SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Preliminary Draft Staff Report
Proposed Amended Rule 445 – Wood-Burning Devices

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TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

Rule 445 – Wood Burning Devices was adopted in March 2008 to implement the PM2.5[1] Control Measure BCM-03 of the 2007 Air Quality Management Plan (AQMP) to reduce PM2.5 emissions from wood-burning devices. Rule provisions apply to manufacturers, vendors, commercial firewood sellers, and persons owning or operating a wood-burning device. The majority of wood-burning devices in the South Coast Air Basin (Basin) [2] are fireplaces and wood-stoves, but include any similar permanently installed, indoor or outdoor wood-burning devices. The rule also prohibits burning of products not intended for use as fuel, sale of unseasoned wood, and curtailment of wood-burning on "No-Burn" days. Wood-burning curtailment is mandatory on No-Burn days where ambient PM2.5 concentration is forecast to exceed a threshold limit (currently at 30 $\mu g/m^3$)[3]. The rule was amended in May 2013 to implement Control Measure BCM-01 in the 2012 AQMP to address the U.S. EPA's lowering of the PM2.5 annual standard from 15 to 12 $\mu g/m^3$ to reflect a more health protective standard. The 2013 amendments expanded the wood-burning curtailment or No-Burn day restrictions by lowering the curtailment threshold from 35 to 30 $\mu g/m^3$, establishing criteria for Basin-wide curtailment, and also setting standards for commercially sold solid-fuel labeling. Exemptions are included for low income households, where the device is the sole source of heating, geographic elevations 3,000 feet or higher above mean sea level, and ceremonial fires.

South Coast Air Quality Management District (South Coast AQMD) staff conduct extensive outreach to ensure that the public and other stakeholders are aware of the wood-burning curtailment requirements. In addition to the South Coast AQMD Check Before You Burn web page with program information including links and videos and the Check Before You Burn map, information regarding No-Burn days is disseminated through e-mail notifications and a toll-free number. The South Coast AQMD Media Office also updates the South Coast AQMD website, publishes press releases, sent email blasts to media contacts, sends news pitches to local news desks, coordinates press interviews, notifies the public on social media (Facebook, Twitter and Instagram), posts Facebook Ads on No Burn Days, runs a Check Before You Burn video advertisement on Facebook during the wood-burning curtailment season, and places door hangers with information on the program throughout communities with elevated wood-smoke and high overall PM2.5 concentrations (via The Walking Man, Inc.).

The Basin is currently in compliance with both the 1997 24-hour and annual PM2.5 National Ambient Air Quality Standard (NAAQS) of 65 $\mu g/m^3$ and 15 $\mu g/m^3$, respectively. However, the Basin is in nonattainment status for both the 2006 24-hour and the 2012 annual PM2.5 NAAQS standards of 35 $\mu g/m^3$ and 12 $\mu g/m^3$, respectively. The Basin is currently classified as serious nonattainment for the 2006 24-hour standard and moderate nonattainment for the 2012 annual standard[4], with attainment deadlines of December 31, 2019 and December 31, 2021, respectively.

1 Airborne fine particulate matter ≤ 2.5 micrometers in aerodynamic diameter (μm).

2 The South Coast Air Basin (SCAB or Basin) is a geographic region that encompasses Orange County and the non-desert portions of Los Angeles, Riverside and San Bernardino counties.

3 Micrograms per cubic meter.

4 South Coast AQMD requested re-designation to serious nonattainment status for the 2012 annual PM2.5 standard in the 2016 AQMP.

Despite significant reductions in ambient PM2.5 concentrations, it is likely that the Basin will fail to attain the 2006 24-hour PM2.5 standard by the December 31, 2019 deadline.

The proposed amendments to Rule 445 are necessary to implement the backstop Contingency Control Measure BCM-09 in the 2016 AQMP and will also address the Clean Air Act (CAA) Section 172(c)(9) contingency measure requirements for the PM2.5 standards. The proposed amendments would extend the No-Burn day requirement Basin-wide when the daily PM2.5 air quality is forecast to exceed 30 $\mu g/m^3$ in any source receptor area (SRA) and would also automatically lower the No-Burn day thresholds subject to specific contingency triggers as set forth in 40 CFR § 51.104(a). Specifically, No-Burn day threshold reductions would be triggered upon a final determination of a failure to meet any Reasonable Further Progress (RFP) or quantitative milestone requirement in an approved plan, to submit a required quantitative milestone report, or to attain either the 2006 24-hour or 2012 annual PM2.5 NAAQS by the applicable attainment date.

Contingency measures would reduce ambient PM2.5 by increasing the number of No Burn days by expanding curtailment Basin-wide. Staff estimates a 25.4 ton per year (TPY) reduction from implementing the Basin-wide curtailment at 30 $\mu g/m^3$ in all cases and a 46.3 TPY reduction after triggering the first contingency measure which will reduce the Basin-wide No-Burn day threshold from the current 30 $\mu g/m^3$ to 29 $\mu g/m^3$. Additional contingency measures, if triggered, would lower the Basin-wide No-Burn day threshold incrementally to 28 $\mu g/m^3$, 27 $\mu g/m^3$, and 26 $\mu g/m^3$ and result in cumulative additional estimated emissions reductions of 67.1, 81.0 and 100.1 TPY, respectively.

BACKGROUND

Numerous studies have linked higher concentrations of PM2.5 with health effects such as increased mortality, respiratory and cardiovascular disease. In July 1987, U.S. EPA promulgated a health protective based 24-hour NAAQS of 150 micrograms per cubic meter ($\mu g/m^3$) for particulate matter less than 10 microns (PM10), which the Basin has met since 2008. In July 1997, U.S. EPA strengthened the NAAQS for PM2.5 setting a more health protective 15 $\mu g/m^3$ annual standard and 65 $\mu g/m^3$ 24-hour standard. The Basin is currently in compliance with the both the 24-hour and annual 1997 PM2.5 NAAQS of 65 $\mu g/m^3$ and 15 $\mu g/m^3$, respectively. On December 17, 2006, the U.S. EPA revised the 24-hour PM2.5 NAAQS, lowering it from 65 $\mu g/m^3$ to 35 $\mu g/m^3$. The Basin was subsequently designated as "moderate" nonattainment for the 2006 24-hour PM2.5 NAAQS on December 14, 2009. On December 14, 2012, the U.S. EPA revised the annual PM2.5 standard, lowering it to 12 $\mu g/m^3$ and issued a final nonattainment designation for the Basin on December 18, 2004. Table 1 summarizes the historical timeline for these standards applicable to the Basin.

Table 1 – Historical Summary for PM2.5 24-Hour and Annual Standards

Year	24-Hour Average	Annual Average
1997	65 μg/m^3	15 μg/m^3
2006	35 μg/m^3	15 μg/m^3
2012	35 μg/m^3	12 μg/m^3

Area-wide sources contribute approximately 42% or 27.7 tons per day (TPD) to the estimated 66.0 TPD of total directly emitted PM2.5 inventory in the Basin. This total includes both stationary and mobile sources. [5] An estimated 5.2 TPD or almost one-fifth of the area-wide PM2.5 comes from wood-burning devices, such as wood-burning fireplaces and wood stoves.[6] . Approximately 90% of wood-smoke PM by weight is comprised of PM2.5.[7] Accordingly, control measures for residential wood combustion were included in the 2007 and 2012 AQMPs. Rule 445 – Wood-Burning Devices was adopted in June 2008 and was then amended in May 2013, in response to U.S. EPA lowering the PM2.5 NAAQS. The 2013 amendments lowered the threshold for triggering a wintertime wood burning curtailment, established criteria for a basin-wide curtailment, and require commercial firewood sellers to label packaged wood and wood-based products with a No-Burn day advisory.

The 2012 AQMP projected attainment of the 2006 24-hour PM2.5 NAAQS by 2014; however, largely due to the region's long-running drought conditions, attainment within this time frame was not possible. In July 2015, the South Coast AQMD requested that U.S. EPA reclassify the Basin as a serious nonattainment area and committed to demonstrate attainment of the 24-hour PM2.5 NAAQS as expeditiously as practicable, but not beyond December 31, 2019. As a consequence of the re-designation, more stringent requirements now apply including implementation of Best Available Control Measures / Best Available Control Technology (BACM/BACT), a lower major source threshold (from 100 tons per year to 70 tons per year), and an update to the reasonable further progress (RFP) analysis. The annual PM2.5 standard attainment is achieved when the 3-year average of the annual averages does not exceed 12.0 μg/m^3. Under the CAA, moderate nonattainment areas have until 2021 to meet 2012 PM2.5 standard for moderate nonattainment areas, and if necessary, up to four additional years (i.e. 2025) if the area is re-classified as serious nonattainment. Table 2 shows that ambient PM2.5 concentrations in the Basin which have been trending downwards toward attainment with both the 2006 24-hour and 2012 annual NAAQS.

5 Final 2016 AQMP. Chapter 3. Base Year and Future Emissions. Annual Average TPD. P. 3-14 and 3-15.

6 Final 2016 AQMP. Appendix IV-A. BCM-09 Further Reductions From Wood Burning Fireplaces and Woodstoves. P. IV-A-222.

7 CARB. "Speciation Profiles Used in ARB Modeling." https://ww3.arb.ca.gov/ei/speciate/speciate.htm#assnfrac (reviewed January 29, 2018).

Table 2 – Basin-wide Historical Federal Equivalency Method Ambient PM2.5 Concentration (µg/m^3)[8]

Calendar Year	Annual Average Maximum Concentrations	Annual 3-Year Average Maximum Concentrations	24-Hour Average Maximum Concentrations	24-Hour Design Value Average Maximum Concentrations
2008	17.3	20.0	48.3	53
2009	17.2	18.8	42.9	49
2010	15.5	16.9	35.6	41
2011	15.9	15.9	50.0	38
2012	15.1	15.2	35.6	36
2013	14.1	14.8	37.5	36
2014	14.5	15.1	40.0	41
2015	14.5	14.5	43.2	44
2016	14.9	14.5	35.2	43
2017	14.6	14.7	53.4	39
2018	14.5	14.7	36.1	38
2019[9]	12.7	13.8	36.2	37

Table 3 summarizes the current status of the Basin with respect to the revised lower 2006 24-hour and 2012 annual average standards. The Basin is currently classified as moderate nonattainment for the annual standard and serious nonattainment for the 24-hour standard. As shown in Table 2, since the adoption of Rule 445, ambient 24 hour and annual PM2.5 concentrations have decreased from 48.3 to 36.1 µg/m^3, and from 17.3 to 14.5 µg/m^3, respectively. Despite these significant reductions and nearing compliance with the 24-hour average and 2012 annual NAAQS, the Basin will likely fail to attain the 35 µg/m^3 PM2.5 24-hour average NAAQS by the December 31, 2019 attainment deadline.

Table 3 – Summary of Basin PM2.5 Attainment Status

PM2.5 NAAQS	NAAQS (µg/m^3)	Status	Attainment Deadline
2006 24-Hour	35	Serious	December 31, 2019
2012 Annual	12	Moderate	December 31, 2021[10]

8 Federal Reference Method (FRM) and Design Value (DV) are discussed further in the Forecasting section of this report.

9 2019 data is preliminary and subject to change. Data collected during exceptional events are not removed. Final values may be lower when accounting for exceptional events.

10 South Coast AQMD has requested Basin reclassification to serious non-attainment which will change the attainment date to no later than December 31, 2025.

HEALTH EFFECTS & ENVIROMENTAL IMPACTS

Health studies have shown a significant association between exposure to particle pollution and health risks, including premature death. Smaller particles in the PM2.5 range are particularly dangerous since they can penetrate and deposit deep in lung tissues. Appendix I of the 2016 Final AQMP describes in more detail the health effects of fine particulates based on numerous studies including data on increased hospital admissions, emergency room and physician office visits and school absences. In addition to increased mortality other health effects include the exacerbation of respiratory and cardiovascular diseases (asthma and non-fatal myocardial infarction) and effects on lung function as well as lung morphology. Recent studies have shown an association with changes in the brain leading to both memory and cognitive decline[11] and also to the development of benign and malignant brain tumors.[12]

Residential wood burning is a significant source of PM emissions. Emissions from residential wood burning devices are caused primarily by incomplete combustion and include PM, CO, NOx, SOx, and VOCs. Studies indicate that the vast majority of particulate emissions from residential wood combustion are in the fine (2.5 micrometers or less) fraction. Additionally, incomplete combustion of wood produces polycyclic organic matter (POM), a group of compounds classified as hazardous air pollutants under Section 112 of the CAA. Biomass burning is also a source of black carbon (soot) which studies suggest can influence climate by directly absorbing light, reducing the reflectivity of snow and ice through deposition and interacting with clouds. According to CARB[13], soot from residential wood combustion is forecast to be the largest individual anthropogenic (man-made) source of black carbon in 2030 if no new programs are implemented.

FORECASTING

South Coast AQMD staff use weather forecasts, air pollution measurements, satellite data, and mathematical models to predict particle (PM2.5 and PM10), ozone, nitrogen dioxide, and carbon monoxide concentrations. Forecast models are tools for making predictions, which are trained and evaluated with air pollution measurements. Traditionally, South Coast AQMD staff issued a daily air quality forecast summarizing conditions expected over the entire day for geographical areas in the region which are shown in Appendix B as General Forecast Areas and Air Monitoring Areas or Source Receptor Areas (SRAs). However, with new models developed and maintained by NOAA[14] scientists, South Coast AQMD staff can now issue hourly forecasts of PM2.5 and ozone for the next day. These models are customized using local measurements and state-of-the-science models of air pollution levels, resulting in more accurate predictions. The predicted pollutant levels are reported as an Air Quality Index (AQI). The higher the AQI, the higher the level of air pollution and potentially greater health concerns for the exposed population.

11 Younan, Diana & Petkus, Andrew (2019). Particulate matter and episodic memory decline mediated by early neuroanatomic biomarkers of Alzheimer's disease. Brain : a journal of neurology. 143. 10.1093/brain/awz348.

12 https://www.aqmd.gov/nav/about/groups-committees/bltap-foundation/bltap-6th-annual-report.

13 CARB. Short-Lived Climate Pollutant Reduction Strategy. March 14, 2017. https://ww3.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf.

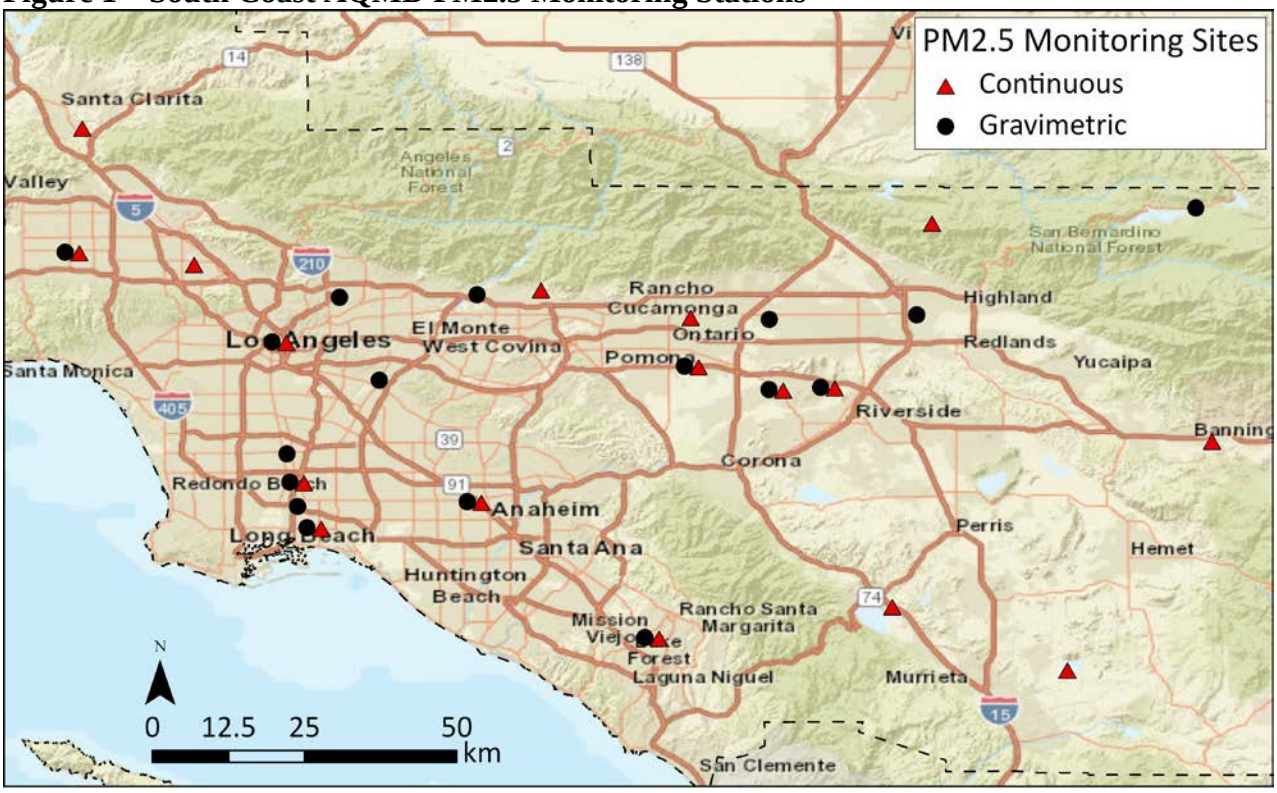
14 National Oceanic and Atmospheric Administration https://www.noaa.gov/ is a federal agency providing weather forecasts.

Figure 1 shows the location of PM2.5 monitoring stations in the Basin. PM10 and PM2.5 concentrations are monitored throughout the South Coast AQMD by samples collected on quartz or Teflon filters in samplers with size selective inlets. These are known as the Federal Reference Methods (FRMs) and shown as gravimetric in Figure 1. Some stations also have continuous PM10 and/or PM2.5 measurements, using either Beta Attenuation Monitor (BAM) or Tapered Element Oscillating Microbalance (TEOM) instrumentation. This data is available in real-time and is used for air quality forecasting and public reporting of current conditions. Where the continuous BAM or TEOM PM10 monitors have been certified by U.S. EPA to be Federal Equivalent Methods (FEM), the continuous PM10 data is averaged for the 24-hour period (midnight to midnight) and used for comparison to the standards on days when a valid FRM filter measurement was not collected. For PM2.5, there can be significant differences between the FEM and FRM results that have been recognized by national assessments of the technologies. South Coast AQMD measures FRM PM2.5 on a daily basis at the critical stations in the Basin and does not use the continuous PM2.5 data to compare to the NAAQS for attainment purposes.

Hourly forecasts provide more detailed information about pollution levels throughout the day. This can be useful, for example in planning out what time of the day would be best for outdoor activities. For regulatory purposes however, a daily average forecast is used. The proposed rule amendments include a definition for the daily PM2.5 air quality forecast as the predicted ambient average PM2.5 concentration, for the entire consecutive 24-hour period, beginning at midnight of the current day and spanning the entire time period which ends on the following midnight. This is to distinguish the annual from the hourly PM2.5 forecast which is provided for informational purposes only. Both hourly and daily Basin forecasts can be found on the South Coast AQMD website at: http://www.aqmd.gov/forecast.

Compliance with the annual PM2.5 NAAQS is determined using a three (3) year average of the annual mean PM2.5 ambient concentrations at the monitoring station with the highest average. Compliance determination for the 24-hour standard is evaluated using the highest Design Value (DV). The DV is defined as the 98th percentile of the 24-hour average concentrations measured in a year, averaged over a consecutive three (3) year term. In both cases the monitoring site with the highest measured values in an area is used for compliance purposes. Air quality forecasts are generated on the SRA level with models that are trained with monitoring data. However, not all SRAs contain a PM2.5 monitoring station/equipment, in which case the forecast is interpolated.

Figure 1 – South Coast AQMD PM2.5 Monitoring Stations



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

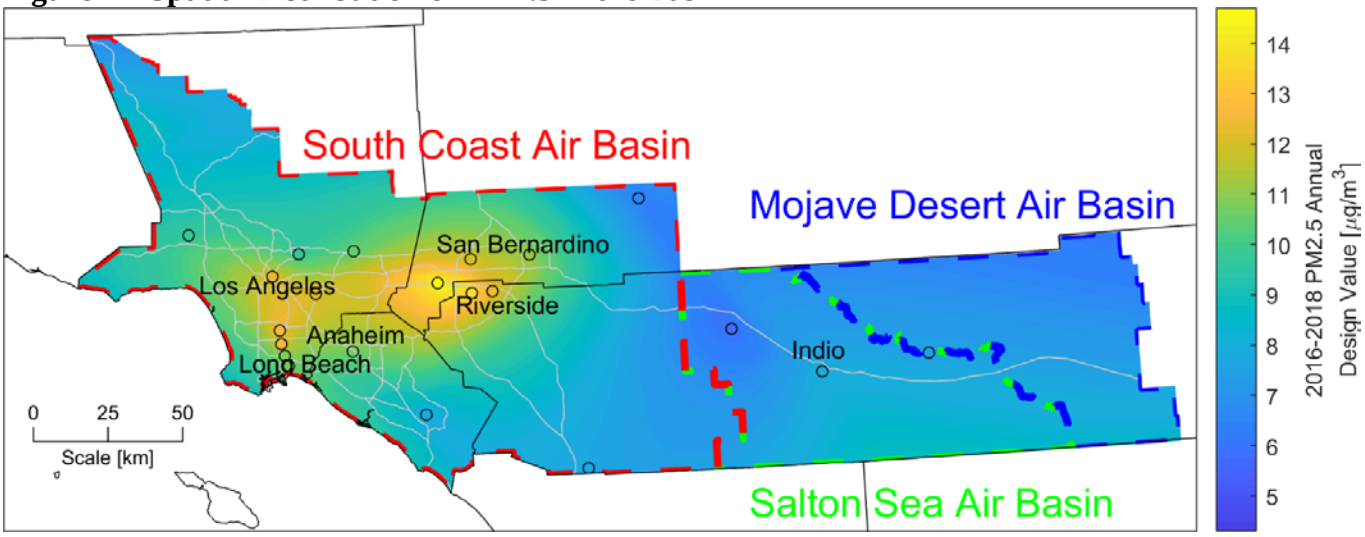
PM2.5 concentrations are generally higher in the inland valley areas of Metropolitan Riverside County and San Bernardino County. These higher PM2.5 concentrations are mainly due to the secondary formation of smaller particles resulting from emissions of precursor gases (NOx, SOx, NH3, VOC) that are converted to particulate matter in the atmosphere. Atmospheric chemistry and dispersion are a strong function of topography and weather, leading to strong geographic variations in PM2.5 concentrations. The geographical distribution of PM2.5 precursor emissions also govern PM2.5 concentration variations throughout the Basin. Figure 2 shows the distribution of annual average PM2.5 concentrations in the Basin. This figure shows peak annual average concentrations for the Basin in the Metropolitan Riverside area where transport and secondary chemical processes are most important. It also shows another peak in the most urbanized portions of Los Angeles area due to the emissions from abundant motor vehicle sources.

PM2.5 levels have decreased dramatically in the Basin since 1999; however, design value concentrations are still above the current annual 24-hour NAAQS. In 2018, the 24-hour PM2.5 NAAQS was exceeded on 19 days in the Basin. In 2019, there were 12 exceedance days.[15] Because the highest PM2.5 concentrations typically occur during the rainy-season, design values are heavily dependent on the frequency of wintertime storm systems, which increase ventilation and remove PM when rainfall is present. PM2.5 concentrations are also significantly influenced by wildfire smoke, which can be transported across wide distances. Currently, PM2.5 monitors do not

[15] Based on preliminary filter data.

attain the 24-hour standards in Compton and Mira Loma, based on preliminary 2017-2019 design values. However, the average of the 2019 and 2020 98th percentile concentrations (two-thirds of the data used to calculate the 2018-2020 design value) are below the federal standard at all locations. The CA-60 near road site in Ontario, Mira Loma, Compton, Rubidoux, and the CA-710 near road station in Long Beach do not meet the annual PM2.5 standard, based on preliminary 2017-2019 design values.[16] The Basin's peak annual average PM2.5 level in 2019 of 12.8 $\mu g/m^3$ (preliminary data) at the Ontario-60 near road site was lower than its 2018 value of 14.5 $\mu g/m^3$.

Figure 2 – Spatial Distribution of PM2.5 in the Basin



RULE 445

Current provisions of Rule 445 control PM2.5 wood smoke emissions from wood burning devices through several mechanisms. These include:

- New developments: prohibiting the installation of wood-burning devices in developments where construction began after March 9, 2009.
- Existing developments: by limiting the sale and installation of wood burning devices to:
  - U.S. EPA certified wood-burning heater,
  - pellet-fueled wood burning heater,
  - masonry heater, or
  - dedicated gaseous-fueled fireplace insert.
- A prohibition against the burning of any product not intended for use as a fuel (e.g., trash, plastics, rubber products and treated wood),
- Sale of only seasoned wood fuel (20 percent or less moisture content by weight) by commercial wood-based fuel sellers between July 1 through the end of February of the following year,
- A labeling requirement for commercial firewood sellers to affix an indelible label to each package of firewood advising at a minimum that there are times during the year when there may be a restriction on product usage. The label or alternatively other form of written

16 Data collected during exceptional events such as wildfires and Independence Day fireworks are removed when calculating design values.

material provided must also list the No-Burn toll-free number and www.8774NOBURN.org website address. This advisory is intended to let the consumer know that on Currently, Rule 445 defines the wood burning season as any of the days beginning November 1, through to the last day in February of the following year, and

- "No-Burn" day: a prohibition on operating an indoor or outdoor wood-burning device, portable outdoor wood-burning device, or wood-fired cooking device during the wood-burning season (November 1 through February of the following year) on days when the PM2.5 ambient concentration is forecast to exceed specific thresholds. Rule 445(c)(6) specifies the conditions for wood-burning curtailment or No-Burn days as follows:

MANDATORY WINTER BURNING CURTAILMENT

(A) Means any calendar day or consecutive calendar days during the wood burning season so declared to the public by the Executive Officer when ambient levels of particulate matter of 2.5 microns in size or less (PM2.5) is forecast to exceed 30 $\mu g/m^3$ for a specific source/receptor area.

(B) Applies to the entire South Coast Air Basin whenever a PM2.5 level of greater than 30 $\mu g/m^3$ is predicted for a source receptor area containing a monitoring station that has recorded a violation of the federal 24-hour PM2.5 National Ambient Air Quality Standard for either of the two previous three-year design value periods. The design value is the three-year average of the annual 98th percentile of the 24-hour values of monitored ambient PM2.5 data.

Dedicated gaseous fueled fireplaces or electric powered devices are exempt from the provisions of Rule 445. Additional exemptions exist where there is no natural gas service within 150 feet of the property line, locations 3,000 feet or higher above mean sea level, when the device is the sole source of heat, when the device is in low income households, and for ceremonial fires, as defined in the Rule 444 – Open Burning.

CONTINGENCY MEASURES

The federal CAA requires areas not attaining the NAAQS to develop and implement an emissions reduction strategy that will bring the area into attainment at the soonest practicable time, but not later than statutory attainment deadlines[17]. For the South Coast AQMD, this strategy is set forth in the 2016 AQMP. In addition to existing rule requirements such as Rule 445, contingency control measures in AQMPs are designed as backstop measures to be promulgated in the event that a Basin is fails or is likely to fail in attaining a NAAQS or comply with regulatory requirements by the applicable due dates. Control Measure BCM-09 – Further Emission Reductions From Wood-Burning Fireplaces and Wood Stoves is a PM2.5 specific contingency control measure in the 2016 AQMP.

Pursuant to 40 CFR § 51.104(a) - Contingency Measure Requirements (CFR):

(a) The state must include as part of each attainment plan submitted under this subpart for a PM2.5 nonattainment area specific contingency measures that shall take effect with minimal further

17 CAA Section 172.

action by the state or the EPA following a determination by the Administrator that the area has failed:

(1) To meet any RFP requirement in an attainment plan approved in accordance with § 51.1012;
(2) To meet any quantitative milestone in an attainment plan approved in accordance with § 51.1013;
(3) To submit a quantitative milestone report required under § 51.1013(b); or,
(4) To attain the applicable PM2.5 NAAQS by the applicable attainment date.

(b) The contingency measures adopted as part of a PM2.5 attainment plan shall meet all of the following requirements:
(1) The contingency measures shall consist of control measures that are not otherwise included in the control strategy or that achieve emissions reductions not otherwise relied upon in the control strategy for the area; and,
(2) Each contingency measure shall specify the timeframe within which its requirements become effective following a determination by the Administrator under paragraph (a) of this section.
(3) The attainment plan submission shall contain a description of the specific trigger mechanisms for the contingency measures and specify a schedule for implementation.

CAA Section 172(c)(9) requires contingency measures in the event that an area fails to meet reasonable further progress (RFP) milestones or to attain the national primary ambient air quality standard by the attainment date. U.S. EPA implementing regulations for particulate matter require that these contingency measures take effect with minimal further action following a determination by the U.S. EPA that the area has failed: (1) to meet any approved RFP requirement, (2) to meet any approved quantitative milestone, (3) to submit a required quantitative milestone report, or (4) to attain the standard by the applicable attainment date.[18] Table 4 below provides a summary and analysis of potential control measures, including suggestions in BCM-09 for contingency measures for achieving further direct PM2.5 emissions reductions:

[18] 40 CFR 51.1014(a).

Table 4 – Summary and Analysis of Potential Control Measures

Potential Control Measure	Analysis
Allow for year-round wood-burning curtailment mirroring Bay Area Air Quality Management District (BAAQMD) provisions	Rule 445 defines the Wood-Burning Season as any of the days beginning on November 1 and running through to the end of February in the following year. Due to the temperate climate of the region, about 70% of wood smoke in the Basin is emitted on typically colder days during the wood-burning season. Use of wood-burning devices at other times is generally limited to ambience purposes. There is some wood smoke in the "shoulder months" of March and October, but it is unlikely that the additional wood smoke during these months would be sufficient to cause an exceedance as total PM2.5 concentrations are much lower than during the wood-burning season.
Requiring that no person sell or transfer real property without assuring that any installed wood-burning heater meets the latest U.S. EPA certification, is a previously exempted wood pellet stove or that it is rendered permanently inoperable mirroring San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) Rule 5.2.2	Currently the rule only allows existing fireplaces to be repaired in order to prevent health or safety impacts. Extending the requirement to removal of non-compliant wood-burning devices upon the sale or transfer of any real property in the Basin would be resource prohibitive. Most wood-burning devices are for ambience purposes and all devices are already required to curtail on No-Burn days. Staff is also looking to expand the existing incentive program for voluntary conversion of existing fireplaces to approved wood-burning devices, natural gas fueled or electric units.
Including a visible emissions/opacity limitation similar to SJVAPCD Rule 5.2.2	Rule 445 currently mandates the use of Seasoned Wood in wood-burning devices and also prohibits the burning of materials not intended to be used as a fuel for wood burning devices. These two provisions are designed to avoid the use of "wet" wood or other materials such as for example treated wood that smoke excessively. In addition, sources can be cited pursuant to existing Rule 401- Visible Emissions and/or Rule 402 – Nuisance (where odor complaints are made about wood-smoke). The visible emissions prohibition in SJVAPCD Rule 1420 mirrors the provisions of South Coast AQMD Rule 401 with both specifying Ringelmann 1 and/or 20% opacity.

Potential Control Measure	Analysis
Including unseasoned wood to the list of banned fuels	The sale of unseasoned firewood in the Basin is only allowed during the months of March through to the end of April. This provides sufficient time for the wood to season. Only seasoned firewood may be sold at other times during the year. Since the majority of wood-burning devices are used for ambience purposes in the Basin and there is a ban on selling unseasoned wood during most of the year, adding unseasoned wood to the list of non-fuel products is unnecessary. In addition, the properties of unseasoned wood such as excessive smoking and low heat output do not lend to its being used as a fuel.
Including a trigger for the annual PM2.5 standard	The total number of No-Burn days forecast after triggering the provisions of the initial contingency measure (at 30 $\mu g/m^3$ for any SRA) are estimated to exceed the number based on an annual design value. As such an annual design value exceedance threshold would lead to a lower number of forecast No-Burn days.
Recommend specifying that only currently certified U.S. EPA wood-burning heaters may be installed in developments over 3,000 feet or higher above mean sea level.	Proposed amendments would maintain the exclusion from Rule 445 applicability to areas of the Basin located 3,000 feet or higher above mean sea level. There have been no exceedances of the 24-hour PM2.5 standard in the last several years in geographic areas located 3,000 feet or higher above mean sea level and emissions modeling shows measurable emissions reductions without including emissions from wood-burning devices located in these areas.
Recommend specifying that only currently certified U.S. EPA wood-burning heaters may be installed in developments where there is no natural gas service within 150 feet of the property line	U.S. EPA certified wood-burning heaters are significantly more efficient, however prices can range anywhere from $2,000 to $4,000 per unit and require professional installation. Natural gas service is generally available in the more densely populated regions of the Basin, so that this will likely not be a cost-effective requirement or a significant source of emissions reductions[19]. Staff is considering expanding the existing Fireplace and Wood Stove Change Out incentive program to include additional zip codes. The program currently provides qualified applicants between $200 to $2,000 towards the purchase and installation of an approved wood-burning or gaseous-fueled device that replaces an existing fireplace[20].

19 https://www.socalgas.com/stay-safe/pipeline-and-storage-safety/natural-gas-pipeline-map.

20 South Coast AQMD. Wood Stove & Fireplace Change-Out Incentive Program http://www.aqmd.gov/home/programs/community/community-detail?title=wood-device-incentive-program.

Potential Control Measure	Analysis
Reducing the forecast threshold for No-Burn days to 20 µg/m^3 mirroring the San Joaquin Valley Unified Air Pollution Control District SJVUAPCD Rule 1409 5.7.1	The rule amendments primarily impact residential wood-burning and will provide significant emission reduction at the proposed limits. Most wood-burning in the Basin is for ambience purposes and a 20 µg/m^3 threshold would be cost prohibitive with little cost-benefit.

PROPOSED AMENDMENTS TO RULE 445

Based on the analysis of the potential control measures above the proposed amendments incorporate the requirements of the CFR as follows:

- Subsequent to rule adoption by the Governing Board contingency provisions will automatically take effect upon a final determination of either a failure to attain or a failure to comply with requirements in subdivision (f) of the proposed rule;
- Control measures under the proposed rule achieve emissions reductions not otherwise relied upon in the current control strategy by incrementally lowering the No-Burn day threshold with both incremental and cumulative emissions reductions quantified;
- There are specific trigger mechanisms for the proposed contingency measures and the schedule for implementation in subdivision (f)(1) of the proposed rule which lists the four (4) requirements or contingency measure triggers (A) through (D) pursuant to 40 CFR § 51.104(a). There is no set order in which these contingency triggers may potentially be activated. However, as each contingency trigger is activated the increasingly more stringent Basin-wide No-Burn thresholds in subdivisions (f)(2)(A) through (D) are automatically implemented. Based on the proposal, and upon the final determination by U.S. EPA of a failure by South Coast AQMD to attain the 24-hour PM2.5 standard by the December 31, 2019 attainment date the first proposed contingency measure would be automatically triggered. While failing to "attain the applicable PM2.5 NAAQS by the applicable attainment date" is the fourth contingency trigger (D) in subdivision (f)(1) when the final determination of failure with the provision is made it triggers the first contingency measure (A) in subdivision (f)(2).
- The first contingency measure automatically lowers the ambient PM2.5 24-hour forecast threshold for calling a No-Burn day from the current 30 to the more stringent 29 µg/m^3. Staff does not anticipate any additional contingency triggers in subdivision (f)(1) will be activated, however, upon a final determination by U.S. EPA of a failure to attain any second requirement the next most stringent contingency measure would be triggered. As an example, assume that subsequent to triggering the initial contingency measure at 29 µg/m^3, there is a final determination of a failure to "meet any RFP requirement in an attainment plan approved in accordance with §51.1012" pursuant to subparagraph (f)(1)(A) which is the first trigger in subdivision (f)(1) of the proposed rule. This event would trigger the second, and next most stringent, contingency measure in subparagraph (f)(2)(B) automatically lowering the ambient PM2.5 24-hour forecast threshold for calling a No-Burn day from 29 to 28 µg/m^3. Any subsequent, third, final determination of a failure to comply would trigger the third and next most stringent 27 µg/m^3 forecast threshold and in the unlikely event that a fourth final determination of a failure to comply with any of the

contingency triggers is made the forecast threshold would automatically be lowered to 26 µg/m^3.

Staff is proposing to strengthen the mandatory burning curtailment provision of the rule in order to achieve additional PM2.5 emission reductions from the operation of wood-burning devices. The proposed amendments would generally reduce emissions by decreasing the number of No-Burn days and expanding the affected geographic area thereby decreasing both the number of days and number of wood-burning devices allowed to operate during the wood-burning season (defined as November, 1 through to the last day in February of the following year). Proposed amendments to Rule 445 are as follows:

(c)(3) - Daily PM2.5 Air Quality Forecast	This definition clarifies that for the purposes of Rule 445 a daily PM2.5 ambient concentration is used for forecasting whether a No-Burn day should be declared. Also, that this daily forecast is based on an average forecast modeled using a 24 consecutive hour period from midnight to the subsequent midnight. Once forecast the daily forecast number remains static. Conversely, the hourly PM2.5 forecast may vary hourly depending on ambient conditions. The hourly air quality forecast may be used to for example better determine optimal times for exercising or other outdoor activities on any given day whereas the daily PM2.5 ambient concentration is used for the purpose of forecasting No-Burn days pursuant to Rule 445. Text: DAILY PM2.5 AIR QUALITY FORECAST means the predicted ambient <u>average</u> PM2.5 concentration, <u>for</u> the <u>entire consecutive</u> 24-hour period,-<u>beginning at</u> <u>midnight of the current day</u> <u>and ending upon the subsequent</u> midnight.
(c)(6) - Mandatory Winter Burning Curtailment [This provision of the rule is moved from the definitions to the implementation section of the rule]	Mandatory wood-burning curtailment provisions are currently covered in subdivision (e) of Rule 445. Since this provision is a rule requirement related to ambient PM2.5 concentration threshold triggers it is removed from the definitions section and dove-tailed into the existing mandatory wood-burning curtailment provision in subdivision (e). In addition, this re-write facilitates having all the requirements for the mandatory wood-burning curtailment program in one rule subdivision that immediately precedes the proposed subdivision on contingency measures, and to which for contingency purposes subdivision (e) refers. Text: ~~MANDATORY WINTER BURNING CURTAILMENT~~ ~~(A) Means any calendar day or consecutive calendar days during the wood burning season so declared to the public by the Executive Officer when ambient levels of particulate matter of 2.5 microns in size or less (PM2.5) is forecast to exceed 30 µg/m3 for a specific source/receptor area.~~ ~~(B) Applies to the entire South Coast Air Basin whenever a PM2.5 level of greater than 30 µg/m3 is predicted for a source receptor area containing a monitoring station that has recorded a violation of the federal 24-hour PM2.5 National Ambient Air~~

	~~Quality Standard for either of the two previous three-year design value periods. The design value is the three-year average of the annual 98th percentile of the 24-hour values of monitored ambient PM2.5 data~~
(c)(12) – PM2.5	The definition of PM2.5 previously contained in the definition of Mandatory Winter Burning Curtailment as a parenthetical is re-written as a stand-alone definition. The definition and meaning of PM2.5 remain unchanged. Text: PM2.5 means particulate matter with an aerodynamic diameter less than 2.5 microns.
(c)(16) – Source Receptor Area (SRA)	Formally defines source receptor in the rule. The map shown in the proposed rule as Attachment 1 is listed in this report as Appendix B. Text: SOURCE RECEPTOR AREA (SRA) means any of the general forecast/air monitoring areas in the South Coast AQMD as shown on the map in Attachment 1.
(e) – Wood-Burning Season Mandatory Burning Curtailment	Subsequent to a determination by U.S. EPA, pursuant to 40 CFR § 51.104(a) of non-attainment with either a referenced PM2.5 standard or reporting requirement the No-Burn day parameters in contingency subdivision (f) of the proposed rule become effective. Note that the current rule only requires curtailment in the SRA for which an exceedance is forecast if there is no DV exceedance. However, it has proven to be difficult to call an SRA only No-Burn day, therefore the rule is being amended to call a Basin-wide No-Burn day in all cases of a threshold exceedance. The proposed contingency measures will continue the trend of increased emissions reductions as discussed below. The term "winter" is removed since in the Basin this is a period of time that spans mid-December through mid-March while the Wood-Burning Season runs from November 1 thru to the end of February. Clarification is provided that provisions of the rule are not applicable in areas located higher than 3,000 feet above mean sea level.

	Text: Wood-Burning Season Mandatory ~~Winter~~ Burning Curtailment No person shall operate an indoor or outdoor wood-burning device, portable outdoor wood-burning device, or wood-fired cooking device on a calendar day during the wood-burning season so declared to the public by the Executive Officer to be a mandatory ~~winter~~ wood-burning curtailment day ~~during the wood-burning season when a mandatory winter burning curtailment~~ based on the specified geographic area and applicable daily PM2.5 air quality forecast threshold for the specified geographic area, 3,000 or less feet below mean sea level and applicable daily PM2.5 air quality forecast as follows: ~~is forecast for the specific region where the device is located, or on a Basin-wide basis as defined in paragraph (c)(6).~~ (1) Basin-wide if the daily PM2.5 air quality forecast for any source receptor are exceeds 30 µg/m^3, or ~~(2) the entire South Coast Air Basin whenever the daily PM2.5 air quality forecast exceeds 30 µg/m3 for a Source Receptor Area (SRA) containing a monitoring station that has recorded a violation of the federal 24-hour PM2.5 National Ambient Air Quality Standard for either of the two previous three-year design value periods. The design value is the three-year average of the annual 98th percentile of the 24-hour values of monitored ambient PM2.5 data, or~~ (3) subsequent to a determination by U.S. EPA, pursuant to 40 CFR § 51.104(a) of non-attainment with either a referenced PM2.5 standard or reporting requirement; the applicable daily PM2.5 air quality forecast threshold for the specified geographic area as set forth in subdivision (f) Contingency Measures.
(f) – Contingency Measures	Under the current rule provisions, a Basin-wide No-Burn ban is only declared if an exceedance is forecast for an SRA that contains a monitor that has not met the 24-hour PM2.5 standard over the past two immediately preceding 3-year periods. The region shown on the map in Appendix B has historically been divided into 41 Source Receptor Areas (SRAs), of which SRAs 1 through 38, with the exception of 14 are within the Basin. A small number of SRA's such as 12, 23 and 33 typically have had design values that have not-attained the 24-hour standard over the two immediately preceding design value periods. A fair number of exceedances are often forecast for other SRAs which based on the current rule language would trigger a curtailment in the SRA-only. Table 5 shows that under the current rule, about a fifth of the time the SRA would be required to curtail: **Table 5 – Exceedances in DV and non-DV Monitor SRAs**

Year	Number of DV Exceedance Days	Number of SRA (non-DV) Exceedance Days	SRA Only Percentage
2017	19	6	24%
2018	24	6	20%

	<table><tr><td>2019</td><td>17</td><td>4</td><td>19%</td></tr></table> The proposed amendments would strengthen the No-Burn provision by expanding the geographic area impacted from individual SRAs to Basin-wide in all cases when any SRA, regardless of design value exceedance, is forecast to exceed the compliance threshold. In addition to expanding the geographic area the triggering threshold for forecasting a No-Burn day would be lowered incrementally based on missed millstones or attainment dates as specified in 40 CFR § 51.104(a). Proposed amendments to Rule 445 would increase the scope and expected number of mandatory winter wood-burning curtailment days, based on either a failure to attain the PM2.5 24-hour or annual average NAAQS, or upon a failure to meet any associated reporting requirements, by the applicable due dates. Text: f) Contingency Measures (1) Upon the issuance of a final determination by U.S. EPA, pursuant to 40 CFR §51.104(a), that the South Coast Air Basin has failed to comply with the following requirements by the applicable date to: (A) meet any Reasonable Further Progress (RFP) requirement in an attainment plan approved in accordance with §51.1012; (B) meet any quantitative milestone in an attainment plan approved in accordance with §51.1013; (C) submit a quantitative milestone report required under §51.1013(b); or, (D) attain the applicable PM2.5 NAAQS by the applicable attainment date, (E) the contingency measure(s) specified in paragraph (f)(2) shall be implemented, sequentially and in the order of stringency. (2) A Basin-wide, mandatory wood-burning curtailment during the wood-burning season if the daily PM2.5 air quality forecast for any SRA exceeds: (A) 29 µg/m^3, upon a final determination of a failure to comply with any of the provisions of paragraph (f)(1); (B) 28 µg/m^3, upon a final determination of a failure to comply with any two of the provisions in paragraph (f)(1) (C) 27 µg/m^3, upon a final determination of a failure to comply with any three of the provisions in paragraph (f)(1) (D) 26 µg/m^3, upon a final determination of a failure to comply with any four of the provisions in paragraph (f)(1).
(g) - Exemptions	Clarification that the exemption reference remains unchanged due to the relabeling of subdivision (f) to (g) and that there are no other changes in exemptions in relation to subdivision (f)

	Text: (7) The provisions of subdivisions (e) and (f) shall not apply under the following circumstances
Other	Other minor amendments include typographical corrections and clarifications (e.g., wood burning is corrected to wood-burning).

EMISSION REDUCTION

Appendix A provides a detailed methodology for the estimated PM2.5 emission reductions from the proposed rule. The methodology is based on a statistical analysis of relevant historical daily PM2.5 concentrations in the Basin. Since Rule 445 prohibits the installation of wood-burning devices in new construction, and wood-burning devices already installed have significantly extended useful lifetimes, the baseline emissions from the 2016 AQMP are used to estimate the emission reductions for the proposed amended rule. The methodology evaluates the additional PM2.5 emission reductions associated with the Basin-wide curtailment as well as the increased number of No-Burn days as the curtailment threshold is lowered. Table 5 of Appendix A shows the additional emission reductions from the Basin-wide curtailment at 30 $\mu g/m^3$ and for each proposed decrease in the curtailment threshold. The current rule only requires curtailment in the specific SRA for which the daily PM2.5 air quality is forecast to exceed 30 $\mu g/m^3$. Basin-wide curtailment is only required if the exceedance is forecast for an SRA containing a monitoring station that has recorded a violation of the federal 24-hour PM2.5 National Ambient Air Quality Standard for either of the two previous three-year design value periods[21]. Under the proposed amendments, the curtailment will be implemented Basin-wide when daily PM2.5 air quality forecast for any SRA exceeds 30 $\mu g/m^3$, due to potential difficulties with SRA-specific outreach. The emission reduction from the current rule provisions is estimated to be 139.7 TPY. The Basin-wide curtailment at the current threshold of 30 $\mu g/m^3$ instead of SRA-specific curtailment in the proposed amendment will result in an additional 25.4 TPY. After triggering the first contingency measure the curtailment threshold will automatically decrease to 29 $\mu g/m^3$ resulting in an estimated addition emission reduction of 46.3 TPY. While it is not anticipated that any additional contingency measures will be triggered, if that occurs, additional emission reductions are anticipated as the curtailment threshold is lowered as shown in Table 5 of Appendix A.

AFFECTED SOURCES

An estimated 1.4 million[22] wood-burning devices are subject to the provisions of Rule 445. The number of affected sources is not anticipated to change greatly since wood-burning devices have lengthy useful lifetimes and Rule 445 prohibits the installation of wood-burning devices in new developments. Rather it is anticipated that the proposed amendments will decrease the number of days that the devices can be operated resulting in emissions reductions.

[21] Design value is the three-year average of the annual 98th percentile of the 24-hour values of monitored ambient PM2.5 data.

22 James E. Houck and Brian N. Eagle, "Residential Wood Combustion Emission Inventory South Coast Air Basin and Coachella Valley Portion of Salton Sea Air Basin 2002 Base Year" Based on a 2002, www.omni-test.com, October 24, 2006, http://www.omni-test.com/publications/SCAQMD-RWC4.pdf.

No additional costs are expected to be incurred. Provisions of the proposed amended rule would extend the prohibition on use of wood burning devices to additional days almost exclusively for ambience use of these devices. Wood burning devices that are the sole source of heat for a dwelling or structure are specifically exempted from the No-Burn mandate.

PUBLIC PROCESS

PAR 445 is being developed through a public process. A Public Workshop is scheduled for February 27, 2020, with close of comments on March 13, 2020 and the proposal is scheduled to be presented at the Stationary Source Committee on March 20, 2020.

SOCIOECONOMIC ASSESSMENT

A socioeconomic impact assessment will be conducted and released for public review and comment at least 30 days prior to the South Coast AQMD Governing Board Hearing which is anticipated to be heard on May 1, 2020.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Pursuant to the California Environmental Quality Act (CEQA) and South Coast AQMD's certified regulatory program (Public Resources Code Section 21080.5, CEQA Guidelines Section 15251(l) and South Coast AQMD Rule 110), the South Coast AQMD, as lead agency, is reviewing the proposed project to determine if it will result in any potential adverse environmental impacts. Appropriate CEQA documentation will be prepared based on the analysis.

DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY CODE SECTION 40727

Requirements to Make Findings California Health and Safety Code Section 40727 requires that prior to adopting, amending or repealing a rule or regulation, the South Coast AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing and in the staff report.

Necessity Proposed Amended Rule 445 is needed to promulgate contingency measures required to be put into effect should the South Coast Air Basin fail to attain the NAAQS for PM2.5, as required by Title 40 of the Code of Federal Regulations (CFR) Section 51.1014.

Authority The South Coast AQMD Governing Board has authority to adopt Proposed Amended Rule 445 pursuant to the California Health and Safety Code Sections 39002, 40000, 40001, 40440, 40702, 40725 through 40728, and 41508 and 40 CFR Section 51.1014

Clarity Proposed Amended Rule 445 is written or displayed so that its meaning can be easily understood by the persons directly affected by it. The addition of definitions will improve the clarity.

Consistency Proposed Amended Rule 445 is in harmony with and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations.

Non-Duplication Proposed Amended Rule 445 will not impose the same requirements as any existing state or federal regulations. The proposed amended rule is necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

Reference By adopting Proposed Amended Rule 445 the South Coast AQMD Governing Board will be implementing, interpreting or making specific the provisions of the Title 40 CFR 51.1014.

Appendix A - Emission Reductions Expected from the Rule 445 Amendment

1. Baseline Emissions

Annual average PM2.5 emissions developed for the 2016 AQMP were utilized to estimate reductions expected from the proposed amended Rule 445. Two emission categories subject to the rule are Residential Wood combustion for Wood Stoves and Fireplaces. The total PM2.5 emissions from the two categories are 4.944 tons per day in 2017 in annual average emissions. The rule baseline emissions do not change in future years due to full implementation of the current rule in year 2015.

The rule baseline emissions were allocated to each Source Receptor Area (SRA), using a spatial allocation factor which is developed based on the U.S. Census American Community Survey (ACS) data regarding fuel type used to heat households. ACS is conducted every year to update a portion of the population. Excluding mountainous areas with altitude higher than 3000 ft, the basin-wide total emissions subject to the rule is 4.416 TPD in annual average emissions.

Wood-burning season daily emissions were estimated using the methodology included in the South Coast AQMD staff report[1]. 69% of PM2.5 emissions is estimated to occur during wood-burning season months (November through February) according to CARB's temporal allocation factors[2]. In addition, a 75 percent compliance rate was assumed as indicated in the staff report. Table 1 below provides a step-by-step calculation of an average winter day emission.

Table 1. Estimate of 2017 Winter Day Emissions for Wood Burning Devices

2017 Annual Average Day (tons per day)	Emissions below 3000 ft altitude (tons per day)	Days per year	Annual Total Emissions (tons)	Percent of Emissions Occurring During Wood-Burning Season Months (%)	Wood-Burning Season Emissions (tons)	Number of Days in the Wood Burning Season (Nov to Feb)	Wood-Burning Season Daily Emissions (tons per wood-burning season day)
4.944	4.416	365	1611.84	69	1112.17	120	9.268

[1] South Coast AQMD Governing Board Agenda No. 37, March 7, 2008, Staff Report.

[2] CARB Methodology Updates: Residential Wood Combustion, 2015. Available at https://ww3.arb.ca.gov/ei/areasrc/fullpdf/full7-1_2011.pdf.

2. Emission Reductions from the Existing Rule

Rule 445, amended in March 2013, has two mechanisms to mandate residential wood burning curtailment. One is a curtailment for a specific SRA where the SRA is forecast to have PM2.5 higher than 30 μg/m^3. The other is a Basin-wide curtailment when an SRA which is forecasted to exceed 30 μg/m^3 of PM2.5 has recorded a violation of the federal 24-hour PM2.5 National Ambient Air Quality Standard (NAAQS) of 35 μg/m^3 for either of the two previous three-year design value periods. The design value (DV) is the three-year average of the annual 98th percentile of the 24-hour values of monitored ambient PM2.5 data. Federal Reference Method (FRM) data were used to determine DVs. During the two 3-year periods (2015-2017 and 2016-2018), three monitoring stations showed DVs exceeding 35 μg/m^3, the 2006 24-hour PM2.5 NAAQS. They are Compton, Mira Loma, and Freeway 60 near-road sites, located in SRA 12, 23 and 33, respectively.

Under the March 2013 amendment, if any of the three sites were forecasted to have a daily PM2.5 average higher than 30 μg/m^3, a Basin-wide curtailment would be triggered. Continuous PM2.5 measurements taken by Beta Attenuation Method (BAM) indicate that there are 79 days in which any of the three stations had high PM readings exceeding the threshold. Note that the District's daily air quality forecast, which wood burning curtailment is based on, utilizes BAM, not FRM. 79 occurrences in four years is equal to 19.75 day per year on average. The emission reductions from the 19.75-day Basin-wide curtailment are 137 tons per year (0.376 tons per day), using the wood-burning season-day average emission and 75% of compliance assumption.

Table 2. Reductions from Basin-wide curtailment

Wood-Burning Season Daily Emissions (Tons per Wood-Burning Season Day)	Number of Curtailment Days	Compliance Rate (%)	Total Reductions from the curtailment (Tons per Year)
9.268	19.75	75	137.3

While high PM2.5 levels were mostly recorded at the three monitors, 29 occurrences of an SRA specific exceedance were identified during the four-year period. This does not include the three SRAs that triggered the 79 days of Basin-wide curtailment. This SRA count is a cumulative accounting of all SRAs, except the three SRAs, including multiple SRAs on a single day.

Reductions from an SRA specific curtailment were estimated with SRA-specific emissions multiplied by the number of high PM days occurring at the specific SRA and 75% compliance rate. High PM day means that BAM reading of PM2.5 concentration is higher than 30 μg/m^3. For example, SRA4, South Coast LA, recorded 12 high PM days during the four-year period. PM2.5 emissions of 0.459 TPD allocated for SRA4 was multiplied by 3 days and 75% compliance to calculate reductions per year. Repeating the calculation for the 29 high PM occurrences, reductions due to an SRA specific curtailment is estimated to be 2.396 TPY in annual average emissions. Table 3 lists SRAs that recorded high PM days and its associated PM2.5 emissions.

Combining the basin-wide and SRA specific curtailments, total reductions from the existing rule are 139.7 TPY (0.376 TPD) in annual average emissions.

Table 3. Reductions Associated with Curtailment at an Individual SRA

	High PM Days per year (4-year Average)	Emissions below 3000ft Altitude per SRA (Tons per Year)	Wood-Burning Season Daily Emission per SRA (Tons per Day)	Reduction due to curtailment (Tons per Year)
SRA1	0.50	87.546	0.503	0.189
SRA2	0.25	76.252	0.438	0.082
SRA3	0.50	110.405	0.635	0.238
SRA4	3.00	79.863	0.459	1.033
SRA6	0.75	85.430	0.491	0.276
SRA7	0.50	78.287	0.450	0.169
SRA8	0.25	37.784	0.217	0.041
SRA13	0.25	22.508	0.129	0.024
SRA15	0.25	19.049	0.110	0.021
SRA16	0.25	29.930	0.172	0.032
SRA17	0.50	134.823	0.775	0.291
SRA29	0.00	12.934	0.074	0.000
Total	7.25	-	-	2.396

3. Emission Reductions from the Proposed Amendment

The proposed amendment includes four new measures to comply with the contingency measure requirements listed in 40 CFR § 51.1014(a). The following sections provides emission reductions associated with each of the measures.

According to (f)(2)(A) of the proposed amendment, an SRA-specific curtailment is suggested to expand to the entire Basin. BAM data taken in the last four-year period indicates 95 days that any SRA in the Basin exceeded the 30 $\mu g/m^3$ threshold. This would be 23.75 days of Basin-wide curtailment days per year, bringing approximately 165.1 TPY reductions, with 25.4 TPY net additional reduction from the existing rule.

Net additional emission reductions associated with subsequent lower thresholds are expected to be 20.9, 20.9 and 13.9 TPY for the curtailment thresholds of 29, 28 and 27 $\mu g/m^3$ respectively. These estimates are based on the number of high PM days exceeding the thresholds in the four-year

analysis period. Emission reductions from the curtailment were calculated with the average-wood-burning season daily emissions provided in Table 2 and 75% compliance assumption. The number of high PM days occurred during the four-year period are provided in Table 4. Net emission reductions expected from the proposed rule amendment are summarized in Table 5.

Table 4. Number of days exceeding proposed curtailment thresholds

Year	30 µg/m^3	29 µg/m^3	28 µg/m^3	27 µg/m^3	26 µg/m^3
2016	23	27	29	33	37
2017	24	26	30	31	33
2018	27	33	34	36	38
2019	21	21	26	27	30
Average	23.75	26.75	29.75	31.75	34.5

Table 5. PM2.5 emission reductions expected due to the proposed rule amendment (tons per year)

Category	Total Reduction	Additional Reductions beyond Current Rule	Incremental Reductions
Existing Rule	139.7		
Proposed amendment - Basin-wide expansion of 30 µg/m^3 threshold	165.1	25.4	25.4
Proposed amendment - Lowering Threshold to 29 µg/m^3	186.0	46.3	20.9
Proposed amendment - Lowering Threshold to 28 µg/m^3	206.8	67.1	20.9
Proposed amendment - Lowering Threshold to 27 µg/m^3	220.7	81.0	13.9
Proposed amendment - Lowering Threshold to 26 µg/m^3	239.8	100.1	19.1

APPENDIX B – Source Receptor Areas (SRAs)