Bay Area Air Quality Management District
Community Air Protection Program
Final Report – Grant #17-CAPP-3
April 30, 2020 **(Amended 6/3/2020)**

The Bay Area Air Quality Management District is submitting this Final Report in compliance with requirements of the agreement governing the use of the funds provided through the Community Air Protection Grant #17-CAPP-3. The Air District has fully expended the $4,800,000 Community Protection Grant plus the earned interest of ~~$44,189~~ $97,101 in support of implementation of AB 617 in the Bay Area. **This Final Report covers activities and expenditures for the period of March 1, 2018 through June 30, 2019**.

The main activities that occurred during the reporting period included identifying priority communities with the Bay Area; selecting one community, West Oakland, for the development of community air protection plan; selecting one community, the Richmond-San Pablo area, for the development of a monitoring plan; identification of potential Best Available Retrofit Control Technologies for stationary sources subject to the requirements of Cap and Trade Regulation; updated modeling of regional, background particulate matter and toxic emissions impacting West Oakland; an updated local inventory of emissions occurring within West Oakland; modeling of local concentrations of diesel particulate matter and PM2.5 in West Oakland, as well as modeling of cancer risks from toxics emissions; design of a mobile monitoring van; and conducting research into new monitoring systems for identifying diesel trucks with high emissions.

The Air District has posted online agendas, presentations and documents developed with support from Community Air Protection Grant at http://www.baaqmd.gov/community-health/community-health-protection-program. Documents and other materials related to the assessment of Best Available Retrofit Control Technology are available online at http://www.baaqmd.gov/rules-and-compliance/rule-development/barct-implementation-schedule. The Air District is also submitting as attachments to the Final Report the following:

- The West Oakland CERP Steering Committee Charter and Participant Agreement;
- An example of a West Oakland Steering Committee meeting Agenda and meeting materials;
- The Final Staff Report on the Best Available Retrofit Control Technology;
- Progress reports on the diesel truck monitoring system;
- A photo of the eight cluster-computer nodes purchased to enhance modeling used for the West Oakland CERP;
- A survey distributed to local community groups to assess capacity building needs;
- Documents associated with the start-up of a resource center for community-led air pollution sampling programs;
- Samples of agendas for the inter-agency Technical Coordinating Committee supporting the development of CERPs and Monitoring Plans.

Table A

Bay Area Air Quality Management District
Assembly Bill 617 Implementation
Expenditures – March 1, 2018 to June 30, 2019 (Amended 06/03/2020)
Grant #G17-CAPP-3

Program Component	Major Activities	CAPP Grant Allocation	Total Expenditures
Community Engagement	• Adoption of Year 1 and Years 2-5 priority AB 617 communities. • Held ten (10) community workshops as part of the selection of AB 617 communities. • Conducted two online *Open Air Forum* surveys to gather input on the criteria for selecting AB 617 communities. • Ongoing capacity building with local communities.	~~$833,252~~ **$839,733**	$890,399
Implementation of Best Available Retrofit Technology	• Review of existing controls at over 3,000 sources that contribute to emissions at facilities subject to Cap-and-Trade. • Identification of feasible Best Available Retrofit Control Technologies (BARCT) • CEQA review on schedule to implement new BARCT requirements. • Adoption by the Board of Directors of a schedule for adoption of rules to implement new BARCT requirements.	~~$235,505~~ **$237,337**	$245,505
Community Emission Reduction Plans	• In cooperation with the West Oakland Environmental Indicators Project, convened a Steering Committee for the development of the West Oakland Community Action Plan. • Hosted thirteen (13) meetings of the Steering Committee for the West Oakland Community Action Plan. • Development of the draft West Oakland Community Action Plan. • Professional Facilitation for the West Oakland Community Action Plan • Initiated CEQA review of the draft West Oakland Community Action Plan. • Development of a detailed emissions inventory for West Oakland.	~~$2,273,036~~ **$2,290,716**	$2,428,929

	• Fine Particulate Matter Analysis and Regional Modeling in the San Francisco Bay Area in Support of AB 617. • Local scale modeling of emissions concentrations and cancer risks from emissions sources within West Oakland. • Research into automated, remote exhaust sampling and identification of high-emitting drayage trucks at or near the Port of Oakland.		
Community Monitoring	• Hosted five (5) meetings of stakeholders to design the Richmond-San Pablo Community Summit • Held the Richmond-San Pablo Community Summit • In cooperation with the five (5) community Co-Leads, convened a Steering Committee for the development of the Richmond-San Pablo Area Monitoring Plan. • Hosted 4 community meetings in Richmond, CA as part of the development of the Richmond-San Pablo Area Monitoring Plan. • Professional Facilitation for the Richmond-San Pablo Area Monitoring Plan. • Participation in and support for the development of the Richmond-San Pablo Area Monitoring Plan. • New equipment and van for short-term mobile monitoring studies. .	~~$1,258,243~~ **$1,268,030**	$1,344,538
Emissions Reporting Coordination	• Participate in the development of new, statewide emissions calculations protocols. • Software enhancements to improve quality of reported data.	~~$102,417~~ **$103,214**	$109,441
Overhead	• Executive Management to coordinate/oversee AB 617 program development. • Legal Services for CEQA analysis and regulatory development. • Administrative Services.	~~$156,851~~ **$158,071**	$167,608
	TOTALS	~~**$4,844,189**~~ **$4,897,101**	**$5,176,421**

West Oakland Community Air Action Plan
Steering Committee Charter and Participation Agreement
Amended August 29, 2018

1. **Mission Statement**

Assembly Bill 617 (Garcia, C., Chapter 136, Statutes of 2017) is a State-mandated program that uses a community-based approach to reduce local air pollution in communities around the State that continue to experience disproportionate impacts from air pollution. West Oakland— which includes the Port of Oakland, Oakland Army Base, East Bay Municipal Utility District's (EBMUD) waste treatment facility, surrounding freeways and various industrial facilities—is the region's initial focus under the AB 617 program to develop an action plan to reduce air pollution and exposure in the West Oakland community.

The steering committee will be responsible for advising the development of the community plan as well as disseminate information and transmit input from your representative sectors as appropriate. The key elements of the West Oakland Community Air Action Plan (Plan) will need to be completed by early 2019 in preparation for State adoption in October 2019.

2. **Committee Objectives**

The West Oakland Community Air Action Plan Steering Committee is a special committee that will serve for the designated purpose outlined in the mission statement. Committee objectives include identifying the West Oakland community boundary, identifying areas of concern for air pollution sources and sensitive receptor sites, reviewing existing plans, studies and reports on air quality to provide strategic input towards Plan development. Committee objectives also include disseminating and soliciting information with community stakeholders for which the committee members represent. The goal is for the Plan to be adopted by the Bay Area Air Quality Management District Board by October 2019. Upon adoption of the Plan, the steering committee may elect to continue to meet quarterly to support and provide guidance on implementation, and develop progress reports.

3. **Membership**

Criteria for Community Steering Committee Membership

To ensure the Plan focuses on the impacts to people and businesses within the defined study area, steering committee membership is limited to residents or businesses with street addresses within the West Oakland study area. Additional members may include city/county officials, land use planning agencies, transportation agencies and local health departments. Interested stakeholders, and larger representation groups such as regional associations, are encouraged to participate as non-voting members at all open meetings.

The official roster will contain one primary name for each affiliation to be represented on the committee. One alternate name can substitute for the primary member if the primary member is unable to attend a meeting. However, only one member from each affiliation will be allowed to deliberate at meetings to reach consensus. The committee meetings are open to the public and additional members may be added to the roster if agreed upon by the West Oakland Environmental Indicators Project and the Bay Area Air Quality Management District who will serve as co-leads of the Steering Committee.

4. Roles and Responsibilities

Community Steering Committee Members

Steering committee members will be responsible for assisting Air District and WOEIP staff in identifying all air pollution issues and sources of air pollution in the West Oakland community and the development of the West Oakland Community Air Action Plan. Committee members may be asked to review local community plans, health impact studies, and air quality data to assist in developing the Plan. Committee members will help develop emission reduction goals or targets that will be used to evaluate the success of the Plan in reducing emissions and exposure.

Steering committee members are expected to attend a minimum of ten committee meetings (in their entirety) and to participate in 2-4 community townhall meetings throughout the course of the year prior to the Plan adoption.

Steering Committee members who participate in this process are expected to sign the *West Oakland Air Action Plan Committee Participation Agreement* (Page 5 of this Charter) which outlines the expected conduct of all Steering Committee members.

Co-Leads

The West Oakland Environmental Indicators Projects and Bay Area Air Quality Management District serve as partnering co-leads for the development of the West Oakland Community Steering Committee. As co-leads, they will be responsible for providing necessary background materials for committee members, developing meeting agendas, coordination with the meeting facilitator and establishing and maintaining a community website for Steering Committee activities. Co-leads will also be responsible for providing technical support and other relevant technical assessment information to the Committee.

Facilitator

A professional and impartial facilitator will be used for moderating the steering committee meetings and for helping the committee reach consensus on issues.

5. Standard Committee Meeting Procedures

Deliberation and Consensus

A professional and impartial facilitator(s) will be employed to support the steering committee in the overall organization, order and focus of the meeting, resolve conflicts and help reach consensus to ensure the goals and objectives of this charter are met. Achieving full consensus of the steering committee may not always be possible. In the event of an impasse, the co-leads shall be the final decision-makers, carefully weighing the consequences of any decision where there is a lack of consensus. If the co-leads cannot agree, then the action in question will not proceed. Community Steering Committee members who do not agree with a majority consensus on a decision may submit a minority position statement.

Member Participation

Only one member from each affiliation may participate as part of the steering committee deliberative process in any individual meeting. If the primary member is unable to attend, the designated alternate on the steering committee roster may attend in their absence and deliberate on the primary member's behalf.

If a primary member or their alternate is not able to attend a scheduled meeting, they may submit written comments for consideration on relevant agenda topics to the Committee chair or the co-leads prior to the scheduled meeting. Written communications may inform, but not substitute, for being physically present during deliberations of the committee. If a primary member or their alternate has not attended three consecutive steering committee meetings, their membership may be revoked as determined by the co-leads.

Open Meetings

All meetings are open to the general public and will provide a formal opportunity for members of the public to provide their perspective on the development of the Plan. Stakeholder input is welcome and encouraged.

Meeting Schedule and Agendas

Steering committee members are expected to attend monthly meetings. Upon consensus agreement of the committee, meeting schedules may be adjusted with adequate advance notice. Agenda topics will be developed by the co-leads and will include the time, date, duration, location and topics to be discussed. Individual committee members may request relevant items be added to an agenda at least one week prior to the schedule meeting.

Subcommittees

Members who wish to be further involved may choose to participate in ad-hoc sub-committees such as technical assessment, community surveys and outreach or other relevant topics. Subcommittees would meet every other month between full steering committee meetings and will report back their findings and/or recommendations at the next full steering committee.

6. Accessibility/Accommodation

The steering committee meetings and other outreach events associated with the committee must be held at facilities that can accommodate members covered by the Americans with Disabilities Act. Language interpretation services will be provided as needed with a minimum 48-hour advance request.

7. Dissemination of Materials

Any materials, presentations, documents, correspondence or other written communications generated or disseminated by the committee, or on behalf of the committee or its members, must be approved by the co-leads prior to release. All final correspondence will include the logos of West Oakland Environmental Indicators Project and Bay Area Air Quality Management District.

8. Website

A website will be developed and maintained by the co-leads to provide information to the community on the Steering Committee actions and development of the Plan.

West Oakland Community Air Action Plan
Steering Committee Participation Agreement
Amended August 29, 2018

By signing below, I agree to abide by all conditions of the West Oakland Community Air Action Plan Steering Committee Charter. I also agree to the following principles, goals and expected conduct to demonstrate how agencies, communities and other stakeholders working in concert can achieve meaningful improvements in public health for the West Oakland community:

- **Adopt and support the principles of ensuring healthy air in West Oakland**:
    - Our goal is to remedy persistent air pollution problems and excessive local health risk exposures to people who live, work and play in and around West Oakland. We are committed to working collectively and cooperatively with all stakeholders within the community—local residents, businesses and organizations, youth groups, schools, local, regional and State governments, health agencies and faith-based organizations—to ensure all represented parties are heard and can agree on an outcome that protects public health.
- **Provide strategic guidance, vision, and oversight** including:
    - **Informing** the development of the West Oakland Community Air Action Plan
    - **Using data** to inform strategy development analysis
    - **Tracking progress of the work** using agreed-upon indicators at Steering Committee and subcommittee levels
    - Identifying fair, effective and feasible goals to bring about reduced health risk in West Oakland.
- **Provide leadership and accountability** by:
    - **Identifying obstacles** to achieving the goal and develop solutions to overcome them. **Considering how my own organization** or those in my network can align to the common goals and principles of the Steering Committee
    - **Serving as a vocal champion** of the collective impact effort in the community
    - **To work towards consensus** while recognizing that not everyone will agree on every issue and to resolve conflicts in a positive, swift and constructive manner.
- **Play an active role** by:
    - **Participating in-person** at the regularly scheduled meetings
    - **Reviewing pre-read materials** prior to meetings and coming prepared for engaged discussion, active listening, and respectful dialogue
    - **Committing to monthly Steering Committee meetings and a few hours of preparation in between. Attending occasional community town hall meetings to share the work of the Steering Committee.**

Printed Name: _____ Date: _____

Signature: _____

Find and Understand High Emitters Project

Progress Update – June 12 to September 1, 2018

Rebecca Sugrue, UC Berkeley

Project summary:

In this project, UC Berkeley will work closely with BAAQMD and CARB toward the design of a system for autonomous truck plume sampling. In doing so, we will evaluate the exhaust plume capture performance of research grade, lower cost, and emerging low-cost instrumentation under lab and field settings. Project tasks are to: (1) analyze existing emission factor data sets for variability and repeatability, (2) develop and lab-test a sensor emissions detection algorithm, (3) field deploy sensors for roadside testing in coordination with BAAQMD and CARB, and (4) analyze and report data.

Progress Update:

During this period, we worked primarily on project tasks 1 and 2. The main accomplishments are as follows.

We assembled the CO_2, BC, and NO_x analyzers listed below in Table 1 and began laboratory evaluation of how precisely various combinations quantify BC and NO_x emission factors.

Table1. Analyzers used in lab testing. The lower cost options are noted with an asterisk (*).

CO_2		BC		NO_x	
Instrument	**Approx. Price ($K)**	**Instrument**	**Approx. Price ($K)**	**Instrument**	**Approx. Price ($K)**
PP Systems SBA-5*	2	Aerosol Black Carbon Detector (ABCD)*	2	Eco Physics CLD 60 - NO	20
Vaisala GMP 343*	2.5	AethLabs AE51*	6	Eco Physics CLD 60 - NOx	20
LI-COR 820*	4	AethLabs MA300	10		
PP Systems EGM-4	10	Brechtel Model 2901 Tricolor Absorption Photometer (TAP)	10		
LI-COR 7000	12	Magee AE16	20		
		Magee AE33	25		

It is important for the truck exhaust plume capture method to choose and test instruments for their ability to measure and record at 1 Hz. Research was done to gather suitable lower cost instruments of the three pollutant categories, however, no available option was found for NOx.

All instruments were gathered, calibrated, and arranged in a sampling configuration similar to what is planned for field deployment. The instruments were evaluated when sampling from an inverted methane-air diffusion flame in our lab. This flame is tunable and highly sooting with very stable emissions. During lab tests, the apparatus was operated to deliver either steady pollutant concentrations or concentration peaks to the suite of instruments by switching from room to flame air. In the latter case, the flame settings were kept constant such that emission ratios of BC/CO_2 and NO_x/CO_2 (i.e., the BC and NO_x emission factors) were also constant. Peaks were performed in sets of 10 in order to examine and calculate the repeatability of the measurement and emission factors (EF) post sampling. Trouble with establishing a relatively constant relative humidity (RH) level similar to that found when sampling truck plumes in the field proved to be a non-trivial challenge for these tests and caused the BC instruments to respond differently than when RH is held constant.

The initial flame peak tests began to show the measurement differences in the collection of instruments. The GMP 343 had a very slow response time after hitting high concentrations and was unable to come down to baseline in a reasonable time manner causing the area under the CO_2 peak to be inaccurate. Additionally, response differences by the LI-COR 820 and LI-COR 7000 were observed (Figure 2), in which the LI-COR 820 consistently overshoots during a rapid concentration change (i.e., peak event). This erroneous overshooting effect increases the plume area and decreases the emission factor for that peak/truck. Therefore, all CO_2 instruments will be compared to the LI-COR 7000 for accuracy and precision. The AE16 initially showed errors in peak behavior due to RH differences when switching between room and flame air; once RH differences were minimized, reported results were comparable to other BC measurements. The AE51 produced the most noise-to-signal during its measurement period and may not be suitable for field testing if trying to detect low-emitting vehicles as well as high-emitting ones. Finally, differences in reported BC were observed across all instruments (Figure 3), relating to differences in handling the filter loading artifact. The MA300 and AE33 have a real-time correction for the loading artifact during sampling whereas the ABCD, AE51, AE16, and TAP do not. The TAP performed the most consistently during long periods of high BC levels by switching to the next clean filter spot. This tape advancing kept filter attenuation levels low and reduced the influence of the loading artifact on reported BC concentrations. The AE33 performance over-correction by the analyzer's internal real-time correction algorithm. The ABCD, AE51, AE16, and MA300 demonstrated a decline in BC measurement, indicating a need to apply a correction factor prior to calculating emission factors.

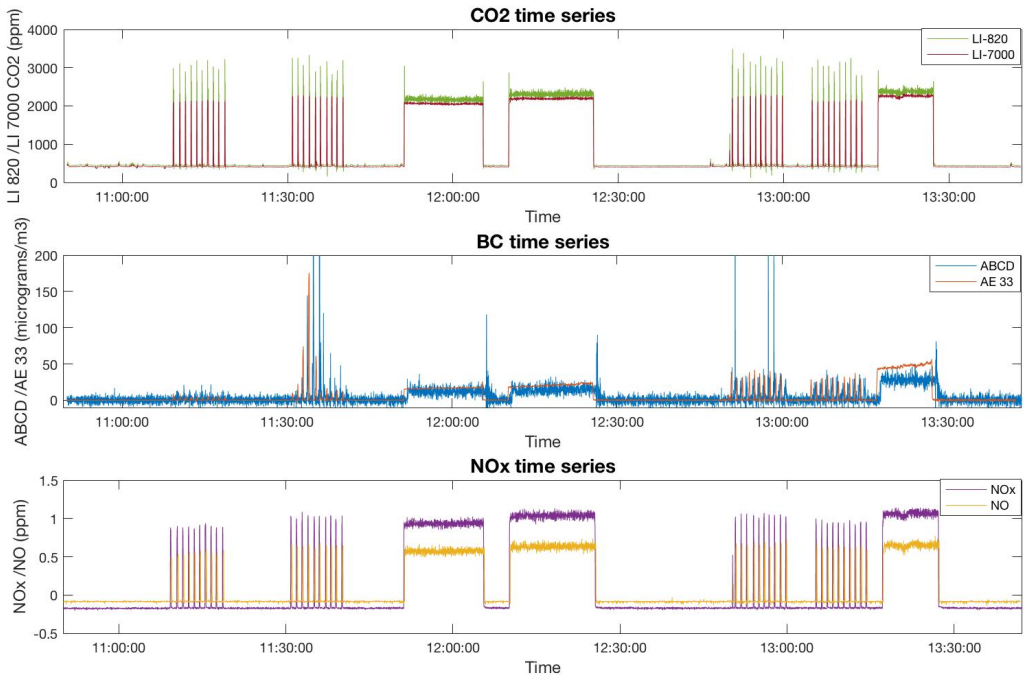


Figure 1. Time series example of lab flame tests, showing times of peak testing and constant emissions.

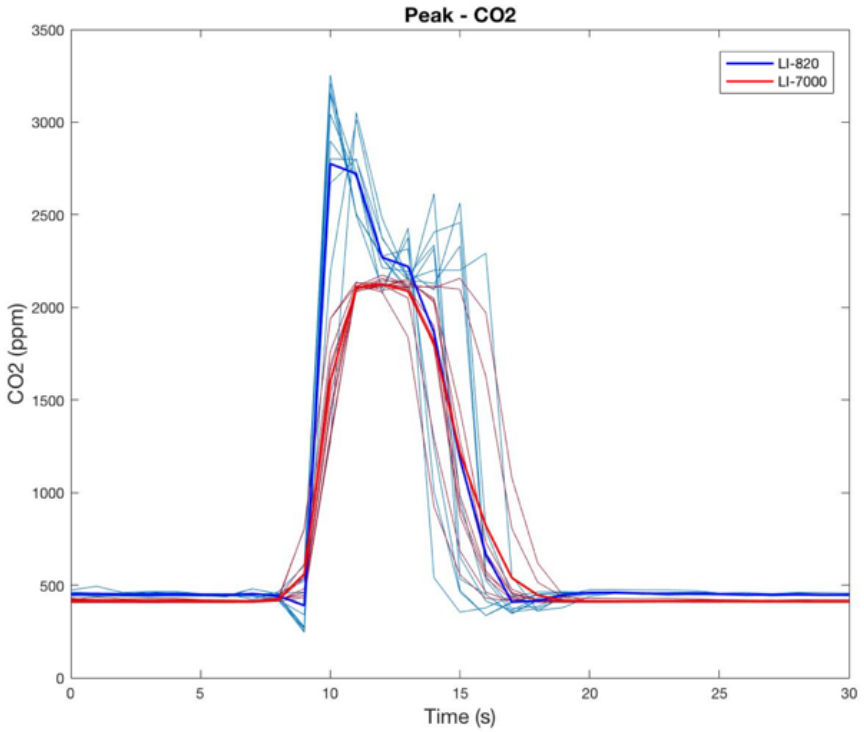


Figure 2. Comparison of LI-COR 820 and LI-COR 7000 during 10 peaks at the same flame concentration. The average of the 10 peaks is the bold line for each instrument. Note that the LI-COR 820 response consistently overshoots that of the LI-COR 7000.

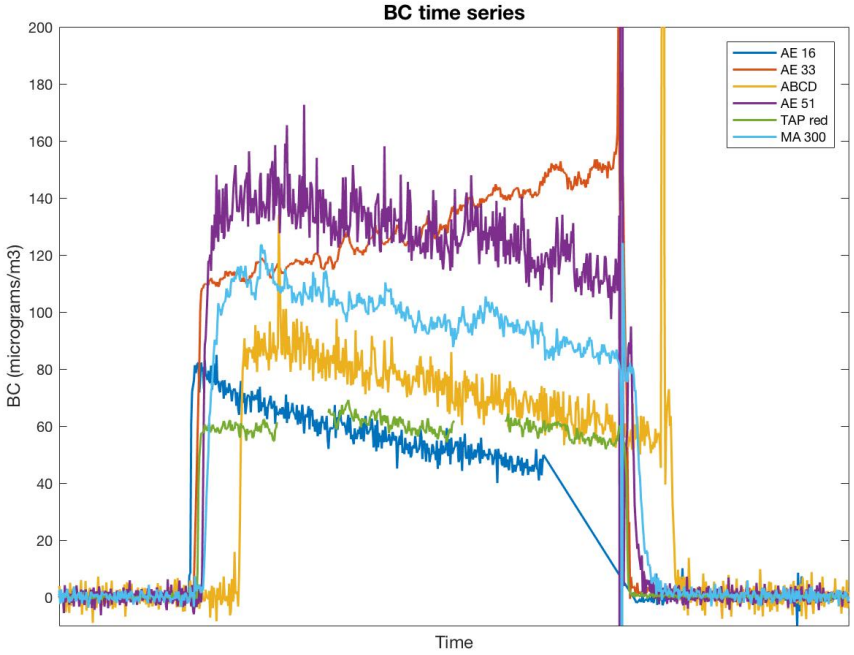


Figure 3. Lab flame test with high BC concentrations, highlighting the different responses by six black carbon instruments under constant conditions.

We began assembling data acquisition hardware and writing code for data acquisition, management, and processing.

Initial steps for programming an automatic emission factor system required establishing a communication system between each instrument and a microprocessor. For 13 instruments, 5 Raspberry Pi (RPi) processors were purchased and are being used to collect, parse, and store the data as it streams in real-time. In the future, another processor will take this data from across the RPi's and begin EF calculations and comparisons. The communication and data storage system was shown to work with two instruments at one time and will soon be expanded to all the instruments.

We held kickoff and planning meetings with CARB and BAAQMD.

A kickoff meeting with CARB and BAAQMD was held at LBNL on June 12th. UCB also traveled to Sacramento on August 23rd to meet with CARB Monitoring and Laboratory Division staff. At the latter meeting, we discussed the data presented above and discussed possible field sampling venues and dates. The first potential field sampling location is at the Truckee agricultural inspection station near the California-Nevada border. We plan to join CARB's PEAQS team at this location during the first week of October (Oct 1–4) for collocated measurements of the UCB autonomous plume capture system and PEAQS. Subsequent sampling locations will include the Port of Oakland, and possibly within the West Oakland neighborhood, the Port of Los Angeles, Blythe in Riverside County, and Otay Mesa in San Diego.

This work has been led by Rebecca Sugrue, MS student in the Department of Civil and Environmental Engineering at UCB and researcher in the Kirchstetter Lab, with guidance from Chelsea Preble (UCB postdoc in the Kirchstetter Lab), Aditya Khandekar (Senior Scientific Engineer at LBNL), and Thomas Kirchstetter (PI).

Find and Understand High Emitters Project

Progress Update – September 1, 2018 – January 15, 2018

Prepared by Rebecca Sugrue, UC Berkeley

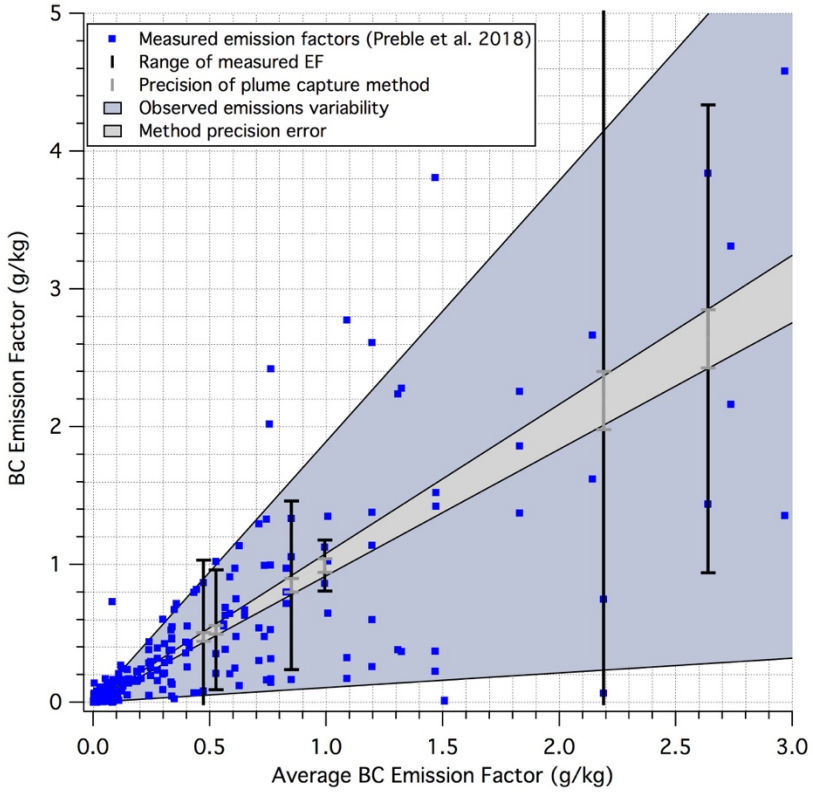
Project summary:

In this project, UC Berkeley will work closely with BAAQMD and CARB toward the design of a system for autonomous truck plume sampling. In doing so, we will evaluate the exhaust plume capture performance of research grade and emerging moderate- and low-cost pollutant analyzers under laboratory and field settings.

Updates on Project Tasks:

(Task 1) Analyze existing emission factor data sets for variability and repeatability

- Chelsea Preble and co-authors published a journal article detailing the results of four years' worth of road-side emissions data (Preble et al. 2018).
- There is evidence of increasing variability as a function of BC emission factor for both observed and lab measurements. Also, the method precision only accounts for part of the variability that exists in the observed data (see figure below)



(Task 2) Develop and lab-test a sensor emissions detection algorithm

- Many lab tests were conducted to compare low, mid, and high-cost CO_2 and BC analyzers for repeatability and variability when used for simulated plume capture of diesel emissions. An inverted methane-air flame is used to generate pollutants and

mimic plumes of diesel vehicles. Results from that testing were presented at AGU's Fall Meeting in December 2018 (see available copy of R. Sugrue's presentation from AGU).

- A data acquisition and analysis platform is under development that includes autonomous detection of concentrations peaks. This is currently being evaluated and refined based on tests in lab. We are able to collect and record data from 10 different instruments (LI-7000, LI-820, SBA-5, GMP-343, AE16, AE33, ABCD, MA300, Ecophyiscs CLD 60, Aerodyne CAPS NO_2) through one program run on a Raspberry Pi. We also have tested real time peak detection algorithms using a method that detects a pre-set percent rise above baseline concentration and integrates until concentration returns to baseline.
- In the next month, the data visualization will be added. Also, real time peak detection methods, integration, and EmFac calculation will be tested in the lab.

(Task 3) Field deploy sensors for roadside testing in coordination with BAAQMD and CARB

- UCB joined ARB for field measurements on October 1-4th in Truckee, CA. We used the BAAQMD research with a suite of 11 low, mid, and high-cost instruments (3 CO_2, 6 BC, 2NO_x) and co-located with the ARB PEAQS team and enforcement officers, who were performing opacity checks on trucks. The sample site was located at the California I-80 Inspection station for the FDA and located in a pull through inspection building. This provided a very controlled setting where trucks were directed one at a time through the set up and then, the trucks were randomly selected for an opacity check. Over 4 days 174 trucks were sampled and 28 had opacity checks.
- An upcoming field deployment is planned in the Port of Oakland at the TraPac facility for February 2019. A field visit will be held in January 2019. During this field visit, the autonomous sensor system will be tested, where it will record and visualize data, detect concentration plumes, integrate plumes, and calculation EmFac values all in real time for BC and NOx.

(Task 4) analyze and report data

West Oakland Community Action Plan

Steering Committee Meeting Agenda #11

Wednesday, June 5, 2019 from 5:30 pm — 8:30 pm

West Oakland Senior Center: 1724 Adeline Street Oakland, CA 94607

Objectives:

- Provide a summary of the May 1st meeting.
- Review tracking process and discuss accountability and implementation.
- Panel: Discuss how multiple agencies can help with Plan implementation.

Agenda:

5:30 - 6:00 **Sign in + Dinner**

6:00 - 6:05 **Welcome + Brief Introductions** Marybelle Tobias (Facilitator, E / J Solutions)

6:05 - 6:20 **Summary of May 1st SC Meeting and Status of Draft Plan** Brian Beveridge (WOEIP) & Yvette DiCarlo (BAAQMD)

6:20 - 6:35 **Review and Discuss Tracking** Alison Kirk (BAAQMD)
Q&A

6:35 – 6:45 **Accountability: Laying the Foundation for Implementation** Brian Beveridge (WOEIP)
Q&A

6:45 – 6:50 **Break**

6:50 - 8:15 **Panel: Ensuring Implementation Success for West Oakland's Community Action Plan**
Opening Comments from Co-Leads*:* Ms. Margaret Gordon (WOEIP), Jack Broadbent (Bay Area Air Quality Management District)
Panelists:

- Richard Corey (California Air Resources Board)
- Kimi Watkins-Tartt (Alameda County Public Health Department)
- Maraskeshia Smith (City of Oakland)
- Chris Lytle (Port of Oakland Authority)
- Tess Lengyel (Alameda County Transportation Commission)

Q&A

8:15 - 8:25 **Closing Statements** Co-Leads (WOEIP/BAAQMD)

8:25 – 8:30 **Wrap-up + Other Items + Next steps** Azibuike Akaba (BAAQMD)
Next SC Meeting Date: SECOND WEDNESDAY - **July 10, 2019 (*Note*: Holiday schedule)**

West Oakland Community Action Plan Steering Committee Meeting

June 5, 2019

MEETING GUIDELINES

Be on time and prepared to contribute to achieving the goals of the meeting.

Co-create this experience with positivity and energy.

Share airtime. Be concise and to the point. Create space for those who don't speak up as often.

Respect all voices. Have open ears and an open mind. Assume that together we know more.

Propose don't oppose. When you disagree with an idea, ***attack the problem, not the person***. Propose a different idea or offer a solution.

Be Present. Silence your technology. Engage your mind and heart, knowledge and intuition, expertise and passion.

Take care of yourself. Stand or stretch, take bio breaks, as needed.

West Oakland Community Action Plan
Steering Committee Meeting

Brian Beveridge
West Oakland Environmental Indicators Project

Summary of May 1, 2019 Meeting

West Oakland Community Action Plan
Steering Committee Meeting

Yvette DiCarlo
Bay Area Air Quality Management District

Update of Draft Plan

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

West Oakland Environmental Indicators Project

West Oakland Community Action Plan Status

Steering Committee Meeting
June 5, 2019

Proposed Action Plan Outline

- Introduction
- Purpose/Scope
- Community Description
- Goals & Targets
- Existing Plans
- Technical Assessment
- Community Engagement
- Strategies – Authorities, strategies, implementation schedule
- Funding
- Enforcement Plan
- Tracking Progress

Upcoming Meetings

June

June 5 – Steering Committee: Tracking/Implementation Authority

June 26 –Workgroup for Steering Committee to review Initial Draft Plan

July

July 10 – Steering Committee: Comments on Initial Draft Plan

July 19 – Estimated Pubic Release of Draft Plan (no meeting)

August

Early August – West Oakland Town Hall: Steering Committee presents Draft Plan to Community

West Oakland Community Action Plan
Steering Committee Meeting

Alison Kirk
Bay Area Air Quality Management District

Update of Draft Plan

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

West Oakland Environmental Indicators Project

Plan Implementation: Tracking Progress

Alison Kirk, BAAQMD

Plan Goal

Protect and improve community health by eliminating disparities in exposure to local air pollution

Tracking Slide from May 3, 2019:

“Tracking is a Process

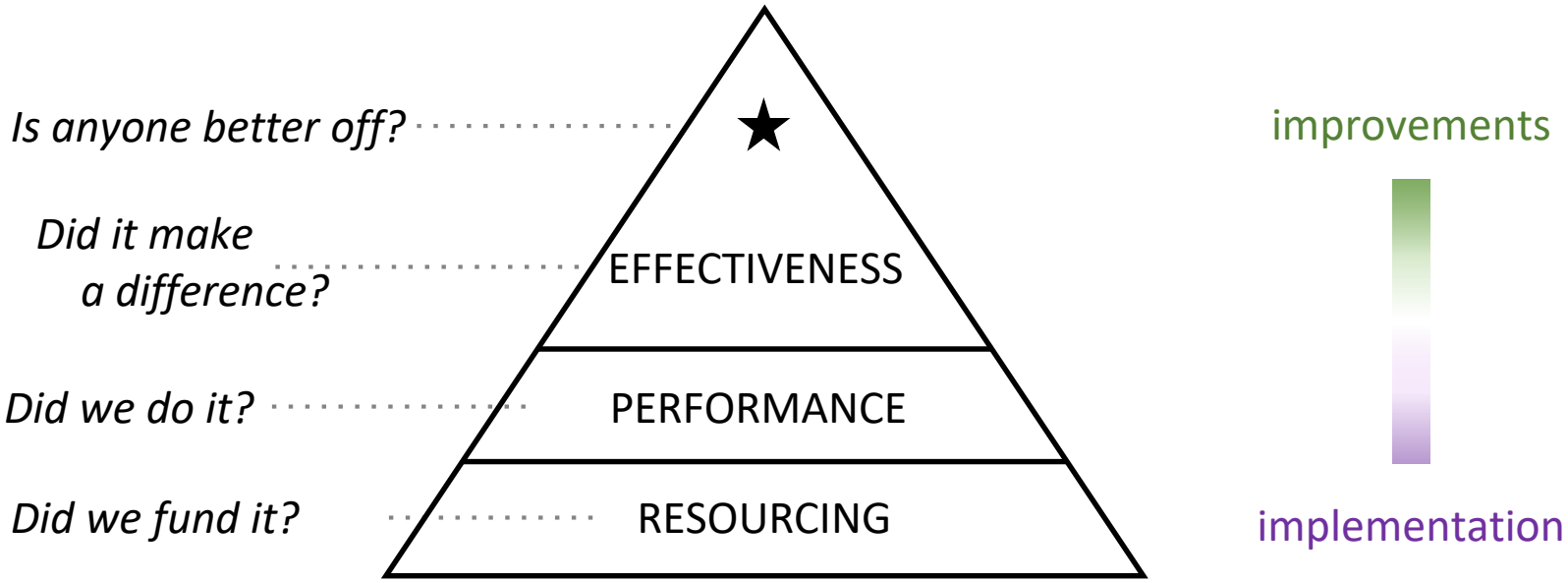
Tracking unfolds over time.
It doesn’t only happen once, at the end.

With tracking, we don’t have to just accept what happened.
We can gauge progress *while there’s still time to adapt.”*

Tracking Example: Strategy #42

“The Air District offers financial incentives to replace box and yard diesel trucks with zero emission trucks owned by West Oakland businesses every year.”

Ideal Tracking Process: May 3, 2019



Slide from 2019-04-03 Steering Committee Meeting

Strategy #42: Building up Metrics

1. Did we fund it?	Did the Air District offer financial incentives?
2. Did we do it?	Did West Oakland businesses accept the funds & purchase zero-emissions equipment?
3. Did it make a difference?	Can we quantify or characterize outcomes?

Strategy #42: Data Collection

1. Did the Air District offer financial incentives?

2. Did West Oakland businesses accept the funds & purchase zero-emissions equipment?

3. Can we quantify or characterize outcomes?

Funding offer letters to truck owners

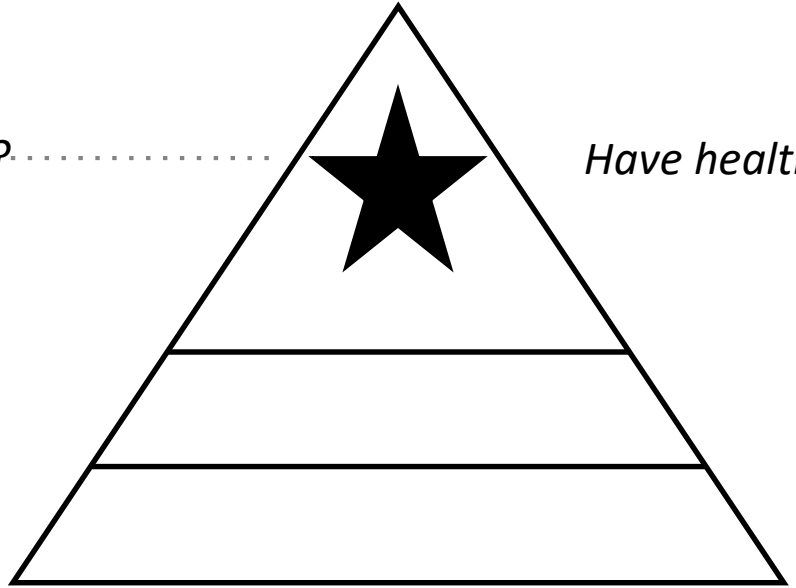
Signed contracts between Air District and truck owners, receipts for new truck purchase

How many tons of emissions were reduced?

= Engine emissions specifications and mileage documentation

Tracking Pyramid

Is anyone better off?



Have health outcomes improved?

4. Have health outcomes improved?

1. Implementation takes time
2. Many factors contribute to health outcomes:
    - clean air and water
    - affordable healthcare, healthy foods, housing
    - safe neighborhoods and
    - dependable transportation, education, and social support

- We may see improvements in health outcomes during Plan implementation, but it will be difficult to attribute these improvements to individual measures in the Plan, or even the Plan as a whole.

Summary

- Steering Committee will determine the best way to track implementation
- The Draft Plan will summarize tracking implementation
- Plan success will need the cooperation of partner agencies (City, Port, County, Air District, CARB, etc.)

West Oakland Community Action Plan
Steering Committee Meeting

Brian Beveridge
West Oakland Environmental Indicators Project

Laying the Foundation for Implementation

AGENDA: 15

West Oakland Community Action Plan Update

June 5, 2019

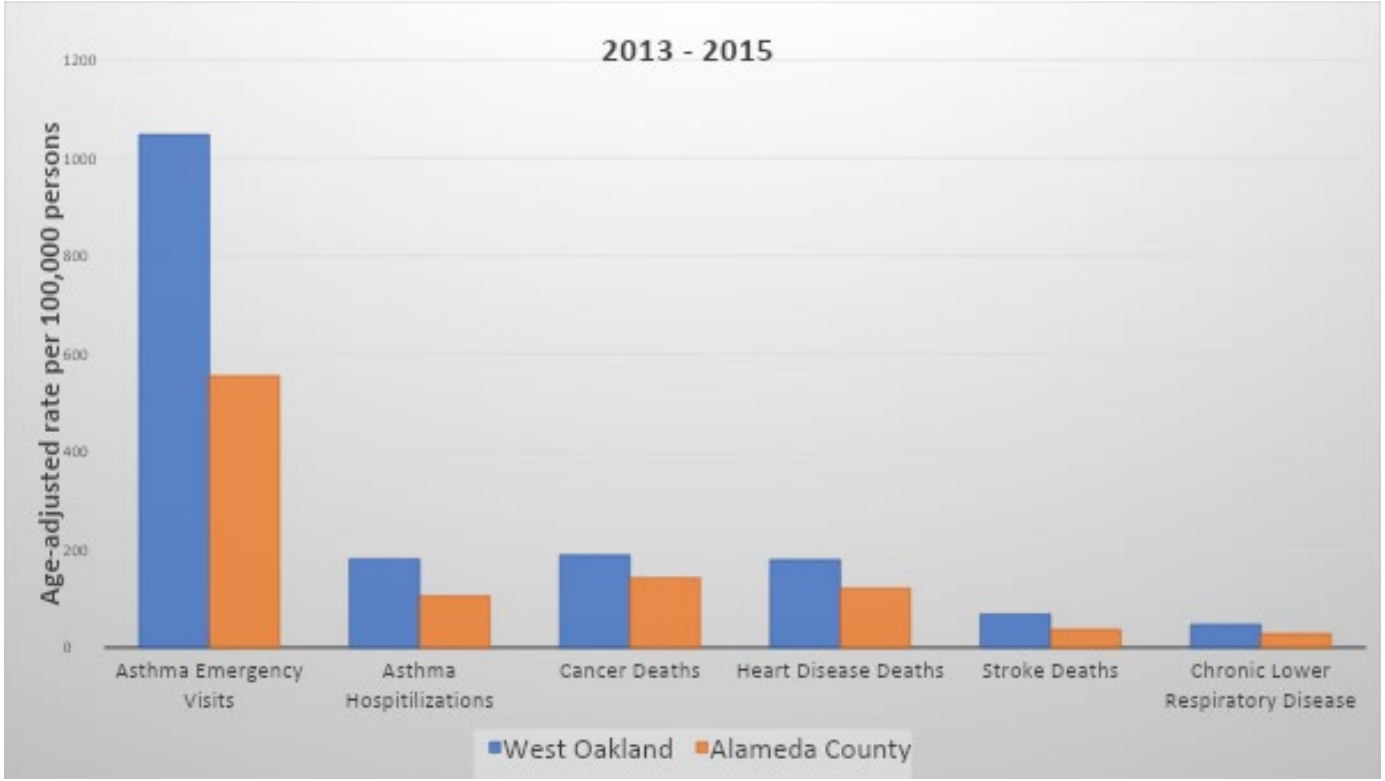
AB 617 Communities

Year 1

West Oakland – action plan

Richmond - monitoring

Health Indicator Rates in West Oakland and Alameda County



Source: OSHPD 2013 - 3Q2015

Community Engagement – Developing the Steering Committee

West Oakland Environmental Indicators Project:

- Co-lead planning partner
- Long history of community organizing, citizen science in West Oakland
- Select and establish Steering Committee
- Steering Committee training, orientation
- Kick-Off July 2018 at Oakland City Hall

Steering Committee – Overview

- 26 members
- Monthly meetings
- Great turnout and ideas
- Partner presentations
- Interactive exercises

Steering Committee – Getting Up to Speed

Built technical knowledge:

- Air quality and health
- Existing and ongoing studies
- Modeling vs. measuring

Placed in context:

- Compliance and enforcement
- Agency responsibilities

Taking action:

- Identify goals and targets
- Identify strategies to reduce emissions and exposure

How Much is Local?

DRAFT 2019-05-31

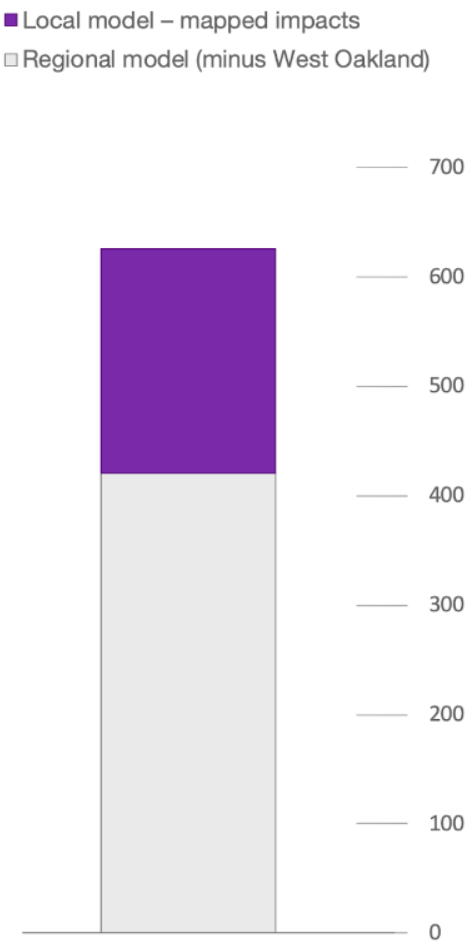
Modeled Impact, on Residential Cancer Risk, of **Local (versus Regional)** Emissions of Toxic Air Contaminants

Top Local Contributors*

- Trucks (**39%**)
- Marine Vessels (**31%**)
- Rail (**17%**)

Cancer Risk

+204
per million



*** cancer risk from construction was not modeled**

Modeled Impact of Local Sources on Residential

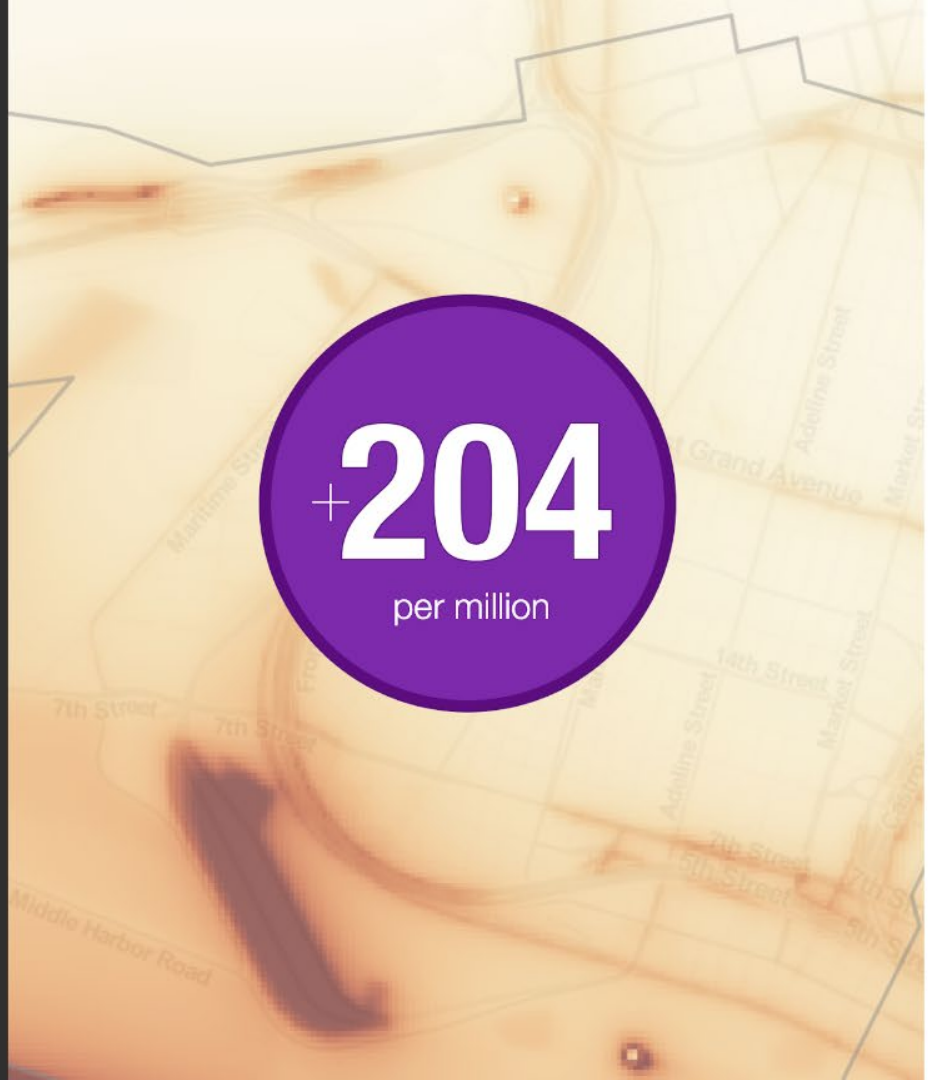
Cancer Risk

Top Local Contributors*

- Trucks (**39%**)
- Marine Vessels (**31%**)
- Rail (**17%**)

* cancer risk from construction was not modeled

1000 per million
800
600
400
200
0



Impacts on Cancer Risk (30-yr, per million)		
Highway		
Heavy/Medium HD trucks	32.2	16%
Non-truck vehicles	7.3	4%
Light HD trucks	1.6	1%
Street		
Heavy/Medium HD trucks	39.3	19%
Non-truck vehicles	7.5	4%
Light HD trucks	1.9	1%
Port		
Harbor craft	24.3	12%
OGV (berthing)	16.5	8%
OGV (maneuvering)	10.5	5%
Dredging	6.1	3%
Drayage trucks*	4.6	2%
Cargo handling	3.4	2%
Railyard (OGRE)	2.2	1%
Railyard (BNSF)	1.6	1%
Bunkering (tugs + pumps)	1.0	0%
Non-truck vehicles	0.1	0%
Rail		
Railyard (UP)	15.5	8%
Rail lines	14.9	7%
Permitted		
Schnitzer (stationary)	4.1	2%
Other facilities	2.2	1%
EBMUD	1.6	1%
Other		
Ferries	3.7	2%
Schnitzer (ships)	1.3	1%
Truck-related businesses	0.7	0%
Schnitzer (trucks)	0.1	0%
	204.2	**100%**

DRAFT 2019-05-31.
Residential impacts from modeled local sources only.
* Drayage trucks at any location (Port, street, or highway).

DRAFT 2019-05-31

Modeled Impact of Local Sources on Residential

Cancer Risk

Top Local Contributors*

- Trucks (**39%**)
- Marine Vessels (**31%**)
- Rail (**17%**)

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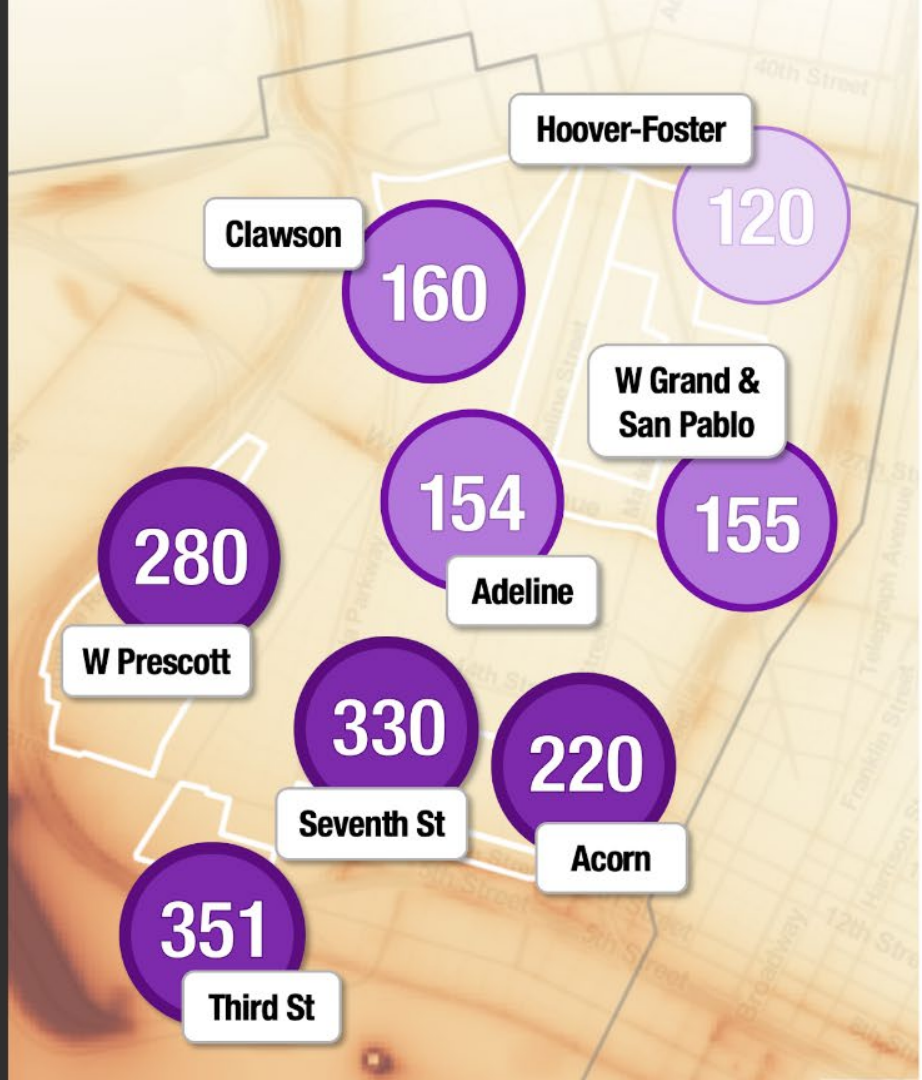


Highest impacts found at community-designated

Impact Zones

W Prescott
46% Port, 26% Rail, 23% Truck

Third St
42% Port, 33% Rail, 18% Truck

Seventh St
35% Port, 15% Rail, **44% Truck**

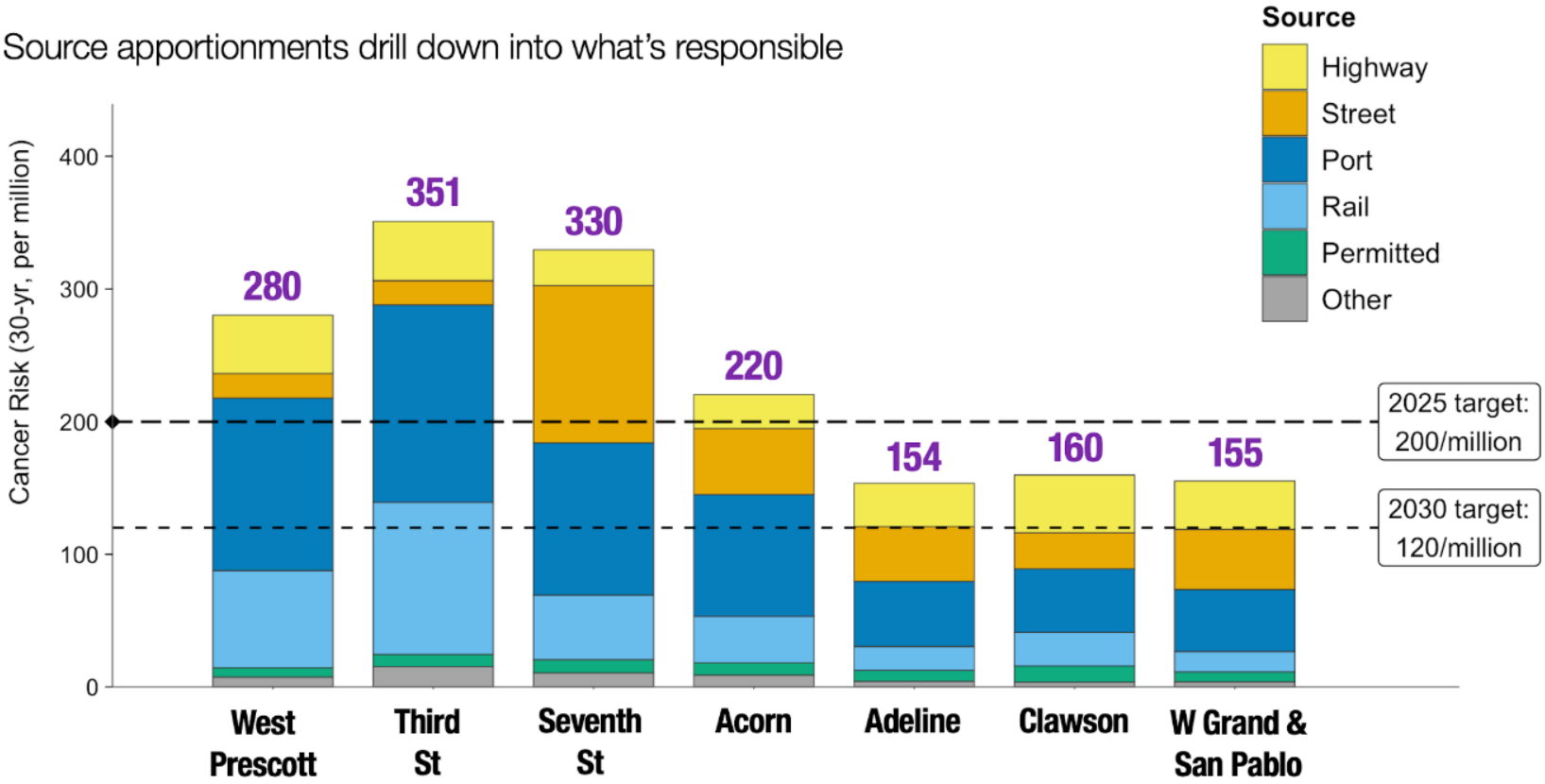
Acorn
42% Port, 16% Rail, 35% Truck

Black Carbon Measurements
EDF / Google / Aclima (2017)

DRAFT 2019-05-31

Cancer Risk

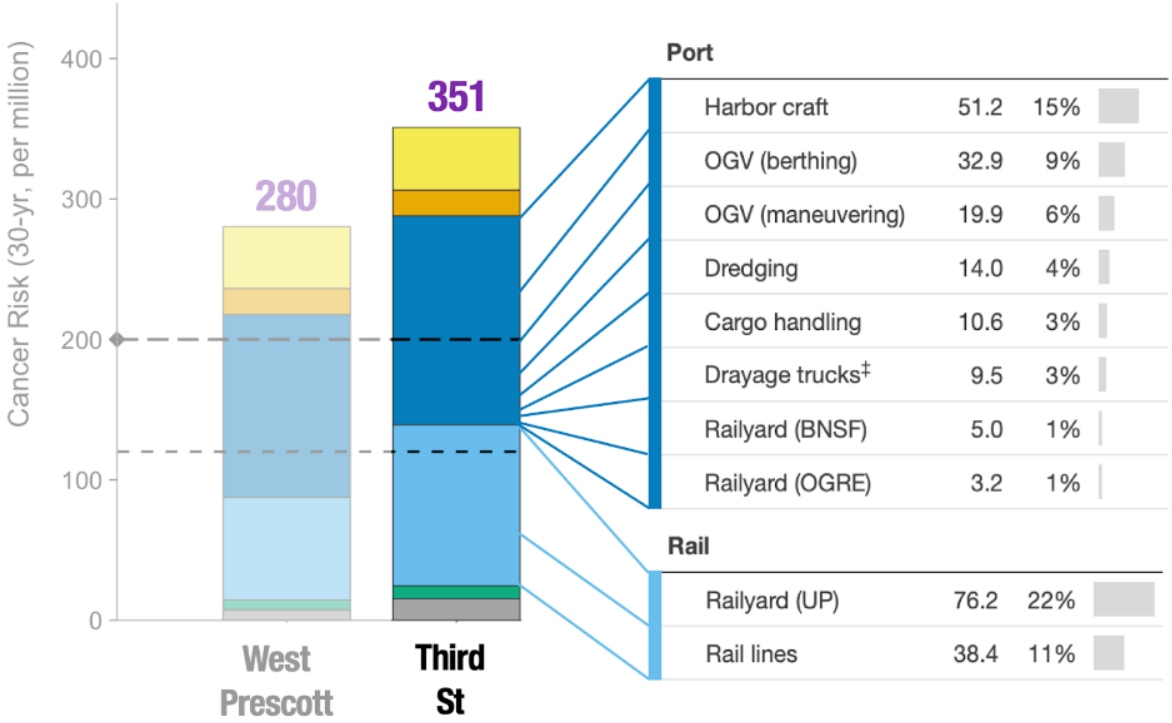
Source apportionments drill down into what's responsible



DRAFT 2019-05-31

Cancer Risk

Source apportionments drill down into what's responsible



West Oakland Proposed Strategies - Overview

Land Use

Relocate recycling businesses

Accelerate relocation of auto-repair and painting that conflict with West Oakland Specific Plan (WOSP) zoning

Incentives to relocate truck yards/repair, etc.

Trucks

Better route and parking enforcement

Stop idling in West Oakland

Incentives for cleaner trucks

More street sweeping

Other Mobile Sources

Incentives for cleaner rail, marine, off-road upgrades

Implement zero-emissions equipment

California Air Resources Board (CARB) regulations

Car, bike incentives

Stationary Sources

Amendments and new regulations

Incentives for stationary diesel engines

Enhanced enforcement

Magnet sources

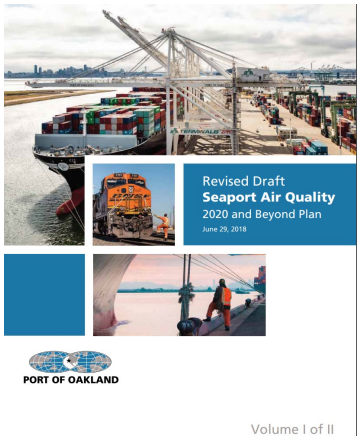
Health Programs

Incentives for exposure reduction (MERV 13, etc)

Expansion of County Asthma Management

Healthy Oakland Development Guidelines

Seaport Air Quality 2020 and Beyond Plan
A Pathway to Zero-Emissions Seaport Operations



- Key Strategies
  1. Sets goal of zero emissions Port
  2. Commits to some near-term reductions
  3. Includes mechanism to add measures that further reduce air pollution exposure

- Air District Concerns
  1. Allows for increased greenhouse gas and diesel particulate matter emissions
  2. No interim targets on path to zero emissions
  3. No commitment to upgrade electrical infrastructure
  4. Less progressive than plans for Southern California ports
  5. No commitment to incorporate measures needed to meet goals of West Oakland Community Action Plan


Q&A
Powell Street
Emeryville
40th Street
San Pablo Avenue
Adeline Street
Martin Luther King Jr Way
Telegraph Avenue
51st Street
Piedmont Avenue
Broadway
Pill Hill
Glen Echo Creek
Harrison Street
Grand Avenue
Adams Point
Lakeshore Avenue
NIMITZ FREEWAY
Frontage Road
Campbell Village
7th Street
West Grand Avenue
14th Street
Market Street
OAKLAND
12th Street
8th Street
Chinatown
Madison Street
Oak Street
Laney College
East 12th Street
Ferry Building
Oakland - Alameda
80
580
880
980
24
123
61

NEXT MEETING:

July 10, 2019

West Oakland Low Carbon Transportation Investments Workshop

by West Oakland Environmental Indicators Project

Free

Register

Description

Come have dinner with **West Oakland Environmental Indicators Project** at **DeFremery Park June 10th, 2019** from **5:30PM to 8:00PM**.

We will be having dinner and a workshop to increase awareness and access to clean transportation:

- Currently, there are **millions** of dollars available from the California Air Resources Board's Low Carbon Transportation Investments programs, which aim to serve disadvantaged communities and lower-income households.
- Learn about rebates and incentives to replace old cars with electric and hybrid cars and pay for charging equipment
- Learn about funding opportunities to bring clean, shared mobility options to West Oakland, such as car share, ride share, bike share and neighborhood transit
- Discuss community transportation needs and action to take advantage of these resources

Dinner and childcare* provided.

Date And Time

Mon, June 10, 2019
5:30 PM – 8:00 PM PDT
Add to Calendar

Location

DeFremery Recreation Center
1651 Adeline Street
Oakland, CA 94607
View Map

Speaker Biographies for Panel: Ensuring Implementation Success

Richard Corey, California Air Resources Board

Executive Officer, rcorey@arb.ca.gov

Mr. Corey has over 30 years of professional experience in the air quality and climate change field. Prior to his appointment as Executive Officer, he served as Deputy Executive Officer, Chief of the Stationary Source Division, as well as various management positions throughout the organization.

Mr. Corey's team of approximately 1,700 engineers, scientists, technicians, analysts, are responsible for a broad range of programs including those concerning cleaner emission standards for motor vehicles and equipment, fuels, climate, incentives, and air toxics. Some of the key programs that his team is responsible for implementing include the zero and near zero emission standards for mobile and off road sources (e.g., cars, trucks, fork lifts, cargo handling equipment, motor cycles, and lawnmowers), low carbon fuel standard, cap-and-trade regulation, and focused efforts to drive down emissions and exposure in impacted communities throughout the state.

Other measures include incentives of over one billion dollars to support reducing emissions from a variety of goods movement sources, including port trucking, transport refrigeration units, cargo handling operations, maritime operations, rail-related goods movement, and measures to reduce emissions from stationary and portable diesel engines as well as several strategies to reduce toxic air contaminants from a wide variety of sources.

A key focus of CARB is developing policies that not only work for California by reducing emissions of pollution while creating economic opportunities for clean technologies, but building national and international partnerships. The CARB has partnered with states and jurisdictions around the worlds that are helping to secure additional emission reductions and bolstering the signal to the market that investments in zero and near zero emission technologies will be rewarded.

Mr. Corey has an undergraduate degree in Environmental Toxicology as well as an MBA from the University of California, Davis.

Kimi Watkins-Tartt, Alameda County Public Health Department

Director, kimi.watkins-tartt@acgov.org

Kimi Watkins-Tartt serves as Public Health Director. In this capacity she is responsible for providing overall administrative direction, planning and organization of the programs and operations of the Public Health Department.

Prior to this, and in the role of Deputy Director, Ms. Watkins-Tartt was responsible for the oversight of the department's programmatic divisions which include Family Health Services, Community Health Services, Public Health Nursing and Communicable Disease Control and Prevention. Additionally, Ms. Watkins-Tartt oversaw the management of internal department policies, program budget, grant coordination and personnel management. Ms. Watkins-Tartt has worked for over 25 years within the local public health community and brings a wealth of experience in public health administration, policy development, as well as community health planning and coordination. Prior to taking on the role of Deputy Director, Ms. Watkins-Tartt led the Division of Community Health Services, driving the division's strategic initiatives including the launching of new efforts that aligned with the department's strategic direction to achieve health equity. Ms. Watkins-Tartt was instrumental in helping the department design and implement its health equity and local policy efforts and recently spearheaded the department's first Chronic Disease Prevention Planning process.

Ms. Watkins-Tartt has a long standing passion and commitment to health equity and social justice. She is a founding member and current Internal Capacity Committee co-chair for the Bay Area Regional Health Inequities Initiative (BARHII) and serves on the Health Equity and Social Justice Committee of the National Association of City and County Health Officials (NACCHO).

Maraskeshia Smith, City of Oakland

Assistant City Administrator, MSmith2@oaklandca.gov

June 8, 2018 via the Oakland Post - Oakland City Administrator Sabrina Landreth has hired Maraskeshia Smith as her new Assistant City Administrator.

Smith has more than 18 years of government experience with an emphasis in public works, organizational development, emergency operations, community engagement, and performance management.

She most recently served as Director of Public Services for the City of Cincinnati.

According to the City Administrator Landreth, Smith "is recognized as a leader in performance management and data-driven decision making for tracking efficiency and effectiveness of frontline operations, improving service-level performance, and enhancing customer service."

"I am humbled and honored to be selected as Oakland's next Assistant City Administrator and to join a dynamic team of professionals who are vested in making Oakland the great city it is," said Smith, who will begin work on July 16, filling the position on the City Administrator's executive team formerly held by Claudia Cappio.

Chris Lytle, Port of Oakland Authority

Executive Director, clytle@portofoakland.com

J. Christopher Lytle, Executive Director of the Port of Oakland, California, was named to the Port's top management position on July 22, 2013, by the Oakland Board of Port Commissioners, the Port's seven-member governing body.

Prior to assuming the position at the Port of Oakland, Mr. Lytle served as the Executive Director at the Port of Long Beach. A longtime shipping industry veteran, Mr. Lytle served as the Deputy Executive Director and Chief Operating Officer from 2008 to 2011 for the Port of Long Beach. He joined the Port in September 2006 as Managing Director of the Port's Trade Relations and Port Operations Bureau.

Before joining the Port, Mr. Lytle served as Vice President of West Coast Operations for the French-based shipping line CMA CGM, which has significant marine and terminal operations at the ports of Long Beach, Oakland and Seattle. Mr. Lytle has also held executive positions at P&O Ports North America, Denmark-based APM (Maersk) Terminals, and Sea-Land Service, Inc.

Mr. Lytle has been affiliated with several associations serving the maritime industry, including the Pacific Maritime Association, and the Pacific Merchant Shipping Association, where he was on the Board of Directors. He also has served on the boards of the Steamship Association of Southern California, the Propeller Club of Los Angeles and Long Beach, and the Marine Exchange of Southern California, and was a member of the Executive Committee for the Center for International Trade and Transportation. He currently is on the board of the University of Denver's Intermodal Transportation Institute. Also, he served as a trustee with the Long Beach Ronald McDonald House, a charity organization.

Mr. Lytle holds a master's degree in business administration from the University of Puget Sound, and a bachelor's degree in business administration from Central Washington University. He served as an Infantry Officer in the U.S. Army and has traveled extensively during his career in the maritime industry, including positions in Europe, Asia and the Middle East.

Mr. Lytle, his wife, Stephanie, and their three sons live in the Bay Area.

Tess Lengyel, Alameda County Transportation Commission

Deputy Executive Director of Planning and Policy, tlengyel@alamedactc.org

As deputy executive director of planning and policy for the Alameda County Transportation Commission (Alameda CTC), Lengyel directs all short- and long-range transportation planning for Alameda County, which provides the foundation for transportation funding decisions made by Alameda CTC. She led development of the $8 billion, 30-year Transportation Expenditure Plan, approved by 70.76 percent of voters in November 2014. She is also responsible for policy, legislation and government affairs at Alameda CTC.

Lengyel has over 25 years of transportation experience. Prior to her current position, she served as a programs and public affairs manager for the Alameda County Transportation Improvement Authority (ACTIA) and was responsible for oversight of approximately $60 million per year in programmatic expenditures for multimodal transportation systems, including streets maintenance and repair, bicycle and pedestrian safety projects, transportation for seniors and people with disabilities and bus, commuter rail and ferry operations. Lengyel was a key participant in public outreach and education that helped result in the passage of the 2000 transportation sales tax measure that garnered 81.5 percent of voter support for a 20-year measure.

Prior to ACTIA, Lengyel worked for an international engineering firm delivering transportation projects throughout the Bay Area. She holds a bachelor's degree in planning and policy/environmental studies.

Jack Broadbent, Bay Area Air Quality Management District

Executive Officer, jbroadbent@baaqmd.gov

Jack Broadbent serves as the Executive Officer/Air Pollution Control Officer for the Bay Area Air Quality Management District. In this position, Mr. Broadbent is responsible for directing the Air District's programs to achieve a healthy breathing environment for every Bay Area resident while protecting and improving public health, air quality, and the global climate for the nine-county San Francisco Bay Area. Under his direction, the Air District has led the development of a comprehensive greenhouse gas program, grants to reduce diesel pollution, refinery emissions tracking rule and the Commuter Benefits Program.

Prior to the Air District, Mr. Broadbent worked for the U.S. Environmental Protection Agency in the Pacific Southwest region. In that position, Mr. Broadbent was responsible for overseeing the implementation of the Clean Air Act as well as indoor air quality and radiation programs. Before serving at the EPA, Mr. Broadbent worked for the South Coast Air Quality Management District as a Deputy Executive Officer. While at the South Coast District, Mr. Broadbent directed the development of several landmark programs that contributed to significant improvements in air quality in the Los Angeles region.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

West Oakland Environmental Indicators Project

West Oakland Community Action Plan

Steering Committee Meeting #11

Wednesday, June 5, 2019, 6:00 PM - 8:30 PM

West Oakland Senior Center: 1724 Adeline Street Oakland, CA 94607

Meeting Objectives

- Provide a summary of the May 1st meeting, including evaluations
- Review tracking process and discuss accountability and implementation
- Panel: Discuss how multiple agencies can help with Plan implementation

Meeting Summary

1. Welcome message and brief introductions from facilitators, Marybelle Tobias & Anuja Mendiratta.

2. **West Oakland Community Action Plan Status** (Yvette DiCarlo, BAAQMD). Yvette informed that the Draft Plan is nearing completion. There will be a second SC meeting in June for the SC to review the draft before it becomes public. After the special meeting, it will go onto the website the week of July 19. There will be a Town Hall meeting in August to present the plan to the public.
    a. Brian Beveridge, WOEIP, shared that the process was created so that the SC can make sure that the Draft plan reflects what they want to see before its public release. After Plan is released there will be a 45-day comment period, and SC members are also welcome to submit comments during that period.
    b. Brian also clarified that the Draft Plan will be released at the same time as the Draft Environmental Impact Report which will also have a 45-day public comment period in accordance with CEQA requirements.

3. **Accountability: Laying the Foundation for Implementation** (Alison Kirk, BAAQMD). Alison explained the need for tracking during the implementation phase to ensure we meet our goals. Tracking is a process that will take place throughout implementation to determine whether we are on target.
    a. The Tracking Process looks at: (1) whether the strategy was properly funded, (2) whether it makes an impact and if that impact can be quantified based on the types of data that can be collected; and (3) whether anyone is better off.
    b. Difficulty in attributing success to the steps taken by this plan -- changes we see may have been caused by other factors.
    c. SC will determine the best tracking process, the right data to collect, the right questions to ask.
    d. Questions: Richard Grow, U.S. EPA, asked whether we are also tracking health equity goals.
        i. Kimi Watkins Tartt answered that, broadly speaking, yes, but we can't expect to have that fine-grained of health data during this plan's timeline because health improvements take time.
        ii. Other questions addressed plans for cross-sector data sharing, and the SC's tracking process.

4. **Overview of Plan Goals** (Brian Beveridge, WOEIP). Brian shared that the West Oakland Plan's goal is to eliminate the disparity and exposures in our community when compared to County levels. When compared to Alameda County as a whole, West Oakland has nearly double the rates of asthma emergency visits and hospitalizations, cancer risk, stroke, and chronic respiratory disease. Brian emphasized that the novel combination of strategies included in the Plan will require continuous interagency collaboration over the next 10-20 years.
    a. Steering Committee member Karin MacDonald asked why the Plan's goal for West Oakland is for *less dirty*, rather than *clean*, especially given the emphasis on it being a living plan. Brian mentioned that the data shows a zero emissions/exposures goal is not plausible in our lifetime.
    b. Karin urged that, while we can't say zero, we can nudge the targets lower.

5. **Panel: Ensuring Implementation Success for West Oakland Community Action Plan**

    Opening Statements (WOEIP & BAAQMD)
    a. **Ms. Margaret Gordon, WOEIP**. Ms. Margaret described WOEIP's history with the Air District, developing a relationship over 12 years that has resulted in West Oakland being the first community in the state to create an AB 617 action plan. Ms. Margaret described the process of developing the plan: long-term engagement with the Air District around land use, stationary sources, mobile sources, and how to use the data and research. Ms. Margaret challenged the other agencies present to commit themselves to the implementation process and to understand how true collaboration works.
    b. **Jack Broadbent, BAAQMD**. Exciting time - Air District is celebrating 65 years. AB 617 is about improving public health; we are excited to move forward to implement this plan. At this morning's Board meeting, we briefed the plan and affirmed our explicit partnership with WOEIP.

    Panelists shared their responses to this question: "**What do you see as your agency's role in implementing West Oakland's AB 617 Community Action Plan?**"
    c. **Richard Corey, California Air Resources Board**. Richard shared that CARB has seen successes that demonstrate the broader benefits of community-based plans and reduction targets, and of taking action even before having perfect information. This plan represents an evolution at the local level. It will be necessary for CARB to play a meaningful role: our responsibility is action. We've got to deliver on enhanced enforcement, and working with other environmental agencies. We are going to get reductions. This process will be hard and tough; there will also be hiccups along the way, but we will make the needed adjustments.
    d. **Chris Lytle, Port of Oakland Authority**. The Port is a member and active participant in this Steering Committee and agrees this city/community collaboration is essential. Our 2020 and Beyond Plan is going to our Board next week and we've added a number of measures based on our work here. It will be our framework for action moving forward and will fit in with AB 617.
    e. **Tess Lengyl, Alameda County Transportation Commission**. Our Agency plans, funds and delivers transportation programs and projects; currently implementing the Alameda County Goods Movement Plan and funding the different elements, including emissions reductions projects and rail safety projects. Our commission has matching funds available; there are multitudes of strategies in the Draft Plan that we can work together

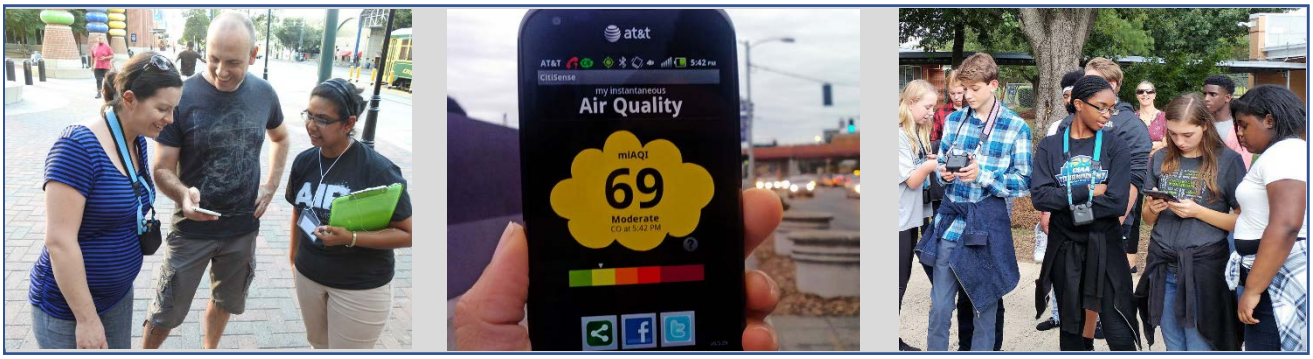
on implementing -- the strategies in your action plan can get a pipeline/pathway to funding through ACTC funds.

f. **Maraskeshia Smith, City of Oakland**. One of the things that is important for me is to be an agent for change within the City of Oakland, to teach the City how to best work together to improve public health in West Oakland.

g. **Kimi Watkins-Tartt, Alameda County Public Health Department**. Collaboration is critical; it is the only way we achieve health equity. We provide the health data, looking at better ways to reduce impacts. The data is not perfect, it does not help us make the link to the impacts in West Oakland. We need additional infrastructure and funding to better understand how much of a difference we are making.

6. Wrap-up + Other Items/Next steps. (Azibuike Akaba, BAAQMD). Now the agencies have to be accountable and the Steering Committee has to call them on their commitments, that is what needs to happen to push the plan forward.
    a. Upcoming Events:
        i. **June 10th**: CARB Low Emissions Workshop at Defermary Park. Non-Vehicle programs, rideshare, how to roll this program out in West Oakland
        PG&E will be present
        ii. **June 19th:** District 3 Equitable Climate Action Plan Workshop
        iii. **June 26th:** SC Special Working Meeting to discuss tracking
        iv. **July 19th:** July SC meeting at West Oakland Senior Center

9. Adjourn



Bay Area Air Quality Management District
Community-led Sensing Program

Implementation Plan

Prepared by Kearns & West and TD Environmental

May 17, 2018

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Table of Contents

Section 1 – Program Background and Objectives

1.1 Overview

Air quality monitoring is undergoing a technological revolution that is enabling community groups and individual citizens to measure air quality themselves. Commonly called "air sensors," these new devices are less expensive and easier to deploy than traditional, federally required air monitors. While these air sensors do not have the level of accuracy of more expensive and sophisticated reference instruments required by the federal government and used by the Air District, the devices can generate useful information when used in a planned and organized way for specific applications.

The Air District's Community-led Sensing Program is designed to respond to, and encourage, community interest in using low-cost sensors to assist the community and the Air District better assess local air quality. The program's goal is to help guide low-cost sensing project sponsors in identifying the appropriate approach for achieving their intended objective(s) of collecting data, and to ensure sufficient data quality such that the data can best inform potential voluntary and, possibly, regulatory actions. The following plan identifies systems, protocols and resources to ensure community-led sensing efforts will result in data "fit for purpose" (described in Section 1.2), and, hopefully, a positive and productive experience for all parties involved.

The plan does *not* include specific recommendations for some key elements that will require additional internal discussions and agreement before the program can be launched, including internal roles and responsibilities and resources needed to implement the program.

1.2 Importance of Data Fit for Purpose

All measurement programs share a fundamental element – the collection of data that can be used to answer a question, provide new information, or address an objective. A key function of the program is to support community-led monitoring efforts to ensure that both the methods utilized and resulting data are appropriately matched with what the study is intended to achieve. The data need to be:

- Accurate and of sufficient quality to the extent required
- Valid
- Complete
- Relevant
- Timely, and
- Documented

The term "*data fit for purpose"* is used in the plan, and will be used in conversations with community-led sensing project proponents, to underscore the fundamental importance of collecting data in a manner that supports the intended purpose of the study. Data fit for purpose are suitable for answering a question posed in a study, add credibility to one's analysis and conclusions, and also allow others to use the data for future applications.

1.3 Program Need

The Community-led Sensing Program is an important initiative for the Air District as it continues to seek new and improved ways to partner with community groups in improving air quality throughout the Bay Area. The Program is intended to respond to a variety of both internal and external community needs,

including the following:

Significant community interest The Air District recognizes that, with the availability of low-cost monitors, community-led sensing efforts (and that immense amounts of data that will come with them) will be increasing significantly in the future. It is essential that the Air District have a structured program in place to manage these efforts and the resulting data that result from them.
Consistent and transparent process A clear, consistent process – both internal and external – is needed to ensure that community-led sensing efforts are helpful and lead to data fit for purpose. This process should achieve the following: • Help increase transparency and expectations about the potential outcome(s) of sensing efforts. • Help the Air District manage its resources efficiently. • Support productive interactions and build trust with community groups.
Data integrity and accuracy Information gathered from community-led sensing needs to be fit for its intended purpose with each application. It is important to focus on how the information is being captured and its accuracy to ensure it will be fit for purpose.
Clear internal roles and responsibilities It will be critical to clarify internal Air District roles and responsibilities, particularly because community-led sensing overlaps with the charge and expertise of several Air District divisions. These different divisions will need to understand their roles and work together collaboratively to ensure a successful program. A clear common understanding of tasks and responsibilities must be established to ensure the data are of maximum value to both the Air District and the community.
Community capacity Capturing and interpreting data requires time, resources and technical skills. Community members often have limited capacity for the work, and they usually do not have the resources nor technical skills to plan, manage and collect data that is fit for purpose. The Air District will need to provide guidance and resources to ensure communities are successful in their efforts.

1.4 Program Objectives

The Community-led Sensing Program will aim to achieve the following objectives:

- Establish a clear, consistent Air District process for partnering with communities on community-led sensing efforts, from initial intake to project completion.
- Clearly define internal roles and responsibilities to ensure resources are used appropriately and efficiently and to ensure uniform actions and outcomes.
- Ensure the goals and expectations of community-led project proponents are clear and realistic.

- Provide resources, targeted training and capacity building to community groups (and Air District staff) to assist them in maximizing the effectiveness of their community-led project-related work.

- Promote positive, productive working relationships between community groups and Air District staff that are built on trust and a spirit of partnership and shared goals.

1.5 Relation to Other Air District Programs

The Air District currently has a number of initiatives that overlap with or incorporate community-led sensing, including Citizen Science Grants, CARE, and AB 617-related monitoring efforts. Low-cost sensing projects stemming from these and other Air District programs will fall within the new Community-led Sensing Program, and will follow a consistent process and structure. Monitoring efforts that use higher cost instruments or different methods (e.g., truck counting) will not fall under this program, and Air District internal roles and responsibilities for those projects will be defined elsewhere.

1.6 Plan Development Methodology

The Air District convened an internal workgroup comprised of staff from divisions that would likely be involved in the implementation and operation of the program, including Meteorology and Measurement, Community Engagement, Planning, Rules, and Communications. The internal workgroup met four times to identify key components of the program and develop the framework for the Implementation Plan.

The consultant team also conducted confidential interviews with both Air District staff and external stakeholders to understand their experiences working on community-led sensing projects in the past, to identify best practices and lessons learned from previous community-led sensing efforts, and to solicit recommendations on how best to implement the various components of a community-led sensing process. Summary findings documents for both the internal and external interviews are available provided in Appendices A and B, respectively.

Section 2 – Program Structure and Components

2.1 Consistent and Adaptive Process

The program structure described below is designed to ensure consistency, transparency, and effective internal coordination across the various community-led sensing efforts the Air District will support. While different sensing projects will have unique goals and intended outcomes, they will all undergo the same intake process and will be managed and supported in a consistent manner. The program is also designed to be flexible and adaptive; if a project's goals change after learning new information or receiving guidance, for example, the program will support the sponsoring group in making adjustments to its project to incorporate this new information.

2.2 Sensing Resource Center – the Program Hub

Sensing Resource Center

Note: Placeholder logo

The Sensing Resource Center, operated by a third party, will serve as the cornerstone and "hub" of the Community-led Sensing Program. Air District staff and external stakeholders expressed broad support for the Sensing Resource Center concept during interviews and working group meetings. They identified a number of potential benefits for the third-party approach (compared to operating the program internally at the Air District), including:

- More nimble and responsive
- More easily scale-able according to needs and available resources
- Able to coordinate more easily across various Air District divisions that sometimes operate in "silos"
- Likely to be more trusted by the community, and can help build stronger relationships among the Air District and community members

The Center will have its own dedicated staff and operating space, and will be responsible for the overall management of the program, with close oversight and guidance from the Air District. The Center will support community-led projects through each step in the process (see Section 2.4), and will report back to Air District staff, identified to perform specific task and hold specific responsibilities, at key decision-points and milestones and make recommendations for the Air District's consideration. Figure 1 below indicates the flow and frequency of information between the Sensing Resource Center, the Air District, and community monitoring groups. Having the Center will allow the Air District to engage with community groups on a strategic level, while allowing the Center to manage more time-consuming day-to-day tasks and interactions.

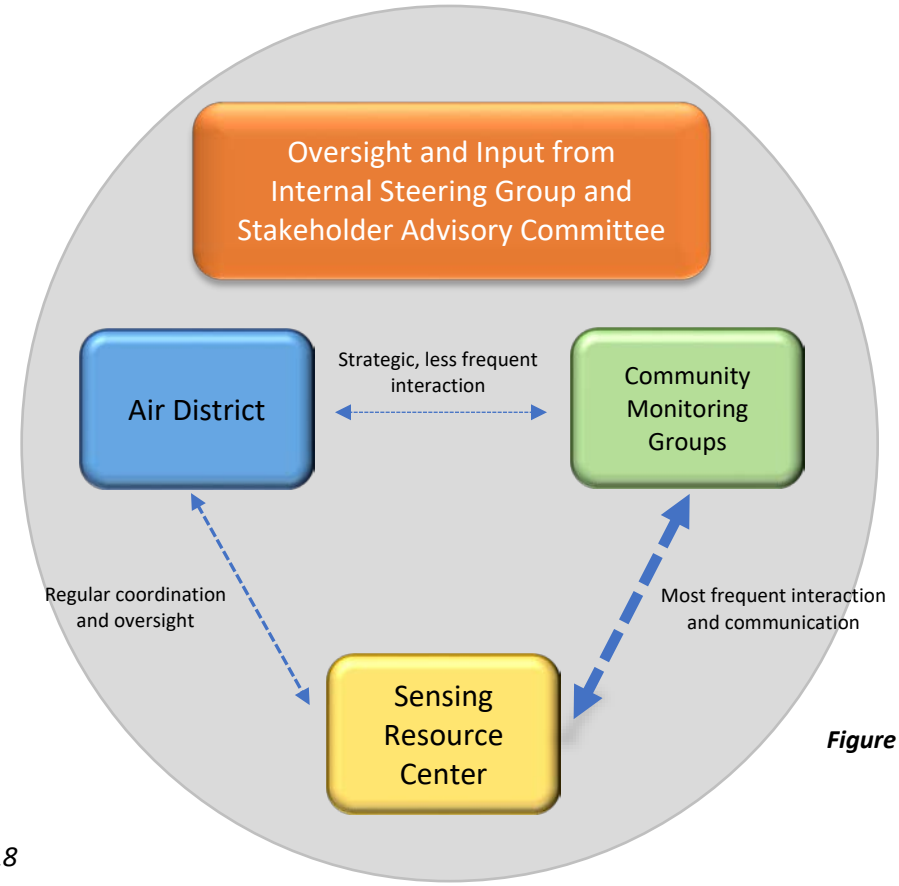


Figure 1: Flow and Frequency of Communication

The table below outlines the services that the Center can provide to the Air District and community groups. While the Center will manage the overall Sensing Program, it will also be available to assist community groups with more discrete and bounded requests for assistance.

Engagement Type/Service	Description	Examples
End-to-End Support	Assist with all aspects of community monitoring from inception, monitoring, analysis, and next steps.	Support a community group in setting up a "pre-AB 617" monitoring program.
Advisory Role	Provide guidance on one or more aspects (i.e., a la carte) of air monitoring or capacity building – planning, training, sensor lending, analysis, interpretation, etc.	• Work with an existing community group to help with selecting a sensor, siting it, and using data management tools. • Work with a prospective community grant applicant to create a viable and technically sound approach. • Match a community group with a technical expert. • Conduct a training course on specific or all aspects of setting up and installing a sensor network.
Education/Training	Design and conduct educational program(s) to build capacity and awareness.	• Develop and make available a variety of educational materials. • Operate an "Air Quality Academy" to inform community groups about air quality (basics/measurement/ data interpretation), and aspects of air quality management.
Expert Guidance	Answer "one-off" questions and provide information.	Answer a community group's question of "What sensor should we buy?"

2.3 Program Oversight

Two entities – one internal and one external – will be convened to oversee the program and maintain a close connection to the broader Bay Area community, including:

- An **Internal Steering Group** will perform governance and decision-making duties related to the program. The group will include 1-2 senior staff from each of the following Air District divisions: Meteorology and Monitoring; Community Engagement; Planning; and Enforcement. Steering Group members will represent the priorities and interests of their respective divisions, and will be expected to share information and gather input from other staff as needed.

  The group will meet monthly and potentially more frequently around key milestones and decision-points for the program. The group's decisions and guidance will be informed by information and preliminary recommendations from Sensing Resource Center staff. The

Steering Group will provide updates to Air District governing bodies (e.g., APCO, Board of Directors, Public Engagement Committee, etc.) as needed or requested.

- The Air District will convene a **Stakeholder Advisory Committee** to promote ongoing dialogue and transparency with the broader community regarding the Community-led Sensing Program. The committee will function in an advisory capacity; that is, it will receive updates, share information, identify preferences and provide recommendations for Air District consideration. The committee will not have explicit decision-making authority.

  The committee will have broad representation from Bay Area communities, and will include low-cost monitoring project proponents, youth organizations, industry, and academia. The committee will meet quarterly and potentially more frequently around key milestones and decision-points for the program. Air District and Sensing Resource Center staff will support and participate in Committee meetings.

2.4 Key Program Components

The Community-led Sensing Program will be implemented and managed according to six key components, or steps, in the process. Each project will follow this uniform set of steps, ensuring consistency across the projects and common expectations. The steps are shown in Figure 2 below and are described in the text that follows.

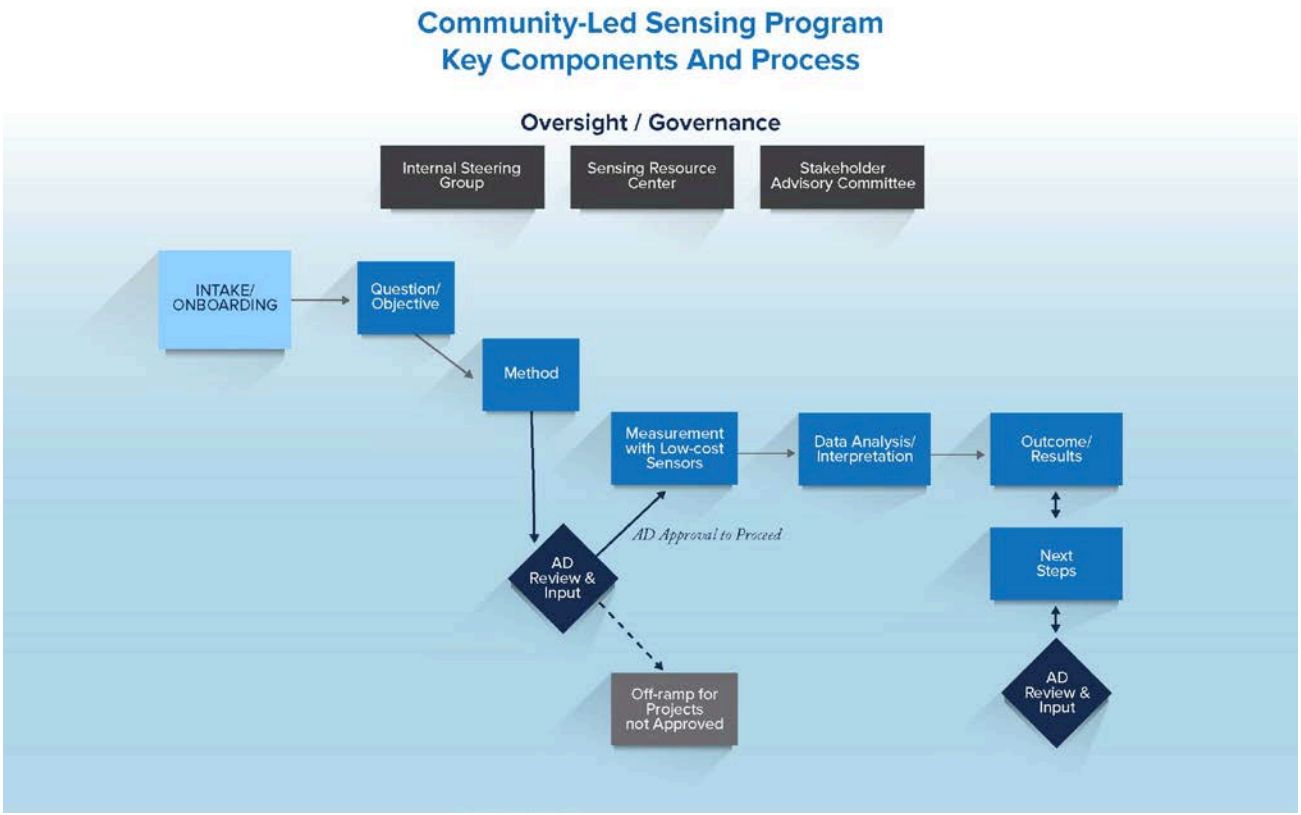


Figure 2: Key Program Components and Process

- **Step 1: Intake**
    - *Description*: Work with the community to identify issues, create an initial approach, and discuss potential outcomes. This serves as an initial screening and expectation-setting step for the community group and Air District.
    - *Process:*
        - Community group will provide basic information (name, organization, project description) using a form template
        - Conduct an onboarding phone conversation
        - Identify and frame question/issue
        - Identify desired outcome
        - Determine possible methods to achieve outcome
        - Determine how the Air District/Center can potentially assist
        - Create a project identification number and enter into tracking database

- **Step 2: Identify Objectives**
    - *Description:* Work closely with community group to fully refine its monitoring objective(s). Conduct in-person meetings and/or site visits, and develop clear objectives (or questions) stating the need for air monitoring and the desired outcome.
    - *Process:*
        - Continue to work with the community to identify and refine questions and sub-questions, including:
            - State the problem
            - Identify information inputs
            - Define the boundaries of the study
            - Identify the goals of the study and expected outcome

- **Step 3: Method**
    - *Description:* Create a Monitoring Plan that provides specific details of the project's methodology for monitoring, including: approach to project management, measurements, data quality and validation, analysis and insights, funding, oversight, and next steps. This plan will be based on elements identified in EPA's Quality Assurance Project Plan (QAPP).
    - *Process:*
        - Work with the community group to flesh out details of the Monitoring Plan
        - Assist the community group with sensor selection and design of the monitoring approach to collect data to address their concerns
        - Identify the resources needed to implement the Plan (technical expertise, hardware, sensors/instruments, funding, etc.)
        - Foster common expectations regarding likely next steps and/or actions depending on the study findings
        - The Air District's Internal Steering Group will review and approve, or recommend improvements to, the project outlined in the Monitoring Plan document.
        - If the Internal Steering Committee concludes that the project's Monitoring Plan is not adequately designed to achieve its intended purpose, the Committee will recommend that the project not move forward to subsequent steps. There will be an "off-ramp" step during which the Air District and Resource Center will work with the project proponent to identify potential alternative options,

partners or resources for achieving its goals.

- **Step 4: Measurement**
  - *Description:* Provide a range of assistance, such as planning, siting, equipment use, procuring and/or lending sensors/instruments, troubleshooting, and data management. Because the community primarily will be installing, operating, and using the sensors, the Center may be asked to help with a wide range of support services from answering simple questions to assisting with onsite training. This process will aim to assist the community in making sound technical decisions and achieving data fit for purpose.
  - *Process:*
    - Follow the measurement methods identified in the Monitoring Plan
    - Set up check-ins to ensure the monitoring progresses and produces data with the highest level of quality possible
    - Conduct early and mid-project data reviews to catch problems and issues that commonly occur when making measurements
    - Provide adaptive on-call support and training services as needed. This could include answering questions, providing data reviews, conducting additional training, and assisting with data management.

- **Step 5: Data Analysis and Interpretation**
  - *Description:* During this stage, the community group will review and interpret data using the approach outlined in the Monitoring Plan. This step is a challenging as it involves extracting meaning from the data and seeking to answer the question posed during Step 2. The community group will likely analyze the data continuously during and at the end of the monitoring, and therefore there will be a need to be responsive and nimble. The Center will be flexible by providing technical support, guidance, insights, expert matching, and answering questions. This step will be easier for some community groups rather than for others; thus, the Center must be adaptive in working with each community group. Some groups may need tools or software while other groups may need a training course on interpreting data or connecting with an expert.
  - *Process:*
    - Help the community group develop and follow the analysis approach outlined in the Monitoring Plan document.
    - Check in shortly after measurements begin:
      1. Provide technical training on data analysis and interpretation, as needed
      2. Provide training or consultation on analysis tools and techniques
      3. Assist with display and visualization of data
    - Identify other information and resources that may be needed to interpret the data and connect the community group with the best informational resource (Air District staff, experts, other governmental organizations).
    - Provide other on-call support and training services as needed.

- **Step 6: Summarize Results and Identify Next Steps**
  - *Description*: Based on the results of monitoring, data analysis, and interpretation the Center will work with the community group to develop a summary of its findings and to identify or confirm next steps following completion of the monitoring and analysis. This could include a range of activities: additional monitoring with low-cost sensors, more sophisticated monitoring performed by the Air District or other organizations or

agencies, other types of pollution/source assessments, and awareness and education efforts.

- *Process*:
  - Conduct meetings and discussions to determine next steps with the community group
  - Engage the Air District or other jurisdictional agencies for advice on next steps
  - Prepare a summary of the findings and next steps
  - Review the summary with the Internal Steering Group

The anticipated duration a community-led project from initial intake (Step 1) to summarizing results and next steps (Step 6) is approximately 12 months, though the timeline will depend on several factors, including: project scale, the project sponsor's capacity to complete its work; and how much assistance the sponsor requires to refine its approach to yield data fit for purpose.

Section 3 – Resources and Infrastructure

The Community-led Sensing Program will aim to build the capacity of community groups to become active partners with the Air District and other government agencies in identifying, evaluating, and ultimately reducing air pollution and exposure to harmful emissions in their communities. The program will include the following resources and infrastructure:

Resource	Description
Sensing Resource Center	The Center will be comprised of staff with sensor and air monitoring expertise, a collection of tools and sensors/instruments, and training materials and processes to support the program. • Staffing and experience. Will include dedicated staff and on-call contactors with extensive experience working with air monitoring, air sensors, data management, as well as community engagement and training. • Center location. Initially, the Center will be virtual as its various parts are being developed. Over time, the Center could have a physical space and/or function as a mobile lab that can travel to communities and perform work on location.
Sensing Project Tracking and Management	Each project that comes through the Center will receive a project identification number, and all information and recommendations related to that project will be saved in a project management database accessible to appropriate Air District and Center staff. Having the database will allow for easy access to project information and effective coordination across various Air District divisions.
Program Website	The Program website will provide resources, contact information, training videos, examples of data use, and an open forum for sharing insights and recommendations. Initially, the website will be linked from BAAQMD.gov to an external website. Over time, the website could include data analysis tools and systems to easily manage data, case studies, success stories, and other resources.

Training	The Center will provide trainings to community groups to build their capacity and expertise related to air quality monitoring. These trainings can take place in person and also be recorded and made available on the Program website. Trainings can be offered as a single or multi-part course that provides detailed information and guidance on more complex topics from issue identification to air monitoring best practices (see list of education resource topics below). The Center could also sponsor an Air Academy that has a class of trainees who receive training on a variety of topics to help them be effective in their work. The trainees will also support one another in implementing their respective monitoring efforts.

Educational Resources	The Center will develop an extensive library of resources on various monitoring topics. Topics that receive the most interest can be developed into training modules.
	
	• How to frame a project's purpose/objective
	• Who controls an emissions source?
	• Sensor/instrument
	  o Selecting and operating an air sensor
	  o Types of monitoring
	• Overview information
	  o Air District 101
	  o Air Quality 101
	  o Data Science 101
	• Quality
	  o Developing a QAPP
	  o QA/QC concepts
	  o What are Data Quality Indicators?
	  o Choose the right balance of quality assurance and documentation
	  o Record keeping and documentation
	  o Validating air sensor data
	• Monitoring location and placement
	  o Designing a network
	  o Siting air monitors
	• Data management fundamentals
	  o Tools and tips for managing data
	  o Using online tools
	• Visualization
	  o Using simple data display tools
	  o Visualizing results with online tools
	• Interpreting data
	  o Making sense of sensor data
	  o Telling a story with data
	• Determining next steps based on your results

Sensor Lab	The Center could have a Sensor Lab that would support (e.g., guide purchasing, help set up, repair) and make available validated and appropriate sensors/instruments to meet the objectives of the various monitoring efforts. The lab would have a small supply of sensors for demonstrations and may include some sensor loaning capacity for short duration projects for appropriate technologies. The lab could be located at a small warehouse/office or vehicle. The lab would include: • Assistance with instrument setup and answering questions about the best technology to purchase. • Assistance with troubleshooting, validating, and repairing low-cost sensors. • A sensor loan program that provides short-term (i.e., less than 6 months) loans of sensors. Providing low-cost sensors for longer-term studies may not be cost-effective and would need to be investigated. As appropriate this function may be a procurement, rather than a loan program, depending on the technology and advisement of the steering committee. • Mid-cost instrument support (resources permitting).
Expert Matching	Matching sensing project sponsors with experts will help community groups gain insights and expertise and create monitoring results with higher quality data. The Center will maintain a roster of independent technical experts who are interested in working with community groups on monitoring projects. This will include experts with knowledge of air quality, emissions, public health, epidemiology, policy, and regulation. There will be a vetting process for all experts before they are added to the roster. Criteria that will be considered in the vetting process will include: education background, professional experience, independence/neutrality, location, and ensuring there are no conflicts of interest with the Air District and/or community groups.

Data Management, Analysis and Interpretation	Air sensors produce high volumes of data that can be difficult to manage. Having easy-to-use, scalable, and transparent tools to manage and use sensor data will be an asset to both the community and the Air District and will help promote higher quality data. In addition, having a data management system operated by the Center will help incorporate more oversight and promote data quality. Developing or purchasing a data management system will take time and resources, and we recommend beginning with the following steps: • Survey and identify tools that allow high-quality data management at a cost-effective price. Work with the Air District to identify likely systems. • Work with community groups to identify the highest priority needs and tools. • Create a list of tools, resources, and methods to manage and interpret data, along with a schedule that can be implemented in phases. • Create a list of software tools that can aid in analysis and interpretation of data. Many free or open source tools are now available, and with modest training could be used by community groups to provide insights about their data.

Section 4 – Next Steps and Implementation Schedule

4.1 Next Steps

This plan is intended to provide an overview and description of the program's components (i.e., *what* will be implemented). It will serve as a framework for important, subsequent conversations – both internally at the Air District and externally with stakeholders – regarding *how* the program will be implemented. A key next step for the program is to socialize and build awareness and support for the program, and make adjustments to the program framework (to the extent feasible) to incorporate input received. In addition, a program work plan will be developed that fleshes out more specific details related to several topics, including:

- Internal roles and responsibilities;
- Internal decision-making processes;
- Integrating existing, overlapping Air District initiatives into the program;
- Resources needed to support the Sensing Resource Center and overall program; and
- Identifying targets or measurable objectives for the program.

4.2 Implementation Schedule: Year One

Note: The schedule below assumes that a contractor will be in place to support implementation. Q1 will begin when the contractor is identified and under contract.

Project Task	Q1	Q2	Q3	Q4
Internal Coordination and Education	• Share final implementation plan broadly with Air District staff • Hold Internal Steering Group kick-off meeting • Develop detailed program work plan • Present on Sensing Program to Executive Committee	• Internal Steering Group kick-off meeting • Host internal brown bag on Sensing Program	• Monthly Internal Steering Group meetings • Present on Sensing Program to Public Engagement Committee	• Monthly Internal Steering Group meetings
Coordination with External Stakeholders	• Share implementation plan with stakeholders, gather feedback • Identify stakeholder priorities for training and education topics	• Recruit Stakeholder Advisory Committee members • Hold Stakeholder Advisory Committee kick-off meeting	• Quarterly Stakeholder Advisory Committee meeting • Co-sponsor community meeting to build community awareness about the Sensing Program	• Quarterly Stakeholder Advisory Committee meeting • Conduct ongoing outreach to build community awareness about the Sensing Program
Sensing Resource Center	• Identify staffing and resource needs for Center • Recruit and hire Center staff • Set up process for reporting to Internal Steering Group and	• Set up virtual Sensing Resource Center • Develop Center/resource sharing website		• Set up Sensing Resource Center (mobile and/or physical space)

	Stakeholder Advisory Committee			
Support for Community-Led Monitoring Projects	• Select two monitoring projects for end-to-end assistance, conduct intake process • Develop intake form • Establish project tracking system/database	• Begin providing a la carte support to other community groups	• Identify one additional project for end-to-end assistance (total of 3), conduct intake process • Provide a la carte support to other community groups	• Identify one additional project for end-to-end assistance (total of 4), conduct intake process • Provide a la carte support to other community groups
Tools and Resources	• Develop Monitoring Plan template • Establish protocol for Sensor Lab • Survey and identify tools for data management • Identify appropriate tools and systems for data display and visualization	• Establish initial methods to manage data • Create a list of software and tools • Set up Sensor Lab and begin using in communities as part of training.	• Setup data management system and process • Create framework for Expert Matching • Recruit experts to participate in program	• Begin expert matching
Training and Education	• Develop 6-8 information sheets • Develop curricula for training courses • Recruit participants (internal and external) for trainings and Air Academy	• Conduct two 101 training courses • Develop additional information sheets as needed	• Conduct 101 training course • Create training videos, make available on Program website	• Launch Air Academy

Appendix A
Summary of Findings from Interviews with Air District Staff

I. Overview

What follows is a summary of findings from in-person interviews Kearns & West and Tim Dye conducted with Air District staff in January 2018 on the topic of community-led sensing. This document highlights overarching themes and key perspectives that emerged from the interviews. It is intended to solely reflect the input we received from Air District staff during the interviews.

The following staff participated in the interviews:

- Communications: Lisa Fasano
- Community Engagement: Azibuike Akaba, Kristina Chu, David Ralston
- Enforcement: Jeff Gove
- Meteorology and Measurement: Kate Hoag and Eric Stevenson
- Planning: David Holstius, Phil Martien
- Rules: Victor Douglas, Greg Nudd

The interview instrument that was used is provided in Appendix A.

II. Overarching Themes

- **Multiple benefits**
  Interviewees identified a variety of benefits that community-led monitoring could foster, including screening air quality problems for further investigation; supporting effective community engagement and building trust; building community capacity; and educating community members about air quality.

- **Need for a consistent methodology and process**
  Interviewees identified the need for a consistent methodology for community monitoring, including and a clear plan to guide the Air District and interest communities through the monitoring process. Such a plan would achieve the following:
  - Help increase transparency and expectations about the outcome(s) of monitoring efforts.
  - Support productive interactions with the community and set expectations early.
  - Identify resources, tools and training needed to build capacity at the community level.
  - Help the Air District become more proactive in addressing community concern.

- **Improved internal coordination needed**
  Interviewees noted that different divisions within the Air District tend to operate in silos, which can create challenges for efforts like community-led monitoring that involve several divisions. Improved internal coordination and cooperation will be needed to ensure the community-led monitoring program is successful.

- **Defining success**
  Interviewees shared several attributes of a future successful community-led monitoring program, including: a template exists for how to conduct monitoring effectively; there is internal buy-in on shared objectives and values and improved trust and relationships with communities; community monitoring leads to new Air District rules; and other decision-makers (cities, counties, etc.) take action on their own ends as a result of the monitoring. Different perspectives were shared regarding the appropriate threshold to consider the program successful.

III. Key Topics

Potential Benefits

Interviewees identified a variety of benefits that could result from a community-led monitoring program, including:

- **Screening air quality problems**. Community members can use apply low-cost sensors to identify or screen air quality problems that air control agencies can then investigate more closely, including gathering regulatory-quality data and ultimately pursuing regulatory action.
- **Effective engagement.** Monitoring can empower community members to participate in a meaningful way in discussions about regulatory change, and it can also serve as a good organizing tool. Monitoring also provides a venue for the Air District to engage the communities it serves.
- **Build relationships and improve trust**. Working with communities as *partners* on monitoring can help the Air District build stronger relationships and improve trust with communities. Several interviewees identified trust as a key benefit (if not the most important) in and of itself for community monitoring.
- **Community education and awareness**. Monitoring helps stakeholders and communities gain a better understanding of their local air quality, and the complexities of accurately measuring data. It can also support increase awareness around personal behavior (e.g., indoor air quality), and it can help communities distinguish perceptions from reality.
- **Community capacity building**. By participating in monitoring efforts, communities can develop a higher level of sophistication and participate in the air quality regulatory process in more meaningful ways. Monitoring can also serve as a gateway to building capacity for AB 617 implementation and related actions.
- **Positive visibility.** The Air District has the opportunity to show it can work collaboratively with communities. Effective monitoring and partnering with communities can lead to positive visibility for the Air District, and potential recognition as a leader in this field.

Keys to Success

Interviewees identified a number of keys to success that should be kept in mind in the development of a community-led sensing program, including:

- **Data integrity and accuracy**. Information gathered from community-led sensing needs to be high enough quality to be actionable to the greatest extent possible. It is important to focus on how the information is being captured and its accuracy. Several interviewees posed the question “Can the Air District use the data in a legal case?” which is the litmus test for data use at the Air District.

- **Comprehensive, consistent and transparent process**. A clear, consistent process (both internal and external) is needed to ensure that community monitoring efforts are helpful and lead to actionable data.
- **Build internal buy-in and trust.** The program will need internal buy-in, and trust needs to be fostered across different staff and Divisions. Several interviewees recommended presenting the program concept to the Air District's Executive Committee when it's more fully developed. Some also recommended connecting community-led monitoring efforts (and the overall program) to the 2017 Clean Air Plan which identifies the priorities and future path for the Air District.
- **Clarify internal roles and responsibilities.** It will be critical to clarify internal Air District roles and responsibilities, particularly because community-led monitoring overlaps with the charge of several Air District divisions. And, while the Air District has the tendency to operate in silos, the different divisions will need to work together collaboratively to ensure a successful program.
- **Education and training** will be needed for community members (and potentially Air District staff) to ensure their work meets an acceptable standard. One interviewee suggested establishing a community monitoring certification or academy. Another interviewee recommended that the Air District generally invest in communities more holistically, and train community members to take samples, analyze/interpret data and potentially identify facilities that are impacting the community.
- **Expectation setting.** While community monitoring can help advance a community's interest in improving its air quality, it is important to clearly set expectations regarding what low-cost sensors can and cannot do upfront, and to make sure community members understand and appreciate the limitations.
- **Bottom-up approach.** The identification of community needs and issues should be bottom-up. The program should be driven by what the community wants to achieve, and it should help them identify their goals.
- **Involve partners**. Some interviewees recommended including other partners in the program, including the public health community and local universities. Public health departments can help interpret symptoms and add credibility to the process, and universities offer technical expertise and additional resources.

Challenges and Potential Concerns

Interviewees identified the following key challenges that should be considered and/or addressed in the development and operation of the community-led monitoring program:

- **Internal coordination.** There are internal silos at the Air District, and different divisions approach monitoring from different perspectives and/or goals. Historically there has not been much cross-division collaboration at the Air District, and this will be needed for an effective monitoring program.
- **Ad hoc process**. The Air District does not have a consistent, predictable process for working with communities on monitoring efforts. This has led to confusion on the part of community members and internal disconnects at the Air District.
- **Possible community frustration**. If community members deploy sensors and detect harmful levels of pollutants, this will not necessarily lead to improved air quality. For example, emitters can be compliant and still create air quality problems for communities, which some community

members find exasperating. In addition, monitoring that is not conducted properly can result in unusable data.

- **Limited authority**. The Air District has limited authority in curbing emissions to improve air quality. It doesn't regulate impacts from all sources (only stationary), and communities have to work with other agencies (CARB, EPA, etc.) on non-stationary sources. It is a big ask of communities to navigate the process with multiple agencies.
- **Reactive approach.** The Air District tends to be reactive to community needs and problems.
- **Internal capacity and costs**. While the cost of purchasing sensors may be relatively low, significant resources and staff time are needed to work with communities on monitoring efforts.

Recommendations for Program Implementation

Interviewees offered several suggestions related to the implementation of the program, including:

- There was general support for having a third party operate the program. This could help add credibility to the program.
- There were several different suggestions regarding which Air District division should serve as the program lead, including CARE, rulemaking, community engagement and monitoring. It was also suggested to not have a lead, i.e. that the program be co-owned.
- Establish a lending library and/or training center with a teaching assistant on staff. Other partners can be brought in (academics, consultants, etc.).
- Incorporate monitoring into school curriculums.
- Pair communities with a technical expert who can guide them through the process and ensure that it's being conducted properly.
- Consider establishing a community advisory panel. Tesoro and Shell Oil have both established community advisory panels that monitor their refineries in Martinez.

Success Stories and Defining Success

Interviewees shared monitoring success stories and their visions for success, including:

- **Relevant success stories**
    - CASS (Berkeley). Community needs (and their interest in data) were clear, and the process results in community satisfaction. CASS also falls within the Air District's jurisdiction.
    - Lennar/Bayview listening sessions resulted in the Air District installing air filtration systems into local schools, and there was supporting education at the schools focused on indoor air quality.
    - Truck counts with the CARE program in West Oakland (WOEIP). There were clear protocols in place, community helped identify where to monitor, and a contractor ran the project. The project resulted in policy at the CARB level to install particulate filters on trucks.
    - Examples of effective internal coordination, including weekly meetings between Monitoring, Community Engagement, and CARE to scope out monitoring protocols and plans for community grantees.
- **What success in five years looks like**
    - There is a template for how to conduct monitoring effectively.

    - There is internal buy-in on shared objective and values.
    - Monitoring gets results for communities (satisfied customers).
    - Improved trust and relationships with communities.
    - Increased awareness about personal behavior and indoor air quality.
    - Sustained funding.
    - The Air District has a compelling story to tell and becomes the leader/catalyst for community sensing. It's a model that other Air Districts emulate.
    - Other decision-makers (cities, counties, etc.) take action on their own ends as a result of the monitoring.
- **Different views on success**. There were different perspectives shared regarding what defines success for community monitoring, i.e. what is the threshold of results or outcomes to make it worth investing in? For example, is a resulting new rule or action required for community monitoring to be considered successful? Some felt action is the key criterion to evaluate the program's effectiveness, while others felt that having positive interactions with communities and building trust through partnering on monitoring are worthy pursuits in themselves.

Appendix B
Summary of Findings from Interviews with Community Stakeholders

I. Overview

What follows is a summary of findings from phone interviews Kearns & West and Tim Dye conducted with Air District stakeholders in February/March 2018 on the topic of community-led sensing. This document highlights overarching themes and key perspectives that emerged from the interviews. It is intended to solely reflect the input we received from stakeholders during the interviews.

The following stakeholders participated in interviews:

- Air Watch Bay Area (Gwen Ottinger)
- Bayview Hunters Point Community (Karen Pierce)
- California Council for Environmental and Economic Balance (Janet Whittick)
- Environmental Defense Fund (Maria Harris, Fern Uennatornwaranggoon)
- GreenAction (Bradley Angel)
- Vallejo Community Air Monitoring Network (Ken Szutu)
- West Oakland Environmental Indicators Project (Brian Beveridge)

The interview instrument that was used is provided in Appendix A.

II. Key Topics

A. Potential Benefits of Low-Cost Sensing

Interviewees identified a variety of benefits that could result from a community-led monitoring program, including:

- **Community education, awareness and empowerment**. Participating in monitoring can help community members gain a better understanding of their local air quality (including the air quality variability across a given community), and also help them learn about data and tools and how to apply them. Generally, monitoring is an experiential tool that can empower communities to have informed conversations about data and correlate it to real health experiences.
- **Effective engagement.** Monitoring allows community members to participate in a meaningful way. It was viewed as particularly powerful for children.
- **Initiate dialogue with the Air District, screening tool.** Community monitoring can help communities open up a conversation with the Air District about air quality concerns and needs, and "speak in the language of the regulator." Having this conversation could give the Air District a compelling reason to come out to the community and investigate a concern with more sophisticated tools.
- **Make the case**. Communities are interested in being able to back up their lived experiences and strengthen their argument with real data. Low-cost sensors can help provide this data which community members don't always see from regulators.

B. Challenges and Potential Concerns

Interviewees identified concerns related to previous experiences and anticipated challenges that should be addressed, including:

- **Air District processes and bureaucracy** lead to slow project implementation and community frustration. This includes the distribution of funding to community organizations being delayed, and the limitations of the reimbursement model for funding.
- **Expectations between communities and the Air District** are sometimes unclear regarding what monitoring can and cannot do, and the extent to which it can lead to an action the community is advocating for, e.g., shutting down a source. This often leads to misunderstandings and assumptions about intentions.
- **Low-cost monitoring does not address the larger problem.** Communities often know what the problem is, and more monitoring is not necessarily going to solve the problem. The Air District will continue to get blow-back from communities because monitoring is not addressing the larger issue from their perspective, i.e., it's not about measuring pollutants – it's about being exposed to pollution.
- **Strained relationships.** Some community groups and members have had frustrating experiences with the Air District in the past, and this influences their perception of the Air District's actions.
- **Capacity and technical challenges.** Capturing and interpreting data requires time, resources and technical skills. Community members often have limited capacity for the work, and they usually do not have the resources nor technical skills to conduct the work at a high-quality level. Further, the sheer volume of information can be daunting and inaccessible for many community members.
- **Future struggle over data.** Some interviewees predicted that communities will use low-cost monitors to advocate their causes to the Air District, and that as a result a never-seen-before amount of data (in varying levels of quality) will be generated. The Air District needs to be prepared to have constructive conversations with communities about the data they've collected.

C. Keys to Success

Interviewees identified a number of keys to success that should be kept in mind in the development of a community-led sensing program, including:

- **Treat community members like peers, equals.** Community members should be engaged as equals partners from the outset. It is critical that the Air District respect community leadership and make sure communities feel considered and included in the process. The Air District should also understand that communities function like institutions, rather than a random collection of residents.
- **Establish clear roles and protocols.** This will help set appropriate expectations and strengthen relationships. The protocols should be co-created with community input and participation. There should be an explicit conversation and clear understanding regarding how to ensure the data is usable and how it will be used. Community members are keenly interested in understanding the path to regulatory action.
- **Provide resources, targeted training and capacity building.** Communities will need more resources and capacity to be successful. Training for community members should include how to plan a study, how to make measurements, how to interpret data, ways to communicate results, and potential outcomes**.** Training should also be provided for Air District and consultant staff to help them work more effectively with community members.

- **Build partnerships.** The Air District can help connect communities with organizations, institutions and consultants who can provide technical support and guidance. This also includes identifying partners from the health community to focus and improve upon community health conditions.
- **Community monitoring efforts should be community-led**. Any community monitoring effort should be driven by the community.
- **Bring in different perspectives.** Different communities function in different ways, and the Air District should engage a variety of different perspectives in the development of the program.
- **Provide guidance, simplify the process.** The Air District can help communities identify appropriate monitoring devices and make sure they are being used correctly. The Air District should also look for ways to make monitoring-related processes as simple and consistent as possible and make data more easily usable, including a plug-and-play data collection methodology.

D. Recommendations Actions and Tools

Interviewees also identified several specific tools and processes to incorporate into the Air District's low-cost sensing program, including:

- **Establish a third party resource center**. A third party center was viewed as a needed and useful resource for the community and the Air District to provide capacity building for the community, agility and responsiveness to community interactions, and build trust among all parties.
- Provide **expert matching and a roster of practitioners and academics** so communities can connect with technical experts on all aspects of air monitoring. Also, the Air District can teach communities how to establish their own partnerships with technical experts. WOEIP is particularly adept at this, but other organizations will need guidance.
- Create and **open and transparent data policy and provide data management and interpretation tools** to promote open and quality data, and promote data sharing and exchange. This could include a central data portal or open data platform.
- **Provide toolkits and guidance materials.** This could include developing a community monitoring guidebook and/or creating an educational clearinghouse or sharing space. There will be multiple models of monitoring programs, depending on the sources of the pollutants and what data are already available, and the toolkit should be flexible and extensive enough to address the different models.
- **Conduct trainings**. Several interviewees suggested established a monitoring academy or institute.
- Create a **sensor lending library or loan program** to ensure community member have access to appropriate sensors.
- Develop a **youth education program** to empower and train youth on the technology and environmental aspects of air monitoring.
- Convene a **working group of community members** to work collaboratively on developing a program. This group can partner with the Air District to identify an initial set of pilot projects and help work through the details of implementing these projects.

Draft Agenda
Technical Assessment Coordination Meeting

112 Claremont Conference Room, 1st Floor
July 1, 2019 @ 2-3 pm
Canada Day!*
Dial-in: 1-888-204-5987; Access: 5244974

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1. **The Draft Plan is Out—What's Next for Technical Assessment Work** (25 min)
   a. Minor changes to Base Year 2017
   b. Forecasts for Future Years
      i. Follow up meeting with ARB: Wed July 3, 11 am - noon
      ii. Bay Conservation Development Commission (BCDC) Growth Forecast
         1. Will we include two growth forecasts?
         2. Next steps
      iii. "With the Plan"
   c. What needs to happen? By when? Who?
   d. Construction projects in West Oakland—Update on commitment to Steering Committee to provide examples of recent construction projects in West Oakland?

2. **Next Steps for Documentation** (30 min)
   a. Addressing comments on Draft Plan
   b. Technical Appendices—What needs to happen, by when? Who?
   c. Who is coordinating documentation this week and next?

3. **Review Action Items** (5 min)

Who should attend (recommendations only): The focus will be on next steps for the Technical Assessment Chapter in the West Oakland Action Plan and associated Appendices. Primarily Planning and AIM staff working on the West Oakland Action Plan documentation should attend.

* Canada Day was a topic of recent discussion for those of us who recently travelled to Quebec City for the 2019 A&WMA Conference. And it's today!

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

July 2, 2018

Request for Qualifications# 2018-007

Community-led Sensing Program

SECTION I – SUMMARY

In carrying out its mission to improve air quality in the San Francisco Bay Area, the Bay Area Air Quality Management District (Air District) seeks to develop a Community-led Air Quality Sensing Program designed to respond to, and encourage, community interest in using low-cost sensors to assist the community and the Air District to better assess local air quality. The program's goal is to help guide non-Air District and Air District grant supported low-cost sensing projects in identifying the appropriate approach for achieving their intended objective(s) of collecting data, and to ensure sufficient data quality such that the data can best inform potential voluntary and, possibly, regulatory actions. The following plan identifies systems, protocols and resources to ensure community-led sensing efforts will result in data "fit for purpose" (described in the next paragraphs), and, hopefully, a positive and productive experience for all parties involved. The Air District would also desire applicants to supply costs associated with meeting the implementation schedule contained later in this document.

All measurement programs share a fundamental element – the collection of data that can be used to answer a question, provide new information, or address an objective. A key function of the program is to support community-led monitoring efforts to ensure that both the methods utilized and resulting data are appropriately matched with what the study is intended to achieve. The data needs to be:

- Accurate and of sufficient quality to the extent required
- Valid
- Complete
- Relevant

- Timely, and
- Documented

The term "data fit for purpose" is used in the description of this program, and will be used in conversations with community-led sensing project leaders, to underscore the fundamental importance of collecting data in a manner that supports the intended purpose of the study. Data fit for purpose are suitable for answering a question posed in a study, add credibility to one's analysis and conclusions, and allow others to use the data for future applications.

To respond to this Request for Qualifications (RFQ), an interested firm should submit one (1) electronic copy (in Adobe Acrobat PDF file format) of its statement of qualifications to the Air District's Procurement Portal (Portal):

Cynthia Zhang, Staff Specialist
Bay Area Air Quality Management District
375 Beale Street, Suite 600; San Francisco, CA 94105
Portal link: https://baaqmd.bonfirehub.com

Statements of qualifications must be received by 4:00 p.m., July 31, 2018.
Late submissions will not be considered.

Statements of qualifications must address all information requested in this RFQ. A statement may add information not requested in this RFQ, but the information should be in addition to, not instead of, the requested information and format. Minority business enterprises, women's business enterprises, veteran's business enterprises, and Certified Green Businesses are encouraged to submit statements of qualifications. **Any questions regarding this RFQ should be submitted through the Portal.**

Pre-Bid Conference:

A pre-bid conference will be held on **July 18, 2018 at 1:30 p.m. to 4:00 p.m.** for the purpose of providing an outline of the RFQ requirements and an opportunity for Q&A. The conference will be hosted at the Air District's office located at 375 Beale St. in San Francisco, CA. An online webinar is available to those unable to attend in-person. Attendance is encouraged, but not mandatory.

Dial-in Number: 1-872-240-3311
Access Code: 925-088-757

SECTION II – BACKGROUND

A. Air District Overview

The Bay Area Air Quality Management District (Air District) was created by the California Legislature in 1955 as the first regional agency to deal with air pollution in California. The Air District jurisdiction includes Alameda, Contra Costa, Marin, Napa, Santa Clara, San Francisco, San Mateo, southwestern Solano, and southern Sonoma counties.

The State Legislature originally gave the Air District the authority to regulate stationary sources of air pollution, such as factories, oil refineries, chemical plants, gasoline stations, and agricultural burning. With more recent legislation, the Air District was granted authority to enact certain transportation and mobile source measures.

The Air District is governed by a twenty-four member Board of Directors, consisting of elected officials, including county supervisors, mayors, and city council members. The Executive Officer / Air Pollution Control Officer for the Air District is Jack P. Broadbent.

B. Community-led Air Quality Sensing Program

The Community-led Air Quality Sensing Program is an important initiative for the Air District as it continues to seek new and improved ways to partner with community groups in improving air quality throughout the Bay Area. The Program is intended to respond to a variety of both internal and external community needs, including the following:

Significant community interest
The Air District recognizes that, with the availability of low-cost monitors, community-led sensing efforts (and that immense amounts of data that will come with them) will be increasing significantly in the future. It is essential that the Air District have a structured program in place to manage these efforts and the resulting data that result from them.

Consistent and transparent process
A clear, consistent process – both internal and external – is needed to ensure that community-led sensing efforts are helpful and lead to data fit for purpose. This process should achieve the following:

- Help increase transparency and expectations about the potential outcome(s) of sensing efforts.
- Help the Air District manage its resources efficiently.
- Support productive interactions and build trust with community groups.

Data integrity and accuracy
Information gathered from community-led sensing needs to be fit for its intended purpose with each application. It is important to focus on how the information is being captured and its accuracy to ensure it will be fit for purpose.

Community capacity
Capturing and interpreting data requires time, resources and technical skills. Community members often have limited capacity to devote to the work, and they usually do not have the resources nor specific technical skills to plan, manage, and collect data that is fit for purpose. The Air District will need to provide guidance and resources to ensure communities are successful in their efforts.

Through this RFQ, the Air District seeks to select one or more firms to further develop and operate this Community-Led Air Quality Sensing Program. The selected firm or firms will work with the Air District's Meteorology and Measurement, Emissions Assessment and Modeling, and Community Protection and Strategic Policy Divisions. Firms interested in submitting a statement of qualifications to provide such services are required to follow the recommended guidelines and instructions contained in this RFQ.

SECTION III – GENERAL DESCRIPTION OF SERVICES

A. Services Needed

The Air Quality Sensing Resource Center ("Center") will serve as the cornerstone and "hub" of the Community-led Air Quality Sensing Program. Air District staff and external stakeholders expressed broad support for a third-party resource center concept during interviews and working group meetings. They identified several potential benefits for the third-party approach (compared to operating the program internally at the Air District), including:

- More nimble and responsive
- More easily scale-able according to varying needs and available resources
- Able to coordinate more easily across various Air District divisions
- Likely to be more trusted by the community, and can help build stronger relationships among the Air District and community members

The Center will have its own dedicated staff and operating space, and will be responsible for the overall management of the program, with close oversight and guidance from the Air District. The Center will support community-led projects through each step in the process, and will report back to Air District staff, identified to perform specific task and hold specific responsibilities, at key decision-points and milestones and make recommendations for the Air District's consideration. Figure 1 below indicates the flow and frequency of information between the Sensing Resource Center, the Air District, and community monitoring groups. Having the Center will allow the Air District to engage with community groups on a strategic level, while allowing the Center to manage more time-consuming day-to-day tasks and interactions.

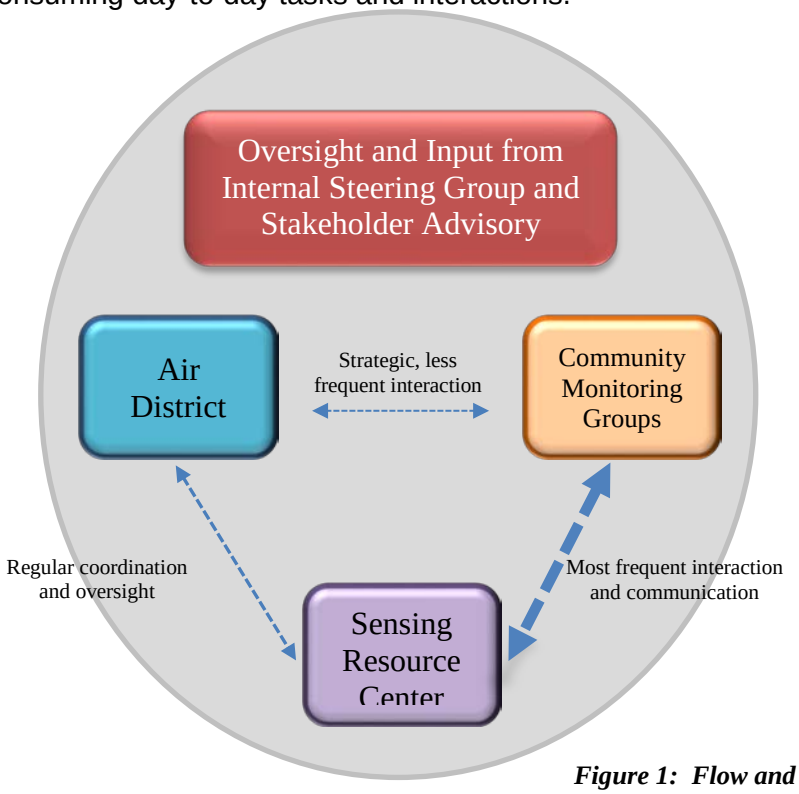

Figure 1: Flow and Frequency of Communication

The table below outlines the services that the Center can provide to the Air District and community groups. While the Center will manage the overall Sensing Program, it will also be available to assist community groups with more discrete and bounded requests for assistance.

Engagement Type/Service	Description	Examples
End-to-End Support	Assist with all aspects of community monitoring from inception, monitoring, analysis, and next steps.	Support a community group in setting up a "pre-AB 617" monitoring program.
Advisory Role	Provide guidance on one or more aspects (i.e., a la carte) of air monitoring or capacity building – planning, training, sensor lending, analysis, interpretation, etc.	• Work with an existing community group/grantee to help with selecting a sensor, siting it, and using data management tools. • Provide initial screening for a prospective community grant applicant to create a viable and technically sound approach. • Match a community group with a technical expert. • Conduct a training course on specific or all aspects of setting up and installing a sensor network.
Education/Training	Design and conduct educational program(s) to build capacity and awareness.	• Develop and make available a variety of educational materials. • Operate an "Air Quality Academy" to inform community groups about air quality (basics/measurement/ data interpretation), and aspects of air quality management.
Expert Guidance	Answer "one-off" questions and provide information.	• Answer a community group's question of "What sensor should we buy?"

Oversight would be provided by Air District staff and a Stakeholder Advisory Committee ("Committee") will be convened to promote ongoing dialogue and transparency with the community regarding the Community-led Sensing Program. The Committee will function in an advisory capacity; that is, it will receive updates, share information, identify preferences and provide recommendations for Air District consideration. The Committee will not have explicit decision-making authority.

The Committee will have broad representation from Bay Area communities, and will include low-cost monitoring project proponents, youth organizations, industry, and academia. The Committee will meet quarterly and potentially more frequently around key milestones and decision-points for the program. Air District and Sensing Resource Center staff will support and participate in Committee meetings.

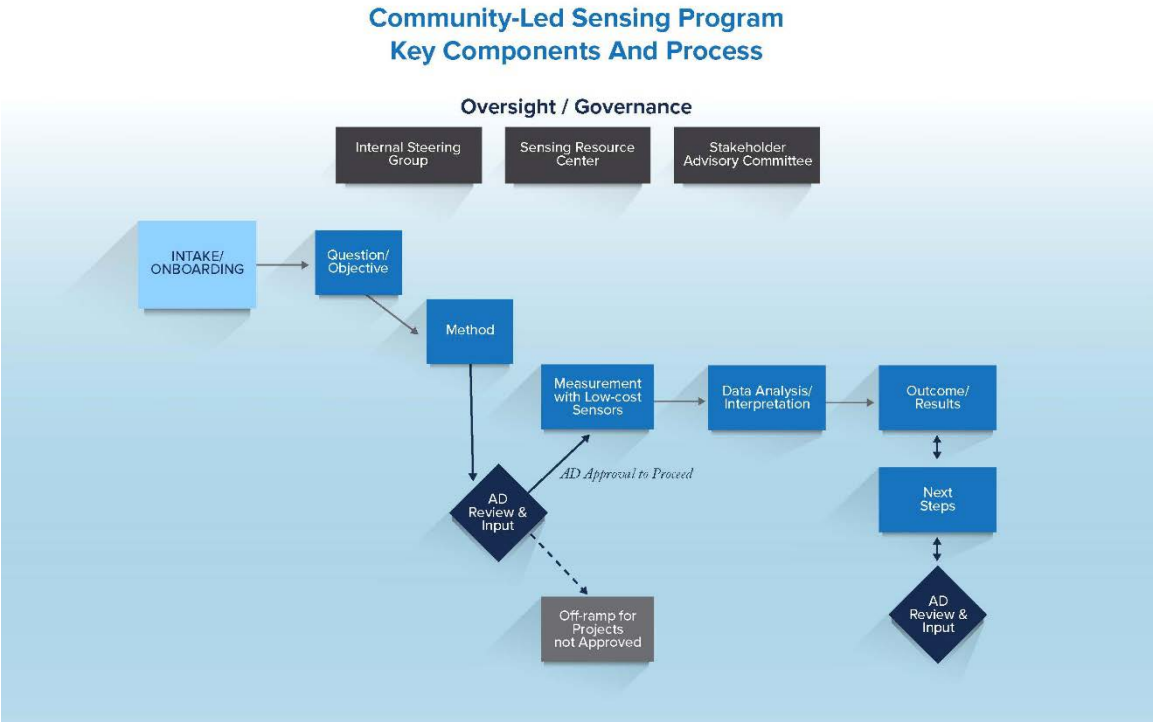

Figure 2: Key Program Components and Process

- **Step 1: Intake**
  - Description: Work with the community to identify issues, create an initial approach, and discuss potential outcomes. This serves as an initial screening and expectation-setting step for the community group and Air District.
  - Process:
    - Community group will provide basic information (name, organization, project description) using a form template
    - Conduct an onboarding phone conversation
    - Identify and frame question/issue
    - Identify desired outcome
    - Determine possible methods to achieve outcome
    - Determine how the Air District/Center can potentially assist
    - Create a project identification number and enter into tracking database

- **Step 2: Identify Objectives**

- Description: Work closely with community group to fully refine its monitoring objective(s). Conduct in-person meetings and/or site visits, and develop clear objectives (or questions) stating the need for air monitoring and the desired outcome.
- Process:
  - Continue to work with the community to identify and refine questions and sub-questions, including:
    1. State the problem
    2. Identify information inputs
    3. Define the boundaries of the study
    4. Identify the goals of the study and expected outcome

- **Step 3: Method**
  - Description: Create a Monitoring Plan that provides specific details of the project's methodology for monitoring, including: approach to project management, measurements, data quality and validation, analysis and insights, funding, oversight, and next steps. This plan will be based on elements identified in EPA's Quality Assurance Project Plan (QAPP).
  - Process:
    - Work with the community group to flesh out details of the Monitoring Plan
    - Assist the community group with sensor selection and design of the monitoring approach to collect data to address their concerns
    - Identify the resources needed to implement the Plan (technical expertise, hardware, sensors/instruments, funding, etc.)
    - Foster common expectations regarding likely next steps and/or actions depending on the study findings
    - The Air District's Internal Steering Group will review and approve, or recommend improvements to, the project outlined in the Monitoring Plan document.
    - If the Internal Steering Committee concludes that the project's Monitoring Plan is not adequately designed to achieve its intended purpose, the Committee will recommend that the project not move forward to subsequent steps. There will be an "off-ramp" step during which the Air District and Resource Center will work with the project proponent to identify potential alternative options, partners or resources for achieving its goals.

- **Step 4: Measurement**
  - Description: Provide a range of assistance, such as planning, siting, equipment use, procuring and/or lending sensors/instruments, troubleshooting, and data management. Because the community primarily will be installing, operating, and using the sensors, the Center may be asked to help with a wide range of support services from answering simple questions to assisting with onsite training. This process will aim to assist the community in making sound technical decisions and achieving data fit for purpose.
  - Process:
    - Follow the measurement methods identified in the Monitoring Plan
    - Set up check-ins to ensure the monitoring progresses and produces data with the highest level of quality possible

- Conduct early and mid-project data reviews to catch problems and issues that commonly occur when making measurements
- Provide adaptive on-call support and training services as needed. This could include answering questions, providing data reviews, conducting additional training, and assisting with data management.

- **Step 5: Data Analysis and Interpretation**
  - Description: During this stage, the community group will review and interpret data using the approach outlined in the Monitoring Plan. This step is a challenging as it involves extracting meaning from the data and seeking to answer the question posed during Step 2. The community group will likely analyze the data continuously during and at the end of the monitoring, and therefore there will be a need to be responsive and nimble. The Center will be flexible by providing technical support, guidance, insights, expert matching, and answering questions. This step will be easier for some community groups rather than for others; thus, the Center must be adaptive in working with each community group. Some groups may need tools or software while other groups may need a training course on interpreting data or connecting with an expert.
  - Process:
    - Help the community group develop and follow the analysis approach outlined in the Monitoring Plan document.
    - Check in shortly after measurements begin:
      1. Provide technical training on data analysis and interpretation, as needed
      2. Provide training or consultation on analysis tools and techniques
      3. Assist with display and visualization of data
    - Identify other information and resources that may be needed to interpret the data and connect the community group with the best informational resource (Air District staff, experts, other governmental organizations).
    - Provide other on-call support and training services as needed.

- **Step 6: Summarize Results and Identify Next Steps**
  - Description: Based on the results of monitoring, data analysis, and interpretation the Center will work with the community group to develop a summary of its findings and to identify or confirm next steps following completion of the monitoring and analysis. This could include a range of activities: additional monitoring with low-cost sensors, more sophisticated monitoring performed by the Air District or other organizations or agencies, other types of pollution/source assessments, and awareness and education efforts.
  - Process:
    - Conduct meetings and discussions to determine next steps with the community group
    - Engage the Air District or other jurisdictional agencies for advice on next steps
    - Prepare a summary of the findings and next steps
    - Review the summary with the Internal Steering Group

The anticipated duration a community-led project from initial intake (Step 1) to summarizing results and next steps (Step 6) is approximately 12 months, though the timeline will depend on several factors, including: project scale, the project sponsor's capacity to complete its work; and how much assistance the sponsor requires to refine its approach to yield data fit for purpose.

The Community-led Sensing Program will aim to build the capacity of community groups to become active partners with the Air District and other government agencies in identifying, evaluating, and ultimately reducing air pollution and exposure to harmful emissions in their communities. The program will include the following resources and infrastructure:

Resource	Description
Sensing Resource Center	The Center will be comprised of staff with sensor and air monitoring expertise, a collection of tools and sensors/instruments, and training materials and processes to support the program. • Staffing and experience. Will include dedicated staff and on-call contactors with extensive experience working with air monitoring, air sensors, data management, as well as community engagement and training. • Center location. Initially, the Center will be virtual as its various parts are being developed. Over time, the Center could have a physical space and/or function as a mobile lab that can travel to communities and perform work on location.
Sensing Project Tracking and Management	Each project that comes through the Center will receive a project identification number, and all information and recommendations related to that project will be saved in a project management database accessible to appropriate Air District and Center staff. Having the database will allow for easy access to project information and effective coordination across various Air District divisions.
Program Website	The Program website will provide resources, contact information, training videos, examples of data use, and an open forum for sharing insights and recommendations. Initially, the website will be linked from BAAQMD.gov to an external website. Over time, the website could include data analysis tools and systems to easily manage data, case studies, success stories, and other resources.

Training	The Center will provide trainings to community groups to build their capacity and expertise related to air quality monitoring. These trainings can take place in person and also be recorded and made available on the Program website. Trainings can be offered as a single or multi-part course that provides detailed information and guidance on more complex topics from issue identification to air monitoring best practices (see list of education resource topics below). The Center could also sponsor an Air Academy that has a class of trainees who receive training on a variety of topics to help them be effective in their work. The trainees will also support one another in implementing their respective monitoring efforts.

Educational Resources	The Center will develop an extensive library of resources on various monitoring topics. Topics that receive the most interest can be developed into training modules.
	• How to frame a project's purpose/objective
	• Who controls an emissions source?
	• Sensor/instrument
	  o Selecting and operating an air sensor
	  o Types of monitoring
	• Overview information
	  o Air District 101
	  o Air Quality 101
	  o Data Science 101
	• Quality
	  o Developing a QAPP
	  o QA/QC concepts
	  o What are Data Quality Indicators?
	  o Choose the right balance of quality assurance and documentation
	  o Record keeping and documentation
	  o Validating air sensor data
	• Monitoring location and placement
	  o Designing a network
	  o Siting air monitors
	• Data management fundamentals
	  o Tools and tips for managing data
	  o Using online tools
	• Visualization
	  o Using simple data display tools
	  o Visualizing results with online tools
	• Interpreting data
	  o Making sense of sensor data
	  o Telling a story with data
	• Determining next steps based on your results

Sensor Lab (Please provide a separate line item cost for section)	The Center could have a Sensor Lab that would support (e.g., guide purchasing, help set up, repair) and make available validated and appropriate sensors/instruments to meet the objectives of the various monitoring efforts. The lab would have a small supply of sensors for demonstrations and may include some sensor loaning capacity for short duration projects for appropriate technologies. The lab could be located at a small warehouse/office or vehicle. The lab would include: • Assistance with instrument setup and answering questions about the best technology to purchase. • Assistance with troubleshooting, validating, and repairing low-cost sensors. • A sensor loan program that provides short-term (i.e., less than 6 months) loans of sensors. Providing low-cost sensors for longer-term studies may not be cost-effective and would need to be investigated. As appropriate this function may be a procurement, rather than a loan program, depending on the technology and advisement of the steering committee. • Mid-cost instrument support may also be included (resources permitting).
Expert Matching	Matching sensing project sponsors with experts will help community groups gain insights and expertise and create monitoring results with higher quality data. The Center will maintain a roster of independent technical experts who are interested in working with community groups on monitoring projects. This will include experts with knowledge of air quality, emissions, public health, epidemiology, policy, and regulation. There will be a vetting process for all experts before they are added to the roster. Criteria that will be considered in the vetting process will include: education background, professional experience, independence/neutrality, location, and ensuring there are no conflicts of interest with the Air District and/or community groups.

Data Management, Analysis and Interpretation	Air sensors produce high volumes of data that can be difficult to manage. Having easy-to-use, scalable, and transparent tools to manage and use sensor data will be an asset to both the community and the Air District and will help promote higher quality data. In addition, having a data management system operated by the Center will help incorporate more oversight and promote data quality. Developing or purchasing a data management system will take time and resources, and we recommend beginning with the following steps: • Survey and identify tools that allow high-quality data management at a cost-effective price. Work with the Air District to identify likely systems. • Work with community groups to identify the highest priority needs and tools. • Create a list of tools, resources, and methods to manage and interpret data, along with a schedule that can be implemented in phases. • Create a list of software tools that can aid in analysis and interpretation of data. Many free or open source tools are now available, and with modest training could be used by community groups to provide insights about their data.

SECTION IV – SUBMISSION REQUIREMENTS

A. General

1. Interested firms must create an account through the Portal described on p.2 of this RFQ to view RFQ documents and addenda, and to submit questions and bid documents.

2. All statements of qualifications must be made in accordance with the conditions of this RFQ. Failure to address any of the requirements is grounds for rejection of this submission.

2. All information should be complete, specific, and as concise as possible.

3. Statements of qualifications should include any additional information that the respondent deems pertinent to the understanding and evaluation of the bid.

4. The District may modify the RFQ or issue supplementary information or guidelines during the submission preparation period prior to the due date. Please check the Portal for updates prior to the due date.

5. The District reserves the right to reject any and all submissions.

6. All questions must be in written form and submitted through the Portal no later than **4:00 p.m. on July 23, 2018**. Firms will not be able to submit questions after this time. All questions will be answered in writing and posted on the Portal by **6:00 p.m. on July 26, 2018.**

7. All bidders are encouraged to attend the pre-bid conference held on **July 18, 2018 at 1:30 p.m.** The conference will be hosted at the Air District's office located at 375 Beale St. in San Francisco, CA.

8. The cost for developing the statement of qualifications is the responsibility of the responding firm, and shall not be chargeable to the Air District.

9. A firm's selection and the execution of a contract with the Air District does not guarantee any particular amount of work.

B. Submittal of Statements of Qualifications

All statements of qualifications must be submitted according to the specifications set forth in Section V (A) – Contents of Statement of Qualifications, and this section. Failure to adhere to these specifications may be cause for the rejection of the submission.

1. Due Date – All statements of qualifications are due no later than 4:00 p.m. on July 31, 2018, and should be submitted via the Portal:

   Cynthia Zhang, Staff Specialist
   Bay Area Air Quality Management District
   375 Beale Street, Suite 600; San Francisco, CA 94105
   Portal link: https://baaqmd.bonfirehub.com

2. Uploading large documents may take significant time, depending on the size of the file(s) and Internet connection speed. Bidders should plan sufficient time before the due date to begin the uploading process and to finalize their submissions. Bidders will not be able to submit documents after the due date and time. Statements of qualifications received after the date and time previously specified will not be considered.

3. Signature – All statements of qualifications should be signed by an authorized representative of the responding firm.

4. Submittal – Submit one (1) electronic copy (in Adobe Acrobat PDF file format). Electronic submissions submitted via the Portal will be acknowledged with a confirmation email receipt. Late proposals will not be accepted. Any correction or re-submission of proposals will not extend the submittal due date.

5. Grounds for Rejection – A statement of qualifications may be immediately rejected at any time if it arrives after the deadline, or is not in the prescribed format, or is not signed by an individual authorized to represent the firm.

6. Disposition of the Submissions – All responses to this RFQ become property of the Air District and will be kept confidential until a recommendation for award of a contract has been announced. Thereafter, submittals are subject to public

inspection and disclosure under the California Public Records Act. If a respondent believes that any portion of its submittal is exempt from public disclosure, it may mark that portion "confidential." The District will use reasonable means to ensure that such confidential information is safeguarded, but will not be held liable for inadvertent disclosure of the information. Statements of Qualifications marked "confidential" in their entirety will not be honored, and the District will not deny public disclosure of any portion of submittals so marked.

By submitting a statement of qualifications with portions marked "confidential," a respondent represents it has a good faith belief that such portions are exempt from disclosure under the California Public Records Act and agrees to reimburse the District for, and to indemnify, defend, and hold harmless the District, its officers, employees, and agents, from and against any and all claims, damages, losses, liabilities, suits, judgments, fines, penalties, costs, and expenses, including without limitation, attorneys' fees, expenses, and court costs of any nature whatsoever, arising from or relating to the District's non-disclosure of any such designated portions of a statement of qualifications.

C. Interviews

1. The Air District, at its option, may interview firms that respond to this RFQ. The interviews will be for the purpose of clarifying the statement of qualifications.

2. Submittal of new materials at an interview will not be permitted.

3. Interviews may involve a presentation and/or a question-and-answer session.

SECTION V – SUBMISSION CONTENTS

A. Contents of Statement of Qualifications

Submitted statements of qualifications should follow the format outlined below and include all requested information. Please number your responses exactly as the items are presented here, and limit to 10 one-sided pages, except work samples, which should be included in a separate appendix.

1. Experience, Structure, Personnel

    a. Firm Contact Information – Provide the following information about the firm:

        - Address and telephone number of office nearest to San Francisco, California and the address and phone number of the office that each of the proposed staff members are based out of if different.
        - Name of firm's representative designated as the contact and email address
        - Name of project manager, if different from the individual designated as the contact

    b. Firm History – Provide a history of your firm's experience in providing

similar services to those sought through this RFQ, including any services provided to governmental organizations. Provide references for any similar projects listed, including contact name, title, and telephone number. Describe the technical capabilities of the firm in all areas relevant to the services sought through this RFQ.

c. Assigned Personnel – List all key personnel who would be assigned to Air District projects by name and role. Provide descriptions of education and training, along with a summary of experience in providing services similar to those sought through this RFQ. Background descriptions can be a resume, CV, or summary sheet. Note that the standard Air District contract will not permit substitution of project manager or staff without prior written approval of the Air District's assigned program manager.

d. Work Samples (Does not count against 10-page limit) – If applicable, samples of up to 5 major projects that the firm has completed in the areas sought through this RFQ. Include the client, the name of a contact person who is able to provide a reference, a description of the nature of the work, and the size and complexity of the project.

e. Subcontractors – List any subcontractors that will be used and the work to be performed by them.

f. Conflict of Interest – Address possible conflicts of interest or appearance of impropriety regarding other clients of the firm that could be created by providing services to the Air District. Describe procedures to be followed to detect and resolve any conflict of interest or appearance of impropriety. The Air District reserves the right to consider the nature and extent of such work in evaluating the statement of qualifications.

g. Additional Information – Provide any other information that the firm wishes the Air District to consider in evaluating the submission.

2. Fee Information (Does not count against 10-page limit)

a. The normal hourly rate of each principal and staff member whose resume is provided or whose job category may be required, and the rate that would be charged to the Air District.

b. A list of anticipated reimbursable expenses, such as expenses for presentation materials, supplies, deliveries, B/W and color printouts and copies, faxes, photo scans and travel, copywriting and copyediting services and the rate charged for each.

c. Any reduced fees offered to other municipalities, governmental entities, economic development or nonprofit organizations, and civic organizations.

d. A "not to exceed" estimate of costs associated with performing all functions on the timeline provided below.

d. Any other fees or charges.

3. Task List and Timeline

a. Develop a sample Task List and Timeline, such as that presented below, that describes what implementation steps would be taken and the approximate timelines that these steps would be completed by once a contract has been signed.

Project Task	Q1	Q2	Q3	Q4
Internal Coordination and Education	• Share final implementation plan broadly with Air District staff • Hold Internal Steering Group kick-off meeting • Develop detailed program work plan • Present on Sensing Program to Executive Committee	• Internal Steering Group kick-off meeting • Host internal brown bag on Sensing Program	• Monthly Internal Steering Group meetings • Present on Sensing Program to Public Engagement Committee	• Monthly Internal Steering Group meetings
Coordination with External Stakeholders	• Share implementation plan with stakeholders, gather feedback • Identify stakeholder priorities for training and education topics	• Recruit Stakeholder Advisory Committee members • Hold Stakeholder Advisory Committee kick-off meeting	• Quarterly Stakeholder Advisory Committee meeting • Co-sponsor community meeting to build community awareness about the Sensing Program	• Quarterly Stakeholder Advisory Committee meeting • Conduct ongoing outreach to build community awareness about the Sensing Program
Sensing Resource Center	• Identify staffing and resource needs for Center • Recruit and hire Center staff • Set up process for reporting to Internal Steering Group and	• Set up virtual Sensing Resource Center • Develop Center/resource sharing website		• Set up Sensing Resource Center (mobile and/or physical space)

	Stakeholder Advisory Committee			
Support for Community-Led Monitoring Projects	• Select two monitoring projects for end-to-end assistance, conduct intake process • Develop intake form • Establish project tracking system/database	• Begin providing a la carte support to other community groups	• Identify one additional project for end-to-end assistance (total of 3), conduct intake process • Provide a la carte support to other community groups	• Identify one additional project for end-to-end assistance (total of 4), conduct intake process • Provide a la carte support to other community groups
Tools and Resources	• Develop Monitoring Plan template • Establish protocol for Sensor Lab • Survey and identify tools for data management • Identify appropriate tools and systems for data display and visualization	• Establish initial methods to manage data • Create a list of software and tools • Set up Sensor Lab and begin using in communities as part of training.	• Setup data management system and process • Create framework for Expert Matching • Recruit experts to participate in program	• Begin expert matching
Training and Education	• Develop 6-8 information sheets • Develop curricula for training courses • Recruit participants (internal and external) for trainings and Air Academy	• Conduct two 101 training courses • Develop additional information sheets as needed	• Conduct 101 training course • Create training videos, make available on Program website	• Launch Air Academy

SECTION VI – QUALIFICATIONS EVALUATION

A panel of Air District staff will evaluate all statements of qualifications. The panel will recommend the selection of one or more contractors to the Air Pollution Control Officer (APCO), who will, in turn, make a recommendation to the Air District Board of Directors. The Air District Board of Directors must approve the contract to carry out the work described in this RFQ. An example of a typical contract for professional services used by the Air District is included in Section VII.

In evaluating statements of qualifications submitted pursuant to this request, the Air District places high value on the following factors, not necessarily in order of importance:

- Approaches in methodology with respect to the anticipated scope of services that demonstrate maximum comprehension of and ability to provide such services to the Air District.
- Experience of firm and employees to be assigned to a District project in general, and in particular, providing similar services sought in this RFP to governmental agencies.
- Demonstrated knowledge of Air District activities.
- Experience of the firm with comparable organizations and types of services.
- Innovative or outstanding work by firm that demonstrates the firm's unique, creative qualifications to provide software development services.
- Number, complexity, and nature of software development projects handled by the firm.
- Selected firm's staff ability, availability and facility for working with Air District directors, officers, staff and consultants.
- Conformity with applicable Air District policies as noted herein.
- Proposed fee structure relating to services the firm(s) would provide.

The Air District reserves the right to reject any and all statements of qualifications submitted and/or request additional information. During the selection process, the Air District's evaluation panel may interview responding firms. The interviews will be for clarification only. The submittal of new material will not be permitted at that time. Interviews may involve a presentation and/or a question-and-answer format or any combination of these.

SECTION VII – SAMPLE CONTRACT

A sample contract to carry out the work described in this RFQ is available on the Air District's website, here.

Bay Area Air Quality Management District

375 Beale Street
San Francisco, CA 94105

Assembly Bill 617
Industrial Cap-and-Trade Sources
Expedited BARCT Implementation Schedule

FINAL STAFF REPORT
December 2018

Prepared by:
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ACKNOWLEDGEMENTS

The following people contributed to development this Staff Report for an Expedited BARCT Implementation Schedule that meets the requirements of Assembly Bill 617. Each deserves recognition for their important contributions.

Brian Bunger, Esq. – Legal
Todd Gonsalves, Esq. – Legal
Jeff Gove – Compliance & Enforcement
Pam Leong – Engineering
Jerry Bovee – Meteorology & Measurements
Victor Douglas – Community Engagement & Policy
Laura Cackette – Community Engagement & Policy
David Holstius – Assessment, Inventory and Modeling
Aneesh Rana – Community Engagement & Policy

Table of Contents

I. EXECUTIVE SUMMARY

Assembly Bill 617 (AB 617), approved July 26, 2017, amends California Health and Safety Code section 40920.6 et seq. and requires each air district that is a nonattainment area for one or more air pollutants to adopt an expedited schedule for implementation of best available retrofit control technology (BARCT) on specified facilities by the earliest feasible date, but no later than December 31, 2023. Local air districts are required to adopt this schedule before January 1, 2019. This requirement applies to each industrial source subject to California Greenhouse Gas (GHG) Cap-and-Trade requirements. The schedule must give priority to any sources that have not had emissions limits modified for the greatest period of time. The schedule does not apply to sources that have implemented BARCT since 2007.

The overall purpose of BARCT implementation is to reduce criteria pollutant emissions from significant industrial sources that currently participate in the GHG Cap-and-Trade system. Emissions of criteria pollutants and toxic air contaminants are often associated with GHG emissions, and these criteria and toxic pollutants may impact local communities that are already suffering a disproportionately higher burden from air pollution.

The Bay Area Air Quality Management District (Air District) is proposing an Expedited BARCT Implementation Schedule to meet the requirements of AB 617. Staff conducted background research and analysis to identify pollutants of concern and affected sources, conduct preliminary BARCT evaluations, and identify and prioritize potential BARCT rule development projects. The schedule includes six potential rule development projects, each of which is listed in Table ES-1, along with estimates of potential emission reductions and cost effectiveness where available.

Table ES-1: Rule Development Projects with Potential Emission Reductions and Cost Effectiveness

	Rule Development Projects	**Potential Emission Reductions** (tpy)[1]	**Cost Effectiveness** ($/ton)[2]
1	Rule 8-5: Organic Liquid Storage Tanks	ROG: 75 to 125 tpy	ROG: $10,000 to $20,000
2	Rule 8-8: Petroleum Wastewater Treating	ROG: Unknown	ROG: Unknown
3	Rule 9-13: Portland Cement Manufacturing	PM: Unknown SO_2: 698 tpy	PM: Unknown SO_2: $2,100
4	Rule 6-5: Refinery Fluid Catalytic Crackers and CO Boilers	PM: Unknown SO_2: 567 tpy	PM: Unknown SO_2: $4,000 to $47,000
5	Rule 8-18: Refinery Heavy Liquids Leaks	ROG: Unknown	ROG: Unknown
6	Rule 9-14: Petroleum Coke Calcining Operations	NOx: Unknown	NOx: Unknown

[1] More detailed information and further discussion on potential emission reductions for the rule development projects can be found in the individual project scopes in Attachment A.
[2] More detailed information and further discussion on costs and cost effectiveness for the rule development projects can be found in the individual project scopes in Attachment A.

Rule development activity for the projects listed in the schedule will follow the standard rule development process, and is anticipated to occur throughout the period from 2018 to 2021.

An analysis of the potential environmental impacts of the proposed Expedited BARCT Implementation Schedule was conducted pursuant to the California Environmental Quality Act (CEQA). The Environmental Impact Report concluded that the project may result in potential significant impacts in the following resources areas: Air Quality and Water Resources.

Staff recommends the Board of Directors adopt the proposed Expedited BARCT Implementation Schedule and certify the associated CEQA Environmental Impact Report at the Public Hearing scheduled for December 2018.

II. BACKGROUND

Regulatory framework

California's air quality programs have significantly improved public health through statewide and regional air quality planning requirements, advancement of technology-based solutions, and risk reduction efforts. However, certain communities continue to experience a disproportionately higher burden from air pollution, including communities near ports, rail yards, warehouses, and freeways and areas with high concentrations of industrial facilities. AB 617 requires new community-focused and community-driven action to reduce air pollution and improve public health in communities that experience disproportionately higher burdens from exposure to air pollutants. AB 617 directs air districts to apply BARCT to all industrial sources subject to Cap-and-Trade, and to identify communities with a "high cumulative exposure burden" to air pollution. Districts must then prioritize these communities for community air monitoring projects and/or emission reduction programs, which must be developed through a community-based process. Implementing and updating BARCT controls at industrial sources should also provide some emission reductions for these community programs.

The Air District 2017 Clean Air Plan includes a long-range goal to eliminate disparities in air pollution exposure in the San Francisco Bay Area. The Air District has been explicitly working towards this goal since 2006, with the initiation of the Community Air Risk Evaluation (CARE) program. The CARE program identifies and assists communities that have higher air pollution levels and may experience more air pollution-related health impacts. Emissions from mobile sources, small and large stationary sources, and goods-movement related indirect sources can have localized impacts on pollution levels or contribute to cumulative levels of pollution that are experienced by nearby communities. The CARE program provides a framework for the Air District to target its incentive and enforcement efforts in the most impacted communities. However, many communities remain overburdened and there is more that must be learned and done. The Air District, through a partnership with local communities and the state, has an opportunity to better understand local air pollution, its sources, and impacts, and to develop strategies to better reduce people's exposure to air pollution.

AB 617 Overview

AB 617 requires the following:

- Air districts in nonattainment areas must implement BARCT on all industrial sources subject to the AB 32 Cap-and-Trade Program (the subject of this Staff Report).
- The California Air Resources Board (CARB) must establish and maintain a clearinghouse of best available control technology (BACT), and best available retrofit control technology (BARCT).
- Maximum penalties for air pollution violations are increased and will adjust with inflation.
- CARB must prepare an air monitoring plan for all areas of the state by October 1, 2018.

- Based on air monitoring plan information, CARB must select communities with high cumulative exposure burden from both toxic and criteria air pollutants by July 1, 2019.
    - Each air district with a high cumulative burden community must deploy a community air monitoring system in that community within one year of selection and provide the air quality data to CARB for publication.

- By January 1, 2020, and each January 1 thereafter, CARB will select additional communities with high cumulative exposure burden.
    - Each air district with a high burden community must deploy a community air monitoring system in that community within one year of selection and provide the air quality data to CARB for publication.

- CARB must prepare a state-wide strategy to reduce emissions of toxic and criteria pollutants in communities affected by high cumulative exposure burden, by October 1, 2018, and update the strategy every five years. The state-wide strategy must include:
    - A methodology for assessing and identifying contributing sources and estimating their relative contribution to elevated exposure (source apportionment);
    - An assessment of whether an air district should update and implement the risk reduction audit and emissions reduction plan for any facility if the facility causes or significantly contributes to the high cumulative exposure burden;
    - An assessment of available measures for reducing emissions including BACT, BARCT, and best available control technology for toxics (TBACT); and
    - A priority on disadvantaged communities and sensitive receptor locations.
- CARB will select locations for preparation of Community Emission Reduction Plans by October 1, 2018. CARB will select additional locations annually thereafter.
    - Within one year of selection, the air district will adopt Community Emission Reduction Plans in consultation with CARB, individuals, community-based organizations, affected sources, and local governmental bodies.
    - The Community Emission Reduction Plans must be consistent with the state-wide strategy, and include emission reduction targets, specific reduction measures, a schedule for implementation of the measures, and an enforcement plan.
    - The Community Emission Reduction Plans must be submitted to CARB for review and approval.
        - CARB must initiate a public process to achieve an approvable Community Emission Reduction Plan if the Plan is initially not approvable.
        - CARB must develop and implement applicable mobile source elements in the Community Emission Reduction Plans to achieve emission reductions.
    - The Community Emission Reduction Plans must achieve emission reductions in the community, based on monitoring or other data.

- The air district must prepare an annual report summarizing the results and actions taken to further reduce emissions.

- CARB will provide grants to community-based organizations for technical assistance and to support community participation in the identification of communities with high exposure burden, and development and implementation of the Community Emission Reduction Plans.

AB 617 represents a significant enhancement to the approach that CARB and local air districts take in addressing local air quality issues. The Air District has implemented and established a number of programs that support the goals and intent of AB 617; these programs include the Community Air Risk Evaluation (CARE) Program, Health Risk Assessments for the AB 2588 Air Toxics "Hot Spots" Program, and Air District Regulation 11, Rule 18: Reduction of Risk from Air Toxic Emissions at Existing Facilities. However, the requirements of AB 617 formalize new programs and establish challenging goals and timelines for implementation.

AB 617 Expedited BARCT Implementation Schedule Requirements

AB 617 requires each air district that is in nonattainment for one or more air pollutants to adopt an expedited schedule for implementation of BARCT by the earliest feasible date, but no later than December 31, 2023. The expedited schedule must be adopted no later than January 1, 2019. The BARCT requirements apply to each industrial source subject to California GHG Cap-and-Trade requirements. The schedule must give priority to any sources that have not had emissions limits modified for the greatest period of time and does not apply to sources that have implemented BARCT since 2007. When developing and adopting an expedited schedule, air districts should take into account the local public health and clean air benefits to the community, cost effectiveness of control options, and air quality and attainment benefits of control options.

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.[3] The Air District typically determines BARCT during the rulemaking process for a given source category on a pollutant-by-pollutant basis, and develops and adopts rules reflecting BARCT. AB 617 does not expand or limit the Air District's ability to adopt or amend rules; but it does set a requirement for developing an expedited schedule for rule development and places a priority on adopting rules requiring BARCT implementation on sources at industrial Cap-and-Trade facilities.

Technical review

Air District staff conducted a review of all affected industrial sources and developed preliminary BARCT evaluations to determine which sources are appropriate for rule

[3] California Health and Safety Code § 40406.

development. Staff's process for identifying potential BARCT rule development projects and developing the expedited schedule involved:

- Identifying pollutants of concern and affected facilities and sources
- Identifying sources subject to the expedited schedule requirements and sources with the greatest potential BARCT emission reductions
- Conducting preliminary BARCT evaluations
- Identifying and prioritizing potential BARCT rule projects

Pollutants of Concern

The Bay Area air basin is in attainment with both the National Ambient Air Quality Standards and California Ambient Air Quality Standards for carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and lead. The air basin is designated as nonattainment for ozone (O_3) and particulate matter ($PM_{2.5}$ and PM_{10}) California Ambient Air Quality Standards;[4,5] therefore, the BARCT review was conducted focusing on the following pollutants:

- Nitrogen Oxides (NOx)
- Reactive Organic Gases (ROG)
- Particulate Matter less than 10 microns (PM_{10})
- Particulate Matter less than 2.5 microns ($PM_{2.5}$)
- Sulfur Dioxide (SO_2).

Note that NOx and ROG are included because they are precursors for ozone formation. SO_2 may contribute to the formation of condensable PM (i.e. formed in the emissions plume from the stack) at certain types of sources, so PM control strategies may include SO_2 limits. Preliminary studies and testing indicate that these condensable PM emissions may be substantial, therefore SO_2 sources that are likely to form condensable PM are included in this BARCT determination study. Sulfur dioxide can also be a precursor for secondary PM (i.e. ammonium sulfate formed in the atmosphere through reactions with ambient ammonia); however, these secondary PM impacts from SO_2 may not be a significant contributor to exceedances of PM ambient air quality standards. Therefore, SO_2 sources that do not have condensable PM potential are not included in this BARCT review and evaluation study at this time.

Affected Facilities and Sources

A list of facilities that are subject to Cap-and-Trade, including sources and emissions, was developed from the 2016 Reporting Year Emissions Inventory. The Bay Area has 80 facilities that are subject to Cap-and-Trade, which encompass 3,246 individual sources in 61 source categories. AB 617 requires that the expedited schedule for BARCT implementation apply to each industrial source subject to the Cap-and-Trade program. The

[4] United States Environmental Protection Agency (EPA), 2018a. Eight-Hour Ozone (2015) Nonattainment Areas by State/County/Area. Data is current as of September 30, 2018. https://www3.epa.gov/airquality/greenbook/jncty.html

[5] United States Environmental Protection Agency (EPA), 2018b. PM-2.5 (2006) Designated Area Area/State/County Report, Data is current as of September 30, 2018. https://www3.epa.gov/airquality/greenbook/rbca.html#PM-2.5.2006.San_Francisco

term “industrial source” is not explicitly defined in the AB 617 language, however the Cap-and-Trade program does include particular provisions that refer to “industrial sectors”, “industrial covered entities”, “industry assistance”, and “industrial facilities.”[6] These provisions relate the term “industrial” to certain covered entities or facilities that are eligible for free allowance allocation under the Cap-and-Trade program.[7] Under the Cap-and-Trade program, these free allowance allocations are provided to certain industrial sectors to minimize potential leakage of economic activity and emissions.[8] The usage of the term “industrial sources” in the AB 617 language has subsequently been clarified by CARB staff,[9] and is understood to be consistent with the usage of the term “industrial” in the Cap-and-Trade program. CARB provided a list of these “industrial” facilities that includes all covered entities that are eligible for free allowance allocations in accordance with the Cap-and-Trade requirements based on their engagement in an activity within a particular North American Industrial Code System (NAICS) Code listed in Table 8-1 of the Cap-and-Trade regulation.[10] The list excludes opt-in covered entities,[11] and any industrial sources that became subject to the Program after January 1, 2017. This screening for “industrial sources” reduces the number of affected facilities to 19 industrial Cap-and-Trade facilities, which encompass 1,899 individual sources in 50 source categories.

Source Screenings

Staff performed pollutant-by-pollutant screenings on this population of potentially affected sources to determine which sources and source categories required further BARCT evaluation. Staff initially identified and included sources where potential emission reductions from additional controls may be cost effective. Controls that are not cost effective would not meet the criteria to be considered BARCT. In such cases, the source would already be considered to be implementing and achieving BARCT, and therefore no further BARCT controls would be required. Staff identified and included sources that emit more than 10 pounds per day of a given pollutant (1.8 tons per year). This level of emissions is consistent with the Air District’s threshold for new sources required to install best available control technology (BACT) per Rule 2-2: New Source Review, Section 2-2-301. Given that sources below this threshold would have relatively low annual emissions, potential emissions reductions at these sources would be small and are not likely to be cost effective. This approach reduced the population of sources as shown in Table 1.

[6] 17 CCR §§ 95870, 95890, and 95891.
[7] 17 CCR §§ 95870(e) and 95891(a).
[8] “Leakage” refers to potential production shifts away from a jurisdiction due to increased compliance costs and prices. The reduction in production and emissions in the implementing jurisdiction may be offset by increased production and emissions elsewhere.
[9] Email correspondence between K. Magliano, CARB and A. Abbs, CAPCOA, “BARCT List.” June 18, 2018.
[10] 17 CCR § 95890(a).
[11] 17 CCR § 95802(a)(259).

Table 1: AB 617 BARCT Initial Screening Results for Affected Industrial Sources

Pollutant	Number of Source Categories	Number and Percentage of Sources[12]	Amount and Percentage of Emissions[13]
NOx	24	214 / 41%	5,722 tpy / 98%
ROG	23	259 / 16%	4,430 tpy / 93%
PM	17	126 / 16%	1,857 tpy / 92%
SO_2	16	104 / 19%	5,043 tpy / 98%

As shown in Table 1, the resulting population of sources accounts for a large majority of the total emissions at affected industrial Cap-and-Trade facilities (92 to 98 percent). These results also indicate that the low emitting sources, while numerous, account for only a small percentage of the total emissions at affected industrial Cap-and-Trade facilities. Given the relatively small total emissions from the low emitting sources, additional controls on these sources would have limited potential to achieve substantial emission reductions and effectively provide meaningful air quality and attainment benefits. As discussed previously, additional controls on low emitting sources are also not likely to be cost-effective, and therefore would not be anticipated to meet the criteria to be considered BARCT.

Staff then selected sources where BARCT has not already been applied for each nonattainment pollutant. Per AB 617, the requirements for an expedited BARCT schedule do not apply to sources where BARCT implementation has occurred since 2007. Regulations with emission limits that have been amended and/or adopted since 2007 are generally considered to reflect current BARCT levels for that pollutant, and sources subject to these limits are therefore already assumed to meet BARCT for those nonattainment pollutants. In such cases, no further BARCT determination or rulemaking is required for the expedited schedule. After selecting sources where BARCT has not already been achieved for the given pollutant, the population of sources was reduced as shown in Table 2.

[12] Percentage values shown indicate the percentage relative to the total number of sources at affected industrial Cap-and-Trade facilities

[13] Percentage values shown indicate the percentage relative to the total emissions at affected industrial Cap-and-Trade facilities

Table 2: AB 617 BARCT Final Screening Results for Affected Industrial Sources

Pollutant	Number of Source Categories	Number and Percentage of Sources[14]	Amount and Percentage of Emissions[15]
NOx	21	73 / 34%	1,764 tpy / 30%
ROG	23	259 / 16%	4,430 tpy / 93%
PM	16	124 / 15%	1,851 tpy / 92%
SO_2	15	102 / 19%	3,651 tpy / 71%

These sources and source categories require further evaluation and BARCT determination.

BARCT Determination Process

Staff reviewed available information on current achievable emission limits and potential controls for each source category and each nonattainment pollutant. This information included guidelines and recent determinations of BACT, reasonably available control technology (RACT), and lowest achievable emission rate (LAER) from EPA, CARB, and other air districts. Staff determined:

- Current levels of BACT/RACT/LAER controls and emissions (and next more stringent levels of BACT/RACT/LAER controls, if available);
- Potential emission reductions (and incremental additional potential emission reductions, if available); and
- Estimated capital and annual costs for retrofit of controls to existing facilities.

Preliminary estimates of cost effectiveness (and incremental cost effectiveness, where appropriate) were calculated, and any controls and emission limits with a cost effectiveness within reasonable bounds, consistent with recent BARCT determinations, were considered for potential rule development projects. Additional information on the estimates of emissions reductions and control costs can be found in Section IV and in the project scopes included in Attachment A.

Based on these preliminary BARCT determinations, staff proposes six potential high priority rule development projects for inclusion in the Expedited BARCT Implementation Schedule. Criteria for the selection and prioritization of these six projects include:

- Potential for localized clean air and public health benefits through reduction of localized exposure to harmful pollutants, including potential toxic emission reduction co-benefits;
- Potential for substantial emissions reductions (greater than ten tons per year), with a focused consideration of potential PM emissions reductions for reducing localized PM health impacts;
- Prioritization of source categories where BARCT rules have not been adopted or evaluated for the greatest period of time; and
- Cost effectiveness of potential rule development project controls.

[14] Percentage values shown indicate the percentage relative to the total number of sources at affected industrial Cap-and-Trade facilities

[15] Percentage values shown indicate the percentage relative to the total emissions at affected industrial Cap-and-Trade facilities

High priority potential rule development projects are shown in Table 3. Project scope descriptions for each of these projects are included in Attachment A.

Table 3: Potential Rule Development Projects

Rule Development Projects	PM	NOx	ROG	SO_2
1 Organic Liquid Storage Tanks (Rule 8-5)			**X**	
2 Petroleum Wastewater Treating (Rule 8-8)			**X**	
3 Portland Cement Manufacturing (Rule 9-13)	**X**			**X**
4 Refinery Fluid Catalytic Crackers and CO Boilers (Rule 6-5)	**X**			**X**
5 Refinery Heavy Liquid Leaks (Rule 8-18)			**X**	
6 Petroleum Coke Calcining (Rule 9-14)		**X**		

Through this BARCT evaluation and review process, staff also identified 12 additional source categories for further study and consideration, as shown in Attachment C. Based on the preliminary review process, staff believes that there is limited potential to apply additional BARCT controls and achieve substantial reductions at these sources. Staff identified a number of factors that may limit the potential emissions reductions and efficacy of further controls at these sources:

- Potential emissions reductions are relatively small;
- Estimates of emissions and emissions reductions may be uncertain and require further study;
- Control options may not be technologically feasible or may not be suitable for retrofit; and
- Many control options identified may not meet BARCT cost effectiveness requirements.

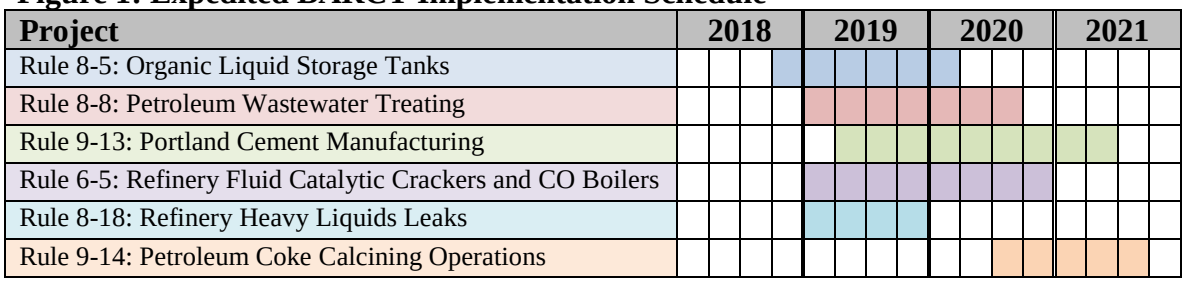
Additionally, further controls on these sources may have limited potential to effectively impact localized exposures in communities and attainment of ambient air quality standards. Based on the limited potential for substantial controls and emissions reductions, staff does not recommend that these potential rule projects be included as priority rule development projects in the Expedited BARCT Implementation Schedule at this time. Staff believes that these projects merit further study, and actions on these source categories may be more appropriately considered during development of local Community Emission Reduction Plans. Staff anticipates that further evaluation and study during the AB 617 community-based monitoring, modeling, and planning activities, will inform future potential actions for these source categories. Further information on these 12 additional source categories can be found in Attachment C.

III. PROPOSED EXPEDITED BARCT IMPLEMENTATION SCHEDULE

Rule Development Project Schedules

Figure 1 shows the estimated schedule for each of the six potential rule development projects. This schedule is also included in Attachment B. This schedule assumes the Air District rule development group operates at full staffing, with various phases of the different rule development process occurring in parallel over four consecutive years. Note that staff anticipates that these projects would be developed along with other rule development projects outside of the Expedited BARCT Implementation Schedule, including rules currently being developed as part of the 2017 Clean Air Plan implementation.

Figure 1: Expedited BARCT Implementation Schedule



Rule Development Project Timelines

Most rule development projects take approximately 12 months from initiation to rule adoption at a Public Hearing. Staff assumes the first nine months of a project require a full-time staff person to perform and coordinate regulatory development activities, which may include:

- Establishing scope with internal workgroup
- Identifying all affected sources
- Verifying and refining emissions estimates
- Completing research on possible controls
- Refining estimates of emission reductions
- Confirming and refining capital and annual cost estimates
- Determining cost effectiveness (and incremental cost effectiveness, if applicable)
- Working with and gathering input from affected parties
- Drafting rule language and workshop report
- Reviewing/revising workshop documents
- Conducting workshops
- Initiating California Environmental Quality Act (CEQA) and Socioeconomic Analyses
- Receiving and incorporating comments from workshops into final documents
- Reviewing CEQA and Socioeconomic Analyses
- Finalizing Public Hearing documents

Staff assumes the remaining three months of the project require about half-time staff person to complete the public hearing, assist in implementation, and submit proper documentation to CARB.

Staff recognizes that some rule development projects may take more time during the technical assessment phase, especially if emission estimates from various sources are inconsistent, or additional source testing or emissions profile testing is required. This information gathering phase can extend a project timeline from six to 12 months. As shown in the Expedited BARCT Implementation Schedule in Figure 1, staff anticipates that additional emissions information gathering and/or testing will be required for rule development projects regarding Organic Liquid Storage Tanks, Petroleum Wastewater Treating, Cement Manufacturing, and Refinery Fluid Catalytic Crackers and CO Boilers. Further information on additional data collection and other testing considerations for each rule development project can be found in the project scope descriptions in Attachment A.

IV. EMISSION REDUCTION BENEFITS & COMPLIANCE COSTS

This section of the Staff Report summarizes the methods used to estimate emission reductions that can occur when applying BARCT to sources emitting nonattainment pollutants. More detailed information on the current emissions, potential emission limits, emission reductions, and costs and cost effectiveness for each specific priority rule development project can be found in the project scopes in Attachment A.

Current Emissions

Current emissions are based on Reporting Year 2016 Emissions Inventory reported to CARB by August 1, 2017. These emissions are based on operating year 2015 for most facilities.

Potential Emission Limits

As described in Section II, staff reviewed available information on current achievable emission limits and potential controls for each source category and each nonattainment pollutant. This information included guidelines and recent determinations of best available control technology (BACT), reasonably available control technology (RACT), and lowest achievable emission rate (LAER) from EPA, CARB, and other air districts. These determinations often provide limits in the form of emission factors (e.g., mass of pollutant emitted per unit of input or per unit of output) and describe the type of controls typically required to achieve the stated emission limit. Where there is a wide array of emission limits for a given control technique, staff typically used the average level of control achieved, leading to somewhat conservative estimates for potential emission reductions.

This BACT/RACT/LAER information is available in the EPA clearinghouse, CARB clearinghouse, or through BACT determinations available from California air districts. Note that the Air District has been coordinating and collaborating with CARB and other California air districts to support CARB's efforts to improve availability and access of this information.

Emission Reduction Estimates

Staff estimated potential emission reductions based on the current performance of the affected sources and the potential limit or level of control identified in the preliminary BARCT review. Current performance of the affected sources was based on Air District 2016 Reporting Year emissions, as well as other additional supplemental information available. The difference between the current performance and the preliminary BARCT level identified was used to calculate potential emission reductions from BARCT implementation. Priority rule development projects included in the Expedited BARCT Implementation Schedule were identified to have potential emission reductions greater than 10 tons per year (tpy) and provide a significant opportunity for emission reductions and public health benefits. Estimates of potential emission reductions for the rule development projects (where available) are shown in Table 4. More detailed information and further discussion on potential emission reductions for the rule development projects can be found in the individual project scopes available in Attachment A.

Capital and Operating Cost Estimates

Staff estimated control costs using a variety of sources. Costs of controls are most often obtained from the EPA Cost Models,[16] readily available on the EPA website. Control cost data are also available from cost studies performed and published by EPA, CARB, or other air districts, often as part of the evaluation and analysis of regulations, rules, and engineering determinations. Control equipment vendors and affected industries may also generate estimates for control costs. These estimates may need to be adjusted to account for cost uncertainties, as well as differences and changes in market conditions. Although these studies and cost estimates are often updated regularly, cost estimates may sometimes need to be reassessed to reflect today's changing conditions and actual costs. The Chemical Engineering Magazine Plant Cost Index can be used to adjust historical costs to today's cost values. Costs may also need to be adjusted to reflect higher costs in the San Francisco Bay Area, as cost models and estimates may differ when compared to lower cost regions throughout the country. Staff typically applies additional factors to capital and/or operating costs to reflect these uncertainties, market differences, and other adjustments.

Capital costs are normally amortized based on control equipment project life and prevailing interest rates, and assumptions and opinions on these parameters may vary. For this preliminary BARCT evaluation, amortized capital cost estimates are based on 11 percent amortization, 1 percent tax, 1 percent insurance, and 2 percent maintenance costs, totaling 15 percent amortization of capital. More detailed or specific amortization data and assumptions may also be used where appropriate. Operating costs are normally based on costs for energy, water, air, catalyst/reagent, and labor costs in the cost models or cost estimates. For preliminary BARCT evaluations where these operating cost data were not available, any control system that is likely to require significant energy, utilities, or catalyst usage is estimated to have total operating costs equal to 5 percent of capital cost. This approach provides a conservative initial estimate of operating costs for all the but most

[16] United States Environmental Protection Agency (EPA), 2018c. Cost Analysis Models/Tools for Air Pollution Regulations, https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-analysis-modelstools-air-pollution. Updated May 23, 2018.

energy intensive control methods.

Cost Effectiveness and Incremental Cost Effectiveness

California Health and Safety Code (H&SC), Section 40703 requires the Air District to consider the cost effectiveness of a control measure when adopting any regulation. Cost effectiveness is calculated by dividing the annual costs (including capital amortization and operating costs) by the total number of tons of emission reductions expected each year. The result is the cost effectiveness of implementing the control method retrofit at the existing source.

H&SC Section 40920.6 requires the Air District to identify one or more potential alternative control method that achieves the emission reduction objectives of the rule or regulation and estimate the incremental cost effectiveness between the proposal and the alternative. Incremental cost effectiveness is calculated when two (or more) control methods are being considered. First, cost effectiveness is calculated for the less stringent control method, as described above. Incremental cost effectiveness is then calculated by: 1) calculating the incremental increase in cost between the first control method and the second more stringent control method, and 2) dividing the incremental increase in cost by the incremental increase in emission reductions from the second more stringent control method. This analysis is used to help determine which controls should be recommend when multiple options are available.

Estimates of cost effectiveness for the rule development projects (where available) are shown in Table 4. More detailed information and further discussion on costs and cost effectiveness for the rule development projects can be found in the individual project scopes in Attachment A.

Table 4: Potential Emission Reductions and Cost Effectiveness

	Rule Development Projects	**Potential Emission Reductions** (tpy)[17]	**Cost Effectiveness** ($/ton)[18]
1	Rule 8-5: Organic Liquid Storage Tanks	ROG: 75 to 125 tpy	ROG: $10,000 to $20,000
2	Rule 8-8: Petroleum Wastewater Treating	ROG: Unknown	ROG: Unknown
3	Rule 9-13: Portland Cement Manufacturing	PM: Unknown SO_2: 698 tpy	PM: Unknown SO_2: $2,100
4	Rule 6-5: Refinery Fluid Catalytic Crackers and CO Boilers	PM: Unknown SO_2: 567 tpy	PM: Unknown SO_2: $4,000 to $47,000
5	Rule 8-18: Refinery Heavy Liquids Leaks	ROG: Unknown	ROG: Unknown
6	Rule 9-14: Petroleum Coke Calcining Operations	NOx: Unknown	NOx: Unknown

[17] More detailed information and further discussion on potential emission reductions for the rule development projects can be found in the individual project scopes in Attachment A.
[18] More detailed information and further discussion on costs and cost effectiveness for the rule development projects can be found in the individual project scopes in Attachment A.

Note that for some of the potential rule development projects in Table 4, estimates of emission reductions and cost effectiveness may be unknown or uncertain at this time. For particular sources or pollutants, there may be uncertainties associated with emission estimates or the level of control and emission reductions achievable, and further study and evaluation would be required to develop more detailed estimates. For example, potential emission reductions of condensable PM are often difficult to quantify due to the complex nature of condensable PM formation. This formation can be highly dependent on site-specific source parameters, including flue gas properties and composition. Because control strategies typically involve the reduction of condensable components and precursors (such as ammonia and SO_2) instead of a direct limit on condensable PM, reductions of condensable PM emissions associated with these precursor controls may be difficult to estimate without further characterization and evaluation. More detailed information and further discussion on the potential emission reductions, costs, and cost effectiveness for the rule development projects can be found in the individual project scopes in Attachment A.

V. ENVIRONMENTAL IMPACTS

Review of Potential Environmental Impacts Under CEQA

The California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq., requires that the potential environmental impacts of proposed projects be evaluated and that feasible methods to reduce or avoid identified significant adverse environmental impacts of these projects be identified. The Air District contracts with an independent consultant to conduct a CEQA analysis of potential environmental impacts from any rule making projects. Since the Expedited BARCT Implementation Schedule would consist of the implementation of several rule development projects to fulfill the requirements of AB 617, a CEQA analysis was conducted for the entire suite of potential rule development projects.

The Air District prepared a Notice of Preparation and an Initial Study (NOP/IS) for the Draft Environmental Impact Report (DEIR) for the Expedited BARCT Implementation Schedule. The NOP/IS was distributed to interested parties and published on the Air District's website on August 7, 2018 for review and comment. A CEQA scoping meeting was conducted on August 24, 2018, where minimal public comments were received. Written comments on the NOP/IS were accepted through September 7, 2018. The Air District prepared a Draft Environmental Impact Report to address the potential environmental impacts associated with the Expedited BARCT Implementation Schedule. The Draft EIR was published on October 23, 2018 for review and comment, and written comments were accepted through December 7, 2018. One comment letter on the Draft EIR was received during the comment period, and responses to the comments are included in the Final EIR. Prior to making a decision on the adoption of the proposed Expedited BARCT Implementation Schedule, the Air District's Board of Directors must review and certify the Final EIR as providing adequate information on the potential adverse environmental impacts of implementing the proposed schedule. The EIR concluded that air quality impacts during the construction of additional pollution control equipment were found to remain potentially significant after mitigation and cumulatively considerable. Hydrology and water quality impacts associated with water demand from the operation of control equipment were found to remain potentially significant after mitigation and cumulatively considerable.

VI. SCHEDULE DEVELOPMENT/PUBLIC CONSULTATION PROCESS

Schedule Development Process

The process for development of the AB 617 Expedited BARCT Implementation Schedule has been adjusted slightly from the typical rule development process. Because AB 617 requires the Air District to develop a schedule for developing BARCT rules before developing the individual rules themselves, the development of the Expedited BARCT Implementation Schedule is more comparable in scope to an air quality plan, such as the Air District's 2017 Clean Air Plan. Similar to an air quality plan, the Expedited BARCT Implementation Schedule identifies and describes potential regulatory strategies, rules, and rule amendments, which would be further developed in the future. Therefore, development of the Expedited BARCT Implementation Schedule follows most of the Air District's typical steps for developing rules and plans.

Air District staff initially reviewed requirements of AB 617, including markups of the pertinent sections of the H&SC. Staff developed the emissions inventory information for affected facilities to perform the preliminary BARCT review and evaluation. This process involved screening sources to identify source categories with significant potential for emission reductions, researching BACT/RACT/LAER controls and emissions levels, identifying a preliminary BARCT level, and determining potential emission reductions. Staff also estimated retrofit capital costs and annual cost of controls, and calculated cost effectiveness of emission reductions. Staff then identified and prioritized the potential rule development projects based on health benefits, air quality impacts, cost effectiveness, and the length of time since these sources had last been addressed through rules or permit limits. Staff developed detailed project scope papers for each potential rule development project to further discuss the preliminary evaluation process, and to identify and review current source information, available controls and costs, potential emission limits, cost effectiveness, and any further considerations and issues. Finally, staff developed a concept paper describing the BARCT determination process and potential rule development projects included in the Expedited BARCT implementation schedule.

Air District staff published the concept paper and rule development project scope papers for the draft schedule on the Air District website on May 24, 2018 and accepted written comments on the documents through June 15, 2018. Staff also met with representatives from affected facilities and industries, such as refinery and cement manufacturing plant representatives. Staff discussed this AB 617 Expedited BARCT Implementation Schedule with community members and environmental groups and presented on the status of the project at a Board of Directors Stationary Source Committee meeting on May 21, 2018.

Staff received input from these sources and prepared an Initial Staff Report and revised rule development scope papers. Staff published these documents on the Air District website on September 5, 2018 and accepted comments on these documents through October 5, 2018. An update on the Expedited BARCT Implementation Schedule was presented at the Air District's Board of Directors meeting on September 5, 2018.

Air District staff considered input received on the Initial Staff Report and related materials, and continued to conduct further analysis, coordinate with CARB and other air districts, and meet with affected facilities and industries. Staff published the proposed Expedited BARCT Implementation Schedule and Staff Report for public review and comment on October 23, 2018 and accepted written comments through December 7, 2018. Three comment letters on the proposed BARCT Schedule and Staff Report were received, and staff prepared a summary of comments received and responses for inclusion in the final proposal package. Staff will present final proposals to the Air District's Board of Directors for their consideration. At the Public Hearing, the Air District Board of Directors will consider the final proposal and receive public input before taking any action on the Expedited BARCT Implementation Schedule.

Note that each individual rule development project will also follow the standard rule development process. As described in the schedule, rule development activity is anticipated to occur throughout the period from 2018 to 2021.

Public Outreach and Consultation

In developing the proposed Expedited BARCT Implementation Schedule and Final Staff Report materials, staff solicited public comments on the concept paper, Initial Staff Report, and Staff Report, and conducted early stakeholder engagement with affected facilities, as described above. Input received during these outreach efforts, along with further investigation and analysis by staff, were used to develop the final proposals for consideration by the Air District's Board of Directors. Throughout the outreach process for the development of the schedule, Air District staff also engaged in additional early outreach with stakeholders for individual rule development projects, and will continue those efforts as those projects progress.

VII. CONCLUSION/RECOMMENDATIONS

The AB 617 requirements for the Expedited BARCT Implementation Schedule are described in H&SC 40920.6(c). This section requires that each air district in nonattainment for one or more air pollutants adopt an expedited schedule for implementation of BARCT by the earliest feasible date, but no later than December 31, 2023. The Air District is in non-attainment for ozone and PM. [19,20] The expedited schedule must be adopted no later than January 1, 2019. The section states that the schedule shall apply to each industrial source subject to California GHG Cap-and-Trade requirements and must give priority to any sources that have not had emissions limits modified for the greatest period of time. The schedule shall not apply to sources that have implemented BARCT since 2007. As described in Section II and Section III of this report, Air District staff has evaluated and identified sources subject to these requirements and conducted analyses to determine the appropriate applicability of the schedule. The proposed schedule identifies the potential

[19] United States Environmental Protection Agency (EPA), 2018a. Eight-Hour Ozone (2015) Nonattainment Areas by State/County/Area. Data is current as of September 30, 2018. https://www3.epa.gov/airquality/greenbook/jncty.html

[20] United States Environmental Protection Agency (EPA), 2018b. PM-2.5 (2006) Designated Area Area/State/County Report, Data is current as of September 30, 2018. https://www3.epa.gov/airquality/greenbook/rbca.html#PM-2.5.2006.San_Francisco

rule development projects that would evaluate and implement BARCT controls at the affected sources and includes timelines for the rule development process to address these AB 617 requirements no later than December 31, 2023.

The AB 617 requirements for adoption of the Expedited BARCT Implementation Schedule are described in H&SC 40920.6(d). This section states that prior to adopting the schedule, the Air District shall hold a public meeting and take into account the local public health and clean air benefits to the surrounding community, the cost effectiveness of control options, and air quality and attainment benefits of control options. As described in Section II and Section III of this report, the staff's process for reviewing BARCT controls and developing the proposed BARCT schedule involved evaluating potential emission reductions, identifying the potential for toxic emission reduction co-benefits, and considering the cost-effectiveness of control options. These are further described for the potential rule development projects in their respective individual project scopes included in Attachment A. As such, these considerations were taken into account during the development of the proposed Expedited BARCT Implementation Schedule and support the adoption of the proposed schedule. The Air District will present the final proposal to the Air District Board of Directors at a Public Meeting for consideration. In addition, the Air District solicited comments from the public and affected facilities and industries throughout the development process, held a CEQA Scoping Meeting on August 24, 2018, and presented updates on the development of the Expedited BARCT Implementation Schedule at the Air District Stationary Source Committee and Board of Directors meetings, as described in Section VI of this report.

Staff recommends the Air District Board of Directors adopt the proposed Expedited BARCT Implementation Schedule and certify the associated CEQA Environmental Impact Report.

VIII. REFERENCES

Email correspondence between K. Magliano, CARB and A. Abbs, CAPCOA, "BARCT List." June 18, 2018.

United States Environmental Protection Agency (EPA), 2018a. Eight-Hour Ozone (2015) Nonattainment Areas by State/County/Area. Data is current as of September 30, 2018. https://www3.epa.gov/airquality/greenbook/jncty.html

United States Environmental Protection Agency (EPA), 2018b. PM-2.5 (2006) Designated Area Area/State/County Report, Data is current as of September 30, 2018. https://www3.epa.gov/airquality/greenbook/rbca.html#PM-2.5.2006.San_Francisco

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ATTACHMENT A

Scope Papers for Potential Rule Development Projects in Expedited BARCT Implementation Schedule

1. Organic Liquid Storage Tanks
2. Petroleum Wastewater Treating
3. Portland Cement Manufacturing
4. Refinery Fluid Catalytic Crackers and CO Boilers
5. Refinery Heavy Liquid Leaks
6. Petroleum Coke Calcining

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ATTACHMENT B

Proposed AB 617 Expedited BARCT Implementation Schedule

Rule Development Project	Pollutants Addressed	Anticipated Development Schedule	2018				2019				2020				2021			
Rule 8-5: Organic Liquid Storage Tanks	ROG	Q4 2018 – Q1 2020																
Rule 8-8: Petroleum Wastewater Treating	ROG	Q1 2019 – Q3 2020																
Rule 9-13: Portland Cement Manufacturing	PM, SO_2	Q2 2019 – Q2 2021																
Rule 6-5: Refinery Fluid Catalytic Crackers and CO Boilers	PM, SO_2	Q1 2019 – Q4 2020																
Rule 8-18: Refinery Heavy Liquids Leaks	ROG	Q1 2019 – Q4 2019																
Rule 9-14: Petroleum Coke Calcining Operations	NOx	Q3 2020 – Q3 2021																

ATTACHMENT C

Additional Source Categories for Further Study and Consideration with Local Community Emission Reduction Plans

Other Source Categories Being Considered	**PM**	**NOx**	**ROG**	**SO_2**
Cooling Towers	**X**			
Fuel Gas Combustion Practices • Boilers • Gas Turbines • Hydrogen Furnaces • Process Heaters	**X**		**X**	
Internal Combustion (Reciprocating) Engines			**X**	
Incinerators		**X**		
Marine Terminal Loading			**X**	
Natural Gas Furnaces		**X**	**X**	
Natural Gas Dryers		**X**	**X**	
Refinery Flares		**X**	**X**	
Solvent Cleaning			**X**	
Sulfur Plants	**X**	**X**		
Thermal Oxidizers		**X**		
Wallboard Manufacturing	**X**			

As shown in the table above, Air District staff identified 12 additional source categories for further study and consideration. Based on the preliminary review process, staff believes that there is limited potential to apply additional BARCT controls and achieve substantial reductions at these sources. Staff identified a number of factors that may limit the potential emissions reductions and efficacy of further controls at these sources:

- **Potential emissions reductions are relatively small –** For many of the source categories identified, staff's research indicates that more stringent controls or limits may have been achieved at other facilities, but potential emission reductions from current levels may be relatively small or incremental in nature due to the existing controls or limits at affected facilities. In such cases, implementation of additional controls may not achieve substantial emission reductions and may be constrained by issues regarding technological feasibility and cost effectiveness.
- **Estimates of emissions and emissions reductions may be uncertain and require further study** – Certain emissions and emission sources have historically been difficult to characterize and quantify, resulting in uncertainties regarding

current impacts and potential reductions. For example, PM emissions from cooling towers have been difficult to accurately measure and estimate due to the large physical size of the source, configuration of cooling tower emissions points that prevent proper source testing, and the nature of the organic and inorganic salt content of these PM emissions. Current emissions estimates may not adequately reflect the actual emissions and efficacy of existing controls, therefore additional research and study would be needed to evaluate potential emission reductions and control options.

- **Control options may not be technologically feasible or may not be suitable for retrofit** – Some control options may not be feasible for retrofit at certain sources. For some sources with existing control equipment, it may be possible to upgrade, modify, or add capacity to the existing control system, however there may be cases where an additional level of control would require complete rebuilding or replacing control equipment. In such cases, these additional considerations may result in certain control options being deemed infeasible or not cost effective.
- **Many control options identified may not meet cost effectiveness criteria to be considered BARCT** – Cost effectiveness is calculated by dividing the annual control costs by the annual tons of anticipated emission reductions. Because the potential emission reductions identified for these sources are small and incremental in nature, many control options that involve substantial capital and operating costs would not meet the cost effectiveness criteria to be considered BARCT.

Additionally, further controls on these sources may have limited potential to effectively impact localized exposures in communities or attainment of ambient air quality standards. Based on the limited potential for substantial controls and emissions reductions, staff does not recommend that these potential rule projects be included as priority rule development projects in the Expedited BARCT Implementation Schedule at this time. Staff believes that these projects merit further study, and actions on these source categories may be more appropriately considered during development of local Community Emission Reduction Plans. Staff anticipates that further evaluation and study, during the AB 617 community-based monitoring, modeling, and planning activities, will inform future potential regulatory actions for these source categories.

Organic Liquid Storage Tanks – Rule Development Project Scope

Summary

This rule development project would address emissions of reactive organic gases (ROG) from organic liquid storage tanks. Staff estimates that preliminary best available retrofit control technology (BARCT) levels may result in ROG emission reductions, as well as reductions of associated toxic air contaminant (TAC) emissions from organic liquid tank storage. Staff recommends considering amending Regulation 8, Rule 5: Storage of Organic Liquids to specifically address these ROG and TAC emissions from external floating roof tanks storing organic liquids. Rulemaking for emissions of oxides of nitrogen (NOx), sulfur dioxide (SO_2), and particulate matter (PM) is not anticipated at this time.

Background

The Air District has regulated emissions from tanks storing organic liquids for nearly 50 years, first under former Regulation 3, which was adopted in 1967, and later under Regulation 8, Rule 5: Storage of Organic Liquids. Rule 8-5 was originally adopted in 1978 and has been amended several times. By 1993, this rule included most of the control strategies found in the current rule, including gap standards for floating roof rim seals, pressure vacuum valve setpoint requirements for fixed roof tanks, closure requirements for tank roof fittings, and tank degassing requirements. Amendments in 2006 improved the rule, primarily in the area of non-routine operations, such as tank degassing and cleaning.

Storage vessels containing organic liquids can be found in many industries, including petroleum producing and refining, petrochemical and chemical manufacturing, bulk storage and transfer operations, and other industries consuming or producing organic liquids. Organic liquids in the petroleum industry, usually called petroleum liquids, generally are mixtures of hydrocarbons having dissimilar true vapor pressures (for example, gasoline and crude oil). Organic liquids in the chemical industry, usually called volatile organic liquids, are composed of pure chemicals or mixtures of chemicals with similar true vapor pressures (for example, benzene or a mixture of isopropyl and butyl alcohols).

Six basic tank designs are used for organic liquid storage vessels: fixed roof (vertical and horizontal), external floating roof, domed external (or covered) floating roof, internal floating roof, variable vapor space, and pressure tanks (low and high).

ROG

Regulatory Context and Preliminary BARCT Level

Emissions from organic liquids in storage occur because of evaporative loss of the liquid during its storage and as a result of changes in the liquid level. The emission sources vary with tank design, as does the relative contribution of each type of emission source. Emissions from fixed

roof tanks are a result of evaporative losses during storage (known as breathing losses or standing storage losses) and evaporative losses during filling and emptying operations (known as working losses). External and internal floating roof tanks are emission sources because of evaporative losses that occur during standing storage and withdrawal of liquid from the tank. Standing storage losses are a result of evaporative losses through rim seals, deck fittings, and/or deck seams.

Existing Applicable Regulations

Tanks used for bulk storage of organic liquids or liquid mixtures containing organic compounds are regulated under Air District Rule 8-5. Such tanks are typically found at petroleum refineries and chemical plants, as well as gasoline bulk plants and terminals. Underground gasoline storage tanks located at gasoline stations are regulated under Air District Regulation 8, Rule 7: Gasoline Dispensing Facilities, and are not addressed in Rule 8-5.

Federal tank regulations include new source performance standards (NSPS) in 40 CFR 60 Subpart Kb, and Maximum Achievable Control Technology (MACT) standards in 40 CFR 63 Subpart CC. Each of these federal requirements require certain storage vessel provisions in terms of control, monitoring, and recordkeeping.

South Coast Air Quality Management District (SCAQMD) maintains their tank regulations in Regulation 1178. The rule applies to all aboveground storage tanks with capacities greater than or equal to 75,000 liters (19,815 gallons) that are used to store organic liquids with a true vapor pressure greater than five millimeters of mercury (mm Hg) (0.1 psi) absolute under actual storage conditions, and are located at any petroleum facility that emits more than 40,000 pounds (20 tons) per year of volatile organic compounds (VOC) in any emission inventory year, starting with the emission inventory year 2000. The rule also includes requirements for domed roofs. Several exemptions are also listed in the rule, the most notable of which include: 1) exemption from doming requirements for crude oil tanks, 2) exemption of facilities with an emission cap equal to or less than 20 tons per year, and 3) exemption from doming requirements for tanks with true vapor pressure limits less than 3 psia.

Review of BACT and Potential Controls

Best Available Control Technology (BACT) for external floating roof storage tanks containing organic liquids is found in the Air District BACT Guideline 167.1.2 dated September 2011. This BACT guideline includes information on two categories of BACT: 1) “technologically feasible and cost effective” and 2) “achieved in practice”. The first category of BACT is a more stringent level of control, and generally refers to advanced control devices or techniques. The guideline indicates that a vapor recovery system (VRU) with an overall system efficiency of at least 98 percent would constitute BACT that is “technologically feasible and cost effective”. Typical technology implemented for this BACT level includes a thermal incinerator, carbon adsorber, refrigerated condenser, or an Air District-approved equivalent.

The guideline indicates that the BACT level “achieved in practice” is an Air District-approved roof with liquid mounted primary seal and zero gap secondary seal, all meeting the design

criteria of Rule 8-5. The tank system must have no ungasketed roof penetrations, no slotted pipe guide pole (unless equipped with a float and wiper seals), and no adjustable roof legs (unless fitted with vapor seal boots or equivalent). Additionally, a dome is required for tanks that meet the following criteria: 1) capacity greater than or equal to 19,815 gallons, 2) located at a facility with greater than 20 tons per year of VOC emissions since the year 2000, and 3) storing material with a vapor pressure equal to or greater than 3 pounds per square inch absolute (psia) (except for crude oil tanks that are permitted to contain more than 97 percent crude oil by volume).

Potential Emission Reductions and Impacts

Emissions generated from organic liquid storage tanks for AB 617 identified sources in the Air District are nearly 840 tons per year from approximately 100 tanks. Table 1 below shows AB 617 identified floating roof (non-crude), coned roof (non-crude), and crude tank storage.

Table 1. AB 617 Organic Liquid Storage Tank Emission Summary

Tank Type	Number of Identified Tanks	Annual[1] Emissions (TPY)
Floating Roof[1]	30	400
Coned Roof	47	300
Other	9	40
Crude	14	100
Total	100	840

[1] Floating roof tanks include both external floating roof and internal floating roof. Further distinction between these two types has not yet been identified.
[2] 2016 emissions referenced in Air District data files. Emission factors vary from AP-42, 7.1 to Tanks 4.09D emission calculations.

Crude units identified above include both coned and floating roof tank types. Tanks associated with refineries comprise over 95 percent of the AB 617 organic liquid storage tanks identified above. Additional tanks were identified in the AB 617 analysis but excluded from further BARCT analysis, as ROG emissions for each of these tanks were less than 10 pounds per day (1.8 TPY).

Potential ROG emission reductions may be achieved by installing domes on external floating roof tanks, and by capturing vented emissions from internal floating roof or coned roof tanks and removing ROG emissions through a vapor recovery unit (VRU) flowing back to the tank(s) or to a thermal incinerator. Domed roofs on external floating roofs without capture will reduce ROG by limiting wind effects. Tables 2, 3, and 4 below describe the potential emission reductions and cost effectiveness from these different control options at floating roof tanks. Note that each of the estimates for total capital cost and total annual costs below are based on approximately 10 tanks with Rule 8-5 applicability as external floating roof tanks (EFRTs).

Table 2. AB 617 Organic Liquid Storage Tanks BARCT Summary – Dome

Current Emissions, Floating Roof Tanks (tpy)	400
Potential Emission Reductions (tpy)	75
Preliminary BARCT Level	EFRT Dome with 75% Evaporation/Wind Effect Reduction
Controls Required	EFRT Dome
Total Capital Cost	$6,250,000
Total Annual Cost	$750,000
Cost-Effectiveness ($/ton)	$10,000

Table 3. AB 617 Organic Liquid Storage Tank BARCT Summary – Dome + VRU

Current Emissions, Floating Roof Tanks (tpy)	400
Potential Emission Reductions (tpy)	100
Preliminary BARCT Level	EFRT Dome + 98% Efficiency Vapor Recovery Unit
Controls Required	EFRT Dome + 98% Efficiency Vapor Recovery Unit
Total Capital Cost	$8,500,000
Total Annual Cost	$1,500,000
Cost-Effectiveness ($/ton)	$15,000

Table 4. AB 617 Organic Liquid Storage Tank BARCT Summary – Dome + VRU + Incinerator

Current Emissions, Floating Roof Tanks (tpy)	400
Potential Emission Reductions (tpy)	125
Preliminary BARCT Level	EFRT Dome + 98% Efficiency Vapor Recovery Unit + Incinerator
Controls Required	EFRT Dome + 98% Efficiency Vapor Recovery Unit + Incinerator
Total Capital Cost	$12,000,000
Total Annual Cost	$2,500,000
Cost-Effectiveness ($/ton)	$20,000

Dome installation on an external floating roof tank cost estimates assume a dome cost of approximately $40 per square foot, with a construction cost of $50,000. Using an average tank size of 135-foot diameter (based on Valero refinery gasoline tanks), dome capital costs (including installation) would be approximately $625,000 per tank. Total annualized cost would be approximately $75,000 per tank. Additional considerations would need to be made for tank age, earthquake structural supports, and fire suppression on certain tanks.

Vapor recovery units (VRU) capital costs are estimated to be approximately $225,000 per single tank. There would likely be cost savings for VRU systems that are applied to multiple tanks with an associated increase in compressor size. Incinerators are estimated to require an additional

$350,000 in capital costs per tank, with potential cost savings for systems combining several tanks into one VRU header prior to incineration. Additional fuel costs for incineration may also need to be considered and evaluated further.

In lieu of converting fixed roof tanks to internal floating roof tanks, operators may instead choose to vent the vapor losses from these fixed roof tanks to a vapor control system or a vapor recovery system for ROG control. Facilities with an existing vapor control or vapor recovery system on site may be able to accommodate the additional vapor recovery load without installation of additional systems or capacity. In this scenario, the costs of implementing this control option would be anticipated to be minor. However, the cost and cost effectiveness could vary significantly with each individual scenario depending on the location of the tanks, the size of the existing compressors, and the types of vapor control or vapor recovery system the facility would choose to use.

Further Considerations

Staff recommends working with stakeholders to collect additional tank design data and emission information associated with the organic liquid storage tanks at AB 617 identified facilities. Staff recommends forming an OLST (Organic Liquid Storage Tank) Working Group that may include representatives of affected facilities, environmental organizations, and manufacturers of domed roofs to discuss relevant control technologies for storage tanks. In parallel, staff may also perform site visits of the affected facilities to assess actual operating conditions. Additional refinements to estimates of current emissions and potential reductions would be needed to appropriately evaluate BARCT control options. This further study and refinement may involve additional estimation of ROG emissions through site visits, testing, monitoring, or assessment of emission estimation protocols and programs, such as the United States Environmental Protection Agency (EPA) TANKS version 4.09D program. Staff would also seek input through OLST Working Group meetings, public workshops, and numerous individual site visits and meetings with stakeholders.

SO_2

Organic liquid storage tanks do not typically generate substantial SO_2 emissions that would require additional controls. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time. There could be a slight increase in SO_2 emissions due to possible ROG vapor recovery system combustion; however, no additional rulemaking for SO_2 will be considered at this time.

NOx

Organic liquid storage tanks do not typically generate substantial NOx emissions that would require additional controls. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time. There could be a slight increase in NOx emissions due to possible ROG vapor recovery system combustion; however, no additional rulemaking for NOx will be considered at this time.

Particulate Matter

Organic liquid storage tanks do not typically generate substantial PM emissions that would require additional controls. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time. There could be a slight increase in PM emissions due to possible ROG vapor recovery system combustion; however, no additional rulemaking for PM will be considered at this time.

Petroleum Wastewater Treating – Rule Development Project Scope

Summary

This rule development project would address emissions of reactive organic gases (ROG) from petroleum wastewater treating operations. Staff estimates that preliminary best available retrofit control technology (BARCT) levels could result in potential ROG emission reductions. The Air District has addressed ROG emissions from petroleum wastewater treatment facilities in previous rule developments (Rule 8-8 Wastewater Collection and Separation Systems), but staff recommends reviewing each of the five Bay Area refineries for additional opportunities for reduction of wastewater ROG. This review may include on-site air emissions testing, which will require refinery cooperation. Any recommended and implemented ROG controls in addition to current regulatory requirements are also anticipated to reduce toxic air contaminant (TAC) emissions. Rulemaking for emissions of oxides of nitrogen (NOx), sulfur dioxide (SO_2), and particulate matter (PM) is not anticipated at this time.

Background

All refineries employ some form of wastewater treatment so that water effluents can be safely returned to the environment or reused in the refinery. The designs of specific wastewater treatment plants are complex, and are complicated by the diversity of refinery pollutants, including oils, phenols, sulfides, dissolved solids, and toxic chemicals. Although the treatment processes employed by refineries vary greatly, they generally include drain systems, neutralizers, oil/water separators, settling chambers, clarifiers, dissolved air flotation systems, coagulators, aerated lagoons, and activated sludge ponds.

Drain systems consist of individual process drains, where oily water from various sources is collected, and junction boxes, which receive the oily water from multiple drains. Oil-water separators (OWS) generally represent the first step in the treatment of refinery wastewater. The separation and removal of the oil from the water are accomplished through density differences that cause oil to rise to the top and enable it to be skimmed off. Air flotation usually follows the oil-water separator and is used to remove remaining oil and solids by introducing air bubbles into the wastewater by mechanical means. The factors influencing emissions from these systems are wastewater composition, equipment design, and climatic factors.

ROG

Regulatory Context and Preliminary BARCT Level

The purpose of an amended rule would be to reduce ROG emissions from petroleum wastewater treatment operations located in the Air District. The main components of atmospheric emissions from wastewater treatment plants are fugitive ROGs and dissolved gases that evaporate from the surfaces of wastewater residing in open process drains, separators, and ponds. Treatment processes that involve extensive contact of wastewater and

air, such as aeration ponds and dissolved air flotation, have an even greater potential for atmospheric emissions.

The control of wastewater treatment plant emissions involves covering systems where emission generation is greatest (such as oil-water separators and settling basins) and removing dissolved gases from water streams with sour water strippers before contact with the atmosphere. These control techniques potentially can achieve greater than 90 percent reduction of waste water system emissions.

Emission Estimates

Current ROG emission estimates associated with refinery wastewater operations may vary widely and may not be consistently characterized between different systems and components. Some facilities report total wastewater ROG emissions for the overall treatment system, while others may delineate between OWS emissions and fugitive emissions. Additionally, other facilities may report no discernable ROG emission contributions from wastewater treatment components and systems. Considering these caveats and limitations, a reasonable estimate of annual ROG emissions attributable to refinery wastewater treatment systems is 300 to 600 tons per year. Additional review and study of current emissions inventories, refinery emission reporting methodology, emission factors, and calculations would be needed to appropriately inform future rule development.

Review of BACT and Potential Controls

Recent best available control technology (BACT) determinations from the United States Environmental Protection Agency (EPA) RBLC[1] database indicate that controls for refinery wastewater systems include requirements for process wastewater effluent treatment to utilize a covered system. All lift stations, manholes, junction boxes, conveyances, and any other wastewater facilities should be covered, and all emissions routed to a vapor combustor with a guaranteed destruction/removal efficiency (DRE) of 99 percent for control. Additionally, BACT includes a general requirement of good control practices.

The Air District lists a BACT determination of an OWS system with capacity greater than 250 gallons per minute. The determination includes a recommendation of a vapor tight fixed cover vented to a vapor recovery system with combined collection and destruction/removal efficiency greater than 95 percent.

Existing Applicable Regulations

Current Air District Rule 8-8: Wastewater Collection and Separation Systems requires oil-water separators to be covered. Additionally, Air District Rule 8-18: Equipment Leaks also requires refining operations to test for potential equipment leaks related to wastewater operations.

Applicable federal requirements include 40 CFR Part 60, Subpart QQQ; and 40 CFR Part 61, Subpart FF. Subpart QQQ focuses on the control of air emissions from process drains, junction

[1] RACT/BACT/LAER/Clearinghouse

boxes, and oil-water separators. Subpart FF pertains to benzene waste operations NESHAPSs[2] (BWON). 40 CFR 63 Subpart CC (MACT[3] 1) targets miscellaneous wastewater process vents.

Further Considerations

Refineries generate a large amount of wastewater that has both process and non-process origins. Depending on the type of crude oil, composition of condensate, and treatment processes, the characteristics of refinery wastewater can vary widely according to refinery-specific factors. Therefore, there is no singular approach to handling and treating refinery wastewater.

Accordingly, strategies to further reduce ROG emissions will require development and refinement of emissions testing protocols, as well as individual refinery cooperation with the Air District measurements and testing staff. Further evaluation of the potential control options identified, as well as their efficacy, feasibility, and cost-effectiveness, would depend heavily on these additional study and research efforts. In addition to the wastewater treatment system components discussed, aeration ponds can also be a large area source of ROG emissions in the petroleum wastewater treatment process. Control strategies for this type of source are unknown at this time, but would also need to be studied further.

Additional coordination between individual facilities and the Air District Measurements and Meteorology Division and Engineering Division staffs will be required to determine individual refinery specific measurement data, coordinate emission factor development across refineries, and review emission estimation techniques and methodologies. Previous Air District efforts, including studies of refinery wastewater conducted in 2006, would be reviewed and referenced in developing these further analyses and efforts. Staff recommends additional evaluation and research prior to development of a draft BARCT limit or rule.

SO_2

Petroleum refinery wastewater treatment processes do not typically generate substantial SO_2 emissions that would require additional controls. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time.

NOx

Petroleum refinery wastewater treatment processes do not typically generate substantial NOx emissions that would require additional controls. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time.

Particulate Matter

Petroleum refinery wastewater treatment processes do not typically generate substantial PM emissions that would require additional controls. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time.

[2] National Emissions Standards for Hazardous Air Pollutants
[3] Maximum Achievable Control Technology

Portland Cement Manufacturing – Rule Development Project Scope

Summary

This rule development project would address emissions from Portland cement manufacturing operations. Staff estimates that preliminary best available retrofit control technology (BARCT) levels may result in potential emission reductions of particulate matter (PM) and sulfur dioxide (SO_2). Rulemaking for emissions of oxides of nitrogen (NOx) and reactive organic gases (ROG) is not anticipated at this time.

Background

Portland cement is used as a component of concrete, which can be used in a variety of construction projects. The Portland cement manufacturing process involves the mining of limestone, crushing and blending of the limestone with other raw materials (such as clay, sand, and alumina), calcining of the mixture in a cement kiln to produce clinker, and the subsequent cooling, grinding, and mixing of the clinker with gypsum and additional limestone to produce cement. Cement kiln operations can generate substantial PM, NOx, and SO_2 emissions from the combustion of fuel and the heating and calcining of feed materials. PM emissions also arise from other aspects of material handling, including crushing, mixing, storage, and clinker cooling. One Portland cement manufacturing facility operates within the San Francisco Bay Area.

Particulate Matter

Regulatory Context and Preliminary BARCT Level

Federal rules that address emissions from Portland cement manufacturing include New Source Performance Standards (NSPS) Subpart F and National Emissions Standards for Hazardous Air Pollutants (NESHAP) Subpart LLL. The NSPS and NESHAP subparts include multiple PM emission limits for new and existing cement kilns. The Air District adopted Regulation 9, Rule 13 (Rule 9-13): Nitrogen Oxides, Particulate Matter, and Toxic Air Contaminants from Portland Cement Manufacturing in 2012 (with subsequent amendments in 2016), which contains the following PM emission limits: 0.04 pounds of filterable PM per ton clinker (lb/ton clinker) from cement kilns and 0.04 lb/ton clinker from clinker coolers. Staff's review of existing best available control technology (BACT) guidelines and recent determinations indicates that PM emission levels of 0.01 grains of filterable PM per dry standard cubic foot (gr/dscf) and 0.02 lb/ton clinker have been achieved at cement kilns.

The existing regulatory limits, guidelines, and determinations described above are based on methods for monitoring and measuring filterable particulate matter only. Recent advancements in the understanding and quantification of condensable particulate matter formation indicate that cement kilns may emit substantial amounts of condensable PM in addition to filterable PM. Therefore, staff believes that the PM limits in BAAQMD Rule 9-13 adopted in 2012 may not

reflect current BARCT levels for addressing total (filterable and condensable) PM. Staff believes that substantial reductions of condensable PM emissions are achievable, however research of potential control options for cement kilns is ongoing, and a preliminary BARCT level is still under development. Controls may involve reduction of SO_2, ammonia (NH_3), or other condensable components and precursors. Note that further discussions on SO_2 controls and BARCT levels are included in the SO_2 section of this scope. Staff believes that SO_2 emission reductions would also be an integral part of reducing these condensable PM emissions, and anticipates that these SO_2 and PM control efforts would be considered and developed in concert.

Potential Emission Reductions and Impacts

Because a preliminary BARCT emission level for condensable PM has not yet been identified, estimates of potential emission reductions and control costs are not currently available. Staff estimates that cement manufacturing emits approximately 600 tons per year of total PM (including filterable and condensable PM), and the potential for substantial emission reductions should be further evaluated.

Further Considerations

Additional testing and study of the cement kiln are likely necessary to properly characterize condensable PM emissions. Potential control options, as well as their efficacy, feasibility, and cost-effectiveness, would depend heavily on this evaluation. Efforts towards development and/or implementation of cement kiln SO_2 BARCT controls should also be considered in any future study and evaluation of cement kiln condensable PM emissions.

SO_2

Regulatory Context and Preliminary BARCT Level

Federal NSPS Subpart F includes an emissions limit of 0.4 lb SO_2 per ton clinker on a 30-day rolling average basis; however, this limit only applies to cement kilns constructed, reconstructed, or modified after June 16, 2008. Air District Rule 9-13 addresses Portland cement manufacturing emissions, but does not include limits on SO_2 emissions.

Staff's review of existing BACT guidelines and recent determinations indicate that performance levels of 0.16 to 1.0 lb SO_2 per ton clinker have been achieved at cement kilns. Typical controls include judicious selection and use of raw materials, use of low sulfur fuels, dry scrubbing, and dry sorbent injection. Based on this review, staff has identified a preliminary BARCT level of 1.0 lb SO_2 per ton clinker. This preliminary BARCT level is used for staff's evaluation of potential BARCT controls, compliance costs, and emissions reductions, but may change as controls are further evaluated.

Potential Emission Reductions and Impacts

Based on staff's identified preliminary BARCT level and understanding of current performance of the potentially affected sources, staff estimates a potential emission reduction of 698 tons per year of SO_2. The facility currently operates lime injection and sodium carbonate systems for control of HCl emissions, but staff anticipates that additional lime injection capacity or an additional dry sorbent injection system would be required to meet the preliminary BARCT level

for SO_2. The capital cost of the current lime injection system was $700,000, with operating costs of $1.26 million per year.[1] Based on EPA cost estimating methods and assumptions for lime injection systems at cement kilns,[2] the capital cost of an appropriately sized system for the facility is estimated to be less than $500,000, with annual operating costs of approximately $1 million dollars. Based on the costs of the facility's current lime injection system and EPA cost estimates of dry lime injection systems for SO_2 control, staff conservatively estimates capital costs of the additional control system to be approximately $1.4 million dollars. Total annualized cost of the additional control (including amortized capital and operating costs) is estimated to be $1.47 million dollars per year, resulting in a cost-effectiveness of approximately $2,100 per ton of SO_2.

Table 1. Portland Cement Manufacturing SO_2 BARCT Summary

Current Emissions (tpy)	1,298
Potential Emission Reductions (tpy)	698
Preliminary BARCT Level	1.0 lb SO_2 per ton clinker
Controls Required	Hydrated lime injection
Total Capital Cost	$1,400,000
Total Annual Cost	$1,470,000
Cost-Effectiveness ($/ton)	$2,100

Further Considerations

Sulfur dioxide emissions from the cement kiln are highly dependent on the sulfur content of the fuel and raw material being processed. Therefore, the efficacy of a lime injection system for SO_2 control and achievable limit may or may not be comparable from one cement manufacturing plant to another. Further site-specific analysis of the affected facility would be needed to appropriately evaluate the impact of existing controls on SO_2 emissions and better characterize the efficacy of additional controls. This may involve testing and optimization of additional lime injection, use of different sorbents, and modification of control equipment parameters, as well as further source testing (including speciation of condensable PM). Further refinements to the evaluation of control costs and cost-effectiveness are also needed. Draft and final proposed BARCT limits may change throughout the rule development process as additional testing, research, and evaluation is conducted.

NOx

Regulatory Context and Preliminary BARCT Level

Federal NSPS Subpart F includes an emission limit of 1.5 lb NOx per ton clinker on a 30-day rolling average basis; however, this limit only applies to cement kilns constructed, reconstructed, or modified after June 16, 2008. Air District Rule 9-13 addresses Portland cement

[1] BAAQMD, 2012. Staff Report – Regulation 9, Rule 13: Nitrogen Oxides, Particulate Matter, and Toxic Air Contaminants from Portland Cement Manufacturing. July.

[2] EPA, 2010. Summary of Environmental and Cost Impacts of Final Amendments to Portland Cement NESHAP. August.

manufacturing emissions, and contains an emission limit of 2.3 lb NOx per ton clinker on a 30-operating day rolling average.

Staff believes that the NOx limits in Rule 9-13 adopted in 2012 reflect BARCT for NOx, and further BARCT evaluation and rulemaking is not anticipated at this time.

ROG

Regulatory Context and Preliminary BARCT Level

The federal rules that address emissions from Portland cement manufacturing (NSPS Subpart F and NESHAP Subpart LLL), do not contain limits on ROG, although NESHAP Subpart LLL does include limits to control total hydrocarbon emissions. Air District Rule 9-13 does not contain a ROG emissions limit for Portland cement manufacturing, but contains an emission limit of 24 ppmv (dry at 7 percent O_2) for total hydrocarbon.

The cement kiln does not generate substantial ROG emissions (approximately 1.3 tons per year), and staff believes that BARCT controls to further reduce these emissions are not likely to be cost-effective. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time.

Fluidized Catalytic Crackers and CO Boilers – Rule Development Project Scope

Summary

This rule development project would address emissions from fluidized catalytic cracking units (FCCU) and carbon monoxide (CO) boilers at petroleum refineries. Staff estimates that preliminary best available retrofit control technology (BARCT) levels may result in potential emission reductions of particulate matter (PM) and sulfur dioxide (SO_2). Rulemaking for emissions of oxides of nitrogen (NOx) and reactive organic gases (ROG) is not anticipated at this time.

Background

FCCUs are complex processing units at refineries that convert heavy components of crude oil into light, high-octane products that are required in the production of gasoline. FCCUs use a powdered catalyst to promote the hydrocarbon cracking process, and this catalyst becomes coated with carbonaceous material (coke) during its exposure to the hydrocarbon feedstock. Each FCCU includes a reaction vessel where the catalyst and feedstock are mixed, as well as a catalyst regenerator where coke is burned off the surface of the catalyst to restore its activity so that it can be re-used. Catalyst regenerators may be designed to burn the coke completely to carbon dioxide (CO_2) (full burn) or to only partially burn the coke to a mixture of CO and CO_2 (partial burn). Because the flue gas from these partial burn regenerators have high levels of CO, the flue gas is vented to a CO boiler where the CO is further combusted to CO_2. FCCUs and associated CO boilers can generate substantial PM, NOx, and SO_2 emissions.

Four of the five refineries in the San Francisco Bay Area operate FCCUs: Chevron Richmond, Shell Martinez, Andeavor Martinez, and Valero Benicia. Shell Martinez operates a partial burn regenerator and three CO boilers. Valero Benicia also operates a partial burn regenerator and two CO boilers, which are abated by a wet gas scrubber. Andeavor Martinez operates one CO boiler that processes flue gas from its FCCU regenerator. Andeavor's regenerator operates in full burn mode, but does operate in partial burn mode for limited periods under unusual circumstances. Chevron Richmond operates a full burn FCCU and does not have CO boilers.

Particulate Matter

Regulatory Context and Preliminary BARCT Level

Federal rules that address emissions from FCCUs and CO boilers include New Source Performance Standards (NSPS) Subparts J and Ja, and National Emissions Standards for Hazardous Air Pollutants (NESHAP) Subpart UUU. NSPS Subpart J contains a PM emission limit of 1.0 kilograms of filterable PM per megagram (kg/Mg) (2.0 lb/ton) of coke burnoff in the catalyst regenerator and an opacity limit of 30 percent. NSPS Subpart Ja has a PM emission limit of 1.0 g/kg of coke burnoff for FCCUs reconstructed or modified after May 14, 2007, and a

limit of 0.5 g/kg of coke burnoff for FCCUs newly constructed after May 14, 2007. NESHAP Subpart UUU includes various PM emission limit options for compliance. Air District Regulation 6, Rule 1: Particulate Matter – General Requirements contains an opacity limit of 20% for all sources, including FCCUs and CO boilers.

These existing federal and Air District limits are based on methods for monitoring and measuring filterable particulate matter only. Recent advancements in the understanding and quantification of condensable particulate matter formation indicate that FCCUs and CO boilers may emit substantial amounts of condensable PM in addition to filterable PM. The Air District adopted Regulation 6, Rule 5: Particulate Emissions from Refinery Fluidized Catalytic Cracking Units (Rule 6-5) in 2015 to reduce condensable PM emissions through reduction of ammonia injection. Ammonia is injected in FCCU flue gas to suppress NOx formation and improve the efficacy of electrostatic precipitators (ESP) for filterable PM abatement, but unreacted ammonia may be present in the exhaust stream (ammonia slip) and contribute to condensable PM formation. Rule 6-5 requires FCCUs to meet ammonia slip limits or conduct optimization of ammonia injection.

Implementation of BAAQMD Rule 6-5 is ongoing, with optimization testing having occurred through 2016 and 2017. Testing indicates that reduction of ammonia injection has the potential to substantially reduce condensable PM emissions. However, because ammonia injection is used as a component of abatement systems for filterable PM, injection rate reductions may be limited by compliance issues with filterable PM and opacity operating limits. Staff believes that substantial reductions of the condensable PM emissions are achievable, however evaluation of control options is ongoing, and a preliminary BARCT level is still under development. Control options may involve further optimization and reduction of condensable components and precursors (such as ammonia and SO_2) or operation of a wet gas scrubber.

Staff is evaluating additional amendments to Rule 6-5 to further reduce ammonia slip following the conclusion of the current ammonia injection optimization process. Enhancements may include modifications to the ammonia optimization requirements and/or ammonia slip limit. Enhanced ammonia slip requirements and limits may require the upgrade or installation of additional ESP capacity to improve filterable PM removal and reduce the need to ammonia injection, or use of alternative flue gas conditioning agents. Results from the current ammonia optimization testing may provide information on the level of controls needed and the achievable ammonia slip levels. Staff may also consider additional amendments or adjustments to the existing filterable PM and opacity limits to better harmonize with new condensable PM rule development efforts and focus on potentially large reductions in total PM.

Potential Emission Reductions and Impacts

Staff estimates that FCCUs and CO boilers emit approximately 480 tons per year of total PM, and the potential for substantial emission reductions should be further evaluated. Estimates of potential emission reductions would also be highly dependent on the efficacy of the current Rule 6-5 implementation process and ammonia optimization. Therefore, emission reductions and cost-effectiveness of these controls may be more appropriately evaluated following the

conclusion of the current Rule 6-5 implementation. Additional baseline testing of current condensable PM emissions should also be conducted as part of this ongoing evaluation.

Costs of additional controls for reducing ammonia slip may vary depending on the types of control options required. Staff reviewed ESP cost data and information from previous analyses from South Coast Air Quality Management District (SCAQMD)[1] and EPA,[2] and estimated that capital costs of additional ESP capacity or upgrades may range from $20 million to $50 million per facility. Implementation of alternative conditioning agents would be anticipated to require lower capital and operating costs compared to ESPs. Further site-specific considerations of current ESP and ammonia injection performance, additional control costs, and space constraints would be needed to appropriately evaluate the potential for achieving substantial condensable PM reductions. As discussed previously, evaluation of potential emission reductions and cost-effectiveness of these additional controls would be more appropriate following the conclusion of the current Rule 6-5 implementation.

Further Considerations

Additional testing and study of the FCCUs and CO boilers are likely necessary to properly characterize condensable PM emissions. This further study would be expected to inform the evaluation of efficacy, feasibility, and cost-effectiveness of various potential control options. Potential controls involving ESP improvements or additional capacity would need to be evaluated for costs and space constraints, and the feasibility of achieving the ammonia slip limit would need to be analyzed on a site-specific basis. Potential controls involving wet gas scrubbing would also need to be evaluated for other potential environmental impacts, as wet gas scrubbers may require substantial water usage.

SO_2

Regulatory Context and Preliminary BARCT Level

Federal NSPS Subpart J contains SO_2 emission limits of 9.8 kg/Mg (20 lb/ton) of coke burnoff, and 50 parts per million by volume (ppmv) SO_2 for an FCCU with an add-on control device. NSPS Subpart Ja contains SO_2 emission limits of 50 ppmv SO_2 on a seven-day rolling average basis and 25 ppmv SO_2 on a 365-day rolling average basis for FCCUs constructed, reconstructed, or modified after May 14, 2007. The Air District adopted Regulation 6, Rule 5: Particulate Emissions from Refinery Fluidized Catalytic Cracking Units in 2015 to reduce condensable PM emissions. Rule 6-5 does not currently contain SO_2 emission limits, but the role of SO_2 as a PM precursor was recognized during the adoption of Rule 6-5, with the intent of addressing SO_2 in future rule amendments.

Staff's review of existing best available control technology (BACT) guidelines and recent determinations indicates that emission limits of 50 ppmv SO_2 on a seven-day rolling average basis and 25 ppmv SO_2 on a 365-day rolling average basis (equivalent to NSPS Subpart Ja standards for newly constructed, reconstructed, and modified units) have been applied and

[1] SCAQMD, 2003. Final Staff Report – Proposed Rule 1105.1 Reduction of PM10 and Ammonia Emissions from Fluid Catalytic Cracking Units. September 2003.
[2] EPA, 2008. Regulatory Impact Analysis of the Petroleum Refinery NSPS. April 2008.

achieved at FCCUs and CO boilers. Typical controls include SO_2-reducing catalyst additives or wet gas scrubbers. Based on staff's review, staff has identified a preliminary BARCT level of 50 ppmv SO_2 on a seven-day rolling average basis and 25 ppmv SO_2 on a 365-day rolling average basis. This preliminary BARCT level is used for staff's evaluation of potential BARCT controls, compliance costs, and emissions reductions, but may change as controls are further evaluated.

Potential Emission Reductions and Impacts

Three of the four refineries operating FCCUs currently have permit limits equivalent to the preliminary SO_2 BARCT level, and no further emission reductions or additional controls would be anticipated. One refinery does not currently meet the preliminary BARCT level for FCCUs and CO boilers, and would potentially be required to install a wet gas scrubber or optimize use of enhanced SO_2-reducing catalyst additives. The facility operates a partial burn FCCU and currently utilizes an SO_2-reducing catalyst additive, however recent advances have been made in the performance and efficacy of catalyst additives, specifically for partial burn operating modes. Staff believes there is potential to reduce SO_2 emissions through optimization of these newer catalyst additives and/or use of wet gas scrubbing.

Based on staff's preliminary BARCT level and understanding of current performance of the potentially affected sources, Staff estimates a potential emission reduction of up to 567 tons per year of SO_2. For this preliminary evaluation, staff estimated potential emission reductions and costs for control options involving enhanced catalyst additive optimization and wet gas scrubbing.

Optimized use of enhanced partial burn catalyst additive would result in one-time costs for optimization testing, as well as continued costs of the enhanced catalyst additive. Staff conservatively estimates that optimization testing may result in costs up to $5 million dollars, and costs of continued addition and use of enhanced catalyst additive may be up to $1 million dollars per year. Note that these current estimates do not account for any cost savings from reduced additive usage that may occur as a result of the optimization. Based on these estimates, the annualized cost of the control strategy (including amortized optimization costs and operating costs) is estimated at approximately $1.8 million dollars per year. This would result in a cost-effectiveness of approximately $4,000 per ton of SO_2. Note that these further study is needed to determine if this optimization option would achieve the preliminary BARCT level and associated emission reductions.

Capital and operating costs of wet gas scrubbing would likely have higher total costs compared to other control options. Based on staff's review of wet gas scrubber costs from vendor estimates and previous projects and evaluations, capital costs of a wet gas scrubber are estimated at $135 million dollars, with the annualized cost of the control system (including amortized capital costs and operating costs) estimated at approximately $27 million dollars per year. This would result in a cost-effectiveness of approximately $47,000 per ton of SO_2.

Table 1. FCCUs and CO Boilers SO_2 BARCT Summary

Current Emissions (tpy)	1,044
Potential Emission Reductions (tpy)	567
Preliminary BARCT Level	50 ppmv SO_2, 7-day rolling average 25 ppmv SO_2, 365-day rolling average
Controls Required	Optimized SO_2-reducing catalyst additive; Wet gas scrubber
Total Capital Cost	$5,000,000 (enhanced catalyst additive) to $135,000,000 (wet gas scrubber)
Total Annual Cost	$1,800,000 (enhanced catalyst additive) to $27,000,000 (wet gas scrubber)
Cost-Effectiveness ($/ton)	$4,000 (enhanced catalyst additive) to $47,000 (wet gas scrubber)

Further Considerations

Optimization of partial burn SO_2-reducing catalyst additives may or may not be able to achieve preliminary BARCT levels. Therefore, estimates of emission reductions and cost-effectiveness for this control option may change with additional testing, research, and study of these sources and enhanced catalyst additives. Further refinements to the evaluation of cost-effectiveness and technological feasibility for both additive optimization and wet gas scrubbing are also needed.

NOx

Regulatory Context and Preliminary BARCT Level

Federal NSPS Subpart Ja includes an emission limit of 80 ppmv NOx for newly constructed, reconstructed, or modified FCCUs. The Air District adopted amendments to Regulation 9, Rule 10: Nitrogen Oxides and Carbon Monoxide from Boilers, Steam Generators and Process Heaters in Petroleum Refineries (Rule 9-10) in 2013, which contains NOx limits for non-partial burn CO boilers (150 ppmv on an operating day average, and 45 ppmv on a calendar year average) and partial burn CO boilers (125 ppmv on an operating day average, and 85 ppmv on a calendar year average). Staff's review of existing BACT guidelines and recent determinations indicates that NOx emission levels of 20 ppmv NOx on a 365-day rolling average basis have been achieved at some FCCUs with selective catalytic reduction (SCR) systems and/or low temperature oxidation (LoTOx) controls.

Staff believes that the NOx limits in Rule 9-10 adopted in 2013 reflect BARCT for NOx emissions from FCCUs with CO boilers, and further BARCT evaluation and rulemaking is not anticipated at this time. The FCCU at the Chevron Richmond Refinery does not have a CO boiler, and is therefore not subject to Rule 9-10 NOx limits. However, this FCCU is subject to facility permit limits of 20 ppmv NOx on a 365-day rolling average basis and 40 ppmvd NOx on a seven-day rolling average basis, which are comparable to the BACT levels reviewed. Staff believes that these limits reflect BARCT for NOx emissions from FCCUs, and further BARCT evaluation and rulemaking are not anticipated at this time.

ROG

Regulatory Context and Preliminary BARCT Level

Federal rules NSPS Subparts J and Ja and NESHAP Subpart UUU for FCCUs and CO boilers do not address ROG emissions, although NESHAP Subpart UUU does include limits on total organic hydrocarbon and organic hazardous air pollutant emissions.

Staff's review of existing BACT guidelines and recent determinations indicate that BACT for ROG is typically good combustion practice. Good combustion practices are generally required for complete combustion and control of CO emissions, and staff believes that these sources currently implement these practices. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time.

Refinery Heavy Liquid Leaks – Rule Development Project Scope

Summary

This rule development project would address emissions of reactive organic gases (ROG) from petroleum refineries, chemical plants, bulk terminals and bulk plants, and other facilities that store, transport and use organic liquids. Amendments to Regulation 8, Rule 18: Equipment Leaks (Rule 8-18) in December 2015 addressed equipment that service heavy liquids at these sources, but those amendments have not yet been fully implemented due to uncertainty regarding proper emissions factors for heavy liquid fugitive emissions. Air District staff is coordinating with each of the five Bay Area refineries to conduct a Heavy Liquid Leak Study. These studies are designed to determine appropriate emission factors for heavy liquid leaks. The results of these studies are expected by Spring 2019. Staff recommends using results of the Heavy Liquid Leak Study to amend Rule 8-18, and address the current issues with the 2015 amendments. Any recommended and implemented requirements to address ROG emissions from these sources are also anticipated to reduce toxic air contaminant (TAC) emissions. Rulemaking for emissions of oxides of nitrogen (NOx), sulfur dioxide (SO_2), and particulate matter (PM) is not anticipated at this time.

Background

Oil refineries, chemical plants, bulk plants, bulk terminals, and other facilities that store, transport, and use volatile organic liquids may occasionally have leaks wherever there is a connection between two pieces of equipment, and lose some organic material as fugitive emissions. Valves, pumps, and compressors can also leak organic material. Air District Rule 8-18 requires such facilities to maintain a leak detection and repair (LDAR) program.

The purpose of the LDAR program is to ensure that all equipment is inspected regularly and, if a leak is found to exceed the leak threshold, that the equipment is repaired, replaced, or placed on a limited list of non-repairable equipment. Component leaks commonly occur at the joints or connections between sections of piping, at valves, at pumps or from barrier fluid contained between seals, and at leaking pressure relief devices (PRDs).

Rule 8-18 was amended in December 2015 to extend the requirements of the LDAR program to include equipment in hydrocarbon heavy liquid service.[1] Inclusion of heavy liquids is costly because equipment in heavy liquid service expands the LDAR program by approximately one-third more equipment than is currently being monitored. The Heavy Liquid Leak Study was originally projected to be completed within a year. However, completion of the heavy liquid leak study mentioned above has been problematic, because some heavy hydrocarbon liquids are condensing and coating the leak detection sensors. These equipment problems have prevented

[1] Heavy hydrocarbon liquids are defined as having an initial boiling point greater than 302°F.

proper collection of all the data needed. Study participants are re-configuring the study approach, and anticipate having useful data by the Spring of 2019.

ROG

Regulatory Context and Preliminary BARCT Level

The Air District originally adopted Rule 8-18 in 1980, and has amended the rule in 1992, 2004, and 2015. In addition, some minor changes were made to the rule in 1998 and 2002. The original intent of the rule was to control fugitive organic gas leaks from valves and connectors at refineries, chemical plants, bulk plants, and bulk terminals. Rule amendments adopted in 1992 significantly lowered the allowable leak concentration limits to the lowest levels in the country and required more effective inspection and repair programs to reduce emissions and promote self-compliance. The 1992 amendments reduced emissions by an estimated 1.2 tons per day (tpd).

The allowable leak standard is 500 parts per million volume (ppmv) for pumps, compressors, and PRDs.[2] For valves and other equipment, the allowable leak standard is 100 ppmv. Leaks are detected using a portable combustible gas indicator.

The U.S. Environmental Protection Agency (EPA) standards in 40 CFR parts 60 and 63 include LDAR provisions for monitoring and repairing equipment in heavy liquid service and do not rely on instrument monitoring, but instead rely on "visual, audible, olfactory, or any other detection method." The concern with visual, audible, and olfactory monitoring is that these methods only identify large leaks (typically 10,000 ppm or more). Instrument monitoring can identify much smaller leaks (in the 100 – 500 ppm range).

Potential Emission Reductions and Impacts

The 2015 emissions inventory estimates that fugitive hydrocarbon leaks from the five refineries in the Bay Area total approximately 1,172 tons per year of ROG based on emission factors at that time. As mentioned previously, uncertainties associated with these heavy liquid leak emission estimates are being evaluated, and staff is currently coordinating with Bay Area refineries to conduct a Heavy Liquid Leak Study to determine appropriate emission factors and refine these estimates. Refined estimates of heavy liquid leak emissions will be quantified based on the results of the Heavy Liquid Leak Study.

Due to the uncertainties associated with emission estimates from heavy liquid leaks, estimates of potential emission reductions from expanded LDAR controls are uncertain at this time. Note that potential emission reductions from expanded LDAR requirements were previously estimated during the development of the 2015 amendments to Rule 8-18. At that time, ROG emissions from heavy liquid leaks were estimated to be approximately 1,476 tons per year, and the 2015 amendments were anticipated to reduce emissions by over 80 percent (1,227 tons per year) based on conservative assumptions of leak occurrences and concentrations in the controlled scenario. As mentioned previously, the need for more certainty regarding heavy liquid

[2] PRDs are also subject to the requirements of Air District Regulation 8, Rule 28: Episodic Releases from Pressure Relief Devices at Petroleum Refineries and Chemical Plants.

emission factors has delayed implementation of the 2015 amendments and has prompted efforts to refine these estimates and the characterization of leaks. Staff anticipates re-evaluating these estimates of potential emission reductions following the completion of the Heavy Liquid Leak Study.

Potential capital and annualized costs for implementation of expanded LDAR requirements were also estimated during the development of the 2015 amendments to Rule 8-18. These cost estimates are included in Table 1 for informational purposes, and will also be re-evaluated following the completion of the Heavy Liquid Leak Study.

Table 1. Refinery Heavy Liquid Leaks ROG BARCT Summary

Current Emissions (tpy)	1,172 tpy
Potential Emission Reductions (tpy)	Uncertain
Preliminary BARCT Level	TBD
Controls Required	LDAR for heavy liquid equipment
Total Capital Cost	$250,000
Total Annual Cost	$6,800,000
Cost-Effectiveness ($/ton)	Uncertain

Further Considerations

Rule 8-18 will require amendments based on results of the Heavy Liquid Leak Study. Therefore, estimates of emission reductions and cost-effectiveness for this control and monitoring may change as the study progresses. Results of the study are also expected to inform health risk analyses required by Regulation 11, Rule 18: Reduction of Risk from Air Toxic Emissions at Existing Facilities (Rule 11-18), so further controls based on implementation of Rule 11-18 may also be taken into consideration when evaluating further rulemaking activity.

Particulate Matter

Heavy liquid leaks do not typically generate substantial PM emissions that would require additional controls. Heavy liquids that may become aerosols (and any toxic air contaminant components) would be controlled by a heavy liquid leak LDAR program for ROG emissions. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time.

NOx

Heavy liquid leaks do not typically generate substantial NOx emissions that would require additional controls. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time.

SO_2

Heavy liquid leaks do not typically generate substantial SO_2 emissions that would require additional controls. Therefore, further BARCT evaluation and rulemaking are not anticipated at this time.

Petroleum Coke Calcining – Rule Development Project Scope

Summary

This rule development project would address oxides of nitrogen (NOx) emissions from petroleum coke calcining operations. Staff estimates that preliminary BARCT levels could result in significant emission reductions of NOx; however, NOx control options for petroleum coke calcining appear limited in practice in the United States. The Air District has not addressed NOx emissions concerning petroleum coke calcining in previous rule developments. Staff recommends potentially amending Regulation 9, Rule 14: Petroleum Coke Calcining Operations (Rule 9-14), which only address sulfur dioxide (SO_2), to include NOx emissions if socioeconomic impacts, cost effectiveness, and control technology application can be justified as BARCT. Technologies potentially available for NOx reduction for this process may not be commercially available nor demonstrated in practice, and therefore may be considered Lowest Achievable Emission Rate (LAER). Rulemaking for emissions of sulfur dioxide (SO_2), reactive organic gases (ROG), and particulate matter (PM) is not anticipated at this time.

Background

Petroleum coke calcining operations in the Bay Area occur only at the Phillips 66 Carbon Plant. It is one of two such facilities in California; the other facility is located in Southern California. The Carbon Plant processes green coke from the Phillips 66 San Francisco Refinery to purify it and sell it to industry that is primarily offshore. The facility commenced calcining operations with a single kiln in 1960, and a second kiln was added to the facility in 1968. The Carbon Plant sells the majority of its calcined coke to a single company that uses the refined coke to produce titanium dioxide, which is a photocatalyst commonly used to manufacture white pigments that are incorporated into a wide range of applications, including skincare products, plastics, food coloring, paint, and coating products.

Phillips 66 Carbon Plant Operations

The Phillips 66 Carbon Plant operates two process trains that include a natural gas kiln burner with a rating of approximately 60 million British thermal units (MMBtu/hr) each, and that have a combined permitted maximum coke throughput of 250 tons per hour. Each train includes a pyroscrubber and baghouse with a separate exhaust stack. Annual production is limited to 262,800 tons of coke produced per train.

Petroleum coke is received from the Phillips 66 Refinery coker and is stored on-site at the Carbon Plant. Coke is conveyed to the coke calciner where it is calcined (heated). This process removes impurities from the coke, including sulfur and volatiles. The hot waste gases from the calciner are sent to the pyroscrubber that removes particulates through a combination of settling and incineration. Sulfur compounds are oxidized to SO_2. The hot waste gases are sent to a heat recovery steam generator to produce steam for the generation of electricity. The cooled waste gases pass through a baghouse and tall stack and are emitted into the atmosphere. The resulting calcined coke is then sold.

Petroleum Coke

Petroleum coke is a carbon by-product that remains from petroleum refining processes. It is a black solid residue that results from the thermal processing of petroleum derived from feedstocks, tar, pitch, or vacuum tower bottom blends that have been cracked or otherwise processed in a coker to remove low boiling fractions. Coke consists mainly of carbon (90 to 95 percent) and is created by heat-treating the residual oil (more accurately described as tar) to a temperature high enough to polymerize it to form a non-melting solid carbonaceous material.

Coke is used as a feedstock in coke ovens for the steel industry, for heating purposes, for electrode manufacturing, and for the production of chemicals. Coke, as it is removed from the petroleum coking process, is referred to as “green coke.” Green petroleum coke may contain approximately 15 to 20 percent residual hydrocarbon materials. Such hydrocarbons are compounds that do not polymerize in the coke cracking process and cannot be removed from the coke substrate due to process limitations. Thus, green coke is calcined to remove hydrocarbons and other impurities to make it a more marketable product.

Calcining Process

Calcined petroleum coke is manufactured by heating green coke in a rotary kiln to a temperature that ranges between approximately 2,200 to 2,500 degrees Fahrenheit (°F). This roasting process combusts virtually all of the residual hydrocarbons and also removes sulfur compounds and moisture from the coke. The coke’s crystalline structure is refined and thus enhances the coke’s physical properties such as electrical conductivity, density and oxidation characteristics. A rotary kiln is a long, refractory lined cylindrical device that rotates on its own axis and drives off contaminants from the green coke by bringing the contaminants into direct contact with heated gas. As the petroleum coke slides down the rotating kiln it flows counter-current to the rising hot combustion gas produced by burning natural gas.

NOx

Regulatory Context and Preliminary BARCT Level

The purpose of a new rule would be to reduce NOx emissions from petroleum coke calciners located in the Air District. NOx emissions from gas-fired combustion kilns result primarily from oxidation of atmospheric nitrogen during the combustion of natural gas and coke fines. NOx formation is favored when both high combustion temperatures and high excess oxygen (O_2) levels are present. Thermal NOx formation increases exponentially as a function of temperature, with the rate of formation rising very rapidly at temperatures above about 2,400 °F. NOx can also be formed if nitrogen is present in the fuel. Currently, there are no federal or Air District NOx requirements applicable to petroleum coke calcining operations.

When the Phillips 66 Carbon Plant calcines green coke under fully operational conditions, the total NOx emissions are approximately 2,000 pounds per day; this translated to approximately 350 tons per year in 2015. In previous years, NOx emissions from the facility have exceeded 500 tons per year. Staff believes that substantial reductions of NOx emissions may be achievable, however research of potential control options is ongoing, and a preliminary BARCT

level is still under development. Potential control technologies are discussed in the section below.

Further Considerations

NOx control for petroleum coke calcining operations appears to be unproven and not necessarily commercially available. There were no best available control technology (BACT) determinations for NOx emissions found for the process in the United State Environmental Protection Agency RBLC[1] database. However, South Coast Air Quality Management District (SCAQMD) published a 2000 BACT guideline for NOx at 44 ppmvd at 3 percent O_2. Further research is needed to determine if possible control options have been achieved in practice in SCAQMD or other parts of the US. Typical NOx control options include selective catalytic reduction (SCR) and LoTOx, which may be considered by some as a LAER control for this process.

SCR

SCR is a post-combustion control technology that, for combustion unit applications, typically employs ammonia (NH_3) in the presence of a catalyst to convert NOx to nitrogen and water according to the following overall reactions:

$$4NH_3 + 4NO + O_2 \rightarrow 4N_2 + 6H_2O$$
$$4NH_3 + 2NO_2 + O_2 \rightarrow 3N_2 + 6H_2O$$

An SCR system typically utilizes an injection grid to evenly disperse the NH_3 into the combustion unit exhaust gas upstream of a catalyst. The function of the catalyst is to lower the activation energy of the NH_3-NOx reduction reactions. Operating temperatures between 500 °F and 800 °F are often required of the gas stream at the catalyst bed. NOx removal rates can exceed 90 percent with a well-designed system.

SCR has been successfully installed at a petroleum coke calcining facility in Germany, however additional firing was required to heat the gases back up to 500 °F prior to flow through the SCR catalyst bed, increasing GHG emissions.

Additional study of this control option would be required to appropriately evaluate this control strategy and achievable BARCT limits. Further considerations of efficacy, feasibility, and cost-effectiveness would need to be analyzed on a site-specific basis. Draft and final proposed BARCT limits may change throughout the rule development process as additional testing, research, and evaluation is conducted.

LoTOx

In the LoTOx system, ozone is injected into the flue gas stream and oxidizes insoluble NOx to soluble oxidized compounds. LoTOx is a low temperature system; therefore, it does not require heat input to maintain operational efficiency or to prevent the “slip” of treatment chemicals (such as ammonia), as is common with SCR and selective non-catalytic reduction (SNCR) systems.

[1] RACT/BACT/LAER Clearinghouse

Ozone rapidly reacts with insoluble nitric oxide (NO) and nitrogen dioxide (NO_2) molecules to form soluble dinitrogen dioxide (N_2O_2). The species N_2O_2 is highly soluble and will rapidly react with moisture in the gas stream to form nitric acid. The conversion of NOx into the aqueous phase in the scrubber is rapid and irreversible, allowing nearly complete removal of NOx. The nitric acid, along with unreacted N_2O_2 and nitrous acid formed by reaction of NO_2 with water, can be easily scrubbed out of the gas stream in a wet scrubber with water or neutralized with a caustic solution.

Additional study of this control option would be required to appropriately evaluate this control strategy and achievable BARCT limits. Increased water use associated with the LoTOx system would need to be evaluated, as substantial water consumption may be a concern. Additional research is also required to determine commercial availability for this application. Further considerations of efficacy, feasibility, and cost-effectiveness would need to be analyzed on a site-specific basis. Draft and final proposed BARCT limits may change throughout the rule development process as additional testing, research, and evaluation is conducted.

SO_2

Regulatory Context and Preliminary BARCT Level

In April 2016, Air District Rule 9-14 was promulgated limiting SO_2 emissions from petroleum calcining operations. Staff believes that these limits reflect BARCT for SO_2, and further BARCT evaluation and rulemaking is not anticipated at this time.

ROG

Regulatory Context and Preliminary BARCT Level

Natural gas fired pyroscubbers control ROG emissions. The main function of a pyroscrubber in petroleum coke calcining process is to oxidize the carbonaceous contents, including hydrocarbon volatiles, of the exhaust gas from the coke calcination kiln. Staff believes that this level of control reflects BARCT for ROG at the source, and further BARCT evaluation and rulemaking is not anticipated at this time.

Particulate Matter

Regulatory Context and Preliminary BARCT Level

Natural gas fired pyroscubbers and baghouses are located on each train to control PM emissions. Current permit requirements include keeping the baghouses in good operating condition, meeting 12-month rolling average PM limits, and incorporating monitoring and recordkeeping as specified per the Title V operating permit conditions. Staff believes that this level of control reflects BARCT for PM at the source, and further BARCT evaluation and rulemaking is not anticipated at this time.

Building Capacity: Survey of Government Leaders

ASK ABOUT BEING RECORDED

INTRODUCTIONS

GIVE AB 617 CONTEXT

SIX TOPICS, A FEW QUESTIONS UNDER EACH TOPIC

(Give interviewee an opportunity to ask any questions and interviewer to respond)

1. AB 617 designation:

a. How do you feel about your community (city/county) being designated as a high priority AB 617 community?

2. General community concerns:

b. What is the most significant concern (or top two) of people who live in your community?
c. What neighborhoods are most impacted by this/these concerns?
d. What is being done to address this/these concern(s) by your agency or others?
b. What resources are available to support efforts to address community concerns? Examples include direct program funding by city, staff time, government building use, grants, public-private partnerships, collaboratives, non-profit support or resources, etc.

3. Community's knowledge and participation in community concerns:

a. How widespread or deep is the community's knowledge about this/these concern(s)?
b. How is the community involved in addressing this/these concern(s)?
c. How empowered do you think community members feel at effecting change or impacting decisions regarding their concerns?

4. Existence and understanding of any known local air quality concerns and health vulnerabilities:

a. What local air quality concerns have been raised by community members?
b. What are the suspected sources of air pollution in your community?
c. What local groups are active around these air quality concerns, or possible sources?
    i. What specific neighborhoods are impacted?

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d. What land use and air quality conflicts are you aware of, i.e. homes or schools near freeways?
e. Are you aware of any planning or other processes to address air quality sources or concerns?
f. What resources are available to support efforts to reduce local air pollution, e.g. funding, staff time, etc.?
    i. Are resources being leveraged to address air quality concerns? If so, how?
g. Are you aware of any health or socio-economic vulnerabilities in your community? For example, some communities experience high rates of asthma, limited access to health care or high rates of poverty.

5. Environmental justice; Senate Bill 1000:

a. How familiar are you with the recently passed SB 1000?
About SB 1000: SB 1000 requires cities with any disadvantaged communities to develop an environmental justice element when updating two or more general plan elements. A city may also opt to include environmental justice goals, objectives and policies in other elements of the general plan, if they do not want to do a separate environmental justice element.
b. How are you planning to incorporate environmental justice into your General Plan?
c. What concerns do you have about fulfilling the SB 1000 requirements?

6. How can Air District help:

a. What support or resources from the Air District could help the city address local air quality or environmental justice concerns?
b. What support or resources does the community need to be more engaged in decision making?

7. Other people we should talk to:

a. Who else should we talk to, in either the city or community? (may be local groups mentioned earlier, Q3c)

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