SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Preliminary Draft Staff Report

Proposed Amended Rule 1138 – Control of Emissions from Restaurant Operations

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EXECUTIVE SUMMARY

The South Coast Air Basin Attainment Plan for the 2012 Annual $PM_{2.5}$ Standard (2024 PM2.5 Plan) was adopted on June 7, 2024, to assist in meeting state and federal air quality standards for fine particulate matter (PM2.5). Although the South Coast Air Basin (Basin) is in attainment with the 1997 PM2.5 National Ambient Air Quality Standard (NAAQS) and meets the 2006 PM2.5 NAAQS, it is a "serious" nonattainment area for the 2012 PM2.5 NAAQS. Proposed Amended Rule 1138 – Control of Emissions from Restaurant Operations (PAR 1138) focuses on reducing PM2.5 from restaurant operations to comply with the federal Clean Air Act (CAA) Most Stringent Measures (MSM) requirements for the 2012 PM2.5 NAAQS.

Rule 1138 was adopted on November 14, 1997, to reduce emissions from chain-driven charbroilers in commercial cooking operations by establishing emissions control and reporting requirements. Under the existing Rule, owners and operators of chain-driven charbroilers subject to Rule 1138 are required to operate chain-driven charbroilers equipped with control equipment certified by the South Coast AQMD or other control technology demonstrating combined PM and volatile organic compound (VOC) control efficiency of no less than 83% (as demonstrated by South Coast AQMD approved source testing protocol). Chain-driven charbroilers with a throughput of less than 875 pounds of meat cooked per week are exempt from the control technology requirements of Rule 1138.

PAR 1138 partially implements the 2024 PM2.5 Plan's Control Measure BCM-12: Further Emission Reductions from Commercial Cooking by lowering Rule 1138's exemption threshold from less than 875 pounds of meat cooked per week to less than 400 pounds of meat cooked per week, or, alternatively, less than 10,800 pounds of meat cooked per month while maintaining a weekly throughput of less than 875 pounds of meat cooked. PAR 1138 also aligns South Coast AQMD requirements for chain-driven charbroilers with similar regulations adopted by Bay Area Air District Regulation 6, Rule 2 – Commercial Cooking Equipment[1] and San Joaquin Valley Air Pollution Control District Rule 4692 – Commercial Charbroiling.[2] It is estimated that lowering the exemption threshold will reduce PM emissions by 0.05 ton per day.

[1] Bay Area Air District Regulation 6 Rule 2 – Commercial Cooking Equipment (2007): https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-6-rule-2-commercial-cooking-equipment/documents/rg0602.pdf

[2] San Joaquin Valley Air Pollution Control District Rule 4692 – Commercial Charbroiling (2018): https://ww2.valleyair.org/media/1ecbi4rm/r4692.pdf

CHAPTER 1 : BACKGROUND

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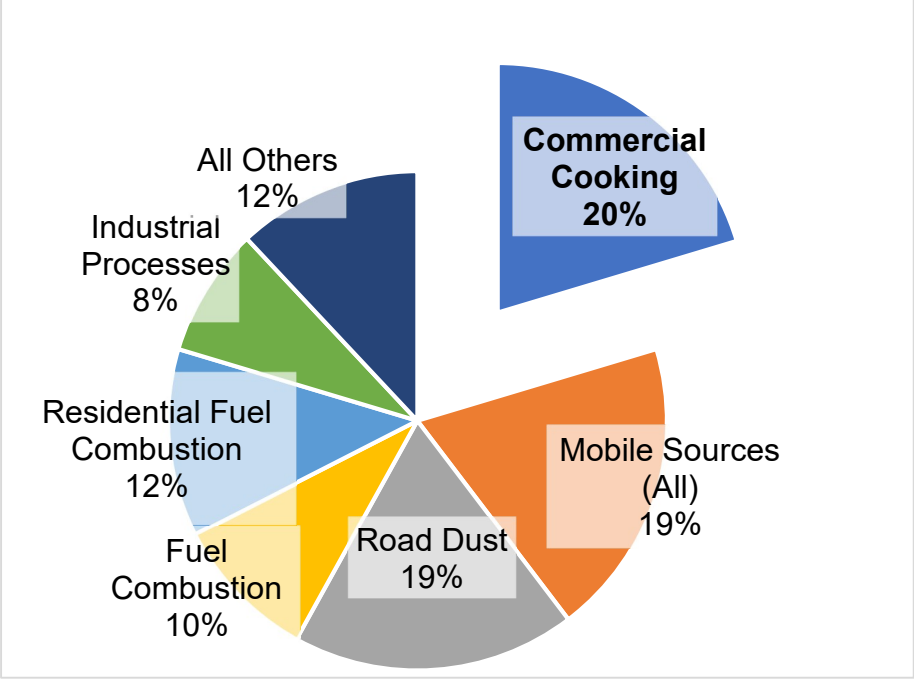
INTRODUCTION

South Coast AQMD is the regulatory authority with jurisdiction over the South Coast Air Basin and Coachella Valley. The region has the worst levels of ground-level ozone (smog) and among the highest levels of fine particulate matter (PM2.5) in the nation. PM2.5 is an air pollutant that is either directly emitted into the atmosphere (primary particles) or formed in the atmosphere through chemical reactions (secondary particles). Primary PM2.5 includes road dust, diesel soot, combustion products, and other sources of fine particles. Secondary PM2.5 particles, such as sulfates, nitrates, and complex organic compounds, are formed from reactions with oxides of sulfur (SOx), oxides of nitrogen (NOx), VOCs, and ammonia. Numerous studies have linked high levels of particulate air pollution with detrimental health effects such as respiratory and cardiovascular disease as smaller particles in the PM2.5 range can penetrate and deposit deep in lung tissue. PM2.5 can have adverse environmental outcomes such as reduced visibility, diminished water quality, and altered plant yield.[3] Top sources of directly emitted particulate matter (PM) are from area sources and include commercial cooking, paved road dust, and residential fuel combustion (see Figure 1-1). Commercial cooking emissions alone account for around 20% of total direct PM2.5 emissions in the region.[4]

Figure 1-1: Direct PM2.5 Emissions from Major Categories



Rule 1138 – Control of Emissions from Commercial Cooking Operations (Rule 1138), was adopted in November 1997 to reduce emissions from chain-driven charbroilers. Rule 1138 requires

[3] California Air Resources Board, Inhalable Particulate Matter and Health (PM2.5 and PM10), Accessed 2025, https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health

[4] South Coast Air Quality Management District, South Coast Air Basin Attainment Plan for the PM2.5 Standard, 2024, https://www.aqmd.gov/docs/default-source/clean-air-plans/pm2.5-plans/final-pm2.5-plan/2012-annual-pm2-5-plan.pdf

owners and operators of chain-driven charbroilers to install and operate emission control equipment certified by the South Coast AQMD. Certified emission control equipment must demonstrate control efficiency of 83% for PM and VOCs combined. Testing of control equipment must also adhere with South Coast AQMD-approved source test protocols[5].

FEDERAL CLEAN AIR ACT REQUIREMENTS

The South Coast Air Basin continues to exceed state and federal air quality standards for PM2.5. The CAA requires areas that do not meet NAAQS to develop and implement strategies to reduce emissions so that healthful levels of air quality can be achieved in a timely manner. The strategy or attainment plan, along with other supporting elements, must be submitted to the United States Environmental Protection Agency (U.S. EPA) for its review and approval into the State Implementation Plan (SIP). Nonattainment areas must develop State Implementation Plan(s) to attain NAAQS by specific dates or face the possibility of sanctions by the federal government and other consequences under the CAA. California also has air quality standards for PM2.5, and, under state law, the regional nonattainment area is required to attain those standards as expeditiously as practicable. On January 30, 2024, the U.S. EPA published its finding that California failed to submit a complete SIP by omitting certain required elements for the implementation of the 2012 NAAQS for PM 2.5 in the South Coast Air Basin. Consistent with CAA section 179(b), the U.S. EPA stated that emissions offset sanctions would apply if a complete SIP correcting the deficiencies was not submitted within 18 months. Subsequently, CARB sent a revised SIP addressing all the deficiencies identified by the U.S. EPA, which included a commitment to amend Rule 1138. On June 9, 2025, the U.S. EPA affirmatively found that the submitted revisions resulted in a complete SIP and terminated the federal sanction clock. This finding was made based on the commitment included in the revised SIP, including implementation of MSM such as PAR 1138.

The 2012 PM2.5 NAAQS level is set at 12 micrograms per cubic meter ($\mu g/m^3$). The South Coast Air Basin is classified as a "serious" PM2.5 non-attainment area for this standard, with an attainment date of December 31, 2025. In March 2023, South Coast AQMD withdrew the previous plan addressing the standard to avoid potential disapproval of the plan by U.S. EPA. Staff subsequently developed the 2024 PM2.5 Plan[6] that requests a five-year extension and demonstrates attainment of the standard by December 31, 2030. Under section 188(e) of the federal Clean Air Act, areas classified as serious non-attainment seeking an extension of the attainment date are required to demonstrate that the attainment plan includes MSM. U.S. EPA defines MSM as:

> *"The maximum degree of emission reduction that has been required or achieved from a source or source category in any other attainment plans or in practice in any other states and that can feasibly be implemented in the area seeking the extension."*

[5]South Coast Air Quality Management District, Determination of Particulate and Volatile Organic Compound Emissions from Restaurant Operations, 1997, https://www.aqmd.gov/docs/default-source/2021-pm-2.5-redesignation-request-maintenance-plan/protocol---determination-of-particulate-and-volatile-organic-compound-emissions-from-restaurant-operations.pdf?sfvrsn=3f229e61_2

[6] United States Environmental Protection Agency, Federal Register Vol. 85 No. 217, 2020, https://www.govinfo.gov/content/pkg/FR-2020-11-09/pdf/2020-23033.pdf

REGULATORY HISTORY

Control measures for emissions from the commercial cooking source category first appeared in the 1989 AQMP[7] as #88-C-3 – Control of Emissions from Commercial Charbroiling (PM10, VOC). In the 1991 AQMP,[8] emissions from this category appeared as A-C-4 - Control of Emissions from Deep-fat Frying (PM10, VOC). These control measures were combined in both the 1994[9] and 1997[10] AQMPs as PRC-03 – Control of Emissions from Restaurant Operations (PM10, VOC). PM is categorized as either PM10 or PM2.5 based on the size of the particles. PM10 are inhalable particles of 10 micrometers or less, of which PM2.5 is a subset with particle size of 2.5 micrometer or less.

In November 1997, the Governing Board adopted Rule 1138 to reduce emissions from chain-driven charbroilers by requiring installation of control equipment demonstrating combined PM and VOC control efficiency of 83%.

After the adoption of Rule 222 – Filing Requirements for Specific Emission Sources not Requiring a Written Permit Pursuant to Regulation II (Rule 222), at the September 11, 1998 Governing Board meeting, commercial charbroilers were included in the Rule 222 filing system.

In March 2002, San Joaquin Valley Air Pollution Control District (SJVAPCD) adopted Rule 4692 – Commercial Charbroiling (Rule 4692). This rule required catalytic oxidizers certified to reduce PM and VOC by at least 83% to be installed on all newly installed chain-driven charbroilers by June 21, 2002, as well as existing chain-driven charbroilers by March 21, 2003. In September 2009, SJVAPCD adopted an amendment to lower the exemption limit of Rule 4692 from 875 pounds per week of cooked meat to 400 pounds per week. To account for chain-driven charbroiler operators that may see seasonal activity peaks, the amendment added an alternative exemption limit of 10,400 pounds of cooked meat per 12-month period while maintaining less than 875 pounds per week.

In November 2007, the Bay Area Air District (BAAD) adopted Regulation 6, Rule 2: Commercial Cooking Equipment. This rule applies to anyone who owns, operates, or installs a chain-driven (conveyorized) charbroiler within a restaurant that purchases 500 pounds of beef or more per week. Chain-driven charbroilers in BAAD must be equipped with a catalytic oxidizer that limits emissions of PM10 and VOCs to no more than 1.3 lbs and 0.32 lbs, respectively, per 1000 lbs of beef cooked. Alternatively, a different control device may be used if the operator can demonstrate that it will limit PM10 emissions to no more than 0.74 lbs per 1000 lbs of beef cooked. This rule also has an exemption threshold of 400 pounds of beef per week based on a survey of their restaurants and cost-effectiveness calculation.

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[7] South Coast Air Quality Management District, Air Quality Management Plan Appendix IV-A: Stationary Source Control Measures, 1989

[8] South Coast Air Quality Management District, Air Quality Management Plan Appendix IV-A: Stationary Source Control Measures, 1991

[9] South Coast Air Quality Management District, Air Quality Management Plan Appendix IV-A, Stationary Source Control Measures, 1994

[10] South Coast Air Quality Management District, Air Quality Management Plan Appendix IV-A: Stationary Source Control Measures, 1997, https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/1997-air-quality-management-plan/1997-aqmp-appendix-iv(a).pdf

San Diego Air Pollution Control District (SDAPCD) announced initiation of rule development for Proposed New Rule 67.26 – Commercial Charbroiling Operations in 2024 and released the final staff report in March 2025. Since this proposed rule currently has a comparatively higher exemption threshold of 415 pounds of meat cooked per week, staff does not consider this rule as a MSM.[11]

THE NEED FOR PROPOSED AMENDED RULE 1138

The 2024 PM2.5 Plan[12] identifies the South Coast AQMD's stationary source attainment strategy through source-specific control measures. Control measure BCM-12: Further Emission Reductions from Commercial Cooking was initially included in the 2016 AQMP as BCM-01. The measure describes the strategy of seeking further direct reductions of PM2.5 emissions from commercial cooking facilities. In part, the control strategy is based on the 2024 PM2.5 Plan Most Stringent Measures analysis which is required to be conducted as part of the CAA for nonattainment regions.

Appendix III of the 2024 PM2.5 Plan outlines the methods that staff used to identify MSM by first looking for Potential Control Measures (PCMs) via analysis of Best Available Control Measure (BACM)/Best Available Control Technology (BACT). The demonstration generally involves an analysis of South Coast AQMD's control requirements as they compare to those in other jurisdictions. Other sources such as U.S. EPA guidance documents are also consulted. When South Coast AQMD's control requirements meet the BACM/BACT definition, no further analysis is required. When a regulation or control measure from another air basin or from U.S. EPA guidance is identified as more stringent than South Coast AQMD's regulation, the measure is analyzed for technological and economic feasibility.

From the list of identified PCMs based on the BACM/BACT analysis, staff applied the MSM criteria as specified in Appendix III of the 2024 PM2.5 Plan to identify potential MSMs. Some PCMs were rejected based on technological or economic infeasibility. Rule 1138 was one of the rules that passed both phases of this analysis with analogous rules in other air districts that can be seen in Table 1-1.

In line with existing regulations in nonattainment air districts, PAR 1138, seeks to implement MSM by lowering the exemption threshold for Rule 1138. As summarized in Table 1-1, regulations from BAAD Regulation 6, Rule 2 and SJVAPCD Rule 4692 were identified to have more stringent exemption thresholds than South Coast AQMD Rule 1138. To implement MSM, PAR 1138 will lower the existing threshold and provide two pathways for a chain-driven charbroiler to qualify for an exemption: 1) a throughput of less than 400 pounds of meat cooked per week; or 2) a throughput of less than 10,800 pounds of meat cooked per 12-month period and less than 875 pounds for any week within that 12-month period.

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[11] San Diego Air Pollution Control District, Proposed New Rule 67.26 – Commercial Charbroiling Operations & Corresponing Amendments to Rule 11,12, and 40, March 2025, https://www.sdapcd.org/content/dam/sdapcd/documents/rules/rule-workshops/041025/Rule-67.26-Staff-Report.pdf

[12] South Coast Air Quality Management District, Air Quality Management Plan Appendix IV-A: Stationary and Mobile Source Measures, 2024, https://www.aqmd.gov/docs/default-source/clean-air-plans/pm2.5-plans/final-pm2.5-plan/appendix-iv-a-control-measures.pdf

Table 1-1: Comparison of Regulations for Chain-Driven Charbroilers

Air District	Rule	Date Adopted/Amended	Exemption upper limit
South Coast AQMD	1138	11/14/1997	<875 pounds per week
Bay Area AD	Regulation 6 Rule 2	12/05/2007	<400 pounds per week (beef)
San Joaquin APCD	4692	06/21/2018	<400 pounds per week; or ≤10,800 pounds over 12 months and <875 pounds per week

AFFECTED INDUSTRY

To understand the universe of affected facilities under PAR 1138, staff obtained information on currently active restaurants and food service facilities from the health departments of four counties within South Coast AQMD's jurisdiction (Los Angeles, San Bernardino, Riverside and Orange County). Staff refined the received data by filtering out restaurants which do not contribute to cooking emissions (e.g. juice bars, prepackaged food stands) as well as those outside of the South Coast AQMD jurisdiction. As a result, staff were able to estimate that 33,360 commercial cooking facilities operate within the South Coast AQMD jurisdiction. Utilizing a Pacific Environmental Services, Inc. (PES) study,[13] staff engaged in a top-down approach to estimate the total number of chain-driven charbroilers affected by PAR 1138. The PES estimated that, on average, 3.73% of all commercial cooking facilities within South Coast AQMD utilize a chain-driven charbroiler. Additionally, it is estimated that, on average, each facility potentially utilizing chain-driven charbroilers statistically operate exactly one unit. Accordingly, staff estimated a total of 1,244 chain-driven charbroilers in operation within South Coast AQMD which would be subject to Rule 1138.

As additional research, staff analyzed submitted throughput data from charbroiler filings required by Rule 222 to better understand how many chain-driven charbroilers are exempt from Rule 1138 emission control requirements. From this analysis, 14.6% of all chain-driven charbroilers are currently exempt from Rule 1138, while 3.05% of chain-driven charbroilers are anticipated to be exempt from PAR 1138.

EQUIPMENT OVERVIEW

While this rule targets restaurant operations generally, the only equipment subject to emissions control requirements are charbroilers. Charbroilers are cooking devices that generally consist of a heating source, a high-temperature radiant surface, and a slotted grill. Underfired charbroilers are the most common type of charbroiler (e.g., grill charbroilers, flamebroilers, and direct-fired charbroilers); these units hold the meat on a slotted grill with the heat source (usually natural gas)

[13] Pacific Environmental Services, A Detailed Survey of Restaurant Operations in the South Coast Air Basin, Contract No. 98089, 1999

underneath in a fixed position. Underfired charbroilers are distinct from chain-driven charbroilers, which have conveyor belts carry meat through the heating area. Typically, chain-driven charbroilers broil the meat with simultaneous flames from above and below—producing lower PM and VOC emissions than under-fired charbroilers.

At the time of Rule 1138's initial adoption, under-fired charbroilers were found to be the primary contributor of emissions from restaurants. However, chain-driven charbroilers were the best candidates for emission reductions due to a lack of cost-effective emission controls for the under-fired category. Catalytic incineration for chain-driven charbroilers has since been added to the BACT guidelines.

The industry standard emissions control technology for chain-driven charbroilers are catalytic oxidizers. The catalytic oxidizer beds sit directly on top of the charbroiler units enclosed in a stainless-steel frame. They do not need utility hookups since exhaustive heat directs PM emissions through the oxidizer. Cleaning and maintenance involve rinsing the catalyst off with water on a daily to monthly basis per manufacturer recommendation. Installation is minimal and only requires hand tools.[14]

Staff contacted representatives for manufacturers of chain-driven charbroilers and their control devices who, combined, make up the majority of market share. According to manufacturers, catalytic oxidizers are unique to the manufacturer for a chain-driven charbroiler but not particular models. In other words, all chain-driven charbroiler units made by the same manufacturer can use the same catalyst regardless of year of manufacture. Due to this, all chain-driven charbroiler units are anticipated to be retrofittable. Maintenance across manufacturers only involves rinsing off the catalyst with water and (if the manufacturer recommends) soap, though the frequency of maintenance for a catalytic oxidizer may vary per manufacturer recommendation from nightly to monthly. Manufacturers state that, with proper maintenance, catalytic oxidizers should last the entire useful life of a chain-driven charbroiler unit. According to one manufacturer, a catalytic oxidizer is estimated to cost around $1,900 in 2025.

PUBLIC PROCESS

South Coast AQMD conducted Working Group Meetings on March 5, 2025, and April 17, 2025, where staff presented background information as well as proposed amendments with rule language. A Public Workshop is currently scheduled for July 2, 2025. Staff will continue to refine the proposal if necessary and plans to bring the proposed amended rule to the Stationary Source Committee which is scheduled for June 20, 2025, and to the South Coast AQMD Governing Board at the Public Hearing which is scheduled for September 5, 2025 (subject to change). Besides public meetings, staff conducted outreach to the California Restaurant Association (CRA) to discuss rule considerations and receive feedback on how Proposed Amended Rule 1138 may affect the restaurant industry. Staff additionally contacted manufacturers to better understand the costs of owning and operating chain-driven charbroilers and their associated control technologies. Staff

[14] South Coast Air Quality Management District, South Coast Air Basin Attainment Plan for the PM2.5 Standard Appendix VIII: California Environmental Quality Act, 2024, https://www.aqmd.gov/docs/default-source/clean-air-plans/pm2.5-plans/final-pm2.5-plan/appendix-viii---ceqa.pdf

conducted one site visit and was able to observe multiple chain-driven charbroilers in operation, providing an opportunity to understand typical operation and maintenance.

CHAPTER 2: SUMMARY OF PROPOSAL

Introduction

Overall Approach

INTRODUCTION

Rule 1138 reduces emissions from chain-driven charbroilers at restaurant operations by requiring owners and operators of chain-driven charbroilers to install and operate emission control equipment which meets minimum control efficiency as certified by South Coast AQMD. PAR 1138 was developed to lower the exemption threshold of Rule 1138 and implement MSM identified in the 2024 PM2.5 Plan as required by the U.S. EPA. Additional administrative amendments were included to remove legacy language for requirements with past-due implementation dates.

For this chapter, when referring to PAR 1138 specific terms that are defined in the rule language, the terminology will be capitalized.

OVERALL APPROACH

The rule title, applicability - subdivision (a), recordkeeping - subdivision (d), and test methods - subdivision (f) remain unchanged from Rule 1138 language.

Definitions – Subdivision (b)

The following definitions were removed from PAR 1138:

- *Existing Chain-Driven Charbroiler* – any Chain-Driven Charbroiler operating on or before November 14, 1997
- *New Chain-Driven Charbroiler* – any Chain-Driven Charbroiler initially installed and operated after November 14, 1997

These terms are used in Rule 1138 to distinguish Chain-Driven Charbroilers initially installed and operated prior November 14, 1997. This distinction was made to establish a 10-year grace period from the Rule's requirements for Existing Chain-Driven Charbroilers. Since the grace period ended long ago, these definitions can be removed without affecting compliance.

The definition for Meat, found in paragraph (b)(5) of PAR 1138, was revised to remove "fish" as a redundant term and to avoid confusion over the scope of "seafood." The Merriam-Webster's dictionary defines "seafood" as "edible marine fish and shellfish." The California Department of Public Health also lists the definition of "seafood" to include "all fish and fishery products intended for human consumption." Seafood also includes freshwater derivatives. As defined in the California Food and Agriculture Code Section 58623, "seafood" is, in principal part, "shellfish and every other form of animal or plant life which is taken from fresh or salt water and used for human consumption…" Accordingly, the use of the term "seafood" adequately covers fish, and all other edible marine and aquatic life, for the purposes of this rule.

Requirements – Subdivision (c)

Similar to Subdivision (b), paragraphs (c)(1) and (c)(2) from Rule 1138 are removed from PAR 1138 due to their relationship to the now-defunct grace periods.

Paragraph (c)(1) of PAR 1138 expands the applicability of Rule 1138 from New Chain-Driven Charbroilers to all Chain-Driven Charbroilers by removing references to grace period dates.

Paragraph (c)(3) of PAR 1138 requires owners and operators of Chain-Driven Charbroilers to submit equipment filings under Rule 222 and include applicable exemptions specified in subdivision (e). Since emission sources with a South Coast AQMD issued permit to operate is

exempt from Rule 222, paragraph (c)(3) does not conflict with the exemption option specified in paragraph (e)(1)(B).

Exemption – Subdivision (e)

Subparagraph (e)(1)(A) of PAR 1138 provides the new exemption thresholds that must be met. A Chain-Driven Charbroiler is exempt from paragraphs (c)(1), (c)(2), and (d)(1) if the unit has a throughput less than 400 pounds of meat weekly or, alternatively, 10,800 pounds of meat in any continuous 12-month period while maintaining less than 875 pounds of meat weekly. Paragraph (e)(1)(B) is retained from Rule 1138 language and provides an alternative exemption option for owners and operators of Chain-Driven Charbroilers demonstrating less than one pound per day of any criteria pollutant with the test method specified in subdivision (f) and accepting permit conditions supporting such emissions limit.

Paragraph (e)(2) gives existing owners and/or operators temporary exemption from the provisions of (c)(1), (c)(2), and (d)(1) if their throughput is less than 875 pounds of meat weekly. Owners and operators are only eligible for this exemption for a period of 12 months after the rule amendment date.

Evaluations – Previously Subdivision (f)

In Rule 1138, this subdivision requires the Executive Officer to evaluate Rule 1138 and provide a report to the Governing Board on its feasibility within 18 months of initial adoption. Given that this 18-month period expired over 20 years prior to the beginning of the PAR 1138 rule development process, this language is obsolete and has been removed.

CHAPTER 3: IMPACT ASSESSMENT

EMISSIONS INVENTORY AND EMISSION REDUCTIONS

COST AND COST-EFFECTIVENESS

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SOCIOECONOMIC IMPACT ASSESSMENT

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COMPARATIVE ANALYSIS

EMISSIONS INVENTORY AND EMISSION REDUCTIONS

The 1998 survey and a subsequent report conducted by Pacific Environmental Studies (PES) estimated that 3.73% of all restaurants within South Coast AQMD jurisdiction contain at least one chain-driven charbroiler. Additionally, this survey suggests that facilities operating at least one chain-driven charbroiler have exactly one chain-driven charbroiler.

Emission factors for PM and VOC as well as associated test methods for various combinations of appliances for cooking meat, including chain-driven charbroilers (with and without a catalytic oxidizer), were developed from a study conducted in 1995 by The UC Riverside Center for Environmental Research and Technology (CE-CERT)[15] sponsored by the South Coast AQMD and the California Restaurant Association.

The emissions inventory of chain-driven charbroiler units within South Coast AQMD's jurisdiction was estimated by utilizing the emission factors from the CE-CERT study as well as the rates of chain-driven charbroiler prevalence calculated from the PES survey. To complete its estimation, staff collaborated with health departments at the county and city level to create a list of all permitted food service facilities within South Coast AQMD jurisdiction. From this list, staff created a filter to remove entries that were likely not associated with any sort of commercial cooking in line with justifications from the PES study. This methodology led staff to estimate that there are 1,244 chain-driven charbroilers in South Coast AQMD jurisdiction which, in 2023, were responsible for 99.78 tons per year (tpy) of PM and 30.61 (tpy) of VOC.

Emissions reductions requirements from the control technology for this rule mean that it is reasonable to assume an 83% reduction in emissions from newly non-exempt chain-driven charbroiler units. It was found that about 11.5% of chain-driven charbroiler filings under Rule 222 would be newly subject to PAR 1138. Combined with the estimate of 1,244 total chain-driven charbroilers in South Coast AQMD jurisdiction, 143 chain-driven charbroiler units are estimated to be newly non-exempt from this rule. Currently, staff assume that all newly non-exempt units do not have control technologies currently installed. Emissions from affected chain-driven charbroilers are calculated based on the upper limits of Rule 1138's current exemption threshold of 875 lbs of meat cooked per week and assume that no newly non-exempt units will remain exempt under the alternative exemption pathway of 10,800 pounds per 12-month period while maintaining less than 400 pounds cooked per week. When combined with emission factors of 14.8 pounds of PM per ton of meat cooked and 4.54 pounds of VOC per ton of meat cooked, total emission reductions from the proposed amendment are expected to reduce PM emissions by 19.98 tpy, ~0.05 tons per day (tpd), and additional VOC reductions of 6.13 tpy, ~0.02 tpd, as a co-benefit.

COST AND COST-EFFECTIVENESS

Cost-effectiveness is the cost-benefit analysis comparing the relative costs of rule implementation to the outcomes. South Coast AQMD compares factors such as initial capital costs, maintenance costs, and installation costs against the anticipated emission reductions across the South Coast Air

[15]University of California, Riverside Bourns College of Engineering – Center for Environmental Research and Technology, Further Development of Emission Test Methods and Development of Emission Factors for Various Commercial Cooking Operations Final Report, 1997, https://www3.epa.gov/ttnchie1/old/ap42/ch09/s133/related/rel01_c09s1303.pdf

Basin and calculates the cost of removing one ton of pollutant through the implementation of this regulation. There are two potential methods to calculate cost-effectiveness for emission reductions, discounted cash flow (DCF) method and levelized cash flow (LCF) method. The cost-effectiveness calculations were completed using the DCF approach due to the former providing a more conservative estimation of cost-effectiveness. Staff believe this is the most appropriate method for this analysis based on the discussion of the two methods below.

Discounted Cash Flow (DCF) and Levelized Cash Flow (LCF) Approaches

The DCF method converts all costs, including capital investments and costs expected in the present and all future years of equipment useful life, to present value. Conceptually, it is as if calculating the amount of funds that would be needed at the beginning of the initial year to finance the initial capital investments and to set aside funds to pay off the annual costs as they occur in the future. The funds that would be set aside are assumed to be invested which in turn, would generate a rate of return at the discount rate chosen. Cost-effectiveness is derived by dividing the present value of all total costs by the emission reduced over the equipment's useful life.

By contrast, the LCF approach amortizes all costs regardless of when they are incurred, into a yearly expenditure of equal amount over the project life. The LCF method assumes that the annual emission reductions are constant over time by comparing the annualized cost with the amount of annual emission reductions that can be potentially achieved. However, for projects that do not have linear or constant emission reductions, which is often the case for rule development projects with varying implementation schedules, the DCF method is better suited to address these variabilities when forecasting future costs.

Compliance Costs

One year after adoption, PAR 1138 would make chain-driven charbroilers that cook between 400 and 875 pounds of meat weekly subject to emissions reduction requirements. Compliance requires that these newly non-exempt units achieve a reduction of at least 83% below baseline emissions for PM and VOC. Discussions with manufacturers revealed that the current cost of a catalytic oxidizer is approximately $1,900. Manufacturers confirmed that no additional costs should be incurred from the installation process as the control technology can be installed with no more than simple hand tools. Additionally, manufacturers stated that retrofits should be available for all existing chain-driven charbroiler units and that a completely new unit would not be necessary unless the unit itself is at the end of its useful life. Useful life of catalytic oxidizers, with proper maintenance, are estimated to last for the entire lifetime of a chain-driven charbroiler unit. From discussions with manufacturers, typical maintenance of a catalytic oxidizer involves cleaning with water in intervals that can range from daily to monthly. A previous cost-effectiveness analysis from the 1997 staff report for Rule 1138 assumes that chain-driven charbroilers have a 10-year useful lifespan, and therefore this number will be used in cost effectiveness calculations.[16] Additionally from the 1997 staff report, exhaust stack cleaning is estimated to be completed four times annually for chain-driven charbroilers without a catalytic oxidizer while units equipped with catalytic oxidizers have their exhaust stack cleaned once annually resulting in a potential cost savings. As part of staff's conservative approach, cost savings from the reduction of exhaust stack

[16]South Coast Air Quality Management District, Staff Report for Proposed Rule 1138 – Control of Emissions from Restaurant Operations, October 1997

cleaning is assumed to be balanced out by the costs incurred from the additional maintenance needs of a catalytic oxidizer.

Cost Effectiveness

To calculate cost-effectiveness, staff assumed that all newly subject units would have a throughput equivalent to the current exemption limit, 875 pounds per week. Meat was assumed to be 25% fat 1/3 lb hamburgers that have an emission factor of 14.8 lbs PM per ton of meat cooked in line with patties used in the 1997 CE-CERT study.[17]

To calculate the present worth factor, a 4% per annum real interest rate is assumed. Below is the calculation:

Equation 3-1: Present Worth Factor Multiplier After *n* Years

$$Present\ Worth\ Factor\ after\ n\ years = \sum_{i=1}^{n} \frac{1}{(1 + real\ interest\ rate)^i}$$

$$= \sum_{i=1}^{10} \frac{1}{(1.04)^i}$$

$$= 8.1108$$

Step 1: Calculate the anticipated annual emissions for PM for one uncontrolled chain-driven charbroiler:

Equation 3-2: Annual PM Emissions per Chain-Driven Charbroiler

$$PM\ Emissions = lbs\ meat\ per\ week\ threshold * weeks\ per\ year * PM\ Emission\ Factor$$

$$= 875\ \frac{lbs\ meat}{week} * 52\ \frac{week}{year} * 14.8\ \frac{lbs\ PM}{2000\ lbs\ meat}$$

$$= 336.7\ \frac{lbs\ PM}{year}$$

$$= 0.168\ tpy\ PM$$

Step 2: Calculate the cost per unit for one chain-driven charbroiler:

[17]University of California, Riverside Bourns College of Engineering – Center for Environmental Research and Technology, Further Development of Emission Test Methods and Development of Emission Factors for Various Commercial Cooking Operations Final Report, 1997

Equation 3-3: Cost per Chain-Driven Charbroiler to Adopt Control Technology

$$Unit\ Cost = Initial\ Cost + (Present\ Worth\ Factor * Annual\ Maintenance\ Costs)$$
$$= \$1{,}900 + (8.11 * \$0)$$
$$= \$1{,}900$$

Finally, to calculate cost effectiveness, 83% reductions were assumed for PM since compliance requires 83% reductions of the total PM + VOC emissions. Since a majority of chain-driven charbroiler units are greater than both the proposed 400 pounds per week and existing 875 pounds per week thresholds, the number of anticipated newly non-exempt chain-driven charbroilers can be quantified. This calculation was performed by identifying the number of chain-driven charbroiler units registered pursuant to South Coast AQMD Rule 222 with a meat throughput ranging between 400 and 875 pounds per week; approximately 11.5% of all registered chain-driven charbroilers were within this throughput range. Utilizing an assumption of 1,244 charbroilers in South Coast AQMD jurisdiction as shown in calculations referenced in the Emissions Inventory section of this Staff Report, 143 chain-driven charbroilers are anticipated to be newly subject to PAR 1138.

Equation 3-4: South Coast AQMD Cost-Effectiveness by Criteria Pollutant

$$PM\ Cost\ Effectiveness = \frac{Unit\ Cost}{Lifespan\ (years) * \%\ Reductions * Annual\ PM\ Emissions}$$
$$= \frac{\$1{,}900}{10\ years * 0.83 * .168\ tpy}$$
$$= \$\mathbf{1{,}362.59\ per\ ton\ of\ PM\ reduced}$$

Incremental Cost-effectiveness

Health and Safety Code Section 40920.6(a)(3) requires the calculation of incremental cost-effectiveness for potential control options, when the South Coast AQMD adopts rules to meet the requirements for best available retrofit control technology (BARCT) pursuant to Sections 40918, 40919, 40920, and 40920.5, or for a feasible measure pursuant to Section 40914. This Section does not apply to PM (Health and Safety Code Section 40910). PAR 1138 is not being adopted to meet BARCT requirements nor is it being adopted as a feasible measure pursuant to an alternative reduction strategy under Health and Safety Code Section 40914. Therefore, an incremental cost-effectiveness analysis is not needed.

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 and CEQA Guidelines Section 15251(l); codified in South Coast AQMD Rule 110), the South Coast AQMD, as lead agency, is reviewing the proposed project (PAR 1138) to determine if it will result in any potential adverse environmental impacts. Appropriate CEQA documentation will be prepared based on the analysis.

SOCIOECONOMIC IMPACT ASSESSMENT

A Socioeconomic Impact Assessment, to be included in the Draft Staff Report, will be prepared and released for public review and comment at least 30 days prior to the South Coast AQMD Governing Board Hearing for PAR 1138, which is scheduled for September 5, 2025 (subject to change).

DRAFT FINDINGS UNDER THE HEALTH AND SAFETY CODE

Requirements to Make Findings

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, nonduplication, and reference, as defined in that section, based on relevant information presented at the Public Hearing, this written analysis, and the rulemaking record.

Necessity

PAR 1138 is needed to reduce PM2.5 emissions by partially implementing control measure BCM-12: Further Emission Reductions from Commercial Cooking and to implement Most Stringent Measure requirements from the 2024 South Coast Air Basin PM2.5 Attainment Plan for the 2012 Annual PM2.5 Standard.

Authority

The South Coast AQMD Governing Board obtains its authority to adopt, amend, or repeal rules and regulations from Health and Safety Code Sections 39002 40000, 40001, 40440, 40702, 40725 through 40728 and 41508.

Clarity

PAR 1138 is written and displayed so that the meaning can be easily understood by persons directly affected by it.

Consistency

PAR 1138 is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, federal or state regulations.

Non-duplication

PAR 1138 does not impose the same requirements as any existing state or federal regulation, and the proposed rule is necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

Reference

By adopting this proposed rule, the South Coast AQMD Governing Board will implement, interpret or make specific: Health and Safety Code Sections 40001 (rules to achieve ambient air quality standards) and 40440(a) (rules to carry out the AQMP)

COMPARATIVE ANALYSIS

Health and Safety Code Section 40727.2 requires a written analysis comparing the proposed amended rule with existing federal, state and South Coast AQMD regulations. This analysis must include averaging provisions, operating parameters, work practice requirements, and recordkeeping, monitoring, and reporting requirements associated with existing applicable rules and proposed regulations.

Federal and state regulations do not contain rules for the source category of chain-driven charbroilers. BAAD adopted Regulation 6, Rule 2: Commercial Cooking Equipment in December 2007 and SJVAPCD amended Rule 4692 – Commercial Charbroiling in June 2018. Table 3-1 compares the Bay Area rule and San Joaquin's rule with staff's proposal.

Table 3-1: PAR 1138 Comparative Analysis

Rules	Rule Elements		
	Applicability	**Requirements**	**Reporting, Notifications, Recordkeeping**
PAR 1138 (South Coast AQMD)	Owners and operators of commercial cooking operations that have chain-driven charbroilers	Chain-driven charbroilers must be equipped with a catalytic oxidizer certified by the Executive Officer and maintained in accordance with manufacturer specifications	- If the unit has control equipment, installation and maintenance records for the control device for at least five years - If under exemption, weekly records of the meat cooked and monthly records of meat purchased kept for at least five years - Alternative recordkeeping can be requested should the Executive Officer and EPA deem it sufficient
Regulation 6 Rule 2 (BAAD)	Owners, installers, or operators of: - Underfired charbroilers that purchase >1,000 pounds of beef weekly - Chain-driven charbroilers that purchase > 400 pounds of beef weekly	Beginning 1/1/2009, chain-driven charbroilers must operate with either: - A catalytic oxidizer limiting PM10 emissions to 1.3 pounds per 1000 pounds of beef cooked and VOC emissions to 0.32 pounds per 1000 pounds of beef cooked - Another control device limiting PM10 emissions to 0.74 pounds per 1000 pounds of beef cooked	For owners or operators of non-exempt chain-drive charbroilers: - Date of installation of any emission control device - Maintenance, work description, and date of maintenance These records shall be maintained for at least five years
Rule 4692 (SJVAPCD)	Charbroilers used to cook meat at commercial cooking operations	- A catalytic oxidizer or other control device must be equipped to a chain-driven charbroiler to achieve at least 83% and 86% reductions for PM-10 and VOC emissions, respectively. Control devices must be maintained in line with manufacturer's instructions - Chain-driven charbroilers are exempt from the above requirement if the unit cooks either less than 400 pounds of meat cooked per week **or** less than 10,800 pounds per rolling 12-month period while maintaining less than 875 pounds of meat cooked per week.	For exempt units, to be kept at least five years: - Weekly records of the meat cooked on a chain-driven charbroiler - Test results showing exemption eligibility For non-exempt units, to be kept at least five years: - Weekly records of the meat cooked on a chain-driven charbroiler

Rule 74.25 (Ventura County Air Pollution Control District)[18]	Owners or operators of conveyorized charbroilers	- Reactive organic compound emissions and PM emissions from a conveyorized charbroilers must be reduced by at least 83% using a South Coast AQMD certified emissions control device. - Conveyorized charbroilers in service before 10/12/05 are exempt if they cook less than 875 pounds of meat per week	Conveyorized charbroilers equipped with an emissions control device must: - Maintain records for the date of installation and/or replacement of the control device - Maintain records of any maintenance performed on the emissions control device including date, time, and description of maintenance. - Keep records on file for at least two years Exempt units must maintain weekly records of the amounts of meat charbroiled and monthly records of meat purchased. Records must be kept on file for at least two years.

[18]Ventura County Air Pollution Control District, Rule 74.25 – Restaurant Cooking Operations, October 2004, https://www.vcapcd.org/wp-content/uploads/Rulebook/Reg4/RULE%2074.25.pdf