ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Amendments to:

State Air Quality Control Plan

Vol. II: III.D.7.14

Air Quality Conformity and Motor Vehicle Emission Budget

Replaced and Adopted

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Michael J. Dunleavy, Governor

Jason W. Brune, Commissioner

Note: This chapter consists of the adopted language of the 2020 Amendments to the Serious SIP for inclusion in this section of the State Air Quality Control Plan addressing the Fairbanks North Star Borough PM2.5 Serious nonattainment area. The chapter is a replacement for the 2019 Adopted Serious SIP Requirements.

7.14. Air Quality Conformity and Motor Vehicle Emission Budgets

7.14.1. Regulatory Overview

Transportation conformity is required under Clean Air Act section 176(c) (42 U.S.C. 7506(c)) to ensure that federally supported highway and transit project activities are consistent with the purpose of the state air quality implementation plan (SIP). The requirements for transportation conformity are found in State regulation at 18 AAC 50 Article 7, Conformity, and in Volume II Section III.I in the State Air Quality Control Plan.

Conformity for the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant national ambient air quality standards (NAAQS or "standards") or any required interim emissions reductions or other milestones. The U.S. Environmental Protection Agency's (EPA) transportation conformity rule (40 C.F.R. § 51.390 and Part 93, Subpart A) establishes the criteria and procedures for determining whether transportation activities conform to the SIP. Conformity helps protect public health through early consideration of the air quality impacts of transportation decisions in places where air quality does not currently meet federal standards.

On March 24, 2010, the EPA finalized changes to the transportation conformity rule that primarily affected $PM_{2.5}$ and PM_{10} nonattainment and maintenance areas. The final rule provides clear guidance on how to implement transportation conformity under the 2006 $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) to ensure transportation planning and air quality planning are coordinated and air quality is protected.

On October 7, 2014, EPA approved the release of the MOVES2014 emissions model for SIPs and transportation conformity analyses in states other than California.[1] This approval also started a two-year transportation conformity grace period that ended on October 7, 2016, after which MOVES2014 was required to be used for new transportation conformity analyses outside of California.

Specific guidance on $PM_{2.5}$ conformity requirements is also contained in the Final $PM_{2.5}$ Implementation Rule for the 2006 $PM_{2.5}$ NAAQS, promulgated by EPA in August 2016[2] to meet Clean Air Act Subpart 4 requirements.

Emission inventories and motor vehicle emission budgets in this 2020 Amendment to the Serious SIP were developed using MOVES2014b (December 2018, the latest version of MOVES), consistent with the above requirements.

[1] Federal Register, Vol. 79, No. 194, Tuesday, October 7, 2014.
[2] Federal Register, Vol. 81, No. 164, Wednesday, August 24, 2016.

7.14.1.1 Regional Conformity and Motor Vehicle Emission Budgets

EPA requires that all nonattainment areas develop a motor vehicle emissions budget for use in determining regional transportation conformity. The process used to calculate the MOVES-based motor vehicle emission budget within the on-road mobile source inventory is described in detail in Section III.D.7.6.6.5. Relevant portions of that description are presented below to ensure consistency in the information presented and to avoid the need for readers to shift between sections of this document.

Need for MVEBs – Generally, motor vehicle emission budgets (MVEBs) must be established within a SIP for use in subsequent regional transportation conformity analysis that is tied to the SIP's attainment demonstration and the on-road vehicle emissions share of the overall attainment inventory. The central finding of this 2020 Amendment to the Serious SIP is that attainment of the $PM_{2.5}$ NAAQS is modeled to occur by 2024, the most expeditous attainment date as discussed earlier in Section III.D.7.9.

A control strategy implementation plan revision and MVEB is defined under 40 C.F.R. § 93.101 as follows:

> *Control strategy implementation revision is the implementation plan which contains specific strategies for controlling the emissions of and reducing ambient levels of pollutants in order to satisfy CAA requirements for demonstrations of reasonable further progress and attainment (including implementation plan revisions submitted to satisfy CAA sections 172(c), 182(b)(1), 182(c)(2)(A), 182(c)(2)(B), 187(a)(7), 187(g), 189(a)(1)(B), 189(b)(1)(A), and 189(d); sections 192(a) and 192(b), for nitrogen dioxide; and any other applicable CAA provision requiring a demonstration of reasonable further progress or attainment).*
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> *Motor vehicle emissions budget is that portion of the total allowable emissions defined in the submitted or approved control strategy implementation plan revision or maintenance plan for a certain date for the purpose of meeting reasonable further progress milestones or demonstrating attainment or maintenance of the NAAQS, for any criteria pollutant or its precursors, allocated to highway and transit vehicle use and emissions.*

EPA's Region 10 staff were consulted regarding applicable MVEB requirements for this 2020 Amendment to the Serious SIP. In summary, MVEBs must be set based on the projected expeditious attainment date (estimated to be 2024) and tied to RFP inventories for milestone years until that date, plus one milestone year after.

MVEB Calendar Year and Pollutants – As noted earlier in SectionIII.7.6.10, the milestone years for RFP under the 2020 Amendment to the Serious SIP are 2020, 2023, and 2026. Thus, RFP inventories and MVEBs were established for each of these years. Budgets of on-road motor vehicle emissions occurring within the nonattainment area were set for directly-emitted $PM_{2.5}$. Based on DEC's interpretation of applicable precursor requirements under 40 C.F.R. § 93.102(b)(1) and § 93.102(b)(2)(iv), coupled with precursor significance modeling discussed earlier in SIP Section III.D.7.8 which found that both total and motor vehicle NOx

concentrations did not exceed EPA-established significance thresholds in the required 2019 attainment year, budgets were not established for NOx. Therefore, MVEBs were set only for directly-emitted $PM_{2.5}$ on-road vehicle emissions.

Summary of MVEB Methodology – The MVEBs were calculated using a consistent approach to that applied in estimating motor vehicle emissions within the SIP emission inventories. The MVEB modeling is summarized below.

- *Emissions Model* – Emissions were calculated using the MOVES2014b vehicle emissions model, executed in county-wide "Inventory" mode. For the modeling inventories used to evaluate attainment in the SIP, the "Emission Rates" calculation mode was used to support development of spatially gridded motor vehicle emissions as input to downstream SMOKE/MOVES and SMOKE inventory processing models. The choice to establish MVEBs based on Inventory mode MOVES runs was made to simplify future conformity analysis requirements where gridded outputs are not needed and is consistent with EPA's technical guidance. [3] The model was run to simulate conditions within the three months encompassing the historical modeling episodes used in the SIP to evaluate attainment (November, January and February) to generate emissions over this period. The Time Aggregation Level option was set to "Hour" as required for SIPs and regional emissions analysis.[3]

- *Vehicle Activity Inputs* – On-road motor vehicle activity inputs (VMT by vehicle type, speed distributions, road type VMT distributions) were developed from the "Final 2045 MTP" travel demand model outputs obtained from FMATS/FAST Planning[4]. These were the same travel model outputs used for the SIP modeling inventories, with activity tabulated just for the nonattainment area.[5] 2045 MTP travel model outputs were obtained from FAST Planning for 2019-2029, 2035, and 2045. Vehicle activity (VMT and speeds) for MVEB years 2020, 2023, 2024, and 2026 were based on actual (not interpolated) travel model outputs for those years.

- *Temporal Profiles* – The same locally developed seasonal, weekly, and diurnal travel activity profiles used in the SIP inventories were also used to generate the MVEBs. Default MOVES activity was assumed for heavy-duty trucks (with no explicitly input extended idling) given the absence of local extended idling data.

- *Fleet Characteristics Inputs* – MVEB analysis year specific vehicle populations were extrapolated from actual 2018 DMV registrations using the same growth rate assumptions used to generate Projected Baseline modeled inventories. Vehicle age

[3] "MOVES2014, MOVES2014a, and MOVES2014b Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity," U.S. Environmental Protection Agency, EPA-420-B-18-039, August 2018.

[4] The Metropolitan Planning Organizations in the Fairbanks North Star Borough changed from FMATS to Fairbanks Area Surface Transportation Planning (FAST Planning) in 2019.

[5] The travel model outputs were GIS-based. A spatial shapefile for the nonattainment area was merged with the travel model outputs (which extend beyond the nonattainment area) to identify and tabulate link-based activity only within the nonattainment area.

distribution and Alternative Vehicle and Fuel Technology (AVFT) inputs were based on the calendar year 2018 registration data, with an exception for light-duty vehicle age distributions explained as follows. Age distribution inputs for light-duty vehicles were based on wintertime parking lot survey data collected by DEC, rather than registration data. Multiple parking lot surveys have consistently found that older vehicles are operated less during winter due to drivability concerns. In developing winter nonattainment season inputs, motorcycles were assumed to not operate during harsh winter conditions. Thus their populations were zeroed out. The source population, age distribution and AVFT inputs were supplied to MOVES using the County Data Manager importers in accordance with the modeling guidance.[3]

- *Geographic Area* – MOVES was executed using the "County" geographic area option, with the Fairbanks North Star Borough as the selected county. As explained under "Vehicle Activity Inputs" link VMT and speed outputs from the travel model were scaled to the activity within the nonattainment area using a GIS shapefile. Vehicle populations for the nonattainment area (instead of the entire county) were determined from ZIP code specific DMV registrations.

- *Road Types* – All five road types as defined in MOVES were selected (Off-Network, Rural/Restricted Access, Rural/Unrestricted Access, Urban/Restricted Access, Urban/Unrestricted Access). Facility types from the travel model outputs were categories into these MOVES road types to develop the "VMT by Road Type" inputs.

- *Fuel Property Inputs* – Fuel property inputs (e.g., fuel volatility, sulfur level, ethanol volume, aromatic, olefins and benzene content, etc.) were based on MOVES defaults for FNSB with one exception discussed below. In MOVES2014b, FNSB is grouped within Fuel Region 6, which includes Alaska and rural portions of California, Nevada, Arizona and Hawaii where Reformulated Gasoline (RFG) is not required. In consultation with EPA, the defaults were chosen over industry-based survey data[6] collected in FNSB which tend to be limited to a small number of fuel samples. The MOVES default fuel properties for this non-RFG region assume a 10% ethanol blend level in gasoline. Although this "E10" blend level is used for gasoline in the lower-48, there is no ethanol blending in Alaska. Thus, the MOVES2014b "Fuel Wizard" tool was used to zero the gasoline ethanol content and properly adjust the other fuel properties that would be affected by this change. The Fuel Wizard has been designed in MOVES2014b to be consistent with EPA refinery modeling based on the Tier 3 Motor Vehicle Emissions and Fuel Standards rulemaking.

  Table 7.14-1 shows the MOVES2014b gasoline fuel properties used for FNSB for calendar year 2017 and later (2017+) before and after the Fuel Wizard-based ethanol adjustment to the defaults. (The "Null" value for T50 is as-extracted from the MOVES database, indicating this value is not defined in the default database.) Diesel fuel defaults for Fuel Region 6 were not changed.

[6] Bi-annual fuel surveys across 30 U.S. cities conducted by the Alliance of Automobile Manufacturers 1999-2017.

Table 7.14-1
MOVES2014b Gasoline Fuel Properties Before and After Ethanol Adjustment

Fuel Property	MOVES2014b Defaults (Calendar Year 2017+)	Fuel-Wizard Adjusted (Calendar Year 2017+)
RVP (psi)	11.4	10.4
Sulfur Level (ppm)	10.0	10.0
Ethanol (% vol)	10	0
Aromatic Content (% vol)	21.4	25.0
Olefin Content (% vol)	6.7	8.7
Benzene Content (% vol)	0.7	0.7
e200 (% vol)	53.7	48.8
e300 (% vol)	87.4	86.8
T50 (deg F)	Null	202.2
T90 (deg F)	192.2	312.0

- *Pollutants/Processes* – All applicable pollutants and emission processes described earlier in Section III.D.7.6 were selected. Although emission budgets were only required for direct $PM_{2.5}$ as noted earlier. These direct $PM_{2.5}$ budgets include exhaust and breakwear and tirewear emissions.

- *Meteorology Inputs* – Based on interagency consultation with EPA and FWHA, single hourly ambient temperature and relative humidity profiles were developed from hourly temperatures (and humidity data) averaged across the two modeling episodes and used as the meteorology inputs to the MVEB modeling. The resulting hourly temperature profiles exhibited diurnal ranges from -31.7°F (Hour 8) to -17.2°F (Hour 16) for Episode 1 (January-February) and from -0.6°F (Hour 8) to 8.4°F (Hour 16) for Episode 2 (November). This was consistent with episodic modeling inventory development in the SIP although these episode average meteorology profiles were used for the MVEB while individual day meteorology (for each of the 35 days) was used to establish the MVEB and was agreed upon in consultation with EPA and FHWA.

- *Plug-In Adjustments to $PM_{2.5}$ Emissions* – Finally, starting exhaust $PM_{2.5}$ emissions for light-duty gasoline vehicles were adjusted to account for the effects of wintertime vehicle plug-in block heater use in FNSB.[7] These adjustments were applied using an EPA-accepted approach that consisted of modifying the MOVES soak time distribution inputs for light-duty vehicles contained in *OpModeDistribution* table in the model's default database. Appendix III.D.7.6 provides further details on these plug-in adjustments. Note that EPA's approval of the methodology for modeling the adjustments only extends to analyses conducted using MOVES2014.

[7] It is noted that EPA allowed plug-in adjustments that account for their effects within the baseline on-road mobile source inventory, but no credit is being taken for plug-in use as a SIP control strategy.

Based on these methods, MVEB emissions nominally approximate, but do not exactly match on-road mobile source sector emissions within the SIP modeling inventories for the same year. These methods collectively maximize consistency with the modeling inventories (which tie to attainment analyses) but establish a simpler workflow (largely based on the Inventory calculation mode) for subsequent regional conformity determinations by FMATS/FAST Planning, the affected Metopolitan Planning Organization.

Motor Vehicle Emission Budgets – Using the modeling methodology outlined above, MOVES2014b was executed with locally developed inputs representative of wintertime episodic conditions. Table 7.14-2 summarizes the resulting regional average winter day on-road vehicle $PM_{2.5}$ emissions, which represent the applicable MVEBs under the 2020 Amendment to the Serious SIP.

Table 7.14-2
FNSB Nonattainment Area Motor Vehicle $PM_{2.5}$ Emission Budgets
Under 2020 Amendment

Calendar Year	Requirement	Motor Vehicle Emission Budgets $PM_{2.5}$ (tons/day)
2020	RFP year	0.203
2023	RFP year	0.173
2024	Attainment year	0.163
2026	RFP year	0.146

The $PM_{2.5}$ MVEBs shown in Table 7.14-2 include the plug-in adjustment effects. (As noted earlier, the plug-in adjustments are applied only to starting exhaust emissions for light-duty gasoline vehicles. Plug-ins reduced vehicle fleet-wide $PM_{2.5}$ emissions by 5.4 %.) The $PM_{2.5}$ MVEBs assumed zero contribution from fugitive road dust. This is consistent with the SIP inventory assumption that road dust emissions do not occur during winter in FNSB when road surfaces are snow- and ice-covered. The emissions budget also does not include construction dust for the same reason. (These assumptions are also consistent with the EPA-approved FNSB $PM_{2.5}$ Moderate Area SIP and the previously submitted Serous Area SIP.)

MVEB Context within RFP Inventories – To provide a clear understanding for the contribution of emissions from on-road motor vehicles (i.e., the MVEBs) relative to all other emission sources within the nonattainment area, Table 7.14-3 presents a summary comparison of direct $PM_{2.5}$ emissions from on-road vehicles to total emissions for each of the MVEB calendar years. Emissions are shown on both an absolute (tons/day) and relative (percentage of total emissions) basis for both pollutants.

Table 7.14-3
Motor Vehicle and Total Emissions and Motor Vehicle Contributions to Total Nonattainment Area Emissions by MVEB Year Under 2020 Amendment

Calendar Year	*Nonattainment Area $PM_{2.5}$ Emissions (tons/day)*		Relative Motor Vehicle Contributions (%)
	On-Road Vehicles	Total (All Sectors)	
2020	0.203	2.82	7.2%
2023	0.173	2.15	8.0%
2024	0.163	1.99	8.2%
2026	0.146	1.76	8.3%

Although on-road vehicles are by no means the predominant source of these pollutants, the vehicle emission budgets established under the federal conformity regulations require that emissions associated with future federally-funded regional transportation plans do not exceed budgeted limits, thereby ensuring these plans conform to the overall attainment progress reflected in the SIP.

Budget Adequacy Requirements - For an emissions budget to be found adequate by EPA, the revisions to the air quality control plan that establishes the budget must fulfill a series of requirements per 40 CFR 93.118(e)(4). Each of these requirements are listed in *italics* below, along with specific actions that satisfy each requirement.

- *Be endorsed by the Governor (or a designee)* - Prior to final submittal to EPA, this plan will be filed by the Lieutenant Governor as per state regulation.

- Be subject to a public hearing - Prior to submittal to EPA, these plan revisions were the subject of a public hearing held telephonically on October 15, 2020. The affidavit of oral hearing is included in Appendix III.D.7.14.

- *Be developed through consultation among federal, State and local agencies* - Federal, state, and local agencies were consulted on the motor vehicle emissions budget. Specifically, the state has held interagency calls related to the regulatory requirements and the appropriate technical methodologies for development of the motor vehicle emissions budget. A formal interagency consultation was held on June 24, 2020. These calls have involved appropriate DEC, FAST Planning, Borough, EPA, FHWA and FTA personnel. The state briefed and discussed the motor vehicle emission budgets with the FAST Planning Technical Committee on October 7, 2020 and the Policy Board on October 21, 2020. The state received a Resolution of Support (R2020-37, adopted 10/8/2020) for the amended SIP from the Fairbanks North Star Borough Assembly, which has been included in Appendix III.D.7.14.

- *Be supported by documentation that has been provided to EPA* - This plan contains documentation supporting the motor vehicle emission budget. Section III.D.7.6 and Appendix III.D.7.6 describe development of motor vehicle emissions in further detail.

- Address any EPA concerns received during the comment period - Comments received from EPA both before and during the public comment period were addressed through revisions contained in this final SIP.

- *Clearly identify and precisely quantify the revised budgets* - This section clearly identifies the motor vehicle emissions budgets for the Fairbanks North Star Borough $PM_{2.5}$ nonattainment area.

- *Demonstrate that the budgets, when considered together with all other emissions sources in the inventory and control measures in the plan revision, are consistent with applicable requirements for reasonable further progress, attainment or maintenance (depending on which is relevant to the specific plan submission)* - The motor vehicle emissions budget was established based on the FNSB $PM_{2.5}$ emission inventory and control measures included in the plan and satisfies reasonable further progress requirements. In particular, see Sections III.D.7.6 and III.D.7.10.

- *Explain and document revisions to the previous budget and control measures, and include any impacts on point or area sources* - The budgets presented in this 2020 Amendment are consistent with those established in the EPA-approved Moderate Area SIP (and the previously submitted Serious Area SIP) in that they rely on locally collected data from the same sources (Alaska DMV, FMATS/FAST travel model, etc.) as employed in those earlier plans. However, they are based on the latest version of EPA's vehicle emissions model, MOVES2014b, and incorporate the latest planning assumptions (e.g., updated DMV registrations) and activity projected from these local data sources.

- *Address all public comment on the plan's revisions and include a compilation of these comments* – DEC compiled and responded to all public comments received on the plan including the MVEB. A compilation of the comments received and the DEC's responses will be provided in the submittal to EPA and made available to the public on the department's internet site. The department's affidavit of agency record of public comment is included in Appendix III.D.7.14.

Once a motor vehicle emissions budget is found to be adequate by EPA, the FNSB nonattainment area Transportation Plans and Transportation Improvement Programs (TIP) must be less than or equal to the motor vehicle emissions budget. For projects not from a conforming plan and TIP, the additional emissions from the project together with the transportation plan emissions must be less than or equal to the budget.

Interagency Consultation - Under 40 C.F.R. § 93.105, Fairbanks Area Surface Transportation Planning (FAST Planning), the MPO in the Fairbanks North Star Borough $PM_{2.5}$ nonattainment area, must coordinate interagency consultation procedures for regional transportation conformity

determinations to ensure transportation plan emissions are properly calculated in a manner consistent with the applicable SIP.

7.14.1.2 Project-Level Conformity

Interagency Consultation - Under 40 C.F.R. § 93.105, FAST Planning must similarly coordinate interagency consultation procedures for project-level conformity determinations (as is the case for regional conformity). Because the boundary of the nonattainment area is larger than the MPO boundary, in 2010, the transportation and environmental agencies within the area (Alaska DOT&PF, DEC, FMATS (now FAST Planning), and FNSB) established a *Memorandum of Agreement for the Development of Transportation Conformity Determinations within the Fairbanks $PM_{2.5}$ Nonattainment Area*.[8] The agreement was established for the purpose of conducting cooperative planning and analysis of, and determining transportation conformity, for all transportation projects within the FNSB $PM_{2.5}$ nonattainment area and outlines the roles and responsibilities for the agencies. It includes discussion of the extent of FMATS/ FAST Planning's involvement in any specific project-level determination. Interagency consultation is used in all project-level conformity determinations and FMATS/FAST Planning data may be valuable in hot-spot analyses, especially regarding regional transportation and traffic conditions and emissions.

The interagency consultation process will be the key means of ensuring emissions are properly calculated. The interagency consultation process will also be important in ensuring that appropriate analyses of project emission impacts are conducted. As always, conformity determinations will be subject to the applicable public review requirements required under regulation. This provides the public an opportunity to comment on the approach that is taken for the conformity determination for each plan, program and project.

The project sponsor is the agency responsible for implementing the project. Typically, the project sponsor is a local government, transit operator, or state department of transportation. The project sponsor is responsible for providing the $PM_{2.5}$ and/or PM_{10} hot-spot analysis described in 40 C.F.R. § 93.123 or the approved conformity SIP. The interagency consultation process is critical to completing project-level conformity determinations and $PM_{2.5}$ and PM_{10} hot-spot analyses. The project sponsor, in cooperation with federal agencies, is also responsible for conducting the environmental analysis and review to comply with NEPA as required by the Council on Environmental Quality regulations (40 C.F.R. 1500-1508) and the FHWA/FTA Environmental Impact and Related Procedures (23 C.F.R. Part 771).

Analysis Guidance - EPA released guidance for the preparation of Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas in 2015.[9] It provides guidance on estimating project level PM emissions using MOVES. It also provides guidance in selecting appropriate air quality models, determining background concentrations from nearby and other emission sources, calculating PM design values and preparing conformity

[8] http://fmats.us/wp-content/uploads/2012/08/MOU-for-FBX-Transportation-Conformity-PM-2-5-Final.pdf
[9] https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100NMXM.pdf

determinations. These requirements should be addressed in the interagency consultation process, so that FAST Planning and the State can determine the support needed to:

- prepare MOVES-based emission estimates which reflect appropriate fleet characterization, activity and meteorological inputs and plug-in adjustments;
- access monitoring data available to characterize background concentrations; and
- specify meteorological conditions used in air quality modeling to assess conformity.

7.14.1.3 General Conformity

For projects requiring general conformity determinations, it is also important to consider the impacts of off-road motor vehicle emissions (e.g., idle emissions) in developing conformity determinations. General conformity requirements are given in 40 C.F.R. 93, Subpart B. Interagency consultation shall be used to determine whether off-network mobile source emissions are significant and what analysis of these emissions is appropriate for determining general conformity. An example of this type of project is an airport expansion. Federal actions not funded or approved under Title 23 or the Federal Transit Act should assess project emissions relative to de minimus thresholds established for $PM_{2.5}$ and precursor emissions and applicability requirements established in 40 C.F.R. § 93.153 to determine whether general conformity requirements apply.