the Borough are implementing all the measures identified in the approved Moderate Area SIP and the submitted Serious Area SIP. Table 7.7-20 summarizes the Moderate SIP control measures and their implementation status. Table 7.7-21 summarizes the Serious Area SIP control measures and their implementation status.

Table 7.7-20
Moderate SIP Control Measures

Control Measure/Program	Voluntary Measure	Status	
		Implemented	On-going
Space Heating and Solid Fuel Heating Controls			
Solid Fuel-Fired Heating Device Upgrades	X	X	X
Solid Fuel-Fired Heating Device Emission Standards		X	X
Improving Solid-Fuel Device Operations	X	X	X
Reduced Use of Solid Fuel Heating During Air Pollution Episodes (Curtailment)		X	X
AHFC Energy Programs	X	X	X
Expanded Availability and Use of Natural Gas	X	X	X
Required Replacement of Non-Certified Wood Heating Devices When Properties are Sold (Contingency Measure)		X	X
Enhanced Dry Wood Compliance: Registration of Wood Sellers and Moisture Content Disclosure (Contingency Measure)		X	X
Transportation Control Strategies			
Expanded Availability of Plug-Ins	X	X	
Mass Transit System	X	X	X
DOT Anti-Idling and Diesel Emission Reductions	X	X	
ADEC Diesel Emission Reduction Efforts	X	X	
Federal Diesel Emission Reduction Programs		X	X
Federal Motor Vehicle Control Program		X	X
Open Burning			
Winter Season Open Burning Ban		X	X
Point Source Controls			
Reasonably Achievable Control Technology		X	X
New Source Review Permit Program		X	X

Table 7.7-21 2020 Adopted Serious SIP Control Measures		
Control Measure/Program	Status	
	Implemented	On-going
Space Heating and Solid Fuel Heating Controls		
Solid Fuel-Fired Heating Device Upgrades	X	X
Solid Fuel-Fired Heating Device Emission Standards (Device Requirements)	X	X
Improving Solid-Fuel Device Operations (Fuel Requirements)	X	X
Reduced Use of Solid Fuel Heating During Air Pollution Episodes (Curtailment)	X	X
Real Estate Requirement and Date Certain Removal	X	X
Wood-Fired Heating Device Registration	X	X
Expanded Availability and Use of Natural Gas	X	X
Transportation Control Strategies		
Mass Transit System	X	X
Federal Diesel Emission Reduction Programs	X	X
Federal Motor Vehicle Control Program	X	X
Small Commercial Sources		
Small Source Information and Requirements	X	X
Open Burning		
Winter Season Open Burning Ban	X	X
Point Source Controls		
Best Available Control Technology	X	X

Additional information and more detailed documentation on the implementation of the Moderate Area SIP and Serious Area SIP control measures is included in Appendix III.D.7.7

7.7.12.4 Control Strategy Origination

The $PM_{2.5}$ Final Rule requires states to identify controls for all sources and source categories in the latest base year emission inventory for the nonattainment area. The starting point for assembling a list of controls is the RACM analysis prepared for the Moderate SIP. However, it is worth noting that progress on control measures did not stop with the RACM analysis and the Moderate SIP. During the time period following the Moderate SIP submission FNSB had authority to regulate the home heating source sector. The most recent version of the FNSB air quality program with significant control measures began with adoption of FNSB Ordinance 2015-01 on February 27, 2015 which created the following control measures:

- **Visible emission standards;**
- **$PM_{2.5}$ emissions crossing property lines;**
- **Setback for hydronic heaters;**
- **Prohibited fuels;**
- **Limitations on appliance sales;**

- **Nuisance provisions; and,**
- **Curtailment program.**

FNSB Ordinance 2015-01 also established the air quality control zones within the nonattainment boundary and established a fine schedule for noncompliance.

FNSB Ordinance 2016-21, adopted May 4, 2016 added a control measure that required persons convicted of two or more violations involving visible emissions or $PM_{2.5}$ crossing property lines to remove certain hydronic heaters. FNSB Ordinance 2016-37, adopted July 28, 2016 modified the No Other Adequate Source of Heat (NOASH) exemption for the curtailment program requiring that qualifying structures were constructed on or before December 31, 2016 to ensure that no new construction would be eligible for a NOASH affidavit.

FNSB Ordinance 2017-18, adopted March 9, 2017 strengthened the curtailment program by:

- **Removing the temperature threshold on the curtailment program which prevented curtailment from being called when the temperature was below -15 degrees Fahrenheit at the Fairbanks International Airport;**
- **Modified the curtailment program from a 3 stage program to a 2 stage program by removing the voluntary stage;**
- **Lowered the first stage threshold from 35 $\mu g/m^3$ to 25 $\mu g/m^3$; and,**
- **Lowered the second stage threshold from 55 $\mu g/m^3$ to 35 $\mu g/m^3$.**

FNSB Ordinance 2017-18 also strengthened the wood stove change out program by requiring pellet stoves certified as a replacement option be EPA certified to 2.0 g/hr or less and added emergency power systems as a replacement option.

FNSB Ordinance 2017-44, adopted June 19, 2017 added a new control measure requiring permits for installation of SFBA in new construction. Ordinance 2017-44 strengthened the wood stove change out program by requiring professional installation, proper wood storage, and training. Ordinance 2017-44 strengthened the curtailment program by requiring a waiver to operate a SFBA during a Stage 1 curtailment, thereby making a Stage 1 curtailment enforceable, and also required more stringent NOASH documentation.

FNSB Ordinance 2018-04, adopted February 8, 2018 modified the NOASH requirements from only Borough listed (under 2.5 g/hr) to Borough listed or EPA certified appliances manufactured after 1998. The change was made to ensure consistency with the Wood Stove Change Out Program.

FNSB Ordinance 2018-26, adopted September 13, 2018 added standards for Retrofit Control Devices (RCD) such as electrostatic precipitators (ESP). The standards included testing requirements, emission standards for RCDs, installation requirements, and a curtailment exemption if regulatory requirements were met.

FNSB Ordinance 2018-45, adopted November 8, 2018 repealed prohibited acts, the curtailment program, and the fine schedule from FNSB Code. The repeal was due to Proposition 4 which states that the FNSB, excluding the natural gas utility, shall not in any way regulate, prohibit, curtail, ban, nor issue fines or fees associated with the sale, distribution, installation or operation of solid fuel heating appliances or any type of combustible fuels. FNSB Ordinances prior to 2018 were all previously adopted by the State into the Moderate SIP and are being implemented by the State where the FNSB could no longer do so.

FNSB Ordinances 2015-01, 2016-21, 2016-37, 2017-18, 2017-44, 2018-04, 2018-26, and 2018-45 are included in Appendix III.D.7.7.

Consistent with the requirements of 40 CFR 51.1010(a), the starting point for assembling a list of controls for BACM analysis is the RACM analysis prepared for the Moderate SIP. Similarly, the requirements detailed in 40 CFR 51.1010(c specify that the list of BACM controls is the starting point for assembling a list of 2020 Amendment control measures. All controls considered, but not adopted in each succeeding plan must be identified. States are also 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. Additionally, the Stakeholder process allowed for public input into control measure selection. The following sections provide a summary of control measure selection.

7.7.12.4.1 Preliminary Draft BACM Report

DEC prepared a preliminary draft BACM report that was released March 22, 2018 for public review. The preliminary draft BACM document identified 72 control measures for consideration that included information from the RACM analysis from the Moderate SIP. A list of the control measures identified is provided in table 7.7-22.

Table 7.7-22. Control Measure from March 22, 2018 Preliminary Draft Document

Number	Description
1	Surcharge on Device Sales
2	Prohibit advertising used devices that do not meet emission criteria for new device sales
3	Require building or other permit
4	Require confirmation of proper installation by requiring professional installation or on-site inspection
5	Register/require industry certification of heating professionals
6	Prohibit installation of flue dampers unless device was certified using a flue damper
7	Require devices meet stricter emission criteria in high pollution zones.
8	Prohibit installation of Solid Fuel Heating Device (SFHD) in new construction

Number	Description
9	Limit the density of SFHD in new developments
10	Install EPA-certified device whenever a fireplace or chimney is remodeled
11	Prohibit use of rain caps on stacks
12	Require minimum stack height for outdoor wood boilers relative to rooflines of nearby unserved buildings
13	Submit sale and installation information to Air Program
14	Require installation of thermal mass to improve efficiency and prevent frequent cycling in selected new units
15	Disclosure of devices on property sale
16	Require notice and proof of destruction or surrender of removed, uncertified devices (date certain removal of uncertified devices)
17	Require Removal of Uncertified Solid Fuel Burning Devices Upon Sale of Property
18	No Visible Emissions during Curtailment Periods
19	Require registration of devices to qualify for exemption from curtailments
20	Require renewals with inspection requirements
21	Optional device registration for curtailment exemptions
22	Require registration of all devices
23	Require exempt households to display a decal visible from a point of public access
24	Require Permanent Installed Alternative Heating Method in Rental Units
25	Require detailed application or inspection to verify need for No Other Adequate Source of Heat (NOASH)
26	Require inspection of device and installation
27	Require annual renewal of waiver
28	Set income threshold [for Curtailment Exemption]
29	Allow only NOASH households to burn during curtailment periods
30	Distribution of Curtailment Information at Time of Sale of Wood-Burning Device
31	Require sale of only dry wood during late summer to end of winter
32	Require dry wood to be clearly labeled to prohibit marketing of non-dry wood as dry wood
33	Burn permits required
34	Prohibit burn barrels and other outdoor equipment
35	Restrict burning during air pollution events
36	Prohibit residential open burning
37	Periodic burn windows
38	Ambient $PM_{2.5}$ curtailment threshold (1-hr average)
39	Use of AQI as Basis for Curtailment Threshold
40	Single stage curtailment
41	Special needs permit
42	Burn down period
43	Exempt ceremonial or religious fires
44	Alternative heating appliance failure

Number	Description
45	Elevation exemption from wood burning curtailments
46	Lack of electrical or natural gas service availability
47	Inspection warrants
48	Date certain removal of "coal only heater"
49	Prohibit use of coal burning heaters
50	Require low sulfur content coal
51	Ultra-low Sulfur Heating Oil
52	Operation and sale of small "pot burners" prohibited
53	No Use, Sale or Exchange of Used Oil for Fuel, unless it Meets Constituent Property Limits
54	Adopt CARB vehicle standards
55	School bus retrofits
56	Road paving
57	Other Transportation Control Measures (TCMs)
58	Controls on road sanding and salting
59	I/M Program
R1	Regional kiln
R4	All wood stoves must be certified
R5	Ban new installations - Hydronic Heaters
R6	Remove hydronic heaters at time of home sale
R7	Ban use of Hydronic Heaters
R10	Replace uncertified units at time of sale
R11	Replace uncertified units at time of significant remodeling
R12	Replace uncertified stoves in rental units
R15	Ban new installations - Wood Stoves
R16	Disincentives to sell used stoves
R17	Ban use of Wood Stoves
R20	Transportation Control Measures
R29	Increase Coverage of District Heating Systems

The process followed to select control measures for the 2020 Amendment was to assemble a list of the control measures not adopted in the Serious SIP and to review the directly control measures implemented in the following communities to determine if any revisions had been adopted since the submission of the Serious SIP; they included:

- **Bay Area AQMD, CA**
- **South Coast AQMD, CA**
- **San Joaquin Valley, CA**
- **Maricopa County, AZ**
- **Puget Sound CAA, WA**
- **Utah, UT**

The review of the control measures employed in these $PM_{2.5}$ programs determined that no new measures had been implemented since submission of the Serious SIP. The list of control measures not adopted in the Serious SIP is presented in Table 7.7-23

Table 7.7-23. Control Measure Not Adopted in the Serious Area SIP

Number	Description
1	Surcharge on Device Sales
6	Prohibit installation of flue dampers unless device was certified using a flue damper
8	Prohibit installation of Solid Fuel Heating Device (SFHD) in new construction
9	Limit the density of SFHD in new developments
10	Install EPA-certified device whenever a fireplace or chimney is remodeled
11	Prohibit use of rain caps on stacks
12	Require minimum stack height for outdoor wood boilers relative to rooflines of nearby unserved buildings
14	Require installation of thermal mass to improve efficiency and prevent frequent cycling in selected new units
18	No Visible Emissions during Curtailment Periods
20	Require renewals with inspection requirements
23	Require exempt households to display a decal visible from a point of public access
25	Require detailed application or inspection to verify need for No Other Adequate Source of Heat (NOASH)
27	Require annual renewal of waiver
28	Set income threshold [for Curtailment Exemption]
29	Allow only NOASH households to burn during curtailment periods
31	Require sale of only dry wood during late summer to end of winter
32	Require dry wood to be clearly labeled to prohibit marketing of non-dry wood as dry wood
35	Restrict burning during air pollution events
38	Ambient $PM_{2.5}$ curtailment threshold (1-hr average)
39	Use of AQI as Basis for Curtailment Threshold
42	Burn down period
45	Elevation exemption from wood burning curtailments
46	Lack of electrical or natural gas service availability
50	Require low sulfur content coal
51	Ultra-low Sulfur Heating Oil
52	Operation and sale of small “pot burners” prohibited
53	No Use, Sale or Exchange of Used Oil for Fuel, unless it Meets Constituent Property Limits
54	Adopt CARB vehicle standards
55	School bus retrofits
56	Road paving
57	Other Transportation Control Measures (TCMs)
58	Controls on road sanding and salting

Number	Description
59	I/M Program
60	Vehicle Idling
61	Fuel Oil Boiler Upgrade – Burner Upgrade/Repair
62	Fuel Oil Boiler Upgrade – Replacement
63	Require Electrostatic Precipitators
64	Weatherization and Energy Efficiency
67	Coffee Roasters
68	Charbroilers
69	Incinerators
70	Used Oil Burners
R1	Regional kiln
R7	Ban use of Hydronic Heaters
R15	Ban new installations - Wood Stoves
R17	Ban use of Wood Stoves
R20	Transportation Control Measures
R29	Increase Coverage of District Heating Systems

7.7.12.4.3 Other Control Measures for Consideration

After the preliminary draft BACM documents for Serious Plan were released additional control measures were identified. These other control measures include: EPA comments, public comments, rejected stakeholder measures, small commercial and industrial sources, and new control measures. Other control measures identified are shown in Table 7.7-24.

Table 7.7-24, Other Control Measures

Number	Description
60	Vehicle Idling
61	(EPA3a) Fuel Oil Boiler Upgrade - Burner Upgrade/Repair
62	(EPA3b) Fuel Oil Boiler Upgrades - Replacement
63	Require Electrostatic Precipitators
64	Weatherization and energy efficiency measures
65	Emissions crossing property lines
66	Lower curtailment threshold
67	Coffee Roasters - Commercial
68	Charbroilers - Commerical
69	Incinerators - Commercial
70	Used Oil Burners
71	Date certain removal for EPA certified devices over 2.0 g/hr or over 25 years old

As noted above the review of other $PM_{2.5}$ programs determined that no new measures have been implemented since submission of the Serious SIP. These measures are addressed

above in Table 7.7-23, therefore, this control measure category has nothing to contribute to the evaluation of potential 2020 Amendment control measures.

7.7.12.4.4 Control Measure Selection

Presented below are the measures selected to address the 40 CFR 50.1010(a) Serious Plan requirements and the 40 CFR 50.1010(c) 2020 Amendment Plan requirements.

Serious Plan Control Measures - A number of control measures address the space heating source sector, in particular the solid fuel space heating source sector. Due to the multiple processes for identifying control measures, and overlap between the control measures, a crosswalk and summary was developed which is shown in Table 7.xxx. When comparing control measures identified in the preliminary draft to Stakeholder control measures specific details may differ, however in several cases a common intent is found in both sets of measures. The crosswalk identifies where the common intent is present.

In total 118 unique control measures were identified which are presented in the crosswalk and summary in Table 7.xxx. The BACM analysis in Appendix III.D.7.7 addresses 84 of the control measures. The 34 unique control measures identified but not addressed in the BACM analysis include 33 Stakeholder recommendations and one contingency measure. The contingency measure is addressed in Section III.D.7.11. Of the 33 Stakeholder measures not included in the BACM analysis 23 were determined to be non-regulatory in nature (e.g. education and outreach recommendations, or implementation strategies/enhancements for existing measures), 6 recommendations dealt with stationary point sources and are not addressed in BACM, 3 are proposed to be adopted into DEC regulations, and 1 resulted in a FNSB resolution. FNSB resolution number 2019-08 supports legislation granting DEC administrative penalty authority in areas classified as serious nonattainment areas and can be found in Appendix xxx.x.7.7.

Step 2 in the BACM analysis was to identify potential control measures. The process identified 84 control measures for analysis. The analysis showed that 6 of the control measures identified did not meet the definition for BACM and were dismissed.

Step 3 in the BACM analysis was to determine if the control measure was technically feasible. 22 control measures were determined to be technically infeasible and were dismissed. 8 control measures were found to be adopted in different form with no further analysis required. 48 measures were determined to be technologically feasible. 40 of those measures were adopted through new state regulations. The 8 remaining measures were forwarded for Step 4 analysis.

Step 4 in the BACM analysis was to determine if the control measure was economically feasible. 7 control measures were determined to be economically infeasible and were dismissed from BACM.

Step 5 in the BACM analysis was to determine if a control measure or technology could be implemented in whole or in part no later than 4 years after reclassification of the area to Serious, which would be June 2021. A total of 41 measures are addressed through state regulations.

Detailed information regarding the analysis of individual BACM is found in the BACM appendix.

Table 7.7-25. Control Measure Summary and Crosswalk

Identified Measures			Measures Dismissed from BACM				Proposed BACM Measures		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet BACM Definition	Proposed to Adopt as BACM	MSM	Page in BACM
1	-	-	-	Tech	-	-	-	-	25
2	-	-	-	-	-	-	18 AAC 50.077(k)	-	27
3	S28 S31	-	-	-	-	-	18 AAC 50.077(j)	-	28
4	S33	-	-	-	-	-	18 AAC 50.077(i)	-	29
5	-	-	-	-	-	-	18 AAC 50.077(i)	-	30
6	-	-	-	Tech	-	-	-	-	31
7	-	-	-	-	-	-	18 AAC 50.077(b),(c),(d),(e)	-	33
8	-	-	-		Econ	-	-	-	35
9	-	C.a.	-	Tech	-	-	-	-	36
10	S29	-	-	Tech	-	-	-	-	38
11	-	-	-	Tech	-	-	-	-	38
12	-	-	-	Tech	-	-	-	-	40
13	-	-	-	-	-	-	18 AAC 50.077(a),(b),(h),(l),(k),(i),(j)	-	42
14	-	-	-	-	-	Not BACM	-	-	43
15	-	-	-	-	-	-	18 AAC 50.077(a),(h),(l) & Episode Chapter	-	44

Identified Measures			Measures Dismissed from BACM				Proposed BACM Measures		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet BACM Definition	Proposed to Adopt as BACM	MSM	Page in BACM
16	S17b S18	-	-	-	-	-	18 AAC 50.077(a),(l),(m),(h) & Episode Chapter	-	46
17	-	-	-	-	-	-	18 AAC 50.077(a),(l),(m) & Episode Chapter	-	48
18	-	-	-	Tech	-	-	-	-	50
19, 21	S1a, S1c	-	-	-	-	-	18 AAC 50.077(h)(3) & Episode Chapter	-	52 & 56
20	-	-	-	-	-	-	18 AAC 50.077(h) & Episode Chapter	-	54
22	S1a	-	-	-	-	-	18 AAC 50.077(h), (c), (d), & (n)	-	57
23	-	-	-	Tech	-	-	-	-	58
24	S22	-	-	-	-	-	18 AAC 50.077(j)	-	59
25	S24	-	-	-	-	-	Episode Chapter	-	61
26	-	-	-	-	-	-	18 AAC 50.077(i)	-	62
27	S26, S27	-	-	-	-	-	Episode Chapter	-	63
28	-	-	-	-	-	-	Episode Chapter & 18 AAC 50.077(a),(l)	-	64
29	S25	C.c.	-	-	-	-	Episode Chapter	-	65
30	-	-	-	-	-	-	18 AAC 50.077(k)	-	66
31	S13	B.h.	-	-	-	-	18 AAC 50.076(d),(e),(g),(j),(k),(l)	-	67

Identified Measures			Measures Dismissed from BACM				Proposed BACM Measures		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet BACM Definition	Proposed to Adopt as BACM	MSM	Page in BACM
32	-	-	-	-	-	-	18 AAC 50.076(d),(e),(g),(j),(k),(l)	-	69
33	-	-	ADF	-	-	-	-	-	72
34	-	-	ADF	-	-	-	-	-	74
35	-	-	-	-	-	Not BACM	-	-	75
36	-	-	ADF	-	-	-	-	-	76
37	-	-	ADF	-	-	-	-	-	77
38	-	-	-	-	-	Not BACM	-	-	78
39	-	-	-	-	-	Not BACM	-	-	80
40	S25	C.c.	-	-	-	-	18 AAC 50.077(a),(l) & Episode Chapter	-	81
41	-	-	ADF	-	-	-	-	-	84
42	-	-	-	-	-	-	18 AAC 50.075(e)	-	85
43	-	C.f.	ADF	-	-	-	-	-	86
44	-	-	ADF	-	-	-	-	-	87
45	-	-	-	-	-	Not BACM	-	-	88
46	-	-	-	-	-	Not BACM	-	-	89
47	S39	D.e.	ADF	-	-	-	-	-	91
48	S20	-	-	-	-	-	18 AAC 50.079(f)	-	92
49	S20	-	-	-	-	-	18 AAC 50.079(f)	-	93
50	-	-	-	Tech	-	-	-	-	94
51	S12	-	-	-	-	-	18 AAC 50.078(b)	-	96

Identified Measures			Measures Dismissed from BACM				Proposed BACM Measures		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet BACM Definition	Proposed to Adopt as BACM	MSM	Page in BACM
52	-	B.d., B.e.	-	-	Econ	-	-	-	98
53	-	B.d., B.e.	-	-	Econ	-	-	-	98
54	-	-	-	Tech	-	-	-	-	100
55	-	-	-	Tech	-	-	-	-	101
56	-	-	-	Tech	-	-	-	-	102
57	-	-	-	Tech	-	-	-	-	139
58	-	-	-	Tech	-	-	-	-	103
59	-	-	-	Tech	-	-	-	-	139
60	-	C.j., D.h., D.i.	-	Tech	-	-	-	-	104
61	S21	C.h.	-	-	Econ	-	-	-	106
62	S21	C.h.	-	-	Econ	-	-	-	107
63	-	B.k.	-	Tech	-	-	-	-	108
64	S15, S16	B.a., B.b.	-	Tech -	-	-	-	-	109
65	-	-	-	-	-	-	18 AAC 50.075(f)(2)	-	110
66	-	-	-	-	-	-	Episode Chapter	-	111
67	-	D.f., D.g.	-	-	-	-	18 AAC 50.078(d)	-	112
68	-	D.f., D.g.	-	-	-	-	18 AAC 50.078(c)	-	116
69	-	D.f., D.g.	-	-	-	-	18 AAC 50.078(c)	-	118
70	-	D.f., D.g.	-	-	-	-	18 AAC 50.078(c)	-	122
71	-	-	-	-	-	-	-	18 AAC	-

Identified Measures			Measures Dismissed from BACM				Proposed BACM Measures		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet BACM Definition	Proposed to Adopt as BACM	MSM	Page in BACM
								50.077 (n)	
R1	S9	-	-	Tech	-	-	-	-	123
R4	-	B.c., B.f.	-	-	-	-	18 AAC 50.077(a),(l)	-	124
R5	-	A.c.	-	-	-	-	18 AAC 50.077(a),(b),(l)	-	125
R6	-	A.c.	-	-	-	-	18 AAC 50.077(a),(b),(l)	-	126
R7	-	A.c.	-	Tech	-	-	-	-	128
R9	-	-	-	-	-	-	18 AAC 50.077(a),(l)	-	129
R10	-	-	-	-	-	-	18 AAC 50.077(a),(l)	-	131
R11	S29	-	-	-	-	-	18 AAC 50.077(a),(l)	-	132
R12	-	-	-	-	-	-	18 AAC 50.077(a),(l)	-	133
R15	-	-	-	-	Econ	-	-	-	135
R16	-	-	-	-	-	-	18 AAC 50.077(a),(i),(l)	-	136
R17	-	-	-	Tech	-	-	-	-	138
R20	-	-	-	Tech	-	-	-	-	139
R29	-	C.g.	-	-	Econ	-	-	-	143
-	S1b	-	-	Non-reg	-	-	-	-	-
-	S8	-	-	Non-reg	-	-	-	-	-
-	S10	-	-	Non-reg	-	-	-	-	-
-	S11	-	-	Non-reg	-	-	-	-	-
-	S14	-	-	Non-reg	-	-	-	-	-

Identified Measures			Measures Dismissed from BACM				Proposed BACM Measures		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet BACM Definition	Proposed to Adopt as BACM	MSM	Page in BACM
-	S17a	-	-	Non-reg	-	-	-	-	-
-	S19	-	-	Non-reg	-	-	-	-	-
-	S23	-	-	-	-	-	Episode Chapter	-	-
-	S30	-	-	-	-	-	18 AAC 50.077(a)	-	-
-	S32	-	-	-	-	-	18 AAC 50.077(i)	-	-
-	S34	-	-	-	-	-	FNSB Resolution	-	-
-	S35	-	-	Non-reg	-	-	-	-	-
-	S36	-	-	Non-reg	-	-	-	-	-
-	S37	-	-	Non-reg	-	-	-	-	-
-	S2	-	-	-	-	-	Refer to BACT Analysis for details	-	-
-	S3	-	-	-	-	-	Refer to BACT Analysis for details	-	-
-	S4	-	-	-	-	-	Refer to BACT Analysis for details	-	-
-	S5	-	-	-	-	-	Refer to BACT Analysis for details	-	-
-	S6	-	-	-	-	-	Refer to BACT Analysis for details	-	-
-	S7	-	-	-	-	-	Refer to BACT Analysis for details	-	-
-	S40	-	-	Non-reg	-	-	-	-	-
-	S41	-	-	Non-reg	-	-	-	-	-

Identified Measures			Measures Dismissed from BACM				Proposed BACM Measures		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet BACM Definition	Proposed to Adopt as BACM	MSM	Page in BACM
-	S42	-	-	Non-reg	-	-	-	-	-
-	S43	-	-	Non-reg	-	-	-	-	-
-	S44	-	-	Non-reg	-	-	-	-	-
-	S45	-	-	Non-reg	-	-	-	-	-
-	S46	-	-	Non-reg	-	-	-	-	-
-	S47	-	-	Non-reg	-	-	-	-	-
-	S48	-	-	Non-reg	-	-	-	-	-
-	S49	-	-	Non-reg	-	-	-	-	-
-	S50	-	-	Non-reg	-	-	-	-	-
-	S51	-	-	Non-reg	-	-	-	-	-
-	S56	-	-	Non-reg	-	-	-	-	-

2020 Plan Control Measures – Listed in the crosswalk table below are the control measures not adopted in the Serious Plan. It employs the same format from the table above listing the Serious Plan control measures and notes areas of common intent.

In total 48 unique control measures were identified which are presented in the crosswalk and summary in Table 7.7-26. The 2020 Amendment control measure analysis titled, "Control Measure Analysis for Fairbanks PM2.5 Nonattainment Area 2020 Amendment to the Serious State Implementation Plan," found in Appendix III.D.7.7 addresses all of the control measures.

Step 2 in the 2020 Amendment control measure analysis was to identify potential control measures. The process identified 48 control measures for analysis. The analysis showed that 6 of the control measures identified did not meet the definition for 2020 Amendment measures and were dismissed.

Step 3 in the 2020 Amendment analysis was to determine if the control measure was technically feasible. 24 control measures were determined to be technically infeasible and were dismissed. 9 control measures were found to be adopted in different form with no further analysis required. 9 measures were determined to be technologically feasible and forwarded for Step 4 analysis.

Step 4 in the 2020 Amendment analysis was to determine if the control measure was economically feasible. 8 control measures were determined to be economically infeasible and were dismissed from BACM.

Step 5 in the 2020 Amendment analysis was to determine if the identified technologically and economically feasible control measure or technology could be implemented in whole or in part to support both the 5% annual reductions in the base emission year inventory and the most expeditious attainment of the ambient $PM_{2.5}$ standard.

Detailed information regarding the analysis of individual BACM is found in the BACM appendix.

Table 7.7-26. Reevaluation of Previously Rejected Control Measures – Summary and Crosswalk

Identified Measures			Measures Dismissed from 2020 Amendment Analysis				Proposed 2020 Amendment Measures Determined to be Equivalent and Most Stringent		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet 2020 Definition	Regulations Implementing Equivalent Measures	MSM	Page in 2020
1	-	-	-	Tech	-	-		-	18
6	-	-	-	Tech	-	-	-	-	20
8	-	-	-	Tech	=	-	18 AAC 50.077(a),(b),(c),(d)&(e)	MSM	22
9	-	C.a.	-	Tech	-	-	-	-	26
10	S29	-	-	Tech	-	-	-	-	27
11	-	-	-	Tech	-	-	-	-	28
12	-	-	-	Tech	-	-	-	-	29
14	-	-	-	-	-	Not Meet Def.	-	-	31
18	-	-	-	Tech	-	-	-	-	32

Identified Measures			Measures Dismissed from 2020 Amendment Analysis				Proposed 2020 Amendment Measures Determined to be Equivalent and Most Stringent		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet 2020 Definition	Regulations Implementing Equivalent Measures	MSM	Page in 2020
20	-	-	ADF	-	-	-	18 AAC 50.077(h) & Episode Chapter	MSM	34
23	-	-	-	Tech	-	-	-	-	36
25	S24	-	ADF	-	-	-	Episode Chapter	MSM	37
27	S26, S27	-	ADF	-	-	-	Episode Chapter	MSM	38
28	-	-	ADF	-	-	-	Episode Chapter & 18 AAC 50.077(a),(l)	MSM	39
29	S25	C.c.	ADF	-	-	-	Episode Chapter	MSM	40
31	S13	B.h.	ADF	-	-	-	18 AAC 50.076(d),(e),(g),(j),(k),(l)	MSM	42
32	-	-	ADF	-	-	-	18 AAC 50.076(d),(e),(g),(j),(k),(l)	MSM	45
35	-	-	-	-	-	Not Meet Def.	-	-	48
38	-	-	-	-	-	Not Meet Def.	-	-	49
39	-	-	-	-	-	Not Meet Def.	-	-	51
42	-	-	ADF	-	-	-	18 AAC 50.075(e) & Episode Chapter	MSM	53
45	-	-	-	-	-	Not Meet Def.	-	-	54
46	-	-	-	-	-	Not Meet Def.	-	-	55
50	-	-	-	Tech	-	-	-	-	56

Identified Measures			Measures Dismissed from 2020 Amendment Analysis				Proposed 2020 Amendment Measures Determined to be Equivalent and Most Stringent		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet 2020 Definition	Regulations Implementing Equivalent Measures	MSM	Page in 2020
51	S12	-	-	-	-	-	-	-	58
52	-	B.d., B.e.	-	-	Econ	-	-	-	60
53	-	B.d., B.e.	-	-	Econ	-	-	-	61
54	-	-	-	Tech	-	-	-	-	62
55	-	-	-	Tech	-	-	-	-	64
56	-	-	-	Tech	-	-	-	-	65
57	-	-	-	Tech	-	-	-	-	66
58	-	-	-	Tech	-	-	-	-	66
59	-	-	-	Tech	-	-	-	-	67
60	-	C.j., D.h., D.i.	-	Tech	-	-	-	-	68
61	S21	C.h.	-	-	Econ	-	-	-	69
62	S21	C.h.	-	-	Econ	-	-	-	70
63	-	B.k.	-	-	Econ	-	-	-	71
64	S15, S16	B.a., B.b.	-	Tech -	-	-	-	-	77
67	-	D.f., D.g.	ADF	-	-	-	18 AAC 50.078(d)	MSM	78
68	-	D.f., D.g.	-	-	Econ	-			82
69	-	D.f., D.g.	-	Tech	-	-		-	85
70	-	D.f., D.g.	-	Tech	-	-		-	90
R1	S9	-	-	Tech	-	-	-	-	92

Identified Measures			Measures Dismissed from 2020 Amendment Analysis				Proposed 2020 Amendment Measures Determined to be Equivalent and Most Stringent		-
Number	Stakeholder Measure	Rejected by Stakeholder	Adopted in Different Form	Technical Dismissal	Economic Dismissal	Does Not Meet 2020 Definition	Regulations Implementing Equivalent Measures	MSM	Page in 2020
R7	-	A.c.	-	Tech	-	-	-	-	94
R15	-	-	-	-	Econ	-	-	-	95
R17	-	-	-	Tech	-	-	-	-	97
R20	-	-	-	Tech	-	-	-	-	98
R29	-	C.g.	-	-	Econ	-	-	-	101

Measure 8 is listed as technologically infeasible because Alaska lacks the land use authority to implement it. The analysis of the measure in the 2020 Amendment Plan Appendix, however determined that 18 AAC 50.077 is the only technologically feasible method to implement this measure in Alaska. This regulation is broader than just Measure 8 new construction restrictions; by regulating at the point of sale any new installation, including installation in existing homes, is affected. 18 AAC 50.077(a) includes a general prohibition on the installation of wood fired heating devices within the area, with exceptions defined in subsequent sections. No outdoor hydronic heaters may be sold or installed unless pellet fueled. 18 AAC 50.077(b) identifies 0.10 lb/MMBtu as the emission rate used as a requirement for pellet fueled hydronic heaters, that EPA certification is required, and that the certification from EPA will be reviewed by ADEC and only approved if the underlying certification test results are accepted. 18 AAC 50.077(c) identifies 2.0 g/hr as the emission rate used as a requirement for cordwood stoves and pellet fueled stoves, an additional emission requirement that the 1-hr filter pull shall not exceed 6.0 g/hr, that EPA certification is required, and that the certification from EPA will be reviewed by ADEC and only approved if the underlying certification test results are accepted. 18 AAC 50.077(d) identifies 2.0 g/hr as the emission rate for wood-fired heating devices whose rated size is 350,000 Btu/hr or greater, that EPA certification is required, and that the certification from EPA will be reviewed by ADEC and only approved if the underlying certification test results are accepted. 18 AAC 50.077(e) allows ADEC to review manufacturer test results and place a model on ADEC's list of devices, which identifies devices that are allowable under 18 AAC 50.077

18 AAC 50.077 is more stringent than current EPA certification for cordwood stoves because the emission limit is set at 2.0 g/hr, regardless of test method. EPA Step 2 certification has an emission limit of 2.5 g/hr for cordwood stoves that are certified with ASTM 3053, a.k.a. the cordwood method. 18 AAC 50.077 is more stringent than current EPA certification for cordwood and pellet stoves because of the additional emission limit on

the 1-hr filter pull of 6.0 g/hr. EPA Step 2 certification has no limit on the 1-hr filter pull. 18 AAC 50.077 also requires another layer of oversight and report review by requiring that ADEC perform certification reviews. For this reason, Measure 8 in its more stringent form is listed as a MSM.

None of the listed measures is identified as a contingency measure. That is because no credit can be claimed in the control measure benefits incorporated into the 2020 Amendment. To satisfy the contingency measure requirement, Alaska has determined that in the event EPA issues a finding of failure, as identified in 18 AAC 50.030(c)(2), a contingency measure lowering the threshold for calling a Stage 2 alert will be triggered upon the effective date of the EPA finding. The Stage 2 level identified for this contingency measure is included in Section III.D.7.12, Fairbanks Emergency Episode Plan, Table 7.12-1 "Air Quality Episode Thresholds and Exceptions/Contingency Measure."

The analysis did find one measure, Measure 51, related to ultralow sulfur diesel (ULSD or 15 ppm S) heating oil that appears to be technically and economically feasible. However, in reviewing public comment and finalizing the Serious Area plan the department decided to take an approach that would address sulfur in heating oil in a manner more compatible with the community situation. ULSD cannot be produced at the local refinery that currently provides much of the fuel supply to the local area. Thus, an immediate wholesale requirement for the use of ULSD in the nonattainment area results in all of the affected fuel having to be imported into the community by either rail or truck, which increases cost and the environmental risks of transport spills. Further, there remains much uncertainty surrounding the underlying physical processes that are resulting in the formation and observation of particulate sulfate in the subarctic nonattainment area. This makes the quantification of benefits from sulfur controls on sulfate reductions an uncertain exercise.

As described in Section 7.7.5.1.5, an area wide fuel switch from Diesel #2 (2,566 ppm) to Diesel #1 (1000 ppm) by September 1, 2022 was adopted rather than a requirement to switch to ULSD (15 ppm). This initial step down was determined to be more economically feasible for local residents and still provides a large sulfur reduction. The change in fuel will impact home heating and some stationary engines; transportation diesel fuel is already ULSD. A UAF/DEC cost analysis estimated 7 cent/gallon increase or about $68.31 annual cost to average household under the selected measure, while the same cost analysis estimated approximately 30 cent/gallon increase in heating oil cost if ULSD were used. September 1, 2022 was determined as the conversion year due to comments received during the public comment period. There is an inadequate supply of locally produced Diesel #1 (1000 ppm) and additional time was required to allow for the local refinery to modify its processes. Concerns were also raised that the increased cost in fuel oil could drive more residents to burning less expensive and higher PM emitting solid fuels. The additional time allows residents to budget and prepare for the increased cost. DEC received requests through the comment process to delay the conversion until 2024, but DEC felt that was too long a delay and that the approximate two years provided should be sufficient to allow the local refinery and residents to plan and prepare for the change in fuel oil.

With the Serious Plan finalized in late 2019, less than one year ago, the department has determined that revisiting this decision, which was made based on local circumstances and public comment is not warranted for the 2020 Amendments. After implementation of the fuel switch to Diesel #1 in 2022, the department will be able to see if this significant sulfur reduction is making impactful reductions in sulfate at the air monitoring sites and whether the additional expense to homeowners of requiring the use of ULSD heating oil is needed to further address the air pollution problem.

7.7.12.5 Adopted Control Measures (Specific Regulations)

The following regulations reflect new or revised measures for the 2020 Amendment to the Serious SIP. Regulations and on-going measures adopted in the Serious Area SIP are detailed in Section 7.7.5 and remain in effect. Regulations and on-going measures adopted in the Moderate SIP remain in effect. The full adopted regulations reside in the Volume III Appendix to Volume II, Section II, however, a summary of the adopted regulations is also discussed in this section. The summary language in Table 7.7-27 does not reflect the detailed verbiage that is in the actual regulations. Please review the official, adopted regulatory language to ensure full understanding of the requirements.

To see the whole suite of measures enacted through the fully amended Serious SIP, the existing Serious SIP measures and regulations are listed in Table 7.7-21 and implemented with state regulations found in 18 AAC 50.075 - 18 AC 50.079. The control measures from the 2020 Amendment listed below will work together with those existing measures. Contingency control measures are described in Section III.D.7.11.

Table 7.7-27, Control Measure Regulation Summary

Control Measure Identification	Proposed Regulation citation	Summary
Solid Fuel Device Operations/Curtailment		
Measure 42	2020 Amendment: Episode Chapter	A burn down period of 3 hours was added to the Episode Chapter. The 3 hour burn down begins upon the effective date and time within a curtailment announcement. This further clarifies existing state regulation at 18 AAC 50.075(e)(3).
Measure 28	2020 Amendment: Episode Chapter	NOASH and Exemptions requirements • Specific requirements to document economic hardship for the NOASH waiver were added to the Episode Chapter.

7.7.12.5.1.4 Fuel Requirement – dry wood

In addition to the dry wood requirements outlined in Section 7.7.5.1.4 Aurora Energy Solutions, LLC recently announced plans[3] to install and operate a wood drying kiln in Fairbanks. Operations are expected to start in September 2020 and produce 2,000 cords of dried birch (only) 20% moisture content firewood for the 2020/2021 winter. Heat from a coal-fired cogeneration power plant that Aurora Energy operates in downtown Fairbanks will be used to dry the wood. Details of the design and permitting for the facility are not currently available, but a mixture of waste and production heat are expected to be used to dry the wood. The availability of additional dry wood to the local market is anticipated to assist in bolstering compliance with dry wood burning requirements.

7.7.12.5.2 Area Sources – Small Sources (Incinerators, Char broilers, Used Oil, Coffee Roasters)

As noted in the BACM analysis, these sources were not previously controlled, nor were their emissions well understood. Presented below is a summary of the control measure analysis prepared in both the Serious Plan and the 2020 Amendment.

Serious Plan

Small area sources and their impact on emissions within the nonattainment area were not well understood in the Serious Plan. To gain insight into the operation of these sources and their emissions DEC required all incinerators, charbroilers and used oil burners to provide a one time submittal of information to better understand these sources, their emissions and determine the need for control. The Serious Plan committed to require coffee roasters to install controls on any unit that emitted 24 lbs or more of particulate matter/year. DEC also committed to waive the requirement if information is provided that documents that the control technology is economically or technologically infeasible. The requirement for installation of control equipment on coffee roasters was committed to be 1 year from the effective date of regulation.

2020 Amendment

Incinerators – Regulation 18 AAC 50.078(c) was adopted which required incinerators to submit information on location, type (medical, liquid, solid, etc.), process, fuel, throughput, hours of operation, etc. Based on the information received, ADEC determined that it does not have any record of permitted or unpermitted sources under the incinerator source category. Therefore, there are no existing incinerators to be affected by a regulation change. Based on this information, Measure 69 was dismissed from the 2020 Amendment control strategy analysis as technologically infeasible.

3 https://www.heatyourway.com/our-products

Charbroilers – Regulation 18 AAC 50.078(c) was adopted which required charbroilers to submit information on their location, operation type (chain driven versus underfire), number of operations, fuel used, # of lbs of meat cooked/week, etc. The 2020 Amendment control measure analysis determined that charbroiler control is technologically feasible. The cost effectiveness analysis, however determined that the installation of catalyst oxidizers is not cost effective. For this reason, the Measure 68 was dismissed from 2020 Amendment control strategy analysis as economically infeasible.

Used Oil – Regulation 18 AAC 50.078(c) was adopted which required used oil burners to submit information on the location, # of burners, rating, operating hours, fuel use/hour, etc. Based on an analysis of the information received and discussions with the FNSB Solid Waste manager to determine how FNSB disposes of waste oil, it was determined that combustion of used oil is the only acceptable disposal method available in the FNSB without shipping the used oil to the lower 48. Prohibiting or regulating the combustion of used oil in the FNSB would place a burden on the small businesses that rely on combustion of used oil as a waste disposal method, encouraging a small percentage to improperly dispose of the used oil. Due to the severe environmental impacts used oil can have on waterways and drinking water, and the probability that prohibiting or regulating the combustion of used oil would lead to improper disposal, Measure 70 was dismissed from 2020 Amendment control strategy analysis due to potential environmental impacts. Thus, it was determined to be technologically infeasible.

Coffee Roasters -18 AAC 50.078(d) became effective on January 8, 2020 and required the installation of either a catalytic oxidizer or thermal oxidizer on any unit emitting particulate matter at or above the 24 lb/ year threshold. One of these devices must be installed within a year of the effective date of the regulation. DEC may waive the requirement if a facility submits information demonstrating that the control device is either technologically or economically infeasible. The 2020 Amendment analysis determined that the adoption of this regulation was sufficient to meet the control measure requirements specified in 40 CFR 50.1010(c). For this reason, Measure 67 was dismissed from 2020 Amendment control strategy analysis because it was adopted in a different form.

7.7.12.5.5 Mass Transit – FNSB Transit Fleet Natural Gas Efforts

Section 7.7.5.5 describes FNSB efforts to transition the FNSB Transit fleet to natural gas. Since submission of the Serious Area SIP significant progress has been made toward the transition. The following updates detail the progress made:

Transit Maintenance and Storage Facility Upgrades
In addition to the FNSB grant award through the FTA on May 18, 2017 for $12,800,000 an additional award of $10,400,000 through FTA was announced in August of 2020. Both grant awards will be used for design and construction of a new maintenance/storage facility and will be fully compliant with CNG fuel requirements. As described in Section 7.7.5.5 ground testing on the existing property identified inadequate stability which would require significant measures and funding to correct. Financial and logistical analysis suggested

moving the project to an alternate location. An alternate site had been identified at the time of the Serious Area SIP submittal. Having completed environmental studies, ground stability determination, and receiving FNSB Assembly approval, FNSB is finalizing the purchase of the alternate site.

Transit Fleet Replacement Schedule and Funding Sources
In addition to the funding sources mentioned in Section 7.7.5.5, FNSB was awarded 3 years of CMAQ funding beginning in 2021 to be used towards the purchase of CNG vehicles. The award amount for each year is $1,826,850. It is estimated that this will allow for the replacement of 9 additional buses. The FNSB has also been awarded FTA Section 5339 funds for FY 17-20 totaling $449,114. Once appropriated these additional awards provide FNSB with the funding needed for a total replacement of 13 buses and 10 paratransit style vehicles, or approximately 90% of the total fleet vehicles.

The FNSB FY 20/21 budget continues to include the combined use of FTA Section 5307 funding and local match funds to acquire buses. It is the FNSB's intent to continue to use similar funding combinations in the future to procure transit vehicles and continue the transition process.

Acquisition and Installation of CNG Fueling Infrastructure
In April of 2020, FNSB was awarded $1,826,850 in CMAQ funding by FAST Planning for the installation of a CNG fueling infrastructure.

7.7.12.6 Most Stringent Measures (MSM)

EPA defines MSMs in 40 C.F.R. 51.1010 (b) as measures that are identified as an MSM and included in the attainment plan for any state or are achieved in practice in any state. A measure could also be considered an MSM if the measure cannot be implemented within the four year window after an area is reclassified as Serious. Furthermore, an MSM could be a control measure that has not been implemented anywhere else.

For the Serious Plan, DEC identified Measure 71 - the required removal of EPA certified devices that are 25 years old and have a PM emission rating of greater than 2.0 g/hr as an MSM. Initially these older EPA certified devices are required to be removed by December 2024 and this requirement was triggered upon EPA's determination that the area failed to attain the standard. However, once the regulation is triggered, all older EPA certified devices must be removed or replaced upon sale of the property where they are located. Furthermore, the 25 years, is a rolling time period. Every year, a new set of older EPA certified devices is eligible for removal or replacement. This on-going MSM provides the foundation for transitioning the area's wood-fired heating devices more quickly to the 2.0 g/hr standard.

For the 2020 Amendment, DEC's review of the control measures not adopted in the Serious SIP determined that a total of 10 measures (#'s 8, 20, 25, 27, 28, 29, 31, 32, 42 and 67) were implemented in either existing regulations, planned modifications to those regulations and

the Episode chapter and therefore qualified as MSMs. Table 7.7-26 lists the measures and regulations implementing them. The discussion following that table explains that while Measure 8 was dismissed as technologically infeasible, that was because the state did not have the authority to implement land use regulations. Analysis of that measure, however, demonstrates that 18 AAC 50.077 contains point of sale restrictions that are broader than land use controls, and contain cordwood stove standards that are more restrictive than current EPA certification standards, which more than qualifies it as an MSM.

7.7.12.7 Calculating the Benefits of Control Measures

Calculation of emission benefits for key control measures through 2029 are summarized within Section III.D.7.6. Within this sub-section, post-2019 control measures under the Serious Area SIP and 2020 Amendments are presented. They are consistent with the emission benefits presented later in Section III.D.7.9.2 to support the 5% annual emission reduction requirements and in Section III.D.7.9.3 in the expeditious attainment analysis.

As discussed in detail earlier in Section III.D.7.6, control measure benefits are calculated to reflect reductions inclusive of the Serious Area SIP and the 2020 Amendments. In addition, reductions from on-going federal control programs such as the FMCVP, Diesel Emission Reduction Program and fuel standards are accounted for in projected baseline emission estimates.

Table 7.9-3 in Section III.D.7.9, placed here for reference as Table 7.7-28, lists state and local control measures for which emission benefits were quantified.

Table 7.7-28
List of Control Measures for Which Emission Benefits Were Quantified under 2020 Amendments Expeditious Attainment Analysis

Source Sector	Measure ID	Measure Summary	Start Year
Area, Space Heat	WSCO	Borough Wood Stove Change Out Program, reflecting future change outs using currently available funding[a]	On-going, thru 2025
	Curtailment	Solid Fuel Burning Appliance (SFBA) Episodic Curtailment Program, reflects enhanced compliance by future attainment date	On-going
	STF-12, BACM 51	Shift residential and commercial space heating from #2 to #1 oil	2023
	STF-13, Modified BACM 31, 32	Requires commercially sold wood to be dry before sale	2022
	STF-17b, 18 BACM 16, 17, R6, R10	Removal of all uncertified devices and cordwood outdoor hydronic heaters (OHHs)	2024
	BACM R8, R9, R16, R17 Modified, R5 Modified	Requires 2.0 g/hr (stoves/inserts) and 0.10 lb/mmBTU (hydronic heaters) certified PM emission rates for new or re-conveyed wood devices	2020
	BACM 48, 49	Removal of coal heaters	2024
	STF-22, 31 BACM 3, 24	Wood-fired devices may not be primary or only heating source	2020
	STF-23, 24, 26, 27 BACM 25, 27	NOASH/Exemption requirements	2020
Point	n/a	BACT SO_2 controls	2021

[a] Reflects WSCO program funding through 2016, 2017 and 2018 EPA -awarded Targeted Airshed Grants (TAGs).

Table 7.9-5 in Section III.D.7.9, placed here for reference as Table 7.7-29, presents the $PM_{2.5}$ and SO_2 emission reductions for each measure in the State's control strategy package for which benefits were quantified. The benefits shown for each individual measure are discounted to account for the overlap of measures controlling the same sources within the combined control package. Combined measure benefits shown at the bottom of Table 7.7-XX also properly account for measure overlap within the combined control package (eliminating double-counting).

Table 7.7-29
Projected 2023 and 2024 Emission Reductions for Post-2019 Control Measures under 2020 Amendments Expeditious Attainment Analysis

Measure ID	Measure Summary	Emission Reductions[a] (tons/episodic day)			
		2023		2024	
		$PM_{2.5}$	SO_2	$PM_{2.5}$	SO_2
WSCO	*Borough Wood Stove Change Out Program, reflecting future change outs using currently available funding*	0.66	0.01	0.68	0.01
Curtailment	Solid Fuel Burning Application Episodic Curtailment Program, reflects enhanced compliance by future attainment date	S1[b]: 0.31 S2[b]: 0.51	S1[b]: -0.09 S2[b]: -0.13	S1[b]: 0.26 S2[b]: 0.42	S1[b]: -0.10 S2[b]: -0.13
STF-12, BACM 51	Shift residential and commercial space heating from #2 to #1 oil	0.01	1.93	0.01	1.95
STF-13, Modified BACM 31, 32	Required commercially sold wood to be dry before sale	0.10	<0.01	0.10	<0.01
STF-17b, 18 BACM 16, 17, R6, R10	Removal of all uncertified device and cordwood outdoor hydronic heaters	0.00	0.00	0.16	<0.01
BACM R8, R9, R16, R17 Modified, R5 Modified	Requires 2.0 g/hr (stoves/inserts) and 0.10 lb/mmBTU certified emission rates for new of re-conveyed wood devices	0.33	0.01	0.39	0.01
BACM 48, 49	Removal of coal heaters	0.00	0.00	0.02	0.02
STF-22, 31 BACM 3, 24	Wood-fired devices may not be primary or only heating source	0.34	-0.01	0.35	-0.01
STF-23, 24, 26, 27 BACM 25, 27	NOASH/Exemption requirements	<0.01	<0.01	<0.01	<0.01
n/a	IGU-projected natural gas expansion through 2029	0.00	0.00	0.00	0.00
Combined Total, Area Space Heating (accounting for measure overlap)		S1[b]: 1.76 S2[b]: 1.96	S1[b]: 1.85 S2[b]: 1.81	S1[b]: 1.95 S2[b]: 2.11	S1[b]: 1.88 S2[b]: 1.84
n/a	Point Source fuel-based sulfur controls by 2029	n/a	1.39	n/a	3.34
Combined Total, Point Sources		n/a	1.39	n/a	3.34

[a] Emission reductions shown for each measure account for effects of overlap within the combined control package.
[b] S1 and S2 refer to benefits under Curtailment program Stage 1 (20 µg/m^3) and Stage 2 (30 µg/m^3) alert conditions.
n/a – Not Applicable.

DEC and the Borough recognize that the long-term mix of $PM_{2.5}$ control strategies implemented in Fairbanks could warrant revision. This would be accomplished through a future attainment or maintenance plan revision and subject to approval by EPA. This

evaluation could result in measures being removed or added to the plan depending on the outcome of the analyses prepared at that time. All changes to the air quality plan must be approved by EPA.

7.7.12.10 Potential Future Control Measures Currently Undergoing Research Efforts or Development

7.7.12.10.1 Retrofit Control Devices (RCD)

During development of the Serious Area SIP, FNSB and ADEC were engaged in a testing program to evaluate the efficacy of RCDs for various solid fuel appliances. Acknowledging the obstacles presented in Section 7.7.10.1, community interest remained high in determining whether the addition of an RCD would allow wood-burning to continue when burn bans were in effect, specifically Stage 2 Alerts where only those with a NOASH are allowed to operate solid fuel appliances. To address this interest, FNSB commissioned a testing project to measure the effect of two RCDs, an aftermarket catalyst and an ESP, on PM emitted from an EPA Step 2 certified pellet stove selected to be representative of this appliance category operated in Fairbanks and develop an emission factor suitable for use in a SIP. To provide additional information in support of the FNSB study, ADEC commissioned a small parallel study to measure the effect of ESPs on two EPA Step 2 cordwood appliances: non-catalytic and catalytic.

FNSB Testing:

The testing program, evaluated the performance of two aftermarket RCDs on an EPA Step 2 certified pellet stove: an OekoTube ESP and a Grace Fire StoveCAT catalyst. The program collected data on PM emitted upstream and downstream from the ESP unit simultaneously to allow a calculation of the efficiency of the unit in reducing emissions. The manufacturer's recommended placement of the StoveCAT catalyst did not allow sufficient space for the measurement of upstream emissions. Therefore, non-simultaneous measurements were collected from baseline (no catalyst) and controlled (catalyst installed) tests; average differences between the baseline and controlled tests provide the basis to calculate emission reduction efficiency.

Two different methods of PM measurement were employed in the program: the primary method used a modified ASTM E2515 protocol with dual train filters to collect the total PM emitted over the course of the test; and a secondary method, not yet certified by EPA, that used a tapered element oscillating microbalance (TEOM) to collect time-resolved measurements of PM emitted during the test. Data collected by the TEOM method provides insight into the performance of controls during different phases of operation (i.e., startup, low, medium, and high burn) as well as total operation, while the ASTM E2515 method only provides a single data point—the average of all phases. Multiple replicate tests were conducted to assess variance in the performance of the retrofit controls.

ADEC Testing:

A limited testing program was conducted to measure the effect of a commercially available ESP on PM emitted from cordwood stoves in support of the FNSB testing project. The study focus was to collect initial measurements with an ESP to assist in providing additional information to the decision-making processes within the Borough related to consideration of retrofit controls and potential needs for further testing by the Borough. The testing program evaluated the performance of an OekoTube ESP.

Two EPA Step 2 appliances[4] were tested: a non-catalytic stove and catalytic stove. Both were selected to be representative of their categories operated in FNSB. The test fuel used was seasoned silver maple, sourced in Connecticut with 19-25% moisture content. The test protocol used for operating the cordwood stoves was the Integrated Duty Cycle Method for Cordwood Stoves (IDC), developed by New York State Energy Research & Development Agency (NYSERDA) and NESCAUM. It specifies four phases of operation at two different heat output settings, high and low, designed to represent realistic stove operation: Startup, High Fire, Maintenance Fire and Overnight Fire.

Given the limited scope of the program, insufficient resources were available to support the collection of simultaneous measurements of PM up and downstream of the ESP unit. Instead, non-simultaneous measurements were collected from baseline (no ESP) and controlled (ESP installed) tests; average differences between the baseline and controlled tests were used to calculate the estimated efficiency in reducing emissions. The same as the FNSB testing, two different methods of PM measurement were employed in the program: the primary method used a modified ASTM E2515 protocol; and a secondary method that used a TEOM to collect time-resolved measurements of PM emitted during the test.

Additional Information:

During the winter of 2019/2020 Golden Valley Electric Association (GVEA) funded an ESP pilot project. The project was funded at $125,000 for two years with a goal of installing 80 ESPs in the nonattainment area over a 2-year period (40 each year). In a July 21, 2020 FNSB Air Pollution Control Commission (APCC) meeting GVEA provided a report on the community pilot project to install ESPs in the North Pole area. Key takeaways from GVEA's report include:

- **17 ESPs were installed in the North Pole area during January – February 2020;**
- **Upon inspection after the burn season, nearly half the installed ESPs had failed due to excessive creosote buildup;**
- **The cause (e.g. wet wood, appliance type, appliance operation, or ESP operation) of excessive creosote buildup was not determined; and**
- **GVEA stopped project funding on a go-forward basis.**

Evaluation of RCDs:

4 Certified to 2.5 g/hr when tested with cordwood)

Controls are evaluated on three bases:

1. **Addressing community interest, does the addition of an RCD provide sufficient emission reductions to allow wood-burning to continue when burn bans are in effect, specifically Stage 2 Alerts where only those with a NOASH are allowed to operate solid fuel appliances;**
2. **Within the context of BACM and control measure analysis, is the mandatory addition of an RCD technologically and economically feasible; and,**
3. **Were any potential safety concerns identified.**

EPA Step 2 certified pellet stove equipped with ESP:

1. **FNSB test results shows a quantifiable emission benefit for including an ESP as a control on EPA Step 2 certified pellet stoves. The PM reductions achieved with a pellet stove plus ESP are insufficient to achieve equivalency with fuel oil appliances. To do so would require reductions of more than 90% with the ESP. Therefore, a Step 2 certified pellet appliance equipped with an ESP does not qualify for an exemption to the curtailment program.**
2. **FNSB testing shows a quantifiable emission benefit for including an ESP as a control on EPA Step 2 certified pellet stoves. Technical and economic feasibility is addressed in the 2020 Amendment Control Strategy Analysis. The technology was found to be technically feasible but economically infeasible.**
3. **No potential safety issues were identified during analysis.**

EPA Step 2 certified pellet stove equipped with StoveCAT catalyst:

1. **FNSB test results for the StoveCAT demonstrate that it is not designed for the operating conditions of a pellet stove and should not be considered as a control device. Therefore, a Step 2 certified pellet appliance equipped with a StoveCAT does not qualify for an exemption to the curtailment program.**
2. **Equipping a Step 2 certified pellet stove with a StoveCAT catalyst does not result in emission reductions, was not identified as a potential control measure, and is not addressed in the 2020 Amendment Control Strategy Analysis.**
3. **No potential safety issues were identified during analysis.**

EPA Step 2 certified non-catalytic cordwood appliance equipped with ESP:

1. **ADEC testing shows a potential emission benefit for including an ESP as a control on a Step 2 certified non-catalytic cordwood stove, additional testing is required to demonstrate a quantifiable emission benefit. Preliminary results indicate that PM reductions achieved with a non-catalytic cordwood appliance plus ESP are insufficient to achieve equivalency with fuel oil appliances. Therefore, a Step 2 certified non-catalytic cordwood stove equipped with an ESP does not qualify for an exemption to the curtailment program.**
2. **Technical and economic feasibility is addressed in the 2020 Amendment Control Strategy Analysis. Equipping a non-catalytic cordwood appliance with an ESP was found to be technologically infeasible due to potential safety issues.**
3. **The ADEC testing and GVEA pilot project provide a weight of evidence identifying a potential safety issue due to accelerated creosote buildup.**

EPA Step 2 certified catalytic cordwood appliance equipped with ESP:

1. **ADEC testing shows a limited potential emission benefit (less than 1% emission reduction) for including an ESP as a control on a Step 2 certified catalytic cordwood stove, additional testing is required to demonstrate a quantifiable emission benefit. Preliminary results indicate that PM reductions achieved with a catalytic cordwood appliance plus ESP are insufficient to achieve equivalency with fuel oil appliances. Therefore, a Step 2 certified catalytic cordwood stove equipped with an ESP does not qualify for an exemption to the curtailment program.**
2. **Technical and economic feasibility is addressed in the 2020 Amendment Control Strategy Analysis. Equipping a catalytic cordwood appliance with an ESP was found to be technologically infeasible due to potential safety issues.**
3. **The ADEC testing did not identify a potential safety issue. The GVEA pilot project identified excessive creosote buildup in a catalytic cordwood stove.**

All other SFBA and RCD combinations:

1. **No testing was completed with any other combination of SFBA and RCD than described in this section. Without quantifiable emission reductions that are equivalent to a fuel oil appliance, any exemption would not comply with CAA Section 110(l). Therefore, no combination of SFBA and RCD would qualify for an exemption to the curtailment program.**
2. **Technical and economic feasibility is addressed in the 2020 Amendment Control Strategy analysis for all other SFBA equipped with an ESP. Other RCDs were not identified as a control measure and were not included in the 2020 Amendment Control Strategy Analysis. Equipping other SFBAs with an ESP was found to be technologically infeasible due to potential safety issues.**
3. **The ADEC testing and GVEA pilot project provide a weight of evidence identifying a potential safety issue due to accelerated creosote buildup on ESP installations. No potential safety issues were identified with other RCDs during analysis.**

Although testing and evaluation do not support a Stage 2 exemption or mandatory installation of an ESP or any other RCD, it does not preclude their use in the FNSB. If determined to be durable in Alaska winters along with professional installation, proper maintenance, cleaning, and monitoring requirements voluntary installation of ESP-equipped pellet stoves, or other RCDs, could provide a quantifiable air quality benefit to the area.

7.7.12.10.2 Expanded Availability and Use of Natural Gas

In November 2019, the FNSB Assembly appropriated $1 million for residents to convert from oil to natural gas or propane burning appliances in a continuing effort to improve air quality in the Borough's non-attainment areas.[5] As of September, funds have been expended for 19 changeouts and 1 conversion. An additional 58 change outs and 2 conversions are currently encumbered and applications are pending for an additional 50 changeouts and 1 conversion. The remaining funds are sufficient for up to 5 additional

5 http://www.co.fairbanks.ak.us/Documents/FY19%20CAFR.pdf

changeouts. Overall, this program, will result in a total of roughly 135 oil to gas conversions. The depletion of available funds has forced the Borough to take down the application website as there is continuing public interest in the program. The schedule for completion of these conversions depends on the weather and when the ground freezes in 2020, all conversions should be completed by the summer of 2021 and available for the 2021/22 winter heating season. The Interior Gas Utility (IGU) has been working in parallel to the Borough by digging and putting in lines to satisfy the backlog of Borough funded conversions and pending owner conversion applications. They plan to continue those efforts until the ground freezes this winter and then add additional lines in the coming years.

The most recent IGU quarterly report[6] documents progress on all of the components of the Interior Energy Project (IEP) effort, including supply, liquefaction, transportation, distribution and conversions. While progress in each of these categories is relevant to the goal of expanding natural gas service in Fairbanks and North Pole, key actions completed include:

- **Construction on the Fairbanks 5.25 million gallon LNG storage tank was completed and service to the public became available on December 18, 2019.**
- **Design on the engineering for the North Pole LNG receipt, storage and regas facility are complete. Construction was divided into two phases: Ground Improvement and Site Infrastructure. The target date for the Infrastructure is the end of September 2020, but the project is being impacted by the COVID-19 pandemic.**
- **Conversions – the original forecasts were based on the Cardno Enxtrix *Interior Energy Project Natural Gas Conversion Analysis*, finalized in January 2014. Those estimates, however, were updated to reflect more conservative rates of customer conversion based on lower fuel oil prices. Efforts to address homeowner concerns about the cost of financing have focused on securing low-cost loan funds via HB 374 approved on May 12, 2018.**

In light of the uncertainty about gas availability in North Pole and homeowner conversion rates, the 2020 Amendment emission inventories assume no growth in natural gas customers through 2026.

7.7.12.10.3 Continuation of AHFC Energy Programs

According to the most recently released annual report for 2019, the Alaska Housing Finance Corporation (AHFC) is continuing to implement several energy programs that are designed to make homes more energy efficient. In 2019, these included the Energy Efficient Interest Rate Reduction (EEIRR) program, Home Energy Loan program, and No-Cost Weatherization program. As homeowners make energy efficiency improvements they reduce the amount of fuel and electricity needed for power and heat leading to corresponding air quality benefits due to the reduced fuels being burned for space heating

6 Interior Energy Project, Quarterly Report to the Alaska State Legislature, Interior Energy Project, April 2020

and power generation. While funding for these programs from the State have come under pressure from more restrictive budgets, federal funding for these programs has continued to provide support for their operation.

Interior Weatherization, Inc. is AHFC's contractor for Fairbanks area weatherization assistance. Their Weatherization Assistance Program provides low and moderate income households with improvements to their homes which increase the energy efficiency of their dwelling

Discussions with staff indicate that AHFC energy programs will continue in the future, assuming continued funding, and, as a result, additional emission benefits will be realized in future years.

7.7.12.11 Future Re-Evaluation of Control Strategies

As described in Section 7.7.11, DEC and FNSB remain committed to re-evaluating the entire mix of control measures as early as 2023/2024, following an update to the CMAQ model, to determine whether the measures have succeeded as planned in reducing emissions and improving air quality. This evaluation could result in measures being removed or added to the plan, depending on the outcome of the analyses.