



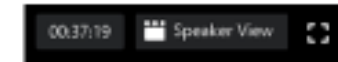
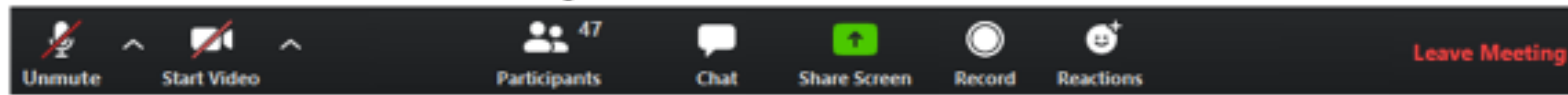
BAY AREA  
AIR QUALITY  
MANAGEMENT  
DISTRICT

# Public Workshop on Draft Amendments to Rule 6-5

Virtual Public Workshop  
February 4, 2021

# How to Use Video Conferencing

## Black menu bar at top or bottom of screen:



**Audio**  
Please mute yourself when not speaking

**Video**

**Participants**

- See Others
- Rename Yourself (Name & Group/Agency Affiliation if applicable)
- Raise Hand (remember to lower after)

**Chat Feature**  
Questions can be chatted at any time

**View**  
Gallery/Speaker View of videos and screen share can be changed in top right corner

Note: The Air District will be recording this public workshop

# Technical Assistance



- If you need technical assistance, please use the chat function and direct your question to “**Jennifer – Tech Support**”
- You can also contact Jennifer via phone, text or email at:
- (650) 784-0107 or [jelwell@baaqmd.gov](mailto:jelwell@baaqmd.gov)

# Welcome and Opening Remarks



Veronica Eady

Senior Deputy Executive Officer of Policy & Equity  
Bay Area Air Quality Management District

# Virtual Participation Principles



- **One** person speaks at a time.
- Be **respectful** of one another's opinions.
- Please **mute** yourself when you're not speaking.
- **Share video** so we can stay visually connected.
- Technology happens – please be **flexible and patient**.
- Remember this is just one meeting in a longer **process**.

# Workshop Agenda



- Introductory poll
- Staff presentation
- Public input
  - Breakout session
  - Questions and comments
- Closing and next steps

# Polling Exercise



We have received many questions, concerns and comments up to this point. Some of the most common sentiments are listed below. **Which one(s) do you identify with?**

- **I support the most stringent wet gas scrubbing technology**
- **I am concerned about potential economic impacts**
- **I am not sure/I need more information**



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# Staff Presentation on Draft Amendments to Rule 6-5

**Virtual Public Workshop**  
February 4, 2021

**David Joe, PE**  
Assistant Manager – Rule Development

**Phil Martien, PhD**  
Director – Assessment, Inventory, & Modeling Division



# Presentation Outline



- Background
- Draft Amendments
  - Control Scenario A
  - Control Scenario B
- Preliminary Estimates of Impacts
  - Emission reductions
  - Compliance costs
  - Socioeconomic impacts
  - Environmental impacts
  - Health impacts
- Next steps and process

# Background



- Fluidized Catalytic Cracking Units (FCCUs) convert heavy components of crude oil into gasoline and high-octane products
- Large source of particulate matter (PM) emissions

<b>Refinery</b>	<b>FCCU PM<sub>10</sub> Emissions</b>
Chevron Products Richmond	245 TPY
PBF Martinez Refinery	309 TPY
<i>Marathon Martinez Refinery</i>	<i>190 TPY</i>
Valero Benicia Refinery	83 TPY
TPY = tons per year	

# Background



- Air District currently developing amendments to Rule 6-5
- Identified two potential control options to reduce PM from FCCUs
- Released workshop package with draft amendments for both control options and information on potential impacts

# Draft Amendments Summary



<b>Pollutant</b>	<b>Control Scenario A</b>	<b>Control Scenario B</b>
<b>Ammonia (NH<sub>3</sub>)</b>	10 ppm	10 ppm
<b>Sulfur dioxide (SO<sub>2</sub>)</b>	25 ppm (365-day average) 50 ppm (7-day average)	25 ppm (365-day average) 50 ppm (7-day average)
<b>Total PM<sub>10</sub></b>	0.020 gr/dscf	0.010 gr/dscf
<b>Effective date</b>	January 1, 2023	January 1, 2026
ppm = parts per million gr/dscf = grains per dry standard cubic foot		

# Affected Refineries



Impact	Control Scenario A	Control Scenario B
<b>Affected refineries</b>	Chevron Products Richmond PBF Martinez Refinery	Chevron Products Richmond PBF Martinez Refinery <i>Marathon Martinez Refinery</i>
<b>Anticipated controls</b>	Improvement/expansion of existing controls: ESP, Feed Hydrotreatment, Catalyst Additives	Installation of new WGS
ESP = electrostatic precipitator WGS = wet gas scrubber		

# Preliminary Estimates of Impacts



- **Emission reductions:** Reductions in pollutant emissions
- **Compliance costs:** Costs for installing and operating controls
- **Cost effectiveness:** Costs per ton of reduction
- **Socioeconomic impacts:** Economic impacts, job losses, consumer impacts
- **Environmental impacts:** Impacts from installation or use of controls
- **Health impacts:** Health benefits associated with reduced pollution

# Emissions and Cost Impacts Control Scenario A



Refinery	PM <sub>10</sub> Reductions	Capital Cost	Total Annualized Cost	Cost Effectiveness
Chevron Richmond	80 TPY	\$30 MM	\$4.4 MM/year	\$55,300/ton
PBF Martinez	170 TPY	\$80 MM	\$14 MM/year	\$84,900/ton
<i>Marathon Martinez</i>	—	—	—	—
TPY = tons per year MM = million				

# Emissions and Cost Impacts Control Scenario B



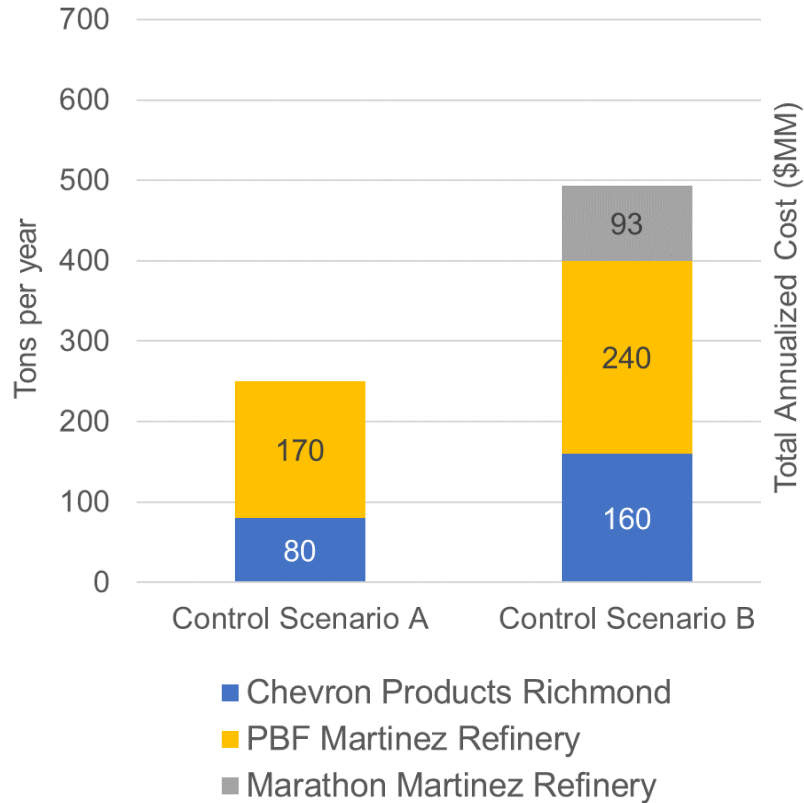
Refinery	PM <sub>10</sub> Reductions	Capital Cost	Total Annualized Cost	Cost Effectiveness	Incremental Cost Effectiveness
Chevron Richmond	160 TPY	\$241 MM	\$39 MM/year	\$239,600/ton	\$423,400/ton
PBF Martinez	240 TPY	\$255 MM	\$40 MM/year	\$165,000/ton	\$359,400/ton
<i>Marathon Martinez</i>	<i>93 TPY</i>	<i>\$235 MM</i>	<i>\$38 MM/year</i>	<i>\$406,400/ton</i>	–
TPY = tons per year MM = million					



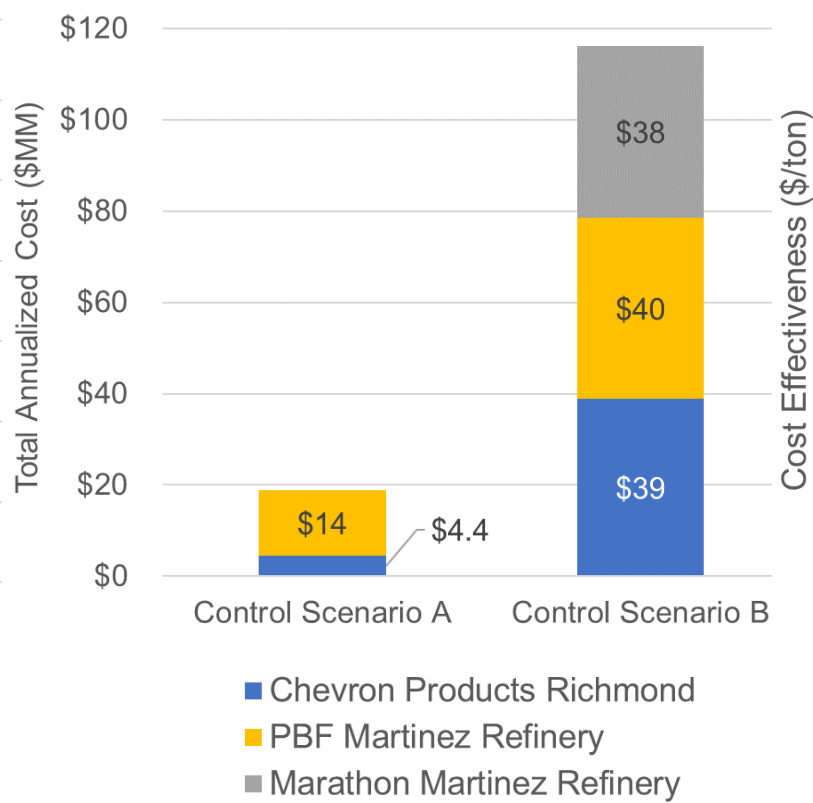
# Emissions and Cost Impacts



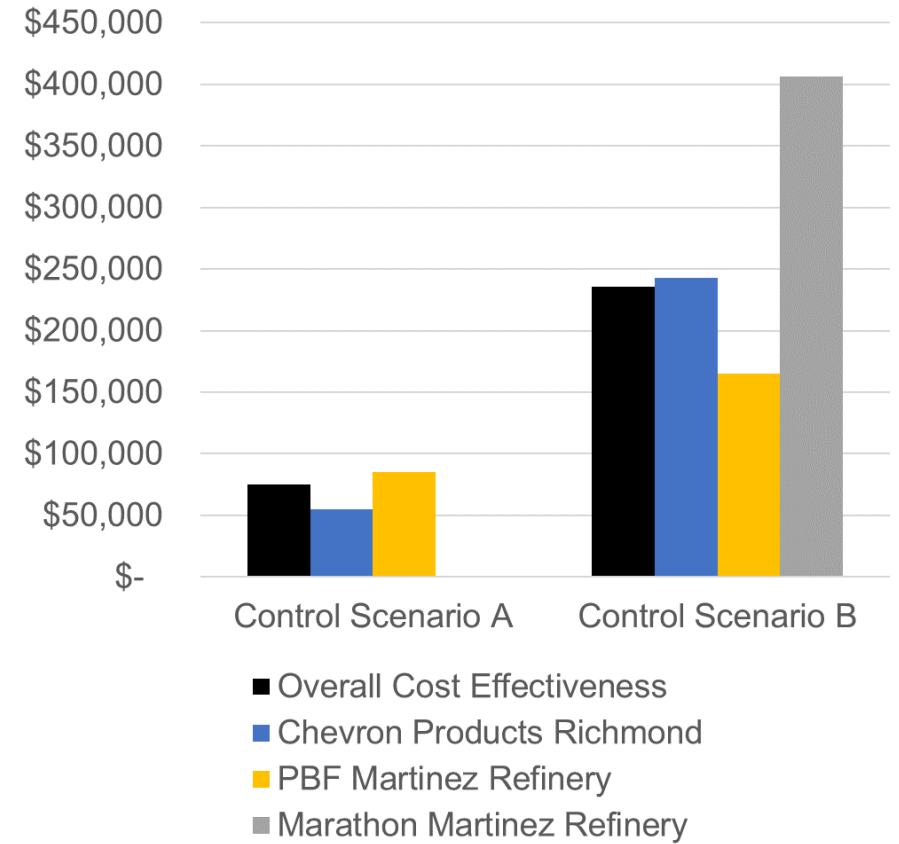
Estimated PM<sub>10</sub> Reductions



Estimated Annualized Costs



Estimated Cost Effectiveness



# Socioeconomic Impacts



- Significant impacts expected when costs exceed 10% of net income
- Potential labor reductions or increased fuel pricing

Refinery	Estimated Annual Net Income (2019)	Control Scenario A		Control Scenario B	
		Compliance Cost (% of Income)	Potential Labor Impacts	Compliance Cost (% of Income)	Potential Labor Impacts
Chevron Richmond	\$282.8 MM	1.6%	N/A	13.7%	62 jobs
PBF Martinez	\$177.7 MM	8.1%	N/A	22.3%	128 jobs
<i>Marathon Martinez</i>	<i>\$146.5 MM</i>	–	–	25.8%	136 jobs
MM = million					

# Environmental Impacts



- Substantial water usage for wet gas scrubbing
- Approximately 400,000 gallons per day for each system
- Technologies and designs available to reduce water impacts, but with increased costs and complexity

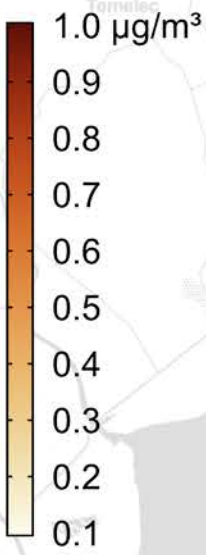
# Health Impact Assessment



## Information on:

- Localized PM<sub>2.5</sub> impacts from Chevron and PBF
- Equity, health, and Rule 6-5 benefits

# Modeled PM<sub>2.5</sub>



*Study area is the region inside the outermost contour*

+0.1 ug/m<sup>3</sup>

*Contours correspond to modeled contributions of +1.0, +0.9, ... +0.1 µg/m<sup>3</sup>*

**Context:** measured total ambient PM<sub>2.5</sub> is 8–10 µg/m<sup>3</sup>

- \* Total ambient (not just from refineries)
- \*\* 8–13 µg/m<sup>3</sup> if including 2017–18 wildfires





- White
- Hispanic / Latino
- Asian / Pacific Isl.
- Afr. Amer. / Black
- Other

# Study Population



*Study area is the region inside the outermost contour*

+0.1  $\mu\text{g}/\text{m}^3$

*Contours correspond to modeled contributions of +1.0, +0.9, ... +0.1  $\mu\text{g}/\text{m}^3$*

**Study area population (2020)**  
is about 1 million residents

# PM<sub>2.5</sub> Exposure Per Capita by Source and Scenario

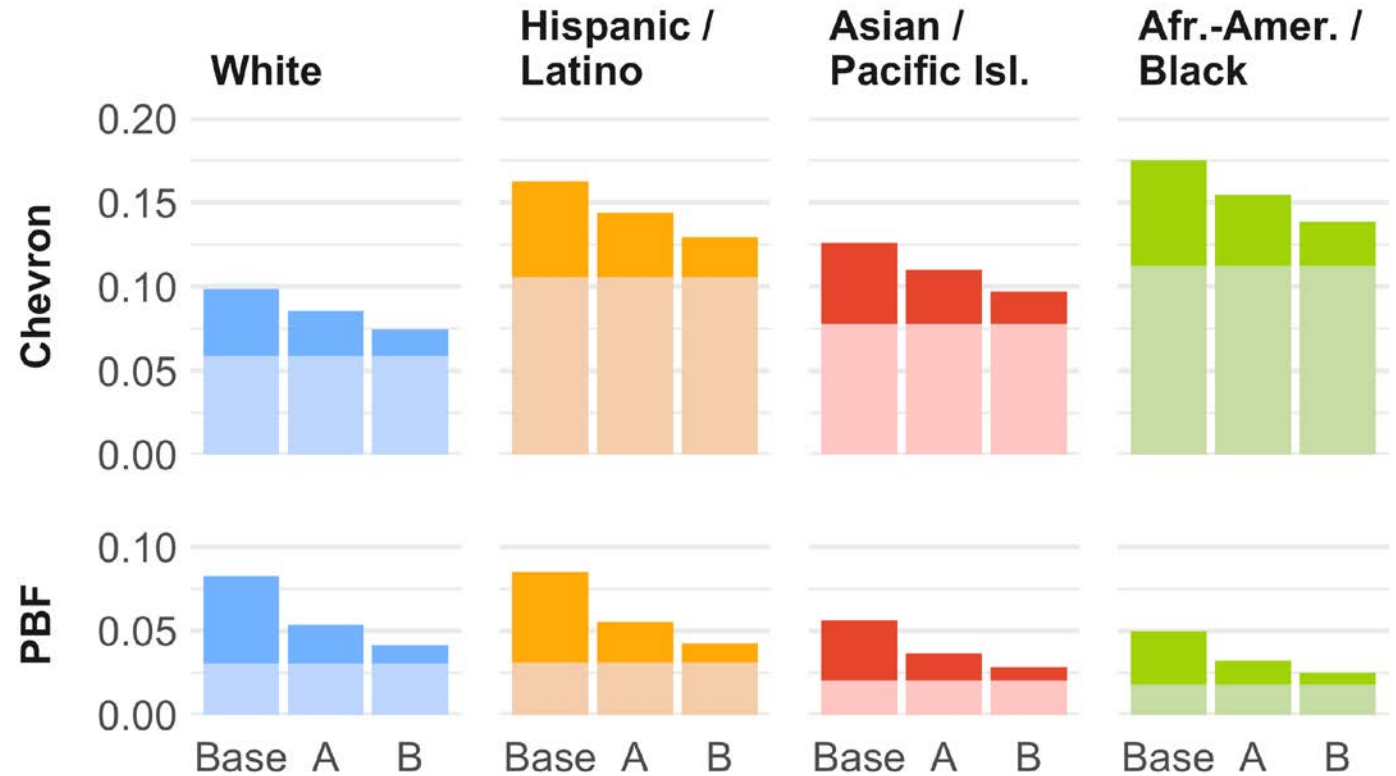


## Disparities in Exposure

- African-American / Black and Hispanic / Latino residents are exposed to more PM<sub>2.5</sub> from Chevron in all scenarios

## Sources other than FCCU

- Drive these disparities
- Remain significant across all modeled scenarios



Base = Baseline; Scenario A = 0.020 gr/dscf; Scenario B = 0.010 gr/dscf  
 Darker colors = Fluidized Catalytic Cracking Unit (FCCU) impacts  
 Bar heights = total impacts (FCCU + Non-FCCU), in µg/m<sup>3</sup>

# Health Impacts and Valuations (Chevron)



Estimated Baseline Health Impact from Modeled Sources (Annual)		Valuation <sup>1</sup> (Annual)	Scenario A	Scenario B
<b>Cardiovascular</b>	0.5–4.3 heart attacks	\$63k–600k	-13%	-22%
	1.0 hospital admissions	\$47k	-13%	-22%
<b>Restricted Activity</b>	4,800 days	\$360k	-12%	-21%
<b>Lost Work</b>	820 days	\$190k	-12%	-21%
<b>Asthma</b>	200 exacerbations <sup>3</sup>	\$12k	-12%	-21%
	4 emergency room visits	\$2k	-12%	-21%
	0.1 hospital admissions	\$1k	-12%	-20%
<b>Respiratory Illness<sup>2</sup></b>	140 upper tract <sup>3</sup>	\$5k	-12%	-20%
	100 lower tract <sup>3</sup>	\$2k	-12%	-20%
	8 bronchitis <sup>3</sup>	\$4k	-12%	-20%
	0.2 chronic lung disease	\$5k	-12%	-21%
<b>Mortality</b>	5.1–11.6 deaths <sup>4</sup>	\$52.5M–118M	-13%	-23%
			<b>\$6.8M to \$15.2M/yr</b>	<b>\$12.2M to \$27.4M/yr</b>

<sup>1</sup> Conventional EPA valuations, in 2015 US dollars

<sup>2</sup> Other than asthma

<sup>3</sup> Subset of pediatric (≤18 years)

<sup>4</sup> Including infant mortality





# Health Impacts and Valuations (PBF)



Estimated Baseline Health Impact from Modeled Sources (Annual)		Valuation <sup>1</sup> (Annual)	Scenario A	Scenario B
<b>Cardiovascular</b>	0.3–2.4 heart attacks	\$37k–350k	-35%	-50%
	0.6 hospital admissions	\$26k	-35%	-50%
<b>Restricted Activity</b>	2,700 days	\$200k	-35%	-50%
<b>Lost Work</b>	460 days	\$100k	-35%	-50%
<b>Asthma</b>	110 exacerbations <sup>3</sup>	\$7k	-35%	-50%
	2 emergency room visits	\$1k	-35%	-50%
	<0.1 hospital admissions	\$1k	-35%	-50%
<b>Respiratory Illness<sup>2</sup></b>	80 upper tract <sup>3</sup>	\$3k	-35%	-50%
	50 lower tract <sup>3</sup>	\$1k	-35%	-50%
	4 bronchitis <sup>3</sup>	\$2k	-35%	-50%
	0.1 chronic lung disease	\$3k	-35%	-50%
<b>Mortality</b>	2.8–6.3 deaths <sup>4</sup>	\$28.8M–64.9M	-35%	-50%
			<b>\$10.1M to \$22.7M/yr</b>	<b>\$14.4M to \$32.4M/yr</b>

<sup>1</sup> Conventional EPA valuations, in 2015 US dollars

<sup>2</sup> Other than asthma

<sup>3</sup> Subset of pediatric ( $\leq 18$  years)

<sup>4</sup> Including infant mortality



# Cost-Benefit Comparisons



Facility	Scenario	Proposed Limit	Projected Costs	Modeled Benefits <sup>1,2</sup>
Chevron	A	0.020 gr/dscf	\$4.4M/yr	\$6.8M to \$15M/yr
	B	0.010 gr/dscf	\$39M/yr	\$12M to \$27M/yr
PBF	A	0.020 gr/dscf	\$14M/yr	\$10M to \$23M/yr
	B	0.010 gr/dscf	\$40M/yr	\$14M to \$32M/yr

<sup>1</sup> Based on conventional US EPA valuations of selected health impacts.

<sup>2</sup> Valuations are in 2015 US dollars, calculated using the US EPA BenMAP system.

# Rule Development Process



- Draft amendments are available for public review and comment
- Consider and evaluate comments and input received
- Staff may solicit further comments and input on additional materials or drafts
- Final proposed amendments
  - Public comment period
  - Considered for adoption by the Air District Board of Directors at a Public Hearing

# Further Comments and Questions



## Comments and Questions

- Comments accepted through March 1, 2021
- Comments received will be posted to website
- Staff available to discuss or answer questions

**David Joe, PE**

Rule Development

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**Phil Martien, PhD**

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[pmartien@baaqmd.gov](mailto:pmartien@baaqmd.gov)

## Materials and Information

<https://www.baaqmd.gov/reg6rule5>

# Breakout Session



## Small Group Discussions

Take a few moments to think about which you feel would be the most appropriate option to bring to the Air District Board of Directors.

1. Control Scenario A (PM<sub>10</sub> limit of 0.020 gr/dscf, achievable through ESP controls)
2. Control Scenario B (PM<sub>10</sub> limit of 0.010 gr/dscf, achievable through WGS controls)
3. Another option not presented or undecided

Note: The Air District will be recording this public workshop

# Technical Assistance



- In just a moment you will receive an invitation to join a breakout room
- Click join to enter the breakout room and wait for your facilitators
- For technical support contact: Jennifer Elwell at:
- (650) 784-0107 or [jelwell@baaqmd.gov](mailto:jelwell@baaqmd.gov)



# Breakout Session Report Out

# Question & Answer Session



- Please mute yourself when you're not speaking
- Please raise your hand if you wish to speak and wait for the facilitator to let you know when you can unmute yourself and speak
- One person speaks at a time
- Be respectful of one another



# Closing and Next Steps



## Comments and Questions

- Materials available at: <https://www.baaqmd.gov/reg6rule5>
- Comments accepted through March 1, 2021
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## Next Steps

- Consider and evaluate comments
- Solicit further comments and feedback as needed
- Proposed amendments and public comment opportunity
- Public Hearing for consideration by Board of Directors

# Workshop Evaluation



## ***The Air District Wants Your Feedback!***

Help us improve our workshops and rule development process by completing this short survey in the link below.

<https://www.surveymonkey.com/r/HYWFCG8>