COMMUNITY EMISSIONS REDUCTION PROGRAM

Updates to be included in the CERP

Shafter

San Joaquin Valley Air Pollution Control District

September 6, 2019

INTRODUCTION

In response to comments received, the District is committing to include the following updates to the measures within Chapter 4 of the Shafter Community Emission Reduction Program (CERP). See the August 12 version of the CERP here. Additional comments continue to be received, and additional updates to the CERP will be ongoing as District staff respond to input from the Steering Committee and public comments, and incorporate responses from involved agencies.

MEASURES TO BE UPDATED

Note: for existing measures already included in the CERP, proposed updates to the existing text is shown in strikeout/underline format.

At the request of the committee, incentives for heavy duty truck replacements has been reduced. The revised measure reads as follows:

HD.1: INCENTIVE PROGRAM FOR HEAVY DUTY TRUCKS REPLACEMENT WITH ZERO AND NEAR ZERO EMISSION TECHNOLOGY

Overview: The goal of this strategy is to reduce emissions from heavy duty diesel trucks operating in the Shafter community. The District currently offers incentives up to $200,000 for the replacement of an in use diesel truck with cleaner technology, including battery electric, hybrid and near zero emission trucks. Heavy duty diesel trucks are currently subject to the state on-road truck and bus regulation which will require fleet turnover to 2010 emission standard compliant engines. Advances in engine technology have resulted in cleaner engines or battery electric units in some applications. By reducing or eliminating emissions from heavy duty trucks significant NOx emissions can be achieved.

Implementing Agency: SJVAPCD

Type of Action: Incentives

Implementation: 2019-2024

Description of Proposed Actions: This strategy would provide enhanced outreach and access to incentive funding under the District's truck replacement incentive program for zero and near-zero emissions clean truck technologies that operate within the community. This measure would replace 40 ~~60~~ older, heavy duty diesel trucks operating in Shafter with zero or near zero emission technology at an expected cost of $4,000,000 ~~$6,000,000~~. This strategy is estimated to achieve 131 ~~196~~ tons of NOx reductions and 0.36 ~~0.54~~ tons of PM2.5.

At the request of the committee, incentives for clean yard truck replacements and TRUs has been reduced. The revised measure reads as follows:

HD.2: INCENTIVE PROGRAM FOR THE DEPLOYMENT OF CLEAN YARD TRUCKS, TRANSPORT REFRIGERATION UNITS, AND RELATED INFRASTRUCTURE

Overview: The goal of this strategy is to provide incentives to reduce emissions from diesel powered yard trucks and transport refrigeration units operating at warehouses, distribution centers or other facilities within the community by replacing them with a zero emission technology. Yard trucks are used in moving trailers and containers short distances around freight terminals, port facilities or warehouses. Transport refrigeration units are powered by diesel engines are designed to refrigerate or heat perishable goods that are transported in various containers. These types of equipment are in near constant operation at impacted facilities and local communities and equipment operators can be exposed to PM2.5 and NOx emissions. Battery powered, zero emission units are currently available for both of these applications.

Implementing Agency: SJVAPCD

Type of Action: Incentives

Implementation: 2020-2024

Description of Proposed Actions: This strategy would provide incentive funding for operators to replace their diesel powered yard trucks or transport refrigeration units with zero emission technology. The goal of this measure is to deploy 10 ~~30~~ new zero emission yard trucks or transportation refrigeration units along with the associated infrastructure at a cost of $1,500,000 ~~$4,000,000~~. Emission reductions associated with this measure would achieve an estimated 0.03 ~~0.09~~ tons of NOx reductions and 1.99 ~~5.97~~ tons of PM2.5.

At the request of the committee, incentives for older diesel school bus replacements has been increased again (initial allocation was $1.6 million, was increased to $3.0 million, and is now increased to $4.0 million). The revised measure reads as follows:

HD.4: INCENTIVE PROGRAM FOR REPLACING OLDER DIESEL SCHOOL BUSES WITH ZERO OR NEAR ZERO EMISSION SCHOOL BUSES

Overview: To provide increased outreach and access to incentive funding for the replacement of older, high polluting school buses with new zero or near-zero-emission school buses operating within and surrounding Shafter.

Replacing older school buses is important to reduce children's exposure to diesel emissions including NOx and PM2.5 and these pollutants negatively impact human health, especially for sensitive populations such as children. New, zero-emission battery electric and near-zero emission natural gas powered school buses are significantly cleaner than older diesel buses.

Emissions from school buses are regulated by the CARB Statewide Truck and Bus Regulation that requires transition to cleaner technology over time. These requirements are generally phased in by model year.
https://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm

The District administers the following incentive programs targeted at reducing emissions from existing school bus fleets with the Valley:

- Electric School Bus Incentive Program – http://valleyair.org/grants/electric-school-bus.htm This program is operated by the District and provides incentives for the replacement of existing older, higher-polluting school buses with new, electric school buses.

- Volkswagen Mitigation Trust – http://vwbusmoney.valleyair.org/
  The VW Mitigation Trust has $130 million in funds to replace older, high-polluting transit, school, and shuttle buses with new battery-electric or fuel-cell buses. Replacing an older bus with a zero-emission bus eliminates particulate matter and other pollutants that impact children and residents riding the buses, as well as residents throughout California communities. This statewide program is being administered by the District.

Implementing Agency: SJVAPCD

Type of Action: Incentives

Implementation: 2019-2024

Description of Proposed Actions: The goal of this action is to replace up to ten (10) ~~eight (8)~~ school buses, operated by Richland School District and/or Kern High School District with zero-emission battery-electric school buses that operate within the community. The proposed funding amount of $4,000,000 ~~$3,200,000~~ would cover up to 100% of the cost of replacing up to ten (10) ~~eight (8)~~ diesel school buses with electric buses at $400,000 each.

At the request of the committee, incentives for replacements of line locomotives have been removed entirely.

~~*HD.6: INCENTIVE PROGRAM FOR REPLACING OLDER DIESEL LOCOMOTIVES WITH NEW CLEAN-ENGINE TECHNOLOGY*~~

~~*Overview:* To provide incentive funding for the replacement of older, high polluting locomotives with new clean-technology locomotives operating within and surrounding Shafter.~~

Replacing older locomotives is important to reduce the public's exposure to diesel emissions including NOx and PM2.5 and these pollutants negatively impact human health, especially for sensitive populations such as children and elderly. New, clean-technology locomotives are significantly cleaner than older uncontrolled diesel locomotives.

The District offers two incentive programs for locomotive fleets interested in transitioning to newer, clean technology, including:

- Heavy-Duty Program – http://valleyair.org/grants/locomotive.htm. Locomotive replacements can be funded as an eligible project category under the District's utilizing funding provided to support AB 617. These projects are administered according to Carl Moyer Program guidelines and are subject to additional requirements contained within the approved AB 617 Community Air Protection Guidelines. This program is operated by the District.

- Proposition 1B - http://valleyair.org/grants/locomotives-prop1b.htm
  This program incentivizes the reduction of emissions and health risks associated with freight movement along California's trade corridors via upgrading to cleaner technologies or installation of emissions capture and control systems.

- To date, the District has administered nearly $66 million dollars to fund the replacement of old, high-polluting locomotive engines with new, Tier 4 and CARB verified locomotive engines.

- South Coast APCD is administering the Volkswagen Environmental Mitigation Trust Funding on behalf of the State of California to replace high-polluting locomotive engines throughout California with newer, low-polluting Tier 4, CARB verified locomotive engines. This program will be launching in the fall of 2019.
  http://www.aqmd.gov/vw/

Implementing Agency: SJVAPCD

Type of Action: Incentives

Implementation: 2019-2024

Description of Proposed Actions: The goal of this action is to replace up to two (2) older, high-polluting locomotives operating within and surrounding the community. The proposed funding amount of $5,200,000 would cover up to 95% of the cost of replacing up to two (2) diesel locomotives at $2,600,000 each.

At the request of the committee, the District has significantly increased incentive funding for replacement of passenger vehicles with electric or plug-in hybrid vehicles. The measure now reads as follows:

C.2: INCENTIVE PROGRAM FOR THE REPLACEMENT OF PASSENGER VEHICLES WITH BATTERY ELECTRIC OR PLUG IN HYBRID VEHICLES

Overview: The goal of this strategy is to reduce emissions associated with passenger vehicles operating in the Shafter community. The District's Drive Clean in the San Joaquin Replacement program provides incentives up to $9,500 to low to moderate income residents of disadvantaged communities to replace their older, high polluting vehicle with a newer, cleaner, model. Emission reductions from passenger vehicles provide benefits to area residents as well as assist in reducing ozone formation in the Valley.

Implementing Agency: SJVAPCD

Type of Action: Incentives

Implementation: 2020

Description of Proposed Actions: This strategy would provide increased levels of incentive funding to Shafter residents to replace their older vehicles with battery electric or plug in hybrid vehicles. This measure would provide $6,000,000 ~~$2,000,000~~ for the replacement of up to 300~~100~~ vehicles. In addition, through this measure the District would work with a local partner to deploy 20 battery electric vehicles with a range of at least 150 miles and associated charging infrastructure for residents who would like to 'check out' battery electric vehicles to ensure that a battery electric vehicle would meet their needs. This measure is expected to achieve 2.88 tons of NOx, 0.08 tons of PM2.5, and 0.56 tons of VOC emissions reductions.

At the request of the committee, the District has significantly increased incentive funding for charging infrastructure for electric vehicles. The measure now reads as follows:

C.3: INCENTIVE PROGRAM FOR INSTALLATION OF ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

Overview: The goal of this strategy is to provide Level 2 electric vehicle charging infrastructure necessary to support the deployment of battery electric and plug in hybrid vehicles. The District's Charge Up program currently provides $5,000 for a Level 2 Single Port, $6,000 for a Level 2 Dual Port, and $25,000 for a Level 3/DC Fast Charger with a cap of $50,000 per applicant and/or site. Having the appropriate charging infrastructure available for Shafter residents will encourage the growth of zero emission passenger vehicles in the community.

Implementing Agency: SJVAPCD

Type of Action: Incentives

Implementation: 2019-2021

Description of Proposed Actions: This strategy would provide incentive funding to private and public entities to provide publically accessible charging infrastructure in the Shafter community. This strategy would utilize the existing Charge Up program guidelines and funding amounts. This goal of this measure is to install up to 78 ~~17~~ electric vehicle chargers, including Level 2 and Level 3 chargers, in Shafter at an expected cost of up to $850,000 ~~$100,000.~~ There are no direct emission reductions associated with this measure, however, this measure supports the emission reductions associated with electric vehicle deployment.

At the request of the committee, the District has increased incentives for a car sharing program. The measure now reads as follows:

C.5: INCENTIVE PROGRAM FOR THE LAUNCH OF A CAR SHARING PROGRAM IN THE SHAFTER COMMUNITY

Overview: The goal of this strategy is to reduce emission from passenger vehicles by launching an electric car sharing program in the Shafter community. These types of programs offer access to electric vehicles for a defined period of time at a minimal cost to the user. In addition these programs may allow for a resident to reduce or eliminate use of a gas powered vehicle resulting in a reduction of ozone forming emissions. These emission reductions provide benefit to community residents by reducing NOx and VOC emissions that would otherwise occur.

Implementing Agency: SJVAPCD

Type of Action: Incentives

Implementation: 2020-2021

Description of Proposed Actions: This strategy would provide funding for a partnering car share provide to launch a program in the Shafter community. The District would leverage experience with existing ride share programs operating in the Valley in order to expand to the Shafter area. This measure would provide $500,000 ~~$250,000~~ in funding for the electric vehicles, related infrastructure and subsidies to help minimize the initial cost to the end user. The emission reductions associated with this measure would be calculated at a later time.

At the request of the committee, the following measure has been removed.

~~*A.1: INCENTIVE PROGRAM FOR ELECTRIC DAIRY FEED MIXING EQUIPMENT TO TARGET DAIRY OPERATIONS NEAR THE COMMUNITY OF SHAFTER*~~

~~*Overview:* The goal of this strategy is to reduce the impact of NOx and PM2.5 emissions associated with dairy operations near the Shafter community. Diesel powered equipment is typically utilized in silage mixing and feed delivery at dairies. This agricultural equipment is not subject to regulations resulting in loaders and tractors that have older engines that do not have emission control systems. In order to reduce emissions from these operations the District has offered incentives to replace existing diesel powered equipment with electric alternatives. Available incentives can provide funding up to 75% of the total eligible cost of the project.~~

~~*Implementing Agency:* SJVAPCD~~

~~*Type of Action:* Incentives~~

~~*Implementation:* 2019-2024~~

~~*Description of Proposed Actions:* This strategy would provide incentives for electric dairy feed mixing equipment and associated equipment (feed trucks, wheel loaders, feed pushers) for dairy operations near the community of Shafter. Proposed incentives to be invested is $6,500,000, which is estimated to reduce 350 tons NOx and 18 tons of PM2.5 (based on average emission reductions expected per project) across up to five (5) dairy operations near the community of Shafter.~~

At the request of the committee, the following measure has been removed.

~~*A.7: INCENTIVE PROGRAM FOR REPLACING OLDER DIESEL DAIRY TRUCKS WITH ZERO OR NEAR ZERO EMISSION TRUCKS*~~

~~*Overview:* To provide increased outreach and access to incentive funding for the replacement of older, high polluting dairy trucks with new zero or near-zero-emission trucks operating within and surrounding Shafter.~~

~~Replacing older trucks is important to reduce the public's exposure to diesel emissions including NOx and PM2.5 and these pollutants negatively impact human health, especially for sensitive populations such as children. New zero and near zero-emission battery electric and near-zero emission natural gas powered trucks are significantly cleaner than older trucks.~~

~~The District does not have regulatory authority of emissions from mobile sources, including heavy-duty trucks. Diesel powered on-road heavy-duty vehicles are subject to statewide ARB Truck and Bus Regulation which requires all equipment to get progressively cleaner over time.~~

~~Due to the large amount of pollution that can be attributed to mobile sources, the District has implemented a broad suite of voluntary incentive programs, targeted at reducing emissions from heavy-duty trucks operating throughout the Valley, including:~~

- ~~The Heavy Duty Truck Replacement Program http://valleyair.org/grants/truck-replacement.htm. This program provides incentives for the replacement of existing heavy-duty diesel trucks with new, zero or near-zero-emission technology.~~
- ~~The District currently developing a Heavy-Duty Truck Repair Pilot Program to provide financial assistance to small fleet truck owners and operators to provide durable repairs for broken emissions components or systems in summer 2019~~
- ~~The District is currently developing new program for Heavy-Duty Alternative Fuel Infrastructure which will provide local businesses and agencies incentive funding to install alternative fueling infrastructure (electric, hydrogen, etc.) to support the increased deployment of heavy-duty advanced clean technology vehicles~~

~~*Implementing Agency:* SJVAPCD~~

~~*Type of Action:* Incentives~~

~~*Implementation:* 2020-2024~~

~~*Description of Proposed Actions:* The goal of this action is to replace up to 20 dairy trucks with zero or near zero-emission trucks that operate in and around the community. The proposed funding amount of $2,000,000 would cover up to approximately 60% of the cost of replacing up to 20 diesel trucks with zero or near-zero-emission trucks at $100,000 each.~~

At the request of the committee, the following measure has been removed.

~~*A.8: SUPPORT DAIRY OPERATIONS NEAR SHAFTER IN INSTALLING DAIRY DIGESTERS*~~

~~*Overview:* The purpose of this strategy is to support dairy operations near the City of Shafter in installing dairy digesters, which capture emissions of methane for productive use in energy production. Dairy digester installations have been shown to reduce emissions of VOCs and ammonia. However, digesters that are not designed in a manner that mitigates or eliminates criteria pollutants can lead to an increase in emissions of criteria pollutants such as NOx. As a part of this strategy, the District will work closely with California Department of Food and Agriculture (CDFA) and industry representatives to ensure that digesters funded through new State programs are designed and implemented to be protective of air quality (i.e., pipeline injection, mobile source fuel projects).~~

~~*Implementing Agency:* SJVAPCD, CDFA, NRCS, local partners~~

~~*Type of Action:* Incentives~~

~~*Implementation:* 2020~~

~~*Description of Proposed Actions*: The District will work with stakeholders and organizations, such as the California Department of Food and Agriculture, Natural Resources Conservation Service and the California Dairy Quality Assurance Program, to support the deployment of dairy digesters with pipeline injection or mobile source fueling technology at dairies near the community of Shafter.~~

At the request of the committee to invest in home solar, the District has committed substantial match funding to our existing commitment to work with the community, state agencies and utilities to bring existing home solar funding programs to Shafter.

SD.1: INCENTIVE PROGRAM FOR INSTALLING SOLAR IN THE COMMUNITY

Overview: The goal of this strategy is to increase the amount of solar photovoltaic (PV) systems installed in the community by connecting community members with programs that provide financial incentives for the installation of solar photovoltaic (PV) systems. A variety of programs are available to provide incentives for the installation of PV systems or for preferred rates for green energy in the community.

Jurisdictional Issues: It should be noted that oversight of energy usage, including implementation of community energy efficiency programs, is the jurisdiction of the California Public Utilities Commission, the public utilities, cities, and counties. AB 617 does not provide the District with new regulatory authority over energy programs, as discussed in CARB's Blueprint (see "Who Has the Authority to Implement Actions?", page 26 of the Blueprint). However, the District will make available to the responsible agencies the below strategy, as suggested by the Committee for potential inclusion into the CERP, for input and response in the Shafter Community Emissions Reduction Program.

Implementing Entities: California Public Utilities Commission, Pacific Gas and Electric Company, GRID Alternatives, SOMAH Nonprofit Administrative Partnership (SNAP)

Type of Action: Partnership

Implementation: 2019-2024

Description of Proposed Actions: <u>The District will commit up to $1.5 million in District funding to incentivize the installation of residential solar in the City of Shafter, by committing a 10% match to state funding for residential solar in the Community. The total state and District funding under this proposal would total $15 million for residential solar in Shafter to leverage strong advocacy for currently available utility and state funding by the District and the Steering Committee. The District will help to coordinate</u>

meetings with, and actively advocate for funding from, entities that offer incentives for solar photovoltaic (PV) installation and other green energy programs that have the potential to reduce utility rates in the community. ~~The District will help to coordinate meetings with entities that offer incentives for solar photovoltaic (PV) installation and other green energy programs that have the potential to reduce utility rates in the community.~~

The following is a summary of state programs that can benefit the community:

DAC-Single Family Solar Homes (DAC-SASH) program provides assistance in the form of up-from financial incentives for the installation of rooftop solar generating systems for income-qualified owners of single family homes in disadvantaged communities. The program is administered by GRID Alternatives and has an annual budget of $10 million from 2019 through 2030.

Solar on Multifamily Affordable Housing (SOMAH) program provides financial incentives for installing solar photovoltaic (PV) energy systems on multifamily affordable housing in dis-advantaged communities (DAC). The program has $100 million annually and has a goal of installing 300 megawatts of generating capacity by 2030. The program is administered by the SOMAH Nonprofit Administrative Partnership (SNAP).

DAC-Green Tariff (DAC-GT) program procures 100 percent renewable energy on behalf of customers while providing them a 20 percent discount on their otherwise applicable utility rate. The 20 percent discount can be applied as a discount to CARE rates. The DAC-GT program will begin in 2020 and will be run through the utility company (Pacific Gas and Electric).

Community Solar Green Tariff (CSGT) is similar to the DAC-GT program in that it procures 100 percent renewable energy on behalf of the customers while providing a 20 percent rate reductions. However, under this program the projects providing the solar energy must be sited within a top 25 percent DAC and the subscribers must reside within a top 25 percent DAC and live within 5 miles of the solar project. The program is approved to serve up to 41 megawatts of power and serve 6,800 customers. In order to enroll in the program communities must contact their utility (Pacific Gas and Electric).

At the request of the committee, the District has reduced the amount of funding available for underfired charbroiler emissions control installations.

CC.1: INCENTIVE PROGRAM FOR INSTALLING ADVANCED EMISSIONS CONTROL EQUIPMENT ON UNDERFIRED CHARBROILERS

Overview: The goal of this strategy is reduce PM2.5 emissions from underfired charbroilers. The District has been very successful in reducing emissions from commercial charbroiling by requiring controls on chain-driven charbroilers. Unfortunately, the same types of controls won't work for underfired units, and other more expensive technologies must be employed to achieve similar results. These new technologies have not been widely achieved in practice, and many remaining questions regarding their technological feasibility must still be addressed. The District's Restaurant Charbroiler Technology Partnership program has had some success installing equipment to reduce PM2.5 emissions from underfired charbroilers, and helped identify some technologies that are very promising to address this source category.

Implementing Agency: SJVAPCD

Type of Action: Incentives (with regulatory backstop)

Implementation: 2020-2024

Description of Proposed Actions: This strategy would provide funding for the installation of control equipment at one ~~or two~~ Shafter restaurant~~s (depending on restaurant size and throughput amounts)~~ to reduce particulate emission from underfired charbroilers, and to provide enhanced outreach and education to local restaurants regarding health impacts and availability of funding for installation of controls. Proposed funding amounts of $150,000 ~~$300,000~~ would cover up to 100% of the cost of installing emissions control equipment. The emissions reductions associated with this measure will be quantified at a later time.

At the request of the committee, the District has committed substantial funding for the installation of bike lanes in the City of Shafter. This new measure is as follows:

LU.5: FUNDING FOR BIKE PATH CONSTRUCTION

Overview: The goal of this strategy is to reduce the impact of pollution from motor vehicles by encouraging bicycle use and reducing vehicle miles travelled in and around the City of Shafter by expanding the network of bicycle paths.

Reducing emissions from motor vehicles through the implementation of alternate modes of transportation, including bicycling, is important to reduce the public's exposure to vehicle emissions including NOx and PM2.5. These pollutants negatively impact human health, especially for sensitive populations such as children. State and Federal requirements control emissions from passenger vehicles. The Valley Air District does not have jurisdiction over these sources. However, due to the large amount of air pollution that originates from passenger vehicles in the Valley, including public fleet vehicles, the District has implemented a suite of programs to reduce pollution from public fleets, including rebates for new zero and near-zero-emission vehicles, vehicle repair and replacement programs, and bicycle path construction.

Implementing Agency: SJVAPCD

Type of Action: Incentives

Implementation: 2019-2022

Description of Proposed Actions: This strategy would provide incentive funding for the development and construction of Class 1, Class 2 and Class 3 bicycle paths, lane striping and routes. The proposed funding level of this measure is $1,000,000 and funding amounts would be consistent with established District guidelines from the District's REMOVE and Public Benefit Grants Programs. Projects proposed under this measure must be consistent with the Approved 2005 City of Shafter General Plan and Bicycle Plan or any related planning efforts.

At the request of the committee, the District has significantly increased the amount of funding that will be made available for road and sidewalk infrastructure improvement projects in the community. The measure now reads as follows:

RD.2: ROAD AND SIDEWALK IMPROVEMENTS

Overview: The goal of this strategy is to identify opportunities to reduce dust from paved and unpaved roads in the community through road paving improvements, as well as reduce motor vehicle emissions by improving the walkability of the community through sidewalk improvement and construction. Road and sidewalk improvement projects are often combined for efficiency and cost reasons, and so are included together in this measure.

The District currently regulates fugitive dust emissions from a range of sources with a series of rules known as Regulation VIII. Rule 8061 (Paved and Unpaved Roads) establishes standards for the construction of new and modified paved roads in accordance with published guidelines by the American Association of State Highway and Transportation Officials for road construction and applies to any paved, unpaved, or modified public or private road, street highway, freeway, alley way, access drive, access easement, or driveway. Rule 8061 also establishes thresholds that when exceeded require that roads are treated to reduce visible dust emissions.

In addition, the District has actively encouraged sidewalk construction through commenting on development projects in our CEQA role as the regional air quality agency, and though public benefit grant funding. Our efforts in this area are based on the well-established link between community walkability/active transportation improvements and decreased vehicle traffic, which leads to decreased emissions associated with vehicle traffic.

Dust from unpaved roads is the source of 7% of the PM10 emissions from area-wide sources in the community, and mobile source emissions comprise the main source of NOx emissions in the community. Through partnerships with other entities (including City of Shafter, Kern County, and Kern Council of Governments) to identify opportunities, such as Congestion Mitigation and Air Quality funding, the District will work to support road improvement efforts in the community where most needed to reduce health impacts, and will provide up to a total of $2.775 million in match grant funding to leverage available local, state, and federal funding. These efforts include paving shoulders, shoulder stabilization, paving or stabilizing unpaved roads, traffic mitigation measures, installing sidewalks, and curbing.

Implementing Agency: SJVAPCD, Cities, Counties

Type of Action: Incentive, Partnership

Timing: Immediately begin development of match funding criteria and project solicitation processes, and begin ~~Immediately upon~~ identifying opportunities for agency coordination

Description of Proposed Actions: The District will work with city and county partners to provide up to $2.775 million in match funding to leverage available local, state, and federal funding sources for road and sidewalk improvement projects in the community. The District will partner with the City of Shafter and Kern County to notify them as other grant funding opportunities for road paving, road resurfacing, and sidewalk improvements become available. The District will provide support to the City and County in paving grant applications through letters of support and technical support, as requested.

At the request of the committee, incentives have been increased for the installation of advanced filtration in schools. The measure now reads as follows:

SC.1: INCENTIVE PROGRAM TO INSTALL ADVANCED AIR FILTRATION SYSTEMS IN COMMUNITY SCHOOLS

Overview: The goal of this strategy is to reduce the impact of air pollution on children at schools and daycare facilities. Air filtration reduces the concentration of particulate contaminants from indoor air and is an important component of a school's Heating Ventilation and Air Conditioning (HVAC) system. Reducing airborne particles (such as PM 2.5) is important because particulate matter negatively impacts human health, especially that of sensitive populations such as children. Older HVAC systems and basic air filtration used in some schools only remove a small fraction of particles in the air that are smaller than 0.3 microns (µm). More efficient HVAC air filters and standalone air cleaners are important for creating healthier air in school classrooms.

Implementing Agency: SJVAPCD

Type of Action: Incentives

Implementation: 2019-2024

Description of Proposed Actions: This strategy would provide up to $250,000 ~~$100,000~~ in incentive funding for schools and daycares in Shafter to install advanced air filtration systems. Proposed funding amounts would provide ten (10) schools with funding to retrofit schools with advanced HVAC filtration systems, consistent with state Community Air Protection Incentives 2019 Guidelines. ~~Proposed funding amounts would provide a pilot group of schools with funding to install HVAC filters with a MERV rating of 14 or greater.~~ Schools with older HVAC systems may receive up to 100% of the cost of approved standalone air cleaner units with HEPA rated filters and a Clean Air Delivery Rate (CADR) appropriate for the classroom size. Schools that receive high-efficiency HVAC filters may also receive up to 100% of the cost of one (1) set of replacement HVAC filters, and schools that receive standalone air ventilation units may also receive up to 100% of the cost of one (1) set of replacement HEPA filters per unit.

To respond to the Committee's request for additional commitment for increased urban greening and tree planting, the District will establish a funding match to support tree planting efforts. The measure now reads as follows:

UG.1: INCREASED URBAN GREENING AND FORESTRY TO IMPROVE AIR QUALITY

Overview: The goal of this strategy is to improve air quality in the community of Shafter through urban greening and forestry programs. This measure is supported by scientific studies that have shown urban trees and forestry can help with the removal of air pollutants and reduced emissions of volatile organic compounds (VOC's). The effects of urban trees on fine particulate matter (PM2.5) was modeled for ten U.S cities, with total annual PM2.5 removal varying from 5.2 tons in Syracuse to 71.1 tons in Atlanta. Overall air quality improvements attributed to urban trees ranged between 0.05% in San Francisco to 0.24% in Atlanta (Nowak, Hirabayashi, Bodine, Hoehn, 2013). Based on a study to assess the effects of urban trees on air quality have found that urban vegetation can attribute to temperature reduction, removal of air pollutants, reduce emission of VOCs, and building energy conservation (United States Department of Agriculture Forest Service, 2002).

The District has long been supportive of the public benefits provided from planting of trees and vegetation. The District's Fast Track Action Plan, adopted by the Governing Board to reduce ozone pollution in the Valley, identified the strategic use of tree and vegetation planting as a potential measure to reduce ozone. There has also been significant efforts at the federal, state, and local levels to promote and increase urban greening and forestry through funding opportunities, programs, and projects.

Jurisdictional Issues: It should be noted that the District has no authority over how agencies allow land under their jurisdiction to be used. These so-called "land-use" decisions, such as whether to allow or require accelerated urban greening efforts, are historically the responsibility, under state law, of cities and counties, or, in some cases, state and federal agencies responsible for transportation corridors, state and federal parks, and other properties. AB 617 does not provide the District with new land-use regulatory authority, so land-use authority remains with cities, counties, and state and federal land-use agencies, as discussed in CARB's Blueprint (see "Who Has the Authority to Implement Actions?", page 26 of the Blueprint). However, the District has made available to the responsible agencies the various land-use strategies that have been presented by the Committee for potential inclusion into the CERP for responsible agency's input and response in the Shafter Community Emissions Reduction Program.

Implementing Agency: City and County, SJVAPCD

Type of Action: Partnership, Incentives

Implementation: 2019-2024

Description of Proposed Actions: This goal of this measure is to identify and support efforts to increased urban greening and forestry to improve air quality and overall quality of life for residents in the community of Shafter. This measure would involve efforts to partner, collaborate, and engage with other agencies to fulfil the need for increased urban greening and forestry in the community. <u>The District has begun outreach efforts with the Tree Foundation of Kern County, San Joaquin Green (Tree Fresno), and Releaf California to identify available funding sources to support urban greening projects. The District will provide $5,000 for a study conducted by the Tree Foundation of Kern and San Joaquin Green to conduct a study on potential planting locations and associated irrigation and maintenance plans. The District will consider a funding match of up to $50,000 to support urban greening projects in Shafter to leverage available state funding and support urban greening projects within the AB 617-selected community boundary.</u>

To respond to committee requests that a notification system for pesticide applications be implemented in the Shafter community, a commitment is included to implement a pilot community notification system. The measure has been updated accordingly, and now reads as follows:

A.10: REDUCING EXPOSURE TO PESTICIDES IN THE COMMUNITY

Overview: Several specific measures were suggested by Committee members regarding reducing community exposure to pesticides, including banning untarped applications of 1,3-D, reducing the 1,3-D township cap, implementing a notification system to alert residents prior to pesticide applications, banning aerial application of pesticides, and establishing buffer zones where pesticide application is banned near sensitive receptor locations.

Jurisdictional Issue: Under state law, the District has no regulatory authority over pesticides in their pesticidal use. Some advocates have pointed out that a 1996 court case (*Harbor Fumigation Inc v. County of San Diego Air Pollution Control District*) clarified that air districts do have jurisdiction over emissions of pesticides released into the air after their pesticidal use:

> *"…although APCD cannot regulate how a pesticide is used within the Facility (and thus does not run afoul of DPR's jurisdiction over pesticide use), once the use of a pesticide is completed and its waste gas emitted into the ambient air from the Facility, then APCD's regulatory jurisdiction … begins."*

The District agrees, and has, for decades, regulated facilities that perform fumigation where the pesticide is applied in a room or fumigation chamber, and then released into the air from that chamber. The District does require air pollution control equipment or techniques to reduce pesticide emissions in such situations. Air Districts are allowed to do so by state law because the emissions of pesticides are occurring after their pesticidal use is completed. However, the District does not have jurisdiction in the case of open air application, such as on-field pesticide application, because all potential control of emissions in such situations is also a regulation of the pesticide in its pesticidal use. For instance, pesticide reformulation and limiting pesticide use (whether by amount or by location) is regulating a pesticide in its pesticidal use, and the state's position is that the District is prohibited by state law from doing so.

Implementing Agency: DPR, CARB

Type of Action: Partnership

Timing: Unknown

Description of Proposed Actions: The District has forwarded all pesticide-related emission reduction strategy suggestions to DPR and CARB, and has received a commitment from DPR to implement specific measures to reduce community exposure to pesticides (see attachment from DPR).

Additionally, to support DPR's commitment to develop a pilot pesticide application notification system, the District will commit up to $125,000 (not to exceed 50% of cost) to support the implementation of a pilot notification system in Shafter.

ADDITIONAL PUBLIC HEALTH INFORMATION

Document attached for Steering Committee review. This public health chapter will be inserted into the CERP prior to final publication.

HEALTH IMPACTS OF AIR POLLUTION

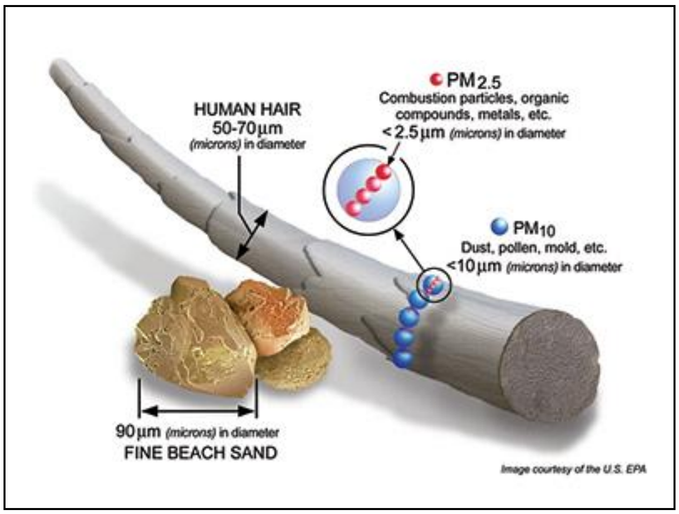
Appendix to be included in Proposed Shafter CERP

HEALTH IMPACTS OF LOCAL AIR POLLUTION

PARTICULATE MATTER

Particulate matter (PM) is a mixture of solid particles and liquid droplets in the air. PM can be emitted directly into the atmosphere (primary PM), or can form as secondary particulates in the atmosphere through the photochemical reactions of precursors (when precursors are energized by sunlight). Thus, PM is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. PM10 is particulate matter that is 10 microns or less in diameter, and the PM2.5 subset includes smaller particles that are 2.5 microns or less in diameter (Figure 1).

Figure 1 Visual Comparison of PM10, PM2.5, Human Hair, and Fine Beach Sand



NATURE AND FORMATION OF PM2.5

The nature and formation of PM2.5 in the San Joaquin Valley (Valley) is highly complex. Significant differences in regional natural environments and the relative contribution of emissions in various regions across the Valley means that local monitoring and pollution control strategy efforts like AB 617 are important for understanding and reducing pollution in impacted communities lick Shafter. Differences within PM2.5 itself, directly-emitted PM2.5 versus secondary PM2.5 forming in the atmosphere through series of chemical reactions, adds to the complexity inherent in emission reduction efforts.

PM2.5 can be composed of any material that has a diameter of 2.5 microns or less. PM2.5 can be emitted directly as primary PM2.5 from various sources or formed secondarily through chemical reactions in the atmosphere. Naturally occurring emissions from biogenic sources, such as plants, can also add to the formation of PM2.5. The resulting ambient PM2.5 mixture can include aerosols (fine airborne solid particles and liquid droplets) consisting of components of nitrates, sulfates, elemental carbons, organic carbon compounds, acid aerosols, trace metals, geological materials, and more.

PM2.5 Species in Shafter

PM2.5 in Shafter comprised of many species that contribute to the total PM2.5 mass, as summarized in Table 1 and **Error! Reference source not found.** below. This complex mixture is attributable to stationary, mobile, and area-wide sources, as well as naturally occurring emissions. Although the list of species contributing to PM2.5 in Shafter is lengthy, it can be grouped into larger representative categories. The following is a brief description of how each of these larger species categories are formed and emitted into the atmosphere.

Table 1 Summaries of PM2.5 Species

PM2.5 Species	Description
Organic carbon	Directly emitted, primarily from combustion sources (e.g. residential wood combustion). Also, smaller amounts attached to geologic material and road dusts. May also be emitted directly by natural/biogenic sources.
Elemental carbon	Also called soot or black carbon; formed during incomplete combustion of fuels (e.g. diesel engines).
Geologic material	Road dust and soil dust that are entrained in the air from activity, such as soil disturbance or airflow from traffic.
Trace metals	Identified as components from soil emissions or found in other particulates having been emitted in connection with combustion from engine wear, brake wear, and similar processes. Can also be emitted from fireworks.
Secondary organic aerosol	Secondary particulates formed from photochemical reactions of organic carbon.
Ammonium nitrate	Reaction of ammonia and nitric acid, where the nitric acid is formed from nitrogen oxide emissions, creating nitric acid in photochemical processes or nighttime reactions with ozone.
Ammonium sulfate	Reaction of ammonia and sulfuric acid, where the sulfuric acid is formed primarily from sulfur oxide emissions in photochemical processes, with smaller amounts forming from direct emissions of sulfur.
Combined water	A water molecule attached to one of the above molecules.

HEALTH IMPACTS OF PM

Any particles 10 microns or less are considered respirable, meaning they can be inhaled into the body through the mouth or nose. PM10 can generally pass through the nose and throat and enter the lungs. PM2.5 can be inhaled more deeply into the gas exchange tissues of the lungs, where it can be absorbed into the bloodstream and carried to other parts of the body.

The potential health impacts of particle pollution are linked to the size of the particles, with the smaller particles having larger impacts. Numerous studies link PM2.5 to a variety of health problems, including aggravated asthma, increased respiratory symptoms (irritation of the airways, coughing, difficulty breathing), decreased lung function in children, development of chronic bronchitis, irregular heartbeat, non-fatal heart attacks, increased respiratory and cardiovascular hospitalizations, lung cancer, and premature death. Children, older adults, and individuals with heart or lung diseases are the most likely to be affected by PM2.5. Many studies have quantified and documented the health benefits of attaining the U.S. Environmental Protection Agency (EPA) air quality standards for PM. The specific impacts of PM2.5 and supporting research studies are further discussed in the sections below.

Understanding various PM2.5 species, including how each species is formed, how much each contributes to the Valley's total PM2.5 concentrations, and how each is linked to different public health impacts, is of the utmost importance for the development of an effective, health-protecting emissions control strategy. For example, ammonium nitrate is estimated to comprise about 40% of the Valley's annual average PM2.5 concentrations, but it is generally regarded as having relatively low toxicity compared to other PM2.5 species, such as organic or elemental carbon.

UNDERSTANDING IMPACTS THROUGH LOCAL HEALTH STUDIES

The District plays an active role in funding leading edge health research focusing on the Valley population. The District sponsored the first major epidemiological investigation of health effects of air pollution in the Valley, focusing on the populations of Modesto, Fresno, and Bakersfield.[1] The study found that daily exposure to high PM2.5 concentrations was significantly correlated with increased daily hospital and emergency room admission rates for asthma and other respiratory and cardiovascular diseases. To follow-up on this study, the District sponsored another epidemiological study to examine which of the chemical species found in Valley PM2.5 are most highly correlated with hospital admission rates. In more detail, the study explored statistical associations between varying concentrations of PM2.5 components (e.g. ammonium nitrate, ammonium sulfate, organic carbon, elemental carbon) and health outcomes, including emergency department visits and hospitalizations associated with selected cardiovascular and respiratory conditions.

[1] Capitman, J.A., & Tyner, T.R. (2011). *The Impacts of Short-Term Changes in Air Quality on Emergency Room and Hospital Use in California's San Joaquin Valley*. Fresno, CA: Central Valley Health Policy Institute for the San Joaquin Valley Air Pollution Control District.

The District also sponsored a pilot study of PM0.1 (ultrafine particles) in Fresno, where UCSF-Fresno investigated the quantity and spatial distribution of PM0.1 plumes from motor vehicles, lawn care equipment, wood burning, and restaurants. Following this study, the District then funded a UC Davis research project to develop a model of PM0.1 population exposure in the Valley based on previous Valley observational research. PM0.1 exposure was correlated with short- and long-term health effects by making use of the large body of Valley epidemiological data that has been generated by the previous studies described above.

In addition, the District sponsored a project with Providence Engineering to conduct a study examining differences in exposure to PM2.5 in residential neighborhoods. In this field project, Providence Engineering deployed approximately 30 passive PM samplers in neighborhoods across the Fresno area to provide a better spatial understanding of concentration variation in the urban area. The samples were analyzed later in a laboratory to provide particle size, mass, and speciation estimates, followed by source apportionment analysis. Overall, the project provided the District with a finer understanding of how the health risk of fine particles varies in different urban locations. Through the implementation of the CERP and beyond, District will continue to seek out and fund research opportunities that further the understanding air pollution impacts on public health.

Toxicity of Chemical Species

PM2.5 particles vary in their toxicity depending on their chemical composition. PM2.5 particles are characterized by a widely diverse combination of chemicals depending on unique regional combinations of meteorology, topography, and pollution sources. In addition to experimental and clinical research that has identified these toxicity differences, epidemiological studies have found regional differences in health impacts despite comparable regional PM2.5 mass exposure.[2] Beyond the intrinsic toxicity of individual chemicals, the unique combinations of chemicals generated by some sources can actually magnify health risk above and beyond what their mass concentrations would suggest.[3]

Many emissions sources evaluated in this CERP are sources of direct (primary) PM2.5 emissions characterized by a unique combination of chemical species. Other sources emit chemical species such as ammonia and nitrogen oxides (NOx), precursors that contribute to the formation of secondary PM2.5 species. The PM2.5 chemical species categories adopted in the exposure characterization model include elemental carbon (black carbon), organic carbon compounds (OC), metals (elements), ammonium nitrate, ammonium sulfate, and geological. PM2.5 in Shafter will be regularly speciated throughout the implementation of the CERP and Community Air Monitoring Plan. The following discussion provides an overview of PM2.5 species and their associated health impacts.

[2] Bell, M.L. (2012). *Assessment of the Health Impacts of Particulate Matter Characteristics*. Research Report 161. Boston: MA. Health Effects Institute.
[3] Kelly, F.J. (2006). Oxidative Stress: Its Role in Air Pollution and Adverse Health Effects. *Occupational Environmental Medicine, 60,* 612–616.

Organic carbon (OC): OC species found in PM2.5 aerosol are generated as primary organic aerosol (POA), predominantly through the combustion of hydrocarbons. Key POA sources include cooking, industrial processes, mobile source exhaust, prescribed burning, tire wear, and wood burning.[4] Secondary organic aerosols (SOA) are formed from the oxidation of motor vehicle hydrocarbons, prescribed burning, wood burning, solvent use, and industrial processes.

OC is recognized as one of the most biologically reactive of PM2.5 chemical species categories, with ample evidence of high toxicity found in experimental, clinical, and epidemiological studies. OC, often in combination with metals such as iron, has been shown to generate reactive oxygen species (ROS) that drive several different mechanisms of pulmonary inflammation, including disruption of normal immune system functioning.[5] In addition, OC and metals have been shown to indirectly stimulate ROS production by macrophages, which are cells responsible for defending the lungs from pathogens and aerosols.

One of the primary OC species categories is polycyclic aromatic hydrocarbons (PAH). PAH species fall into two categories: a high molecular weight fraction and a low molecular weight fraction. The former is found in diesel exhaust and engine oil and is a significant risk factor for lung cancer.[6] Low molecular weight PAH is found in other hydrocarbon combustion particles and serves as a precursor to the formation of an important OC species category known as quinones. Formed from atmospheric processing of PAH or within the body (in vivo), quinones have been shown to be one of the most important drivers of pulmonary oxidative stress, resulting in a host of negative spillover effects on immune system functioning.[7] Quinone formation via chemical aging of PAH occurs during multi-day winter stagnation events in the Valley. A District-funded clinical study of asthmatic patients in Fresno found that quinone levels in urine correlated with sustained (multi-day) high ambient concentrations of PM2.5 and was accompanied by decreased lung function.[8]

Elemental carbon (EC): Elemental carbon is found in combustion-based aerosols produced by mobile exhaust (mainly diesel), wood burning, and cooking (especially charbroiling). Compared to OC species, there is limited evidence of comparable impacts on ROS production, pulmonary inflammation, and immune system disruption. For example, EC appears not to be a significant agent for the induction of inflammation

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[4] U.S. Environmental Protection Agency [EPA]. (2004, October). *Air Quality Criteria for Particulate Matter: Final Report*. Washington, D.C.: EPA 600/P-99/002aF-bF.

[5] Ayres, J.G., Borm, P., Cassee, F.R., Castranova, V., Donaldson, K., Ghio, A. … Froines, J. (2008) Evaluating the Toxicity of Airborne Particulate Matter and Nanoparticles by Measuring Oxidative Stress Potential—A Workshop Report and Consensus Statement. *Inhalation Toxicology 20,* 75–99. doi: 10.1080/08958370701665517

[6] Landvik, N.E., Gorria, M., Arlt, V.M., Asare, N., Solhaug, A., Lagadic-Gossmann, D., & Holme, J.A. (2007). Effects of Nitrated-Polycyclic Aromatic Hydrocarbons and Diesel Exhaust Particle Extracts on Cell Signalling Related to Apoptosis:Possible Implications for their mutagenic and Carcinogenic Effects. *Toxicology*, 231, 159–174. doi: 10.1016/J.tox.2006.12.009

[7] Bolton, J., Trush, M.A., Penning, T.M., Dryhurst, G., & Monks, T.J. (2000). Role of Quinones in Toxicology. *Chemical Research in Toxicology, 13(3)*, 135–160. doi: 10.1021/tx99

[8] Ikeda, A., Vu, K.K.-T., Lim, D., Tyner, T.R., Krishnan, V.V., & Hasson, A.L. (2012). *An Investigation of the* Use of Urinary Quinones as Environmental Biomarkers for Exposure to Ambient Particle-Borne Pollutants. *Science of the Total Environment* (submitted)..

in macrophage cells, indicating a significantly lower toxicity level relative to OC species.[9] A recent study of PM 0.1-based exposure of EC in mice found modest cardiovascular effects. Pulmonary inflammation was noted but only at high doses beyond normal ambient concentrations.[10] A recent study in Mexico City found an association between exposure levels of EC and lung function decrements among asthmatic and non-asthmatic children.[11]

Characterization of health effects of elemental carbon from human exposure studies is complicated by the high correlation between EC, OC, and metals emitted by diesel exhaust. Exposure to EC is a PM2.5 risk factor, although there is more evidence to date that other chemical species, e.g. metals and OC, found in these particles are the primary drivers of negative health effects.

Metals: A combination of clinical, experimental, and epidemiological studies have implicated several of the metals found in PM2.5 with negative respiratory or cardiovascular outcomes, sometimes in conjunction with the action of OC species. One of the most important is iron because of its ability to catalyze the production of hydrogen peroxide, leading to highly reactive hydroxyl radicals (OH). In turn, these highly reactive chemicals stimulate the production and action of cytokines by macrophages. Cytokines are cell-signaling molecules that are critical to normal functioning of the immune system. A recent experimental study examined the impact of iron in silica particles in triggering respiratory toxicity.[12] Compared to silica particles with no iron, silica particles with iron were found to have a significantly greater effect on oxidative stress via hydrogen peroxide production with subsequent stimulus of cytokines by macrophages.

Extensive research relates exposure in metals (particularly nickel and vanadium) in PM2.5 to cardiovascular effects. A national epidemiological study recently found that communities with higher fractions of nickel, vanadium, and EC in their PM2.5 also had higher risk of cardiovascular and respiratory hospitalization.[13] Specifically, cardiovascular hospitalizations were 26% higher in counties with a nickel fraction in the 75th percentile versus counties with nickel in the 25% percentile. In an investigation of the relatively higher association between PM2.5 daily concentrations and daily rates of cardiovascular mortality in New York City, the exceptionally high level of nickel and vanadium resulting from residual oil fly ash used for heating and as fuel for ships were

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[9] Vogel, C.F., Sciullo, E., Wong, P., Kuzmicky, P., Kado, N. & Matsumura, F. (2005). Induction of Proinflammatory Cytokines and C-Reactive Protein in Human Macrophage Cell Line U937 Exposed to Air Pollution Particulates. *Environmental Health Perspectives 113(11)*, 1536–1541. doi: 10.1289/ehp.8094

[10] Vesterdal, L.K., Folkmann, J.K., Jacobsen, N.R., Sheykhzade, M., Wallin, H., Loft, S., & Møller, P. (2010). Pulmonary Exposure to Carbon Black Nanoparticles and Vascular Effects. *Particle and Fibre Toxicology 7:33*. doi: 10.1186/1743-8977-7-33

[11] Barraza-Villarreal, A., Escamilla-Nuñez M.C., Hernández-Cadena L., Texcalac-Sangrador. J.L., Sienra-Monge, J.J., Del Río-Navarro, B., Cortez-Lugo, M., Sly, P.D., & Romieu, I. (2011). Elemental Carbon Exposure and Lung Function in Schoolchildren from Mexico City. *European Respiratory Journal, 38,* 548–552. doi: 10.1183/09031936.00111410

[12] Premasekharan, G., Nguyen, K., Contreras, J., Ramon, V., Leppert, V.J. & Forman, H.J. (2011). Iron-Mediated Lipid Peroxidation and Lipid Raft Disruption in Low-Dose Silica-Induced Macrophage Cytokine Production. *Free Radical Biology and Medicine, 51(6)*, 1184–1194. doi: 10.1016/j.freeradbiomed.2011.06.018

[13] Bell, M.L., Ebisu, K., Peng, R.D., Samet, J.M. & Dominici, F. (2009). Hospital Admissions and Chemical Composition of Fine Particle Air Pollution. *American Journal of Respiratory Critical Care, 179*, 1115–1120. doi: 10.1164/rccm.200808-1240OC

identified as a principle cardiovascular risk factor.[14] In a related study, rats exposed to PM2.5 with high fractions of chromium, iron, and nickel fractions responded with significantly reduced heart rate variability and increased heart rates, each being an indicator of cardiovascular disruption and risk.[15]

In conclusion, metals found in PM2.5 produced from combustion of coal, residual oil, diesel fuel, and motor oil are recognized as chemical drivers of cardiovascular and respiratory morbidity and mortality. This has led some researchers to conclude that regional differences in U.S. cardiovascular mortality that cannot be explained by differences in average daily PM2.5 concentrations are likely to be caused by regional differences in coal combustion and resultant exposure to metals and OC.[16]

Ammonium nitrate: Ammonium nitrate is classified as a secondary inorganic species (not directly emitted) primary source of PM2.5, and it does not contain carbon. Nitrate is formed by atmospheric reactions between two precursors: ammonia and nitric acid. Prior to this reaction, nitric acid generally originates from the chemical processing of nitrogen oxides (NOx), largely from fuel combustion during multiday stagnation events.

The relative toxicity of ammonium nitrate is an important issue given its substantial mass contribution to regional PM2.5. The oral toxicity of nitrate is very low, with an LD50 (dose causing death for 50% of the exposed subjects) reported to be two thirds that of table salt. This raises the question as to whether other factors intrinsic to inhalation could lead to health effects at considerably lower exposure concentrations. As seen in the case of OC species, the most compelling evidence of species toxicity is built on a foundation of experimental, clinical, and epidemiological research. In particular, epidemiological studies draw their inferences from statistical associations between exposure variables and health outcomes only. Uncovering the actual mechanisms of harm, therefore, requires further isolation of mechanisms through experimental and clinical research.

In the case of ammonium nitrate, evidence of toxicity is largely limited to epidemiological research alone. For example, a recent epidemiological study of traffic air toxics and pre-term birth in Los Angeles found statistical associations between nitrate mass, PAH, and several other air pollutants and the increased likelihood of pre-term birth.[17] The authors point to other experimental studies that identified very high oxidative stress potential resulting from PAHs, metals, and other OC species collected from Los Angeles traffic sources as being the likely mechanism for pre-term birth. They conclude by emphasizing the need to further study the links between pre-term birth and PAH exposure.

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[14] Lippmann, M., Ito, K., Hwang, J-S., Maciejczyk, P., & Chen, L-C. (2006). Cardiovascular Effects of Nickel in Ambient Air. *Environmental Health Perspectives*, *114(11)*, 1662–1669. doi: 10.1289/ehp.9150
[15] Chen, L.C., & Lippmann, M. (2009). Effects of Metals within Ambient Air Particulate Matter (PM) on Human Health. *Inhalation Toxicology, 21(1),* 1–31. doi: 10.1080/08958370802105405
[16] Lippmann M, Chen L-C, Gordon T, Ito K, Thurston GD. 2013. National Particle Component Toxicity (NPACT) Initiative: Integrated Epidemiologic and Toxicologic Studies of the Health Effects of Particulate Matter Components. Research Report 177. *Health Effects Institute*, Boston, MA.
[17] Wilhelm, M., Ghosh, J.K., Su, J., Cockburn, M., Jerrett, M. & Ritz, B. (2011). Traffic-Related Air Toxics and Preterm Birth: A Population-Based Case-Control Study in Los Angeles County, California. *Environmental Health 10: 89*. doi: 10.1186/1476-069X-10-89

One experimental study was found that explicitly looked for toxic mechanisms driven by ammonium nitrate.[18] The study exposed rats to high concentrations of nitrate (70 to 420 µg/m^3) in combination with EC. After exposure, animals were sacrificed and a necropsy was performed, followed by a range of tests for pathological impacts between the control (non-exposed) and exposed groups. The authors did not find abnormalities that could be tied to the experimental exposure to nitrate alone or in combination with EC. This absence of experimental evidence for mechanisms of pathology for inhaled ammonium nitrate is consistent with its low oral toxicity.

Ammonium sulfate: Ammonium sulfate (sulfate) is also classified as a secondary inorganic species. It is formed when sulfuric acid, itself a product of oxidation of sulfur, reacts with ammonia. Mass concentrations of sulfate are significantly lower than for nitrate in the Valley, averaging from 10% to 11% of PM2.5 mass on an annual average basis. Fossil fuel combustion is the primary source of sulfate in the Valley, but globally, coal combustion is the primary source. Unlike nitrate, mass concentrations of sulfate are not appreciably different in cold and hot seasons.

Research findings regarding the toxicity of sulfate are comparable to that of nitrate. Oral toxicity is low and it is approved as a food additive by the US Food and Drug Administration and the European Union. One study[19] examined the response of 20 non-smoking subjects to four-hour exposure sessions in chambers containing 500 µg/m^3 of sulfate aerosol, a concentration over two orders of magnitude above ambient levels in the Valley. Pulmonary function tests were performed to assess the response of these exposures. No significant changes in pulmonary function or bronchial reactivity were observed immediately after the individual exposures or 24 hours after exposure. In an experimental study that also exposed rats to 500 µg/m^3 of sulfate for four to eight months, modest pulmonary impacts were noted.[20] After four months, cellular immunologic responsiveness was not impaired, but physiologic changes were detected, including enlargement of bronchial epithelial (surface) cells and in alveolar size.

For each of these studies, the modest health impacts observed at very high exposure levels are consistent with the low intrinsic toxicity of sulfate. This is consistent with results of a review of the epidemiological and toxicological research on sulfate.[21] Researchers found that PM sulfate was a weaker indicator of health risk than PM2.5 mass. Because sulfate is correlated with PM2.5 mass, this result is inconsistent with sulfate having a strong health influence. The study concluded that the epidemiologic

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[18] Cassee, F., Arts, J.H., Fokkens, P.H., Spoor, S.M., Boere, A.J., van Bree, L., & Dormans, J.A. (2002). Pulmonary Effects of Ultrafine and Fine Ammonium Salts Aerosols in Healthy and Monocrotaline-Treated Rats Following Short-Term Exposure. *Inhalation Toxicology, 14(12)*, 1215–1229. doi: 10.1080/08958370290084872
[19] Kulle, T.J., Sauder, L.R., Shanty, F., Kerr, H.D., Ferrell, B.P., Miller, W.R., & Milman, J.H. (1984). Sulfur Dioxide and Ammonium Sulfate Effects on Pulmonary Function and Bronchial Reactivity in Human Subjects. *American Industrial Hygiene Association Journal, 45(3)*, 156–161. ISSN:1542-8125. doi: 10.1080/15298668491399569
[20] Smith, L.G., Busch, R.H., Buschbom, R.L., Cannon, W.C., Loscutoff, S.M., & Morris, J.E. (1989). Effects of Sulfur Dioxide or Ammonium Sulfate Exposure, Alone or Combined, for 4 or 8 Months on Normal and Elastase-Impaired Rats. *Environmental Research 49(1)*, 60-78. doi: 10.1016/S0013-9351(89)80022-2
[21] Reiss, R., Anderson, E.L., Cross, C.E., Hidy, G., Hoel, D., McClellan, R., Moolgavkar, S. (2007). Evidence of Health Impacts of Sulfate-and Nitrate-Containing Particles in Ambient Air. *Inhalation Toxicology, 19(5),* 419-449. doi: 10.1080/08958370601174941

and toxicologic evidence provide little or no support for a causal association of sulfate and health risk at ambient concentrations.

Geological: Winter season and annual average PM2.5 found in the Valley contains a very small fraction of species that are termed *crustal*, i.e. having their origins in the earth's crust. This coarse fraction—PM 2.5-10—contains a much higher fraction, as do particles beyond the PM10 size category. Suspended dust consists mainly of oxides of aluminum, silicon, calcium, titanium, iron, and other metal oxides. The precise combination of these components depends on the geology, industrial, and agricultural processes of the area. Geological material typically consists of 5% to 15% PM particles.

Other researchers examined the respiratory inflammation potential of PM2.5 soil dust from windblown dust and vehicle-generated particles from unpaved roads, taken from nine different sites in the western U.S.[22] None of the sites were located in the Valley. Cultured human epithelial cells were exposed and then were assessed for their release of cytokines known to be triggered by oxidative stress. PM2.5 from five of the sites was found to be benign, three of the sites demonstrated measurable cytokine response, and PM2.5 from one site was found to be highly reactive. Endotoxin, a potentially reactive bio-aerosol that is often found in PM, was not found to be a contributing factor to the variations in inflammatory potential.

Although not technically a geologic species, respirable road dust (RRD) has been recognized and analyzed as a separate form of PM2.5 that has relevance to exposure characterization. In this context, RRD is defined as PM less than 2.5 microns in diameter that is deposited along paved roadways as a result of roadway breakdown, tire wear, brake wear, deposition of exhaust-related particles, and other anthropogenic sources. Speciation analysis[23] of RRD in southern California identified over 100 organic compounds including n-alkanes, n-alkanoic acids, n-alkenoic acids, n-alkanals, n-alkanols, benzoic acids, benzaldehydes, polyalkylene glycol ethers, PAH, oxy-PAH, steranes, hopanes, natural resins, and other compound classes. This relatively toxic mix of OC species is coincident with a range of metals associated with motor vehicle exhaust and component wear. RRD particles are re-suspended by passing traffic, leaf blowers, and other sources for possible inhalation by individuals in or near the roadway.

To conclude, the geologic fraction of PM2.5 found in the Valley makes a relatively small contribution to overall PM2.5 mass and, by itself, has relatively low toxicity. RRD, while not of geologic origins, has been reviewed here because of its relevance to subsequent exposure characterization of sources.

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[22] Veranth, J., Rielly, C.A., Veranth, M.M., Moss, T.A., Langelier, C.R., Lanza, D.L., & Yost, G.S. (2004). Inflammatory Cytokines and Cell Death in BEAS-2B Lung Cells Treated with Soil Dust, Lipopolysaccharide, and Surface-Modified Particles. *Toxicological Science 82(1)*, 88–96. doi: 10.1093/toxsci/kfh24

[23] Rogge, W. F., Hildemann, L. M., Mazurek, M. A., Cass, G. R. and Simoneit, B. R. T. (1993). Sources of Fine Organic Aerosol—3. Road Dust, Tire Debris, and Organometallic Brake Lining Dust—Roads As Sources and Sinks. *Environmental Science & Technology 27(9),* 1892-1904.

Particle Size and Deposition

Particle size has a significant bearing on bodily deposition, net exposure, and corresponding health risk, even within the PM2.5 size fraction. Key metrics for deposition assessment include the percentage of inhaled particles that remain deposited and not exhaled (known as the deposition fraction) and the location where particles are deposited within the body).[24] Within the PM2.5 size range, particles less than 0.1 microns (PM 0.1) and greater than 10 microns are least likely to be exhaled, and thus have higher deposition fractions.[25]

The relationship between particle size, zone of deposition, and deposition fraction are depicted in Figure 2 and is summarized as follows:

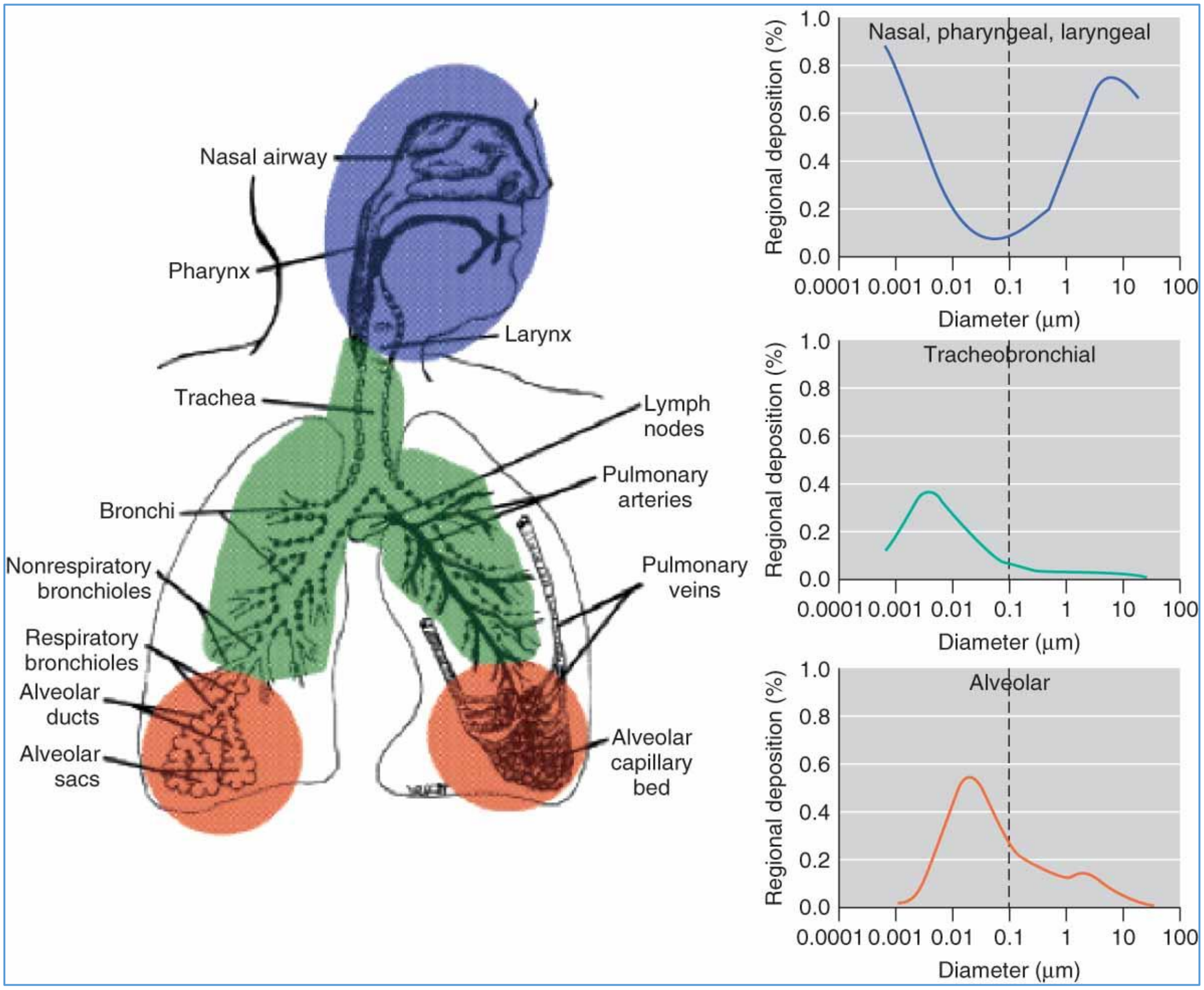
- **Nasal, pharyngeal, laryngeal:** The uppermost segment of the respiratory tract is the primary zone of deposition for the smallest and largest particles. Approximately 80% of extremely small particles of one nanometer (0.001 micron) diameter or less are retained here with a comparable deposition fraction in the 10 micron diameter.

- **Tracheobronchial:** The deposition fraction in this zone peaks at nearly 40% for particles with diameters between 1 and 10 nanometers. Almost 100% of the particles above the PM 0.1 size cut are either deposited in the other two deposition zones or exhaled.

- **Alveolar:** Deposition in the gas exchange zone of the lungs peaks in the 10 nanometer size with a gradual dissipation of deposition beyond the PM 0.1 size.

[24] International Commission on Radiological Protection [ICRP]. (1995). Human Respiratory Tract Model for Radiological Protection. ICRP Publication 66. *Annals of the ICRP 24,* 1–3.
[25] U.S. Environmental Protection Agency [EPA]. (2004, October). *Air Quality Criteria for Particulate Matter*: Final Report. Washington, D.C.: EPA 600/P-99/002aF-bF.

Figure 2 Relationships between Particle Size Distribution and Respiratory Deposition Zones



Deposition of very small particles in the alveolar region of the lungs results in the delivery of their chemicals into the bloodstream where they promote cardiovascular disruption and immune system sensitization.[26] These chemicals can trigger heart attacks and premature death among individuals with pre-existing heart conditions.[27] Extremely small particles can also be absorbed into the brain via the nasal tract, bypassing the protection provided by the blood-brain barrier.[28] The effects of particles deposited primarily in the tracheobronchial region center on respiratory function.[29]

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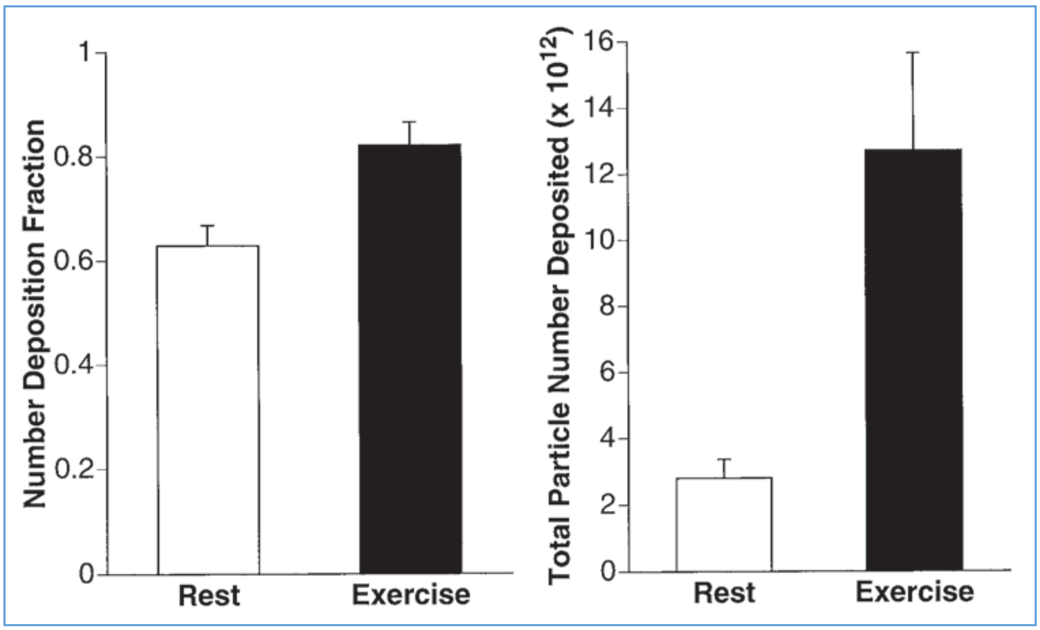
[26] Delfino, R.J., Sioutas, C., & Malik, S. (2005). Potential Role of Ultrafine Particles in Associations between Airborne Particle Mass and Cardiovascular Health. *Environmental Health Perspectives 113(8),* 934–946.
[27] Nel A. (2005). Air Pollution-Related Illness: Effects of Particles. *Science, 308(5723),* 804–806. doi: 10.1126/science.1108752
[28] Oberdorster, G., Sharp, Z., Atudorei, V., Elder, A., Gelein, R., Kreyling, W., & Cox, C. (2004). Translocation of Inhaled Ultrafine Particles to the Brain. *Inhalation Toxicology, 16(6-7)*, 437–445. doi: 10.1080/08958370490439597
[29] U.S. Environmental Protection Agency [EPA]. (2009). *Integrated Science Assessment for Particulate Matter*: Final Report. Washington, D.C.: EPA/600/R-08/139F.

As depicted in Figure 3, particle deposition and associated health risk is magnified by exercise in several ways. First, the amount of inhaled air per minute rises substantially when breathing faster and more deeply. Second, breathing harder means that particles, especially PM 0.1, are more likely to penetrate the alveolar region of the lungs where absorption into the bloodstream occurs. A 2003 study[30] found that during moderate exercise 80% of inhaled PM 0.1 was deposited in the lungs, compared with 60% lung retention while at rest (see left panel in Figure 3). However, because the volume of air exchanged per minute increases substantially during exercise, overall PM 0.1 deposition increased by 450% (right panel). This phenomenon underscores the health risk posed to individuals who work or exercise in areas where sources of hydrocarbon combustion result in very high PM 0.1 particle concentrations.

Figure 3 Particle Number Deposition Fraction (DF) and Total Particle Deposition of PM 0.1 at Rest and Exercise



EXPOSURE TO ULTRAFINE PARTICLES (PM 0.1)

Elevated exposure to freshly emitted PM 0.1 is a critical health risk factor that often does not correspond to ambient PM2.5 concentrations at local monitors. PM 0.1 are formed through nucleation and gas-to-particle reactions and grow (or shrink) through a number of mechanisms including condensation, coagulation, and volatilization.[31] High concentrations of primary (directly emitted) PM 0.1 are typically found near fresh sources of hydrocarbon combustion, including coal plants, charbroiled meat, diesel and gasoline vehicles, wood combustion, and lawn care equipment. These combustion particles start out very small, grow larger over time and space, and evolve chemically at

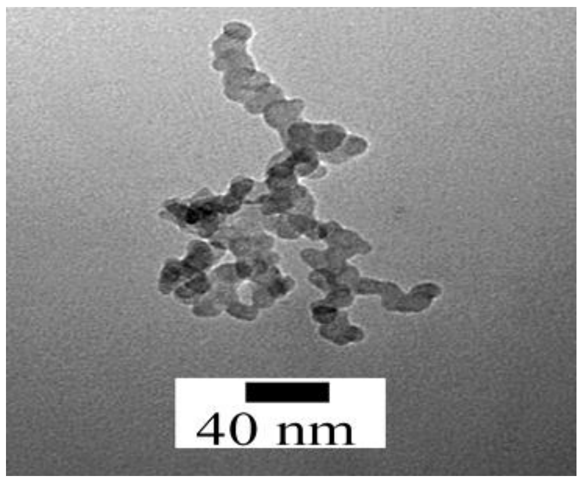
[30] Daigle, C., Chalupa, D.C., Gibb, F.R., Morrow, P.E., Oberdörster, G., Utell, M.J., & Frampton, M.W. (2003). Ultrafine Particle Deposition in Humans during Rest and Exercise. *Inhalation Toxicology, 15(6)*, 539–552. doi: 10.1080/08958370304468

[31] Solomon, P. (2012). An Overview of Ultrafine Particles in Ambient Air. *EM: Journal of the Air & Waste Management Association, May,* 18–26.

the same time. Secondary PM 0.1 typically is formed via particle nucleation from gas or liquids and is characterized by larger geographic scales and more uniform population exposure.

Despite being extremely small, PM 0.1 has an extremely high surface area, as seen in Figure 4. Compared to an equal mass of particles of two microns (PM 2.0) in diameter, ultrafine particles that are 1,000 times smaller (20 nanometers or PM 0.02) nonetheless have 125 times the surface area.[32] In addition, PM 0.1 produced by hydrocarbon combustion typically contain a rich mixture of chemicals with potential health effects, including nickel, iron, vanadium, PAH, and others.[33] Chemical potency, very high surface area, and alveolar deposition are signal characteristics of PM 0.1 from hydrocarbon combustion that result in significant health risks from chronic exposure.

Figure 4 Electron Micrograph of an Ultrafine Particle[34]



Sub-populations who live or work near sources of primary PM 0.1 from hydrocarbon combustion are particularly at risk. Health scientists have generated an overwhelming body of epidemiological (statistical) evidence that individuals near freeways (less than 300 meters) are being harmed via chronic inhalation of PM 0.1 from vehicles.[35] Similarly, a 2011 study of residential wood burning in Cambria, California found very high neighborhood concentrations of PM 0.1 from wood smoke even though concentrations of PM2.5 at the nearby ambient monitor met the federal health standard.[36] The health risk from fresh sources of PM 0.1 has important environmental justice implications to the extent that elevated exposure to near-source PM 0.1 is

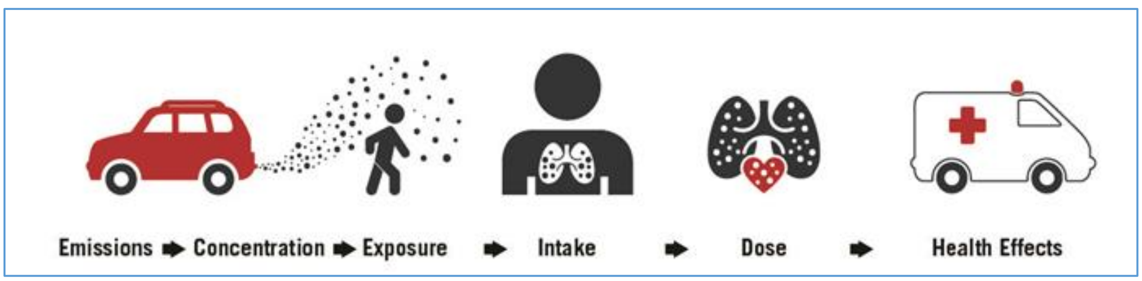
[32] Donaldson, K., Stone, V., Clouter, A., Renwick, L., & MacNee W. (2001). Ultrafine Particles. *Occupational Environmental Medicine 58*, 211–216. doi: 10.1136/oem.58.3.21
[33] Morawska, L., Ristovski, Z., & Jayaratne, E.R. (2008). Ambient Nano and Ultrafine Particles from Motor Vehicle Emissions: Characteristics, Ambient Processing and Implications on Human Exposure. *Atmospheric Environment, 42(35)*, 8113–8138. doi: 10.1016/j.atmosenv.2008.07.050
[34] Nel A. (2005). Air Pollution-Related Illness: Effects of Particles. *Science, 308(5723),* 804–806. doi: 10.1126/science.1108752
[35] Gauderman, W., Vora, H., McConnell, R., Berhane, K., Gilliland, F., Thomas, … Peters, J. (2007). Effect of Exposure to Traffic on Lung Development from 10 to 18 Years of Age: A Cohort Study. *The Lancet 369(9561*), 571–577.
[36] Thatcher, T. & Kirchstetter, T. (2011). *Assessing Near-Field Exposures from Distributed Residential Wood Smoke Combustion Sources*. Report prepared for the California Air Resources Board.

concentrated in communities that already face sources of risk related to race or socioeconomic status.[37] Chronic exposure to near-source PM 0.1 commonly occurs in locations where local monitors are in attainment for PM2.5 standards and during seasons when ambient PM2.5 concentrations are below the annual daily standard.

3.1.1 Population Proximity and Intake Fraction

Estimating total exposure and net health risk from a given source of PM2.5 requires that population proximity and population density be considered in addition to the source's contribution to the regional PM2.5 emissions inventory and its toxicity. In addition to factors governing net deposition of inhaled particles reviewed above, net population exposure from the source in question is also shaped by the number of exposed individuals who inhale the emissions and the duration of exposure in conjunction with aerosol concentration levels (see Figure 5). Known as the intake fraction, this measure of population exposure is defined empirically as the pollutant mass inhaled divided by the mass emitted.[38] Intake fraction is useful in connecting emissions to health risk because the mass inhaled is a better indicator of health risk than the mass emitted or airborne concentration. Two different pollutant sources with very comparable emission rates of the same pollutant can nonetheless have significantly different intake fractions depending on the surrounding population density. For example, sources of PM2.5 located in rural areas may have an intake fraction that is 10 to 100 times smaller than a comparable source located within a densely populated city.

Figure 5 Simplified Intake Fraction Model



The relevance of the intake fraction concept can be seen in a recent study of neighborhood variability in wood smoke concentrations in Cambria, California.[39] The winter study found very high concentrations of PM 0.1 on a neighborhood scale that were often not reflected in PM2.5 concentrations measured by local air quality monitors. In effect, a single wood-burning household had the effect of enveloping the adjacent and downwind homes with a PM 0.1 plume. Furthermore, the study also found that wood smoke PM 0.1 was infiltrating adjacent homes that were not burning, with an average indoor concentration found to be 74% as high as immediately outside the

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37 London, J., Huang, G., & Zagofsky, T. (2011). *Land of Risk, Land of Opportunity: Cumulative Environmental Vulnerabilities in California's San Joaquin Valley*. Davis, CA: University of California, Davis, Center for Regional Change.
38 Marshall, J.D., & Nazaroff, W.W. (2004, October). *Using Intake Fraction to Guide CARB Policy Choices: The Case of Particulate Matter*. Unpublished California Air Resources Board Report.
39 Thatcher, T. & Kirchstetter, T. (2011). *Assessing Near-Field Exposures from Distributed Residential Wood Smoke Combustion Sources*. Report prepared for the California Air Resources Board.

homes. Taking into consideration the length of PM 0.1 inhalation during sleeping hours, the relatively high concentration of PM 0.1 found in the plume, and the number affected of individuals in an urban neighborhood, the intake fraction resulting from the source of the wood smoke would be very high. Assuming that this nightly exposure occurred over the course of a season, the cumulative health risk to the neighborhood would be considerable and would almost certainly exceed the risk indicated by daily concentrations of PM2.5 measured by ambient monitors.

HEALTH IMPACTS OF AIR TOXICS

According to section 39655 of the California Health and Safety Code, a toxic air contaminant (TAC) is "an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health." Toxic air contaminants, otherwise known as “air toxics”, are emitted from mobile sources (i.e., cars, trucks, buses, tractors, etc.), which are primarily regulated by the State and U.S.EPA; area sources (i.e., consumer products, dry cleaners), which are regulated the State, U.S.EPA, and the District; and from stationary sources regulated primarily by the District.

Adverse health effects of air toxics can vary by person based on a variety of factors. The EPA, California Office of Environmental Health Hazard Assessment (OEHHA), and CARB have assessed the health effects of variety of air toxics based on scientific studies that estimate the increased risk of illness from a specific human exposure to a toxic air contaminant. This information is then used to understand the risk associated with exposure to these air toxics in the community based on four key factors[40]:

1. **Hazard identification:** describes the illnesses caused by a toxic air pollutant and the amount of evidence for those illnesses.

2. **Exposure assessment:** The size of the increased health risks depends on the exposure level and duration, as well as the number of people exposed. These are estimated as part of the exposure assessment.

3. **Dose-response:** The dose-response assessment estimates the dose-response relationship, which mathematically shows the change in the likelihood of health effects with changes in the levels of exposure to a toxic air pollutant.

4. **Risk characterization:** The risk characterization uses the above assessments to describe the type and size of any increased risk expected as a result of exposure to the air pollutant. It also includes a discussion of the uncertainties associated with the risk estimates.

Air toxics can cause health problems by interfering with normal body functions. Commonly, air toxics can change chemical reactions within individual cells, which can kill cells, impair cell function, or re-direct cell activity. The results can be damaged

[40] https://www3.epa.gov/airtoxics/3_90_024.html

organs, birth defects when the cells of an unborn child are damaged, or cancer that develops when cells begin to grow at an uncontrolled rate. Air toxics can also cause other serious non-cancer health effects. These health effects vary by compound and can include immune system, neurological, reproductive, developmental, and respiratory damage.

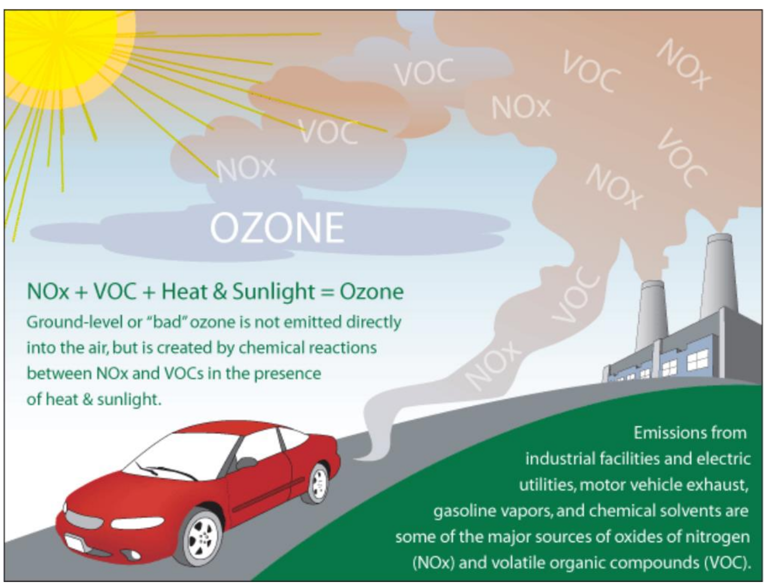
In addition to certain types of PM2.5 as discussed in this appendix, air toxics can be volatile organic chemicals (VOC's), pesticides, or other compounds that, based on scientific studies of exposure to humans and other mammals, have the propensity to cause these short or long-term health effects.

Chapter 4 of this CERP details how AB 2588, California's *Air Toxics "Hot Spots" Information and Assessment Act,* required the District to quantify emissions of air toxics, determine the health risk caused by those emissions, report emissions and any significant risks through written public reports and neighborhood public meetings, and take steps to reduce such risks. Appendix E outlines the health risk assessment status for the facilities within the Shafter Community.

HEALTH IMPACTS OF OZONE

Ground-level ozone, a gas of three oxygen atoms (O3), is the main component of summertime smog. It is not directly emitted into the atmosphere, but produced by photochemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOCs) in the presence of sunlight. The Shafter community generally experiences the highest ozone concentrations on hot, sunny summer days with prolonged periods of stagnation. Figure 6 below further illustrates ozone formation.

Figure 6 Ozone Formation



Breathing ozone can trigger a variety of health problems, including chest pain, coughing, throat irritation, and congestion. It can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. Children are at a greater risk of experiencing negative health impacts because their lungs are still developing and they are more likely to be active outdoors when ozone levels are high, thus increasing their exposure. Studies have linked rising hospital admissions and emergency room visits to higher ozone levels. Although ozone is formed and transported on a regional scale and not directly emitted from local sources, reducing local VOC and NOx emissions within the community will have positive health impacts on residents within and around Shafter.

Air Pollution-Related Health Indicators in Shafter Community

As described above, local air pollution studies have helped identify and track the effects of air pollution on short and long-term negative health impacts of Valley residents. In addition, statewide studies led by OEHHA (Office of Environmental Health Hazard Assessment) and CalEPA have looked at a variety of health indicators on a census-tract level to help understand the geographical, economical, and social differences between communities and identify the most disadvantaged and impacted areas in the State, culminating in the State's CalEnviroScreen (CES) 3.0 tool. Using an understanding of the relationship between poor air quality and certain health indicators (cardiovascular disease, asthma, and low birth weight), the District used CES 3.0 data to highlight air pollution-linked health indicators specifically in the Shafter community. As shown in Figures 7 through 9 below, many areas in the Shafter community are above the 95 percentile, or top 5%, for all three health indicators. Through the District's valley-wide efforts and community action through AB 617, the ultimate goal is to contribute to significantly improving public health in Shafter by improving air quality.

The District will continue to work with the Steering Committee, OEHHA, CARB, and health researchers to track and support local research efforts to understand the public health impacts of local and regional emissions reduction efforts.

Figure 7 Low-Birth Weight CES Percentile Score in Shafter

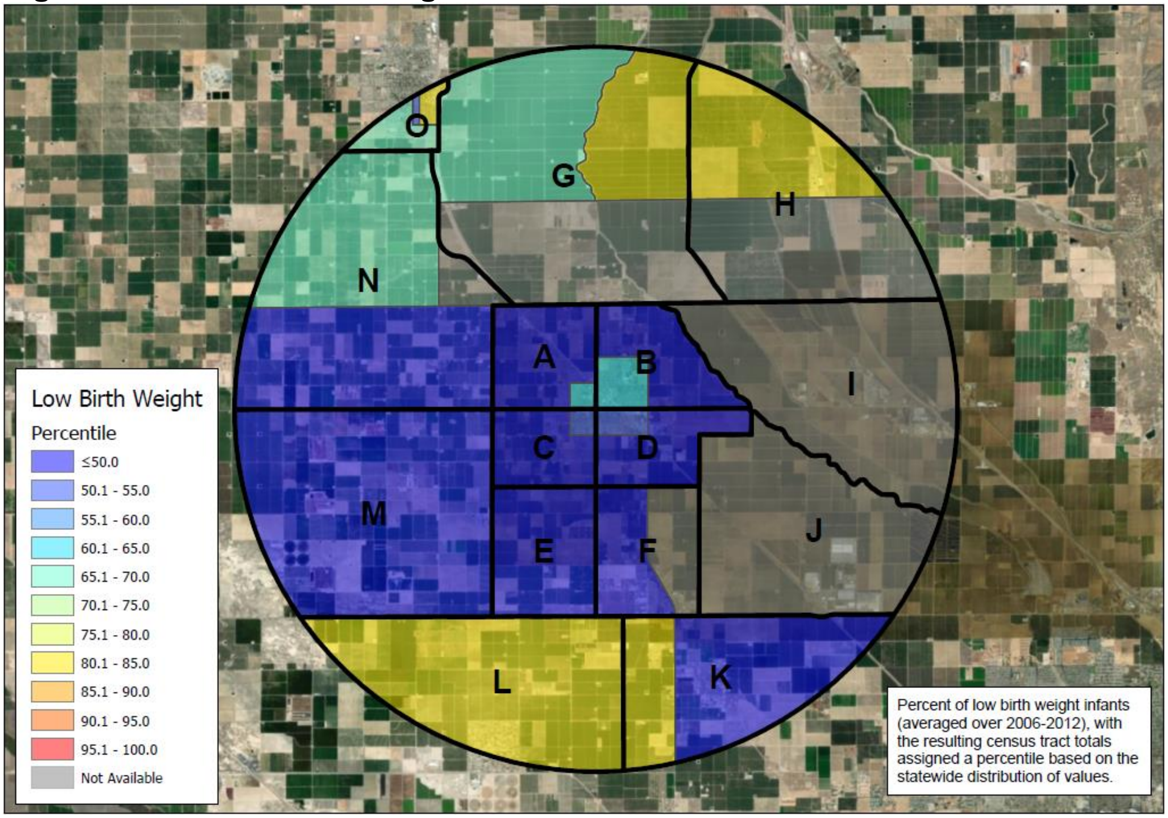


Figure 8 Cardiovascular Disease CES Percentile Score in Shafter

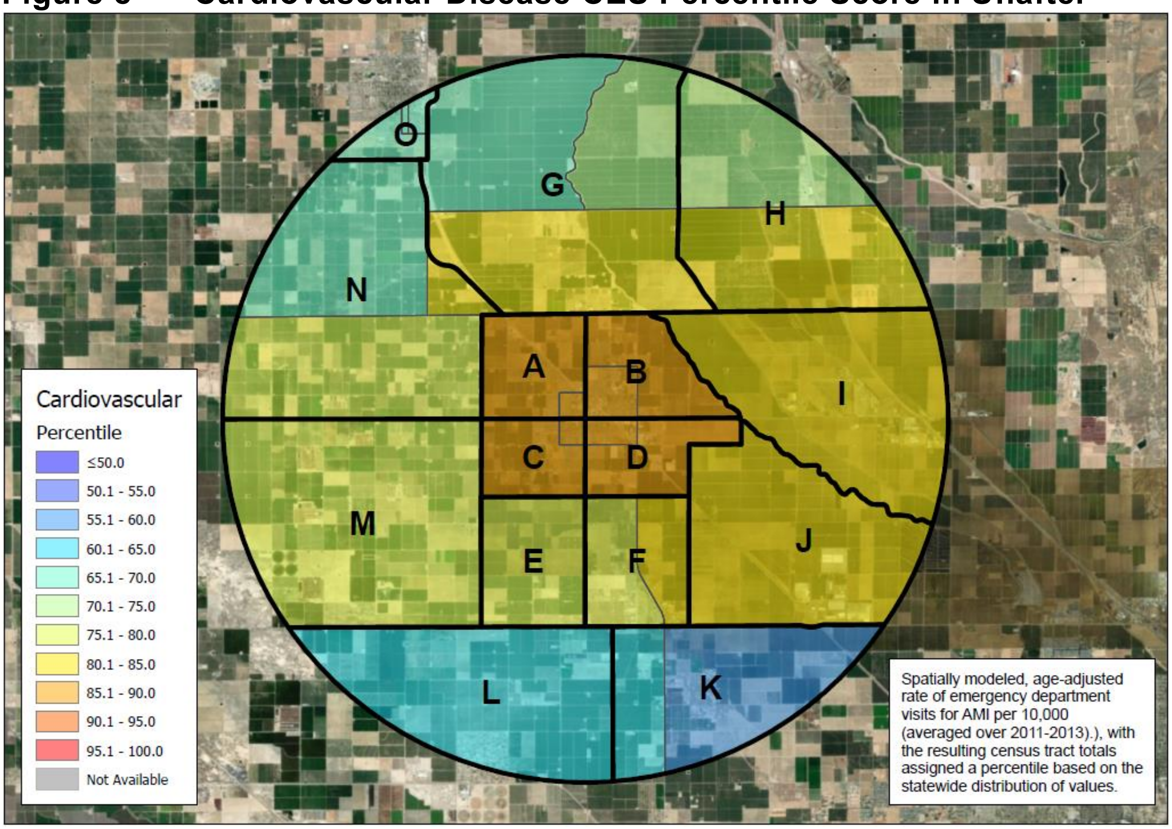
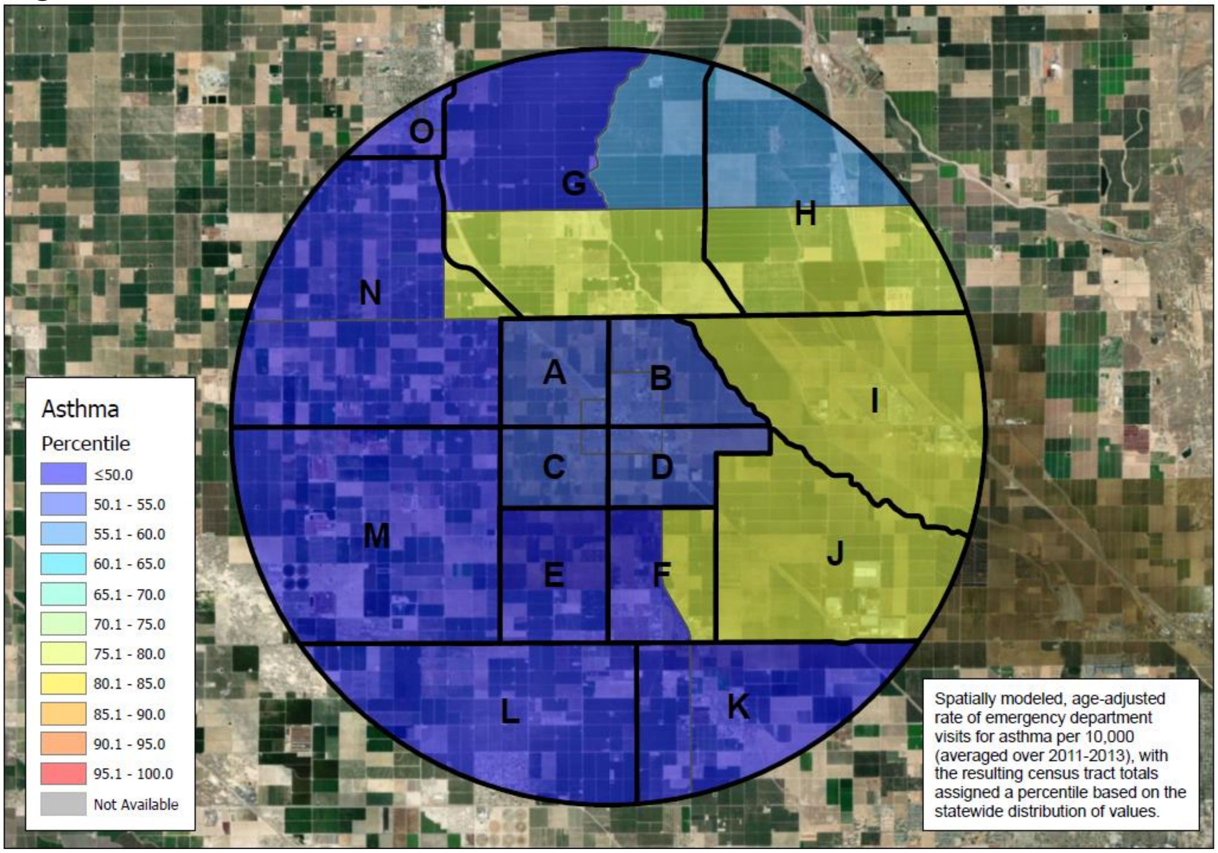


Figure 9 Asthma CES Percentile Score in Shafter



DEPARTMENT OF PESTICIDE REGULATION COMMITMENTS FOR PESTICIDE-RELATED ACTIVITIES IN THE SHAFTER AREA

Attachment to Draft CERP Update

Department of Pesticide Regulation

Val Dolcini
Acting Director

Gavin Newsom
Governor

Jared Blumenfeld
Secretary for Environmental Protection

DPR's Current and Ongoing Commitments for Pesticide-Related Activities in the Shafter Area

Monitoring

- Current Monitoring
  - The California Department of Pesticide Regulation (DPR) is committed to continue operation of the pesticide air monitoring network sampling location in the community of Shafter past the conclusion of the CARB-DPR 2-year limited term monitoring collaboration.

- Monitoring Expansion
  - DPR is committed to explore options to expand the pesticide air monitoring activities in the Shafter area. However, unlike the California Air Resources Board (CARB) or the San Joaquin Valley Air Pollution Control District (Air District), AB 617 funding has not been made available to DPR. Depending on the funding made available to DPR, DPR is committed to lead or participate in additional pesticide air monitoring activities. If no funding is made available, DPR is committed to participating in any pesticide air monitoring activities as a consultant to ensure the quality of the collected air samples.

Pesticide Notification System

- DPR is committed to explore options for a pesticide application notification system in the Shafter area.
- DPR will work with the Kern County Agricultural Commissioner's (CAC) Office, CARB, and the Air District to identify feasible options for the development and implementation of a suitable pesticide application notification system.
- DPR will review previous pilot notification programs and explore new feasible options that could potentially provide the Shafter community with a suitable notification system.
- Depending on the funding available to DPR for this effort, DPR will work with CARB, Air District, and CACs to define the scope and implementation of any possible notification system.

Emission Reductions

- DPR is committed to developing regulations to reduce exposures to 1,3-D in ambient air.
- DPR is currently working through the legal Pesticide Toxic Air Contaminant (TAC) process with its partner agencies including Office of Environmental Health Hazards Assessment (OEHHA), CARB, Air Districts, and CACs during the development of the regulations.
- DPR will work with the Air District to set aside agenda time during a fall Shafter Steering Committee meeting to discuss the possible mitigation options as well as to detail the regulatory process in further detail to the committee and community members

Additional Resources

- DPR will work with local partners to identify and promote use of alternative agricultural practices in the Shafter area.
- DPR promotes the adoption and implementation of effective integrated pest management (IPM) systems and practices that reduce risks from pesticide use to human health and the environment in agricultural and non-agricultural settings. To aid in this effort, DPR makes Pest Management Alliance Grants available on a yearly basis in an effort to support the development of methods or practices to reduce pesticide associated risk. DPR is committed to promote and encourage Shafter groups to apply for the Pest Management Alliance Grants.