



BAY AREA  
AIR QUALITY  
MANAGEMENT  
DISTRICT

BOARD OF DIRECTORS  
PUBLIC ENGAGEMENT COMMITTEE

COMMITTEE MEMBERS

SHIRLEE ZANE – CHAIR  
TERESA BARRETT  
JOHN GIOIA  
LIZ KNISS  
HILLARY RONEN  
LORI WILSON

MARK ROSS – VICE CHAIR  
DAVID CANEPA  
SCOTT HAGGERTY  
NATE MILEY  
BRAD WAGENKNECHT

**THURSDAY  
FEBRUARY 21, 2019  
9:30 A.M.**

**1<sup>ST</sup> FLOOR BOARD ROOM  
375 BEALE STREET  
SAN FRANCISCO, CA 94105**

**AGENDA**

**1. CALL TO ORDER - ROLL CALL**

**PLEDGE OF ALLEGIANCE**

**PUBLIC MEETING PROCEDURE**

*The Committee Chair shall call the meeting to order and the Clerk of the Boards shall take roll of the Committee members. The Committee Chair shall lead the Pledge of Allegiance.*

*This meeting will be webcast. To see the webcast, please visit [www.baaqmd.gov/bodagendas](http://www.baaqmd.gov/bodagendas) at the time of the meeting. Closed captioning may contain errors and omissions and are not certified for their content or form.*

**Public Comment on Agenda Items** *The public may comment on each item on the agenda as the item is taken up. Public Comment Cards for items on the agenda must be submitted in person to the Clerk of the Boards at the location of the meeting and prior to the Board taking up the particular item. Where an item was moved from the Consent Calendar to an Action item, no speaker who has already spoken on that item will be entitled to speak to that item again.*

2. **PUBLIC COMMENT ON NON-AGENDA MATTERS**

**Public Comment on Non-Agenda Items, Pursuant to Government Code Section 54954.3** *For the first round of public comment on non-agenda matters at the beginning of the agenda, ten persons selected by a drawing by the Clerk of the Boards from among the Public Comment Cards indicating they wish to speak on matters not on the agenda for the meeting will have two minutes each to address the Board on matters not on the agenda. For this first round of public comments on non-agenda matters, all Public Comment Cards must be submitted in person to the Clerk of the Board at the location of the meeting and prior to commencement of the meeting.*

Staff/Phone (415) 749-

3. **APPROVAL OF THE MINUTES OF OCTOBER 19, 2018**

Clerk of the Boards/5073

*The Committee will consider approving the attached draft minutes of the Public Engagement Committee meeting of October 19, 2018.*

4. **2019 WORKPLAN FOR THE COMMUNITY AND PUBLIC HEALTH COMMITTEE**

J. Broadbent/5052

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

*The Committee will receive an overview of and timelines for key programs under the purview of the Committee: implementation of Assembly Bill 617 and actions to address smoke from wildfires.*

5. **OVERVIEW OF AIR POLLUTION AND HEALTH IMPACTS**

J. Broadbent/5052

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

*The Committee will receive an overview of the current Bay Area air pollution and health impacts.*

6. **CONSIDERATION OF THE PRIORITIZATION FRAMEWORK FOR SCHOOL AIR FILTER SUPPLEMENTAL ENVIRONMENTAL PROJECT (SEP)**

J. Broadbent/5052

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

*The Committee will consider prioritization framework for school air filter Supplemental Environmental Project SEP.*

7. **PUBLIC COMMENT ON NON-AGENDA MATTERS**

*Speakers who did not have the opportunity to address the Board in the first round of comments on non-agenda matters will be allowed two minutes each to address the Board on non-agenda matters.*

8. **COMMITTEE MEMBER COMMENTS**

*Any member of the Board, or its staff, on his or her own initiative or in response to questions posed by the public, may: ask a question for clarification, make a brief announcement or report on his or her own activities, provide a reference to staff regarding factual information, request staff to report back at a subsequent meeting concerning any matter or take action to direct staff to place a matter of business on a future agenda. (Gov't Code § 54954.2)*

9. **TIME AND PLACE OF NEXT MEETING**

*At the call of the Committee Chair.*

10. **ADJOURNMENT**

*The Committee meeting shall be adjourned by the Committee Chair.*

**CONTACT:**

**MANAGER, EXECUTIVE OPERATIONS**  
**375 BEALE STREET, SAN FRANCISCO, CA 94105**  
[vjohnson@baaqmd.gov](mailto:vjohnson@baaqmd.gov)

**(415) 749-4941**  
**FAX: (415) 928-8560**  
**BAAQMD homepage:**  
[www.baaqmd.gov](http://www.baaqmd.gov)

- To submit written comments on an agenda item in advance of the meeting. Please note that all correspondence must be addressed to the “Members of the Public Engagement Committee” and received at least 24 hours prior, excluding weekends and holidays, in order to be presented at that Committee meeting. Any correspondence received after that time will be presented to the Committee at the following meeting.
- To request, in advance of the meeting, to be placed on the list to testify on an agenda item.
- Any writing relating to an open session item on this Agenda that is distributed to all, or a majority of all, members of the body to which this Agenda relates shall be made available at the District’s offices at 375 Beale Street, Suite 600, San Francisco, CA 94105, at the time such writing is made available to all, or a majority of all, members of that body.

**Accessibility and Non-Discrimination Policy**

The Bay Area Air Quality Management District (Air District) does not discriminate on the basis of race, national origin, ethnic group identification, ancestry, religion, age, sex, sexual orientation, gender identity, gender expression, color, genetic information, medical condition, or mental or physical disability, or any other attribute or belief protected by law.

It is the Air District’s policy to provide fair and equal access to the benefits of a program or activity administered by Air District. The Air District will not tolerate discrimination against any person(s) seeking to participate in, or receive the benefits of, any program or activity offered or conducted by the Air District. Members of the public who believe they or others were unlawfully denied full and equal access to an Air District program or activity may file a discrimination complaint under this policy. This non-discrimination policy also applies to other people or entities affiliated with Air District, including contractors or grantees that the Air District utilizes to provide benefits and services to members of the public.

Auxiliary aids and services including, for example, qualified interpreters and/or listening devices, to individuals who are deaf or hard of hearing, and to other individuals as necessary to ensure effective communication or an equal opportunity to participate fully in the benefits, activities, programs and services will be provided by the Air District in a timely manner and in such a way as to protect the privacy and independence of the individual. Please contact the Non-Discrimination Coordinator identified below at least three days in advance of a meeting so that arrangements can be made accordingly.

If you believe discrimination has occurred with respect to an Air District program or activity, you may contact the Non-Discrimination Coordinator identified below or visit our website at [www.baaqmd.gov/accessibility](http://www.baaqmd.gov/accessibility) to learn how and where to file a complaint of discrimination.

Questions regarding this Policy should be directed to the Air District’s Non-Discrimination Coordinator, Rex Sanders, at (415) 749-4951 or by email at [rsanders@baaqmd.gov](mailto:rsanders@baaqmd.gov)

# BAY AREA AIR QUALITY MANAGEMENT DISTRICT

375 BEALE STREET, SAN FRANCISCO, CA 94105

FOR QUESTIONS PLEASE CALL (415) 749-4941

## EXECUTIVE OFFICE:

### MONTHLY CALENDAR OF AIR DISTRICT ANTICIPATED MEETINGS

#### FEBRUARY 2019

<u>TYPE OF MEETING</u>	<u>DAY</u>	<u>DATE</u>	<u>TIME</u>	<u>ROOM</u>
Board of Directors Personnel Committee	Wednesday	20	9:30 a.m.	1 <sup>st</sup> Floor Board Room
Board of Directors Public Engagement Committee	Thursday	21	9:30 a.m.	1 <sup>st</sup> Floor Board Room
Board of Directors Budget & Finance Committee	Wednesday	27	9:30 a.m.	1 <sup>st</sup> Floor Board Room
Board of Directors Legislative Committee	Thursday	28	9:30 a.m.	1 <sup>st</sup> Floor Board Room

#### MARCH 2019

<u>TYPE OF MEETING</u>	<u>DAY</u>	<u>DATE</u>	<u>TIME</u>	<u>ROOM</u>
Board of Directors Regular Meeting	Wednesday	6	9:30 a.m.	1 <sup>st</sup> Floor Board Room
Advisory Council Mtg.	Monday	11	10:00 a.m.	1 <sup>st</sup> Floor Board Room
Board of Directors Public Engagement Committee	Thursday	14	9:30 a.m.	1 <sup>st</sup> Floor Board Room
Board of Directors Stationary Source Committee	Monday	18	9:30 a.m.	1 <sup>st</sup> Floor Board Room
Board of Directors Executive Committee	Wednesday	20	9:30 a.m.	1 <sup>st</sup> Floor Board Room
Board of Directors Climate Protection Committee	Thursday	21	9:30 a.m.	1 <sup>st</sup> Floor Board Room
Board of Directors Budget & Finance Committee	Friday	22	9:30 a.m.	1 <sup>st</sup> Floor, Yerba Buena Room #109
Board of Directors Technology Implementation Office Steering Committee	Monday	25	9:30 a.m.	1 <sup>st</sup> Floor Board Room
Board of Directors Legislative Committee	Wednesday	27	9:30 a.m.	1 <sup>st</sup> Floor, Yerba Buena Room #109
Board of Directors Mobile Source Committee	Thursday	28	9:30 a.m.	1 <sup>st</sup> Floor Board Room

**BAY AREA AIR QUALITY MANAGEMENT DISTRICT**  
Memorandum

To: Chairperson Shirlee Zane and Members  
of the Public Engagement Committee

From: Jack P. Broadbent  
Executive Officer/APCO

Date: February 13, 2019

Re: Approval of the Minutes of October 19, 2018

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**RECOMMENDED ACTION**

Approve attached draft minutes of the Public Engagement Committee (Committee) meeting of October 19, 2018.

**DISCUSSION**

Attached for your review and approval are the draft minutes of the Committee meeting of October 19, 2018.

Respectfully submitted,

Jack P. Broadbent  
Executive Officer/APCO

Prepared by: Marcy Hiratzka  
Reviewed by: Vanessa Johnson

Attachment 3A: Draft Minutes of the Committee Meeting of October 19, 2018

# AGENDA: 3A – ATTACHMENT

Draft Minutes – Public Engagement Committee Meeting of October 19, 2018

Bay Area Air Quality Management District  
375 Beale Street, Suite 600  
San Francisco, California 94105  
(415) 749-5073

## **DRAFT MINUTES**

Summary of Board of Directors  
Public Engagement Committee Meeting  
Friday, October 19, 2018

### **1. CALL TO ORDER – ROLL CALL**

Public Engagement Committee (Committee) Chairperson, Brad Wagenknecht, called the meeting to order at 9:34 a.m.

#### **Roll Call:**

Present: Chairperson Brad Wagenknecht; Vice Chairperson Mark Ross; and Directors Teresa Barrett, John J. Bauters, David Canepa, Scott Haggerty, Doug Kim, Liz Kniss, and Pete Sanchez.

Absent: Directors Nate Miley and Jim Sperring.

Also Present: None.

### **2. PUBLIC COMMENT ON NON-AGENDA MATTERS**

No requests received.

### **3. APPROVAL OF THE MINUTES OF APRIL 2, 2018**

#### Public Comments:

No requests received.

#### Committee Comments:

None.

#### Committee Action:

Director Canepa made a motion, seconded by Director Barrett, to **approve** the Minutes of April 2, 2018; and the motion carried by the following vote of the Committee:

AYES: Barrett, Canepa, Kim, Kniss, Ross, and Wagenknecht.  
NOES: None.  
ABSTAIN: Bauters and Sanchez.

ABSENT: Haggerty, Miley, and Spering.

#### **4. UPDATE ON THE 2018/2019 WINTER SPARE THE AIR SEASON OUTREACH PROGRAM**

Lisa Fasano, Communications Officer, introduced Kristine Roselius, Communications Manager, who gave the staff presentation *Update on the 2018/2019 Winter Spare the Air Season Outreach Program*, including: winter messaging; door-to-door outreach; and winter events.

Following the presentation, Jack P. Broadbent, Executive Officer/Air Pollution Control Officer, introduced Karen Schkolnick, Strategic Incentives Division Director, who explained the details of the Air District's (District) Wood Smoke Reduction Incentive Program (WSRI), which supplements the District's Winter Spare the Air Program (WSTA). (The WSTA Program notifies residents when particulate matter levels are anticipated to be unhealthy, and prohibits wood burning on those days, while the WSRI Program provides grant funding to help lower the cost of replacing a wood-burning heating device with cleaner options.) Ms. Schkolnick reported that the District currently has approximately 200 active changeout projects, that approximately 100 have closed from the previous WSRI Program funding cycle, and that staff will be surveying program participants who completed projects and dropped out of the program.

#### Public Comments:

No requests received.

#### Committee Comments:

The Committee and staff discussed the request that staff expand the population of communities and neighborhoods that receive WSTA door hangers and surveys; the contractor performing the bicycle messaging services; the District's process of selecting the communities that receive door-to-door and bicycle messaging WSTA outreach; whether television still an effective mode of communication with the public and how much television advertisements cost; the need for District staff who are assisting with door-to-door outreach in neighborhoods to be properly identifiable in signage or apparel that not only displays the name of the District *and* WSTA; staff's potential interaction with smart doorbell systems; the fact that Next Door's social networking platform does not allow multi-county regions, and thus, is not conducive to the District's advertising efforts; safety prevention for staff members who assist with neighborhood outreach, and whether they get paid overtime for WSTA outreach in neighborhoods; the request for a color key or legend for the map indicating where door-to-door outreach takes place; whether the District has pop-up ads online for WSTA; the anticipated survey response rate and whether that can be improved, whether the District paying for the postage on the return envelopes for the WSTA surveys would generate more survey participation, and how staff differentiates the survey results; the request that highly-impacted (polluted) neighborhoods receive WSTA messaging, despite the potential safety concerns of certain neighborhoods; the suggestion that the text regarding the gift card that is printed on the surveys be increased in size; whether door-to-door outreach includes homes without chimneys; and the feasibility of having a preferred list of contractors that WSRI Program participants can select from, to increase the ease (and potentially the cost) of the process for the participants that are replacing their fireplaces.

NOTED PRESENT: Director Haggerty was noted present at 9:44 a.m.

Committee Action:

None; receive and file.

**5. PUBLIC COMMENT ON NON-AGENDA MATTERS (OUT OF ORDER, ITEM 6)**

No requests received.

**6. COMMITTEE MEMBER COMMENTS (ITEM 7)**

None.

**7. BAY AREA AIR QUALITY MANAGEMENT DISTRICT HISTORY DISPLAY TOUR (ITEM 5)**

Ms. Fasano explained that the Committee was invited to take a tour of the Air District History Display located on the 6<sup>th</sup> floor of the Bay Area Metro Center and displayed a slide that listed the features of the display.

Public Comments:

No comments received.

Committee Comments:

The Committee and staff discussed the fact that the District is one of the oldest air districts in the United States; the request for a portable version of the display that can be taken to schools and libraries; and the request that display be moved to the first-floor lobby of the Bay Area Metro Center.

Committee Action:

None; receive and file.

**8. TIME AND PLACE OF NEXT MEETING**

At the call of the Chairperson.

**9. ADJOURNMENT**

The meeting adjourned at 10:28 a.m.

Marcy Hiratzka  
Clerk of the Boards

**BAY AREA AIR QUALITY MANAGEMENT DISTRICT**

## Memorandum

To: Chairperson Shirlee Zane and Members  
of the Public Engagement Committee

From: Jack P. Broadbent  
Executive Officer/APCO

Date: February 15, 2019

Re: 2019 Workplan for the Community and Public Health Committee

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**RECOMMENDED ACTION**

None; receive and file.

**BACKGROUND**

At the next full Board of Directors (Board) meeting on March 6, 2018, the Board is expected to amend the Administrative Code to expand the function and change the name and the responsibilities of the Public Engagement Committee. The new Community and Public Health Committee will review and provide input to staff on community outreach and engagement related to the implementation of Assembly Bill (AB) 617, wood smoke rules, clean air centers, Bay Area Air Quality Management (Air District) activities supporting local public health efforts responding to air quality events, etc. and make recommendations on same to the Board when budget, formal policy, or other action is required, or as the committee determines important for the Board's review. Although the Bay Area is near attainment regionally for criteria air pollutants, many local communities are disproportionately affected by health effects of air pollution. These health risks are increased by heavy exposure associated with air pollution. Programs, such as AB 617 and the Air District's Community Health Protection Program, offer opportunities to diminish health inequities associated with heavy exposure to air pollution and to maximize health co-benefits in disproportionately impacted communities.

**DISCUSSION**

In 2019, the Committee will focus on both activities related to AB 617 and the Air District's response to the recurring wildfires that are expected to continue to plague the region. Staff will provide a brief overview and timeline for these two major efforts, and discuss how the Committee will be incorporated into the decision-making process.

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Jack P. Broadbent  
Executive Officer/APCO

Reviewed by: Greg Nudd

**BAY AREA AIR QUALITY MANAGEMENT DISTRICT**

## Memorandum

To: Chairperson Shirlee Zane and Members  
of the Public Engagement Committee

From: Jack P. Broadbent  
Executive Officer/APCO

Date: February 13, 2019

Re: Overview of Air Pollution and Health Impacts

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**RECOMMENDED ACTION**

None; receive and file.

**BACKGROUND**

Although the Bay Area is near attainment regionally for criteria air pollutants, many local communities are disproportionately affected by health effects of air pollution. These health risks are increased by heavy exposure associated with air pollution. Programs, such as Assembly Bill (AB) 617 and the Air District's Community Health Protection Program, offer opportunities to diminish health inequities associated with heavy exposure to air pollution and to maximize health co-benefits in disproportionately impacted communities.

**DISCUSSION**

Ms. Tammy Lee, Epidemiologist with Alameda County Public Health Department, will discuss the associations between air pollution and community health in Alameda County. Health impacts from air pollution are influenced by several key factors. These include the level of exposure to air pollution, pre-existing health risks and cumulative health burdens in the community, and the population vulnerability due to economic and social conditions. Asthma, heart disease, stroke, chronic lower respiratory disease, cancer and decreased life expectancy are among the many health impacts associated with exposure to air pollution. Many factors, including lack of resources associated with poverty and longstanding disinvestment, contribute to health inequities in disproportionately affected communities.

**BUDGET CONSIDERATION/FINANCIAL IMPACT**

None.

Respectfully submitted,

Jack P. Broadbent  
Executive Officer/APCO

Prepared by: Judith Cutino

Reviewed by: Greg Nudd

**BAY AREA AIR QUALITY MANAGEMENT DISTRICT**

## Memorandum

To: Chairperson Shirlee Zane and Members  
of the Public Engagement Committee

From: Jack P. Broadbent  
Executive Officer/APCO

Date: February 13, 2019

Re: Consideration of the Prioritization Framework for School Air Filter Supplemental  
Environmental Project (SEP)

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**RECOMMENDED ACTION**

Recommend Board of Directors:

1. Approve the Air District enter into contract with IQAir North America for the installation of air filtration systems in sensitive receptor facilities, specifically local schools, in Bay Area communities; and
2. Approve criteria that will be used to select local schools for installation of air filtration systems.

**BACKGROUND**

In May 2018, the Air District submitted a SEP proposal to the California Air Resources Board (CARB) entitled "Installation of Air Filtration Systems in Sensitive Receptor Facilities in Bay Area, Community Air Risk Evaluation (CARE) Communities." This SEP proposed to install and maintain high-performance air filtration systems in sensitive receptor facilities (such as schools, community centers, senior residences, hospitals and similar) located in communities impacted by air pollution, especially Environmental Justice and/or Disadvantaged Communities (including Assembly Bill (AB) 617 communities) disproportionately impacted by air pollution.

In early September 2018, the Air District's Board of Directors, approved the Air District to enter into a SEP agreement with CARB and accept the \$2 million in funds to complete this project within 30 months, once funding is received.

IQAir is the vendor identified in the Air District's SEP proposal to assess sites, install, maintain, and replace filtration systems for a period of five years in each school.

## DISCUSSION

Air District staff reviewed potential sensitive receptor facilities, and for the purposes of this SEP, will focus on local schools in AB 617 Years 1-5 communities. The Air District developed an initial set of criteria to select schools for air filtration systems, recognizing that funding will limit installation to between 10-15 schools, and understanding that not all schools selected may have the infrastructure or staff to support a project at this time. For those schools that do not receive air filtration systems now, the Air District will continue to work with the schools to provide air quality information and consideration for future SEP grant funding. Attachment A for your review and approval is an overview of the evaluation criteria to support the selection of these schools. Attachment B is a technical analysis of high-performance air filtration installations in schools, which provides additional background information on the cost and efficacy of these types of air filtration systems.

## BUDGET CONSIDERATION / FINANCIAL IMPACT

None.

Respectfully submitted,

Jack P. Broadbent  
Executive Officer/APCO

Prepared by: Elizabeth Yura  
Reviewed by: Greg Nudd

Attachment 6A: Supplemental Environmental Project (SEP) Proposed Site Selection Criteria and Framework

Attachment 6B: Technical Assessment of High-Performance Air Filtration Installations in Schools

# Supplemental Environmental Project (SEP) Proposed Site Selection Criteria and Framework

## Background Information

In 2018, with the Air District Board's approval, the Air District applied for and was selected to receive \$2 million in funding from the California Air Resources Board (CARB) under their Supplemental Environmental Project (SEP) Policy. The policy allows community-based projects to be funded from a portion of the penalties received during settlement of CARB's enforcement actions. SEPs are intended to improve public health, reduce pollution, increase environmental compliance and raise environmental awareness in neighborhoods most burdened by environmental harm. The Air District will use these funds to install and maintain high-performance air filtration systems in sensitive receptor facilities, specifically elementary schools, in communities disproportionately impacted by air pollution in the Bay Area. The Air District's SEP application identified IQAir North America (IQAir) as the vendor that will install and monitor the filtration systems in Bay Area schools. IQAir has worked extensively with South Coast Air Quality Management District (SCAQMD) and is one of the leading international providers of high-performance indoor air quality engineering solutions. In addition, IQAir worked with the Air District to install air filtration systems at five schools in Bayview-Hunters Point between 2010 and 2011.

This document outlines the conceptual framework and selection criteria the Air District proposes to use to identify the schools that will receive filtration systems. We anticipate approximately 10-15 schools will benefit from this first round of funding through the SEP program. The Air District considers this a pilot project and plans to continue to seek additional funding to serve more schools in our region in the future.

## Conceptual Framework

The first step in implementing this SEP is identifying schools that serve the most vulnerable children in communities highly impacted by air pollution. Installing high-performance indoor air filtration systems in these schools would help mitigate chronic exposure to particulate matter in classrooms. As described in the SEP proposal, the Air District will prioritize CARE Communities and Environmental Justice and/or disadvantaged communities for this program. After filing the application, AB 617 became law and the Air District identified high priority communities for air quality action. We propose to build upon the AB 617 efforts by selecting elementary schools in the communities already identified for the first five years of program implementation, utilizing the below criteria to further refine the list of eligible schools in these areas.

## Primary Selection Criteria

### AB 617 Years 1-5 Communities

In 2018, the Air District implemented the Community Health Protection Program to work together with Bay Area communities to plan and implement AB 617. As part of this program, the Air District is working closely with CARB, community groups, environmental organizations, regulated industries and other key stakeholders, to reduce harmful air pollutants. As part of the Community Health Protection Program, the Air District together with the community and stakeholders, identified priority communities most impacted by air pollution. For the purposes of this SEP, the Air District is focusing efforts on AB 617 years

1-5 communities. The communities identified are West Oakland, Richmond-San Pablo Area, East Oakland-San Leandro Area, Eastern San Francisco, the Pittsburg-Bay Point Area, San Jose and Vallejo. In addition, the Air District proposes IQAir revisit the five schools in Bayview-Hunters Point that received air filtration systems between 2010 and 2011 to provide any needed maintenance and updates.

#### Proximity to Sources of Diesel Particulate Matter (DPM)

Diesel exhaust poses substantial risks to public health and the environment. It is estimated that 70% of total known cancer risk related to air toxics in California is attributable to diesel PM (DPM). Health concerns include lung cancer, heart disease, and other respiratory illnesses. Children are particularly vulnerable to DPM. For the purposes of this SEP, the Air District will consider schools located near major sources of diesel emissions such as ports, rail yards, and heavily traveled roadways.

#### School Characteristics

Elementary school-age children have a higher breathing rate than adolescents and adults. The Air District recognizes that younger children are more susceptible to the health effects of air pollution. As a result, for the purposes of this SEP, the Air District recommends prioritizing public elementary schools and schools with larger enrollment, where possible, for greatest impact. Another measure of vulnerability the Air District will consider is the proportion of students receiving free or reduced-price lunch at school.

#### Community and Health Department Recommendations

The Air District has consulted with environmental justice leaders in East and West Oakland, Bayview-Hunters Point, Vallejo, Pittsburg, San Jose and Richmond to solicit recommendations for schools that the Air District should prioritize. Local health departments have also provided some recommendations based on local epidemiologic and socio-economic data.

#### Secondary Selection Criteria

##### School Readiness

The Air District recognizes that some schools or school districts may not have the infrastructure or staff available to support an installation project at this time, or may be slated to close in the near future. These factors may make a school ineligible to receive air filtration systems during this SEP implementation. The Air District will continue to work with school sites to provide information and education on the health impacts of air pollution and consider the school for a future project.

##### Next Steps

The Air District anticipates receiving the \$2 million within a month. The Air District seeks direction from the Board of Directors regarding the proposed criteria outlined in this document. After incorporating the Board's guidance, and once funding is received, the Air District will enter into a contract with IQ Air. While the contract with IQ Air is finalized, the Air District will reach out to school sites and develop agreements for installation and monitoring of the air filtration systems, pending the results of IQAir's site assessment. The contract with IQAir will include five years of filter replacement, maintenance, and monitoring for each school. The Air District will continue to keep the Board of Directors apprised of developments. CARB requires the project to be completed within 30 months.



BAY AREA  
AIR QUALITY  
MANAGEMENT  
DISTRICT

# **Technical Assessment of High-Performance Air Filtration Installations in Schools**

**February 13, 2019**

**Bay Area Air Quality Management District  
375 Beale Street, San Francisco, CA 94105**

# Technical Assessment of High-Performance Air Filtration Installations in Schools

## Summary

The installation of high-performance panel filters in HVAC systems or stand-alone air filtration units are a mitigation measure to reduce the concentration of indoor air pollutants. The performance efficiency of IQAir high performance HVAC panel filters was studied in the South Coast AQMD Pilot Study of High-Performance Air Filtration for Classrooms Applications, and further validated in the UC Riverside CE-CERT report, Performance Evaluation of Air Filtration Devices.

When using the high-performance panel filter within an existing HVAC system or a stand-alone unit for lowering indoor concentrations of black carbon, ultrafine particulate and PM<sub>2.5</sub>, reductions were close to 90%.

Of the 15 different air filtration technologies tested by UC California, Riverside, CE-CERT, the high-performance panel filters for HVAC systems and the stand-alone units manufactured by IQAir were the only technologies that met the performance specification criteria of the test.

The average costs for installation of a PM air filtration system for PM are as follows: pre-kindergarten \$25,000, elementary school - \$106,500, middle school - \$146,500, and high school - \$200,000.

For the Bayview Hunters Point project, elementary schools with existing HVAC systems cost less than \$50,000 to install high-performance panel filters. For schools without HVAC systems, installing stand-alone units in each classroom costs between \$100,000 and \$200,000, depending on the number of classrooms in the school.

## Introduction

Health studies show that fine and ultra-fine particles, including diesel soot and other toxic air contaminants, are associated with air pollution health risk to our communities. Children are especially vulnerable to the health effects of exposure to particulate matter due to their developing respiratory systems and higher breathing rates compared to adults. Health impacts of particulate matter (PM) exposure include new onset asthma, lung inflammation, allergies and other types of respiratory conditions. Impacts of air pollution on public health disproportionately affect specific communities often due to historic land use decisions and current zoning practices.

Despite decades of effort to reduce regional air pollution by both BAAQMD and the California Air Resources Board (CARB), the San Francisco Air Basin still has specific localized areas with higher levels of particulate pollution. High pollution levels are associated with negative health impacts on vulnerable communities in close proximity to mobile and stationary sources emitting these pollutants.

For schools in close proximity to heavily traveled roadways, including traffic from freeways, refineries and other sources of air pollution, the installation of effective air filtration technology in classrooms can be an important mitigation measure to help reduce the exposure of school children to indoor pollutants, including ultrafine particles and diesel particulate matter. Outdoor ambient pollutants can infiltrate indoor environments. Older, poorly weatherized buildings are especially susceptible to this migration.

The specific air pollutants addressed by the air filtration systems in the studies discussed in this document are fine and ultra-fine particles, and diesel particles from combustion sources, such as automobiles, trucks, locomotives, ships, and industrial sources. In addition, these air filtration technologies are suitable to remove coarser particles, such as fine dust, pollen, mold spores, and tire debris. Black Carbon is related to elemental carbon and is a component of PM, such as diesel and soot particles, that is formed through the incomplete combustion of fossil fuels. Ultrafine particles are also primarily produced by combustion of fossil fuels. Diesel PM, generally consists of particles < 0.3  $\mu\text{m}$ . Evidence associates exposure to these particles with increased toxicity and cancer risk.

## **MERV Rating**

The Minimum Efficiency Reporting Value (MERV) rating was developed by the American Society of Heating, Refrigeration and Air Conditioner Engineers (ASHRAE) in 1987 to rate the effectiveness of air filters. MERV values typically vary from 1 to 16, but they can go as high as 20. The higher the MERV rating, the more efficient the filter is at removing airborne particles.

The scale is designed to represent the worst-case performance of a filter when handling particles with diameter of 0.3 to 10 micrometers. MERV 16 filters are rated to capture more than 95% of particles greater than 0.3 microns.

True HEPA filters are rated at 99.97% for particles greater than 0.3 microns. However, true HEPA filters may cause a large pressure drop impacting function of the air heating, ventilation, and air conditioning (HVAC) system due to the dense filter material. Replacing with filters that have very high air resistance may damage the HVAC system and result in higher energy costs to run the system.

## MERV CHART

Standard 52.2 Minimum Efficiency Reporting Value (MERV)	Composite Average Particle Size Efficiency, % In Size Range, $\mu\text{m}$			Average Arrestance, %
	Range 1 (0.3-1.0)	Range 2 (1.0-3.0)	Range 3 (3.0-10.0)	
1	n/a	n/a	E3 < 20	$A_{\text{avg}} < 65$
2	n/a	n/a	E3 < 20	$65 \leq A_{\text{avg}} < 70$
3	n/a	n/a	E3 < 20	$70 \leq A_{\text{avg}} < 75$
4	n/a	n/a	E3 < 20	$75 \leq A_{\text{avg}}$
5	n/a	n/a	$20 \leq E3$	n/a
6	n/a	n/a	$35 \leq E3$	n/a
7	n/a	n/a	$50 \leq E3$	n/a
8	n/a	$20 \leq E_2$	$70 \leq E3$	n/a
9	n/a	$35 \leq E_2$	$75 \leq E3$	n/a
10	n/a	$50 \leq E_2$	$80 \leq E3$	n/a
11	$20 \leq E_1$	$65 \leq E_2$	$85 \leq E3$	n/a
12	$35 \leq E_1$	$80 \leq E_2$	$90 \leq E3$	n/a
13	$50 \leq E_1$	$85 \leq E_2$	$90 \leq E3$	n/a
14	$75 \leq E_1$	$90 \leq E_2$	$95 \leq E3$	n/a
15	$85 \leq E_1$	$90 \leq E_2$	$95 \leq E3$	n/a
16	$95 \leq E_1$	$95 \leq E_2$	$95 \leq E3$	n/a

### National Air Filtration Association User's Guide for ANSI/ASHRAE Standard 52.2-2017

*Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*  
 Author(s): NAFA Technical Committee

### South Coast Pilot Study Results

The South Coast AQMD conducted a pilot study to investigate the effectiveness of air filtration systems for reducing the exposure of children to particulate air pollution: Pilot study of high-performance air filtration for classroom applications, (2012) *Indoor Air*.

Three classrooms in each of three elementary schools in Los Angeles County were selected for the study. All of the classrooms had forced air HVAC systems, with three different configurations of filters: panel filters for HVAC systems, register systems and stand-alone systems. Indoor and outdoor concentrations of ultrafine particles, PM<sub>2.5</sub>, PM<sub>10</sub>, black carbon and volatile organic compounds were measured. Baseline measurements performed by IQAir North America (IQAir)

were taken before installing any of the air filtration devices to estimate the pre-existing relative and overall removal efficiencies of the classroom before modification.

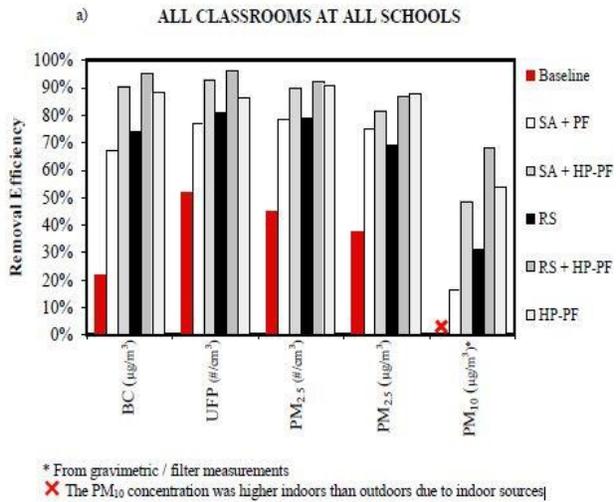
When using the high-performance panel filter within an existing HVAC system for lowering indoor concentrations of black carbon, ultrafine particulate and  $PM_{2.5}$ , reductions were close to 90%. Testing results indicate that the IQAir Nanomax S-220 panel filter had removal efficiencies between 89%-92% for ultrafine particulate matter and between 88%-91% for black carbon.- 88% for black carbon, 86% for ultrafine particles, 91% for  $PM_{0.3-2.5}$ , and 88% for  $PM_{2.5}$ .

The removal efficiency for the stand-alone unit was also close to 90% for black carbon, ultrafine particles, and  $PM_{0.3-2.5}$ .

The primary purpose of most standard air filters, rated at MERV 7 or 8, is to remove coarse particles and dust. IQAir NanoMax high-performance filters are rated at MERV 16 (ASHRAE 52.2). These high-performance panel filters are made of a multi-layered, non-woven filter media, composed of glass and synthetic fibers. The media are arranged in a 'mini-pleat' configuration, similar to that used in HEPA filters. These filters are 5.08 cm (2 inches) thick and have a larger surface area, which is 5 to 9 times larger than a standard filter. Standard filters are typically half this thickness. The increased surface area of these high-performance filters allows similar air resistance properties as conventional filters. The pilot study demonstrated that IQAir's air filtration devices do not significantly reduce the existing airflow rates through the HVAC system and, therefore, do not require higher power consumption to achieve similar flow rates.

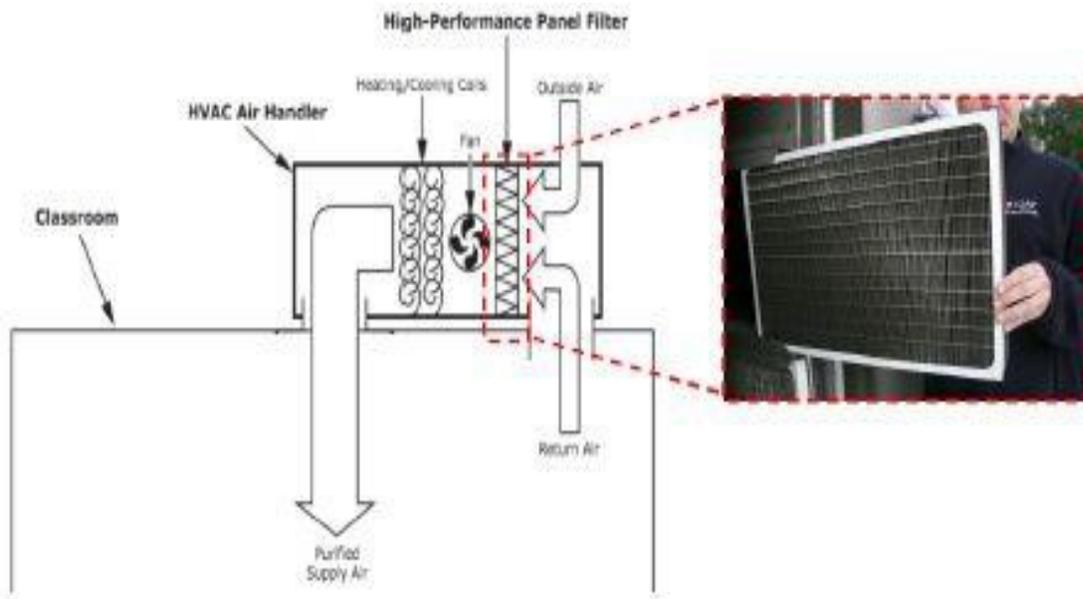
The stand-alone system showed a 52 to 72% removal performance for benzene. The stand-alone filters showed some ability to reduce VOC's indoors, although not as consistently or effectively as the particle filtration. Data on the performance of the gas-absorbing media included in the stand-alone unit, and the ability to remove VOC's, was inconclusive. Addition of a gas-phase filtration media for the register system filters alone reduced the HVAC system airflow by 9%. This small reduction in airflow was due to the increased pressure drop from the addition of the gas-phase filtration media.

In all cases, air quality conditions were improved with respect to the corresponding baseline conditions. Since the pilot study and over the past 10 years, South Coast AQMD has worked with IQAir to install high-performance air filtration systems in over 180 schools near the Ports of Los Angeles and Long Beach.



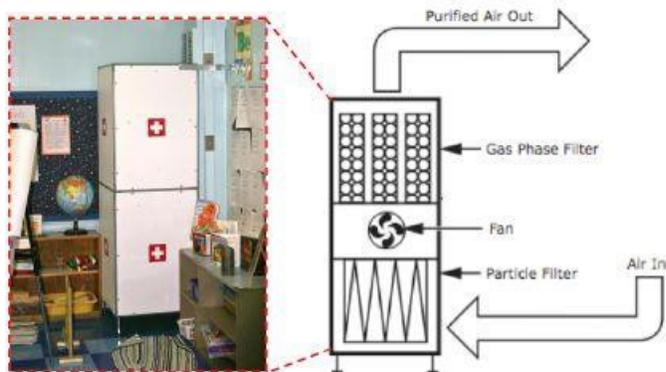
Replacing a conventional HVAC- based panel filter (PF) with a HP-PF resulted in a substantial reduction in the indoor levels of all particulate pollutants inside classrooms. **When the HP-PF alone, the study average removal efficiencies were close to 90% (88, 86, 91, and 88%, for BC, UFP, PM<sub>2.5</sub> count, and PM<sub>2.5</sub> mass, respectively).** This is significantly higher than baseline (pre-existing) removal efficiencies of 20-50%.

Source: SCAQMD Pilot Study of High-Performance Air Filtration for Classroom Applications (2009)



High-performance panel filters used in the SCAQMD Pilot Study of High- Performance Air Filtration for Classroom Applications

Schematic of High-performance stand-alone units used in the SCAQMD Pilot Study of High- Performance Air Filtration for Classroom Applications



(Photos courtesy of the SCAQMD Pilot Study of High- Performance Air Filtration for Classroom Applications, 2009).

### **Performance Evaluation of Air Filtration Devices, Final Report University of California, Riverside, College of Engineering – Center for Research and Technology, (CE-CERT)**

In 2010, the Univ. of Calif., Riverside CE-CERT, evaluated the efficiency of air filtration devices for reducing the concentrations of ultrafine particulate and black carbon in a typical classroom. Nine manufacturers submitted 15 different air filtration devices for evaluation. The school selected for testing had a portable classroom located within 1000 feet of a major freeway in Riverside, California. The average fine particulate matter concentration ( $PM_{2.5}$ ; particles with an aerodynamic diameter equal or less than  $2.5 \mu m$ ) at this location is generally high.

For panel filters, the overall and relative particle removal efficiencies were tested. The relative removal efficiency of each air filtration device tested was defined as the percentage reduction in the concentration of ultrafine particulate or black carbon downstream of the device tested relative to its concurrent ambient (outdoor) level upstream of the HVAC system. The overall removal efficiency of each air filtration device tested was defined as the percentage reduction in the concentration of ultrafine or black carbon inside the classroom, relative to its concurrent ambient (outdoor) level

The IQAir NanoMax S-220, rated as MERV 16, was the only HVAC-compatible device that satisfied the performance requirements of the study. **The overall removal efficiencies for ultrafine particulate and black carbon were 89%.** There was no significant increase in the pressure drop across the panel filters tested.

All stand-alone units tested showed high relative removal efficiencies for ultrafine particulate of 94 to 100%. The relative removal efficiency for black carbon was 83% to 94%. Also, the IQAir CleanZone SL model did not exceed a noise level threshold of 45 decibels. This level is set by many school districts for equipment used in classrooms. No measurable ozone levels were detected from the stand-alone units.

Of the 15 different air filtration technologies tested by UC California, Riverside, CE-CERT, the high-performance panel filters for HVAC systems and the stand-alone units manufactured by IQAir were the only technologies that met the performance specification criteria of the test.

### **Improved Indoor Air Quality Pilot Project at Bayview Hunters Point Schools From IQAir Performance Testing and Monitoring Final Report for Bayview Hunters Point Project**

In 2010, the BAAQMD contracted with IQAir to install high-performance air filtration at five schools in the Bayview Hunters Point neighborhood in San Francisco, California. BAAQMD worked with community members to invest penalty settlement funds to retrofit the five schools in the neighborhood with air filtration units. The goal of this project was to improve indoor air quality in classrooms.

Three of the schools, Carver Elementary School, Drew Elementary School and the Muhammad University of Islam, were serviced by forced air HVAC systems that were upgraded with high-performance panel filters. All existing HVAC systems initially used typical MERV 8 medium-efficiency panel filters prior to upgrade with high-performance (MERV 16) HVAC panel filters. Two other schools (Malcolm X Academy and Bret Harte Elementary School) required wall-mounted stand-alone air filtration systems.

To verify the effectiveness of the high-performance air filtration systems, one school of each type was monitored for two weeks before and two weeks after installation of the filters. A laser particle counter was used to determine the number of particles down to 0.3 microns in diameter. A laser-based particle mass monitor was used to measure mass concentration of PM<sub>2.5</sub>. IQAir calculated the removal efficiencies as the percentage reduction in the indoor air concentration of a particular pollutant relative to its concurrent outdoor concentration.

Carver Elementary School was monitored to demonstrate the effectiveness of improved filtration in an existing HVAC system. The existing filters were replaced with IQAir NanoMax MERV 16 filters. Upgrading this school's HVAC system resulted in an average removal efficiency of 92% for particles greater than 0.3 microns and 52% for PM<sub>2.5</sub>, compared with outside air. The baseline removal efficiencies using the MERV 8 filters were 61% for particles greater than 0.3 microns and 24% for PM<sub>2.5</sub>. The new filters resulted in 80% reduction in average fine particles compared with the previous MERV 8 filters.

At Carver Elementary School, IQAir took differential pressure readings for the large HVAC systems. They found that replacing the conventional medium efficiency filter panels with high-

performance panels improved the measured pressure drop in the three Carver Elementary School air handlers that were evaluated.

Malcolm X Academy does not have an HVAC system in place. Therefore, stand-alone air filtration systems were installed in each of the classrooms. **These filters resulted in average removal efficiencies of 74% for fine particulate matter number concentrations of particles greater than 0.3 microns and 77%, for PM<sub>2.5</sub>.**

In both cases the indoor air quality conditions within the classrooms were improved compared with the corresponding baseline conditions prior to air filtration upgrades.

### **Costs for Installation of High-Performance Air Filtration**

IQ Air gave average costs for PM filtration for different size schools. The average costs for installation of a PM air filtration system for PM are as follows:

**pre-kindergarten \$25,000,  
elementary school - \$106,500,  
middle school - \$146,500, and  
high school - \$200,000.**

For the Bayview Hunters Point project, elementary schools with existing HVAC systems cost less than \$50,000 to install high-performance panel filters. For schools without HVAC systems, installing stand-alone units in each classroom costs between \$100,000 and \$200,000, depending on the number of classrooms in the school. See Table 1. Summary of BAAQMD 2010 Bayview Hunters Point Project.

The costs include a site assessment for each facility, installation of equipment, five-years of replacement filter supply and a maintenance contract. Installation costs will vary based on the number of buildings, whether the school is equipped with an existing HVAC system, to what extent an existing building will require retrofit to accommodate a higher efficiency filter, the number of enclosed spaces or classrooms, and other factors.

Each school project is divided into several phases: project administration, access agreements with the school districts, selection of individual school sites, installation, training of school maintenance staff, air flow and monitoring to verify performance of the systems, and reporting (site assessments, post installation reports, annual operation and maintenance reports).

Agreements executed with school districts require school district board approval. Air filtration installation is after school hours and during vacations when schools are not in session to minimize impacts upon students.

Filter replacement and maintenance costs are approximately half of the initial installation cost. Therefore, a vendor contract providing replacement and maintenance services is important to ensure continuing efficacy of the program. High replacement costs discourage the school district from maintaining the high efficiency filters and maintaining good air quality in the classrooms.

**Table 1. Summary of BAAQMD 2010 Bayview Hunters Point School Project**

School Name	Filter System	No. of Filters Replaced	Filter Size	Cost	No. of Students	No. of Faculty
Malcolm X Academy	Stand-alone air filtration system - No HVAC	22	27x29x14	\$110,421	120	10
Bret Harte Elementary School	Stand-alone air filtration system - No HVAC	33	27x29x14	\$166,995	261	18
George Washington Carver Elementary School	HVAC	92	20x20x2	\$31,517	268	15
Drew Elementary School	HVAC	67	16x20x2 20x24x2	\$21,925	269	20
Muhammad University of Islam	HVAC	3	20x30x2	\$2,230	91	9
<b>Total</b>				<b>\$333,088</b>		

**SEP Proposal**

The BAAQMD requested and was granted Supplemental Environmental Project (SEP) funding from the California Air Resources Board (CARB) to install and maintain high-performance air filtration systems in sensitive receptor facilities, such as schools, community centers, senior residences, hospitals and similar. The selected facilities for this program are to be located in communities impacted by air pollution, especially Environmental Justice and/or Disadvantaged Communities disproportionately impacted by air pollution. Sensitive receptor facilities will be selected by BAAQMD and agreements will be developed with school districts to allow access to sites.

The BAAQMD will enter into a contract with IQAir for installation, facilitation, monitoring, training, and 5-years of maintenance for the installation of high-performance air filtration. IQAir, as the contractor, will also provide Air Visual Pro (AVP) measurement sensor systems (up to 3 per site) as part of the installation and measurement process. Real-time access to AVP monitoring data will be provided on-line.

IQAir North America (IQAir) worked with SCAQMD on the 2009 pilot study and on a subsequent multi-site/multi-year air filtration installation and monitoring program for schools near the Ports of Los Angeles and Long Beach. Based on the South Coast experience, they were the only vendor that could meet the established performance criteria at the time of their study of potential vendors.

The implementation project will include:

- 1) installation of high-performance air filtration systems in classrooms and/or common areas depending on type of facility,
- 2) collection of air flow and monitoring data after installation of the air filtration systems results to verify the performance of the systems,
- 3) post installation reports,
- 4) training of school maintenance staff on maintenance of these air filtration systems to ensure their proper and efficient operation, and
- 5) five to ten year supply of replacement filters.

## **Conclusion**

Air filtration technologies, such as high-performance air filters for HVAC and stand-alone units, have been successfully demonstrated in classroom environments to significantly reduce exposure to particulate air pollution. During the past 10 years, South Coast AQMD has funded, and continues to fund, the installation of air filtration systems in more than 180 schools. The schools have included pre-kindergarten, elementary, middle and high schools. All of the work was focused on improving air quality in classrooms. South Coast AQMD uses SEP funds and penalty fines to fund these projects. Thus far, the work has not included large spaces, such as gymnasiums and cafeterias.

Several studies discussed above have demonstrated the removal efficiency of IQAir filters. The IQAir NanoMax high-performance panel filters use technology that allows similar air resistance compared with conventional MERV 8 HVAC filters. They have been demonstrated not to adversely affect HVAC performance.

Classrooms may have doors and windows that are frequently opened to the outside air, which decreases the efficiency of air filtration units. Even in these conditions, there is an overall positive improvement in indoor air quality. Onsite training and education on how to effectively maintain the reduction efficiency of the high-performance air filtration system will be included in the program contracts.

## References

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Air Filtration Post-Installation Report for Bret Hart Elementary School, Prepared for BAAQMD by IQ Air North America, Inc. 7/7/2011

Air Filtration Post-Installation Report for The Muhammad University of Islam, Prepared for BAAQMD by IQ Air North America, Inc. January 25, 2011

Air Filtration Post-Installation Report for Carver Elementary School, Prepared for BAAQMD by IQ Air North America, Inc. 4/21/2011

Air Filtration Post-Installation Report for Charles Drew Elementary School, Prepared for BAAQMD by IQ Air North America, Inc. January 25, 2011

Air Filtration Post-Installation Report for Malcolm X Academy, Prepared for BAAQMD by IQ Air North America, Inc. 7/7/2011

IQAir Performance Testing & Monitoring Progress Report, San Francisco Unified School District, Monitoring Period: 4/4/2011 – 5/2/2011, Location: George Washington Carver Elementary School

IQAir Performance Testing & Monitoring Progress Final Report, San Francisco Unified School District, Monitoring Period: 4/4/2011 – 5/2/2011 (Carver Elementary School), 10/24/2011 – 11/18/2011 (Malcolm X Academy), Location: George Washington Carver Elementary School, 1360 Oakdale Avenue, San Francisco, CA 94124; Malcolm X Academy, 350 Harbor Road, San Francisco, CA 94124