Proposed $PM_{2.5}$ Measures for the Austin-Round Rock-Georgetown MSA Regional Air Quality Plan

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Prepared by the Capital Area Council of Governments (CAPCOG)

Background

In December 2020, the U.S. Environmental Protection Agency (EPA) concluded its periodic review of the particulate matter (PM) National Ambient Air Quality Standards (NAAQS) by deciding to retain all of the existing PM NAAQS. However, as part of this review, EPA staff indicated that there is no clear threshold below which exposure to PM pollution will not cause significant health problems, and EPA staff had recommended consideration of a tighter annual fine particulate matter ($PM_{2.5}$) NAAQS. During the next PM NAAQS review due in 2025, the new EPA Administrator could tighten the NAAQS and the Austin-Round Rock-Georgetown Metropolitan Statistical Area's (MSA's) $PM_{2.5}$ concentrations are high enough that the region could be at risk of a nonattainment designation for a tighter $PM_{2.5}$ NAAQS. Therefore, both from a public health perspective and a regulatory perspective, the Central Texas Clean Air Coalition (CAC) has decided to update the region's voluntary air quality plan, *2019-2023 Austin-Round Rock-Georgetown Metropolitan Statistical Area (MSA) Regional Air Quality Plan,* to include additional measures targeted at reducing regional $PM_{2.5}$ air pollution and enhancing awareness of PM air pollution.

Currently, the region's air pollution levels continue to be much closer to exceeding the ozone (O_3) NAAQS than any of the PM NAAQS. However, the region's PM air pollution levels pose a much more significant public health threat than O_3, and the PM pollution levels may pose a more significant regulatory threat as well in the coming years. This list of proposed measures is designed to help reduce regional $PM_{2.5}$ pollution, and were developed by a subcommittee of the Clean Air Coalition Advisory Committee (CACAC) that included staff from Austin, Round Rock, Travis County, Bastrop County, EPA, and Public Citizen, and was reviewed by the CAC at its February 10, 2021, meeting. The list is intended to provide a "menu" of options for current and potential future CAC members to consider implementing as part of the regional plan. CAPCOG will solicit public comment on these measures, compile the responses, and provide these to CAC members for their consideration. CAPCOG is requesting that organizations consider this list of measures and notify CAPCOG by May 31, 2021, of any new measures they plan to implement, as well as any existing measures already being implemented. CAPCOG staff will incorporate this into an update to the regional plan that will be presented to the CAC at its August 11, 2021, meeting, for approval.

Proposed Measures

Several proposed measures are new and specific to major sources of PM emissions that differ from measures to control O_3-forming emissions. However, there are also existing measures in the plan that organizations may not be implementing that can also help reduce PM emissions and concentrations. The list includes both a measure and target for implementation. Methods of implementation can range from passive controls such as encouraging and sharing best management practices (BMPs) to more aggressive controls such as contractor requirements that BMPs are implemented or city ordinances. The appendix contains details on specific activities that can be undertaken under each category and provides additional background to help stakeholders understand the multiple ways in which certain sectors could reduce emissions. CAPCOG is not requesting that CAC members list in detail each specific action. However, CAPCOG is requesting that CAC members indicate which general measures they will commit to implementing and the level of commitment (i.e., encouraging best management practices, ordinances, contractual specifications, outreach and education, etc.).

Organization:_____

Table 1 - $PM_{2.5}$ Measures for Austin-Round Rock-Georgetown MSA Air Quality Plan

Measure and Status (i.e., new or existing)	Implement within own organization's operations	Encourage or require 3rd party organizations to implement	Educate and encourage the public at large to implement
1: Reduce PM emissions from construction and demolition activities (new)	Yes No N/A	Yes No N/A	Yes No N/A
2: Reduce PM emissions from commercial cooking/charbroiling (new)	Yes No N/A	Yes No N/A	Yes No N/A
3: Reduce PM emissions from road dust (new)	Yes No N/A	Yes No N/A	Yes No N/A
4: Reduce PM emissions from mining and quarrying activities (new)	Yes No N/A	Yes No N/A	Yes No N/A
5: Reducing PM emissions from open burning (new)	Yes No N/A	Yes No N/A	Yes No N/A
6: Reduce PM emissions or impact of PM emissions from prescribed burning on high PM days (new)	Yes No N/A	Yes No N/A	Yes No N/A
7: Reduce emissions from mobile sources year-round (existing)	Yes No N/A	Yes No N/A	Yes No N/A
8: Reduce emissions from stationary combustion sources year-round (existing)	Yes No N/A	Yes No N/A	Yes No N/A
9: Installation additional $PM_{2.5}$ monitors/sensors within the region (new)	Yes No N/A	Yes No N/A	Yes No N/A
10: Promote awareness of health effects of PM air pollution (new)	Yes No N/A	Yes No N/A	Yes No N/A

Next Steps

Below is the timeline that CAPCOG plans to follow regarding collecting public comments, soliciting emission reduction commitments from CAC members, and updating the Regional Air Quality Plan. CAPCOG will be conducting a region-wide public comment period in March 2021 in order to provide CAC member organizations useful public and stakeholder input on this list of measures ahead of the May 31, 2021, target date for submitting its list of measure for inclusion in the update to the air quality plan that will be presented to the CAC for approval at their August 2021 meeting. Since this is a voluntary plan, the CAC's approval will simply codify all of the commitments that member organizations have made and provide any direction on region-wide initiatives that it may wish CAPCOG to undertake. Please send any questions, comments, or inquiries to Christiane Alepuz at calepuz@capcog.org. Public comment will be accepted until March 26, 2021, and then collated and distributed to CAC members the following week.

CAPCOG also plans to monitor new state legislation that may affect PM emissions sectors from some key sector and sources such as concrete batch plants or mining and quarry operations, and any federal or state-level initiatives that may be supportive of additional PM reductions within the region.

Table 2 - Timeline for 2021 Update to the 2019-2023 Regional Air Quality Plan Update for $PM_{2.5}$

Date or Timeframe	Milestone
2/102021	CAC meeting; list of measures presented, public comment period opens
3/26/2021	End of public comment period
3/29/2021- 4/2/2021	CAPCOG will compile comments and disseminate to CAC and CACAC
4/29/2021	CACAC meeting; review progress
5/3/2021 – 5/7/2021	National Air Quality Awareness Week; Presentations to CAC Organizations
5/12/2021	CAC Meeting; review progress
5/31/2021	Target date for existing CAC members to update commitments
6/25/2021	Target date for commitments from new CAC members
7/22/2021	Target date for drafting plan & distribution to CACAC for review
7/29/2021	CACAC meeting to consider recommendation of plan update (tentative)
8/11/2021	CAC considers approval of update to plan
8/13/2021	CAPCOG submits plan to EPA as "Path Forward" for PM Advance Program

Appendix A: Additional Background

What are the Health Effects of Particulate Matter Pollution?

Particles with diameters of 2.5 micrometers or smaller ($PM_{2.5}$, or "fine PM") are small enough to penetrate and harm numerous body systems. EPA's review of PM health studies have indicated "causal" or "likely causal" relationships between short-term and/or long term exposure to $PM_{2.5}$ and the following health effects[1]:

- Premature death;
- Lung cancer;
- Cardiovascular effects;
- Nervous system effects; and
- Respiratory effects.

EPA's review also indicated that there is no evidence of a threshold below which further reductions to $PM_{2.5}$ exposure would not continue to decrease risks. This means that there are public health benefits of reducing both long-term and short-term exposure to $PM_{2.5}$ even if an area is attaining the $PM_{2.5}$ NAAQS.

EPA also reviewed health effects of particles with diameters 2.5 – 10 micrometers ($PM_{2.5\text{-}10}$ or "coarse PM), but EPA was not able to determine if particles in this size range could be definitively linked to any health outcomes. EPA does have a NAAQS for short-term exposure to all particles with diameters 10 micrometers or smaller (PM_{10}), but PM_{10} includes $PM_{2.5}$. EPA also reviewed information on health effects associated with even smaller particles – ones with diameters smaller than 0.1 micrometers ($PM_{0.1}$ or "ultrafine PM"), but was not able to determine conclusively if there were health effects from particles these sizes that were distinct from the health effects it assessed for $PM_{2.5}$.

Who is Most Affected by Particulate Matter Pollution?

People with heart or lung diseases, children, and older adults are the most likely to be affected by $PM_{2.5}$ pollution exposure. These sensitive groups comprise at least 40% of the population in the MSA. Additionally, people of color and people with low incomes tend to have disproportionate exposure to high $PM_{2.5}$ levels.

What are the Different Types of $PM_{2.5}$ Pollution?

$PM_{2.5}$ is both a primary pollutant (i.e., directly emitted from different sources) and a secondary pollutant (i.e., formed in the atmosphere through chemical reactions and processes from other direct emissions).

Sources of $PM_{2.5}$ include:

- Crustal $PM_{2.5}$ – particles from dust/soil;
- Elemental carbon (EC) $PM_{2.5}$ – particles that contain the elemental form of carbon (i.e., graphite);
- Organic carbon (OC) $PM_{2.5}$ – particles that contain organic molecules (hydrocarbons);
- Sulfate $PM_{2.5}$ – particles that contain SO_4 molecules;
- Nitrate $PM_{2.5}$ – particles that contain NO_3 molecules; and
- Ammonium $PM_{2.5}$ – particles that contain NH_4 molecules.

Which Type of $PM_{2.5}$ Pollution is of Most Concern?

The type of $PM_{2.5}$ that appears to be contributing the most to the highest levels of annual $PM_{2.5}$ concentrations within the region is organic carbon $PM_{2.5}$. The large variation in the organic carbon $PM_{2.5}$ contributions at the two regional regulatory monitors in 2014-2018 accounts for the vast majority in the differences in the annual $PM_{2.5}$ concentrations between these locations. This suggests that reducing organic carbon $PM_{2.5}$ emissions would

[1] EPA. *Integrated Science Assessment for Particulate Matter*. December 2019. EPA/600/R-19/188, http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=539935.

be the most important step that the region can take towards reducing the highest annual $PM_{2.5}$ concentrations, which are located in the urban core.

What are the Largest Sources of $PM_{2.5}$ Emissions?

The largest sources of $PM_{2.5}$ and organic carbon $PM_{2.5}$ within the Austin-Round Rock-Georgetown MSA are listed below:

Table 3 – Largest sources of $PM_{2.5}$ Emissions in the region, 2017

Source Category	Tons per year $PM_{2.5}$	% of Total $PM_{2.5}$ Emissions	Tons per year OC $PM_{2.5}$	% of Total OC $PM_{2.5}$ Emissions
Road Dust	2,325	22%	153	6%
Construction Dust	1,693	16%	78	3%
Open Burning	1,574	15%	611	26%
Prescribed Fires	861	8%	403	17%
Agricultural Dust	793	8%	24	1%
Commercial Cooking	417	4%	279	12%
Mining and Quarrying	326	3%	0	0%
Subtotal	**7,989**	**76%**	**1,548**	**65%**

It's important to note that while these represent the best estimates available, they are characterized by a high degree of certainty, especially compared to some of the largest sources of ozone-forming emissions. EPA has developed these estimates based on broad national datasets and emissions factors, and circumstances may vary significantly location to location. For example, EPA assumes that 12.5% of all PM_{10} emissions from all mines and quarries is $PM_{2.5}$, but EPA's estimates for the region do not reflect any unique circumstances that may be present at any specific mine or quarry within the region.

How Do the Sources of $PM_{2.5}$ Emissions Compare to Sources of Ozone-Forming Emissions?

The list of the mains sources of $PM_{2.5}$ emissions in the region is very different than the list of main sources of emissions contributing to peak O_3 formation, which is dominated by mobile sources and point sources. While measures to reduce O_3-forming emissions from mobile sources and point sources will also help reduce $PM_{2.5}$, those sources do not contribute nearly as much to the region's $PM_{2.5}$ concentrations as they do to peak O_3 formation, and the main sources of $PM_{2.5}$ emissions require distinct control measures in order to significantly affect regional $PM_{2.5}$ concentrations.

How Do the Region's $PM_{2.5}$ Concentrations Compare to NAAQS?

When comparing the region's $PM_{2.5}$ concentrations to the NAAQS, the concentrations are referred to as "design values," and are based on 3 years' worth of data, (i.e., 2018-2020):

- Annual design value: 9.7 micrograms per cubic meter ($\mu g/m^3$) – 81% of the maximum allowed
  - The annual NAAQS is 12.0 $\mu g/m^3$
  - EPA staff had proposed consideration of a NAAQS as low as 8.0 $\mu g/m^3$
- 24-hour design value for 2018-2020: 22 $\mu g/m^3$ – 63% of the maximum allowed
  - The 24-hour NAAQS is 35 $\mu g/m^3$

How are the Design Values Determined?

When EPA determines if an area's $PM_{2.5}$ levels are in compliance with the NAAQS, they will use the most recent three years' worth of data from all of the official $PM_{2.5}$ monitors that the state operates or has approved for use in comparison to the NAAQS. These numbers are known as "design values." The highest design value for the whole region becomes that region's design value. In the Austin-Round Rock-Georgetown MSA, there are two such $PM_{2.5}$ monitors that will be used to assess the region's compliance for the 2018-2020 period:

- AQS Number 484530021/CAMS Number 171 in East Austin: https://www.tceq.texas.gov/cgi-bin/compliance/monops/site_photo.pl?cams=171
- AQS Number 484531068/CAMS 1068 along IH-35, just north of the intersection with US-183: https://www.tceq.texas.gov/cgi-bin/compliance/monops/site_photo.pl?cams=1068

These two sites are located where EPA and the state have determined would be the locations most likely to measure the highest region-wide $PM_{2.5}$ concentrations over a three-year period.

For the annual $PM_{2.5}$ NAAQS, EPA calculates quarterly averages for each year, and then calculates a 3-year average to determine the design value. If that 3-year average is 12.0 $\mu g/m_3$ or below, the region is considered in compliance with the NAAQS. For the 24-hour $PM_{2.5}$ NAAQS, EPA calculates the 98th percentile 24-hour concentration for each year, and then calculates a 3-year average. If that 3-year average is 35 $\mu g/m_3$ or below, the region is considered in compliance with the NAAQS.

What Specific Actions can be Implemented?

This section outlines in detail the specific activities that CAC members could implement under each category identified above. This is meant to provide an idea of specific activities, and it is not required that CAC members list in detail which specific action (e.g., water application) is planned to be implemented.

1. Reduce emissions from construction and demolition activities
    a. There are a number of ways to reduce PM emissions during construction and demolition. The list below is compiled from the WRAP Fugitive Dust Handbook[2] and a best practice document from Canada[3]
        b. Water application
        c. Dust suppressants
        d. Reschedule large dust generating activities from high wind days or forecasted high PM days
        e. Design:
            i. Plan for minimizing dust generation
            ii. Choosing building material to reduce dust generation
            iii. Minimize distances travelled for delivery of materials
            iv. Use of green building materials
            v. Design and construction for maximum energy efficiency
        f. Site preparation

[2] Western Regional Air Partnership's (WRAP's) Fugitive Dust Handbook, https://www.wrapair.org//forums/dejf/fdh/content/FDHandbook_Rev_06.pdf
[3]Best Practices for the Reduction of Air Emissions From Construction and Demolition Activities, http://www.bv.transports.gouv.qc.ca/mono/1173259.pdf

        i. Grade the construction site in phases
        ii. Use wind fencing
        iii. Stabilize surfaces of completed earthworks with vegetation
        iv. Stabilize earthworks with stone/soil/geotextiles
        v. Create ridges to prevent dust
        vi. Compact disturbed soil
        vii. Eliminate open burning
        viii. Reduce certain activities during windy conditions
    g. Storage piles:
        i. Storage pile activity should be conducted downwind
        ii. Utilize enclosures/coverings for storage piles
        iii. Utilize wind fences/screens for storage piles
        iv. Use vegetation cover as a wind break
        v. Properly shape storage piles
        vi. Properly schedule the delivery of landscaping materials
    h. Material Handling & Transfer Systems
        i. Control mud and dirt trackout and carryout
        ii. Minimize material drop at the transfer point and enclosure
        iii. Utilize foam suppression systems
        iv. Secure loads on haul trucks
        v. Prevent PM emissions from spills
        vi. Minimize material handling operations
        vii. Capture fugitive dust emissions
        viii. Utilize wind barriers
        ix. Reduce certain activities during windy conditions
    i. Road surfaces
        i. Establish on-site vehicle restrictions
        ii. Surface improvements to unpaved road surfaces
        iii. Proper maintenance of unpaved roads
        iv. Work practices associated with de-icing materials
    j. Fabrication
        i. On high PM days, reschedule the following:
            1. Cutting and grinding
            2. Sand and grit blasting and façade cleaning
            3. Concrete cutting
            4. Mixing processes
            5. Internal and external finishing and refurbishment
    k. Demolition and Deconstruction
        i. Apply deconstruction techniques
        ii. Minimize drop heights for debris
        iii. Enclose chutes and cover bins
        iv. Use fogging systems
        v. Construct barriers to prevent dispersion
        vi. Avoid blasting when feasible
        vii. Vacuum debris
        viii. Work practices for loading debris
        ix. Avoid prolonged storage of debris
2. Reduce emissions from commercial cooking/charbroiling, possibly through some kind of grant program

a. The U.S. Environmental Protection Agency's (EPA's) Menu of Control Measures[4] identifies one control for commercial cooking, catalytic oxidizers, which are estimated to achieve an 83% control efficiency at a cost of $3,252 per ton of PM + volatile organic compounds (VOCs).
    i. This measure focuses on the control of PM emissions from over-fire and conveyor charbroilers. The use of a catalytic oxidizer, placed above the charbroiler in the stack and activated by heat from the cooking, appears to be the best and most cost-effective emission control device for charbroilers.
    ii. Cities in California and New York have established exemptions for establishments that charbroil less than 400 – 1,000 pounds of meat per week.
b. If funds are available, a grant program could be implemented to assist restaurants and food service businesses, that charbroil a certain threshold of meat, in purchasing and installing a catalytic oxidizer.

3. Reduce road dust emissions[2]
    a. Paved roads and parking lots:
        i. Water flushing/sweeping
        ii. Improvements in sanding/salting applications and materials
        iii. Covering haul trucks
        iv. Prevention of vehicle dust trackout
            1. Curb installation
            2. Shoulder stabilization
    b. Unpaved roads & parking lots
        i. Paving
        ii. Chemical stabilization/dust suppressant
        iii. Surface improvement (e.g., gravel)
        iv. Vehicle speed reduction (to 25 miles/hour or less)
        v. Watering twice a day for industrial unpaved road
4. Reduce emissions from mining and quarrying activities
    a. EPA[4] identifies the following control measures for direct PM emissions from "Mineral Products – Stone Quarrying & Processing" at stationary facilities at which materials are being handled after quarrying.
        i. Dry Electrostatic Precipitator (ESP) – Wire Plate Type
        ii. Fabric Filter
        iii. Paper/Nonwoven Filters – Cartridge Collector
        iv. Venturi Scrubber
        v. Wet Electrostatic Precipitator (ESP) – Wire Plate Type
    b. PM reduction measures at the mining and quarrying site are[2,5]:
        i. Reschedule blasting and other large dust generating activities from days with high winds or high PM levels

[4] EPA Point & Non-Point PM Menu of Control Measures, https://www.epa.gov/sites/production/files/2016-02/documents/menuofcontrolmeasures.pdf
[5] Public Citizen Urges Texas Legislature to Rein in Aggregate Pollution, https://www.citizen.org/article/public-citizen-urges-texas-legislature-to-rein-in-aggregate-pollution/

ii. Implement wet suppression
iii. Enclose or cover storage piles
iv. Plant vegetation as a windbreak and/or erect artificial wind barriers
v. Control mud and dirt trackout
vi. Secure loads on haul trucks
vii. Vehicle wash stations upon exiting property
viii. Route optimization to avoid neighborhoods and school zone times
ix. Vacuuming dust

c. The control measures for unpaved roads[2] are potentially applicable to mines and quarries. These measures include:
   i. Pave roads and high-traffic areas
   ii. Chemical stabilization/dust suppressant
   iii. Surface improvement (e.g., gravel)
   iv. Vehicle speed reduction to 25 miles/hour
   v. Watering twice a day for industrial unpaved road

5. Reducing open burning
   a. Working with the Capital Area Regional Environmental Task Force (RETF) and other city or county environmental enforcement staff to enforce burn bans and the state's Outdoor Burning Rule
      i. Outdoor Burning Rule, Title 30, Texas Administrative Code, Sections 111.201–221
         1. The Outdoor Burning Rule requires that certain kinds of burning be conducted downwind of, or at least 300 feet from, any structure containing sensitive receptors located on adjacent properties unless written approval is obtained beforehand from the owner or occupant—the one who will suffer adverse effects—of the adjacent or downwind property. Also, the burning must not cause a nuisance or traffic hazard.
         2. See the Texas Commission on Environmental Quality's (TCEQ's) Outdoor Burning in Texas Guide - https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg-049.pdf
   b. Educating the public on fire and air quality hazards from open burning
6. Working to ensure prescribed burning activities do not coincide with projected high PM days, if possible
   a. According to Travis County's Park Land Manager, prescribed burn windows are identified the week before the prescribed burn. Therefore, it is recommended that prescribed burning staff consider the air quality forecast for the timeframe in which the burns are being considered. There a lot of factors that go into selecting the day of a prescribed burn such as meteorology and staff availability, so it may not be possible to avoid some high PM days. Note that this measure would be expected to reduce peak daily 24-hour $PM_{2.5}$ concentrations, but not annual $PM_{2.5}$ concentrations.

CAPCOG can also encourage consideration of co-benefits of PM air pollution reductions from other actions/measures that are already in the Regional Air Quality[6] plan for O_3 that also could impact regional 24-hour or annual $PM_{2.5}$ concentrations

[6] 2019-2023 Austin-Round Rock-Georgetown MSA Regional Air Quality Plan, https://www.capcog.org/wp-content/uploads/2019/10/2019-2023_Regional_Air_Quality_Plan.pdf

7. Measures to reduce air pollution from the use of fleet/commercial vehicles and equipment:
    a. Tier 1
        i. Establish and enforce idling restriction policies for use of the organization's vehicles, equipment, and property
        ii. Establish fleet management policies that prioritize the use of vehicles and equipment with low emission rates
        iii. Educate fleet users on driving and equipment operation practices that can reduce emissions
        iv. Seek funding to accelerate replacement of older, higher-emitting vehicles and equipment with newer, cleaner vehicles and equipment, such as TERP grants
    b. Tier 2
        i. Establish low-emission purchasing policies for new on-road vehicles, non-road equipment, and stationary equipment
        ii. Enforce vehicle idling restrictions within the community [either through an ordinance if a city or a memorandum of agreement with TCEQ if a county].
8. Measures to reduce air pollution from power plants and other stationary combustion sources:
    a. Conserve energy
    b. Schedule discretionary emission-generating activities such as engine testing to periods that would avoid peak 8-hour O_3 or 24-hour $PM_{2.5}$ concentrations

The following measures would also be expected to generally improve understanding and awareness of $PM_{2.5}$ air pollution, which could lead to emission reduction or exposure reduction by the community at large.

9. Encourage installation of additional $PM_{2.5}$ monitors/sensors within the region
    a. More $PM_{2.5}$ monitors and sensors in the MSA would allow a better understanding of where elevated $PM_{2.5}$ levels are occurring and the populations that are most affected by high $PM_{2.5}$.
    b. EPA has started to display privately collected $PM_{2.5}$ data from "Purple Air" sensors on their AirNow website, and these low-cost sensors ($200-$300) can greatly expand the availability of $PM_{2.5}$ data within the region (fire.airnow.gov)
    c. CAPCOG is installing/has installed Purple Air sensors at its air monitoring stations in Austin, Bastrop, Dripping Springs, Elgin, Georgetown, Lockhart, Round Rock, and San Marcos.
10. Promote awareness of health effects of PM air pollution
    a. $PM_{2.5}$ poses the greater risk to human health than ozone as $PM_{2.5}$ can be inhaled deep into the lungs and can enter the bloodstream.
    b. People with heart or lung diseases, children, and older adults are the most likely to be affected by particle pollution exposure.
        i. AirNow, www.airnow.gov, can help the public view the air quality in their area in order to avoid elevated PM levels.