

Public Workshop for Potential Amendments to

**District Rule 4460
(Petroleum Refinery Fence-line Monitoring)**

**District Rule 3200
(Petroleum Refinery Community Air Monitoring Fees)**

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Workshop Overview

- Background
 - Implementation of AB1647 in the Valley and other regions in California
 - State-provided refinery air monitoring guidance: recommendations for chemicals to monitor, potential health effects, and technology considerations
 - Valley refineries: current regulations, “Hot Spots” program, emissions inventories
- Potential Amendments to District Rules 4460/3200
 - Remove exemptions
 - Require refineries to submit monitoring plan in accordance with new Rule 4460 Guidelines
 - Monitoring requirements based on thorough site-specific analysis
- Next Steps

Background

Assembly Bill (AB) 1647

- AB 1647 (Muratsuchi) signed by Governor of California on October 8, 2017
 - Created due to safety incidents at large refineries in Bay Area and South Coast
- AB 1647 requires:
 - Petroleum refineries develop, install, operate and maintain a fence-line air monitoring system at and near refineries in accordance to guidance developed by CARB and local air district
 - Air districts develop, install, operate and maintain a refinery-related community air monitoring system
 - Real-time data be made accessible to the public
- District adopted Rule 4460 and Rule 3200 in December 2019 through public process to implement requirements of AB 1647

Current District Rule 4460

- Requires refineries to install, operate, and maintain fence-line air monitoring systems and make data collected by these systems publicly available
- Exempts refineries not currently engaged in refining crude oil

Petroleum Refinery Capacity (barrels per day)	Equipment for Fenceline Air Monitoring System	Pollutants to be Considered in Monitoring Plan
Less than 40,000	Point monitoring or open path system	Sulfur dioxide, hydrogen sulfide, BTEX compounds (benzene, toluene, ethylbenzene and xylene)
40,000 or greater	Open path system and point monitoring, as needed	Sulfur dioxide, nitrogen oxides, total VOCs, BTEX compounds, formaldehyde, acetaldehyde, acrolein, 1,3 butadiene, styrene, hydrogen sulfide, carbonyl sulfide, ammonia, hydrogen cyanide, hydrogen fluoride, black carbon

Current District Rule 3200

- As mandated by AB 1647, Rule 3200 recovers District costs of developing and maintaining refinery-related community air monitoring system
- Community monitoring approach and fees based on establishing community air monitoring station with variety of sensors that measure range of possible pollutants and parameters

Reasons for Proposed Amendments

- Recent Fresno County Superior Court ruling (September 2021) provides additional clarification on statutory requirements under AB 1647
- Issues that need to be addressed include:
 - Removal of exemption for affected (“petroleum”) facilities not currently engaged in refining crude oil
 - Re-evaluation and additional supporting analysis with respect to monitoring provisions for petroleum refineries with a refining capacity of less than 40,000 barrels per day (currently requires monitoring for six specific pollutants)
- In response to court order, the District is conducting a public process to develop amendments and additional technical analysis for Rule 4460 and Rule 3200

State Guidance for AB 1647

- In developing guidance, AB 1647 requires the District to take into account:
 - Monitoring technological capabilities
 - Input from affected parties
 - To extent feasible, refinery-related guidance prepared by the State:
 - Refinery Emergency Air Monitoring Assessment Report (REAMAR) prepared by California Air Resources Board (CARB) and California Air Pollution Control Officers Association (CAPCOA)
 - Office of Environmental Health Hazard Assessment (OEHHA) report “*Analysis of Refinery Chemical Emissions and Health Effects*” (September 2017)

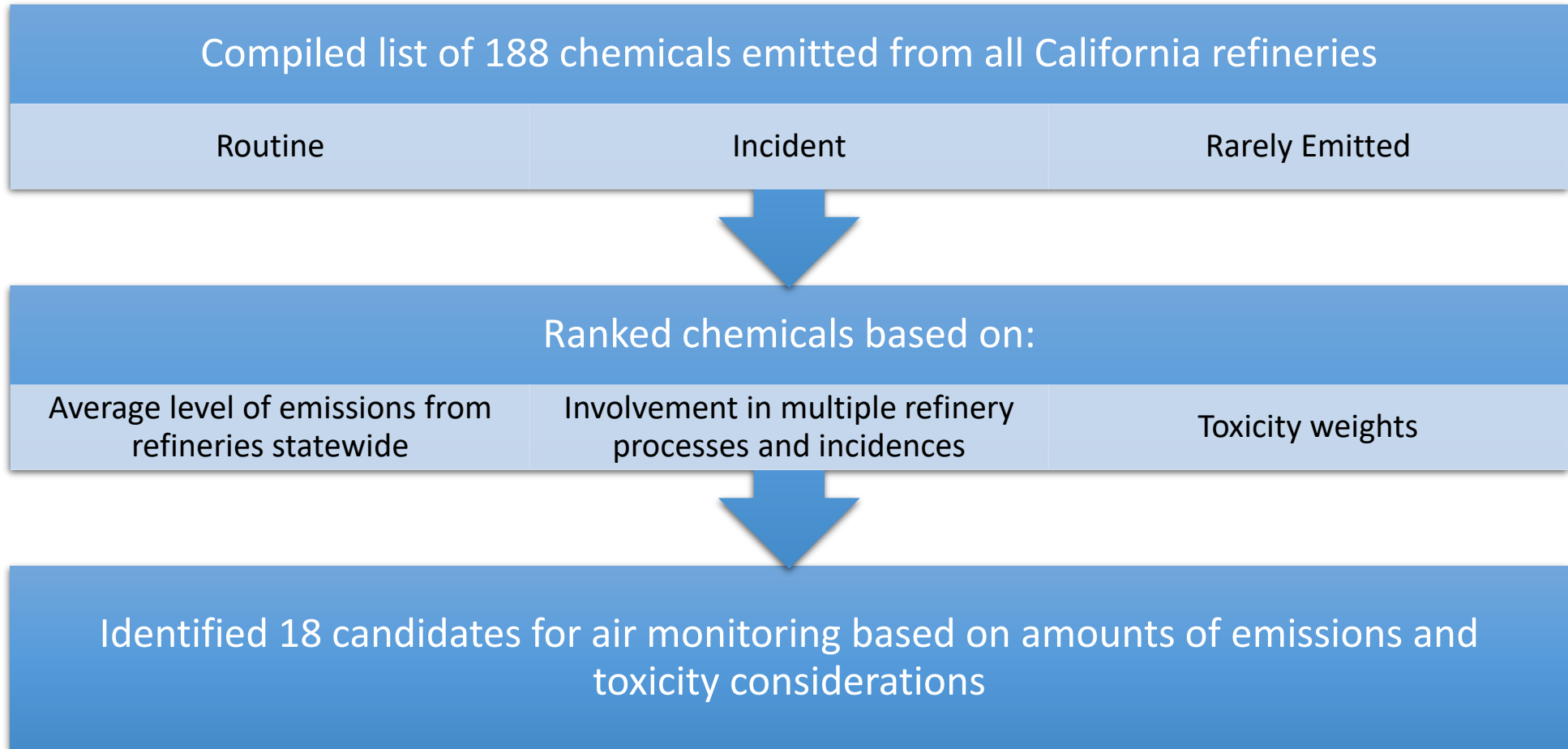
Refinery Emergency Air Monitoring Assessment Report (REAMAR)

- Provides inventory of emergency air monitoring assets and capabilities for refineries in California
- Provides recommendations to improve emergency and routine air monitoring at refineries and in surrounding communities
 - Recommendations cover air monitoring technology, modeling, and coordination
 - Implementing best practices does not imply a one size-fits-all solution for refinery air monitoring
 - Recognizing the variability among refineries, implementation of each recommended strategy must be suited to each facility's size, operations, specific location, and its surrounding receptors, keeping in mind the practical limitations of current and emerging technologies and the timeframes necessary for full implementation

Office of Environmental Health Hazard Assessment

- Presents list of chemicals emitted from California refineries, and identifies 18 top candidates for air monitoring, taking into account emissions levels and toxicity
 - Acetaldehyde
 - Ammonia
 - Benzene
 - 1,3-butadiene
 - Cadmium
 - Diethanolamine
 - Formaldehyde
 - Hydrogen Fluoride
 - Hydrogen Sulfide
 - Manganese
 - Naphthalene
 - Nickel
 - NOx
 - PAHs
 - PM
 - Sulfur Dioxide
 - Sulfuric Acid
 - Toluene
- Sulfur dioxide, hydrogen sulfide, and hydrocarbons were the most commonly reported chemicals emitted during refinery incidents

OEHHA Methodology



California Refineries

South Coast AQMD

	Processing Capacity (bpd)
Marathon Petroleum (Carson/Wilmington)	363,000
Chevron (El Segundo)	269,000
PBF Energy (Torrance)	160,000
Phillips 66 (Wilmington)	139,000
Valero (Wilmington)	85,000
Lunday Thagard, South Gate	8,500
Valero Wilmington Asphalt	6,300

Bay Area AQMD

Chevron (Richmond)	245,271
Marathon Petroleum (Martinez)	166,000
PBF Energy (Martinez)	156,400
Valero (Benicia)	145,000
Phillips 66 (Rodeo)	120,200

San Joaquin Valley APCD

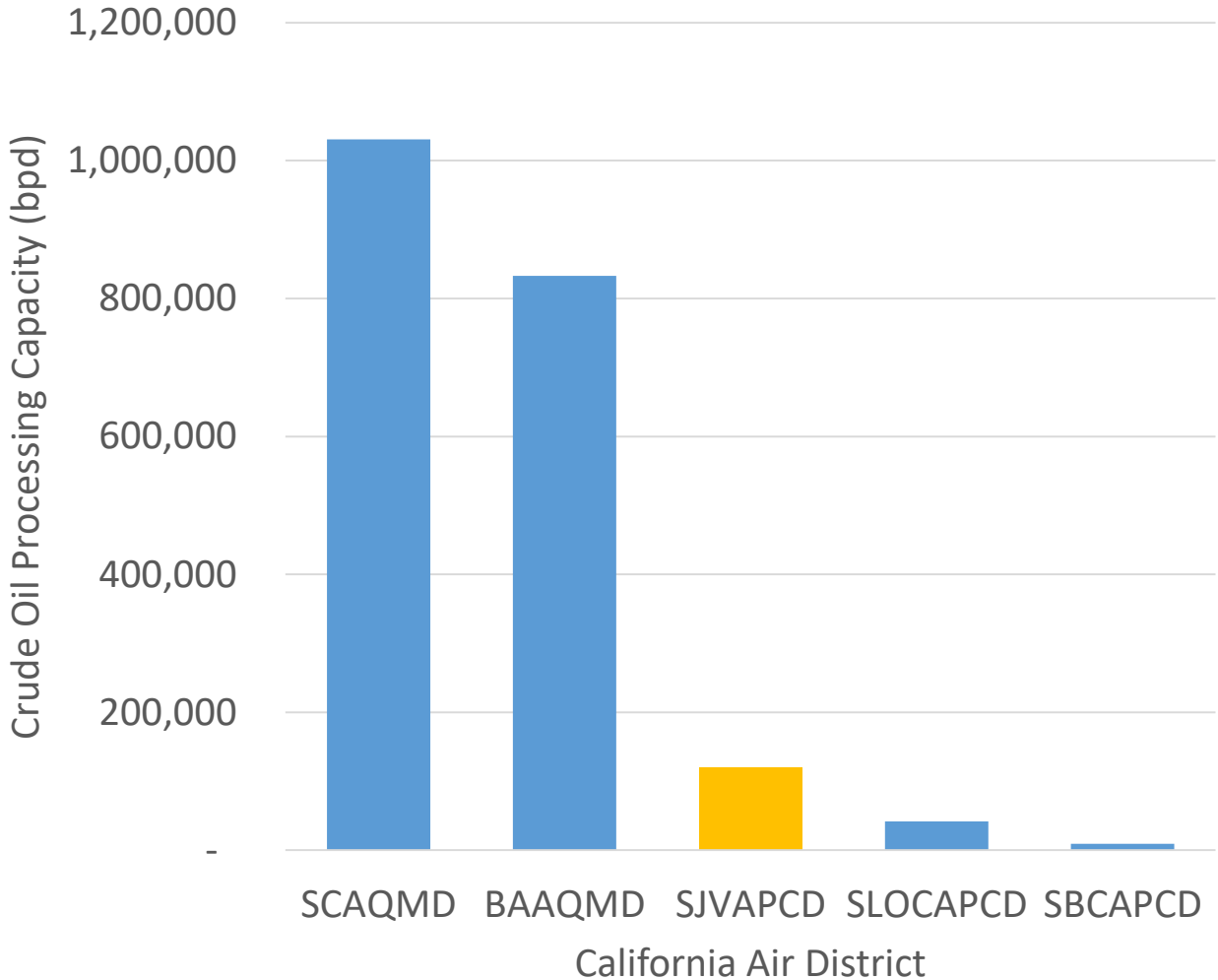
Alon/Bakersfield Renewable Fuels (Bakersfield)	66,000
Kern Oil and Refining Company (Bakersfield)	26,000
San Joaquin Refining Company (Bakersfield)	15,000
Tricor Refining, LLC (Bakersfield)	12,500

San Luis Obispo County APCD

Phillips 66 Santa Maria Refinery (Arroyo Grande)	41,800
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Santa Barbara County APCD

Greka Energy (Santa Maria)	9,500
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Pollutants Required to be Monitored

State OEHHA Recommended Pollutants for Monitoring	SJVAPCD(Rule 4460)		SCAQMD(Rule 1180)		BAAQMD (Reg 12-15)	SLOCAPCD (MOU)	SBCAPCD (Rule 364)
	≥ 40,000 bpd	< 40,000 bpd	≥ 40,000 bpd	< 40,000 bpd			
1,3-butadiene	1,3 Butadiene*		1,3 Butadiene*	No Monitoring Required	1,3 butadiene*		
Acetaldehyde	Acetaldehyde*		Acetaldehyde*				
Ammonia	Ammonia*		Ammonia*		Ammonia*		
Benzene	Benzene*	Benzene*	Benzene*		Benzene*		Benzene
Cadmium							
Diethanolamine							
Formaldehyde	Formaldehyde*		Formaldehyde*				
Hydrogen Fluoride	Hydrogen Fluoride*		Hydrogen Fluoride*				
Hydrogen Sulfide	Hydrogen Sulfide*	Hydrogen Sulfide*	Hydrogen Sulfide*		Hydrogen Sulfide		Hydrogen Sulfide
Manganese							
Naphthalene							
Nickel							
NOx	NOx*		NOx*			NOx	
PAH							
Particulate Matter							
Sulfur Dioxide	Sulfur Dioxide*	Sulfur Dioxide*	Sulfur Dioxide*		Sulfur Dioxide	Sulfur Dioxide	Sulfur Dioxide
Sulfuric Acid							
Toluene	Toluene*	Toluene*	Toluene*		Toluene		Toluene
	Ethylbenzene*, Xylene*, Acrolein*, Black Carbon*, Carbonyl Sulfide*, Hydrogen Cyanide*, Styrene*, Total VOCs*	Ethylbenzene*, Xylene*	Ethylbenzene*, Xylene*, Acrolein*, Black Carbon*, Carbonyl Sulfide*, Hydrogen Cyanide*, Styrene*, Total VOCs*		Ethylbenzene, Xylene, Alkanes or other organic compound indicators*	Black Carbon, VOCs	Ethylbenzene, Xylene

*May be excluded from monitoring if refinery provides sufficient justification in plan

Refinery Fence-line Monitoring in California

	Pollutants Required	Refinery	Processing Capacity (bpd)	Pollutants Identified for Monitoring in Plans
SCAQMD	If processing capacity ≥ 40,000 bpd: 1,3 butadiene, acetaldehyde, acrolein, ammonia, BTEX, black carbon, carbonyl sulfide, formaldehyde, hydrogen cyanide, hydrogen fluoride, H ₂ S, NO _x , SO ₂ , styrene, total VOCs	Marathon Carson/Wilmington	363,000	All except hydrogen fluoride
		Chevron El Segundo	269,000	
		PBF Energy Torrance	160,000	
		Phillips 66 Wilmington	139,000	All except hydrogen fluoride, and additional detectable gases
		Valero Wilmington	85,000	All
BAAQMD	At minimum: BTEX, H ₂ S, SO ₂ Must provide justification for exclusion of: 1,3 butadiene, alkanes or other organic compound indicators, ammonia	Chevron Richmond	245,271	BTEX, H ₂ S, SO ₂ , alkanes
		Marathon Martinez	161,500	All except using hexane as surrogate for alkanes
		PBF Energy Martinez	156,400	BTEX, H ₂ S, SO ₂ , alkanes
		Valero Benicia	145,000	BTEX, H ₂ S, SO ₂
		Phillips 66 Rodeo	120,200	BTEX, H ₂ S, SO ₂ , alkanes
SJVAPCD	If processing capacity: ≥ 40,000 bpd: SCAQMD List < 40,000 bpd: BTEX, H ₂ S, SO ₂	Kern Oil and Refining Co	26,000	BTEX, H ₂ S, SO ₂
		San Joaquin Refining Co	15,000	BTEX, H ₂ S, SO ₂
SLOCAPCD	Black Carbon, NO _x , SO ₂ , VOCs	Santa Maria Refinery	41,800	Black Carbon, NO _x , SO ₂ , VOCs
SBCAPCD	BTEX, H ₂ S, SO ₂	Greka Energy	9,500	BTEX, H ₂ S, SO ₂

San Joaquin Valley Refineries

Facility Name	Location	Processing Capacity (barrels/day)	Pollutants Identified for Monitoring in Current Plans
Alon/Bakersfield Renewable Fuels	Rosedale Highway, Bakersfield, CA	66,000	Not subject to current R4460 (not currently refining crude), however has fence-line monitoring in place as a condition of County permit. Monitors ammonia, H ₂ S, and hydrocarbons.
Kern Oil & Refining Co.	Panama Lane, Bakersfield, CA	26,000	BTEX, H ₂ S, SO ₂ .
San Joaquin Refining Company	Shell Street, Bakersfield, CA	15,000	BTEX, H ₂ S, SO ₂ .
Tricor Refining, LLC	Manor Street, Bakersfield, CA	12,500	Not subject to current R4460 (not currently refining crude). Receiving, storing, and shipping various petroleum products, and production of air-blown asphalt.

Air Quality Regulations – Petroleum Refineries

- Valley petroleum refineries subject to multiple District rules, shown to be most stringent rules feasible for implementation
- Refineries subject to variety of performance standards under local, state, and federal regulations to reduce emissions of air pollutants
 - Refineries required to continuously monitor for leaks
 - Ongoing reporting required
 - Regular District inspections to ensure compliance
- Various federal New Source Performance Standards apply to new and modified equipment at refineries
 - Subparts J and Ja Standards of Performance for Petroleum Refineries
 - Subparts K, Ka, Kb Volatile Organic Liquid Storage Vessels
 - Subpart XX Bulk Gasoline Terminals
 - Subpart GGG and GGGa Equipment Leaks of VOC at Petroleum refineries
 - Subpart QQQ VOC Emissions from Refinery Wastewater Systems

Air Quality Regulations – Petroleum Refineries (cont'd)

- Valley petroleum refineries subject to stringent District regulations, including:
 - Rule 2201 – New and Modified Stationary Source Review Rule
 - Rule 4101 – Visible Emissions
 - Rule 4012 – Nuisance
 - Rule 4311 – Flares
 - Rules 4305 – 4307, 4320, 4351 – Boilers, Steam Generators, and Process Heaters
 - Rule 4453 – Refinery Vacuum Producing Devices or Systems
 - Rule 4454 – Refinery Process Unit Turnaround
 - Rule 4454 – Components at Refineries, Gas Liquids Processing Facilities, and Chemical Plants
 - Rule 4623 – Storage of Organic Liquids
 - Rule 4624 – Transfer of Organic Liquid
 - Rule 4651 – Soil Decontamination Operations
 - Rules 4701 and 4702 – Internal Combustion Engines

Air Toxics “Hot Spots” Act (AB 2588)

- Under state law, requires reporting and assessment of toxic emissions at stationary sources
- Conservative state-established risk screening methodologies
- Recently reassessed Alon/Bakersfield Renewable Fuels, San Joaquin Refining, and Tricor and determined they are not posing significant risk
- In process of reassessing Kern Oil & Refining

Valley Refinery Emissions

State OEHHA Recommended Pollutants for Monitoring	Refinery Emissions (lb/yr)			
	Kern Oil & Refining	San Joaquin Refining Co	Tricor Refining, LLC	Alon/Bakersfield Renewable Fuels
1,3-butadiene	18	< 1	0	< 1
Acetaldehyde	58	14	2	4
Ammonia	130	1	< 1	0
Benzene	466	247	9	32
Cadmium	2	0	0	0
Diethanolamine	0	0	0	0
Formaldehyde	675	71	8	104
Hydrogen Fluoride	0	0	0	0
Hydrogen Sulfide	983	769	13	42
Manganese	13	0	0	0
Naphthalene	317	30	61	8
Nickel	20	0	0	0
NOx	36,600	35,492	19,363	6,434
PAH	1	< 1	< 1	< 1
Particulate Matter	6,480	10,069	2,878	2,317
Sulfur Dioxide	7,120	992	383	162
Sulfuric Acid	< 1	0	0	48
Toluene	2,950	327	86	34

Air Monitoring Equipment Considerations

- Types of air monitoring equipment
 - Point monitoring
 - Open-path
- Varying Capabilities
 - Detection Limits
 - Single to multiple pollutants
- Some pollutants can only be measured through collecting samples and sending it to laboratory for analysis
- Certain pollutants may not have monitoring methodology established
- Varying maintenance requirements
- Broad range of cost

Air Monitoring Equipment Considerations

OEHHA Recommended Pollutants for Monitoring	Real Time Monitoring Currently in Use
1,3-butadiene	X
Acetaldehyde	X
Ammonia	X
Benzene	X
Cadmium	
Diethanolamine	
Formaldehyde	X
Hydrogen Fluoride	X
Hydrogen Sulfide	X
Manganese	
Naphthalene	
Nickel	
NOx	X
PAH	
PM	X
Sulfur Dioxide	X
Sulfuric Acid	
Toluene	X

Potential Amendments

Potential Amendments to Rule 4460 and 3200

- Recognizing variability among refineries, and consistent with REAMAR recommendations, an approach that would require a site-specific analysis is more health protective
 - Consistent/more stringent than other air district approaches
- Remove exemption for facilities not currently refining crude oil
 - Rule will apply to all facilities classified as petroleum refineries (4 facilities)
- Remove list of pre-determined pollutants and requirements based on facility processing capacity
- Require facilities to monitor all OEHHA recommended and consider other pollutants
- Require refineries to submit monitoring plan in accordance with Rule 4460 Guidelines
- Update community air monitoring fees

Potential Rule 4460 Guidelines

- Guidelines to include requirements for fence-line monitoring plans with site-specific analysis
 - Require facilities to monitor all OEHHA recommended pollutants, and consider any additional pollutants emitted by the facility
 - Require facilities to provide sufficient justification in monitoring plan for any compound excluded from monitoring system (i.e. facility does not emit compound, monitoring technology not available, or emissions below monitoring detection levels)
- Will ensure monitoring information provided to the public in real time
- District will develop Guidelines concurrently with Rule 4460 amendments
- Draft Guidelines will be made available for public comment with draft rule, and presented to Governing Board for consideration of approval

Timeline for Implementation

- Following the requirements of existing Rule 4460, petroleum refineries shall be required to submit a new or revised fence-line plan 6 months from adoption of amended rule
- Plan should be available for public review 30 days before approval
- If plan disapproved, revised plan due 30 days after notification of disapproval
- Implementation of plan must begin 1 year from approval

Next Steps

Public Engagement Process

- Ongoing community engagement in designing, implementing, and communicating air monitoring essential



Public Participation and Comment Invited throughout Process

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Visit <https://ww2.valleyair.org/about/sign-up/> to sign up for the District's Petroleum Refineries Listserv for updates

Comments/Questions

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