

Summary of Comments and Response on the Regulatory Package for Proposed Amendments to Regulation 6, Rule 5: Particulate Emissions from Refinery Fluidized Catalytic Cracking Units

Table of Contents

LIST OF COMMENTERS	3
GENERAL COMMENTS.....	6
<i>SUPPORT FOR PROPOSED AMENDMENTS</i>	<i>6</i>
<i>SUPPORT FOR CONSIDERATION OF OTHER OPTIONS.....</i>	<i>7</i>
<i>CONTROL OPTIONS LESS STRINGENT THAN THE PROPOSED AMENDMENTS WOULD NOT MEET THE LEGAL DEFINITION OF BARCT</i>	<i>7</i>
COST-EFFECTIVENESS AND INCREMENTAL COST-EFFECTIVENESS	7
<i>COST-EFFECTIVENESS AND INCREMENTAL COST-EFFECTIVENESS HAVE NOT BEEN PROPERLY CONSIDERED AND ARE NOT SUPPORTED</i>	<i>7</i>
COST ESTIMATES	8
<i>COMPLIANCE COSTS ARE UNDERESTIMATED.....</i>	<i>8</i>
<i>COMPLIANCE COSTS ARE OVERESTIMATED</i>	<i>11</i>
<i>AMORTIZATION OF COSTS USES INCORRECT ASSUMPTIONS.....</i>	<i>12</i>
EMISSIONS AND MODELING.....	12
<i>ESTIMATES OF EMISSIONS AND REDUCTIONS ARE NOT ACCURATE.....</i>	<i>12</i>
<i>EMISSIONS FROM OTHER REFINERY SOURCES AND OTHER REFINERIES SHOULD NOT BE INCLUDED IN MODELING</i>	<i>15</i>
<i>MODELING INPUTS SHOULD BE FURTHER EXPLAINED AND MORE TRANSPARENT</i>	<i>16</i>
<i>AIR QUALITY MODEL SELECTION IS NOT APPROPRIATE</i>	<i>17</i>
<i>MODELING PARAMETERS ARE NOT APPROPRIATE</i>	<i>18</i>
<i>EMISSION AND POLLUTANT PARAMETERS USED FOR MODELING ARE NOT APPROPRIATE</i>	<i>19</i>
<i>METEOROLOGICAL DATA USED IN THE MODELING ARE NOT APPROPRIATE</i>	<i>20</i>
<i>MODELING RESULTS SHOULD BE PRESENTED DIFFERENTLY</i>	<i>21</i>
<i>MODELING RESULTS SHOULD BE COMPARED AND CALIBRATED TO MONITORING DATA</i>	<i>22</i>
<i>AFFECTED SOURCES REPRESENT ONLY A SMALL PORTION OF ALL BAY AREA EMISSIONS AND REDUCTIONS WOULD NOT RESULT IN APPRECIABLE BENEFITS</i>	<i>23</i>
<i>THE BAY AREA IS ALREADY UNDER THE NATIONAL AMBIENT AIR QUALITY STANDARD FOR PM.....</i>	<i>24</i>
ENVIRONMENTAL IMPACTS	24
<i>CEQA REQUIREMENTS HAVE NOT BEEN FULFILLED</i>	<i>24</i>
<i>THE AIR DISTRICT HAS NOT PROPERLY ANALYZED ALTERNATIVES UNDER CEQA</i>	<i>26</i>
<i>THE AIR DISTRICT HAS NOT COMPLIED WITH CEQA REQUIREMENTS FOR MITIGATION OF IMPACTS</i>	<i>27</i>
<i>THE AIR DISTRICT HAS NOT PROPERLY ANALYZED CUMULATIVE IMPACTS UNDER CEQA</i>	<i>28</i>
<i>THE AIR DISTRICT HAS NOT FULLY ANALYZED AND MITIGATED WATER IMPACTS UNDER CEQA</i>	<i>28</i>
<i>THE AIR DISTRICT HAS NOT PROPERLY ANALYZED AND MITIGATED GHG IMPACTS UNDER CEQA</i>	<i>29</i>
<i>THE AIR DISTRICT HAS NOT PROPERLY ANALYZED ENERGY IMPACTS UNDER CEQA</i>	<i>30</i>
<i>THE AIR DISTRICT HAS NOT PROPERLY ANALYZED HAZARDOUS MATERIALS AND WASTE IMPACTS UNDER CEQA</i>	<i>31</i>
<i>THE AIR DISTRICT HAS NOT PROPERLY ANALYZED AIR QUALITY IMPACTS UNDER CEQA</i>	<i>31</i>
<i>THE AIR DISTRICT HAS NOT PROPERLY ANALYZED AESTHETICS IMPACTS UNDER CEQA.....</i>	<i>33</i>

FEASIBILITY OF CONTROLS AND PROPOSED LIMITS	33
<i>WET GAS SCRUBBING CONTROLS ARE NOT TECHNICALLY FEASIBLE</i>	33
<i>PROPOSED LIMITS ARE NOT ACHIEVABLE</i>	34
<i>PROPOSED TIMELINES ARE NOT FEASIBLE</i>	36
<i>PROPOSED TIMELINES SHOULD BE ACCELERATED</i>	37
<i>THE PROPOSED TOTAL PM10 LIMIT CANNOT BE MET DURING STARTUP AND SHUTDOWN OPERATIONS</i>	37
<i>AMMONIA AND SULFUR DIOXIDE LIMITS ARE UNNECESSARY</i>	37
HEALTH IMPACTS.....	38
<i>THE AIR DISTRICT'S HEALTH ANALYSIS IS NOT TRANSPARENT</i>	38
<i>PM HEALTH IMPACTS ARE OVERESTIMATED</i>	40
<i>PM HEALTH IMPACTS ARE UNDERESTIMATED</i>	42
SOCIOECONOMIC IMPACT ANALYSIS	42
<i>SOCIOECONOMIC IMPACTS ARE UNDERESTIMATED</i>	42
<i>SOCIOECONOMIC IMPACTS TO SMALL BUSINESSES WERE NOT ANALYZED</i>	46
<i>SOCIOECONOMIC IMPACTS DO NOT ACCOUNT FOR COSTS RELATED TO ESP EXPLOSION RISK</i>	46
STATUTORY REQUIREMENTS.....	48
<i>THE AIR DISTRICT HAS NOT DEMONSTRATED AUTHORITY TO ADOPT THE PROPOSED AMENDMENTS</i>	48
<i>THE AIR DISTRICT HAS NOT EXPLAINED THE NECESSITY TO ADOPT THE PROPOSED AMENDMENTS</i>	48
<i>THE AIR DISTRICT HAS NOT MET THE CLARITY REQUIREMENTS TO ADOPT THE PROPOSED AMENDMENTS</i>	49
<i>THE AIR DISTRICT HAS NOT MET THE CONSISTENCY REQUIREMENTS TO ADOPT THE PROPOSED AMENDMENTS</i>	49
<i>THE AIR DISTRICT HAS NOT MET THE NON-DUPLICATION REQUIREMENTS TO ADOPT THE PROPOSED AMENDMENTS</i>	50
<i>THE AIR DISTRICT HAS NOT MET THE REFERENCE REQUIREMENTS TO ADOPT THE PROPOSED AMENDMENTS</i>	50
TESTING REQUIREMENTS	50
<i>EPA METHOD 202 USED BY THE AIR DISTRICT OVERESTIMATES PM</i>	50
<i>OTHER MEASUREMENTS METHODS SUCH AS OTM-37 ARE MORE APPROPRIATE</i>	52
<i>THE PROPOSED USE OF EPA METHOD 201A IS NOT FEASIBLE WHEN WATER DROPLETS ARE PRESENT</i> <i>DOWNSTREAM OF A WET GAS SCRUBBER</i>	53
<i>TESTING FREQUENCY SHOULD BE REDUCED</i>	54
<i>OPACITY MONITORING UNDER HIGH MOISTURE CONDITIONS</i>	55
<i>METHODS FOR MEASURING FILTERABLE PM ARE NOT CONSISTENT WITH OTHER REGULATIONS</i>	56
<i>COMPLIANCE TESTING MUST BE CONDUCTED BY THE AIR DISTRICT</i>	56
<i>CONTINUOUS EMISSIONS MONITORS AND SOURCE TESTING PROVIDE DIFFERENT INFORMATION</i>	57
<i>DELAYS IN SOURCE TESTING HAVE DELAYED RULEMAKING EFFORTS</i>	57
<i>REPORTING REQUIREMENTS ARE DUPLICATIVE</i>	58

List of Commenters

The following table lists the individuals and organizations from whom Air District staff received written comments prior to the April 30, 2021 comment deadline.

Abbreviation	Commenter / Reference
350 Bay Area	Jed Holtzman Senior Policy Analyst 350 Bay Area Letter, April 28, 2021
A. C. Mogal	Amy Cecilia Mogal, MD/PhD Clinical Instructor, Stanford University School of Medicine; Department of Anesthesiology and Perioperative Medicine Attending Physician, Washington Hospital, Intensive Care Unit Email, April 29, 2021
A. Millstein	Amanda Millstein, MD Resident/Physician Email, April 30, 2021
A. van Nieuwenhuizen	Adrienne van Nieuwenhuizen, MD Resident/Physician Email, April 30, 2021
Airlines for America	Sean Williams Vice-President, State and Local Government Affairs Airlines for America Letter, April 30, 2021
B. Andrews	Bret Andrews Resident/Neurologist Email, April 27, 2021
B. Lindblom	Brian Lindblom Resident Email, April 27, 2021
CBE	Dan Sakaguchi, CBE Staff Researcher Sharifa Taylor, CBE Staff Researcher Connie Cho, CBE Legal Tyler Earl, CBE Staff Attorney Andrés Soto, CBE Richmond Organizer Zolboo Namkhaidorj, CBE Richmond Youth Organizer Ernesto Arevalo, CBE Northern California Program Director Communities for a Better Environment Letter, April 30, 2021
CCEEB	Bill Quinn President California Council for Environmental and Economic Balance Letter, April 30, 2021
Chevron	Michael Carroll Latham & Watkins, LLP Letter, April 30, 2021

Abbreviation	Commenter / Reference
Climate Health Now (AM)	Ashley McClure, MD Physician and Co-Founder Climate Health Now Email, April 28, 2021
Climate Health Now (CM)	Cynthia Mahoney, MD Advocate for the Medical Society Consortium for Climate & Health Clinical Associate Professor of Medicine, Stanford University (ret.) Climate Health Now Email, April 30, 2021
Community Energy reSource	Greg Karras Community Energy resource Letter, April 30, 2021
D. Bezanson	David Bezanson, Ph.D. Resident Email, April 27, 2021
EBLC	Kristin Connelly President & CEO East Bay Leadership Council Letter, April 27, 2021
IACCC	Mark Hughes Executive Director The Industrial Association of Contra Costa County Letter, April 26, 2021
J. Kilbreth	Jeffrey Kilbreth Richmond-San Pablo CERP Steering Committee Email, April 14, 2021
J. Mann	Jeffrey Mann, MD Resident/Physician Email, April 28, 2021
J. Perlman	Janet Perlman, MC, MPH Resident/Pediatrician Email, April 28, 2021
Jane G	Jane G Resident Letter, May 4, 2021
K. Maher	Karina Maher, MD Resident/Pediatrician Email, April 20, 2021
M. Graubard	Moses Graubard, MD Resident/Physician Email, April 28, 2021
M. Whitman	Meg Whitman, MD Resident/Physician Email, April 30, 2021
Martinez Chamber	Julie Johnston President/CEO Martinez Chamber of Commerce Letter, April 27, 2021

Abbreviation	Commenter / Reference
Mayor of Martinez	Rob Schroder, Mayor City of Martinez Letter, April 28, 2021
Montrose AQS	Kevin Crosby Montrose Air Quality Services
P. Bentom	Paul Bentom Individual Letter, May 4, 2021
PBF (AN)	Andres Novoa Operations Support Engineer PBF Martinez Refinery Company Email, April 26, 2021
PBF (BN1)	Brian Nippa Sr. Engineer, Project Development PBF Martinez Refinery Company Letter, April 14, 2021
PBF (BN2)	Brian Nippa Sr. Engineer, Project Development PBF Martinez Refinery Company Letter, April 29, 2021
PBF (DB)	Dave Bleckinger Manager, Reliability Rotating & Electrical PBF Martinez Refinery Company Email, April 16, 2021
PBF (HD)	Harry Dhillon Process Engineer PBF Martinez Refinery Company Email, April 21, 2021
PBF (JF)	Jerry Forstell Refinery Manager PBF Martinez Refinery Company Letter, April 30, 2021
PBF (JS)	Jessica Scheiber LOP Environmental Focal Point PBF Martinez Refinery Company Email, April 22, 2021
PBF (ML)	Meredith Lewis Process Safety and Assurance Department PBF Martinez Refinery Company Letter, April 14, 2021
PBF (PO)	Patrick Owens Safety Engineer PBF Martinez Refinery Company Letter, April 29, 2021
PBF (RM)	Captain Roy M. Mathur Wharf Master PBF Martinez Refinery Company Letter, April 13, 2021

Abbreviation	Commenter / Reference
PBF (SN)	Susan Nelson Health, Safety, Security and Environmental Manager PBF Martinez Refinery Company Letter, April 19, 2021
PBF Energy	Timothy Paul Davis Western Region President PBF Energy Letter, April 29, 2021
R. Rosenbaum	Robert Rosenbaum, Ph.D. Resident/Neuropsychologist Email, April 28, 2021
S. Oh	Sally Oh M.D. Candidate UCSF School of Medicine Email, April 28, 2021
S. Rosenblum	Dr. Stephen S. Rosenblum, Ph.D. Resident Letter, March 30, 2021
SFO	Ivar Satero San Francisco International Airport Letter, April 12, 2021
T. McCarthy	Theresa McCarthy Individual Letter, May 4, 2021
Valero	Taryn Wier Manager – Environmental Engineering Valero Benicia Refinery Letter, April 30, 2021
WSPA	Kevin Buchan Senior Manager, Bay Area Region Western States Petroleum Association Letter, April 30, 2021

General Comments

Support for proposed amendments

Comment: Several commenters expressed support for proposed amendments to achieve associated health benefits.

350 Bay Area, A. C. Mogal, A. Millstein, A. van Nieuwenhuizen, B. Andrews, Climate Health Now (AM), Climate Health Now (CM), Community Energy reSource, D. Bezanson, J. Kilbreth, J. Mann, J. Perlman, K. Maher, M. Graubard, M. Whitman, R. Rosenbaum, S. Oh, S. Rosenblum

Response: The Air District appreciates the comments in support of the proposed amendments.

Support for consideration of other options

Comment: Several commenters expressed support for other control options instead of the proposed amendments. Several commenters stated that a less stringent PM limit of 0.020 gr/dscf, with flexibility as to how this would be met by each facility, would allow refining operations to remain economically feasible and still achieve substantial emission reductions.

EBLC, Martinez Chamber, Mayor of Martinez, PBF (HD), PBF (JS), PBF (ML), PBF (PO), PBF Energy, IACCC

Response: Information on the other potential control options identified and evaluated is included in the Staff Report. The Air District believes discussion of both control options will promote a more informed decision by the Board of Directors and a better understanding by the public.

Control options less stringent than the proposed amendments would not meet the legal definition of BARCT

Comment: Commenters stated that AB 617 mandates the Best Available Retrofit Control Technology, and any control option less stringent than the proposed amendments would not meet this legal requirement.

350 Bay Area, CBE

Response: Best Available Retrofit Control Technology (BARCT) is defined in the California Health and Safety Code as an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source. The California Health and Safety Code requires that multiple impacts be taken into account and does not mandate that a specific level of control constitute BARCT. Furthermore, under California Health and Safety Code Section 40920.6, a district may establish its own best available retrofit control technology requirement based upon consideration of the factors specified in the BARCT definition.

Cost-Effectiveness and Incremental Cost-Effectiveness

Cost-effectiveness and incremental cost-effectiveness have not been properly considered and are not supported

Comment: Several commenters stated that the Air District has not conducted the required cost-effectiveness analysis in a robust, transparent, or accurate way as required by California law, and the cost per ton is underestimated due to underestimated costs and overestimated emission reductions. Commenters stated that the Best Available Retrofit Control Technology is required to be cost-effective, and the proposed amendments do not meet this criterion. Commenters stated that the cost per ton of the proposed amendments is substantially higher than other adopted Air District rules, and one commenter stated that costs exceed a cost-effectiveness threshold set by the South Coast AQMD.

Several commenters also stated that the Air District has not considered incremental cost-effectiveness of other control options as required by the California Health and Safety Code, and

has not explained how cost-effectiveness and incremental cost-effectiveness were considered in the determination of the recommended controls. Commenters asserted that the cost-effectiveness of the proposed amendments is not reasonable and that costs outweigh the health benefits.

CCEEB, Chevron, PBF (JF), PBF Energy, WSPA

Response: Cost-effectiveness is a required consideration for the adoption the proposed amendments. Best Available Retrofit Control Technology (BARCT) is defined in the California Health and Safety Code as an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source. The Staff Report includes the required analysis of cost impacts and cost-effectiveness. The California Health and Safety Code requires that cost-effectiveness and economic impacts be considered but does not require a finding that a rule is cost effective, nor does State law require that an air district adopt a quantitative definition of cost effectiveness. Cost effectiveness estimates for previously adopted rules provide useful context but do not limit the Air District's authority in adopting future rules or amendments.

The South Coast AQMD reported cost-effectiveness threshold cited by one commenter is specifically for use with South Coast AQMD's BACT Guidelines in their New Source Review process. These BACT guidelines would not limit South Coast AQMD's authority in adopting a rule, and so of course would likewise not affect the authority of any other air district.

Incremental cost-effectiveness of different control options is a required consideration for the adoption of the proposed amendments, and is included in the Staff Report. The Air District is required to evaluate incremental cost-effectiveness but is not required to make a finding in that regard. The Staff Report evaluates the incremental cost-effectiveness of both control options (ESPs and wet gas scrubbers) that have been considered during development of Rule 6-5 amendments.

The Staff Report explains why, although the cost-effectiveness and incremental cost-effectiveness values of the proposed amendments are higher than previously adopted Air District rules, adoption of the proposed amendments is nevertheless justified.

Additionally, information on potential health benefits and valuation of the proposed amendments have been included in the Staff Report to allow a more informed decision by the Board of Directors and a better understanding by the public. The California Health and Safety Code does not require the calculation of these health benefits, and does not require that calculated health benefits meet a particular threshold or value.

Cost Estimates

Compliance costs are underestimated

Comment: Several commenters stated that cost estimates developed by staff for the proposed amendments are underestimated. Several commenters claimed that cost estimates and information provided by industry have been ignored. Commenters asserted that other cost estimate information or methods should be used, including more appropriate cost indices for

escalation at California refineries (such as the IHS Markit Downstream Capital Costs Index and Nelson Farrar Cost Index), and an independent assessment for actual expected costs.

One commenter stated that staff have ignored the cost data from the installation of a wet gas scrubber at the Valero Benicia Refinery, while another commenter questioned why the cost estimates for the proposed amendments are lower than the cost of the wet gas scrubber at the Valero Benicia Refinery. Commenters stated that cost data of other installations cited by staff do not contain enough information to determine whether the costs were the costs of the scrubbers or the total cost of all modifications needed as a result of installing the scrubbers. Some commenters asserted that because some wet gas scrubbers at FCCUs do not meet the proposed limits, the costs are not applicable and the Air District must be underestimating the costs of achieving compliance.

Commenters stated that cost estimates should assume that water resources impacts will be mitigated, and that cost estimates should be higher as a result. One commenter also stated that the cost estimates do not account for increased project and labor costs due to health mandates associated with the COVID-19 pandemic.

CCEEB, Chevron, PBF (JF), WSPA

Response: The cost estimates in the Staff Report are based on cost calculation methodologies commonly used by the US Environmental Protection Agency when evaluating promulgation of federal regulations, and include a number of adjustments to provide a reasonably conservative estimate of costs. These include adjustments to account for inflation and regional market differences. For example, the Chemical Engineering Plant Cost Index used in the Air District's development of cost estimates is a valid tool for cost estimation, and has been used extensively by the US EPA for cost escalation purposes, and was specifically discussed with refinery participants in the 2019 Refinery Rules Technical Working Group. For this proposal, the Air District used relevant cost data from a recent wet gas scrubber installation in the San Francisco Bay Area. The Air District also used other site-specific information provided by refineries where sufficient supporting evidence was provided. However, some specific cost estimates provided by refineries were asserted without documentation or factual support and thus could not be objectively evaluated.

To further compare and evaluate cost estimates, the Air District also reviewed available information on reported costs of wet gas scrubber installations from other refineries throughout the US. Adjustments to these costs for inflation and regional market differences demonstrated that the cost estimates for the affected refineries were comparable and within the range of costs reported for the other wet gas scrubber installations. These costs for other wet gas scrubber installations are shown in Figure 2 and Table 5 in the Staff Report; as shown in the Staff Report, costs for comparatively sized wet gas scrubber installations on refinery units (adjusted to year 2019 dollars and California market costs) include \$210 million for the CITGO Lemont FCCU, \$36 million for the Shell Deer Park FCCU, \$316 million for the Valero Delaware City Refinery Coker, \$579 million for the Valero Benicia FCCU and Coker, and \$316 million for the Valero Delaware City Refinery FCCU. While these costs range widely and there are many potential factors that can impact capital costs of these systems, the cost estimates for the proposed

amendments of \$235 million to \$255 are comparable and within the range of costs for these other wet gas scrubber installations.

The Air District also disagrees with the assertion that cost information and estimates provided by industry stakeholders have been ignored. Many of these data sources, factors, and adjustments used in the analysis were discussed with the affected refineries in meetings of the Refinery Rules Technical Working Group in 2019, and staff solicited early input on other information and sources of data for consideration at those meetings as well. Staff also continued to solicit and discuss input from industry stakeholders through various site visits and meetings with individual refineries throughout the rule development process. As described, the Air District has also considered and reviewed the cost information provided by refineries and incorporated site-specific cost considerations in the analysis where sufficient supporting evidence was provided. However, much of the cost information provided by the affected stakeholders did not include sufficient details or supporting information on the cost estimation methodology, assumptions, or data sources. For example, Chevron Products Richmond asserted in December 2020 comments that a wet gas scrubber installation would cost \$1.48 billion, but did not provide supporting documentation or further detail on this figure or the development of the cost estimates. Capital cost estimates provided by affected refineries are noted in the Staff Report even where those estimates are not documented. As discussed in the Staff Report, cost estimates provided by Chevron Products Richmond and PBF Martinez Refinery are also substantially higher than any of the wet gas scrubber installation costs reported by other refineries reviewed by staff.

As described above and in the Staff Report, cost data from the wet gas scrubber installation at the Valero Benicia Refinery was considered and incorporated into the development of the cost estimates. The Valero Benicia Refinery wet gas scrubber is a regenerative system, which typically requires additional equipment and higher capital costs. In addition, the Valero Benicia Refinery wet gas scrubber is operated to abate exhaust gas streams from both the refinery's FCCU and coker unit, requiring a larger treatment capacity than what would be anticipated at PBF Martinez Refinery's FCCU. These factors were accounted for in the analysis, and are reflected in the cost estimates.

To provide further context for cost estimates, the Air District reviewed available cost information reported for refinery wet gas scrubber installations at other facilities throughout the US. This cost information in the Staff Report was based on reported and publicly available cost information of previous wet gas scrubber installations at petroleum refineries. Many other potential factors can impact capital costs of these systems, including but not limited to specific design and configuration of the source being abated, wet gas scrubbing system design, additional equipment and equipment modifications required. Performance of any abatement device is dependent on the design and operation of each specific unit. Optimal performance of control systems can depend on many factors, such as equipment type and design, adequate size/capacity, and proper operation and maintenance. Although specific wet gas scrubbing systems may not necessarily be designed or operated to meet the limits included in these proposed amendments, these reported costs still provide relevant information on the types of costs that have been historically incurred for wet gas scrubbing installation and are useful for comparative purposes in the cost estimate analysis. This information has been provided notwithstanding the uncertainties and limitations inherent in using publicly available reported data. Air District staff discussed sources of cost data

and emissions performance data with the affected refineries in meetings of the Refinery Rules Technical Working Group in 2019, and solicited input from those stakeholders on other sources of information. Staff did not receive information from the affected refineries on other costs from wet gas scrubbing installations, including any installations at other refineries owned by those companies.

Certain wet gas scrubber designs and technologies, including regenerative system designs, may increase costs due to additional equipment requirements and project complexity. Information about the potential costs associated with the installation of a regenerative wet gas scrubber is included in the Staff Report even though facilities subject to the proposed amendments may choose not to use this technology.

The assumption of increased costs from health mandates related to the COVID-19 pandemic is speculative and not substantiated when considering the compliance deadline and implementation timeframe of the proposed amendments. Given the implementation timeline, most economic forecasts project that the US economy will have substantially recovered from the COVID-related economic downturn early in this time frame. For example, in February 2021, the Congressional Budget Office projected that real GDP will recover to pre-pandemic levels by mid-2021, and that employment levels will recover in 2024 (CBO, 2021).

Congressional Budget Office (CBO). 2021. An Overview of the Economic Outlook: 2021 to 2031. <https://www.cbo.gov/publication/56965>. February 1.

Compliance costs are overestimated

Comment: Several commenters stated that cost estimates developed for the proposed amendments are too high. One commenter stated that the cost of installation at the Valero Benicia Refinery is not a representative data point. One commenter also stated that the costs provided by industry are not substantiated and should not be included in the report, and that the estimates of costs for water re-use are not substantiated.

350 Bay Area, CBE, S. Rosenblum

Response: While there are multiple potential sources of data and methodologies that may be employed when developing cost estimates, the Air District has followed a robust process to develop and assess the cost estimates included in the analysis. Cost estimates in the Staff Report are based on standardized methodologies, include adjustments to account for inflation and regional market differences, incorporate relevant cost information from a recent Bay Area wet gas scrubber installation, and were evaluated against available reported cost data from other installations throughout the US.

Cost data from the installation of the wet gas scrubber at the Valero Benicia Refinery is a relevant data point for consideration. As described in the Staff Report, the unit at Valero Benicia Refinery is the most recent installation of a wet gas scrubber on a fluidized catalytic cracking unit in California, and the only such refinery wet gas scrubber in the San Francisco Bay Area. Valero's wet gas scrubber design differs from those anticipated at the refineries potentially affected by the proposed amendments primarily in that it is a regenerative system, and is used to

abate both the FCCU and fluid coking unit at the facility. These differences are accounted for in the Air District's evaluation of costs.

Cost estimates provided by the affected refineries are noted in the Staff Report, but were incorporated into the Air District's cost estimates only insofar as they were substantiated. As noted above, cost estimates for wet gas scrubber installation provided by Chevron Products Richmond and PBF Martinez Refinery lacked sufficient supporting documentation, and are substantially higher than those for other refineries reviewed by staff.

Wet gas scrubber designs and technologies that re-use water or reduce water consumption typically increase the amount of equipment and complexity involved. The Staff Report includes information for these design and technology options based on industry literature from system vendor/designers. However, it appears unlikely that facilities would use these costlier design options.

Amortization of costs uses incorrect assumptions

Comment: One commenter questioned the basis of assumptions used in the amortization of costs and calculation of annual costs. The commenter suggested a longer depreciation schedule and lower interest rates should be used in the analysis.

J. Kilbreth

Response: As described in the Staff Report, the amortization of capital costs assumes a project lifetime of 20 years at six percent interest. The use of these assumptions is consistent with the approaches and guidelines for the Air District's Policy and Implementation Procedure for Best Available Control Technology (BACT) and US EPA Air Pollution Control Cost Manual. The lifetime of individual installations of wet gas scrubbing systems may vary (and may indeed exceed 20 years in some cases) and different financing mechanisms may be available to the affected facilities (including financing with potentially lower interest rates). However, these assumptions provide a reasonably conservative estimate of the useful life and associated compliance costs from the implementation of these controls. Further, the use of these standardized assumptions provides a consistent framework for analyzing and comparing cost and cost effectiveness values across different control measures and sectors.

Emissions and Modeling

Estimates of emissions and reductions are not accurate

Comment: Commenters stated that refinery emission inventories from 2016-2018 were used in the Air District's health effects analysis, and not recently submitted inventories, which in some cases are significantly lower. One commenter stated that the estimated emission reductions from the proposed amendments are not supported, and previous Air District evaluations show that ammonia reductions had no benefit in reducing secondary PM.

One commenter stated that the PM model includes emissions from the Chevron Refinery's old Hydrogen Plant, a plant that is no longer in operation. The commenter stated that the PM model

does not properly account for reductions from the Chevron Richmond Modernization Project, and the Staff Report overestimates refinery-wide PM emissions at Chevron by 294 tons per year, or more than 52 percent.

The commenter stated that the 2018 PM Chevron Refinery-wide emissions inventory figures included in the model are higher than what Chevron reported as part of Regulation 12-15 (Petroleum Refining Emissions Tracking), and it is unclear how the Air District adjusted emissions inventory data and why they are higher than what was reported to BAAQMD for that reporting year.

The commenter stated that the 2018 emissions for Chevron's FCCU in the Staff Report are based on testing results from 2016-2017, which are not an appropriate baseline. The commenter stated that the Air District conducted testing in March 2021, and Chevron has not received the results of that testing. The commenter stated that Chevron conducted parallel source testing, which shows PM emissions at the Chevron Refinery FCCU have been reduced by 106 tons/year or 43 percent of the reported 2018 emission inventory.

One commenter stated that for the PBF Martinez Refinery, staff are using FCCU emission data that is ten years old, rather than data from a more current source test conducted by the facility. The commenter stated that this ten-year-old data was compiled using a source testing method that is no longer EPA approved.

Chevron, PBF (HD), PBF (JL), PBF (ML), PBF (SN), WSPA

Response: Many comments question the data and methodologies used in the modeling of health impacts presented in the Staff Report. As an overarching response, it is important to note that the amendments to Rule 6-5 are proposed under the Air District authority to require Best Available Retrofit Control Technology (BARCT). There is no requirement for modeling of health impacts in connection with adoption of a BARCT rule. The Air District undertook this modeling exercise to provide context for the Board of Directors and the public to consider. However, the sufficiency of the modeling and, for that matter, whether modeling was done at all, is not prerequisite to adoption of the proposed amendments to Rule 6-5.

That legal background noted, the Air District acknowledges that the context provided by the modeling may affect the Board of Directors' consideration of whether to adopt the proposed amendments. The Air District goal of transparency regarding the modeling is independent of whether the modeling is legally required to support adoption of a BARCT rule. As explained the responses that follow, the Air District believes the modeling was done appropriately and that the supporting data is valid.

As described in the Staff Report and the Appendices, the baseline emissions used for the modeling include contributions representative of 2018, the most recent year that emissions have been checked and finalized by the Air District. The Air District also included emission adjustments to reflect significant reductions in non-FCCU sources at Chevron Products Richmond that have occurred since 2018 (due to the Chevron Refinery Modernization Project) and that have been evaluated by the Air District. As described in the Staff Report, estimates of potential emission reductions are based on FCCU emissions and existing performance at the Bay

Area petroleum refineries, and the reductions necessary for compliance with the proposed limits. Ammonia slip can contribute to the formation of condensable particulate matter, which is a type of primary particulate matter; this is different than the secondary particulate matter described in the evaluations referenced by the commenter.

As described in the Staff Report and described in Appendix A.4, baseline emissions used for modeling PM_{2.5} from the Chevron refinery include contributions representative of 2018, the most recent year that emissions have been checked and finalized by the Air District. However, adjustments were made to reflect reductions in non-FCCU sources that have occurred since 2018, due to Chevron's Modernization Project. Notably, emissions from old hydrogen plant furnaces were omitted from the modeling and replaced with emissions from the new hydrogen plant, where appropriate, to reflect more current conditions. Facility-total adjusted annual PM_{2.5} baseline emissions match more recent draft emissions (2019) that include Modernization Project changes to within approximately five tons.

As discussed in the Staff Report, the Air District relied upon the Air District's official emissions inventories, which are used for renewing Chevron's Permits to Operate and used for required reporting to the California Air Resources Board. The Air District used the most current emissions inventory for these facilities in its regulatory analysis and modeling. These emissions inventory calculations have been reviewed and approved by Air District technical experts. Information submitted by the refineries, including emissions information submitted per Rule 12-15, are reviewed by Air District staff. Emissions information that are not appropriate for use in the Air District's official emissions inventories, such as data that is not accurate or representative, may not be approved for inclusion in the emission inventories.

The reductions of 43 percent referenced by the commenter are based on emissions estimates that Chevron has made for 2020 that have not yet been evaluated by the Air District for accuracy or representativeness. Testing results at Chevron conducted in March of 2021 are still being evaluated, and it is unclear if these results are representative of typical operations at Chevron.

The estimation of emissions from any facility is by its nature an evolving topic. Emissions estimates are a function of facility operations and measurement methodologies, both of which can and typically do change over time. For purposes of understanding emissions as they relate to adoption of an Air District rule, the only reasonable approach is to use the best available information at the time the rule is proposed. As stated in the Staff Report, the best available information on representative emission levels was used for the PM modeling. For the PBF Martinez Refinery FCCU, additional testing was conducted in 2020 at a variety of different operating conditions. Preliminary review of the 2020 source test data does not indicate emissions lower than previous emissions estimates, and in fact suggest the revised estimate, when it is finalized, may be higher. Air District staff continue to work with PBF to ensure that new emissions estimates are accurate. However, the important point for purposes of the proposed amendments to Rule 6-5 is that preliminary review of the most recent tests do not suggest emissions have been overestimated.

Emissions from other refinery sources and other refineries should not be included in modeling

Comment: Commenters stated that the health effects outlined in the March 2021 Staff Report used the entirety of refinery PM emission sources, however, the proposed amendments to Rule 6-5 are intended to further control PM emissions from refinery FCCUs, which represent a fraction of total refinery PM emissions. Commenters stated that this misrepresentation of data serves to falsely elevate emission reduction estimates, which also artificially inflates the alleged benefits associated with the Rule 6-5 proposed amendments.

Commenters stated that facility-wide PM_{2.5} modeling inappropriately expanded the Study Area, which results in overestimates of potential impacts in any further modeling using this Study Area. Commenters state that due to the larger Study Area, more receptors (grid cells) were modeled, resulting in higher overall estimated health risks. Commenters stated that since the proposed amendments are focused on the FCCU, only the area where the model predicted PM_{2.5} annual concentrations greater than 0.1 µg/m³ from the FCCU emissions should be included in the BenMAP analysis. One commenter stated that the Study Area used as the input to BenMAP included receptors where the PM_{2.5} concentrations were less than 0.1 µg/m³.

Commenters stated that emissions from the Marathon Martinez Refinery should not be included in the Staff Report or in the modeling of PM health impacts. Commenters state that including the Marathon emissions in the analysis when it is clear those emissions are no longer occurring, and may never occur again, undercuts the District's analysis and renders the proposed rule unsupported by any substantial evidence.

Chevron, WSPA

Response: As noted above, modeling for health impacts is not required for, nor is it a normal part of, the analysis of BARCT. The Air District conducted modeling to provide context for the BARCT determination in the proposed amendments, but the modeling is not part of the BARCT determination. The BARCT analysis does not in any way hinge on the modeling presented in the Staff Report. Air District staff made judgements regarding how to use modeling to provide context, but acknowledge that there is not one correct or even best way to establish context.

The chosen study area was intended to focus on impacts and benefits for the communities in the Bay Area refinery corridor. PM_{2.5} concentrations and health impacts do not end outside the study area. The Air District's analysis focused on the areas near the refineries, and therefore understates the health benefits of the proposed rule to the broader Bay Area. Choosing the entire Bay Area region would have been another way to establish context. Compared to what has been presented, preliminary work by the Air District indicates that assessing the entire region would approximately double the total modeled exposure and estimated benefits. Section V.E.3 of the Staff Report acknowledges that the size of the study area, as defined and used in the Staff Report, was indirectly linked to baseline emission estimates.

The calculation of health benefits is based on the difference between the baseline case and the control case. This difference is only dependent on FCCU emissions, as all other sources are held constant across all scenarios. Therefore, the emission inventory for any modeled sources other than FCCUs has no bearing on the reported valuations of health benefits, and the accuracy of

non-FCCU emission estimates is immaterial as far as the health benefits assessment is concerned.

As noted in the Staff Report, the Marathon Martinez Refinery announced the idling of the refinery, including the facility's fluidized catalytic cracking unit, in April 2020. Marathon announced in July 2020 that the facility would remain indefinitely idled with no plans to restart. Although the Marathon Martinez Refinery FCCU is not currently operating and no plans have been announced to restart those operations, the FCCU is still a permitted source with a permit to operate. As such, the FCCU at the Marathon Martinez Refinery would be a potentially affected source under the proposed amendments. Therefore, the Air District has included information on the Marathon Martinez Refinery FCCU emissions and potential compliance costs in the analysis. Modeling of health impacts and potential health benefits of PM reductions and controls did not include emissions from the Marathon Martinez Refinery.

Modeling inputs should be further explained and more transparent

Comment: One commenter stated that more description of the care taken in preparing and conducting the air quality modeling should be provided.

One commenter stated that the full suite of modeling files has not been provided, so a complete analysis of the District's modeling, and the results obtained, could not be performed.

Chevron, Montrose AQS

Response: The modeling reports (Appendixes A.2 and A.4) provide extensive description of the care taken in preparing and conducting the air quality modeling, including discussions throughout the documents about quality assurance and quality control. In particular, pages 13 through 17 include the discussion of the preparation of modeling inputs for emissions control scenario B. A lengthy discussion on the preparation of stack parameters for control scenario B is also provided.

As noted above, the modeling presented in the Staff Report is intended to provide context for the BARCT determination, but is not part of the BARCT determination. The Air District has attempted to be thorough in its explanation of the modeling. However, to the extent commenters are suggesting that the validity of the proposed amendments depends on whether affected facilities or members of the public are able to exactly replicate the modeling, the Air District disagrees. The Board of Directors may consider the context provided by the modeling presented by Air District staff, but it may also consider other perspectives on context presented by affected facilities or the public.

The Air District has cooperated with efforts by affected facilities to understand and critique the modeling in the Staff Report. Air District staff have provided modeling data requested through Public Record Requests, and have attempted to answer questions from affected facilities regarding the modeling.

Air quality model selection is not appropriate

Comment: One commenter stated that the CALPUFF model version used in the Air District's modeling was neither the EPA approved version nor the latest version of CALPUFF. The commenter stated that the Air District did not use photochemical grid models like CAMx and CMAQ, which are designed to model chemical transformation of emissions (as in secondary PM_{2.5}). The commenter stated that the BenMAP study area extended as far as 65 kilometers from the FCCU, into the long-range transport assessment range, and long-range transport of pollutants is the specific type of assessment for which EPA delisted the use of CALPUFF. The commenter stated that use of CALPUFF modeling results at this range for a regulatory application is inappropriate.

One commenter stated that the environmental consultant ERM performed PM_{2.5} dispersion modeling in the AERMOD model using the same modeling inputs (source emissions and stack parameters) and surface data from Chevron's onsite meteorological station, with upper air and supplemental surface data from Oakland International Airport obtained from the Air District. The commenter states that the results show that modeled ground-level concentrations resulting from FCCU emissions occur over the Bay, avoiding populated areas near the refinery, and the magnitude of these maximum concentrations are significantly less than the District's reported maximum concentration. The commenter stated that the Air District should use AERMOD for their FCCU PM dispersion modeling.

Chevron

Response: CALPUFF version 6.4.2 was used. This is a version of CALPUFF later than the EPA approved version (5.8.5). This later version of the model has been applied by the Air District for various projects including an SO₂ demonstration project that was submitted to EPA and the findings of which EPA has approved. The US EPA has not "delisted the use of CALPUFF." Revised guidelines "no longer contain language that requires the use of CALPUFF." (82 FR 5195)

The Air District applied models to track directly emitted PM and did not include PM generated from chemical transformation of gases emitted since the proposed regulation is for control of directly emitted PM. Photochemical models, such as CAMx and CMAQ, were not used because chemical transformation of gases to PM was not simulated, i.e., no chemical transformation is included in the simulated PM.

Insufficient information is provided from the ERM modeling with the AERMOD model to make a full assessment, but the results presented are inconsistent with wind patterns in the region. (1) Data from Oakland sounding below 300 meters (height of east Bay hills) are significantly modified by local terrain. As a result, they would not represent conditions in Richmond. In other words, it is inappropriate to use Oakland sounding data for Richmond in applying the AERMOD model. (2) Richmond onsite meteorological data is strongly influenced by topography. Even though predominant winds at onsite meteorological site are from the south, they turn toward east starting from just a few kilometers of downwind areas of Chevron. The AERMOD model is unable capture the impacts of turning winds because it utilizes winds from a single meteorological station. As a result, the use of AERMOD is a less appropriate model for assessing

PM emissions from Chevron for the purpose of exposure and health impacts analyses, because these emissions are typically from tall, hot, stacks that disperse the pollution over a broad area.

Refineries are large sources of PM emissions. Bay Area refineries are located in areas with complex winds that can change direction over distances of a few kilometers. Plumes of PM can extend far from the stack release points. The Air District's modeling of PM was for assessments of refinery emissions on human health and exposure in an extended area to track the emission plumes around the Bay Delta. A Lagrangian "puff" model, such as the CALPUFF model the Air District applied, is an appropriate model for this type of assessment. The AERMOD model will not accurately track the motion of the refinery plumes in this complex wind environment and is a less appropriate model for this type of source and assessment. As noted in the Federal Register (82 FR 5196), "[t]he EPA recognizes that AERMOD, as a Gaussian plume dispersion model, may be limited in its ability to appropriately address such situations, and that CALPUFF or other Lagrangian model may be more suitable..."

Federal Register, Vol. 82, Page 5195. (82 FR 5195) January 17, 2017.

Federal Register, Vol. 82, Page 5196. (82 FR 5196) January 17, 2017.

Modeling parameters are not appropriate

Comment: One commenter stated that the Air District ran CALPUFF with certain parameters that are known to affect dispersion of emitted pollutants and impact modeled ground-level concentrations. The commenter stated that building downwash was not modeled, urban dispersion parameters were only used for model cells that were in the "industrial land use" category, and the Air District failed to use an algorithm that, if enabled, would have better characterized the shoreline thermal effects (the difference in temperature between water and land) in the Bay Area.

The commenter stated that the modeling failed to accurately model the configuration of numerous sources. The commenter stated that the base elevations for each source, even if adjusted to use grid average terrain, are inaccurate. The commenter stated that elevations should be representative of the 100-meter modeling grid, and many source elevations are significantly different than any elevation within 100 meters from that source, which will significantly impact the distance and direction of modeled emissions due to variation in wind speed and direction with height.

Chevron

Response: Modeling of building downwash is not necessary because: (1) there are no tall buildings adjacent to the stacks; and (2) building downwash would only impact concentrations inside of the facility fence line.

In the CALPUFF model, urban dispersion parameters are designed for the core urban areas, such as downtown Richmond. The model parameters were selected properly for the region modeled.

The algorithm referenced in the comment is for improved handling of plume diffusion and dispersion over waters when the plume moves from over land to over water. This algorithm was

not used for several reasons: (1) It is most useful with meteorological data prepared by the CALMET processor, which is designed to characterize vertical mixing processes, including estimating boundary layer heights over water and over land separately when there is a strong temperature gradient between the two areas. However, the District used the Weather Research and Forecasting (WRF) model, which includes more realistic formulations for vertical mixing than CALMET regardless of whether the area is over water or land. (2) There is no strong ambient temperature gradient between the location of refinery emissions over land and downwind locations that are over water (based on WRF simulated temperature data). (3) Boundary layer processes in the region are dominated by mechanical mixing due to the sea breeze. The effect of buoyancy is minimal.

The computational grid resolution of CALPUFF was 1x1 kilometer. Meteorology, terrain elevation, land use, etc., were provided to the model at this resolution and the base elevation was adjusted accordingly. The receptor domain was set at 100-meter spacing. The model is designed to operate with terrain elevations specified at the computational grid resolution, not at the receptor resolution. The suggested model specification would be inconsistent with model operation and the model would not function properly with the suggested specifications.

Emission and pollutant parameters used for modeling are not appropriate

Comment: One commenter stated that measurements of PM_{2.5} using a direct-reading device or a laboratory method are always subject to some measurement errors, and the report should provide the measurement uncertainty of the PM_{2.5} emission measurements and model the ranges.

One commenter stated that the report does not mention input into the CALPUFF model, such as particle aerodynamic diameter size distribution and density, or any FCCU particulate analysis. The commenter stated that the report should include a comparison of the PM_{2.5} data entered in the model and the actual PM_{2.5} in the FCCU. One commenter stated that the report states that PM_{2.5} is a complex mixture of suspended particles and liquid droplets, but FCCU particulate is not liquid, and the report does not include information on its aerodynamic diameters that relates to its staying suspended in ambient air.

One commenter stated that Section 2.2 of the modeling report states the use of average emissions, and questioned if the underlying value distribution was lognormal. The commenter stated that arithmetic averages of lognormal data can grossly over-estimate the average.

PBF (PO)

Response: Standard procedures for estimating facility emissions do not provide uncertainty estimates. While uncertainty estimates may be of theoretical interest, neither regulated facilities nor regulatory agencies typically produce them. As described in the Staff Report and Appendices, the Air District used the best available emissions estimates to conduct the modeling assessments.

Emissions inputs for CALPUFF represent total PM_{2.5} and were not distributed into different size bins. Resulting concentration values output by CALPUFF also represent total PM_{2.5}, and these

concentrations were used as input to the US EPA’s Benefits Mapping and Analysis Program, Community Edition (BenMAP-CE or BenMAP). CALPUFF does use an internal PM2.5 size distribution for the purpose of calculating dry deposition velocity, and the District used the default CALPUFF distribution for this purpose. The purpose of the statement “PM2.5 is a complex mixture of suspended particles and liquid droplets” in the introduction section of the modeling report was to describe PM2.5 in a general sense. It was not intended as a description of FCCU emissions or emissions from a specific source.

Section 2.2 of the modeling report (Appendix A.4) deals with meteorological modeling, and no reference to “average emissions” occurs in the emissions inventory section (Section 2.1). Emissions used as model inputs were intended to be representative of “routine operations” for the facility over the span of a year. Omitted from “routine operations” were emissions from upsets, accidental releases, startups, and shutdowns. If emission estimates did include upsets, accidental releases, startups, and shutdowns—events for which emissions can be higher—this could result in a lognormal distribution, a distribution with infrequent periods of much higher levels. However, during conditions of routine operation, arithmetic averaging is appropriate.

PBF (PO)

Meteorological data used in the modeling are not appropriate

Comment: Commenters stated that meteorological data used in the modeling contained inaccuracies and is not appropriate. Commenters stated that the Air District’s modeling did not use local meteorological data, and therefore, doesn’t effectively track the dissipation or regional movement of PM. One commenter stated that it was not clear whether the Air District used the Chevron Refinery’s onsite meteorological data to blend onsite observations with the other meteorological stations in the Weather Research and Forecasting (WRF) model. The commenter stated that doing so would help to simulate the local wind conditions more accurately in the subsequent dispersion modeling.

One commenter stated that insufficient information was provided to assess how the meteorological data were developed in CALMET, a companion processing program to CALPUFF. The commenter stated that the Air District’s evaluation of the meteorological data was performed using a program called METSTAT, which is an outdated tool that has been superseded by a program called AMET. The commenter stated that AMET was developed by USEPA and is a more comprehensive tool than METSTAT.

The commenter stated that wind speed was underestimated in CALMET compared to the onsite meteorological station, which will tend to overestimate modeled ground-level concentrations and bias the CALPUFF results to significant overprediction. The commenter stated that the CALMET wind direction data showed a bias in the clockwise direction compared to observations at the onsite meteorological tower, which would tend to incorrectly bias modeled ground-level concentrations by directing the plume more towards populated areas instead of over the Bay.

The commenter stated that vertical profile data from the Air District Sodar station on the Chevron property should also have been included in CALMET, and would provide a

significantly better vertical atmospheric profile near the FCCU. The commenter stated that the vertical atmospheric profile will determine to what extent emitted pollutants disperse in the atmosphere or reach ground-level, and its accuracy is extremely important to achieving accurate modeled concentrations.

Chevron, WSPA

Response: Meteorological modeling results were used as meteorological inputs to the air quality model, and these results were determined to be representative of the region by comparison to meteorological monitoring data. On-site meteorological data were not used in the four-dimensional data assimilation of the Weather Research and Forecasting (WRF) model because the assimilation module requires pressure measurements in addition to winds, temperatures, and humidity. Pressure is not measured at the Chevron on-site meteorological station.

Both METSTAT and AMET use the same set of statistical measures for model evaluation, such as bias, error, etc. There is no advantage of using one software over the other.

The simulated windspeed represents an average speed across a 1x1 kilometer grid cell. Observations represent a speed at a single location. It is reasonable that there can be differences in grid cell wind speeds and single point observations. This does not signify overestimation by CALPUFF.

Care must be taken when a single point measurement is compared against a grid-average estimate. The predominant airflow of the region starts from the Pacific Ocean, enters the Bay through the Golden Gate gap, branches near Oakland, with the southerly branch continuing through Richmond and turning toward the east along the Delta. The model captures this overall airflow structure very well.

Data from the onsite SODAR station were compared against nearby measurements such as measurements at Richmond and Point San Pablo meteorological towers. SODAR data were often inconsistent with other nearby measurements and the Air District has been investigating whether this SODAR instrument is functioning properly. As a result, these data were not used for modeling.

Modeling results should be presented differently

Comment: One commenter stated that the staff should provide additional modeling results/figures of the contributions after each of the two control levels to provide a clearer depiction of the improvements to air quality expected.

One commenter stated that Appendix A.4, Figure 3.2.1, for the FCCU without WGS shows that CALPUFF predicted maximum modeled PM_{2.5} ground-level concentrations of 0.1 - 0.2 µg/m³ in a small area where people live, and 0.2 - 0.3 µg/m³ in a very small area where people might work. The commenter stated that these concentrations are significantly lower than the concentrations presented in Appendix A.4, Table 3.2.1, and this table is misleading as the peak offsite concentration it reports is predicted to occur next to the refinery in San Francisco Bay, at a location where no residential or worker receptors are located, as shown in Figure 1(a).

One commenter stated that the report states the PM_{2.5} emissions result in 2.8 to 6.3 premature deaths per year, and questioned what a '0.8' or '0.3' premature death was.

One commenter stated that the Air District mislabeled its dispersion modeling results as “exposures”, whereas the District’s analysis appears to have been an analysis of impacts on outdoor air concentrations rather than people’s exposures. The commenter states that air pollution-related health effects are a function of exposures, and when people are indoors at their residences, it has been estimated that the exposures are 30-40 percent lower than the outdoor concentrations due to deposition and filtration.

One commenter questioned how the approximate 1 percent average decrease in outdoor PM_{2.5} concentrations is being associated with the greater than 20 percent differences in health outcomes as identified in Table 11.

Chevron, Montrose AQS, PBF (PO), WSPA

Response: The bar charts provided in the Staff Report and Appendix A graphically depict the modeled improvements expected after implementation of each of the two control scenarios.

Simulated ambient PM levels were analyzed in Appendix A.4. Figure 3.2.1 of that appendix shows a map of simulated PM from FCCU emissions. Table 3.2.1 shows a comparison of emissions, maximum simulated concentrations, and number of receptors with concentrations above 0.1 µg/m³ for emissions from all facility sources, FCCU only, and FCCU with assumed wet gas scrubber (WGS) control. Appendix A.4 provides ambient analysis of PM regardless of population. Population exposure to PM from these sources provided in Appendix A.2.

The Staff Report does not refer to fractional deaths, which have no meaning. However, the Staff Report does reference fractional death rates, which do have meaning. An annualized rate of 2.8 death per year corresponds to 28 deaths over a 10-year timespan. Similarly, a rate of 6.3 death per year corresponds to 63 deaths over a 10-year timespan.

Outdoor ambient concentrations correspond to the dependent variable in the response functions that the Air District is relying on. It would be inappropriate to adjust these (e.g., by multiplying by an indoor/outdoor ratio), because such adjustments were not performed in the corresponding studies. Referring to that dependent variable as “exposure”, when it is weighted by population, is common and consistent with established practice.

Regarding the results presented in Table 11, the reported percent reductions in health impacts correspond to the PM from modeled sources, not PM from all sources.

Modeling results should be compared and calibrated to monitoring data

Comment: Commenters stated that air dispersion modeling of PM contributions and health impacts from FCCUs have not been calibrated to monitoring measurements of PM in the surrounding communities. Commenters stated that staff should provide an analysis for Air

District monitoring stations PM2.5 data over many years while noting the weeks when the PBF Martinez Refinery FCCU was shut down for maintenance and not emitting PM.

One commenter stated that ambient air monitoring in the vicinity of the Chevron Refinery does not support BAAQMD's modeled PM2.5 impacts from the FCCU or the Refinery as a whole. The commenter stated Chevron Refinery is generally west-southwest of BAAQMD's San Pablo Rumrill Station, and one would expect the measured PM2.5 when winds are from this sector to be elevated, if the refinery actually was causing local elevated PM2.5. The commenter stated that ambient data does not show a statistically significant difference in ambient PM2.5 concentrations during a two-and-a-half-month period in which the Chevron Refinery FCCU was shut down and not operational.

Chevron, PBF (BN1), PBF (PO)

Response: Air monitoring stations measure PM from all sources, including secondary PM formation and PM that has been transported from other areas. No ambient PM monitoring is available for emissions from a specific source such as the FCCU. Therefore, the proposed calibration is not feasible.

Variations in measured hourly or daily ambient PM concentrations are difficult to assign to the contributions from a specific, individual source, and are also affected by meteorological conditions, and day-to-day changes in the emissions of PM or PM precursors from other local and regional sources.

Air monitoring stations measure ambient PM from all sources as well as the contribution of background concentrations. As a result, simulated PM from refinery emissions (entire refinery or FCCU) is not comparable to ambient levels of PM monitored at air monitoring stations. The suggested comparison and conclusion are not useful assessments.

The actual PM emissions from the FCCU were simulated for three years and resulting PM contributions to concentrations were documented. While some reduction in ambient total PM concentrations from the temporary shutdown of the FCCU occurred, and while the modeling predicts an estimated average magnitude of FCCU emissions changes, the measured ambient total PM levels also reflect differences in meteorological conditions between the two periods, as well as variability in other sources of primary and secondary PM.

Affected sources represent only a small portion of all Bay Area emissions and reductions would not result in appreciable benefits

Comment: Commenters stated that estimated PM10 emissions from FCCUs are a small portion of all Bay Area PM10 emissions, and reductions under the proposal represent less than one percent of total Bay Area PM10 emissions.

One commenter stated that there is no supporting evidence that FCCU emissions make up three percent of PM emission in the Bay Area.

Chevron, EBLC, PBF (BN1), PBF (HD), PBF (JS), PBF (ML)

Response: The Air District recognizes that there are many sources of emissions throughout the Bay Area, however, FCCUs are among the largest individual sources of PM emissions in the San Francisco Bay Area. Table 1 in the Staff Report reports total PM10 emissions from petroleum FCCUs to be approximately 825 tons per year. Total human-generated criteria pollutant emissions for all California air districts are publicly available online through the California Air Resource Board's CEPAMv1.05 emissions reporting tool (<https://ww2.arb.ca.gov/criteria-pollutant-emission-inventory-data>). For the Bay Area Air District, human-generated PM10 emissions total about 32,000 tons per year; therefore, the FCCU contribution of 825 tons per year represents approximately 3 percent.

The Bay Area is already under the National Ambient Air Quality Standard for PM

Comment: Commenters stated that the Bay Area is already under the National Ambient Air Quality Standard (NAAQS) for PM.

PBF (BN1), PBF (JF)

Response: The San Francisco Bay Area Air Basin is currently designated nonattainment for the National Ambient Air Quality Standard (NAAQS) for 24-hour PM2.5 and for the California Ambient Air Quality Standards (CAAQS) for annual PM2.5, annual PM10, and 24-hour PM10.

While progress has been made and monitoring data in some previous years have been below the NAAQS, the 2018-2020 design value (which is the air monitoring data indicator used for comparison with the ambient air quality standard attainment) is 55 µg/m³ for 24-hour PM2.5 and 11.3 µg/m³ for annual PM2.5. Achieving and maintaining attainment of all the PM2.5 NAAQS and CAAQS remains a challenge that necessitates further reductions of particulate matter emissions and their precursors.

Environmental Impacts

CEQA requirements have not been fulfilled

Comment: Commenters stated the Air District has not conducted an adequate CEQA analysis for the Proposed Amendments. Commenters state that the Air District is relying on an inappropriate CEQA EIR and needs to prepare an EIR for this rule development. Commenters state that the Air District relies on Public Resources Code Section 21166, which sets forth the standard for the need to conduct additional environmental review in connection with a previously approved project, and that this is not the appropriate inquiry under the circumstances because the Proposed Amendments are not the same project that was evaluated in the EIR. Commenters state that there is significant new information that requires that the District conduct additional environmental review and prepare a subsequent or supplemental EIR. Commenters stated the EIR does not contemplate the potential environmental consequences if the proposed regulation limits cannot be met, in which case the operations may have to cease to operate, which would lead to environmental impacts.

Commenters stated that although the EIR discussed at a general level the possibility of using wet gas scrubbers for refinery FCCUs, it did not contain any detailed discussion or evaluation of

environmental impacts from amendments to Rule 6-5. Commenters stated that none of the requirements in the proposed amendments were discussed in detail in the EIR, and the impacts of these specific amendments were not addressed in the EIR. Commenters stated that at the time of the 2018 EIR, it was unclear what exactly the proposed amendments for Rule 6-5 would entail, and significant new, material information now exists as to the potential environmental impacts of the proposed amendments.

Chevron, PBF (JF), WSPA

Response: The primary purpose of the 2018 EIR was to evaluate the proposed schedule for adoption of BARCT rules expected to be needed to implement AB 617. With regard to control of PM from FCCUs at refineries, the 2018 EIR went further than evaluation of the schedule, and included a thorough evaluation of impacts from the two most likely control options. It is therefore not the case that, as one commenter asserted, wet gas scrubbers were discussed only at a “general level.” Because it was known at the time of the 2018 EIR that electrostatic precipitators and wet gas scrubbers were the primary options for further control of particulate from FCCUs, these control options are evaluated in great detail and side-by-side throughout the EIR.

The 2018 EIR was occasioned by a different project than the current proposed amendments to Rule 6-5. However, the Air District believes comments that cite this as the reason why the 2018 EIR cannot be adequate to support the Rule 6-5 amendments elevate form over substance. Revisions to Rule 6-5 to require either electrostatic precipitators or wet gas scrubbers had begun to be considered as early as August 2018, as discussed in the CEQA Initial Study for the AB 617 Expedited BARCT Implementation Schedule. Even though the decision being made in 2018 was whether to proceed with the Expedited BARCT Schedule, the state of understanding regarding future control options for particulate from FCCUs allowed the Air District to fully evaluate the impacts of these options. The result was an EIR in support of the Expedited BARCT Schedule that addressed the full range of choices at issue in the proposed amendments Rule 6-5 amendments, and that is substantively sufficient to evaluate the impacts of those choices as required by CEQA.

The standard practice in the evaluation of environmental impacts under CEQA is to assume compliance with applicable laws and regulations. This is one reason why evaluation of a scenario in which a refinery ceases operation because it cannot comply with the proposed amendments was not addressed in the EIR. Just as importantly, the prediction, first, that a refinery would cease operations and, second, that the cessation would be due to the difficulty in complying with the proposed amendments entails layers of speculation that put the scenario beyond the scope of reasonable likelihood that informs the breadth of CEQA review.

The public and affected facilities have had the opportunity to comment on this analysis in the context of this proposal to amend Rule 6-5. The Air District has reviewed these comments and is responding to each point regarding the adequacy of the 2018 EIR. The 2018 EIR cannot be revised in response to comments – it either is sufficient to support adoption of the proposed Rule 6-5 amendments or it is not. The Air District has explained in response to each specific comment on the 2018 EIR why it believes the CEQA analysis continues to be adequate.

The Final EIR for the AB 617 Expedited BARCT Implementation Schedule has been included with the package for proposed amendments to Rule 6-5 for consideration by the Air District Board of Directors.

The Air District has not properly analyzed alternatives under CEQA

Comment: Commenters stated that the Air District has failed to properly analyze a reasonable range of alternatives under Section 15126.6 of the CEQA Guidelines. Commenters stated that the 2018 EIR regarded the timing of multiple District rules, rather than address the impacts of this proposed action and its alternatives. Commenters stated that the EIR identifies the only alternatives as (1) not implementing the Expedited BARCT Implementation Schedule and (2) delaying implementation. Commenters stated that the EIR does mention that there are different types of wet gas scrubbers with different energy impacts, but does not provide any analysis of the tradeoffs between the greenhouse gas impacts and PM control effectiveness of these options. Commenters stated that the given that the EIR public notice and title referred to timing and only considered timing alternatives, it is not surprising that comments were limited despite the extensive amount of interest in the details of these rules on the part of both the public and the affected industries.

Commenters stated that the District has previously drafted two rule alternatives to Rule 6-5, and 2018 EIR does not identify these alternatives or provide quantitative information that is useful to the public or decisionmakers with regard to weighing those tradeoffs and the significant environmental impacts of Rule 6-5. Commenters state that while the Final EIR does mention that the potential water demand associated with a wet gas scrubber could result in significant impacts, it does not acknowledge the fact that alternatives to the proposed rule would not necessitate a WGS or those associated impacts. Commenters stated that new information of substantial importance exists as to alternatives for the Proposed Amendments, and supplemental or subsequent environmental review is required when new information of substantial importance shows that alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment.

Chevron, PBF (JF), WSPA

Response: The primary purpose of the 2018 EIR was to evaluate the proposed schedule for adoption of BARCT rules expected to be needed to implement AB 617. With regard to control of PM from FCCUs at refineries, the 2018 EIR went further than evaluation of the schedule and included a thorough evaluation of impacts from the two most likely control options. Electrostatic precipitators and Wet Gas Scrubbers are evaluated side-by-side throughout the 2018 EIR.

Focusing on water usages as a prominent example, Table 3.4-4 includes a column titled “Uses Water?” In adjacent cells in that table, the question is answered “yes” for wet gas scrubbers and “no” for electrostatic precipitators. Table 3.4-6 describes the worst case water usage scenario of three simultaneously operating wet gas scrubbers as using 1,296,000 gallons per day of water. The reader is thus clearly informed that the potential water savings if electrostatic precipitators are chosen as the control option rather than wet gas scrubbers is 1,296,000 gallons per day. This example is illustrative of how the 2018 EIR examined electrostatic precipitators and wet gas scrubbers side-by-side as alternative control options throughout the document.

The control options under evaluation for Rule 6-5 were not formally evaluated in the “Alternatives” chapter of the 2018 EIR because that choice was not at issue in the Expedited BARCT Schedule. Nevertheless, the comparison of impacts from the two control options was as thorough as possible. Although the two control options were not presented as choices in the alternatives section of the EIR, doing so would not have resulted in additional information regarding the control options individually or in direct comparison to each other. Expressed another way, if the 2018 EIR were revised to feature the electrostatic precipitators and wet gas scrubbers in the “Alternatives” section of the document, there would be no change in either content or in how the two control options are compared to each other because the 2018 EIR was prepared with an explicit understanding that amendments to Rule 6-5 would present exactly this choice.

The Air District believes the 2018 EIR continues to be adequate to inform the Air District Board and the public of the impacts of these control options. Various comments assert specific arguments that relevant information was excluded from that EIR and/or that circumstances have changed such that a new or supplemental EIR is needed. The Air District responds to each of these specific comments in responses that follow below.

The Air District sets emission limits based on what is achievable by available control technologies, but does not have authority to prescribe the exact equipment that must be used to meet those limits. Though a refinery subject to proposed amendments to Rule 6-5 may have a choice of wet gas scrubbers, the Air District cannot dictate how that choice is made as long as the emissions limit is met. It follows that different types of wet gas scrubbers are not alternatives appropriate for evaluation under CEQA. The 2018 EIR assumed the most impactful version of wet gas scrubber with respect to each environmental media so that the most significant impact would be evaluated regardless of which choice of scrubber is ultimately made by a refinery.

The Air District has not complied with CEQA requirements for mitigation of impacts

Comment: Commenters state that the District has failed to comply with CEQA requirements that significant impacts be mitigated or that findings be made that support overriding considerations. Commenters state that reliance upon a 2018 Final EIR that finds water impacts are significant, yet does not provide feasible mitigation, is a violation of CEQA under CEQA Section 15126.4. Commenters state that the District did not analyze whether recycled water was available to the three facilities, or just one site and if so, what would the cumulative impact be of the remaining facilities not using recycled water.

Commenters state that new information of substantial importance exists as to mitigation measures for the proposed amendments. Commenters state that a subsequent or supplemental EIR is required when new information of substantial importance shows that mitigation measures which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure. Commenters state that the EIR does not identify any mitigation measures to address significant water impacts, including mitigations that could include a

regenerative wet gas scrubber, which would use less water than non-regenerative wet gas scrubbers.

Chevron, PBF (JF), WSPA

Response: The EIR found that water demand from the use of wet gas scrubbers would result in significant and unavoidable water use impacts. The EIR identifies potential mitigation measures, including HWQ-1, which required to use recirculated, reclaimed, or recycled water, if available, to satisfy the water demand for the air pollution control equipment. This includes the type of regenerative wet gas scrubber designs referenced by the commenter. The EIR concluded that in spite of implementing the mitigation measures, impacts would remain significant and unavoidable. This information was provided to the Air District Board of Directors for consideration during the certification of the EIR and adoption of the AB 617 Expedited BARCT Implementation Schedule in 2018. On December 19, 2018, the Board of Directors adopted a resolution to adopt the AB 617 Expedited BARCT Implementation Schedule, certify the Final EIR, and issue a Statement of Overriding Considerations.

The Air District believes that comments submitted on the proposed amendments have not revealed new information of substantial importance. The specific reasons why are explained in responses to specific comments below.

The Final EIR for the AB 617 Expedited BARCT Implementation Schedule and the December 2018 Statement of Overriding Considerations has been included with the package for proposed amendments to Rule 6-5 for consideration by the Air District Board of Directors.

The Air District has not properly analyzed cumulative impacts under CEQA

Comment: Commenters state that the Air District has failed to properly analyze cumulative effects under CEQA Section 15130. Commenters stated that the District has dramatically underestimated the environmental impacts associated with installing multiple mandated WGSs in the Bay Area. Commenters stated that the District did not properly analyze the water demand without the mitigation coupled with other impacts due to increases in energy use, GHGs and other impacts.

PBF (JF), WSPA

Response: The 2018 EIR contains analysis of cumulative impacts in EIR Chapter 3 as required by CEQA. Included for each impact category is a discussion of whether the proposed project will result in any significant impacts, either individually or cumulatively in conjunction with other projects. As shown in EIR Table 2-4, the environmental review analyzed the installation of up to three wet gas scrubbing units. The EIR discussed impacts to all resource areas, including water demand, energy use, and greenhouse gases in EIR Chapter 3.

The Air District has not fully analyzed and mitigated water impacts under CEQA

Comment: Commenters stated that the District has failed to fully analyze and mitigate the significant environmental impacts of multiple mandated wet gas scrubbers that would be required under the proposed amendments. Commenters stated that the EIR does not include any

meaningful discussion regarding all impacts relating to wet gas scrubbers, which are required before the Air District can consider adopting the Proposed Amendments. Commenters stated that wet gas scrubbers would significantly increase freshwater demand in a region already constrained by water supply and in drought conditions.

Commenters stated that the EIR does not identify appropriate feasible mitigation measures, as it does not address whether recycled water would be available to the facilities. Commenters stated that the EIR does not identify further mitigation if such recycled water is not available.

Commenters also stated that the District has failed to fully analyze and mitigate the potentially significant water quality impacts of wet gas scrubbers.

Chevron, EBLC, PBF (DB), PBF (JF), PBF (ML), PBF (RM), PBF Energy, WSPA

Response: An evaluation and discussion of the potential water use impacts of wet gas scrubbing systems was included in the Final Environmental Impact Report (EIR) for the AB 617 Expedited BARCT Implementation Schedule, which was certified by the Air District Board of Directors in 2018. The EIR discussion included estimates of water usage for up to 3 wet gas scrubber installations, and found that water demand from the use of wet gas scrubbers would result in significant water use impacts. The EIR identified potential mitigation measures HWQ-1 and HWQ-2. The EIR specifically noted that there is no guarantee that reclaimed water would be available to all affected facilities. Therefore, the EIR found that in spite of the identified mitigation measures, impacts would remain significant and cumulatively considerable.

Potential impacts from wastewater and water quality were discussed in the EIR Section 3.4. The EIR discussed potential water quality impacts from operation of wet gas scrubbers, and found that water quality impacts were less than significant. In addition, the Response to Comments in the Final EIR further addressed comments on potential wastewater impacts.

This information was provided to the Air District Board of Directors for consideration during the certification of the EIR and adoption of the AB 617 Expedited BARCT Implementation Schedule in 2018. On December 19, 2018, the Board of Directors adopted a resolution to adopt the AB 617 Expedited BARCT Implementation Schedule, certify the Final EIR, and issue a Statement of Overriding Considerations. The Final EIR for the AB 617 Expedited BARCT Implementation Schedule has been included with the package for proposed amendments to Rule 6-5 for consideration by the Air District Board of Directors.

The Air District has not properly analyzed and mitigated GHG impacts under CEQA

Comment: Commenters stated that the Air District has failed to properly analyze Greenhouse Gas Emissions. Commenters state that there is no discussion in the March 2021 Staff Report or the Final EIR (Appendix D) being relied on by the District as to whether the project complies with GHG reduction plans. Commenters stated that while the EIR summarily concludes that because the facilities must comply with the Cap-and-Trade Program, the Expedited BARCT Implementation Schedule would have a less than significant impact on greenhouse gas (GHG)

emissions, the District is still obligated to analyze the impact of GHGs, which would increase from higher energy demands of the wet gas scrubber.

Chevron, PBF (DB), PBF (JF), PBF (ML), PBF Energy, WSPA

Response: The 2018 Final EIR and CEQA Initial Study address the potential impacts from greenhouse gas emissions, and specifically compliance with plans for the reduction or mitigation of greenhouse gas emissions.

As discussed in the CEQA Initial Study, CEQA Guidelines section 15064.4, promulgated in 2010, sets out the procedures for determining the significance of a project's greenhouse gas emissions. In making that determination, subdivision (b)(3) of that section allows a lead agency to consider "[t]he extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions."

In 2011, California Air Resources Board promulgated the regulations establishing the Cap-and-Trade Program (Cal. Code Regs., tit. 17, §§ 95801–96022) to reduce greenhouse gas emissions under the California Global Warming Solutions Act of 2006. The Cap-and-Trade Program seeks to reduce emissions of greenhouse gases from the subject sources by applying an aggregate greenhouse gas allowance budget on covered entities and providing a trading mechanism for greenhouse gas emission allowances or offsets. (Cal. Code Regs., tit. 17, § 95801.) Cap and Trade constitutes a "plan for the reduction . . . of greenhouse gas emissions" within the meaning of Guidelines section 15064.4, subdivision (b)(3), and that section therefore authorizes agencies to determine a project's greenhouse gas emissions will have a less than significant effect on the environment based on the project's compliance with the Cap-and-Trade Program. (*Association of Irrigated Residents v. Kern County Bd. of Supervisors* (2017) 17 Cal. App. 5th 708, 743.)

As discussed in the CEQA Initial Study Chapter 2, Section XIX, Mandatory Findings of Significance, the applicable significance thresholds for the environmental resources analysis of greenhouse gases also serve as the cumulative significance thresholds. Therefore, the project greenhouse gas impacts are not considered to be significant or cumulatively considerable (CEQA Guidelines §15064 (h)(1)).

The Air District has not properly analyzed energy impacts under CEQA

Comment: Commenters stated that the Air District failed to properly analyze and mitigate energy resources, including electricity and natural gas. Commenters stated that the Final EIR did not properly analyze possible mitigation for the increase demand for electricity and natural gas, and the proposed amendments also fails due to its wasteful use of energy resources. Commenters stated that there is no specific discussion as to electricity usage that would increase from refineries operating the wet gas scrubbers.

Chevron, PBF (DB), PBF (JF), PBF (ML), PBF Energy, WSPA

Response: The 2018 EIR included a discussion and analysis of potential impacts from electricity and natural gas use. Chapter 3 of the EIR discusses potential electricity and natural gas use, and concluded that the electricity and natural gas would be used to further control emissions of

criteria pollutants and assist the District in complying with ambient air quality standards; therefore, the electricity and natural gas would not be used in a wasteful or inefficient manner. The EIR included provided estimates of electricity demand associated with the operation of the air pollution control equipment that would be expected as a result of the Expedited BARCT Implementation Schedule, including wet gas scrubbers and electrostatic precipitators. As discussed in the EIR, because ESPs have a higher electricity demand than wet gas scrubbers, ESP electricity demand was considered for this analysis to provide a conservative estimate.

The Air District has not properly analyzed hazardous materials and waste impacts under CEQA

Comment: Commenters stated that the Air District has failed to fully analyze and mitigate the proposed amendments' significant hazardous materials and waste generation impacts for wet gas scrubbers. Commenters stated that the switch from an electrostatic precipitator to wet gas scrubbers will increase hazardous waste disposal from a given refinery, and the EIR does not contain an adequate discussion regarding this hazardous waste disposal issue.

Chevron, PBF (DB), PBF (JF), PBF (ML), PBF Energy

Response: The 2018 Final EIR and CEQA Initial Study address the potential impacts from hazardous waste generation and disposal. The Initial Study discusses potential impacts from the operation of controls, and concluded that controls would not be expected to generate additional hazardous or solid waste that requires disposal, and waste streams from affected facilities would be treated/disposed/recycled in the same manner as they currently are handled. Therefore, no significant impacts to solid or hazardous waste disposal facilities were expected due to the project. Facilities are expected to continue to comply with all applicable federal, state, and local statutes and regulations related to solid and hazardous wastes.

These documents have been included with the package for proposed amendment to Rule 6-5 for consideration by the Air District Board of Directors.

The Air District has not properly analyzed air quality impacts under CEQA

Comment: Commenters stated that the Air District has failed to fully analyze and mitigate significant air quality impacts for wet gas scrubbers. Commenters stated that the proposed ammonia limit could jeopardize opacity compliance and increase NO_x emissions from FCCUs. Commenters state that ammonia injection reduces NO_x emissions through selective catalytic reduction on catalyst fines trapped in the ESP, and replacing the ESP with a WGS will eliminate this co-benefit and result in increased NO_x emissions or need to install additional NO_x control technology.

Commenters stated that there is an optimal range for ammonia addition (and slip), and the limit proposed in the rule is below the optimal range and may result in actual increases of filterable PM emissions for the sake of poorly defined decreases in condensable PM emissions. Commenters stated that their review of an EIR for the installation of a wet gas scrubber in a Bay Area refinery shows that a wet gas scrubber achieves equivalent control of particulate emissions compared to electrostatic precipitators, and showed a net increase of 2.1 tons/year of PM

associated with the wet gas scrubber. One commenter stated that wet gas scrubbers could result in an unintended increase in total PM emissions from the water droplets containing elevated ammonium salt levels evaporating.

Commenters stated that regenerative wet gas scrubbers use an amine solution which could result in increased toxic air contaminant emissions.

Commenters stated that the installation of wet gas scrubbers could result in a potential increase of exposures compared to current electrostatic precipitator emissions. Commenters stated that the electrostatic precipitator emits a relatively dry exhaust at high temperatures which results in PM dissipating in the upper atmosphere over the refinery, while the wet gas scrubber will have a cool, wet plume resulting in a highly visible plume that will go into the local community. Commenters stated that the Air District's model shows that a wet gas scrubber will have more ground-level exposure for equivalent emissions.

Chevron, PBF (BN2), PBF (JF)

Response: Affected refineries would be required to comply with all currently applicable NOx standards, therefore no additional NOx increases would be anticipated. The Air District also disagrees with the assertion that selective catalytic reduction or other effective NOx control systems could not be used in conjunction with a wet gas scrubber, as other wet gas scrubber installations also employ selective catalytic reduction or otherwise achieve stringent NOx limits.

While the Air District recognizes that there is an optimal ammonia injection range for filterable PM control with electrostatic precipitators, affected refineries would be required to comply with all proposed limits, including ammonia and total PM₁₀ limits. As described in the Staff Report, compliance with these requirements is achievable with wet gas scrubbing controls.

The Air District disagrees with the claim that wet gas scrubbing does not achieve additional PM emission reductions compared to electrostatic precipitators. Furthermore, the Air District disagrees with the commenter's interpretation of the information in the Valero Improvement Project EIR, which indicated a net reduction in particulate emissions resulting from installation of a WGS. The increase of 2.1 tons per year of PM cited by the commenter is in reference to the Valero Improvement Project Addendum, which evaluates the changes in environmental impacts related to subsequent project amendments compared to the original project, not to the current electrostatic precipitator control levels (City of Benicia, 2008).

The commenter's claim of increased PM emissions from evaporating water droplets containing elevated ammonium salt levels is inconsistent with published literature which indicates that use of wet gas scrubbers applied to FCCU abatement, consistently results in net decreases in total PM, PM₁₀ and PM_{2.5} emissions. In addition, ammonium salt formation can, and should, be addressed in any wet gas scrubber design by the manufacturer and can be effectively controlled by implementing manufacturer recommended abatement device operational practices. Any increase in ammonium salt emissions would be an indicator of a poorly designed abatement system or operation in manner inconsistent with manufacturer specifications. Ammonium salts are considered part of the total particulate catch, so all care should be exercised during the wet gas scrubber design phase to consider this particulate matter fraction in the abatement plan. The

claim is also in direct conflict with the Emission Impact Report (EIR) submitted by Valero Refining Company Benicia Refinery in support of the Valero Improvement Project in May 2008, which indicated a net reduction in particulate emissions resulting from installation of a wet gas scrubber (City of Benicia, 2008).

The claim of increased toxic air contaminant emissions from the use of amine solution in regenerative wet gas scrubbers is not supported or substantiated. In addition, affected refineries would be required to comply with all currently adopted and applicable regulations and limits on toxic air contaminants. Therefore, no additional impacts would be anticipated.

The Air District recognizes that dispersion characteristics of exhaust from electrostatic precipitators and wet gas scrubbers differ, however, significant emissions reductions are achievable through the use of a wet gas scrubber, as described in the Staff Report. As shown in the Staff Report and PM modeling results, the substantial emission reductions achieved through wet gas scrubbing result in overall net reductions in exposure.

City of Benicia, 2008. Valero Improvement Project – Addendum to VIP EIR, SCH No. 2002042122. June.

The Air District has not properly analyzed aesthetics impacts under CEQA

Comment: Commenters stated the Air District has failed to analyze the proposed amendments' significant aesthetics impacts for wet gas scrubbers. Commenters stated that the EIR fails to account for changes to aesthetics that could result from the increased visibility of the new wet gas scrubber plume.

Chevron, PBF (JF)

Response: The 2018 Final EIR and CEQA Initial Study address potential aesthetic impacts from the installation of control equipment, including wet gas scrubbers. The Initial Study discusses potential impacts from the operation of controls, and found that while equipment may be visible outside of the existing industrial facilities, these facilities are located in industrial areas which do not have scenic views or scenic resources. Therefore, they are not expected to have significant adverse aesthetic impacts to the surrounding community, and would not be expected to block any scenic vista, degrade the visual character or quality of the area, or result in significant adverse aesthetic impacts.

Feasibility of Controls and Proposed Limits

Wet gas scrubbing controls are not technically feasible

Comment: Commenters stated that there is no feasible space at the PBF Martinez Refinery to install a wet gas scrubber, and that installation is therefore not technically feasible. Commenters stated that the District has not identified a feasible location for the installation of a wet gas scrubber, or how to relocate equipment that would need to be moved to make room for a scrubber. Commenters stated that the Air District has misconstrued the purpose of hypothetical demolition and relocation costs provided by industry by concluding that it is possible to demolish

and relocate equipment. Commenters stated that the proposed rule must consider each refinery's specific operations and configurations.

PBF (JF), PBF (ML), PBF Energy

Response: Though space is at a premium at refinery sites, the lead time given for implementation of the proposed amendments allows affected refineries to adequately plan, engineer, and design control systems and complete installations necessary to comply with the limits. Space considerations at the PBF Martinez Refinery may require the demolition or relocation of certain equipment to install a wet gas scrubbing system. This is why additional costs for this work were included in the Air District's cost analysis and estimates.

Wet gas scrubbers have been implemented at other refineries with space constraints through different available engineering and design solutions. Notably, the installation of a wet gas scrubber at the Valero Benicia Refinery was constrained by a lack of space, with the scrubber planned to be located on a site with an existing slope. This hillside area was cut and filled, and retaining walls were added to create a new 150,000 square foot pad for the scrubber and other equipment in the abatement train (City of Benicia, 2008; Eichleay, 2021). Each affected refinery will determine what specific abatement system design parameter or configuration is most appropriate to comply with the proposed amendments at their respective site.

City of Benicia, 2008. Valero Improvement Project – Addendum to VIP EIR, SCH No. 2002042122. June.

*Eichleay, Inc., 2021. "Flue Gas Scrubber Project - Benicia, CA".
<https://www.eichleay.com/petroleum-refining>. Accessed April 2021.*

Proposed limits are not achievable

Comment: Several commenters stated that the Air District has not demonstrated that the proposed limits are achievable, and do not meet the requirements of BARCT. Commenters stated that the source test data provided in Appendix B show that multiple facilities with wet gas scrubbers do not reliably meet the proposed limit, and do not include facilities in California. Commenters stated that source tests from other FCCUs with wet gas scrubbers have been omitted from Appendix B, and provide examples of other wet gas scrubbers that do not meet the proposed limit or only meet the limit under certain load conditions. Commenters assert there is a low probability that the proposed limit can be achieved by wet gas scrubbing, and data from Appendix B should be made available so they can be independently evaluated.

Commenters stated that installing a wet gas scrubber does not guarantee compliance with the limits, as some facilities with wet gas scrubbers have PM emissions much higher than the proposed standard. Commenters stated that multiple source tests at the Valero Benicia Refinery exceeded the proposed limit.

Chevron, PBF (DB), PBF (HD), PBF (JF), WSPA

Response: The proposed total PM₁₀ emission limit reflects levels of stringency that have been achieved at multiple FCCUs through wet gas scrubbing controls. Staff reviewed available source test data from fluidized catalytic cracking units at other refineries throughout the US (a summary

of this data is provided in Appendix B). Staff reviewed data from 20 FCCUs, including 9 units with ESPs as primary PM abatement and 12 units with wet gas scrubbers as primary PM abatement (note that one FCCU had installed a wet gas scrubber in 2018, and staff reviewed data from this source both before and after this installation). The data indicated that seven of the 20 FCCUs achieved PM emission levels below the proposed PM limit of 0.010 gr/dscf at 5% oxygen (including six of the reviewed FCCUs abated by WGS, and one FCCU abated by ESP).

The performance of any abatement device is dependent on the design and operation of each specific unit. Optimal performance of control systems can depend on many factors, such as equipment type and design, adequate size/capacity, and proper operation and maintenance. Source test data from FCCUs throughout the US indicates that the proposed limits are achievable, and have been demonstrated at several different units, including at the Valero Benicia Refinery within the Air District's jurisdiction. Although there are also units with test data that do not meet the proposed limit, the less effective performance of some wet gas scrubbing units does not categorically demonstrate that a more stringent level is not feasible or achievable.

Regarding source test data at FCCUs abated by a wet gas scrubber that do not demonstrate emissions below the proposed PM limit of 0.010 gr/dscf at 5% oxygen, it is important to note that as far as the Air District is aware, these FCCUs are not subject to that regulatory limit. Wet gas scrubbers have commonly been required as means of controlling sulfur dioxide emissions and therefore may not be designed and optimized for control of PM. The fact that an FCCU is not achieving PM emissions below 0.010 gr/dscf is therefore not necessarily an indication that compliance is infeasible at that FCCU. By contrast, a source test showing operation below the limit is an indication of feasibility regardless of whether the limit is a regulatory requirement at that FCCU.

The Air District continued to gather data and information on controls and emissions performance throughout this rule development process. Although there may be relevant data from wet gas scrubbers at FCCUs that were not discovered during this process, the Air District expended considerable effort in its search and solicited input from all stakeholders. No relevant data was deliberately excluded from consideration. Emissions performance of different controls were discussed with the affected refineries and industry association in meetings of the Refinery Rules Technical Working Group in 2019, and input was solicited from those stakeholders on other sources of information on emissions performance at that time. Thus there has been a robust review of available emissions performance data in the development of the proposed amendments. All data included in Staff Report Appendix B are already publicly available documents.

Table in Appendix B is intended to provide information on other refineries outside of the San Francisco Bay Area. Outside of the San Francisco Bay Area, only one other refinery in California operates an FCCU abated by a wet gas scrubber system (ConocoPhillips Los Angeles Refinery – Wilmington, CA). In addition, source testing at the Valero Benicia Refinery within the Air District's jurisdiction, which operates an FCCU abated by a wet gas scrubbing system, has also shown achievement of PM emission levels below the proposed PM limit. While some individual source tests at the Valero Benicia Refinery resulted in emission levels at or above the

proposed limit, the proposed total PM₁₀ limit is a long-term limit, and compliance determinations would be based on the average of multiple source tests. The long-term average of source tests at the Valero Benicia Refinery indicates that the FCCU and abatement system would be expected to comply with the proposed amendments.

Proposed timelines are not feasible

Comment: Commenters stated that wet gas scrubbing systems would take many years to build and could not be installed within the next five years. One commenter stated that the installation of a wet gas scrubber would take at least eight years to complete design/engineering, CEQA requirements, permitting, procurement/fabrication/delivery, logistics, construction, and testing, and may be potentially longer due to coordination with planned turnaround outages.

PBF (JF), PBF (RM)

Response: While substantial time may be required for the planning, design, permitting, scheduling, construction, and installation of wet gas scrubbing systems at the affected refineries, real world experience indicates that the timeline in the proposed amendment for implementation of a wet gas scrubber is reasonable and achievable. As discussed in the Staff Report, other installations of wet gas scrubbers have been implemented in comparable timeframes. For example, applications for use permits and Air District permits for the installation of the wet gas scrubber at the Valero Benicia Refinery were originally submitted in 2002 as part of the Valero Improvement Project. The Valero Improvement Project involved several components, and construction of the various elements occurred over several years following approval. Planning and permitting of the project began in 2002, construction of the wet gas scrubber abatement train took place from 2008 through 2010, and operation commenced in 2011 (Valero Benicia Refinery, 2012). The ConocoPhillips Los Angeles Refinery (Wilmington) also installed a wet gas scrubber at the fluidized catalytic cracking unit to meet the requirements of South Coast AQMD Rule 1105.1. The Rule was adopted in 2003, a CEQA Notice of Preparation for the project was issued in 2006, and construction occurred from 2007 through 2008 (SCAQMD, 2010). Construction of a wet gas scrubber at the HollyFrontier Cheyenne Refinery FCCU occurred from 2014 through 2015, with planning of the project starting in 2011 (HollyFrontier Cheyenne Refinery, 2015; Orr, 2015).

The Air District recognizes that completion of a major construction project such as a wet gas scrubber involves steps, such as permitting from county building departments, that are to some extent beyond the control of the refinery. The Health & Safety Code Section 42350 et seq. provides for extension of a compliance date through the issuance of an air district hearing board variance where it can be shown that delay in compliance is due to reasons beyond the reasonable control of the refinery. Variances are generally limited to one year in duration, but may be longer. The Air District believes it is better to address circumstances beyond the reasonable control of the refinery if and when those circumstances arise rather than build extra time into the initial compliance schedule in anticipation that such delays may happen.

Valero Benicia Refinery, 2012. Valero Improvement Project (VIP) Construction Report for the period ending June 30, 2012. August.

South Coast AQMD, 2010. Final Staff Report SOx RECLAIM, Part 1: BARCT Assessment & RTC Reductions Analysis. November.

HollyFrontier Cheyenne Refinery, 2015. "Cheyenne Can Breathe Easier." September.

Orr, Becky, 2015. "Massive scrubber at HollyFrontier will cut pollution, stench," Wyoming Tribune Eagle. April 30.

Proposed timelines should be accelerated

Comment: Commenters stated that compliance deadlines in the proposed amendments should be accelerated to meet the Advisory Council's urgency findings and require the earliest possible date. Commenters suggested the Air District consider shortening the compliance timeframe to provide needed protection in overburdened communities.

350 Bay Area, Community Energy reSource, CBE

Response: The Air District recognizes the need to achieve emission reductions and clean air benefits throughout the Bay Area, including in disproportionately impacted communities. As discussed in the Staff Report, the anticipated installation and implementation of controls may involve substantial time and effort for planning, design, engineering, and scheduling, in addition to the construction of these systems. The effective date in the proposed amendments reflects the earliest feasible date of implementation. As discussed in the Staff Report, other installations of wet gas scrubbers at refineries have required similar timeframes for implementation.

The proposed total PM10 limit cannot be met during startup and shutdown operations

Comment: One commenter stated that the proposed amendments remove the exemption for startup and shutdown operations for the proposed total PM10 limit, and the limit cannot be met during startup and shutdown operations.

WSPA

Response: The startup and shutdown exemptions in the proposed amendments are intended to apply to short-term limits, including the proposed daily ammonia limit and proposed short-term seven-day rolling average emission limit for sulfur dioxide, as described in the proposed amendments Section 6-5-112 and the Staff Report. Such exemptions are not appropriate for long-term limits, including the proposed long-term 365-day rolling average emission limit for sulfur dioxide and proposed total PM10 limit.

Ammonia and sulfur dioxide limits are unnecessary

Comment: Commenters stated because the focus of the rule is particulate matter, limits on ammonia and sulfur dioxide are unnecessary.

Chevron, PBF (ML)

Response: Ammonia and sulfur dioxide contribute to the formation of particulate matter. Control of these components ensures particulate matter is adequately controlled. In addition,

continuous monitoring requirements and short-term limits for ammonia and sulfur dioxide ensure that particulate matter emissions are minimized and controlled on an ongoing basis.

Health Impacts

The Air District's health analysis is not transparent

Comment: Commenters stated that the Air District's presentations to the public regarding the science of PM_{2.5} health effects has not been sufficiently transparent. Commenters stated that the Health Impacts Analysis as presented demonstrates a lack of transparency, and fails to present the full picture, including model uncertainties, to the Board and the public.

One commenter stated that the weakness/unreliability of the correlations is not transparent for the graph showing an association between annual PM_{2.5} and annual mortality. One commenter stated that the Air District does not provide sufficient information regarding the risk coefficients from the epidemiology studies, PM concentrations, or population inputs so that its analysis could be replicated or independently validated.

One commenter stated that BAAQMD has not provided sufficient information to assess the Health Impact Analysis, including data inputs and the full set of modeling results from the BenMAP analysis, including: inputs for population estimates, PM_{2.5} concentrations in each modeled scenario (baseline and controlled conditions), concentration-response functions (CRFs), health incidence data, and results associated with the distribution of potential impacts and the percent of baseline incidence.

One commenter stated that the District fails to present the range of uncertainty in the Health Impact Analysis, instead presenting single values as if they were certain. The commenter stated that BenMAP analyses typically include an assessment of the statistical uncertainty associated with the concentration-response functions, and provides a distribution of impacts from which uncertainty bounds can be obtained. The commenter stated that confidence intervals would present the full range of potential impacts, possibly including no benefit from the Proposed Amendments.

One commenter stated that BenMAP analyses assume a log-linear response between exposure and health effects, and models this response without consideration for a threshold below which effects may not be measurable and does not consider, for example, a health effect threshold as a lower bound (such as the NAAQS). The commenter stated that some of the concentration-response functions used in the Health Impact Analysis (i.e., for mortality based on a meta-analysis) are not well justified, and the District fails to discuss the impact of using different concentration-response functions.

Chevron, PBF (JF)

Response: The US EPA's Policy Assessment for Review of the PM NAAQS is intended to serve as a bridge between science and rulemaking, interpreting the findings of the US EPA Integrated Science Assessment with respect to existing and potential policy. This document (EPA, 2018) provides a great deal of detail supporting the fact that the current PM NAAQS may not be

sufficiently health protective (see Section 3.3.2.2., Tables 3-7 and 3-8). Section 3.3.3. summarizes the document’s conclusions, stating that “the current primary PM2.5 standards could allow a substantial number of PM2.5-associated deaths in the U.S.”

With respect to the transparency of PM2.5 health impacts, the Air District’s Advisory Council has held 10 public meetings related to various aspects of the science of PM2.5 health impacts, starting on March 11, 2019, and concluding on December 16, 2020, with a joint meeting of the Advisory Council and the Air District Board of Directors. The Air District has used publicly available tools approved by the US EPA to estimate health impacts and have presented methods and findings at public meetings of the Stationary Source Committee and at a Public Workshop on February 4, 2021.

Details of the air quality health impact analysis are reported in Appendix A.2 (Chevron Richmond Refinery) and in Appendix A.3 (PBF Martinez Refinery). These two appendices provide the details of the application of the US EPA’s Benefits Mapping and Analysis Program-Community Edition (BenMAP-CE or BenMAP), the preparation of the modeling-based PM2.5 concentrations, descriptions of the population data used, and the health endpoint studies applied. The Air District has made these modeled concentration datasets available via public records requests and the publicly available BenMAP model includes the needed population information and health response functions such that experienced modelers could repeat the Air District’s process and check findings. The Air District continues to make available all datasets requested in accordance with Public Record Act requirements.

Apart from the modeled PM2.5 concentrations, several key inputs are publicly available and accessible through the freely downloadable BenMAP-CE platform. These include: population estimates; baseline health incidence data; and concentration-response functions (CRFs). In addition to the extensive documentation included in Appendices A.2 and A.3, to the best of our knowledge, the Air District has provided the commenter with all electronic modeling files they have requested via public records requests and held video conference calls to answer questions related to such requests.

The Air District focused on presenting ranges of estimates for mortality and cardiovascular impacts, which together dominate the bottom-line valuations. These ranges reflect the impact of using different response functions (i.e., relying on different studies). Additional sources of uncertainty, including sources that cannot be feasibly quantified, have been acknowledged in Section V.E.3, “Limitations and Comparability”, of the Staff Report. The Air District has responded to recently submitted public records requests regarding BenMAP output, which includes confidence intervals associated with the modeled response functions. None of those confidence intervals include zero; as such, all reject the possibility of “no benefit”. For reference, please see the USEPA BenMAP technical documentation.

The BAAQMD Advisory Council Particulate Matter Reduction Strategy Report, Particulate Matter: Spotlight on Health Protection, in statement PMRS 5 (page 6), found that “there is no known threshold for harmful PM2.5 health effects; thus, it follows that additional reductions of PM2.5 concentrations will achieve additional public health benefits.” This statement is supported by the U.S. EPA’s 2019 Integrated Science Assessment for Particulate Matter. Section 1.5.3

explains the concentration-response relationship observed between PM2.5 exposure and health effects, stating that recent studies “continue to provide evidence of a linear, no-threshold relationship between both short- and long-term PM2.5 exposure and several respiratory and cardiovascular effects, and mortality.” Sections 11.1.10 (short-term exposure) and 11.2.4 (long-term exposure) provide further discussion of this concentration-response relationship, evidence regarding its linearity, and the lack of a PM2.5 threshold below which deleterious health effects are not observed.

In the context of this specific assessment, please also note that BAAQMD has modeled changes in PM2.5 within a policy-relevant range that is approximately $10 \mu\text{g}/\text{m}^3 \pm 10\%$. Effects within this policy-relevant range have been the subject of many studies; for reference, please see the meta-analysis that BAAQMD included in its evaluation (Vodonos et al., *Environmental Research*, 166:677-689, 2018, Figure 1). For the purposes of this assessment, the possibility of a threshold outside of this range is moot. The relevant issue is the effect of moving from $10 \mu\text{g}/\text{m}^3$ to $9 \mu\text{g}/\text{m}^3$, not moving from $1 \mu\text{g}/\text{m}^3$ to zero.

Regarding the selection of health studies and response functions used in the Staff Report, BAAQMD was guided by four aims: (1) coverage of the suite of studies typically selected by US EPA for regulatory impact analyses; (2) coverage of California-specific findings; (3) balanced and comprehensive coverage of a wide range of recent studies on the most highly-valued endpoint (mortality); and (4) interests and concerns raised by the Board and by public commenters. To satisfy the second and third aims, BAAQMD evaluated a California-specific study (Jerrett et al., *Am J Respir Crit Care Med*, 188(5):593-599, 2013) as well as a meta-analysis of mortality (Vodonos et al., *Environmental Research*, 166:677-689, 2018). The relative risk estimates for mortality taken from those were, respectively, 1.06 for a $10 \mu\text{g}/\text{m}^3$ increase in PM2.5 and 1.0129 for a $1 \mu\text{g}/\text{m}^3$ increase in PM2.5. However, including those studies did not affect the overall results (i.e., reported ranges). The minima and maxima for reported ranges turned out to be determined by the set of studies typically selected by US EPA, which are well justified by EPA documentation in support of numerous regulatory analyses.

EPA, 2018. Integrated Science Assessment for Particulate Matter. October.

PM health impacts are overestimated

Comment: Commenters stated that there are no studies showing the direct health impacts from the Bay Area FCCU PM emissions modeled. One commenter stated that the report should include data on the FCCU mass composition, chemical composition, and an assessment of the toxicological differences between FCCU particulate composition and grass fire, combustion engine, woodsmoke, and cooking particulate. One commenter stated that condensable and secondary PM compounds have not been shown to have significant health impacts.

One commenter stated that BAAQMD fails to present any discussion or acknowledgment of the limitations and uncertainties associated with the epidemiological studies that are the basis of the Health Impact Analysis. The commenter states that causality is difficult to establish because epidemiology studies often have limitations when accounting for confounders and biases, most importantly inadequate individual exposure estimates and the inability to control for many

factors that could explain the association between PM_{2.5} and mortality, such as lifestyle factors like smoking. The commenter states that the speciated components of PM that may be associated with particular adverse health effects are yet unknown, but the analyses in Appendix A.2 assume that all PM species are equally toxic, which makes it a very conservative analysis.

Commenters stated that the Air District is exaggerating and misstating the anticipated health benefits of the proposed regulation, and stated that the science of health effects (from PM) is not exact. The commenter stated that the NAAQS value of 12 µg/m³ was upheld by the EPA in 2012, and is also the California Ambient Air Quality Standards set by California's Office of Environmental Health Hazards Assessment. The commenter stated that the proposed amendments would have no appreciable benefit to measurable PM levels in the Bay Area, which are already well below protective standards in the Martinez area.

One commenter stated that the vast majority of refinery workers and residents in Martinez have not seen ill health impacts; other factors and lifestyle choices may be more responsible for health impacts across the broad population.

Chevron, PBF (DB), PBF (JF), PBF (JS), PBF (ML), PBF (PO), S. Rosenblum

Response: The BAAQMD Advisory Council Particulate Matter Reduction Strategy Report, Particulate Matter: Spotlight on Health Protection, in statement PMRS 9 (p. 7), found that while some species of PM may be more dangerous than others, as of yet, no PM species can be exonerated. This statement is supported by the U.S. EPA's 2019 Integrated Science Assessment for Particulate Matter, which reviewed the body of new PM research since 2009. Section 1.5.4 reviews the evidence regarding health effects of specific components or sources of PM. The authors conclude that "the evidence does not indicate that any one source or component is consistently more strongly related with health effects than PM_{2.5} mass."

Regarding causality: EPA's final Integrated Science Assessment (ISA) for Particulate Matter (EPA/600/R-19/188) finds that there is a causal relationship between PM_{2.5} and mortality, the health endpoint that constitutes over 90 percent of the valuation of BAAQMD-modeled health impacts. The same also finds that PM_{2.5} causes impacts on cardiovascular health; cardiovascular impacts are the second most highly valued endpoint in BAAQMD's assessment. The scientific consensus is clear: PM_{2.5} causes these health impacts.

The Preamble to the EPA Integrated Science Assessment explains the methodology for their Framework for Causal Determinations as follows: "In the ISA, the U.S. EPA assesses the body of relevant literature, building upon evidence available during previous NAAQS reviews, to draw conclusions on the causal relationships between relevant pollutant exposures and health or environmental effects. ISAs use a five-level hierarchy that classifies the weight of evidence for causation. This weight-of-evidence evaluation is based on the integration of findings from various lines of evidence from across health and environmental effect disciplines that are integrated into a qualitative statement about the overall weight of the evidence and causality." EPA is not relying on any one study for their causal determinations, but integrating results over many studies across disciplines.

The BAAQMD Advisory Council Particulate Matter Reduction Strategy Report, Particulate Matter: Spotlight on Health Protection, in statements PMRS 1-6 (pp. 6-7), found that the NAAQS value of 12 $\mu\text{g}/\text{m}^3$ is not health protective, and that PM is the most important health risk driver in Bay Area air quality.

Health impacts from causes other than PM are outside the scope of BAAQMD's supplemental assessment. The scientific studies on which BAAQMD is relying have estimated impacts from PM after adjusting for other factors.

PM health impacts are underestimated

Comment: One commenter stated that health benefits from reducing PM are known to be greater than those estimated by staff, and many other health impacts linked to PM exposure are not included in the modeled health benefits. The commenter stated that the Advisory Council's strong findings on PM should be included and explained for the Board of Directors' consideration of the proposed amendments to Rule 6-5.

350 Bay Area

Response: Regarding the selection of health studies and response functions used in the Staff Report, BAAQMD was guided by four aims: (1) coverage of the suite of studies typically selected by US EPA for regulatory impact analyses; (2) coverage of California-specific findings; (3) balanced and comprehensive coverage of a wide range of recent studies on the most highly-valued endpoint (mortality); and (4) interests and concerns raised by the Board and by public commenters. The Advisory Council's findings are discussed and referenced throughout the Staff Report.

Socioeconomic Impact Analysis

Socioeconomic impacts are underestimated

Comment: Several commenters stated that potential socioeconomic impacts of the proposed amendments are significant and underestimated, and the Air District has not performed a fair and accurate assessment of the socioeconomic impacts. Commenters stated that the threshold used to evaluate the significance of potential socioeconomic impacts is arbitrary, and refinery economics cannot be based on corporate profit. Commenters also stated that the COVID-19 pandemic has heavily impacted the petroleum industry, and these impacts should be taken into account when estimating future revenue.

Commenters stated that the potential measures described to mitigate the significant socioeconomic impacts are not feasible. Commenters stated that the ability to pass through costs to consumers are determined by market forces for feedstocks and products at the local and global scale, not by the percentage of corporate profits. Several commenters asserted that the PBF Martinez Refinery would be forced to closed, resulting in much higher job losses than estimated by the Air District and impacts to other businesses.

Commenters stated that the Air District is not making a good faith effort to minimize these socioeconomic impacts as required under the California Health and Safety Code Section 40728.5.

Chevron, Martinez Chamber, PBF (JF), WSPA

Response: The Socioeconomic Impact Analysis includes an evaluation of the potential significant socioeconomic impacts as required by California Health and Safety Code Section 40728.5, and describes the methodologies, data sources, and assumptions used in the analysis. As described in the Socioeconomic Impact Analysis, the proposed amendments to Rule 6-5 have the potential to result in significant socioeconomic impacts.

State law does not require an air district to use a threshold for significance as part of the Socioeconomic Impact Analysis. The Air District believes the 10 percent threshold for significance is a useful analytic tool even if it is not required, and serves as a reasonable benchmark for significant impacts. The 10 percent threshold was reviewed and validated by Dr. Peter Berck, who served as a Professor in Agriculture and Resource Economics in the UC Berkeley College of Natural Resources until 2018. Dr. Berck wrote extensively on environmental policy and had recently developed economic models used by both the Air Resources Board and the State Department of Finance. The Air District uses standard methodologies and publicly reported data to provide a consistent and standardized framework for analyzing and comparing different rules, amendments, control measures, and other emission reduction programs.

As discussed in the Socioeconomic Impact Analysis, with the current recession starting in 2020 due to the COVID-19 pandemic, it may be expected that refinery production levels will be affected, with associated financial impacts and job reductions at the facilities. It is difficult to predict the time frame for recovery from this current recession related to the COVID-19 pandemic, as there remains much uncertainty on the ability of consumers and businesses to resume previous levels of economic activity given the significant loss of income. However, the implementation costs associated with amendments to Rule 6-5 are not scheduled to occur for several years, at which time the economy is projected to recover to near pre-pandemic levels. Most economic forecasts project that the US economy will have substantially recovered from the COVID-19 related economic downturn early in this time frame. For example, in February 2021, the Congressional Budget Office projected that real GDP will recover to pre-pandemic levels by the middle of 2021, and that employment levels will recover in 2024 (CBO, 2021). Therefore, the refinery economic data prior to the recession is a more relevant benchmark for the impacts of the proposed compliance costs, and the socioeconomic analysis is based on financial indicators from the refinery in 2019.

The Socioeconomic Impact Analysis indicated that the profitability of the affected refineries would be significantly impacted, and includes a discussion of potential adjustments that may be considered by the affected refineries to reduce these impacts to less than significant levels. California Health and Safety Code Section 40728.5 identifies the loss of jobs as a potentially significant socioeconomic impact and the Socioeconomic Impact Analysis identifies the incremental loss of jobs that could occur under one possible mitigation scenario. In another scenario, the proposed amendments could result in gas price increases. The affected facilities

have not provided sufficient data to evaluate which potential mitigation measures they would be most likely to adopt.

The Socioeconomic Impact Analysis indicates that while the costs of the rule would significantly impact profitability of the affected refineries, the facilities would remain able to generate profits. Therefore, while the analysis indicates that impacts would be significant and business adjustments would be anticipated, the analysis does not assume that the facilities would close as a result of the proposed amendments. While the analysis discusses some of the potential adjustments that the affected facilities may consider, staff cannot predict individual business decisions or actions that the affected facilities may elect to take. These decisions may involve a number of other considerations beyond the scope of the proposed amendments. If management at PBF Martinez decided to close the facility, the closure could eliminate an estimated 650 jobs directly at the plant and additional jobs from supplier companies through multiplier effects. Again, based on the available data, the Socioeconomic Impact Analysis concludes that the facilities could still maintain some level of profitability after absorbing the identified compliance costs associated with the proposed amendments, and would not be expected to result directly in the plant closure.

Throughout the rule development process for amendments to Rule 6-5, staff has presented information, discussed, and solicited public input on multiple control options with different potential socioeconomic impacts. The consideration of these different control options with different impacts enables the Air District Board of Directors to make a good faith effort to minimize these impacts while considering the goals and purpose of the proposed amendments.

Congressional Budget Office (CBO). 2021. An Overview of the Economic Outlook: 2021 to 2031. <https://www.cbo.gov/publication/56965>. February 1.

Socioeconomic impacts are overestimated

Comment: Commenters stated that the significance threshold of 10 percent of profit loss is outdated and arbitrary, and results in potential job loss estimates that are not substantiated. Commenters also stated that fuel cost impacts are small and within daily price variations. Commenters stated that potential job creation from the installation of wet gas scrubbers should be estimated and included in the analysis.

One commenter also stated that profits at the Chevron Richmond Refinery are underestimated, and higher refinery profit ratios should be assumed for the refinery. The commenter stated that average refinery profits over multiple previous years are higher than the 2019 profits and should be used in the analysis instead of the single year of 2019. The commenter also stated that the analysis does not account for the value of tax write-offs.

350 Bay Area, CBE, J. Kilbreth

Response: As noted above, the Air District is not required to use any particular threshold of significance in the Socioeconomic Impact Analysis. A significance threshold is intended as a useful analytic device.

Comments on the relative price increases of gasoline are consistent with the statements in the Socioeconomic Impact Analysis that note the potential price increases are well within the level of gas price fluctuations that normally occur due to changes in demand and supply factors annually. While the analysis discusses some of the potential adjustments that the affected facilities may consider, the Air District cannot predict individual business decisions or actions that the affected facilities may elect to take. These decisions may involve a number of other considerations beyond the scope of the proposed amendments.

The Socioeconomic Impact Analysis notes that the cost to purchase and install the required control technologies would translate to added jobs and income in the Bay Area region. This construction-related labor would be temporary, and estimates of construction-related labor for the installation of control equipment would be uncertain at this point prior to the specific design and construction planning of any projects. For example, a major improvement project at Valero Benicia Refinery, which included the installation of a WGS and several other major capital improvements, was estimated to require a work force of roughly 200 construction employees. (City of Benicia, 2002). An improvement project at the ConocoPhillips Los Angeles Refinery in Wilmington also included the installation of a WGS and wet ESP among other improvements. The environmental analysis for that project did not estimate the total construction workforce anticipated, but estimated a maximum of 100 workers per day traveling to the site during construction (South Coast AQMD, 2007).

The Socioeconomic Impact Analysis describes the methodology and data sources used to develop the estimates of annual profits of each affected refinery. The estimates rely heavily on data available from a variety of sources, including Corporate reports filed with the Securities Exchange Commission (SEC), data from the US Census County Business Patterns and Census of Manufactures, the US Internal Revenue Service, and reports published by the California Energy Commission (CEC) that track gasoline prices and cost components as well as refinery production levels. The information and data used in this analysis do not support the assertion that refinery profit ratios should be higher than those estimated, nor do they support the assertion that the Chevron Products Richmond refinery earnings per barrel are significantly higher than other Chevron refineries. However, there are uncertainties and limitations inherent in the development of profit estimates based on the publicly available data. Air District staff and contractors rely on standard methodologies and publicly reported data to provide a consistent and standardized framework for analyzing and comparing different rules, amendments, control measures, and other emission reduction programs.

Refinery profits and financial performance vary from year to year. However, there has been an overall declining trend in California gasoline demand since 2017, and demand is not forecasted to increase over the next several years (Schremp, 2021). Therefore, staff believes information from the 2019 provides a more reasonable estimate of performance than the previous years of higher gasoline demand.

The Socioeconomic Impact Analysis notes that the estimates do not include potential tax savings associated with the depreciation of capital expenditures. The EPA Air Pollution Control Cost Manual notes that depreciation of capital can factor into potential tax savings, however, taxes are not uniformly applied, and subsidies, tax moratoriums, and deferred tax opportunities distort how

the direct application of a tax works. Because the application of these potential tax savings can be speculative and uncertain, the estimates in the analysis conservatively do not include potential tax savings, and notes this in the report.

City of Benicia, 2002. Valero Improvement Project – Draft EIR, SCH No. 2002042122. October. SCH No. 2006111138

Schremp, Gordon (California Energy Commission). 2021. BAAQMD Board of Directors Special Meeting Presentation – “Transportation Fuels Trends, Jet Fuel Overview, Fuel Market Changes & Potential Refinery Closure Impacts”. May.

South Coast AQMD, 2007. Final EIR for ConocoPhillips Los Angeles Refinery PM10 and NOx Reduction Project, SCH No. 2006111138. June.

Socioeconomic impacts to small businesses were not analyzed

Comment: Commenters stated that the socioeconomic analysis does not support the finding that small businesses are not disproportionately impacted by the proposed amendments. Commenters stated that there is no analysis for impacts on small businesses that rely on gasoline for transportation and energy needs.

Chevron

Response: The discussion of small business disproportionate impacts is intended to apply to the three refineries affected by the proposed amendments to Rule 6-5. While the State has used the \$10 million annual sales threshold as one measure to define small business, Government Code Section 11436.3 (January 1, 2017) authorizes the use of a consolidated definition of small business for the purposes of evaluating the impacts of state regulation on businesses within the state. This section uses three criteria:

- 1) Independently owned and operated.
- 2) Not dominant in its field of operation.
- 3) Has fewer than 100 employees.

The three affected refineries are all owned by national corporations and are each estimated to have more than 600 employees. Therefore, they do not qualify as small businesses under California law per California Government Code Section 11346.3.

Socioeconomic impacts do not account for costs related to ESP explosion risk

Comment: Commenters stated the analysis for the proposed amendments and control options should include costs related to ESP explosion risk under the Less Stringent Control Option.

350 Bay Area, Community Energy reSource

Response: The presumption of a catastrophic event such as an ESP explosion is not a standard practice in analyzing potential socioeconomic impacts of a proposed rule or amendment. As discussed in the Staff Report, standard industry practices and vendor safety recommendations, including frequent inspection and maintenance, air filter cleaning, use of hydrocarbon sensors, and electronic controls for process automation can reduce risks from operation of electrostatic precipitators. An investigation of the February 2015 incident at the ExxonMobil Refinery located in Torrance, California by the U.S. Chemical Safety and Hazard Investigation Board identified

weaknesses in the refinery's process safety management system and found that a number of standard industry and safety practices were not followed, contributing to the incident. The analysis assumes that a facility would follow all applicable regulations and standard industry and safety practices. Staff also notes that risks from ESP explosion were discussed in the 2018 Environmental Impact Report for the AB 617 Expedited BARCT Implementation Schedule, and hazard impacts related to ESP controls were found to be less than significant.

Proposed amendments may cause significant impacts on the supply of aviation jet fuel and increase fuel imports

Comment: Several commenters stated that the proposed amendments may cause significant issues for the viability of the refining industry and impacts on the supply of conventional aviation jet fuel needed for airline operations.

Commenters stated that the PBF Martinez Refinery supplies 67% of the aviation jet fuel used in Bay Area airports, and closure of the facility would have impacts on the supply of jet fuel. Several commenters stated that if refineries in the Bay Area are decommissioned due to regulations, fuel will be produced and imported from other countries with less stringent safety and environmental standards.

Airlines for America, EBLC, Mayor of Martinez, PBF (DB), PBF (JF), PBF Energy

Response: The Socioeconomic Impact Analysis indicates that while the costs of the rule would significantly impact profitability of the affected refineries, the facilities would remain able to generate profits. Therefore, while the analysis indicates that impacts would be significant and business adjustments would be anticipated, the analysis does not assume that the facilities would close as a result of the proposed amendments. While the analysis discusses some of the potential adjustments that the affected facilities may consider, it is not possible to predict individual business decisions or actions that the affected facilities may elect to take. These decisions may involve a number of other considerations beyond the scope of the proposed amendments.

Based on the available data, the Socioeconomic Impact Analysis concludes that the facilities could still maintain some level of profitability after absorbing the identified compliance costs. However, CEC staff presented information at the May 5, 2021 Special Meeting of the Air District Board of Directors on potential impacts of refinery closures, including potential impacts on jet fuel (Schremp, 2021). The presentation indicated that a near-term premature refinery closure could result in market impacts. Using market impacts associated with the 2015-2016 outage of the ExxonMobil Torrance Refinery in Southern California as a reference for potential impacts, a premature refinery closure in the near-future could result in greater impacts compared to the 2015-2016 outage, as spare refinery production capacity has been diminished due to the idling of the Marathon Martinez Refinery, the balance of gasoline and diesel supply and demand has tightened, and a potential return to higher jet fuel demand levels may remove additional flexibility from the marketplace. The 2015-2016 outage of the ExxonMobil Torrance Refinery in Southern California also resulted in a price spike of sufficient magnitude to incentivize the over production by other California refiners, as well as increased imports of more expensive gasoline and blending components at a higher level for a sustained period of time. Aside from a potential premature refinery closure over the near-term, however, continued demand declines for gasoline

and fossil diesel fuel over the long-term can create conditions of oversupply that could result in additional refinery consolidation. With respect to the supply of jet fuel, the CEC presentation (Schremp, 2021) included information about the jet fuel distribution system which indicated that Bay Area airports are supplied with jet fuel through a pipeline system that connects to every Bay Area refinery. This provides some flexibility in supplying that product, including from a refinery that is not impacted by the proposed rule amendments because it does not have any FCCU (Phillips 66 in Rodeo) and a refinery not expected to incur significant additional costs as it has already installed a wet gas scrubber (Valero in Benicia).

Schremp, Gordon (California Energy Commission). 2021. BAAQMD Board of Directors Special Meeting Presentation – “Transportation Fuels Trends, Jet Fuel Overview, Fuel Market Changes & Potential Refinery Closure Impacts”. May.

Statutory Requirements

The Air District has not demonstrated authority to adopt the proposed amendments

Comment: Commenters stated that the Air District has not adequately demonstrated its authority to adopt the proposed amendments, and the Air District cites no specific authority to impose emissions limitations on FCCUs at Bay Area refineries. Commenters state that the Air District fails to mention AB 617 and California Health and Safety Code 40920.6.

PBF (JF), WSPA

Response: Relevant authority to adopt the proposed amendments are cited as appropriate in the Staff Report and in these responses to comments. AB 617 and Health & Safety Code Section 40920.6 are cited where appropriate.

The Air District has not explained the necessity to adopt the proposed amendments

Comment: Commenters state that the Air District has not fully explained the necessity of amending Rule 6-5. Commenters state that while the Air District asserts that the proposed amendments are “necessary” because the Bay Area is not in attainment for certain PM standards, the emissions reductions achieved by Rule 6-5 represent less than 1% of current PM emissions in the Bay Area and would not bring the area into attainment with relevant standards. Commenters state that the Air District does not explain why it must regulate PM emissions from Bay Area refinery FCCUs, or why it must mandate WGSs as the control equipment to meet emissions requirements rather than other alternatives considered by the District that are cost-effective, achieved in practice, and significantly reduce FCCU emissions. Commenters state that AB 617 does require BARCT planning in general, but does not mandate that the District impose a specific form of BARCT on a particular emissions source, and does not necessitate any amendment to Rule 6-5.

Chevron, PBF (JF), WSPA

Response: Health & Safety Code Section 40727(a) requires that air district adoption of a rule must be supported by certain findings, among them a finding of “necessity” for the rule. “Necessity” is defined in Section 40727(b) to mean that “a need exists for the regulation, or for

its amendment or repeal, as demonstrated by the record of the rulemaking authority.” The meaning of “necessity” in Section 40727(a) is further illuminated by Health & Safety Code Section 40001(c) which provides that “prior to adopting any rule or regulation to reduce criteria pollutants, a district shall determine that there is a problem that the proposed rule or regulation will alleviate and that the rule or regulation will promote attainment or maintenance of state or federal ambient air quality standards.”

These statutory provisions do not require a showing that a proposed rule will, by itself, bring about compliance with ambient air quality standards. Nor do these provisions require a comparison of a proposed rule with other rules that may be possible to adopt. Contrary to what the comments imply, the finding of “necessity” need not be based on a showing that proposed rule is the only available option for reducing emissions, or even that it is the best available option. Moreover, a finding of “necessity” may be supported even where ambient air quality standards have been achieved if the rule is an appropriate measure to help maintain that status. Read together, Sections 40727 and 40001 clarify that the “necessity” finding is a demonstration based on the rulemaking record that a proposed rule will achieve progress towards attainment or maintenance of federal or state ambient air quality standards.

The Air District does not assert that AB 617 is related to the finding of “necessity” required by Section 40727(a). The Air District’s position is that a “necessity” finding for the proposed amendments could be supported even if the amendments did not also implement AB 617.

The Air District has not met the clarity requirements to adopt the proposed amendments

Comment: Commenters stated that the Air District does not make an adequate demonstration of the Health and Safety Code requirements for “clarity”.

PBF (JF), WSPA

Response: As discussed in the Staff Report, the California Health and Safety Code Section 40727(b)(3) states that “‘Clarity’ means that the regulation is written or displayed so that its meaning can be easily understood by the persons directly affected by it.”

The proposed amendments to Rule 6-5 are written so that its meaning can be easily understood by the persons directly affected by them, and further details in the Staff Report clarify the proposals, delineate the affected industry, compliance options, and administrative requirements for the industries subject to this rule. The Air District has responded to comments indicating a perceived lack of clarity regarding specific rule language.

The Air District has not met the consistency requirements to adopt the proposed amendments

Comment: Commenters stated that the Air District does not make an adequate demonstration of the Health and Safety Code requirements for “consistency”. Commenters stated that proposed amendments are not consistent with federal regulations due to differences in the definition of “condensable particulate matter” and methods to measure filterable PM.

Chevron, PBF (JF), WSPA

Response: Comments regarding the consistency of these definitions and methods are addressed in the responses to comments in the “Testing Requirements” section.

The Air District has not met the non-duplication requirements to adopt the proposed amendments

Comment: Commenters stated that the Air District does not make an adequate demonstration of the Health and Safety Code requirements for “nonduplication”. Commenters stated that the Air District must make a finding that the proposed amendments are not a duplication of existing requirements, and the new monthly reporting requirements would be duplicative with existing Regulation 1-522.8. Commenters stated that the source test reporting requirement is redundant with Title V permit conditions for the refineries that already require notification prior to testing and are duplicative of current state and federal law.

Chevron, PBF (JF), WSPA

Response: Comments regarding the duplication of reporting requirements are addressed in the responses to comments in the “Testing Requirements” section.

The Air District has not met the reference requirements to adopt the proposed amendments

Comment: One commenter stated that the Air District does not make an adequate demonstration of the Health and Safety Code requirements for “reference”. The commenter states that the “reference” discussion in the Staff Report faces the same problems as the Staff Report’s “authority” discussion by failing to address BARCT requirements arising from AB 617.

PBF (JF), WSPA

Response: As discussed in the Staff Report, the California Health and Safety Code Section 40727(b)(6) states that “‘Reference’ means the statute, court decision, or other provision of law that the district implements, interprets, or makes specific by adopting, amending, or repealing a regulation.” By adopting the proposed amendments to Rule 6-5, the Air District Board of Directors will be implementing, interpreting or making specific the provisions of California Health and Safety Code Sections 40000, 40001, 40702 and 40727. Additional statutory provisions or other sources of authority are referenced where appropriate throughout the Staff Report and these responses to comments.

Comments regarding authority are addressed in the responses to comments elsewhere in this “Statutory Findings” section.

Testing requirements

EPA Method 202 used by the Air District overestimates PM

Comment: Commenters stated that the test method used by the Air District results in artifacts that overestimate condensable PM. Commenters stated that EPA Method 202 is seriously flawed because it includes PM associated with condensation of the water vapor from the gases.

Commenters state that EPA Method 202 requires that stack gas be cooled with no dilution, which condenses water in the stack gas causing absorption of ammonia, sulfate, and nitrate species to form salts that are inappropriately assessed as PM emissions. Commenters state that source test results at the FCCUs show that condensable PM samples contain significant amounts of sulfate and ammonium. Commenters stated that because the sulfuric acid is captured as filterable PM, the sulfate is a result of the sulfur dioxide water artifact.

Commenters state that the US EPA has revised EPA Method 202 multiple times to address artifacts and has not yet finalized its 2017 proposed revisions. Commenters state that the US EPA's proposed revisions to EPA Method 202 identify that limitations of the method include that "High moisture in the sampled gas stream can result in the accumulation of SO₂ in the collected moisture resulting in a positive bias for CPM measurements. As the moisture accumulates in the sample impingers, the method performs similarly to the original version of Method 202 where SO₂ in the effluent could react in the condensed moisture and form sulfuric acid that may be counted erroneously as CPM."

Chevron, PBF (BN2), WSPA

Response: In 2010 the EPA adopted revisions to EPA Method 202 to include dry impingement, and other changes, which addressed sulfur dioxide artifact formation in the sample collection system. The prior version of the method bubbled the sampled stack gas through water within the impingers where sulfur dioxide could dissolve and later form sulfuric acid that would add to the condensable particulate mass. As mentioned in the comment, the dry impingement method does not condense water vapor from the sampled stack gas. However, the dry impingement method does not allow adequate mixing and residence time for enough sulfur dioxide to dissolve into the condensed water to form any significant amounts of sulfate (75 FR 80118; EPA, 2016). Prevention of sulfate artifacts is further addressed by the required post-test nitrogen purge which will strip sulfur dioxide from the condensate before it has had time to form sulfate. This further reduces any potential bias attributed to sulfur dioxide.

The formation of condensable particulate matter from sulfate, nitrate, ammonia, and their associated salts in the EPA Method 202 dry impingement system has not been shown to be solely associated with water vapor condensation interactions. Further, it has not been shown that these chemical species are being formed as an artifact from precursors due to water-based reactions in the vapor phase or during condensation. Although it is possible to infer that water condensation could aid to some extent in the capture of these species, it cannot be inferred that these species are being created from artifact precursors in that process. Air District and EPA definitions of condensable particulate matter include contributions from these chemical species. Any of these chemical species that exist as filterable particulate matter at stack conditions or condense upon cooling to a defined temperature range of 68°F to 85°F need to be quantified and included in a measurement of total primary particulate emissions, including PM₁₀ and PM_{2.5}. These chemical species are included in measures of ambient PM₁₀ and PM_{2.5} and when preparing emission inventories, so should be correctly attributed as primary contributions directly from emission sources rather than inappropriately attributed to secondary precursors.

While sulfuric acid may appear as filterable PM at certain stack gas conditions the application of appropriate source test methodology can minimize or eliminate this effect and properly partition

this form of sulfate into the condensable particulate fraction rather than the filterable fraction. Any sulfate, nitrate, ammonia or associated salts present at the point of sampling are considered condensable particulate matter. Only sulfates formed directly from sulfur dioxide and condensed water interaction in the EPA Method 202 sampling train would be considered sulfate artifact which has already been addressed by method improvements and EPA guidance.

Although the US EPA's 2017 proposed revisions to EPA Method 202 have not yet been adopted, the EPA has already addressed issues related to remaining sulfuric acid artifact formation due to sulfur dioxide in their published EPA Method 202 Best Practices Handbook (EPA, 2016). Prior to water condensation occurring to the extent that the stack gas is bubbling through the collected condensate the test run should be paused; the collected condensate should be recovered; and then the test run can be resumed. The condensate should be purged with Ultra High Purity Nitrogen as soon as possible and included with the total condensate catch for analysis.

Federal Register, Vol. 75, Page 80118. (75 FR 80118) December, 2010.
United States Environmental Protection Agency (EPA). 2016. EPA Method 202 Best Practices Handbook. <https://www.epa.gov/emc/method-202-condensable-particulate-matter>. March.

Other measurements methods such as OTM-37 are more appropriate

Comment: A number of comments focused on the relative merits of EPA Method 202, which is the source of much of the data underlying the proposed emission limits, and Method OTM-37, which was judged by the Air District to be a less reliable source of data regarding particulate emissions from FCCUs. Commenters state that dilution sampling tests using Method OTM-37 conducted on Bay Area refinery FCCUs have consistently shown significantly lower PM emissions than methods used by the Air District. Commenters state that measurement method OTM-37 more properly simulates the physical behavior of the cooling stack gas by cooling the mixture with dilution air, and information should be provided on these other test methods being studied. Commenters state that the US EPA is currently in the process of doing side-by-side comparisons of Method OTM-37 and the methods that the Air District has used, specifically in regard to their application at sources with sulfur dioxide and ammonia emissions like FCCUs. Commenters stated that dilution sampling methods were evaluated extensively in the early 2000s for turbines and external combustion sources, and the US EPA and multiple other countries have accepted the results of those tests. Commenters state that the Air District has allowed the use of such dilution test methods to demonstrate permit compliance in a Major Facility Review Permit issued to Russell City Energy Company, LLC in Hayward, CA in September 2019, and the proposed amendments should allow use of OTM-37.

Chevron, PBF (BN2), PBF (JF), WSPA

Response: The Air District disagrees with the commenters' assertion that method OTM-37 provides a more representative measurement of condensable particulate matter. OTM-37 has not been adequately evaluated by the US EPA, nor has it been proven in practice, and there is no evidence that cooling with ambient air provides a more representative measurement of condensable particulate matter than cooling without dilution. There are many physical, chemical, temporal and phase change interactions occurring both at the stack exit and within the sampling systems that need to be considered. EPA Method 202 is the reference test method for

quantification of condensable particulate matter, meaning it is the only method that has been thoroughly evaluated and accepted by the US EPA as valid. There are some indications from the limited data available that use of OTM-37 reports significantly lower condensable particulate matter as compared with EPA Method 202. The discrepancy in results between the two methods needs to be adequately explained before OTM-037 can be considered for regulatory use.

Other Test Methods (OTM) are methods that have been submitted to the US EPA for consideration but have not been subjected to the rigorous evaluation and assessment needed to be accepted as promulgated methods or approved alternatives. OTMs are posted on the US EPA website because they may have some efficacy or usefulness in information gathering efforts, but they are not intended to be used for regulatory determinations except in cases where no other viable alternative exists. EPA Method 202 has undergone the level of evaluation necessary to become the promulgated reference method and is the current basis for how primary condensable particulate matter is defined.

Following a delay due to COVID-19 remote work requirements, US EPA staff have indicated that they plan to resume research work intended to evaluate the efficacy of OTM-37 and how the data generated compares with EPA Method 202. That work should also explore the reasons why OTM-37 results in lower condensable particulate matter, including physical, chemical, temporal and phase interactions that occur within the sampling system. US EPA also indicated in an April 2021 meeting that it will be at least two years before any results will be available for regulatory review and evaluation. It will take some time following that until a determination of equivalency or non-equivalency can be made. Until that process is completed, and a determination is released by the US EPA, the Air District will not accept results generated using OTM-37 for use in regulatory or policy determinations.

Although permit conditions for some facilities permitted by the Air District, including the Russell Energy Center, allow the facility to “propose” the use of dilution tunnel methods to quantify condensable particulate matter, the Air District has never approved the actual use of dilution tunnel methods and to staff’s knowledge these methods, including OTM-37, have never been performed in the Air District for compliance or regulatory determinations. The Air District only accepts EPA Method 202 for quantification of condensable particulate matter and will not approve the use of dilution methods until the US EPA publishes a determination of their efficacy or officially grants approval as a promulgated or alternative method.

The proposed use of EPA Method 201A is not feasible when water droplets are present downstream of a wet gas scrubber

Comment: Commenters state that EPA Method 201A is inappropriate for filterable PM measurement in wet stacks where water droplets are present, such as downstream of a wet gas scrubber. Commenters state that EPA Method 201A states “you cannot run this method to measure emissions in which water droplets are present.” Commenters state that US EPA has not promulgated a method for measuring the PM10 size fraction in exhaust streams where water droplets are present. Commenters state that it is possible to measure filterable total PM downstream of wet gas scrubbers using a different method (such as EPA Methods 5, 5B, 5F, 5I, or the modified SCAQMD Method 5.2 that is used for compliance with the SCAQMD filterable

PM limit for FCCUs), but that measurement is of total PM, not PM10, which effectively means the proposed limit applied to total PM, not total PM10.

One commenter suggested that EPA Method 5 should be added as an alternative test method for wet gas scrubbers, and the rule provide for alternative methods to be used if approved in writing by the APCO.

Chevron, Valero, WSPA

Response: The proposed amendments require EPA Method 201A to be used for testing and compliance determination requirements, but also include provisions to allow for other PM emission monitoring methods to be used with the written approval of the APCO per proposed Section 6-5-503.2. Considerations for acceptable monitoring methods include known method limitations and appropriate alternatives for specific testing conditions; for example, EPA Method 201A acknowledges the limitations of using this method to measure emissions in which water droplets are present, as the size separation of the water droplets may not be representative of the dry particle size emitted. For these emissions, EPA Method 201A recommends using EPA Method 5. The use of these accepted alternative monitoring methods could be considered for approval by the APCO on a case-by-case basis, as described in proposed Section 6-5-503.2.

Testing frequency should be reduced

Comment: Commenters stated that facilities should be allowed to decrease testing frequency from quarterly to annually if test results are consistently well below the proposed limit or if certain objective criteria are met. Commenters stated that at least two refineries are currently required to source test annually for PM, and results over the last five years from this testing have demonstrated very low variability. Commenters stated that a four-time increase in testing frequency is not supported by the source testing results.

Valero, WSPA

Response: The proposed amendments include provisions for the use of alternative emission monitoring systems for PM approved in writing by the APCO. This provision is intended to provide flexibility to affected facilities in meeting the monitoring requirements using other appropriate methods and techniques as approved in writing by the APCO. Alternative monitoring systems and techniques, including the use of different testing schedules, combinations of source testing, development of correlation equations, parametric monitoring, and monitoring of other process or emission parameters, may be considered, provided that these systems and techniques can appropriately provide equivalent information and sufficient data to evaluate compliance with applicable limits.

These are examples of some of the potential alternative systems and techniques that may be considered for approval, but approval of any alternative PM monitoring system by the APCO would require a thorough and robust technical review by Air District staff.

Opacity monitoring under high moisture conditions

Comment: Commenters state that the amended regulation should provide for compliance with the opacity limit to be demonstrated by parametric monitoring approved by the APCO. Commenters state that Regulation 1-520 can be read to suggest that continuous opacity monitors (COMS) must be installed to determine opacity from the catalyst regenerators of fluid catalytic crackers. Commenters state that while COMS are suitable for determining opacity under dry conditions, the COMS optical technology will not function correctly in a wet stack because of the high moisture content. Commenters request that the draft rule language be amended to address this engineering dilemma by allowing parametric monitoring approved by the APCO. Commenters state that the Air District's current FCCU monitoring requirements for continuous opacity monitoring systems are inconsistent with the requirement for a wet gas scrubber because droplets in the WGS exhaust invalidate the COMS measurement.

Valero, WSPA

Response: The proposed amendments do not include any proposed changes to the currently adopted opacity monitoring requirements in Regulation 1 Section 1-520, and the requested changes are beyond the scope of the proposed amendments.

Definitions of condensable particulate matter are not consistent with other regulations

Comment: Commenters state that the Air District's proposed definition of condensable particulate matter is inconsistent with federal regulations. Commenters state that the proposed definition of "condensable particulate matter" is unnecessarily different from the definition of that same term in federal regulations, including the regulatory section where the compliance test method is located, and the final regulation needs to be in harmony with the federal regulations and have the same definition of the term "condensable particulate matter" pursuant to H&SC 40727(b)(4). Commenters state that the proposed rule cites to the EPA Test Method 202, but fails to use the same definition as is included in federal regulation 40 CFR 51.50 and 40 CFR 51 Appendix M, EPA Method 202, Section 3.1.

Chevron, WSPA

Response: The EPA definition of "PM10 emissions" can be found in 40 CFR 51.100(rr), as follows: *40 CFR 51.100(rr) PM10 emissions means finely divided solid or liquid material, with an aerodynamic diameter less than or equal to a nominal 10 micrometers emitted to the ambient air as measured by an applicable reference method, or an equivalent or alternative method, specified in this chapter or by a test method specified in an approved State implementation plan.* Further, 40 CFR Part 51.165(a)(1)(xxxvii)(D) states: *"PM2.5 emissions and PM10 emissions shall include gaseous emissions from a source or activity which condense to form particulate matter at ambient temperatures."*

The approved, and promulgated, EPA reference method for determination of condensable particulate matter emissions is EPA Method 202. Equivalent or alternative test methods have not been approved in the federal regulations or in California's State implementation plan. The commentor referenced language from H&SC 40727(b)(4) reads as follows: *"Consistency"*

means that the regulation is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations.

The Air District finds the adopted definition in Regulation 6 Section 206.6 and proposed Rule 6-5 Section 6-5-203, as provided below, to be consistent with the federal definitions:

Regulation 6 206.6 Condensable PM: Liquid droplets that coalesce, or gaseous emissions that condense to form liquid or solid particles. These liquid and/or solid particles are identified using EPA Test Method 202. If necessary, alternate approved test methods may be used as described in Regulation 2-1-603.

Draft Regulation 6-5-203 Condensable Particulate Matter: Liquid droplets that coalesce, or gaseous emissions that condense to form liquid or solid particles. These liquid and/or solid particles are identified as condensable organic or condensable inorganic particulate matter using EPA Test Method 202.

Methods for measuring filterable PM are not consistent with other regulations

Comment: Commenters state that the proposed Rule requires a different method to measure filterable PM than the federal requirements in NSPS Subpart J. Commenters state that the Air District is proposing EPA Method 201A, which requires that the temperature of the probe and filter box be $250 \pm 25^{\circ}\text{F}$, but Subpart J requires the use of EPA Methods 5B and 5F, which require a probe and filter box temperature of $320 \pm 25^{\circ}\text{F}$. Commenters state that the affected refineries will need to use two methods to measure the same pollutant and the proposed amendments are not consistent with federal regulations.

Chevron, WSPA

Response: The proposed use of EPA Method 201A is for the measurement of filterable PM₁₀, while the requirements to use EPA Methods 5B and 5F in NSPS Subpart J are intended to measure filterable PM. There is therefore no inconsistency with federal regulations.

Compliance testing must be conducted by the Air District

Comment: Commenters state that refineries must not be allowed to self-monitor and self-report their own compliance. Commenters stated that source tests for compliance must be conducted by the agency or contractors retained by the agency and recouped by fees.

350 Bay Area, Community Energy reSource

Response: As the US EPA's delegated agency for the region, the Air District is tasked with oversight of source testing conducted within the geographical boundaries of its authority. Although Air District staff and management greatly appreciate and value the unique in-house source testing capabilities that the agency possesses, and staff routinely conduct source testing throughout the Bay Area to improve emission inventories, establish emission factors, audit facility compliance, perform special projects and collect needed emissions data for policy development, the Clean Air Act firmly establishes that the burden of maintaining and showing compliance with emission standards rests on the owners and operators of regulated facilities.

This burden to maintain and confirm compliance extends to all source testing and monitoring activities and requires facilities to directly bear the costs to perform field sampling and report the results in accordance with regulatory requirements and standards. The specific test requirements and standards are codified in Air District, State and Federal regulations, permit conditions, the Air District Manual of Procedures and guidance documents.

Owners and operators are required to notify the Air District of all scheduled source tests, submit test plans for review when necessary and submit final reports, documenting the results and test conditions during the testing performed, for review and approval by highly trained and qualified Air District technical staff. These test reports are reviewed in intricate detail to ensure that facility source tests conform to all reference method and Air District requirements, and confirm that the reported results are accurate, representative, and defensible. In cases where the testing is determined to be deficient, the source test results submitted are disapproved, resulting in mandatory retesting and/or recommendation for possible violation when determined appropriate. Test results documenting failures to comply with emission, or associated, limitations are referred to the Compliance & Enforcement Division for further evaluation of potential violations.

Source tests are performed by highly qualified professional staff, who are typically specialty consultants hired by the facilities, utilizing approved and promulgated reference test methods as codified in the Code of Federal Regulations, the California Health and Safety Code and Air District documents.

Continuous Emissions Monitors and source testing provide different information

Comment: One commenter stated that Continuous Emissions Monitors can measure direct emissions on a continuous basis, while source testing can provide relevant information but is only a snapshot of time.

PBF (AN)

Response: While Continuous Emissions Monitors (CEMs) and source tests both provide valuable and relevant emissions information, each technique may have unique advantages, limitations, and constraints. The feasibility and cost of CEMs were important factors in determining the appropriate monitoring method for the proposed amendments. The proposed amendments to Rule 6-5 include requirements for source testing to demonstrate compliance with the proposed limits. However, other PM monitoring systems would be considered pursuant to Section 6-5-503.2.

Delays in source testing have delayed rulemaking efforts

Comment: One commenter stated that delays in source testing have further delayed the rulemaking effort for the proposed amendments. One commenter stated that starting in 2015, the District made numerous commitments to gather current CPM data using EPA approved methodologies but failed to collect any current data until late 2020 at the PBF Martinez Refinery, and the lack of data required to develop a technically valid rule has been a known deficiency since 2015.

350 Bay Area, PBF (JF)

Response: The Air District hired a source test contractor in 2016 to perform a particulate testing engineering study at on the exhaust of CO Boiler #2 at the PBF Martinez Refinery. This testing was conducted to collect baseline particulate emission data for Rule 6-5 ammonia optimization plan projects and quantified total particulate emissions, which included both total filterable and condensable particulate matter emissions. This is the only CPM testing commitment from 2015 of which staff is currently aware. However, in the process of developing the draft rule, and making a determination, staff reviewed numerous source test reports from FCCUs equipped with both wet gas scrubbers and electrostatic precipitators.

Reporting requirements are duplicative

Comment: Commenters stated that the Air District must make a finding that the proposed amendments are not a duplication of existing requirements, and the new monthly reporting requirements under a new Section 6-5-404 is unnecessary as it would be duplicative with existing Regulation 1-522.8. Commenters stated that the source test reporting requirement is redundant with Title V permit conditions for the refineries that already require notification prior to testing and are duplicative of current state and federal law.

Chevron, WSPA

Response: The monthly reporting requirement in Regulation 1-522.8 applies to Continuous Emission Monitors. The proposed amendments allow for the use of other monitoring systems where Regulation 1-522.8 reporting requirements may not apply. Therefore, the requirements in proposed Section 6-5-404 are necessary to ensure all relevant monitoring data is reported and are not duplicative.

The proposed amendments also allow for the use of other emission monitoring systems for Total PM10 and Total PM2.5, which may include a combination of source testing and/or other monitoring methods. Therefore, the proposed reporting requirements are necessary to ensure all relevant monitoring data is reported and are not duplicative.