PRINT

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#_______

BOARD AGENDA FACT SHEET

Air Pollution Control District
Department /Agency

December 2, 2014
Requested Board Date

1. Request:

Board Approval	X	**Information Only/Presentation**	
Other (specify) ________		**Schedule Hearing Time:** ______	

2. Requested Action: *Type requested action below*

Request for Approval and Adoption of the "Imperial County 2013 State Implementation Plan for the 2006 24-Hour PM2.5 Moderate Nonattainment Area" (IC 2013 2006 24-hr PM2.5 SIP), adoption of the associated findings as presented in the Staff Report and Certification and adoption of the Negative Declaration of the IC 2013 2006 24-Hr PM2.5 SIP.

3. **Cost $** 0.00 **Source:** N/A

4. **If approval of Contract, reviewed/approved by County Counsel on:** N/A

By: N/A **Action Request #** N/A
Assigned by County Counsel's Office

5. **If approval of position allocation change, approved by Human Resources on:** N/A

By: N/A

6. **Electronic copy submittal date:** Nov 17, 2014 **By:** Monica N. Soucier

Department Head/Agency Representative

INSTRUCTIONS: ***Back-up must be submitted 11 BUSINESS days prior to requested date. Back-up submitted must contain an Original and 6 copies. Back-up must be submitted in a PDF format to cobstaff@co.imperial.ca.us.***

CEO/CLERK USE ONLY: BOARD DATE: ________

Action ______ **Filing** ______ **Consent** ______ **Presentation** ______

Hearing ______ **CEO Approval** ______ **Other (specify)** ________

Review: ________ *Clerk* ________ *Date* ________ *CEO* ________ *Date*

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AIR POLLUTION CONTROL DISTRICT

December 02, 2014

TO: Honorable Board of Directors

FROM: Brad Poiriez, Air Pollution Control Officer

Brad Poiriez

SUBJECT: Request for Approval and Adoption of the "Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area" (IC 2013 2006 24-hr $PM_{2.5}$ SIP), adoption of the associated findings as presented in the Staff Report and Certification and adoption of the Negative Declaration of the IC 2013 2006 24-Hr $PM_{2.5}$ SIP.

The ICAPCD respectfully requests to be placed on the Air Pollution Control District Board of Directors December 02, 2014 agenda for the approval and adoption of the "Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area" (IC 2013 2006 24-hr $PM_{2.5}$ SIP), adoption of the associated findings as presented in the Staff Report and Certification and adoption of the Negative Declaration of the IC 2013 2006 24-Hr $PM_{2.5}$ SIP. The ICAPCD is asking for the Board's consideration in adopting the following:

1. The IC 2013 2006 24-hr $PM_{2.5}$ SIP which fulfills the requirements of the Clean Air Act (CAA) for those areas classified as a "moderate" non-attainment area for $PM_{2.5}$. The IC 2013 2006 24-hr $PM_{2.5}$ SIP incorporates updated emissions inventories, the CAA section 179B analysis, an analysis of Reasonable Available Control Measures (RACM), an assessment of Reasonable Further Progress (RFP) and a discussion of contingency measures. The IC 2013 2006 24-hr $PM_{2.5}$ SIP satisfies the planning requirements set forth in the federal CAA including establishing a transportation conformity budget based on the latest planning assumptions. The IC 2013 2006 24-hr $PM_{2.5}$ SIP demonstrates that the Imperial County would have attained the 24-hour $PM_{2.5}$ National Ambient Air Quality Standards (Standard) "but-for" international transport from Mexico.

2. The Negative Declaration for the IC 2013 2006 24-hr $PM_{2.5}$ SIP which fulfills the purpose and intent of the California Environmental Quality Act. The ICAPCD prepared an Initial Study to help identify and address any potential environmental impacts associated with the Draft IC 2013 2006 24-hr $PM_{2.5}$ SIP and presented the analysis to the Environmental Evaluation Committee (EEC) on October 23, 2014. The EEC proposed a Negative Declaration because there was no evidence presented to suggest that the IC 2013 2006 24-hr $PM_{2.5}$ SIP would lead to or result in significant adverse impact to the environment.

3. The findings included in the staff report for all the above.

The IC 2013 2006 24-hr $PM_{2.5}$ SIP includes analyses which consisted of assessing emission inventories from Imperial County and Mexicali; evaluating the composition and elemental make up of samples collected on Calexico violation days; reviewing the meteorology associated with high concentration measurements; and, performing directional analysis of the sources potentially impacting the Calexico $PM_{2.5}$ monitor. These analyses demonstrate that emissions originating in Mexico impacted measured $PM_{2.5}$ levels in Calexico during five violation days between 2010 and 2012. The analyses also shows that Imperial County would have attained the 24-hour $PM_{2.5}$ standard but for international transport.

Therefore the ICAPCD recommends adoption of the IC 2013 2006 24-hr $PM_{2.5}$ SIP, the proposed Negative Declaration for the IC 2013 2006 24-hr $PM_{2.5}$ SIP and the associated findings as presented in the staff report.

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AIR POLLUTION CONTROL DISTRICT

STAFF REPORT

FINAL DRAFT
Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area (2013 $PM_{2.5}$ SIP)

I Executive Summary

Since 1997 the United States Environmental Protection Agency (U.S. EPA) has released two National Ambient Air Quality Standards (Standard) for particulate matter or PM. The PM Standards included PM_{10} and $PM_{2.5}$.

For $PM_{2.5}$, U.S. EPA determined, using monitoring data, that Imperial County attained or met the 1997 standard (65µg/m^3). However, on October 17, 2006, U.S. EPA strengthened the primary and secondary 24-hour $PM_{2.5}$ NAAQS from 65ug/m^3 to 35ug/m^3. The U.S. EPA designated Imperial County as "Moderate" Nonattainment for the 2006 $PM_{2.5}$ NAAQS and required Imperial County to submit a $PM_{2.5}$ SIP to the U.S. EPA by the end of December 2014.

The Clean Air Act requires a $PM_{2.5}$ SIP to address certain elements affecting an identified nonattainment area (NA). They are, 1) an emission inventory; 2) an attainment demonstration 3) transportation conformity budgets; 4) New Source Review updates; 5) an analysis of Reasonably Available control Measures and Technologies (RACM/RACT); 6) an assessment of Reasonable Further Progress (RFP); and 7) Contingency Measures.

Finally, in order not to unduly burden border regions that are significantly impacted by international emissions, the Clean Air Act allows "States" to demonstrate, to the satisfaction of U.S. EPA, that the area qualifies for treatment under section 179B, which provides that areas which would have attained the standard by the attainment date but for emissions from outside the U.S. are not to be subject to reclassification (i.e. from Moderate to Serious)

II Final Draft Imperial County 2013 $PM_{2.5}$ SIP (Plan) Description

The 2013 $PM_{2.5}$ SIP (Plan) for Imperial County is a highly technical and scientific plan developed cooperatively with the California Air Resources Board and U.S. EPA. The $PM_{2.5}$ SIP demonstrates that emissions originating in Mexico impacted the Calexico area during five exceedance days between 2010 and 2012. The $PM_{2.5}$ SIP demonstrates that Imperial County would have attained the 24-hour $PM_{2.5}$ standard "but for" emissions from Mexicali. Each chapter addresses specific elements required by the Clean Air Act.

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AIR POLLUTION CONTROL DISTRICT

Chapter One - Introduction and Background

This chapter introduces the reader to the pollutant in question, $PM_{2.5}$. The chapter gives the reader the necessary regulatory background, identifies the regulatory agencies affected, a general description of the nonattainment area identified in Imperial County and gives a general overview of the nature, components and the affects of $PM_{2.5}$. Essentially, this chapter brings together the necessary data and discussion in presenting the $PM_{2.5}$ SIP for the 2006 NAAQS.

Chapter Two – Ambient and Air Quality Data

This chapter introduces the reader to the concept of ambient air, its collection and use of data. It gives the reader information regarding the nature of the interaction between the identified pollutant, meteorology, climate, and location. This chapter provides an overview of impact of climate and meteorology on the dispersion of particulate matter, a description of the local air monitoring network and an overview of $PM_{2.5}$ data collected and its temporal and spatial patterns within Imperial County. Essentially, the air quality data demonstrates that air quality in Brawley and El Centro has improved showing a reduction of the average design value; however, in Calexico, air quality has not improved and remains above the $PM_{2.5}$ standard of 35µg/m³.

Chapter Three – Emissions Inventory

This chapter explains and introduces the reader to the concept of an "Emissions Inventory". The chapter explains what an emissions inventory is, an accounting of the amount of a given pollutant that is emitted into the atmosphere by various sources over a specific time period. It also explains how a given pollutant is classified or categorized, either a "stationary source", "area-wide source" or "mobile source". The chapter further explains and discloses the pollutants under review, $PM_{2.5}$ (known as direct $PM_{2.5}$) and its precursors (NOx, SOx, VOC's, and ammonia) and provides the reader the time period used to analyze the Plan, 2008, 2011 and 2012. To complete the cycle the chapter discloses the actual concentrations per classification for each of the identified years, 2008, 2011 and 2012. Finally, because emissions inventories are an accounting of the concentrations of a given pollutant the chapter discusses the pollutants within the context of "significance". Overall the chapter identifies the significant sources of direct $PM_{2.5}$ as unpaved road dust, fugitive windblown dust, farming operations (tilling), managed burning and disposal and emissions from aircraft. No significant sources were identified for precursor emissions.

Chapter Four – Attainment Demonstration

Chapter 4 is an overview of the 179B analysis, "But-for" emissions from Mexicali, Mexico found in "Attachment A". Chapter 4 summarizes the technical and scientific evidence analyzed within the 179B analysis which demonstrates that the Imperial

County nonattainment area (NA) would have timely attained the $PM_{2.5}$ standard "but for" emissions from Mexicali, Mexico.

Summary of the 179B Analysis for $PM_{2.5}$ Emissions Impacting Calexico in Imperial County

The 179B Analysis utilized techniques referenced in U.S. EPA guidelines for areas impacted by emissions originating outside the U.S. Taking a scientific view point, with no preconceived notions, the analysis consisted of assessing emission inventories from Imperial County and Mexicali; evaluating samples collected from the Calexico monitor on exceedance days; reviewing meteorology; and performing what is known as a directional analysis which is an analysis that begins at the monitor and follows back to the direction that it came from.

The technical analysis (Attachment A) indicated that the violations which occurred in Calexico for the 24-hour $PM_{2.5}$ were due to emission sources not found in California. The analysis further found that $PM_{2.5}$ concentrations at El Centro and Brawley, which are more representative of local emissions within Imperial County, were significantly lower during those Calexico violation days. Overall, violations in Calexico occurred during stagnant conditions, where pollution from holiday activities in Mexicali, including extensive firework displays and bonfires containing plastics, tires and other refuse materials filled the entire air shed and drifted into Calexico. The analysis indicated that "but for" increased pollution emissions from the Mexicali Metropolitan area the Calexico $PM_{2.5}$ levels would have attained the 24-hour $PM_{2.5}$ standard.

The 179B Analysis demonstrates that emissions originating in Mexico impacted the Calexico area during five exceedance days between 2010 and 2012. The analysis also demonstrates that Imperial County would have attained the 24-hour $PM_{2.5}$ standard "but for" emissions from Mexicali.

Chapter Five – RACM/RACT, RFP, Contingency Measures and Transportation Conformity

Chapter 5 provides the reader with the methodology, summary and analysis of the Reasonable Available Control Measures (RACM), Reasonable Further Progress (RFP), Contingency Measures and the Transportation Conformity budgets, all requirements of moderate nonattainment areas. Chapter 5 explains to the reader the why's, how's and results of the RACM analysis required by the Clean Air Act. Without a proper RACM analysis, RFP, Contingency Measures and Transportation Conformity budgets become difficult to assess.

Chapter 5 explains the regulatory background and requirements associated with any RACM analysis. It further summarizes the current measures and programs that are being implemented to address those significant sources of direct $PM_{2.5}$. As mentioned within the Chapter 3 summary no significant sources of $PM_{2.5}$ precursor emissions were identified. Chapter 5 summarizes the current rules applicable to unpaved road dust, fugitive windblown dust, farming operations (tilling), managed burning and disposal and describes the state mobile program which addresses emissions from aircraft. Chapter 5 refers the reader to "Attachment B" for detailed rule comparisons. The RACM analysis (which includes RACT) demonstrates that the emissions of the collective existing control measures are sufficient to maintain attainment "but for" emissions from an international source. However, in order to further protect the public health and to prepare for the newly adopted annual $PM_{2.5}$ standard Chapter 5 includes a commitment by Imperial County to further study sources of ammonia, i.e. Beef Feedlots, Composting Facilities and Agricultural Fertilizers.

In addition, Chapter 5 explains that RFP and Contingency Measures are met. The first year that the Imperial County NA would attain is 2012, therefore the milestones, which is required for any RFP demonstration, shows emissions decreasing linearly or staying the same from 2008 to 2012 (the attainment year), meeting the original intent of demonstrating progress towards attainment. Contingency measures are met because the attainment and RFP years are in the past. Since the Clean Air Act only requires contingency measures when RFP is not met, an RFP is met, then the requirement for contingency measures is met. Finally, Chapter 5 establishes the Transportation Conformity Budgets for $PM_{2.5}$ and NOx.

Chapter Six – Border Strategic Concepts

This Chapter provides evidence to the reader of ongoing efforts at the federal, state and local level to implement different programs to achieve mutual international goals oriented at education and protection of the public health and welfare. Generally the chapter provides the reader a complete overview of the programs associated with improving air quality in both Mexicali and Imperial County. This chapter introduces and describes the organizations and programs currently implemented for the benefit of both the Imperial and Mexicali valleys, such as: the web-based air quality and health information center, the school flag alert program, the Mexicali and Imperial education media campaign and the vehicle idling emissions study at the Calexico East and Calexico West ports of entry.

Chapter Seven – Conclusion and SIP Checklist

Chapter 7 provides the reader a checklist with a general description of the Clean Air Act requirement for Moderate Nonattainment Areas. The chapter provides a description and/or location to the reader where that identified requirement is found within the 2013 $PM_{2.5}$ SIP.

III California Environmental Quality Act (CEQA)

The Final Draft Imperial County 2013 $PM_{2.5}$ SIP (Plan) is a "project" as defined by the CEQA. Since the Plan imposes the greatest discretionary authority of approval upon the ICAPCD it is therefore the lead agency for this project. As part of the review process the ICAPCD examined the Plan for applicability to CEQA. Because the Plan does not proposed or imposed any new regulation and in fact demonstrates attainment of the Standard "but for" emissions from an international source a class "8" categorical exemption applies. However, in order to provide for optimum public participation and involvement the ICAPCD opted not to utilize the exemption and instead provide an additional resource for the identification of any potential environmental impacts associated with the Plan. Thus, in order to fulfill the purpose and intent of CEQA the ICAPCD prepared an Initial Study to help identify and address any potential environmental impacts associated with the Plan.

In accord with the Imperial County Planning and Development protocols for CEQA the Environmental Evaluation Committee (EEC) met October 23, 2014 at 1:30pm to discuss and review the prepared Initial Study. After discussion, review and input from the public the EEC made a "mandatory finding" of "No Impact" to the degradation to the quality of the environment. The EEC "[f]ound that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION …" was proposed based on the evidence on record. The final "finding" was signed by the Assistant Air Pollution Control Officer Reyes Romero on October 23, 2014 indicating that the ICAPCD would prepare a Negative Declaration.

The Public Notice of a proposed Negative Declaration was released for a 30 day comment period by the ICAPCD October 23, 2014. The transmittal list included 86 postal mailing as well as e-mails to local, federal, state, libraries, cities, school districts, special districts and others. In addition, the ICAPCD posted the Public Notice on the home page for the ICAPD, outside the main Administration building and outside the ICAPCD building. Comments are due by close of business November 25, 2014.

IV **Final Draft Imperial County 2013 $PM_{2.5}$ SIP (Plan) Development**

The Plan development extended over a period of five years with a cooperative tri-agency effort including the CARB, U.S. EPA and the ICAPCD to address the intricate technical aspects of the Plan. In order to engage additional perspectives and to gain insight into public opinion the ICAPCD introduced a draft version of the Plan October 1, 2014. Two workshops were held to afford the greatest amount of participation, an afternoon workshop in El Centro and an evening workshop in Calexico. CARB was present at both workshops to help explain the technical aspects of the Plan. Translation services, both in English and Spanish, were available for both workshops. The public notice inviting the community to participate was released in Spanish and English September 26, 2014. Two comments were received that were general and broad in nature. One comment was a statement that the commenter observed burning in Imperial County. The second comment asked about the servicing, operation and function of a monitor, no specific monitor was mentioned. Both comments were duly noted and discussed during the workshop in detail. The response by CARB and ICAPCD during the workshop was detailed and informative.

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The Public Hearing notice was released and published in the Imperial Valley Press legal section on October 24, 3014 and November 2, 2014. All interested parties were notified of the Public Hearing notice via e-mail and provided a link to the Plan on October 24, 2014.

V Recommendations

ICAPCD ADVISORY BOARD

The ICAPCD Advisory Board met to discuss and review the Imperial County Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area on November 10, 2014. The ICAPCD Advisory Board recommended the approval of the Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area, the staff report and it's findings.

ICAPCD STAFF

ICAPCD staff recommends adoption of the attached Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area and associated findings. Concurrently, the ICAPCD recommends the certification and adoption of the Negative Declaration for the Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area.

After addressing the technical and non-technical issues raised by the U.S. EPA, the Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area effectively demonstrates that Imperial County timely met attainment of the $PM_{2.5}$ standard "but for" emissions from Mexicali Mexico.

VI Declaration of Findings

The Imperial County Air Pollution Control District Board hereby finds as follows:

The ICAPCD is a regulatory agency and the public agency with the principle responsibility for carrying out the project.

Clean air is a valuable and essential natural resource.

U.S. EPA partially designated Imperial County as a nonattainment area for the $PM_{2.5}$ 24-hr standard, effective December 14, 2009.

The partial $PM_{2.5}$ nonattainment area includes the majority of the populated area in Imperial County.

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As a result of a ruling by the United States Court of Appeals for the District of Columbia circuit Imperial County was classified by "operation of law" as a "moderate" non-attainment area as required by subpart 4 provisions on June 2, 2014 by U.S. EPA.

The Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area meets the requirements of the federal Clean Air Act (CAA) for areas classified as "moderate" nonattainment for $PM_{2.5}$. In accordance with section 179B of the CAA, this Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area satisfies the attainment demonstration requirement satisfying the provisions of subpart 1 and subpart4 of the CAA.

Failure to adopt the Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area would guarantee that the Imperial County would not meet federal $PM_{2.5}$ standards as required by the CAA.

The Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area demonstrates attainment as required by the CAA with a long-term effect resulting in the reduction/maintenance in emissions from stationary and mobile sources.

The Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area incorporates an updated emissions inventory, the CAA section 179B analysis, an analysis of Reasonable Available Control Measures (RACM), an assessment of Reasonable Further Progress (RFP) and a discussion of contingency measures.

The Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area satisfies the planning requirements set forth in the federal CAA including establishing a transportation conformity budget based on the latest planning assumptions.

The continued implementation of the Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area existing control measures would provide for continued attainment of the $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS).

The Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area demonstrates that air quality monitored data for 2010 thru 2012 demonstrates that Imperial County would have been in attainment of the 24-hour $PM_{2.5}$ NAAQS "but-for" international emissions emanating from Mexico.

The Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area is considered a "project" pursuant to the CEQA and that an Initial Study was prepared and presented to the EEC on October 23, 2014 with a finding of "No Impact"

Imperial County prepared and subsequently released for a 30 day public comment period a Negative Declaration upon the recommendation of the EEC.

That Certification and approval is necessary of the Negative Declaration for the Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area because there has been no evidence presented to suggest that the Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area will lead to or result in significant adverse impacts to the environment.

The Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area is technically sound and capable of being understood by those persons directly affected by it.

The Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area does not conflict with or contradict any existing statute, court decision, state or federal regulation.

The Draft Imperial County 2013 State Implementation Plan for the 2006 24-Hour $PM_{2.5}$ Moderate Nonattainment Area is not duplicative of any existing state or federal regulation or plan.

The ICAPCD has a population of less than 500,000 people.

AIR POLLUTION CONTROL DISTRICT

FINAL

IMPERIAL COUNTY
2013 STATE IMPLEMENTATION PLAN FOR THE 2006 24-HOUR $PM_{2.5}$ MODERATE NONATTAINMENT AREA

December 2, 2014

Air Pollution Control Officer
Brad Poiriez

Assistant Air Pollution Control Officer
Reyes Romero

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Planning, Rule Development and Monitoring
Monica N. Soucier

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Imperial County Air Pollution Control District

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ACRONYMS

ACT	Alternative Control Technique
Addendum	U.S. EPA 1994 Addendum to the General Preamble
ANP	Annual Network Plan
AQI	Air Quality Index
AQTF	Air Quality Task Force
BACM	Best Available Control Measures
BACT	Best Available Control Technology
BAM	Beta Attenuation Monitors
BAR	Bureau of Automotive Repair
BECC	Border Environmental Cooperation Commission
BLM	Bureau of Land Management
BP	Barometric Pressure
CAA	Clean Air Act
CARB	California Air Resources Board
CDFA	California Department of Food & Agriculture
CEC	California Energy Commission
CEIDARS	California Emission Inventory Development and Reporting System
CFR	Code of Federal Regulations
CMP	Conservation Management Practice
COBACH	Colegio de Bachilleres; High School
CONALEP	National College of Technical Vocational Education
CTG	Control Technology Guidance
D.C.	District of Columbia
DCP	Dust Control Plan
DMV	Department of Motor Vehicle
DPR	Department of Parks and Recreation
EI	Emission Inventory
ERC	Emissions Reduction Credit
FFS	Future Further Study
FREP	Fertilizer Research and Education Program
FRM	Federal Reference Method
HAP	Hazardous Air Pollutants
HARP	Hot spots Analysis and Reporting Program
HNO_3	Nitric Acid
HWS	Horizontal Wind Speed
ICAPCD	Imperial County Air Pollution Control District
ITM	Instituto Technologico de Mexicali
LCAF	Large Confined Animal Facilities
MPO	Metropolitan Planning Organization
NA	Nonattainment Area
NAAQS	National Ambient Air Quality Standard

ACRONYMS

NH_3	Ammonia
NH_4	Ammonium
NH_4NO_3	Ammonium Nitrate
NMP	Nutrient Management Plan
NO_2	Nitrogen Dioxide
NO_3	Nitrate
NOx	Nitrogen Oxides
NSR	New Source Review
O_3	Ozone
OT	Outside Temperature
PM	Particulate Matter
PM_{10}	Particulate Matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$	Particulate Matter less than 2.5 microns in aerodynamic diameter
Preamble	U.S. EPA 1992 General Preamble
RACM	Reasonable Available Control Measures
RACT	Reasonable Available Control Technologies
RFP	Reasonable Further Progress
RH	Relative Humidity
RTPA	Regional Transportation Planning Agencies
SB700	Senate Bill 700 Florez Agricultural Sources
SCAG	Southern California Association of Governments
SCAQMD	Sacramento Valley Air Quality Management District
SCC	Source Classification Code
SCR	Selectrive Catalytic Reduction
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SJAPCD	San Joaquin Valley Air Pollution Control District
SLAMS	State or Local Air Monitoring Stations
SMP	Smoke Management Plan
SO_2	Sulfur Dioxide
SO_4	Sulfate
SOA	Secondary Organic Aerosols
SOx	Sulfur Oxides
SPA	Secretariat of the State of Baja California
SR	Solar Radiation
TPD	Tons Per Day
U	Units
$\mu g/m^3$	Micrograms Per Cubic Meter

ACRONYMS

U.S.	United States
U.S. BP	United States Border Patrol
U.S. EPA	United States Environmental Protection Agency
UABC	Autonomous University of Baja California
VOC	Volatile Organic Compounds
VSCC	Very Sharp Cut Cyclone
WD	Wind Direction
WESTAR	Western States Air Resources Council
WMP	Waste Management Plan
WRAP	Western Regional Air Partnership

CHAPTER 1 INTRODUCTION AND BACKGROUND

1.1 Introduction

This document brings together the necessary data and discussion in presenting the State Implementation Plan (SIP) for the 2006 24-Hour Fine Particulate Matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$) National Ambient Air Quality Standard (NAAQS). This chapter provides an overview of particulate matter (PM) as an air pollutant, a brief description of the Imperial County area, and a discussion of the purpose, regulatory background, and regulatory agencies concerned with this SIP.

1.2 Federal $PM_{2.5}$ Standards and Implementation

The United States Environmental Protection Agency (U.S. EPA) is required under section 108 of the Clean Air Act (CAA) to periodically review and establish health-based air quality NAAQS for pollutants which "may reasonably be anticipated to endanger public health and welfare"[1]. Section 109 of the CAA directs the Administrator to propose and promulgate "primary" and "secondary" NAAQS for those pollutants identified under section 108.

On July 18, 1997, U.S. EPA issued its final rule revising the PM NAAQS, by adding two new $PM_{2.5}$ standards. U.S. EPA's decision to revise the PM NAAQS rested on available scientific evidence linking exposures to ambient PM to adverse health and welfare effects at levels allowed by the then current PM standard. Particular attention was given to several size specific classes of particles which included fine $PM_{2.5}$. The two new $PM_{2.5}$ standards were set at 15 micrograms per cubic meter (µg/m^3), based on the 3 year average of annual arithmetic mean and a 24-hour average of 65µg/m^3, based on the 3-year average of the 98th percentile. In 2005, the Imperial County was designated as an attainment area meeting the 1997 $PM_{2.5}$ NAAQS.

On October 17, 2006,[2] U.S. EPA strengthened the primary and secondary 24-hour $PM_{2.5}$ NAAQS from 65ug/m^3 to 35ug/m^3.[3] Section 107(d)(1)(A)(i) of the CAA defines a nonattainment area (NA) as any area that does not meet an ambient air quality standard, or that contributes to ambient air quality in a nearby area that does not meet the standard. In a 2007 guidance document U.S. EPA recommended that the three most recent calendar years of air quality monitoring data for $PM_{2.5}$ be used to identify a violation of the 2006 24-hour $PM_{2.5}$ NAAQS. For the final designations, U.S. EPA identified monitoring data from Federal Reference Method (FRM) monitors for calendar years 2006-2008. U.S. EPA designated Imperial County as nonattainment for the 2006 24-hr $PM_{2.5}$ standard, effective December 14, 2009.[4] U.S. EPA required $PM_{2.5}$ nonattainment areas to implement subpart 1 provisions. Imperial County received a

[1] National Ambient Air Quality Standards for Particulate Matter; Final Rule, Federal Register, Volume 62, No 138; 38652-38760, July 18, 1997
[2] National Ambient Air Quality Standards for Particulate Matter; Final Rule, Federal Register, Volume 71, Pages 61144-61233, October 17, 2006.
[3] On January 15, 2013 (78 FR 3086) the U.S. EPA revised the annual $PM_{2.5}$ standard by lowering the level to 12.0 micrograms.
[4] Air Quality Designations for the 2006 24-Hour Fine Particle ($PM_{2.5}$) National Ambient Air Quality Standards. Federal Register, Volume 74, pages 58688-58781, November 13, 2009.

partial nonattainment designation for the 2006 $PM_{2.5}$ standard which includes the majority of the populated area in the district. The $PM_{2.5}$ NA includes that portion of Imperial County which lies within the line described as follows: (San Bernardino Base and Meridian) Beginning at the intersection of the United States-Mexico Border and the southeast corner of T17S R11E, then north along the range line of the eastern edge of range R11E, then east along the township line of the southern edge of T12S to the northeast corner of T13S R15E, then south along the range line common to R15E and R16E, to the United States-Mexico border. The boundaries of the $PM_{2.5}$ NA are presented in Figure 1.1 below.

On January 4, 2013 the United States Court of Appeals for the District of Columbia (D.C.) Circuit held that the U.S. EPA had incorrectly interpreted the CAA with respect to statutory requirements for the implementation of the 1997 $PM_{2.5}$ NAAQS. The D.C. Circuit remanded the Final "Clean Air Fine Particle Implementation Rule" (72 FR 20586, April 25, 2007) and the "Implementation of the New Source Review (NSR) Program for Particulate Matter Less than 2.5 micrometers ($PM_{2.5}$)" final rule (73 FR 28321, May 16, 2008) with instructions to “repromulgate” these rules pursuant to Subpart 4. The Courts reasoning explained that the plain meaning of the CAA required implementation of the 1997 $PM_{2.5}$ NAAQS under subpart 4 because $PM_{2.5}$ particles fall within the statutory definition of Particulate Matter less than 10 microns (PM_{10}) and are thus subject to the same statutory requirements.

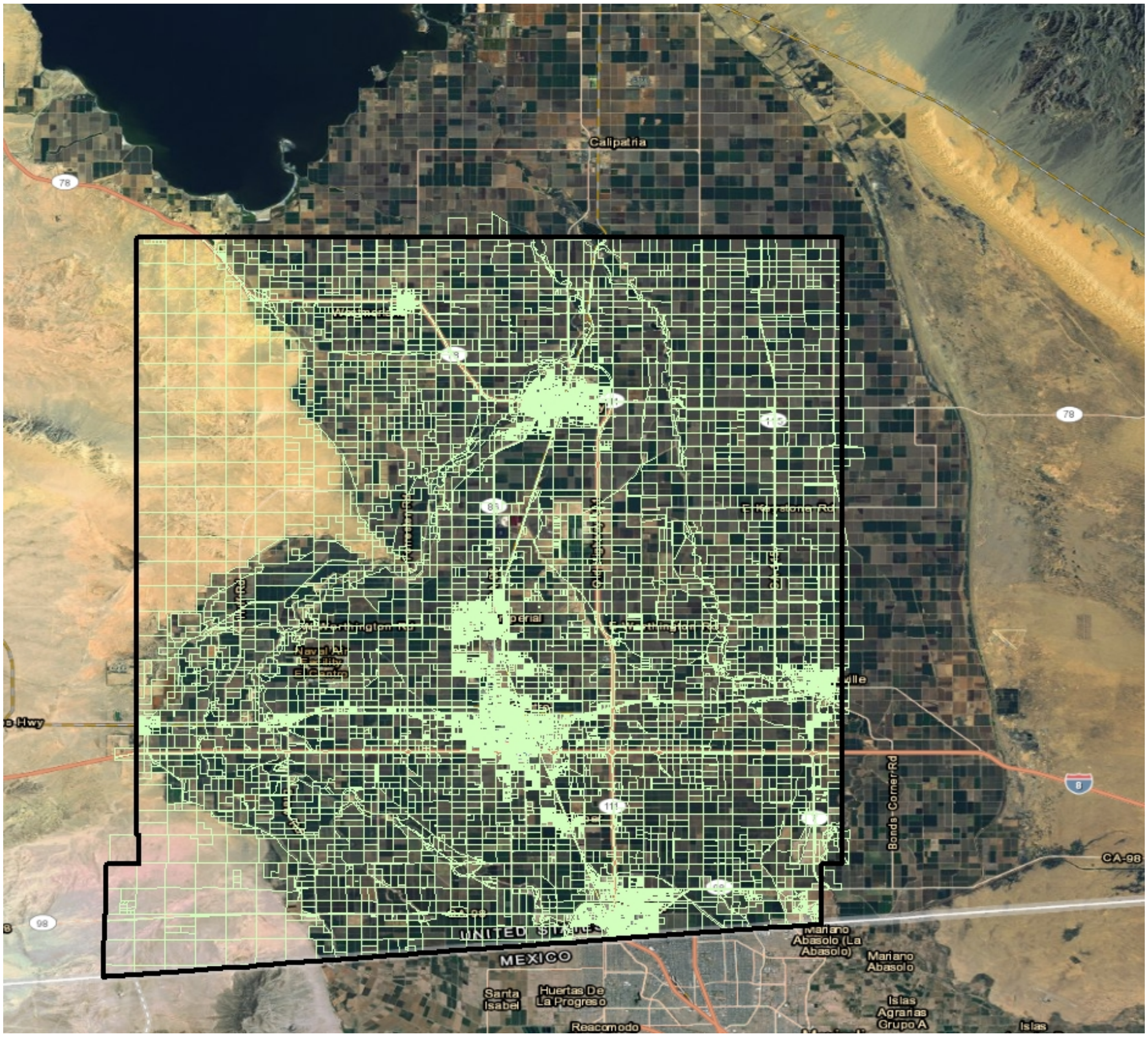
The U.S. EPA interpreted the Courts ruling as necessarily applying Subpart 4 requirements onto the implementation of the 2006 $PM_{2.5}$ NAAQS. As interim guidance the U.S. EPA directed states to rely on the CAA and U.S. EPA’s 1992 General Preamble (Preamble) and the 1994 Addendum to the General Preamble (Addendum).[5] As a result, U.S. EPA is instructing states to implement subpart 1 and subpart 4 provisions as a part of the $PM_{2.5}$ SIP development process. Under subpart 4 provisions, the Imperial County has been classified as a “Moderate” $PM_{2.5}$ non-attainment area, CAA Section 188(a). $PM_{2.5}$ “Moderate” nonattainment areas must attain the 2006 standard within five years of the effective date of U.S. EPA designation.

One of Imperial County's unique features is also its greatest challenge when trying to improve air quality. Imperial County is one of California's international gateways, in particular Calexico shares a border with the densely populated city of Mexicali, Mexico. As is demonstrated in this SIP, the primary reason for elevated $PM_{2.5}$ levels in Imperial County is transport from Mexico. Essentially, this 2013 $PM_{2.5}$ SIP demonstrates attainment of the 2006 $PM_{2.5}$ NAAQS “but-for” transport of international emissions from Mexicali, Mexico. In accordance with section 179B of the CAA, this 2013 $PM_{2.5}$ SIP satisfies the attainment demonstration requirement satisfying the provisions of subpart 1 and subpart 4 of the CAA.

[5] State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990 (57 FR 13498, April 16, 1992) and State Implementation Plans for Serious PM-10 Nonattainment Areas, and Attainment Date Waivers for PM-10 Nonattainment Areas Generally; Addendum to the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990 (59 FR 41998, August 16, 1994).

Elements in a revision to the SIP for the Imperial County $PM_{2.5}$ NA consist of the following: 1) an emission inventory; 2) 179B demonstration; 3) transportation conformity budgets; 4) updated NSR rule; 5) analysis of Reasonable Available Control Measures and Technologies (RACM/RACT); 6) assessment of Reasonable Further Progress (RFP); and, 7) contingency measures.

Figure 1.1 Imperial County $PM_{2.5}$ Nonattainment Area (NA)



1.3 Particulate Matter (PM) Air Pollution and Health Effects

PM is a generic term for a broad class of chemically and physically diverse substances that exist as discrete particles (liquid droplets or solids) over a wide range of sizes. Particles originate from a variety of anthropogenic stationary and mobile sources as well as from natural sources. Particles may be emitted directly or formed in the atmosphere by transformation of gaseous emissions such as sulfur oxides (SOx), nitrogen oxides (NOx), and volatile organic compounds (VOC). The chemical and physical properties of PM vary greatly with time, region, meteorology, and source category.

Particle size is a critical characteristic of PM that primarily determines the location of PM deposition along the respiratory system (and associated health effects) as well as the degradation of visibility through light scattering. In the United States (U.S.), federal and state agencies have established two types of PM air quality standards, reported in Table 1.1 below. $PM_{2.5}$ refers to the subset of PM of a nominal aerodynamic diameter smaller than 2.5 micrometers (a micrometer is one-millionth of a meter; 2.5 micrometers is less than about one-thirtieth the thickness of a human hair). The state standards are presented for comparative purposes and are otherwise outside of the scope of this SIP document.

Table 1.1 National and State Ambient Air Quality Standards for Particulate Matter

Pollutant	Averaging Time	California Standards	National Standards
Fine Particulate Matter ($PM_{2.5}$)	Annual	12 µg/m^3	12 µg/m^3
	24-hour	---	35 µg/m^3

$PM_{2.5}$ is an extremely small airborne particle. $PM_{2.5}$ can penetrate deeply into the lungs of people who inhale them, where they can accumulate, react, or be absorbed into the body. Epidemiological studies have shown a significant association between elevated $PM_{2.5}$ levels and a number of serious health effects, including premature mortality, aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions, emergency room visits, absences from school or work, and restricted activity days), lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems such as heart attacks and cardiac arrhythmia. Individuals particularly sensitive to $PM_{2.5}$ exposure include older adults, people with heart and lung disease, and children.

$PM_{2.5}$ has undesirable and detrimental environmental effects by affecting vegetation, both directly (e.g. deposition of nitrates and sulfates may cause direct foliar damage) and indirectly (e.g. coating of plants upon gravitational settling reduces light absorption). $PM_{2.5}$ also accumulates to form regional haze, which reduces visibility due to scattering of light. Agencies concerned with haze include the National Park Service, the United States Forest Service, the Western Regional Air Partnership (WRAP), and the Western States Air Resources Council (WESTAR).

Common constituents of ambient $PM_{2.5}$ include: Sulfate (SO_4); nitrate (NO_3); ammonium (NH_4); elemental carbon; a great variety of organic compounds; and inorganic material (including metals, dust, sea salt, and other trace elements), which often is referred to as "crustal" material. Ambient $PM_{2.5}$ is typically comprised of a mixture of primary and secondary particles. "Primary" particulates are emitted directly into the air from both human activities and non-anthropogenic activities (e.g., elemental carbon and organic particles from diesel engines or burning activities). "Secondary" particulates (e.g., SO_4 and NO_3) form in the atmosphere as a result of various chemical transformations of gaseous precursors such as sulfur dioxide (SO_2) and NOx. Chemical precursors to secondary particles include SO_2, NOx, VOCs, and ammonia. There are several $PM_{2.5}$ species, or chemical compounds, summarized in Table 1.2.

Table 1.2 Primary $PM_{2.5}$ Species

Species	Description
Organic Carbon	Directly emitted, primarily from combustion sources (e.g., residential wood combustion). Also, smaller amounts attached to geological material and road dust. May also be emitted directly by natural sources (biogenic).
Elemental Carbon	Also called soot or black carbon; incomplete combustion (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 process. Can also be emitted from fireworks.
Sea Salt	Sodium chloride in sea spray where sea air is transported into the Valley.
Secondary Organic Carbon	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.

The overwhelming majority of airborne $PM_{2.5}$ in Imperial County is primary $PM_{2.5}$. The major sources of primary $PM_{2.5}$ are aircraft, fugitive windblown dust, with other contributions from entrained road dust, farming, and burning.

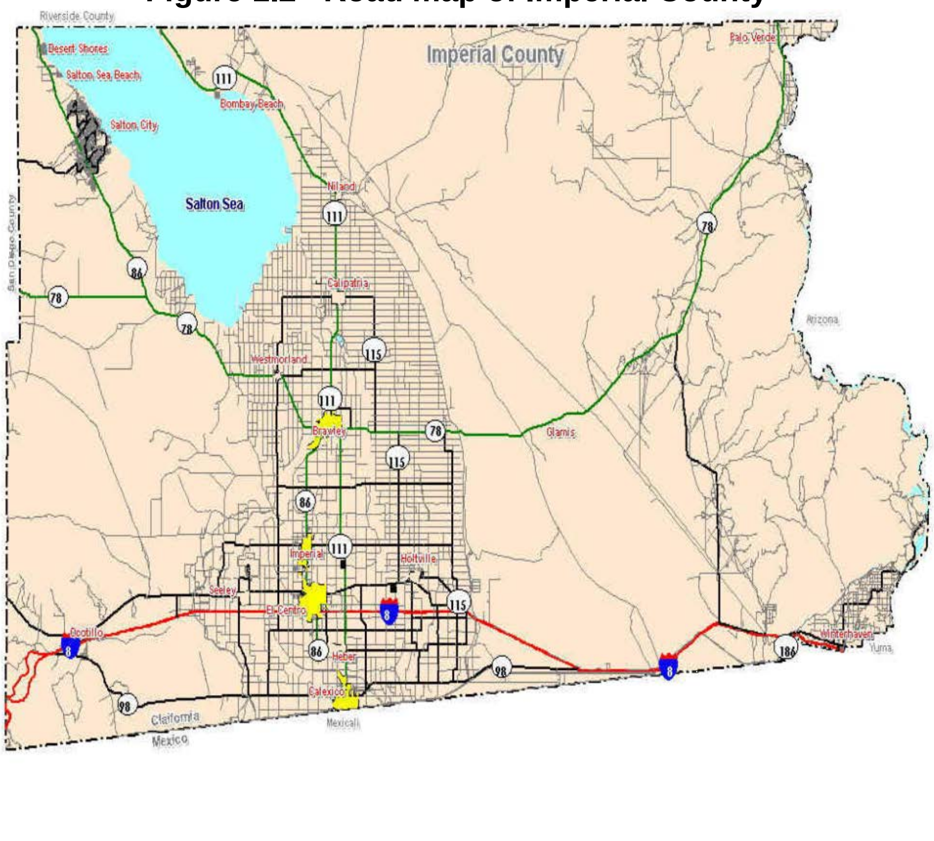
The relative proportion of primary and secondary particles, and the relative proportions of different species of particles found in a given geographic area, can vary widely, depending upon factors such as the mix of sources in the area, the mix of $PM_{2.5}$ precursors, and meteorology. The sources of $PM_{2.5}$ and $PM_{2.5}$ precursors in any area also vary by type, amount, and number. Thus, the ambient $PM_{2.5}$ in areas results from complex interaction of emissions that, in the aggregate, comprise the total ambient $PM_{2.5}$ level. In addition, $PM_{2.5}$ and its precursors can transport hundreds or thousands of miles suspended in the atmosphere. The extent and direction of transport are affected by meteorological conditions and winds. Wind direction, speed, and strength all vary over the course of a single day, as well as by season, and, thus, over the entire year. Consequently, ambient $PM_{2.5}$ in an area may be the combination of primary and secondary $PM_{2.5}$ particles that result from the emissions of sources in the area and areas much farther away.

1.4 Imperial County

1.4.1 Geography, Population, and Land Use

Imperial County extends over 4,597 square miles[6] in the southeastern portion of California, bordering Mexico to the south, Riverside County to the north, San Diego County to the west, and the State of Arizona to the east. The Imperial Valley runs approximately north-to-south through the center of the county and extends into Mexico. The terrain elevation varies from as low as 230 feet below sea level at the Salton Sea to the north to more than 2,800 feet above sea level at the mountain summits to the east.
Imperial County's population is approximately 174,528 people,[7] and its principal industries are farming and retail trade. Most of the population, farming, and retail trade exist in a band of land that, on average, comprises less than one-fourth the width of the county, stretching from the south shore of the Salton Sea to the Mexican border. The road network is densest within this strip, as shown in Figure 1.2. The rest of Imperial County is the Salton Sea and mostly dry, barren desert area with little or no human population.

Figure 1.2 Road map of Imperial County



6 Official website of Imperial County, http://www.co.imperial.ca.us/.
7 U.S.Census Bureau Demographics Profile 2010, http://www.census.gov/popfinder

The three most populated cities in the county are Brawley, El Centro, and Calexico with populations of about 25,000, 42,600, and 38,500, respectively. These three cities form a north-south axis through the approximate center of the county from the southern end of the Salton Sea to the Mexican border. Most of the population, commercial activity, and farming operations occur in this relatively narrow land area comprising approximately one-fourth the width of the county.

The area contains relatively few major emission sources, but may experience significant vehicular traffic, particularly near Calexico, given proximity to an international port entry into the United States. Emission sources consist of geothermal power generation, food processing, plaster manufacturing, and other light industrial facilities. Imperial Valley agriculture produces a variety of crops including hay, vegetables, and dairy products. Beyond the urban and rural areas of Imperial County are large expanses of open desert and the Salton Sea with little human activity.

1.5 Regulatory Responsibility

Federal, state, and local agencies participate in the planning process for attaining air quality in compliance with NAAQS. The roles of the several agencies involved are outlined in the following.

1.5.1 Environmental Protection Agency (U.S. EPA)

The U.S. EPA administers the provisions of the federal CAA and other air quality related legislation. A principal function of the U.S. EPA is to set the NAAQS and promulgate new regulations based on the scientific evidence of the health and environmental effects of pollutants. In addition, the U.S. EPA establishes national emission limits for major sources of air pollution; regulates emissions from locomotives, aircraft, and other mobile sources most effectively controlled at the national level; inspects and monitors emission sources; and provides financial and technical support for air quality research and development programs.

The U.S. EPA enforces federal air quality laws. Under the CAA, the U.S. EPA is authorized to require states to prepare plans to attain the NAAQS by deadlines specified in the CAA. SIPs, which are intended to outline specific pollution control strategies for each federal nonattainment area within a state, are prepared by regional and county air pollution control districts in collaboration with state agencies and with the U.S. EPA, who is ultimately responsible for the SIP final review and approval.

Under the CAA, the U.S. EPA also has authority to impose sanctions for failure to submit a plan or failure to carry out commitments in a plan. Sanctions include (i) increased emissions offsets requirements for major stationary sources, and (ii) withholding of federal highway funds.

1.5.2 California Air Resources Board (CARB)

The California Air Resources Board (CARB) is the state agency responsible for the coordination and administration of both state and federal air pollution control programs in California. The CARB undertakes research, sets state ambient air quality standards as well as emission standards for motor vehicles, provides technical assistance to local districts, compiles emission inventories, develops suggested control measures, and provides oversight of district control programs. An important function of the CARB is to coordinate and guide regional and local air quality planning efforts required by the California Clean Air Act, and to prepare and submit air quality management plans to the U.S. EPA.

1.5.3 Imperial County Air Pollution Control District (ICAPCD)

The Imperial County Air Pollution Control District (ICAPCD) shares responsibility with CARB for ensuring that all state and federal ambient air quality standards are achieved and maintained within the county. The ICAPCD is responsible for monitoring ambient air quality and has authority to regulate stationary sources and some area sources of emissions. The ICAPCD is responsible for developing the overall attainment strategy for Imperial County, and therefore, is responsible for planning activities involving the development of emission inventories, modeling of air pollution, and quantification and comparison of emission reduction strategies.

Air districts in state nonattainment areas are also responsible for developing and implementing transportation control measures necessary to locally achieve ambient air quality standards. In doing so, air districts cooperate with local transportation commissions and Regional Transportation Planning Agencies (RTPAs) in the development of the transportation control measures adopted within a SIP. Under the conformity requirements of the CAA (1977, 1990), Imperial County's TPAs cannot approve any Regional Transportation Plan[8] or Transportation Improvement Program[9] that does not conform to the SIP's purpose of expeditiously bringing the area into attainment of the NAAQS.

[8] A Regional Transportation Plan is a county's master plan outlining policies, actions, and financial projections to guide investment decisions over a 20-year horizon.
[9] A Transportation Improvement Program specifies all highway and transit projects spanning a multi-year period, that are either regionally significant or that require federal funding or approval.

CHAPTER 2 AMBIENT AND AIR QUALITY DATA

2.1 Introduction

Air quality is a function of both the rate and location of pollutant emissions under the influence of meteorological conditions and topographic features. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients, along with local topography, influence the movement and dispersal of pollutants and thereby provide the link between air pollutant emissions and air quality.

This chapter provides an overview of impact of climate and meteorology on the dispersion of particulate matter, a description of the local air monitoring network and an overview of $PM_{2.5}$ data collected and its temporal and spatial patterns within Imperial County.

2.2 Climate and Meteorology

Climatic conditions in the Imperial County are governed by the large-scale sinking and warming of air in the semi-permanent tropical high pressure center of the Pacific Ocean. The high pressure ridge blocks out most mid-latitude storms except in winter when the high is weakest and farthest south. The coastal mountains prevent the intrusion of any cool, damp air found in California coastal environments. Because of the weakened storms and barrier, the Imperial County experiences clear skies, extremely hot summers, mild winters, and little rainfall. The flat terrain of the valley and the strong temperature differentials created by intense solar heating, produce moderate winds and deep thermal convection.

Winters are mild and dry with daily average temperature ranges between 65 and 75ºF (18-24ºC). During winter months it is not uncommon to record maximum temperatures of up to 80ºF. Summers are extremely hot with daily average temperature ranges between 104 and 115ºF (40-46ºC). It is not uncommon, during summer months, to record maximum temperatures of 120ºF. The annual rainfall is just over 3 inches (7.5 cm) with most of it coming in late summer or midwinter.

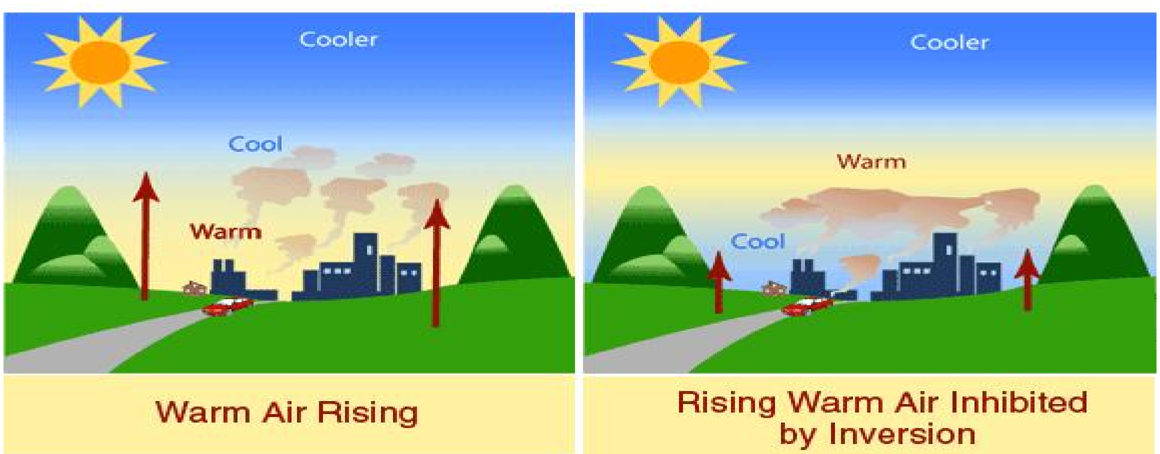
Humidity is low throughout the year, ranging from 28 percent in summer to 52 percent in winter. The large daily oscillation of temperature produces a corresponding large variation in the relative humidity. Nocturnal humidity rises to 50-60 percent, but drops to about 10 percent during the day. Summer weather patterns are dominated by intense heat induced by low-pressure areas that form over the interior desert.

The wind direction follows two general patterns. The prevailing winds are from the west and northwest seasonally from fall through spring. These originating prevailing winds are known to be from the Los Angeles area. Occasionally Imperial County experiences periods of extremely high winds speeds. Wind speeds can exceed 31 mph occurring most frequently during the months of April and May. However, speeds of less than 6.8 mph account for more than one-half of the observed wind measurements. Wind statistics indicate prevailing winds are from the west-northwest through southwest; a secondary flow maximum from the southeast is also evident.

2.2.1 Atmospheric Stability and Dispersion

Air pollutant concentrations are primarily determined by the amount of pollutant emissions in an area and the degree to which these pollutants are dispersed in the atmosphere. The stability of the atmosphere is one of the key factors affecting pollutant dispersion. Atmospheric stability regulates the amount of vertical and horizontal air exchange, or mixing, that can occur within a given air basin. Restricted mixing and low wind speeds are generally associated with a high degree of stability in the atmosphere. These conditions are characteristic of temperature inversions. A temperature inversion is simply a layer of cool air trapped below a warmer layer of air, whereby the normal gradient of air temperature with increasing altitude is reversed. Figure 2.1 shows that this reversal of the normal pattern impedes the upward flow of air, causes poor dispersion, and traps pollutants near the surface. Imperial County experiences surface inversions almost every day of the year, caused by cooling of the air layer in contact with the cold surface of the earth (due to radiational cooling) at night. Because of strong surface heating during the day, these inversions are usually broken, allowing pollutants to disperse more easily. However, the presence of the Pacific high pressure cell can cause the air to warm to a temperature higher than the air below. This highly stable atmospheric condition, termed a subsidence inversion can act as a nearly impenetrable lid to the vertical mixing of pollutants. The strength of these inversions makes them difficult to disrupt. Consequently, they can persist for one or more days, causing air stagnation and the buildup of pollutants. Subsidence inversions, where the air mass aloft sinks, causing compressional heating on the surface, are common in Imperial/Mexicali Valleys from November through June. These inversions can form a nearly impenetrable lid to vertical mixing of particulate matter which accumulate and frequently reach elevated concentrations across the southern border of Imperial County in the densely populated city of Mexicali, Mexico and which transports and impacts the border city of Calexico and the northern areas of the County.

Figure 2.1 Atmosphere with and without a Temperature Inversion



From: http://images.search.yahoo.com/search/images?_adv_prop=image&fr=yfp-t-900-s&va=thermal+inversion.

2.3 Imperial County Air Monitoring Network

Imperial County began its ambient air monitoring in 1976. Since that time, federal regulatory ambient air monitoring in Imperial County has been a collaborative effort between the ICAPCD and the CARB. The primary purpose of any ambient air monitoring is to protect the public health and welfare.

Depending on the purpose and air quality designation of an area the monitoring station may be one of many different types of stations. Here in Imperial County all monitoring stations are designated as state or local air monitoring stations (SLAMS). Per Code of Federal Regulations (CFR) all SLAMS are ambient air quality monitoring sites that are primarily needed for NAAQS comparisons. There are two types of NAAQS that an air district must consider; the primary standard which provides for the protection of the public health and the secondary standard which provides for protection of the public welfare which includes protection against decreased visibility and damage to animals, crops, vegetation and buildings. Therefore the placement of any ambient air monitor is essential for meeting that monitor's objective. Objectives are determined after evaluation of spatial scales of representativeness, levels of concentration and purpose. In particular, the spatial scale of representativeness defines the distance over which pollutant concentrations are expected to be the same, given similar emission sources and meteorological conditions. A properly established monitor should target the key data collection need identified by the monitoring objective and spatial scale of the site. Therefore, the physical placement of the ambient air monitor varies depending on the evaluated monitoring objective. As demonstrated in Chapter 4 the spatial scale determined for the Calexico $PM_{2.5}$ monitor is an important factor in establishing the origin of emissions leading to elevated concentrations. [10]

Table 2.1 $PM_{2.5}$ Network Monitoring Purpose

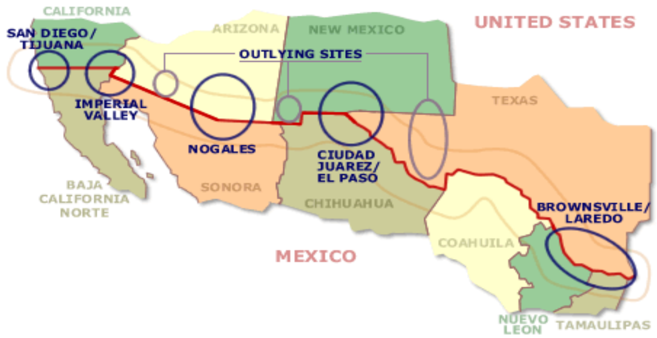
Name	**Calexico Ethel Station**			
Address	**1020 Belcher St., Calexico, California**			
Operator	**California Air Resources Board (CARB)**			
Monitor Designation	SLAMS	SLAMS	FEM	FEM
Sampling Method	R&P 2025 (VSCC) 88101 POC1	R&P 2025 (VSCC) 88101 POC2	MET ONE BAM 1020 88501 POC3	MET ONE BAM 1020 88501 POC4
Spatial Scale	NEIGHBORHOOD	NEIGHBORHOOD	NEIGHBORHOOD	NEIGHBORHOOD
Monitor Objective	PUBLIC EXPOSURE	PUBLIC EXPOSURE	SUPPORT	SUPPORT
Sampling Frequency	EVERYDAY	1-6	CONTINUOUS	CONTINUOUS

Table 2.1 above is a representation of the existing $PM_{2.5}$ monitors established at the Calexico Ethel station, which is located approximately 1 mile north of the International Border to Mexico [11]. Because of Calexico's close proximity to the international border it may be said that there exists a common air shed which is shared by Calexico and

[10] Refer to Chapter 4 and Attachment A for a description of the siting information for the Calexico $PM_{2.5}$ monitors.
[11] 2013 Annual Network Plan for Imperial County

Mexicali. Such a concept is not unusual and is accounted for under the CAA. Having a shared international air shed is not new and the evidence of the recognition of international impacts is evident in plans and efforts realized through such programs as Border 2020. Figure 2.2 is a depiction of the air sheds and areas that are providing monitoring data along the US-Mexico border.

Figure 2.2 Air sheds and areas along the US-Mexico border



Source: http://www.epa.gov/ttn/catc/cica/geosel_e.html

Analysis of data from the Calexico Ethel station indicates that along with capturing emissions within the localized area the monitors are a downwind recipient of concentrations from international sources and is therefore an area that is incorporating emissions sources from outside the United States.

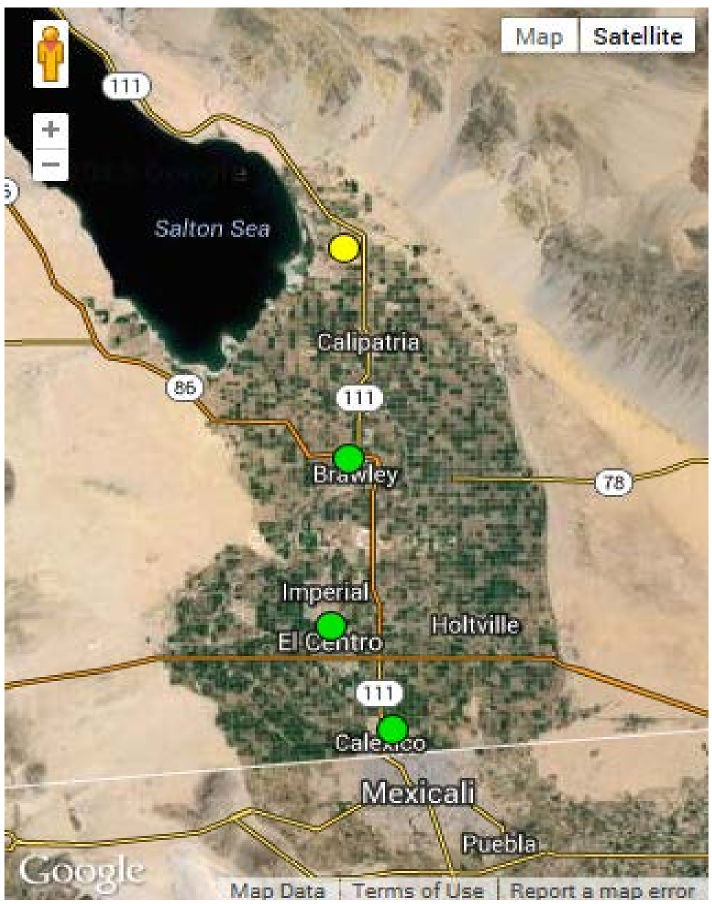
2.3.1 $PM_{2.5}$ Monitoring Stations in Imperial County

In Imperial County there are three $PM_{2.5}$ air monitoring stations located within the populated cities of Brawley, El Centro and Calexico. In addition to running U.S. EPA approved FRM $PM_{2.5}$ monitors, these stations collect meteorological parameters such as horizontal wind speed (HWS), wind direction (WD), outside temperature (OT), relative humidity (RH), barometric pressure (BP), and solar radiation (SR). The 2013 Annual Network Plan for Imperial County (ANP) describes the cities of Brawley, El Centro and Calexico as homogeneous urban sub-regions with similar land use and land surface characteristics. Because all three cities are similar urban type areas with similar land use it is appropriate to compare the $PM_{2.5}$ concentrations and meteorological data from all three stations. It is however, important to note that the 2013 ANP identifies the Calexico Ethel station as consistently recording the highest concentrations of $PM_{2.5}$. Chapter 4 provides additional data comparison and analysis between all three stations located in Calexico, El Centro and Brawley.

Table 2.2
$PM_{2.5}$ Site Type/Locations

Year	Site Location	Site Type	24 HR µg/m³	ANN µg/m³
2010	Calexico Ethel	Highest Concentration	50.9	12.8
	El Centro	Typical Concentration	19.9	6.6
	Brawley	Background/Transport	16.2	6.2
2011	Calexico Ethel	Highest Concentration	80.3	13.5
	El Centro	Typical Concentration	54.4	7.5
	Brawley	Background/Transport	37	7.1
2012	Calexico Ethel	Highest Concentration	64.7	14.4
	El Centro	Typical Concentration	26.4	7.5
	Brawley	Background/Transport	25.9	8.1

Figure 2.3 Imperial County Ambient Air Monitoring Stations



2.3.2 $PM_{2.5}$ Monitoring Stations in Mexicali, Mexico

The ambient air monitoring network in Mexicali began installing, configuring and testing monitors in July of 1996. Through a collaborative effort between the U.S. EPA, the CARB and with the participation of SEMARNAT the air monitoring network in Mexicali began operation in January of 1997. The ambient air monitoring network is composed of seven stations, five of which monitor continuously for ozone, Nitrogen Oxide, Carbon Monoxide, Sulfur Dioxide and $PM_{2.5}$ while the remaining two stations monitor PM_{10} using high volumetric samplers. Similarly, these stations measure some meteorological parameters such as; temperature, humidity, wind speed, and direction. Unfortunately, since 1997, monitored data from the Mexicali ambient air monitoring network has been inconsistent at best with large gaps occurring regularly.

Figure 2.4 shows the following established stations; Autonomous University of Baja California (UABC), Colegio de Bachilleres; High School (COBACH), Instituto Technologico de Mexicali (ITM), National College of Technical Vocational Education (CONALEP), Progresso and Campestre. UABC and COBACH are located in the urban area of Mexicali near the border approximately 2.6 and 2 miles from the Calexico Ethel Station. Both of these stations monitor continuously for $PM_{2.5}$ using Beta Attenuation Monitors (BAMs).

Figure 2.4 Mexicali Ambient Air Monitoring Network

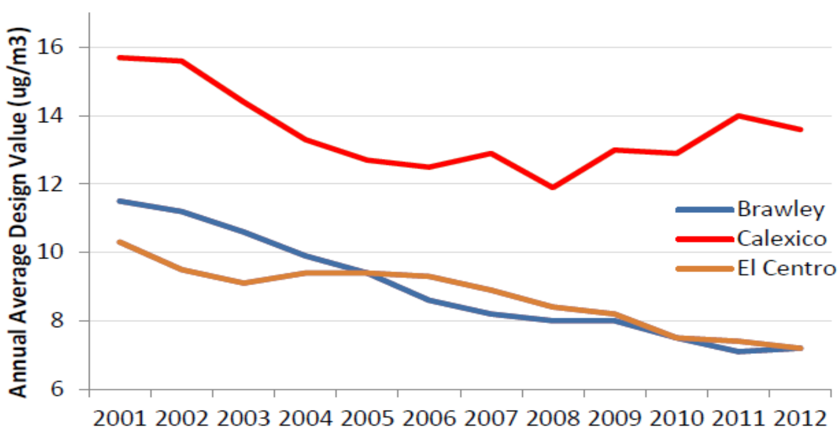
2.4 Ambient Air Quality Data

Under the 2006 $PM_{2.5}$ NAAQS, to meet attainment a region must meet the 24-hour average standard of 35µg/m³. U.S. EPA requires the use of design values for the attainment metric. Design values are based on the 3-year average of the 98th percentile of 24-hour concentrations. According to the CAA, the assessment of an area's air quality for the preparation of a SIP is based on the most recent three years of complete data. Air quality data of importance in the preparation of Imperial County's $PM_{2.5}$ SIP, corresponding to years 2010-2012, is subsequently presented and discussed in detail.

2.4.1 Imperial County $PM_{2.5}$ Air Quality

Border communities such as Calexico are unique areas where many different people come together and cross geopolitical boundaries. Residents on both sides of the border share a common environment and have similar exposures to differing pollutants. Observed traffic and commuting patterns within the Calexico/Mexicali border area is typically home to work and work to home. While it would seem that the most evident exposure along the Calexico/Mexicali border relates to traffic emissions, there are emissions from other sources such as electrical generation, other industrial sources, unpaved roads and to some extent cultural practices. Despite the challenges of geography, climate and proximity to Mexico air quality in Imperial County has improved except for the border area. The annual design values for Calexico, El Centro and Brawley, see Figure 2.5, illustrates how different Calexico is from both El Centro and Brawley. Figure 2.5 shows that the air quality in Brawley and El Centro has improved showing a reduction of the annual average design value; however, in Calexico, air quality has not improved and remains above the recently revised federal annual average $PM_{2.5}$ standard of 12 µg/m³.

Figure 2.5 2001-2012 Average Annual Design Values for Calexico, El Centro, and Brawley

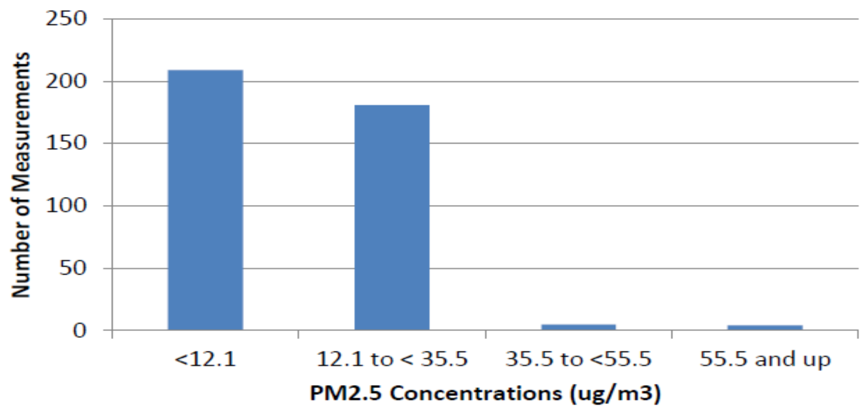


The 179B Analysis (Attachment A) discusses in detail the chemical mass balance speciated data which indicates that the Calexico $PM_{2.5}$ is dominated by organic carbon particles. The analysis further identifies that the organic carbon particles are a significant contributor to elevated $PM_{2.5}$ throughout the year, peaking during the winter months. Known organic carbon sources in urban areas include burning, cooking, and motor vehicle exhaust.

The 179B Analysis also illustrates that geologic material (dust) is a smaller portion of total $PM_{2.5}$ in Calexico. The overall indication is that emissions within the Calexico/Mexicali area are distinct from the rest of Imperial County based on the distribution and nature of emission sources.

Another indicator that the Calexico Ethel station differs in nature to other $PM_{2.5}$ site in Imperial County is the percentage of violations of the 24-hour $PM_{2.5}$ standard that are recorded. As mentioned earlier violations of the 24-hour $PM_{2.5}$ standard are typically limited to Calexico during the winter months of December through February. Figure 2.6 illustrates that more than 52 percent of the $PM_{2.5}$ concentrations measured in Imperial County between 2010 and 2012 were less than 12.1ug/m^3 and 98 percent were below 35.5ug/m^3.

Figure 2.6 Distribution of $PM_{2.5}$ Concentrations in Imperial County (2010-2012)



Indications such as discussed above lend evidence that Calexico is impacted by transport of pollution from Mexicali. To add further evidence, Figure 2.7 below, shows that the 98th percentile and the Design Values are well above the 24-hour average standard of 35 µg/m³ at the Calexico Ethel station (years 2010 to 2012). By contrast, Figures 2.8 and 2.9 illustrate the 98th percentiles and 24-hour Design Values, for El Centro and Brawley, well below the 2006 $PM_{2.5}$ NAAQS for the same period of time. Indications are that the further the station from the border region the less impact to the monitor.

Figure 2.7 Calexico Ethel 24-Hr $PM_{2.5}$ Trends (FRM Data)

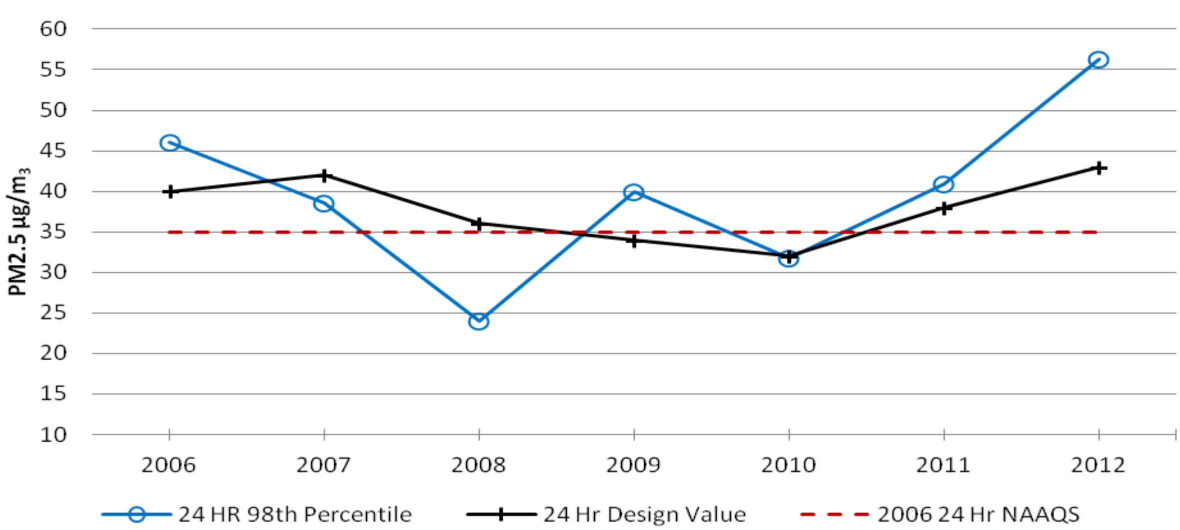


Figure 2.8 El Centro 24-Hr $PM_{2.5}$ Trends (FRM Data)

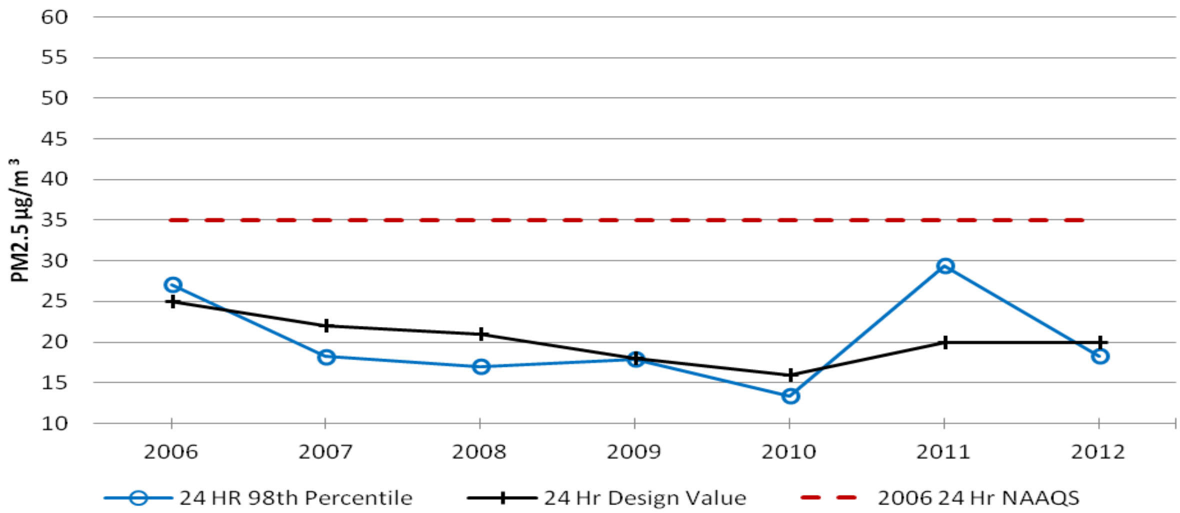
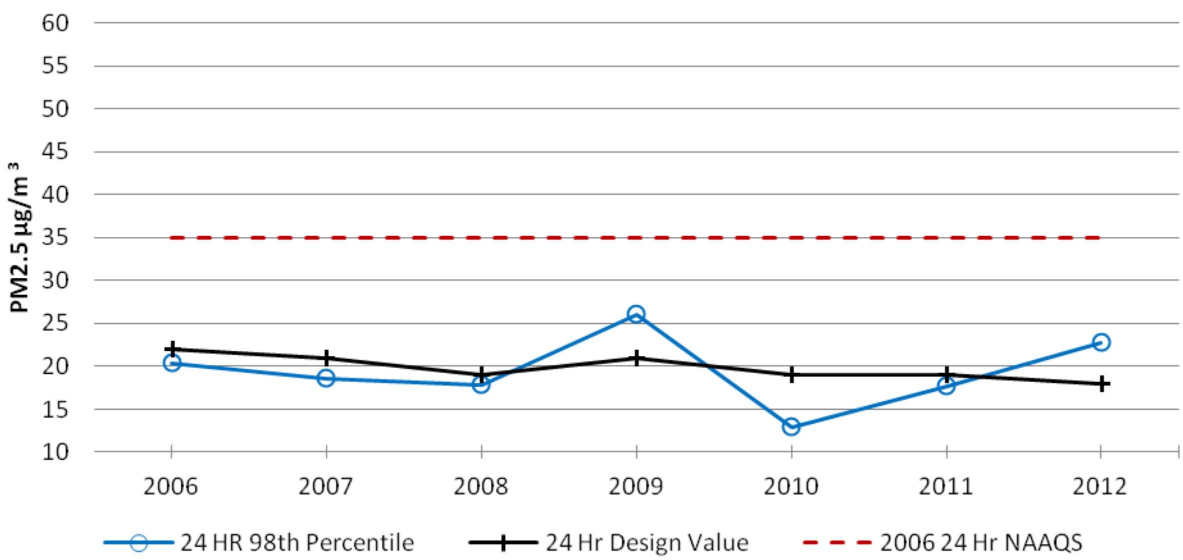


Figure 2.9 Brawley 24-Hr $PM_{2.5}$ Trends (FRM Data)



CHAPTER 3 EMISSIONS INVENTORY

3.1 Introduction

The two major indicators of air quality improvement are the emissions inventory and the ambient air quality data. An emission inventory (EI) for a specified criteria pollutant is an accounting of the amount of the pollutant that is emitted into the atmosphere by various sources over a specific period of time. Inventories allow for the understanding of current emissions levels and the projection of future emission levels. Effective control strategies cannot be developed without an understanding of the type and number of emission sources contributing to the air quality problem. Because pollution-generating activities are continuously changing and methods to estimate their impact are continuously improving, the updating of an EI is an ongoing process. This chapter describes the Imperial County $PM_{2.5}$ inventory and precursors that reflect the latest, best available data.

In cooperation with CARB, the ICAPCD develops a complete emissions inventory every year for all sources in Imperial County. Every year, different emissions inventories are developed for the winter and summer emissions, as well as an annual average emissions inventory. CARB designates the 2008 inventory as the baseline for measuring progress toward attainment of the 2006 $PM_{2.5}$ NAAQS. Thus, a significant effort has gone into making this inventory as complete and as accurate as possible. U.S. EPA establishes the guidelines and requirements regarding emissions information that needs to be included in the SIP submittal packages. For the 2013 $PM_{2.5}$ SIP, the guidelines require that the $PM_{2.5}$ planning inventory includes emissions data for directly emitted $PM_{2.5}$ and its precursors: NOx, VOC, SOx, and Ammonia. The $PM_{2.5}$ planning emissions inventory includes only those emissions generated within the $PM_{2.5}$ NA in Imperial County. As discussed in Chapter 2 and throughout this plan, the majority of exceedances of the 24-hour $PM_{2.5}$ standard for the period 2010-2012 occur in the winter months. For this reason, this plan focuses primarily on winter average daily emissions inventories, with emissions presented as tons per day (tpd). The winter average daily inventory represents emissions from months of November to April. The annual average emissions inventory is also presented to help to estimate year round emissions. The resulting best estimate of the EI for the 2008 baseline year, along with projected growth in emissions in 2011 and 2012, is presented thereafter.

3.2 Emission Source Classification System

All reportable sources are categorized as either stationary, area wide or mobile sources. Stationary or industrial source categories are subdivided depending primarily on their permit status, relative size and emission characteristics while mobile source categories are subdivided into on-road vehicles and other mobile sources. This section provides a brief description of the major emission inventory categories. Within each category, the sources are further classified according to the appropriate category, such as the burning of fuel or the processing of petroleum. However, it is not uncommon to find different source types at the same facility. Thus, an individual company's emission inventory may be divided among two or more source categories. The source categories presented are based on the emissions inventory data obtained from the winter and annual average planning emissions inventories.

Stationary Sources

Stationary or industrial sources are generally larger commercial or industrial facilities that are required to have an ICAPCD Permit to Operate. The stationary source category includes facilities such as factories, power plants, rock quarries, and manufacturing and industrial.

The stationary source emissions inventory is based on the actual emissions data reported by permitted facilities on a quarterly or yearly basis. The ICAPCD's staff inputs and evaluates the emissions data using the Hot spots Analysis and Reporting Program (HARP) and it is later reported to CARB to be imported into the California Emission Inventory Development and Reporting System (CEIDARS) program. The emissions inventory for stationary sources with a potential to emit 10 or more tons per year of VOC, NOx, SOx, PM and ammonia is required to be updated every year; on the other hand, stationary sources with a potential to emit less than 10 tons per year of these pollutants are required to update their emissions inventory every three years. The emissions inventory for each facility is calculated primarily based on their throughput data (fuel usage, material usage, production, etc.), appropriate emission factors or source test results, and control efficiency. Many small point sources, or facilities, that are not inventoried individually are estimated as a group and reported as a single source category in CEIDARS as part of the area source emissions inventory. The emissions data for each facility is categorized based on U.S. EPA's Source Classification Codes (SCCs) for each emission source category. Since HARP collects emissions data on an aggregate basis, facility's equipment permit data is used in conjunction with the reported data to assign the appropriate SCC codes and develop the inventory at the SCC level. Business operation activity profile is also recorded and reported. For growth purposes, facility business type is designated by Standard Industrial Classification (SIC) Code.

Following is a brief description of the methodologies used to evaluate emissions for some of the source categories included in the stationary source emissions inventory:

Fuel Combustion: This category includes sources that burn fuel such as natural gas and diesel as a matter of operations or to produce useful heat. Combustion processes are an important source of NOx emissions due to the oxidation of nitrogen in the fuel and in the combustion of air. This source category includes emissions from sources such as: electrical utilities, manufacturing and industrial, food and agricultural, service and commercial and other. The great majority of emissions from this source category are reported as point sources or facilities. Examples of sources in this category are electric utility boilers, process heaters, internal combustion engines, home furnaces, and orchard heaters. The emissions inventory for the manufacturing and industrial category was recently updated to reflect the total amount of natural gas consumed by Imperial County's sources in 2008. The updated natural gas consumption was obtained from the California Energy Commission (CEC).

Petroleum Production and Marketing: Emissions represented in this category result from the petroleum industry (petroleum pumping stations, truck loading and unloading). Other activities include retail and commercial gasoline marketing and combustion related emissions that do not qualify for the Fuel Combustion category above.

Industrial Processes: The sources and activities included here primarily emit PM_{10} and VOCs. Examples are feed and grain mills, rock quarries, sand and gravel operations, and concrete batch plants.

Area-Wide Sources

The area-wide category includes aggregate point sources or facilities that are not inventoried individually, but are estimated as a group and reported as a single source category. The ICAPCD and CARB share the responsibility for developing the area sources emissions inventory. The area-wide source methods are used to estimate emissions for approximately 500 emission source categories in the emissions inventory. These sources consist of categories associated with human activity and emissions that take place over a wide geographic area. Examples include: pesticides, consumer products, and residential fuel combustion.

Following is a summary of latest improvements and updates to methodologies for some of the source categories included in the area source emissions inventory:

Solvent Use: Organic solvents are used in a wide variety of industrial processes and are ingredients in numerous household and commercial products. The major concern here is that most solvents volatilize as VOCs, which then becomes available to form ozone. Example categories are dry cleaning, degreasing, asphalt paving, architectural coatings, and printing operations.

Farming Operations: the main subcategories included are: tilling, harvest operations, and livestock husbandry (dairy and feedlot cattle). Following is a brief description of these subcategories: (i) tilling operations includes dust emissions produced during preparation of agricultural lands; operations included in this category are disking, shaping, chiseling, leveling, and other mechanical operations used to prepare the soil; emissions are calculated using the county-specific crop acreage from the California Department of Food and Agriculture and emission factors developed by University of California, Davis; (ii) emissions inventory for harvest operations includes dust emissions generated due to vehicles traveling over the soil, or via mechanical processing of the plant material and underlying soil; emissions are calculated using the county-specific crop acreage from the California Department of Food and Agriculture and emission factors developed by University of California, Davis; and (iii) the emissions inventory for dairy and feedlot cattle are estimated by using data reported by the Imperial County Agricultural Crop and Livestock Report and the emissions factors developed by CARB.

Unpaved Road Dust: the district recalculated the entrained unpaved road dust and windblown fugitive dust emissions from all unpaved roads in Imperial County using the latest mileage information from Imperial County, the cities of Imperial County and the Imperial Irrigation District (canal roads) and the latest CARB emissions factors[12]. Based on this information, entrained unpaved road dust and windblown fugitive dust emission from County, Cities, Canals, Bureau of Land Management (BLM) and farm roads are estimated and reported in CARB's emissions inventory.

Fugitive Windblown Dust from Open Areas and Non-pasture Agriculture Lands: consistent with model development done for the Western Regional Air Partnership, ENVIRON developed for Imperial County a Windblown Dust Model to estimate windblown fugitive dust for specific sources[13]. For each land parcel within the modeling domain, the Windblown dust model assesses emission characteristics base on soil texture and soil stability, including reservoir and reservoir recharge characteristics; assesses hourly emission factors for the land parcel base on the emissions characteristic profile and hourly meteorological data; and applies correction terms to the obtained hourly emission rates based on vegetative cover, as well as non-climatic corrections for agricultural lands. Based on this model, fugitive windblown dust emission from open areas and non-pasture agriculture lands are estimated and reported in CARB's emissions inventory. The $PM_{2.5}$ planning emissions inventory includes only those emissions generated within the $PM_{2.5}$ NA in Imperial County.

Managed Burning and Disposal: The emission inventory data for this activity is reported in the Miscellaneous Processes source category. The burning of agricultural waste can generate VOC, CO, PM_{10} and $PM_{2.5}$ because of the incomplete combustion process. This source category is updated annually based on the information collected by the district and later reported to CARB regarding type of crops and total amount of acres burned in Imperial County. Reports indicate that the majority of the reported emissions are a result of the open burning of wheat straw and Bermuda grass. Other sources represented in this category include residential burning, open burning of agricultural and residential tree pruning.

Mobile Sources

On-Road Motor Vehicles: On-road sources include passenger vehicles, buses, and trucks. CARB's most recent mobile source Emission Factors model, EMFAC2011, is used to calculate emission rates from all motor vehicles, such as passenger vehicles to heavy-duty trucks, operating on highways, freeways and local roads in California. EMFAC2011 uses Department of Motor Vehicle (DMV) registration data for the number of vehicles, Southern California Association of Governments (SCAG) travel demand output model for the number of vehicle miles traveled, Bureau of Automotive Repair (BAR) odometer readings and emission factors from vehicle surveillance programs and dynamometer readings.

Other Mobile Sources: Other mobile sources are generally regulated at the state or

[12] Environ, Draft Final Technical Memorandum, Regulation VIII BACM Analysis, prepared for the ICAPCD, October 2005.
[13] Development of a Wind Blown Dust Fugitive Dust Model and Inventory for Imperial County, California; Final Report, May 12, 2004; Prepared by Environ International Corporation and Eastern Research Group.

federal level and consist of aircraft (military, commercial and civil), trains, commercial harbor craft, farm equipment and off-road recreational vehicles and equipment. This mobile source category emissions inventory is generated by the CARB OFFROAD Model, which uses source population, activity, and emissions data to estimate emissions for each type of off-road equipment. The model provides emission estimates for all off-road vehicles, including boats, outdoor recreational vehicles, industrial and construction equipment, farm equipment, lawn and garden equipment, aircraft, and trains.

3.3 2008, 2011 and 2012 Inventory Categories

2008 was selected as the base year inventory (the year from which the inventory is projected forward and backward). The year 2012 has been included as a reference point for the attainment year. The year 2011 has been included to show the progress of the emissions inventory. This section provides a brief description of $PM_{2.5}$ emissions and precursors for the major emission inventory categories.

The following sections summarize the 2008, 2011 and 2012 winter and annual average planning emissions inventories by major source categories for $PM_{2.5}$ and its precursors: NOx, ROG, SOx, and Ammonia.

3.4 $PM_{2.5}$ Emissions Inventory

The $PM_{2.5}$ emissions inventory by source category is presented in Table 3.1. This table shows that the majority of $PM_{2.5}$ emissions in the Imperial County's non-attainment area are produced by unpaved roads, farming operations, fugitive windblown dust and burning of agricultural waste. The majority of $PM_{2.5}$ emissions are produced by vehicles traveling on unpaved roads. Therefore, PM_{10} and $PM_{2.5}$ emissions from unpaved roads in Imperial County are controlled by the implementation of Best Available Control Measures (BACM) approved rules. Farming operations also contribute a considerable amount of $PM_{2.5}$ emissions, specifically from tilling and harvesting operations, these two activities are also controlled by the application of BACM. Agricultural burning is also a source of $PM_{2.5}$ emissions. This activity is regulated by the implementation of a state required and approved Smoke Management Plan (SMP). Table 3.1 shows slight decrease of $PM_{2.5}$ emissions between 2008 and 2012 emissions inventories for both winter and annual average inventories.

Table 3.1
$PM_{2.5}$ Emissions Inventory By Major Source Category
2008, 2011 and 2012 Winter and Annual Planning Emissions Inventories
(tons/day)

Source Category	Winter Average			Annual Average		
	2008	**2011**	**2012**	**2008**	**2011**	**2012**
Stationary Sources						
Fuel Combustion	0.159	0.157	0.166	0.166	0.161	0.174
Waste Disposal	0.000	0.000	0.000	0.000	0.000	0.000
Cleaning and Surface Coatings	0.000	0.000	0.000	0.000	0.000	0.000
Petroleum Prod. and Marketing	0.000	0.000	0.000	0.000	0.000	0.000
Food and Agriculture	0.056	0.054	0.059	0.056	0.053	0.059
Mineral Processes						
- Sand and Gravel Excavation	0.017	0.018	0.021	0.017	0.019	0.021
- Asphaltic Concrete Production	0.060	0.060	0.060	0.066	0.066	0.066
- Cement Concrete Production	0.021	0.023	0.026	0.021	0.023	0.026
- Other	0.182	0.200	0.227	0.182	0.200	0.227
Total Stationary Sources	**0.495**	**0.512**	**0.559**	**0.508**	**0.522**	**0.573**
Area-wide Sources						
Solvent Evaporation	0.000	0.000	0.000	0.000	0.000	0.000
Residential Fuel Combustion	0.064	0.064	0.064	0.037	0.037	0.037
Farming Operations						
- Tilling	0.677	0.598	0.592	0.594	0.525	0.519
- Harvest Operations	0.027	0.024	0.024	0.180	0.159	0.157
- Livestock Husbandry Dairy Cattle	0.002	0.002	0.002	0.002	0.002	0.002
- Livestock Husbandry Range Cattle	0.041	0.041	0.041	0.041	0.041	0.041
- Livestock Husbandry Feedlot Cattle	0.151	0.151	0.151	0.151	0.151	0.151
Construction and Demolition	0.163	0.144	0.162	0.178	0.157	0.177
Paved Road Dust	0.151	0.153	0.153	0.157	0.158	0.158
Unpaved Road Dust	4.599	4.587	4.586	4.758	4.745	4.744
Fugitive Windblown Dust	3.949	3.947	3.947	3.691	3.689	3.689
Fires	0.004	0.004	0.004	0.004	0.004	0.004
Managed Burning and Disposal	0.906	0.800	0.792	1.088	0.961	0.952
Cooking	0.052	0.050	0.056	0.052	0.050	0.056
Other (Miscellaneous Processes)	0.000	0.000	0.000	0.000	0.000	0.000
Total Area-Wide Sources	**10.786**	**10.565**	**10.574**	**10.933**	**10.679**	**10.687**
Mobile Sources						
On-Road Vehicles	0.302	0.273	0.249	0.301	0.273	0.249
Other Mobile Sources						
- Aircraft	0.759	0.759	0.759	0.760	0.760	0.760
- Off –Road, Trains, Recreational Boats and Farm Equipment	0.277	0.225	0.222	0.322	0.265	0.260
Total Mobile Sources	**1.338**	**1.257**	**1.230**	**1.383**	**1.298**	**1.269**
Total for Imperial[14]	**12.619**	**12.334**	**12.363**	**12.824**	**12.499**	**12.529**

[14] The numbers may not match the California Emissions Projection Analysis Model (CEPAM) exactly due to rounding.

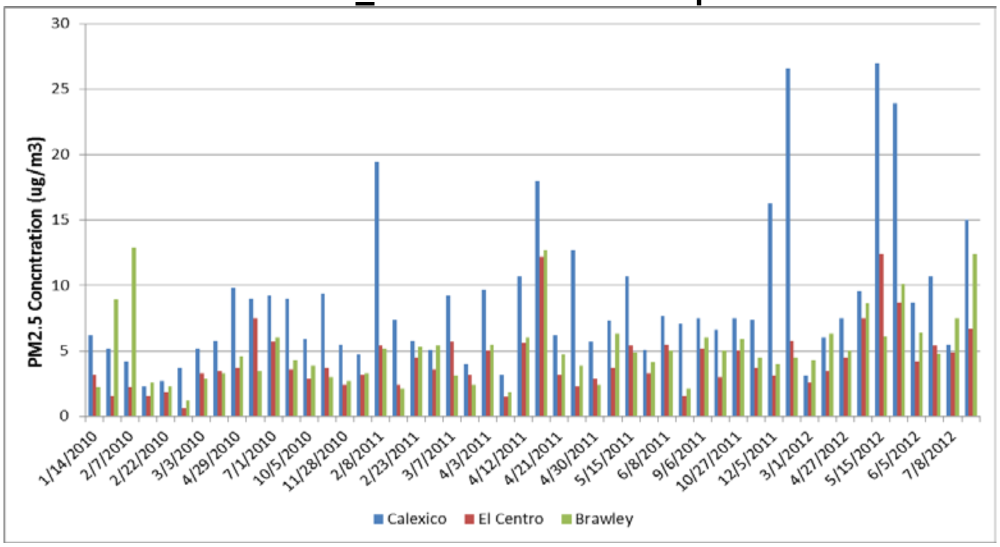
3.4.1 Determination of Significant Sources of $PM_{2.5}$ Precursors

3.4.1.1 North Wind Analysis of $PM_{2.5}$ Concentrations

The 179B analysis developed for the Imperial County NA (Chapter 4 and Attachment A) demonstrates that Calexico would not exceed the 24-hour $PM_{2.5}$ standard but for emissions from Mexicali. An assessment of the area's need for RACM is nevertheless required for all significant sources of PM and PM precursors. Although U.S. EPA has not yet issued a new implementation rule for $PM_{2.5}$, they have recommended using existing guidance for evaluating the significance of PM_{10} precursors and applying that threshold to evaluate the potential significance of $PM_{2.5}$ precursors. The 1992 general preamble states that moderate nonattainment areas must provide controls for major stationary sources of PM_{10} and PM_{10} precursors under Section 189(e) of the CAA. Per the preamble, the precursors for major stationary sources are defined as VOCs, SO_2, and NO_X.

Since Mexicali and much of the Imperial County NA share a common airshed, a large part of the precursor-formed particulate concentrations in the Imperial County NA are from emissions originating in Mexicali. Establishing the $PM_{2.5}$ contribution of Imperial County NA sources without the influence of Mexicali emission sources is therefore challenging. To obtain a best estimate of the contribution of sources within the Imperial County NA to precursor-formed $PM_{2.5}$ measurements made in Calexico, CARB staff began by binning $PM_{2.5}$ concentration data by wind direction and wind speed. The $PM_{2.5}$ concentrations measured when winds originated from the north in Imperial County NA at least 75 percent of the time with speeds greater than 1.5 meters per second were coupled with coincident speciation measurements (see Attachment A). Of the 50 days that had valid $PM_{2.5}$ data using the above criteria, speciation data were available for 31 days. Figure 3.1 is a plot of the $PM_{2.5}$ concentrations meeting the above criteria for all 50 days. The average $PM_{2.5}$ species concentration on the north wind days was 7.6 ug/m^3, which is similar to annual concentrations measured at the Brawley and El Centro sites. No exceedances occurred on any of the 50 days, although $PM_{2.5}$ measurements in Calexico were significantly higher than measurements at Brawley and El Centro.

Figure 3.1 FRM $PM_{2.5}$ Concentrations in Imperial County NA from 2010-2012 when North Winds >18 Hours and Wind Speeds >1.5 m/s



3.4.1.2 Determination of Significance for Precursors

To determine the significant precursors in the Imperial NA as part of SIP planning, and to determine which sources need to have RACM/RACT controls, the following approach was used.

Because exceedances of $PM_{2.5}$ in the border region are typically observed during the winter months of November through February, staff further screened the 31 north wind speciation days to include only values measured during those months. From the resulting nine days of measurements, speciation data (e.g., ammonium nitrate) were used to evaluate the significance of $PM_{2.5}$ precursors in the Imperial County NA. The sum of the species was highest on December 5, 2011. The concentrations on this day were therefore chosen to evaluate the significance of precursor emissions in the Imperial NA (Table 3.2).

Table 3.2 Speciation Data for December 5, 2011

Date	Ammonium Nitrate	Ammonium Sulfate	Dust	Elements	EC	OC	Sum of Species
12/5/11	0.71	0.74	1.95	1.73	1.7	8.31	15.13

U.S. EPA guidance for PM_{10} precursors indicates that a source is considered significant if it contributes more than 5 ug/m^3 to the 150 ug/m^3 PM_{10} standard, which is equivalent to 3.3 percent (5 ug/m^3/150 ug/m^3 x 100% = 3.3%). To evaluate the significance of precursors for SIP planning, and to determine which sources potentially require RACM/RACT controls, staff calculated the percent that each chemical species in Table 3.2 contributes to a $PM_{2.5}$ exceedance (35.5 ug/m^3), as measured on the highest $PM_{2.5}$ winter day from 2010 through 2012 (Table 3.3).

Table 3.3 Significant $PM_{2.5}$ Precursor Species and Sources in Imperial County NA

Chemical Species	Percent Contribution to an Exceedance (35.5 ug/m^3)	Significant? (>3.3%)
Ammonium Nitrate	*1.99%	No
Ammonium Sulfate	2.08%	No
Dust- Geological	*5.52%	Yes
OC and Other Mass	33.07%	Yes

* Percentages may differ from calculating values due to rounding

Because ammonium nitrate and ammonium sulfate are below the significance threshold of 3.3 percent, staff estimates that NOx, SOx, or ammonia sources in the Imperial NA would not significantly contribute to an exceedance of the $PM_{2.5}$ standard. Additional information on why VOC and ammonia emissions should not be considered significant precursors to the winter $PM_{2.5}$ formation in the Imperial NA are discussed on Section 3.4.1.3, below. However, for information, the RFP analysis includes all precursors to show that emissions decline in the Imperial NA in the years 2008, 2011, and 2012.

3.4.1.3 Secondary Ammonium Nitrate Formation

3.4.1.3.a Chemistry

The cooler temperatures and higher humidity of the winter months are conducive to ammonium nitrate formation through a complex process involving NOx, ammonia, and VOCs. This occurs both at the surface and aloft, via both daytime and nighttime chemistry. Understanding the interactions amongst these precursors is needed to design an appropriate and effective approach to reduce ammonium nitrate.

During the day, NO_2 is oxidized to nitric acid (HNO_3). This daytime pathway also involves sunlight, VOCs, and background ozone:

$$NO \xrightarrow{O_3} NO_2 \xrightarrow{OH} HNO_3$$

Main oxidant is OH
Requires high sunlight, VOC rich environment

During the night, nitric acid is formed through oxidation of NO_2 (via dinitrogen pentoxide or N_2O_5) by background ozone:

$$NO \xrightarrow{O_3} NO_2 \xrightarrow{O_3} NO_3 \xrightarrow{NO_2} N_2O_5 \xrightarrow{H_2O} 2\ HNO_3$$

Main Oxidant is Ozone (O_3)
Favors low sunlight intensity, wet conditions

The nitric acid formed from these reactions then combines with ammonia (NH_3) to form ammonium nitrate (NH_4NO_3):

$$HNO_3 + NH_3 \longleftrightarrow NH_4NO_3$$

Since the chemistry of NOx to nitric acid formation involves multiple steps and also depends on the availability of oxidants, only a portion of the NOx emitted ultimately forms ammonium nitrate.

3.4.1.3.b Limiting Precursor Concept

The amount of ammonium nitrate produced will depend on the relative atmospheric abundance of its precursors – VOCs, NOx, and NH_3. It is therefore important to understand which precursor controls are most effective in reducing ammonium nitrate concentrations. In simple terms, the precursor in shortest supply will limit how much ammonium nitrate is produced. This is known as the “limiting” precursor. The following figures provide an illustration of this concept. As shown in Figure 3.2, each molecule of ammonia pairs with one NOx molecule to produce one molecule of ammonium nitrate. In this example, there are more ammonia molecules than NOx, and therefore not all of the ammonia participates in forming ammonium nitrate, i.e. there is “excess” ammonia. This is especially true since not all NOx molecules end up as HNO_3. Figure 3.3 illustrates the impact of reducing NOx. Here, a reduction in NOx, the less abundant precursor, leads to a commensurate reduction in ammonium nitrate. In contrast, Figure 3 illustrates that a larger reduction in the more abundant precursor, ammonia, results in no reduction in ammonium nitrate, as the ammonia reduced did not participate in ammonium nitrate production.

Figure 3.2 Ammonium Nitrate Formation

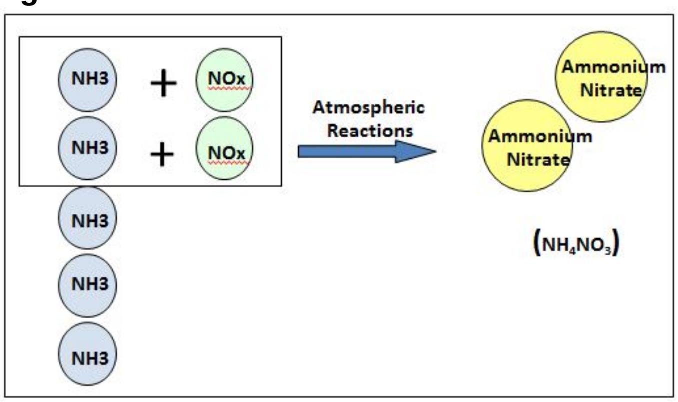


Figure 3.3 Reducing the less abundant precursor is more effective in reducing Ammonium Nitrate

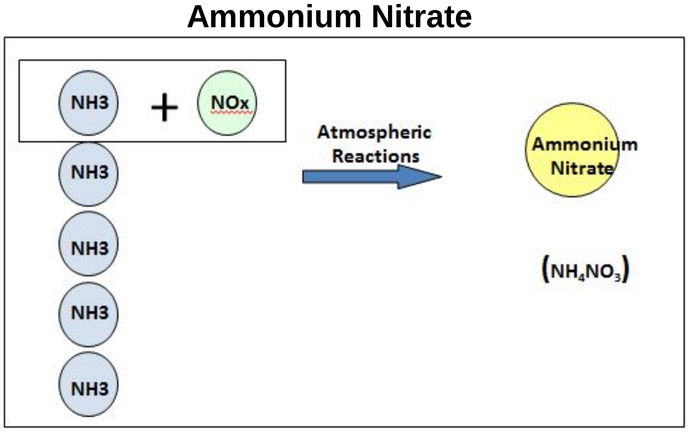
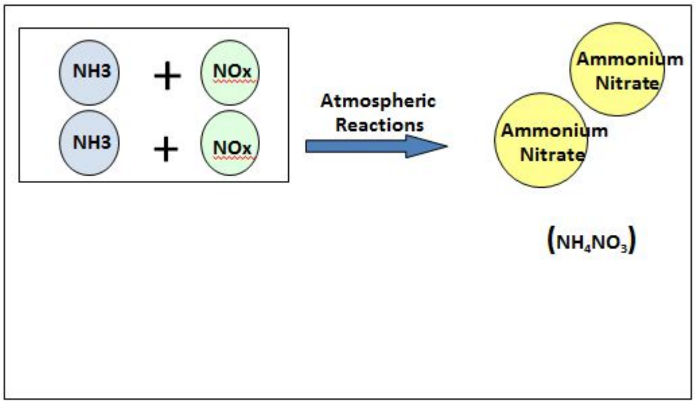


Figure 3.4 Reducing the more abundant precursor is less effective in reducing Ammonium Nitrate



The following sections describe the current state of the science regarding the role of ammonia and NOx in ammonium nitrate formation and identify the most effective precursors for control.

3.4.1.3.c Role of Ammonia in Ammonium Nitrate Formation

Analyses to understand the role of ammonia in ammonium nitrate formation in Imperial County NA is limited. Ambient measurement studies of ammonia, nitric acid, and particulate ammonium; and photochemical modeling analyses of ammonium nitrate sensitivity to precursor emission reductions are not available for the area. The only available analysis is to compare the magnitude of the NOx and ammonia emissions inventories to assess the relative abundance of different precursors.

Emission inventory

As discussed in the limiting precursor section, the precursor in shortest supply limits the amount of ammonium nitrate formation. An evaluation of the magnitude of NOx and ammonia emissions provides a first level assessment of the relative abundance of these two precursors. Table 3.4 lists NOx and ammonia winter emissions in the current inventory for four years (2008, 2010, 2011, and 2012). As Figure 3.2 in the limiting precursor section illustrated, in simple terms it takes one molecule of NOx and one molecule of ammonia to form one molecule of ammonium nitrate. However, due to differing molecular weights, one ton of NOx contains fewer molecules than one ton of ammonia. Therefore it is most appropriate to make an emissions inventory comparison after normalizing for molecular weight.

Due to emission source test procedures, most NOx emissions are expressed in terms of nitrogen dioxide (NO_2). Since one NO_2 molecule weighs 46 universal atomic units (u) and one NH_3 molecule weighs 17u, one ton of NH_3 has 2.7 times (46u/17u) the number of molecules as one ton of NO_2. Dividing the NOx emissions by 2.7 therefore provides a common basis for comparison to the ammonia emissions. On this normalized comparison basis, ammonia is significantly more abundant than NOx in all years by a factor of 4 (Table 3.4). Further, as noted in the chemistry section, only a portion on the NOx is ultimately converted to ammonium nitrate.

Table 3.4 Comparison of NOx and Ammonia emissions in selected years

Year	Winter NH_3 emissions (tpd)	Winter NOx emissions (tpd)	Normalized NOx emissions (tpd)	NH_3/ Normalized NOx
2008	30.9	18.4	6.8	4.5
2010	30.8	15.8	5.9	5.2
2011	30.8	15.3	5.7	5.4
2012	30.9	14.9	5.5	5.6

Air Quality Modeling from other California Regions

In California, two other areas of the State which are nonattainment for $PM_{2.5}$ have been studied regarding the formation of ammonium nitrate, the South Coast Air Basin and the San Joaquin Valley. Table 3.5 compares the relative emissions of Imperial NA with the San Joaquin Valley and the South Coast Air Basin. Table 3.5 shows that from an emission inventory perspective, Imperial County NA is more similar to the San Joaquin Valley rather than South Coast Air Basin as to the relationship between normalized NOx and NH_3. Compared to the San Joaquin Valley, the Imperial County NA has relatively more NH_3 than normalized NOx.

Table 3.5 Comparison of 2008 NOx and Ammonia emissions

Region	Winter NH_3 emissions (tpd)	Winter NOx emissions (tpd)	Normalized NOx emissions (tpd)	NH_3/ Normalized NOx
Imperial County NA	30.9	18.4	6.8	4.5
San Joaquin Valley	374	404	150	2.5
South Coast	109	792	293	0.4

Since Imperial County NA is more similar to San Joaquin Valley than the South Coast Air Basin, San Joaquin Valley air quality modeling and studies can be used to draw conclusion for the Imperial County NA. The San Joaquin Valley has been extensively studied regarding $PM_{2.5}$ formation. Using the results from these analysis, In the San Joaquin Valley, air quality modeling and studies have shown that NOx is the limiting precursor in ammonium nitrate formation due to the abundance of NH_3. Without specific air quality modeling or studies in the Imperial County NA, it is appropriate to assume that ammonium nitrate formation behaves similar a similar to the San Joaquin Valley. Therefore, ammonium nitrate formation is NOx limited and the NH_3 precursor does not contribute significant to elevated $PM_{2.5}$ levels in the Imperial County NA. As such, any ammonia emissions reductions do not substantially contribute to reductions of $PM_{2.5}$ levels in the Imperial County NA.

3.4.1.3.d Role of VOCs in Nitric Acid formation

As discussed in the chemistry section above, during the day, NO_2 is oxidized to nitric acid through a pathway that involves sunlight, VOCs, and background ozone. Air quality modeling is the best tool to understand the VOC chemistry. Unfortunately, air quality modeling is not available for the Imperial County NA. As discussed earlier, only two areas of the State have analyzed VOC formation using air quality modeling, the San Joaquin Valley and the South Coast Air Basin. Most recently, this analysis was done in support of $PM_{2.5}$ SIPs for the 35 ug/m^3 24-hour $PM_{2.5}$ standard.

In the San Joaquin Valley, the air quality modeling showed that VOC reductions had no benefit in reducing nitric acid. In the South Coast Air Basin, air quality modeling showed that VOC emission reductions were 70 percent less effective than NOx emission reductions. Both regions confirm that NOx emission reductions have the greatest benefit when analyzing nitric acid formation. Therefore, the only California specific information shows that nitrate acid formation is limited by the NOx precursor and the VOC precursor does not contribute significant to elevated $PM_{2.5}$ levels and these conclusions can be used for the Imperial County NA.

3.4.1.4 Secondary Organic Aerosol (SOA) Formation

VOC emissions also have the potential to contribute to secondary organic aerosols (SOA). SOA form when intermediate molecular weight VOCs, emitted by anthropogenic and biogenic sources, oxidize and condense in the atmosphere to become aerosols. In addition, lighter VOCs participate in the formation of atmospheric oxidants which then participate in the formation of SOA. The processes of SOA formation are complex and have not been fully characterized. SOA are mostly formed during the summertime, when total $PM_{2.5}$ concentrations are low, and are mainly derived from biogenic emissions sources.

While these components contribute to observed $PM_{2.5}$ concentrations in the Imperial County NA to a small degree in the summertime, in the wintertime, VOCs are not a significant contributor to $PM_{2.5}$ exceedances.

3.4.2 Determination of Significant Sources of $PM_{2.5}$

Based on the North Wind Analysis, the significant level for $PM_{2.5}$ source categories is determined by evaluating their percent contribution to the total $PM_{2.5}$ emissions inventory for the district. Therefore, any $PM_{2.5}$ source category with fractional contribution to the emissions inventory greater than 3.3% is considered potentially significant.

Table 3.6 presents the winter average $PM_{2.5}$ emissions inventory and percent contribution for all source categories on the 2008 $PM_{2.5}$ emissions inventory. Based on the 2008 $PM_{2.5}$ emissions inventory, emission inventory source categories deemed significant requiring a RACM/RACT analysis are: unpaved road dust, fugitive windblown dust, farming operations (tilling), managed burning and disposal, and emissions from aircraft. The District currently has controls for all of these sources categories except for aircraft emissions which are outside of the District's or State's regulatory authority. The District RACM/RACT analysis in Chapter 5 addresses how these significant sources are being controlled.

Table 3.6
2008 $PM_{2.5}$ Winter Emissions Inventory and Predicted Contributions of Emissions by Source Category

Source Category	2008 (tons/day)	% Contribution
Stationary Sources		
Fuel Combustion	0.159	1.26
Waste Disposal	0.000	0.00
Cleaning and Surface Coatings	0.000	0.00
Petroleum Prod. and Marketing	0.000	0.00
Food and Agriculture	0.056	0.44
Mineral Processes		
- Sand and Gravel Excavation	0.017	0.13
- Asphaltic Concrete Production	0.060	0.48
- Cement Concrete Production	0.021	0.17
- Other	0.182	1.44
Total Stationary Sources	0.495	
Area-wide Sources		
Solvent Evaporation	0.000	0.00
Residential Fuel Combustion	0.064	0.51
Farming Operations		
- Tilling	***0.677***	***5.37***
- Harvest Operations	0.027	0.21
- Livestock Husbandry Dairy Cattle	0.002	0.02
- Livestock Husbandry Range Cattle	0.041	0.32
- Livestock Husbandry Feedlot Cattle	0.151	1.20
Construction and Demolition	0.163	1.29
Paved Road Dust	0.151	1.20
Unpaved Road Dust	***4.599***	***36.45***
Fugitive Windblown Dust	***3.949***	***31.29***
Fires	0.004	0.03
Managed Burning and Disposal	***0.906***	***7.18***
Cooking	0.052	0.41
Other (Miscellaneous Processes)	0.000	0.00
Total Area-Wide Sources	**10.786**	
Mobile Sources		
On-Road Vehicles	0.302	2.39
Other Mobile Sources		
- Aircraft	***0.759***	***6.01***
- Off-Road, Trains, Rec Boats and Farm Eq.	0.277	2.20
Total Mobile Sources	1.338	
Total for Imperial	12.619	100.00

3.5 Oxides of Nitrogen (NOx) Emissions Inventory

The NOx emissions inventory by source category is presented in Table 3.7. This table shows that the majority of NOx emissions in the Imperial County's non-attainment area are produced by mobile sources (on-road vehicles and other mobile sources). At the state level, CARB is responsible for regulating on-road motor vehicles and some off-road mobile sources. At the federal level, U.S. EPA traditionally regulates emissions sources related to interstate commerce such as locomotives, aircraft, heavy duty trucks and some off-road engines. Therefore, emissions from mobile sources depend on the current and proposed mobile source strategies under the state and federal jurisdiction. The fuel combustion category is a source of NOx emissions which includes stationary sources that burn fuels such as natural gas and diesel as a matter of operations or to produce useful heat. Examples of sources in this category are electric utility boilers, process heaters, internal combustion engines, and home furnaces. The majority of these sources operate under an ICAPCD permit and are required to be constructed using the Best Available Control technology. Agricultural burning is also a source of NOx emissions. This activity is regulated by implementation of state required and approved Smoke Management Plan. Table 3.7 shows reduction of NOx emissions between 2008 and 2012 emissions inventories for the mobile source categories due to implementation of state programs.

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Table 3.7
NOx Emissions Inventory By Major Source Category
2008, 2011 and 2012 Winter and Annual Planning Emissions Inventories
(tons/day)

Source Category	Winter Average			Annual Average		
	2008	2011	2012	2008	2011	2012
Stationary Sources						
Fuel Combustion						
- Electrical Utilities, NG Boilers	0.640	0.614	0.691	0.837	0.803	0.903
- Electrical Utilities, Turbines	0.026	0.025	0.028	0.130	0.125	0.140
- Manufacturing and Industrial	0.064	0.062	0.064	0.087	0.085	0.087
- Food and Agricultural Processing	0.086	0.059	0.056	0.131	0.090	0.086
- Service and Commercial	0.906	0.923	0.943	0.579	0.590	0.603
- Other (Fuel Combustion)	0.111	0.109	0.120	0.108	0.106	0.117
Waste Disposal	0.000	0.000	0.000	0.000	0.000	0.000
Cleaning and Surface Coatings	0.000	0.000	0.000	0.000	0.000	0.000
Petroleum Prod. and Marketing	0.000	0.000	0.000	0.000	0.000	0.000
Industrial Processes	0.003	0.003	0.003	0.003	0.003	0.003
Total Stationary Sources	**1.836**	**1.795**	**1.905**	**1.875**	**1.802**	**1.939**
Area-wide Sources						
Solvent Evaporation	0.000	0.000	0.000	0.000	0.000	0.000
Residential Fuel Combustion	0.105	0.105	0.106	0.080	0.080	0.081
Farming Operations	0.000	0.000	0.000	0.000	0.000	0.000
Construction and Demolition	0.000	0.000	0.000	0.000	0.000	0.000
Paved Road Dust	0.000	0.000	0.000	0.000	0.000	0.000
Unpaved Road Dust	0.000	0.000	0.000	0.000	0.000	0.000
Fugitive Windblown Dust	0.000	0.000	0.000	0.000	0.000	0.000
Fires	0.001	0.001	0.001	0.001	0.001	0.001
Managed Burning and Disposal	0.317	0.280	0.278	0.381	0.337	0.333
Cooking	0.000	0.000	0.000	0.000	0.000	0.000
Other (Miscellaneous Processes)	0.000	0.000	0.000	0.000	0.000	0.000
Total Area-Wide Sources	**0.423**	**0.386**	**0.385**	**0.462**	**0.418**	**0.415**
Mobile Sources						
On-Road Vehicles	8.608	6.886	6.306	8.425	6.734	6.169
Other Mobile Sources						
- Aircraft	1.523	1.523	1.523	1.524	1.524	1.524
- Off-Road, Trains, Recreational Boats and Farm Equipment	6.053	4.683	4.784	6.502	5.084	5.165
Total Mobile Sources	**16.184**	**13.092**	**12.613**	**16.451**	**13.342**	**12.858**
Total for Imperial[15]	**18.443**	**15.273**	**14.903**	**18.788**	**15.562**	**15.212**

[15] The numbers may not match the California Emissions Projection Analysis Model (CEPAM) exactly due to rounding.

3.6 Volatile Organic Compounds (VOCs) Emissions Inventory

The VOCs emissions inventory by source category is presented in Table 3.8. This table shows that the majority of VOCs emissions in the Imperial County's non-attainment area are produced by mobile sources (on-road and off-road vehicles), solvent evaporation and farming operations. As stated above, mobile sources are regulated at the state and federal level so any emission reductions depends on implementation of state or federal strategy. The solvent evaporation category includes emissions from consumer products, pesticides/fertilizers and asphalt paving, most of the sources included in this category are regulated under the state strategy. The farming category includes emissions from operation of feedlots and dairies; these sources are regulated under a district rule which requires implementation of control measures for large confined animal facilities. Agricultural burning is also a source of VOCs emissions. This activity is regulated by implementation of state required and approved Smoke Management Plan. Table 3.8 shows reduction of VOCs emissions between 2008 and 2012 emissions inventories for the mobile source categories due to implementation of state programs.

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Table 3.8
VOCs Emissions Inventory By Major Source Category
2008, 2011 and 2012 Winter and Annual Planning Emissions Inventories
(tons/day)

Source Category	Winter Average			Annual Average		
	2008	**2011**	**2012**	**2008**	**2011**	**2012**
Stationary Sources						
Fuel Combustion	0.055	0.053	0.055	0.067	0.063	0.066
Waste Disposal	0.016	0.013	0.014	0.016	0.013	0.014
Cleaning and Surface Coatings						
- Laundering	0.008	0.008	0.008	0.008	0.008	0.009
- Degreasing	0.188	0.210	0.247	0.188	0.210	0.247
- Coating and Related Process	0.163	0.143	0.173	0.163	0.143	0.173
- Adhesives and Sealants	0.056	0.062	0.074	0.056	0.063	0.074
Petroleum Prod. and Marketing						
- Petroleum Refining	0.002	0.002	0.003	0.002	0.002	0.003
- Petroleum Marketing	0.559	0.615	0.640	0.559	0.615	0.640
- Other (Petroleum and Marketing)	0.009	0.010	0.011	0.009	0.010	0.011
Industrial Processes	0.003	0.003	0.003	0.003	0.003	0.003
Total Stationary Sources	**1.059**	**1.119**	**1.228**	**1.071**	**1.130**	**1.240**
Area-wide Sources						
Solvent Evaporation						
- Consumer Products	1.058	1.011	1.010	1.058	1.012	1.011
- Architectural Coatings	0.408	0.352	0.331	0.476	0.408	0.382
- Pesticides/Fertilizers	1.269	1.973	1.184	2.144	1.834	1.891
- Asphalt Paving/Roofing	1.361	1.201	1.348	1.740	1.536	1.724
Residential Fuel Combustion	0.058	0.057	0.058	0.033	0.033	0.033
Farming Operations						
- Livestock, Dairy Cattle	0.343	0.343	0.343	0.343	0.343	0.343
- Livestock, Range Cattle	0.115	0.115	0.115	0.115	0.115	0.115
- Livestock, Feedlot Cattle	2.227	2.227	2.227	2.227	2.228	2.227
- Livestock, Ag. Waste, Sheep	0.117	0.117	0.117	0.117	0.117	0.117
- Livestock, Ag. Waste, Horses	0.002	0.002	0.002	0.002	0.002	0.002
Construction and Demolition	0.000	0.000	0.000	0.000	0.000	0.000
Paved Road Dust	0.000	0.000	0.000	0.000	0.000	0.000
Unpaved Road Dust	0.000	0.000	0.000	0.000	0.000	0.000
Fugitive Windblown Dust	0.000	0.000	0.000	0.000	0.000	0.000
Fires	0.002	0.002	0.002	0.002	0.002	0.002
Managed Burning and Disposal	0.662	0.585	0.579	0.795	0.703	0.696
Cooking	0.017	0.016	0.018	0.017	0.016	0.018
Total Area-Wide Sources	**7.639**	**8.001**	**7.334**	**9.069**	**8.349**	**8.561**
Mobile Sources						
On-Road Vehicles	1.996	1.659	1.517	2.072	1.723	1.578
Other Mobile Sources						
- Aircraft	2.186	2.186	2.186	2.189	2.188	2.188
- Off-Road, Trains, Recreational Boats and Farm Equipment	2.657	2.286	2.196	3.624	3.156	3.024
Total Mobile Sources	**6.839**	**6.131**	**5.899**	**7.885**	**7.067**	**6.790**
Total for Imperial[16]	**15.537**	**15.251**	**14.461**	**18.025**	**16.546**	**16.591**

[16] The numbers may not match the California Emissions Projection Analysis Model (CEPAM) exactly due to rounding.

3.7 Sulfur Oxides (SOx) Emissions Inventory

The SOx emissions inventory by source category is presented in Table 3.9. This table shows that there is not any source categories which emit any considerable amount of SOx in Imperial County. Table 3.9 shows slight reduction of SOx emissions between 2008 and 2012 emissions inventories.

Table 3.9
SOx Emissions Inventory By Major Source Category
2008, 2011 and 2012 Winter and Annual Planning Emissions Inventories
(tons/day)

Source Category	Winter Average			Annual Average		
	2008	2011	2012	2008	2011	2012
Stationary Sources						
Fuel Combustion	0.078	0.078	0.086	0.080	0.079	0.088
Waste Disposal	0.000	0.000	0.000	0.000	0.000	0.000
Cleaning and Surface Coatings	0.000	0.000	0.000	0.000	0.000	0.000
Petroleum Prod. and Marketing	0.000	0.000	0.000	0.000	0.000	0.000
Industrial Processes	0.001	0.001	0.001	0.001	0.001	0.001
Total Stationary Sources	**0.079**	**0.079**	**0.087**	**0.081**	**0.080**	**0.089**
Area-wide Sources						
Solvent Evaporation	0.000	0.000	0.000	0.000	0.000	0.000
Residential Fuel Combustion	0.003	0.003	0.003	0.002	0.002	0.002
Farming Operations	0.000	0.000	0.000	0.000	0.000	0.000
Paved Road Dust	0.000	0.000	0.000	0.000	0.000	0.000
Unpaved Road Dust	0.000	0.000	0.000	0.000	0.000	0.000
Fugitive Windblown Dust	0.000	0.000	0.000	0.000	0.000	0.000
Fires	0.000	0.000	0.000	0.000	0.000	0.000
Managed Burning and Disposal	0.055	0.049	0.048	0.066	0.059	0.058
Cooking	0.000	0.000	0.000	0.000	0.000	0.000
Other (Miscellaneous Processes)	0.000	0.000	0.000	0.000	0.000	0.000
Total Area-Wide Sources	**0.058**	**0.052**	**0.051**	**0.068**	**0.061**	**0.060**
Mobile Sources						
On-Road Vehicles	0.015	0.016	0.016	0.015	0.016	0.017
Other Mobile Sources						
- Aircraft	0.204	0.204	0.204	0.205	0.205	0.204
- Off-Road, Trains, Recreational Boats and Farm Equipment	0.026	0.005	0.005	0.026	0.005	0.006
Total Mobile Sources	**0.245**	**0.225**	**0.225**	**0.246**	**0.226**	**0.227**
Total for Imperial[17]	**0.382**	**0.356**	**0.363**	**0.395**	**0.367**	**0.376**

3.8 Ammonia Emissions Inventory

The Ammonia emissions inventory by source category is presented in Table 3.10. This table shows that the majority of ammonia emissions are produced by the fuel combustion, waste disposal, solvent evaporation and farming operations categories in Imperial County. Fuel combustion sources, such as power plants, emit excess ammonia from the NOx control equipment. The waste disposal category includes

[17] The numbers may not match the California Emissions Projection Analysis Model (CEPAM) exactly due to rounding.

ammonia emissions from manure composting facilities. The solvent evaporation category includes emissions from agricultural fertilizers. The farming operation category includes ammonia emissions from cattle feedlots and dairies.

Table 3.10
Ammonia Emissions Inventory By Major Source Category
2008, 2011 and 2012 Winter and Annual Planning Emissions Inventories
(tons/day)

Source Category	Winter Average			Annual Average		
	2008	2011	2012	2008	2011	2012
Stationary Sources						
Fuel Combustion						
- Electric Utilities	1.654	1.586	1.783	1.611	1.545	1.737
Waste Disposal						
- Sewage Treatment	0.001	0.001	0.001	0.001	0.001	0.001
- Landfills	0.057	0.061	0.062	0.058	0.061	0.062
- Composting	1.416	1.416	1.416	1.416	1.416	1.416
Cleaning and Surface Coatings	0.000	0.000	0.000	0.000	0.000	0.000
Petroleum Prod. and Marketing	0.000	0.000	0.000	0.000	0.000	0.000
Industrial Processes	0.014	0.014	0.016	0.014	0.014	0.016
Total Stationary Sources	**3.142**	**3.078**	**3.278**	**3.100**	**3.037**	**3.232**
Area-wide Sources						
Solvent Evaporation						
- Agricultural Fertilizers	14.223	14.151	14.127	18.263	18.170	18.139
Residential Fuel Combustion	0.004	0.004	0.004	0.002	0.002	0.002
Farming Operations						
- Livestock, Dairy Cattle	1.499	1.499	1.499	1.499	1.499	1.499
- Livestock, Range Cattle	0.493	0.493	0.493	0.493	0.493	0.493
- Livestock, Feedlot Cattle	10.056	10.056	10.056	10.060	10.060	10.060
- Livestock, Ag. Waste, Sheep	0.904	0.904	0.904	0.905	0.905	0.905
- Livestock, Ag. Waste, Horses	0.008	0.008	0.008	0.008	0.008	0.008
- Livestock, Goats and Others	0.002	0.002	0.002	0.002	0.002	0.002
Construction and Demolition	0.000	0.000	0.000	0.000	0.000	0.000
Paved Road Dust	0.000	0.000	0.000	0.000	0.000	0.000
Unpaved Road Dust	0.000	0.000	0.000	0.000	0.000	0.000
Fugitive Windblown Dust	0.000	0.000	0.000	0.000	0.000	0.000
Fires	0.000	0.000	0.000	0.000	0.000	0.000
Managed Burning and Disposal	0.136	0.120	0.119	0.163	0.144	0.143
Cooking	0.000	0.000	0.000	0.000	0.000	0.000
Other (Miscellaneous Processes)	0.297	0.297	0.297	0.298	0.298	0.298
Total Area-Wide Sources	**27.622**	**27.534**	**27.509**	**31.693**	**31.581**	**31.549**
Mobile Sources						
On-Road Vehicles	0.166	0.160	0.157	0.166	0.160	0.157
Other Mobile Sources						
- Aircraft	0.000	0.000	0.000	0.000	0.000	0.000
- Off-Road, Trains, Recreational Boats and Farm Equipment	0.002	0.002	0.002	0.002	0.002	0.002
Total Mobile Sources	**0.168**	**0.162**	**0.159**	**0.168**	**0.162**	**0.159**
Total for Imperial[18]	**30.932**	**30.774**	**30.946**	**34.961**	**34.780**	**34.940**

[18] The numbers may not match the California Emissions Projection Analysis Model (CEPAM) exactly due to rounding.

3.9 Emission Reduction Credits (ERC's)

Currently, Imperial County is designated nonattainment for the NAAQS for ozone, PM_{10} and $PM_{2.5.}$ A key tool for enabling nonattainment areas to reach attainment and/or to maintain the NAAQS is the implementation of NSR. The ICAPCD NSR program (described in Chapter 5) ensures that air quality is not significantly degraded from the addition of new and modified stationary sources. Rule 207, New and Modified Stationary Source Review is the implementing regulation within the ICAPCD that assures the public that any large new or modified industrial source will be as clean as possible.

Rule 207 requires new or modified industrial stationary sources that increase their air emissions above certain thresholds to apply the Best Available Control Technology (BACT) and to provide offsets for a portion or all of the emissions increase. The purpose of the emission offset requirement is to provide mitigation, on a nonattainment pollutant-specific basis, for the regional impacts that might otherwise result from the increased emissions of that nonattainment pollutant.

Offsets occur as a result of equipment shutdowns or the voluntary reduction of emissions at a stationary source. These offsets can be registered or banked with an air district as Emission Reduction Credits (ERC's) which can be later used as an offset to compensate for emission increases at the same stationary source or at other stationary sources. U.S. EPA must approve offsets which are required for major stationary sources prior to use.

In order to use ERC's banked before the base year emission inventory, 40 CFR 51.165(a)(3)(ii)(C)(1)(ii) requires the inclusion of the available pre-base year banked ERC's in the base and forecasted years of an attainment demonstration's planning emissions inventory. Therefore, the unused banked ERC's for this $PM_{2.5}$ SIP which occurred prior to the 2008 baseline year are 121.32 tons of NOx, 12.36 tons of VOC's, 11.286 tons of SOx, and 4.60 tons of PM10. The amount of ERC's in the ICAPCD's bank did not change for 2011 and 2012. The ERCs in the ICAPCD's bank for 2008, 2011 and 2012 are found in Table 3.11. The NOx, VOC and SOx emission inventories for the years 2008, 2011 and 2012 have been updated accordingly. No $PM_{2.5}$ ERC's are available in the ICAPCD's bank; however, for the purpose of this plan, we have conservatively assumed that all combustion PM_{10} ERCs may be used to offset $PM_{2.5}$ emission increases.

Table 3.11
Emission Reduction Credits
Added to the Annual Emissions Inventory
(tons/day)

	2008	**2011**	**2012**
NOx Emission Reduction Credits	0.33	0.33	0.33
NOx Emission Inventory	18.79	15.55	15.21
NOx Total	19.12	15.88	15.54
VOC Emission Reduction Credits	0.03	0.03	0.03
VOC Emission Inventory	18.03	16.55	16.59
VOCTotal	18.06	16.58	16.62
SOx Emission Reduction Credits	0.03	0.03	0.03
SOx Emission Inventory	0.40	0.37	0.37
SOx Total	0.43	0.40	0.40
PM_{10} Emission Reduction Credits	0.012	0.012	0.012
$PM_{2.5}$ Emission Inventory	12.82	12.50	12.53
$PM_{2.5}$ Total	12.832	12.512	12.542

CHAPTER 4 ATTAINMENT DEMONSTRATION

4.1 Overview

CARB prepared a report entitled “179B Analysis for $PM_{2.5}$ Emissions Impacting Calexico in Imperial County” for ICAPCD. The purpose of this analysis is to identify the origin of emissions impacting $PM_{2.5}$ concentrations in the Imperial NA next to the Mexico international border. The Imperial NA is an agricultural community located in the southeast corner of California which shares its southern border with Mexicali, Mexico. The Imperial NA includes three $PM_{2.5}$ monitoring sites, El Centro, Brawley and Calexico. These three cities are about the same size and, in general, have emissions sources that are similar. Calexico is the only violating $PM_{2.5}$ monitor in the Imperial NA.

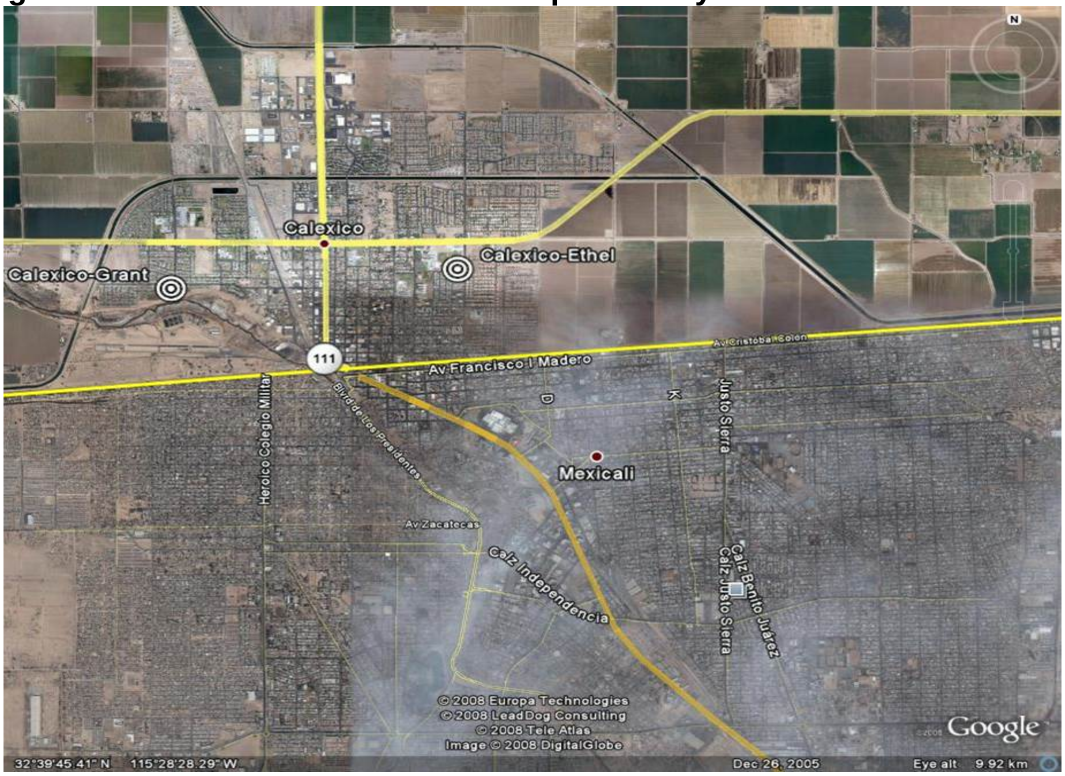
Attachment A contains a complete copy of the 179B Analysis. The 179B analysis provides technical documentation that in 2012 the Imperial NA attained the 24-hour $PM_{2.5}$ standard of 35 $\mu g/m^3$ but for emissions emanating from Mexico. The CAA contains a specific provision in Section 179B for areas that are affected by the international cross-border transport of pollutants. Exceedances that occur due to international transport may cause violations of the standard; however, the Act does not require states to develop an attainment strategy addressing pollution that originates from sources beyond United States borders.

U.S. EPA guidelines on demonstrating that an area is in attainment but for emissions emanating from outside the United States identifies five types of information that may be used in evaluating the impact of emissions from outside U.S. borders on a nonattainment area. States may use one or more of these approaches based on the specific circumstances and the data available:

- Compare emission inventories from each side of the border to assess the magnitude of the emission differences;
- Evaluate changes in $PM_{2.5}$ concentrations with wind direction;
- Analyze filters for specific particles that may be tied to foreign emission sources;
- Analyze the emission inventory on the U.S. side of the border and demonstrate that the impact of U.S. sources does not cause NAAQS exceedances;
- Perform air dispersion and/or receptor modeling (source apportionment) to quantify the impacts from U.S. and foreign emission sources.

To prepare the 179B Analysis, CARB’s Staff utilized all of these approaches to determine the impact of Mexicali emissions on the Calexico $PM_{2.5}$ monitor.

Figure 4.1 Mexicali and Calexico Separated by the International Border



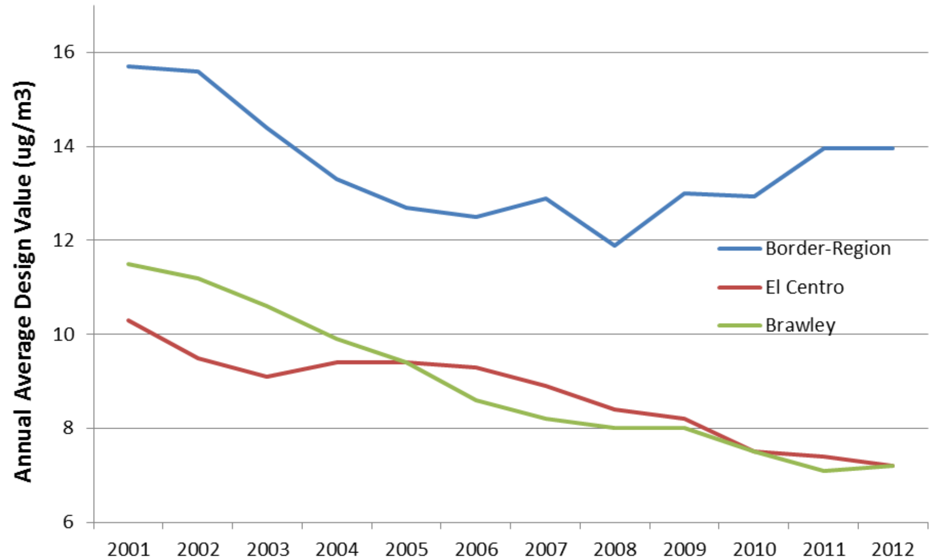
From an air quality perspective, Calexico and the Mexicali Metropolitan Area share a common air shed. Since the topography does not restrict air flow from either side of the border and both areas experience similar meteorology, Mexicali pollution impacts Calexico (Figure 4.1). The Calexico site is less than one mile from the international border and, according to U.S. EPA monitor siting criteria, represents air pollution of both Calexico and Mexicali.

The Mexicali Metropolitan Area has a population of close to 1,000,000 (United Nations Data) people as compared to the significantly smaller city of Calexico which has a population of 38,572 people (2010 U.S. Census). Figure 4.2 shows an aerial image of Calexico and Mexicali during the night which highlights the large difference in size and population. Emissions inventory data for Mexicali shows that emissions are magnitudes higher than the emissions in the Imperial NA. Also, Mexicali ranks as the 3rd most polluted city in the world for PM_{10} behind cities in India and China (*Choked*. Retrieved on June 2, 2014 from: http://www.economist.com/blogs/graphicdetail/2013/01/daily-chart-11).

Figure 4.2 Mexicali and Calexico

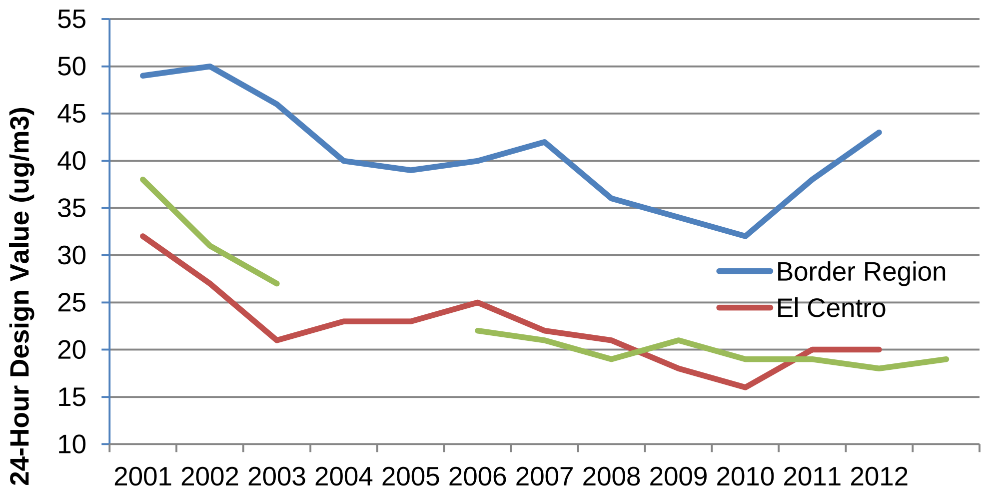
On a daily basis, ambient $PM_{2.5}$ concentrations in Calexico are significantly impacted by Mexicali emission sources. In Mexicali, a large population of industrial, mobile, and area sources are subject to less stringent emission regulations. Consequently, Mexicali industrial sources emit approximately 15 times more emissions and mobile sources emit almost three times more emissions than the entire Imperial NA. Due to these emissions differences, $PM_{2.5}$ concentrations measured in the Imperial NA typically follow a gradient with the lowest $PM_{2.5}$ concentrations measured in the north at Brawley and the highest concentrations in the south at Calexico. As shown in Figures 4.3 and 4.4, Brawley and El Centro have responded similarly to California control programs and air quality has improved as a result. However, in Calexico, air quality has not improved and remains above the revised federal annual average $PM_{2.5}$ standard of 12 μg/m^3 and the 24-hour $PM_{2.5}$ standard of 35 μg/m^3.

Figure 4.3 2001-2012 Annual Design Values for the Border Region, Brawley and El Centro



*Calexico data includes invalidated and transport days in the design value calculation

Figure 4.4 2001-2012 24-hour Design Values for the Border Region, Brawley and El Centro



While Calexico is impacted daily by emissions from Mexicali, on a few days every year, that impact is exacerbated resulting in exceedances of the 24-hour $PM_{2.5}$ standard. Between 2010 and 2012, the Calexico monitor measured $PM_{2.5}$ concentrations that exceeded the $PM_{2.5}$ NAAQS on five winter days (Table 4.1). The 179B Analysis, Attachment A, contains a detailed Day-Specific analysis for each of these days. These days occurred during stagnant weather conditions, often with predominant air flow from the south. Stagnant meteorological conditions impede dispersion and facilitate the build-up of $PM_{2.5}$ concentrations in the Calexico-Mexicali air shed. Most of these days coincide with wintertime holiday celebrations in Mexico where the use of bonfires and refuse burning along with fireworks displays are commonplace further increasing emissions in Mexicali. As a result, in 2012, the Calexico 24-hour $PM_{2.5}$ design value was 43μg/m^3, more than twice that of Brawley and El Centro levels (18 μg/m^3 and 20 μg/m^3 respectively). On all exceedance days included in this analysis, the average concentration at the Calexico site was more than 60 percent higher than the average concentrations at El Centro and Brawley.

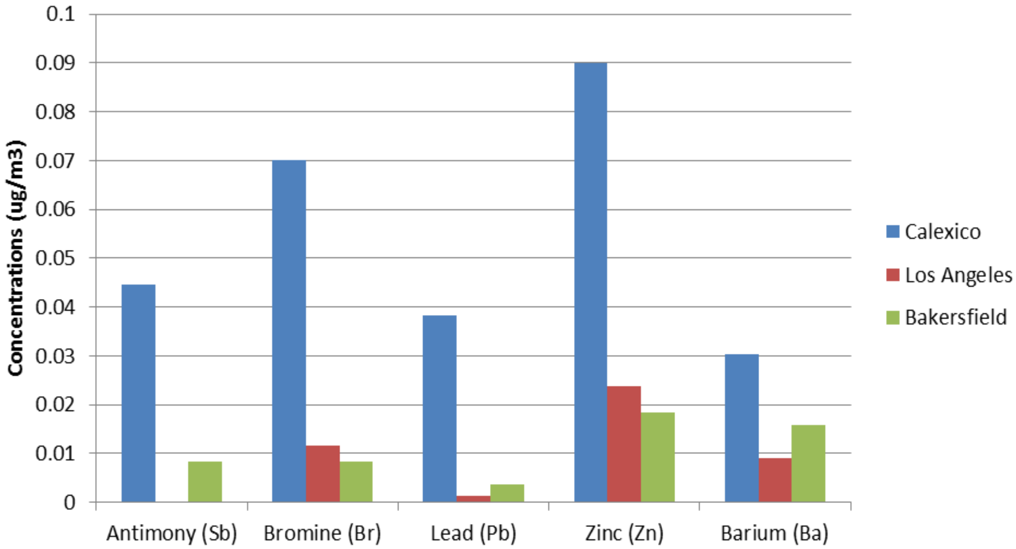
In addition, no exceedances for $PM_{2.5}$ were recorded at Calexico when the predominant wind flow was from the north, northerly winds defined as winds from the north at least 18 hours per day with speeds in excess of 1.5 meters per second. A more refined concentration-wind direction analysis is presented in the 179B Analysis and it shows that no violations of the $PM_{2.5}$ NAAQS occurred during northerly wind flow over the 2010-2012 time period.

Table 4.1
$PM_{2.5}$ Measurements Exceeding the 24-Hour $PM_{2.5}$ Standard at the Calexico Monitoring Site in 2010-2012

Date	Calexico $PM_{2.5}$ (μg/m^3)
12/4/2010	50.9
2/5/2011	80.3
12/11/2011	44.4
1/31/2012	37.7
12/23/2012	64.7

In order to evaluate the impact emission sources in Mexicali on elevated $PM_{2.5}$ concentrations measured in Calexico, CARB's staff analyzed chemical composition of $PM_{2.5}$ data and compared it to the composition of $PM_{2.5}$ from monitoring sites around California. The $PM_{2.5}$ chemical composition provides a signature for identifying types of activities impacting a monitor. On the days exceeding the 24-hour $PM_{2.5}$ standard, the chemical composition showed high values of organic carbon and elements. The high level of organic carbon indicates that combustion activities are a main source of emissions affecting Calexico. The high levels of organic carbon correlated well with high levels of chlorine and fine particulate antimony. Both chlorine and fine particulate antimony have been identified as being associated with refuse burning which is known to occur in Mexico. Some elemental components measured three to thirty times higher than at other sites in California (Figure 4.5). Some elemental components measured three to thirty times higher than at other sites in California. High concentrations of lead, bromine, zinc and barium, are typically associated with fireworks, tire burning and leaded gasoline. This suggests that source signatures contributing to high Calexico $PM_{2.5}$ levels were unique to this site and not found at other sites in California. Significantly, open refuse burning, which might produce these analytical results, has been banned in California since 2004.

Figure 4.5 Concentrations of Select Elemental Species on an Average Exceedance Day (2010-2012)



Further, the CARB laboratory performed additional elemental analysis on $PM_{2.5}$ filters in Brawley and El Centro coinciding with the five exceedance days. The difference between elemental species concentrations at Calexico and the other two Imperial County sites, El Centro and Brawley was similar to the difference observed between Calexico and other California sites. As a result, the analysis indicates that emissions impacting the Calexico monitor are not typical of sources affecting monitors elsewhere in Imperial County, but originate from sources south of the border. Source apportionment modeling substantiated $PM_{2.5}$ chemical composition analysis and indicated that refuse burning and secondary nitrate were the major contributors to the $PM_{2.5}$ concentration on the transport days.

Overall, the analysis shows that Calexico 24-hour $PM_{2.5}$ exceedances are due to emission sources not found in California. This interpretation is based on analyses indicating that during stagnant conditions, pollution from holiday activities in Mexicali, including extensive fireworks displays and bonfires containing plastics, tires and other refuse materials fill the entire air shed and drift into Calexico. $PM_{2.5}$ concentrations at El Centro and Brawley, which are representative of local emission within Imperial County, were significantly lower on Calexico exceedance days.

These analyses indicated that Calexico $PM_{2.5}$ levels would have attained the 24-hour $PM_{2.5}$ standard in 2012 “but for” increased pollution emissions from the Mexicali Metropolitan area. If Mexicali emissions were not impacting the Calexico site, Calexico’s design value would likely be closer to that of El Centro considering the similarity in sources and emission profiles. In addition, Imperial County emissions continue to decline in the future, which ensures continued maintenance of attainment. These analyses and documentation provides evidence for U.S. EPA to approve the Imperial County 2013 $PM_{2.5}$ SIP under Section 179B of the Clean Air Act. Table 4.2 shows the 98th percentile of 24-hour $PM_{2.5}$ concentrations and resulting design values for each $PM_{2.5}$ monitoring station in Imperial County. The Calexico Ethel design values are with and without the transport days. For detailed design value calculation for the Calexico Ethel monitoring site see Attachment B, the calculations in the Attachment provides different matrix of design values calculations per year and includes year 2013.

Table 4.2 24-Hour $PM_{2.5}$ Design Values at Each Monitor

	Air Monitoring Stations							
	Brawley		El Centro		Calexico Ethel			
					Design Value Based on All Data		Design Value Without Five Transport Days	
Year	98th %	Design Value	98th %	Design Value	98th %	Design Value	98th %	Design Value
2010	12.9		13.4		31.7		28.4	
2011	17.7		29.4		40.9		28.4	
2012	22.7	**18**	18.3	**20**	56.3	**43**	30.7	**29**

CHAPTER 5 RACM/RACT, RFP, CONTINGENCY MEASURES, AND TRANSPORTATION CONFORMITY

5.1 Introduction

As explained in Chapter one, on June 2, 2014 U.S. EPA classified all $PM_{2.5}$ nonattainment areas for the 2006 NAAQS according to Subpart 4 of the CAA section 188(a) which provides that all areas designated nonattainment are initially classified “by operation of law” as “moderate”. “Moderate” nonattainment areas must demonstrate attainment as expeditiously as practicable but no later than the end of the sixth calendar year after designation (CAA §188(c)(1)).

As of the writing of this analysis no implementation guidance other than interim guidance has been provided by the U.S. EPA. As directed, this analysis utilizes the CAA and U.S. EPA’s 1992 Preamble and 1994 Addendum.[19] Because $PM_{2.5}$ particles fall within the statutory definition of PM_{10} all references made within this analysis explicitly apply to $PM_{2.5}$.

Section C.(h) of the 1992 Preamble explains that section 189[a](1)(C) along with section 172(c)(1) of the CAA requires areas classified as “Moderate” nonattainment to provide for the implementation of RACM and RACT for existing sources within the nonattainment area. The following analysis demonstrates that Imperial County not only meets but is currently implementing RACM/RACT as required by the CAA.

In addition, section C(d)(1) of the 1992 Preamble makes the control requirements RACM/RACT applicable not only to sources of $PM_{2.5}$ but to those precursors of secondarily formed $PM_{2.5}$ that significantly contribute to $PM_{2.5}$ levels that exceed the $PM_{2.5}$ ambient standard within the nonattainment area.

Finally, the 1994 Addendum explains the statutory requirements for International Border Areas under section III. Section III explains that a “but for” SIP must continue to meet all applicable “Moderate” area SIP requirements, including the implementation of RACM/RACT. Contingency measures may not be required if U.S. EPA determines that the area would have attained the NAAQS “but for” emissions emanating from outside the US. The 1994 Addendum is clear when addressing RACM/RACT as necessary to demonstrate attainment by the applicable attainment date if emissions emanating from outside the US were not included in the analysis. The demonstration provided in Chapter 4 provides compelling evidence that Imperial County would have attained the $PM_{2.5}$ standard “but for” emissions from Mexico.

[19] State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990 (57 FR 13498, April 16, 1992) and State Implementation Plans for Serious PM-10 Nonattainment Areas, and Attainment Date Waivers for PM-10 Nonattainment Areas Generally; Addendum to the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990 (59 FR 41998, August 16, 1994).

5.2 "But For" Impact on the $PM_{2.5}$ Nonattainment Area (NA) RACM/RACT Evaluation

Any discussion, evaluation and/or analysis of control strategies must take into account those influences that have significant impacts on source categories identified for the $PM_{2.5}$ NA in Imperial County.[20] Chapter 3 describes the EI for Imperial County while Chapter 4 summarizes the "moderate but for" 179B demonstration which clearly demonstrates that emission levels within the Imperial County $PM_{2.5}$ NA are heavily impacted by transport from Mexico ("but for" SIP).

Like other "moderate" SIP's, this "but for" SIP must still meet "Moderate" SIP requirements such as RACM/RACT, RFP and Contingency Measures. Therefore, the challenge before Imperial County is the ability to properly analyze, distinguishing the emission level contribution by Imperial County sources from Mexicali sources and to demonstrate that the implementation of existing measures upon those source are RACM/RACT and sufficient to maintain Imperial County below the $PM_{2.5}$ standard in future years.

Any control measure analysis must consider the contribution of emissions solely from sources located within a given NA. For the $PM_{2.5}$ NA in Imperial County such an analysis requires reliable inventories from both Imperial County and Mexico. Currently, no such reliable inventory exists for Mexico making any modeling effort less than reliable. The challenge upon Imperial County then has become how to identify the contribution of local Imperial County sources upon the Imperial County NA.

In the absence of a reliable inventory from Mexico, Imperial County took a two step approach in identifying the local contribution. First, Imperial County reviewed the EI (Chapter 3) to determine the concentrations of direct $PM_{2.5}$, NOx, VOCs, SOx, and Ammonia in Imperial County. Second, Imperial County isolated the elements of a repeated pattern evident during violations of the $PM_{2.5}$ standard within Imperial County which were sufficiently predictable and elements of a repeated pattern during days when the $PM_{2.5}$ standard was not violated, resulting in a "North Wind Analysis".

During days indicating violations of the $PM_{2.5}$ standard Chapter 4 identified a significant international impact from Mexico onto Calexico as originating primarily from Southerly winds and/or stagnation conditions. During non-violation days, a predominate north wind pattern was observed. Therefore, CARB developed a "North Wind Analysis of $PM_{2.5}$ Concentrations", by binning $PM_{2.5}$ concentration data for 2010 through 2012 by wind direction from the north, wind speeds greater than 1.5 meters per second (approximately 3.36mph) and with available speciation data. In all the day's meeting the specified criteria no violations of the $PM_{2.5}$ standard occurred.

Overall, 31 days met the specified criteria, fully explained in section 3.4.3 of Chapter 3. These days were further filtered into days during the winter season when $PM_{2.5}$ concentrations are highest at Calexico. The screening resulted in nine days of

[20] Chapter 1 section 1.2 page 2 describes the boundaries established by the U.S. EPA for the $PM_{2.5}$ nonattainment area.

measurements which were used in conjunction with U.S. EPA guidance to evaluate the significance of $PM_{2.5}$ precursors (see Chapter 3, section 3.4.3.2)[21].

This Chapter discusses the approach and results of the ICAPCD's RACM/RACT, RFP and Contingency Measures as required of "Moderate" nonattainment areas for $PM_{2.5}$.

5.3 Reasonably Available Control Measures (RACM) AND Reasonably Available Control Technology (RACT)

Title 40, Part 51, Subpart Z, section 51.1010 describes the "Requirements for reasonably available control technology (RACT) and reasonably available control measures (RACM)". Essentially, RACM/RACT is the collection of reasonable emission reductions that collectively advance attainment of an air quality standard. Because a "but for" SIP demonstrates attainment "but for" emissions from an international source, then such a "but for" RACM/RACT analysis must demonstrate that the emissions of the collective existing control measures are sufficient to maintain attainment "but for" emissions from an international source.[22]

The ICAPCD took a two step approach to analyzing RACM/RACT in light of the court decision issued January 4, 2013. The first step identifies the significant sources of direct and precursor $PM_{2.5}$ emissions within the Imperial County NA. The second step identifies those control measures currently enforceable upon those sources identified in step one. It is noteworthy to mention that CARB's mobile program is considered RACM and that the ICAPCD developed a RACT analysis for the "2009 8-Hour Ozone Modified Air Quality Management Plan" currently under U.S. EPA review which addresses RACT for NOx, and VOC's.

Finally, RACM/RACT by definition is a level of reasonable control. Although SIPs are required to thoroughly analyze reasonably available control measures and technologies not every conceivable control measure or technology must be included, especially if that control measure or technology is unenforceable or impractical causing disruptive socioeconomic impacts that are unreasonable.

[21] Footnote 10 of the US Court of Appeals for the District of Columbia Circuit opinion January 4, 2013 cites 42 U.S.C §7513a(c)as expressly governing precursor emissions.

[22] Section III International Border Areas, subsection B. Policy point 5 found in the State Implementation Plans for Serious PM-10 Nonattainment Areas, and Attainment Date Waivers for PM-10 Nonattainment Areas Generally; Addendum to the General Preamble for the Implementation of Title I of the Clean Air Act Amendment of 1990, Federal Register Volume 59, No. 157, Tuesday August 16, 1994, Proposed Rules.

5.3.1 Major Stationary Sources in Imperial County

Although the 1992 Preamble identifies sources of fugitive dust (e.g. haul roads, unpaved staging areas), residential wood combustion, prescribed burning, and point source emissions as categories of sources contributing to the nonattainment of the PM NAAQS the CAA section 189(e) and the 1992 Preamble explains that any RACM/RACT analysis should begin with a demonstration of RACT for all major stationary sources. Table 5.1 illustrates the current major stationary sources in Imperial County. All listed sources were constructed under the new source review requirements and currently implement Best Available Control Technology (BACT) a level beyond RACT.

Table 5.1
Major Stationary Source Applicability

FACILITY	PERMIT NUMBER	$PM_{2.5}$	NOx	SOx	VOC	NH_3	CO	PM_{10}	HCL	NSPS	NESHAP
Imperial Irrigation District (IID Rockwood)	1365		X	X			X				
Mesquite Lake Water & Power	1929		X				X		X		
Imperial Irrigation District (ECGS)	2152		X	X			X	X			
SFPP, L.P.	2046				X						
Spreckels Sugar	V-1697		X	X			X				
**Western Mesquite Mine	V-1920										X
**Imperial Landfill, Inc.	V-2625									X	
*United States Gypsum (USG)	2834		X				X	X			
*Imperial Irrigation District (IID Niland)	V-3507									X	

*Not within the $PM_{2.5}$ NA
**Not considered major for $PM_{2.5}$ or any of the known precursors of $PM_{2.5}$

Of the nine (9) identified major stationary sources USG and IID Niland both are not within the $PM_{2.5}$ NA. Western Mesquite Mine and Imperial Landfill Inc. are not major sources of direct $PM_{2.5}$ or any of the known precursors of $PM_{2.5}$. Of the remaining five (5) sources none are major for direct $PM_{2.5}$ or NH_3. However, all other applicable precursor emissions are included with the 2009 RACT SIP submitted for U.S. EPA review.

One of the main sources of ammonia emission identified in the District's emissions inventory is the Fuel Combustion category. A review of the emissions inventory for the electric utility source category indicates that the majority of the ammonia emissions from these facilities were primarily the direct result of the use of catalytic emission controls to reduce NOx emissions to acceptable levels as determined by regulatory agencies including, the U.S. EPA, CARB and ICAPCD. An important note, the ICAPCD has not identified any facilities in Imperial County as potential major sources of ammonia emissions. The ammonia emissions from the natural gas-fired turbines are the direct result of the use of Selective Catalytic Reduction (SCR) control, which is required by NSR conditions and also required to comply with the Federal Enforceable requirements of District's NSR rule. The NSR permits for the natural gas-fired turbines include conditions limiting the allowable amount of ammonia slip and further reducing the amount of ammonia could potentially increase NOx emissions.

Stationary Sources and RACT
Control Technology Guidance (CTG) documents represent a presumption that RACT is met when existing rules meet the minimum emissions limitations given for a particular source category. Alternative Control Technique (ACT) documents describe the available control technologies and their respective cost effectiveness. U.S. EPA completed CTG's for VOCs between 1970 to the mid 1990's and NOx ACT's between 1992 and 1995.

As mentioned above the ICAPCD developed a RACT analysis for the "2009 8-Hour Ozone Modified Air Quality Management Plan". In order to assure that all currently implemented rules continue to meet RACT the ICAPCD updated the 2009 RACT analysis to capture any updates to CTG's as appropriate. All applicable rules meet RACT within the Imperial County $PM_{2.5}$ NA. Attachment B contains the rule comparative analysis for NOx, and VOC's.

5.3.2 Significant Sources of Direct $PM_{2.5}$

Chapter 3, section 3.4 describes the $PM_{2.5}$ EI for the Imperial County $PM_{2.5}$ NA. Because reductions in the EI is a reflection of the effectiveness of an implemented rule Table 3.1 and Tables 3.6 through 3.10 highlight the current EI for each source category in tons per day both as winter and annual averages. The first indication that RACM is being met can be discerned from a cursory review of reduced direct $PM_{2.5}$ emissions between 2008 and 2012 (see Table 3.1). While this is not the sole indicator it is an important indicator of the effectiveness of the existing implementation of existing rules. To help understand the evaluation of all the precursors to $PM_{2.5}$ Chapter 3 quantifies the significance level of each category and subcategory by identifying the percent contribution of a pollutant to a $PM_{2.5}$ violation (see Chapter 3 section 3.4.1).

A review of Table 3.6 illustrates that no stationary source categories contribute significantly to direct $PM_{2.5}$ levels within the $PM_{2.5}$ NA. Similarly, Table 5.1 above illustrates that there are no major stationary sources of direct $PM_{2.5}$ within the $PM_{2.5}$ NA. While farming operations, unpaved roads, fugitive windblown dust, managed burning and disposal are identified as significant area-wide sources contributing to direct $PM_{2.5}$ levels within the $PM_{2.5}$ NA, residential wood burning is not and so deserves a bit of discussion below since the preamble identifies this as a significant source. Under the mobile source category aircraft has been identified as contributing to direct $PM_{2.5}$ levels within the $PM_{2.5}$ NA.

Residential Wood Burning
According to US EPA wood stoves, fireplaces, or fireplace inserts used as the primary heating device to heat a house or room cause hazardous air pollutants (HAPs) and particle pollution. The pollutants resulting from the use of "Residential Wood Burning"

have been described by US EPA as having the potential to cause cancer, damage lung tissue which may lead to serious respiratory problems particularly to children and the elderly.

Internal investigations with the different planning departments within the county indicate that "Residential Wood Burning" within the $PM_{2.5}$ non-attainment area is infrequent. Generally, homes are not built with fireplaces. The determination by a developer to build a home with a fireplace is a cost driven decision and not a necessity in Imperial County. Essentially, there are two driving motives that discourage the building of homes with fireplaces. First, the lack of available wood, Imperial County is a desert and the resources of available wood are not local. The cost of importing and purchasing wood is expensive. Second, the mild winter months in Imperial County are not conducive to extensive heating of homes. It is much more cost effective to have central gas heating. As a result, most existing fireplaces are found in homes that can be purchased by more affluent residents.

Farming Operations, Unpaved Roads, Fugitive Windblown Dust

Imperial County has adopted and is currently implementing regulatory control measures to address farming operations, unpaved roads, fugitive windblown dust and managed burning and disposal. The first three source categories farming operations, unpaved roads and fugitive windblown dust have U.S. EPA approved BACM under Regulation VIII. Below is a summary description of Regulation VIII and the associated rule comparative analysis can be found in Attachment B.

Regulation VIII Summary

Because $PM_{2.5}$ particles fall within the statutory definition of PM_{10} and because they are subject to the same statutory requirements Regulation VIII, likewise applies to $PM_{2.5}$ particles. ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM_{10} from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the U.S. BLM, United States Border Patrol (U.S. BP) and the Department of Parks and Recreation (DPR) to submit Dust Control Plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B of Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit when winds are in excess of over 25 mph only if certain other control measures are in place.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generate dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

These rules collectively are regarded as BACM therefore RACM is met.

Managed Burning and Disposal

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California which are required, under title 17, to implement a district-wide smoke management program. Title 17 is divided into three Article's. Article 1 provides the general provisions for each air district to follow. Article 2 provides program elements and requirements with specific requirements for the Sacramento Valley Basin wide program (Connelly-Areias-Chandler Rice Straw Burning Reduction Act of 1991), special requirements for prescribed burning and prescribed fires in Wildland and Wildland/Urban Interface areas and exemptions. Article 3 identifies the meteorological criteria for regulation of agricultural and prescribed burning by air basin.

The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines were revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines were approved March 14, 2001. All air districts were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines, except for the San Joaquin Valley Air Pollution Control District (SJAPCD). In addition to the revisions to title 17 the

SJVAPCD was legislatively required (Senate Bill 705; Florez, Chapter 481, Statutes of 2003) to develop a Smoke Management Program that further limited agricultural burning. In response to the 1987 Guideline revisions Imperial County updated its existing Rule 701, Agricultural Burning on August 13, 2002 and updated its existing Smoke Management Plan to meet newly established requirements. The 2002 rule revision for agricultural burning in Imperial County was approved as RACM in 2003 (68 FR 4929; January 31, 2003)

Smoke Management Plan (SMP) Summary
Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

Generally, on any given day, the ICAPCD reviews hourly surface meteorological reports from various airport agencies, the National Weather Service, State fire agencies and CARB to help determine whether the day is a burn day. Using a four quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is known as the Good Neighbor Policy.

<u>Open Burning in Imperial County</u>
In order to understand the effectiveness of the agricultural burning program in Imperial County it is important to understand the agricultural practices and operations. Although Imperial County is a desert an agricultural base exists because of a sophisticated irrigation system that provides water from the Colorado River. The natural vegetation in Imperial County is limited to lower desert plants and species with sparse trees and brush. Figure 5.1 is an aerial view depicting the contrast between the desert areas and the agricultural areas in Imperial County.

Figure 5.1 Imperial County Agriculture Contrast to Desert

The 2013 Crop & Livestock report listed the 6 core categories of agriculture in Imperial County, see Table 5.2. Of the six commodities listed below only field crops are permitted for burning. The effectiveness of the Agricultural burning program in Imperial

County is evident when one compares the total field crops harvested in 2013 to the total acreage burned. In 2013 approximately 8% of the total harvested field crops were allowed to burn. That is out of 332,727 acres of field crops that were harvested in 2013 only 26,548 acres were approved burns. Historical information also confirms significant reductions in burning since 2003 in Imperial County.

Table 5.2
2013 Imperial County Crop Acreage

2013 COMMODITY	HARVESTED ACREAGE
FIELD CROPS	332,727
VEGETABLE & MELON CROPS	121,371
FRUIT & NUT CROPS	7,793
SEED & NURSERY CROPS	68,037
TOTAL 2013	529,928

Historical open burning in Imperial County has reduced over the last ten years not only in quantity but in type of allowed crop burning. With the revisions to the 1987 Guidelines, and the emphasis on public health and safety Imperial County has successfully managed to reasonably curtail burning from a total of 40,221 acres of mixed crop in 2003 to 26,548 acres of field crops, primarily grass crops (i.e. klien, Bermuda). This represents approximately a 34% reduction in burning since 2003.

This RACM analysis therefore looks at the feasibility of other measures that would enhance the current trend of reductions in burning to protect the public health. As mentioned above, the topography and the type of agriculture are important to any comparative analysis.

Imperial County looked at the following rules as a comparative analysis with the understanding that area's like the Sacramento Valley Air Quality Management District (SCAQMD) and the SJAPCD have additional legislative restrictions not imposed upon other air districts such as Imperial County. In addition, it is very important to note that other areas such as the Placer County have fire agencies that are authorized to permit burning. In Imperial County, the local fire agency may not permit any agricultural burn without the ICAPCD approval.

- Monterey Bay Unified APCD Rule 438; Open Outdoor Fires; revised February 19, 2014
- South Coast AQMD Rule 444; Open Burning; revised July 12, 2013
- Placer County APCD Rule 302; Agricultural Waste Burning Smoke Management; revised February 9, 2012
- San Joaquin Valley Unified APCD Rule 4103; Open Burning; revised April 15, 2010

Below is a rule comparison summary which is supported by a rule comparative matrix which is found in Attachment B.

Rule 701 Agricultural Burning
Adopted prior to 1979 and revised August 13, 2002. Approved into the California SIP January 31, 2003 as RACM (68 FR 4929)

All agricultural waste burners are required to have a valid operating permit with the ICAPCD.

Rule 701, Agricultural Burning, generally prohibits agricultural burning, except with a permit that is valid on any day on which burning is not prohibited by the CARB, fire control agency or the APCO. The type of waste material that is allowed for burning is specified, along with appropriate drying times, the hours when burning must cease. Rule 701 does not allow any burning to be a nuisance, to reduce visibility or to impact a sensitive receptor within 1 ½ miles.

Rule Comparison Summary

- Monterey Bay Unified APCD Rule 438 - Open Outdoor Fires adopted April 16, 2003 and revised February 19, 2014

The Monterey Bay Unified APCD Rule 438 regulates all burning conducted within the boundaries of the air district which includes agricultural burning, prescribed burning, backyard burning, residential burning, and designated sensitive areas within the Monterey Peninsula, Carmel Valley and San Lorenzo Valley. For the analysis Imperial County has only compared those requirements that are directly related to Agricultural burning.

The Monterey Bay Unified APCD rule allows agricultural burning necessary to maintain and continue agricultural operations including burning for the control and disposal of agricultural wastes and the growing of crops, raising of fowls, animals or bees. Rule 438 imposes burning hours to after 10am but before 5pm but allows for additional burning during other hours if local conditions allow. Rule 701 restricts burning only between 10am and 3pm and on approved burn days. Rule 438 bans garlic top burning. Imperial County cannot ban the burning of specific crops without legislative authority.

Overall, the Monterey Bay Unified APCD rule and the ICAPCD are comparable in specifing the conditions under which agricultural burns can be ignited, when agricultural burns may burn (approved burns only) and times. Both rules similarly, identify the allowed content of waste and drying times. Both rules do not allow burning that is a nuisance or if visibility is reduced.

Comparatively Imperial County Rule 701 is as stringent as the Monterey Bay Unified APCD rule.

- South Coast AQMD Rule 444 – Open Burning adopted October 8, 1976 and revised July 12, 2013.

The South Coast rule 444 regulates Agricultural burning, disposal of Russian thistle, Prescribed burning, Fire prevention/suppression training, Open detonation or use of pyrotechnics and Fire hazard.

Only those sections that are directly related to Agricultural burning have been compared. Both rules contain similar exemptions and requirements associated with an agricultural operation. Because of the differences in agricultural operations, specific drying times and waste burning differ between both rules.

Drying times
The South Coast rule requires specific drying times for trees and large branches similar to the Imperial County rule both rules require a 6 week drying period. When comparing green waste from field crops, the South Coast rule requires 4 weeks of drying while the Imperial County rule requires 4 days. For prunings and small branches the South Coast rule requires 4 weeks while the Imperial County rule requires 2 weeks.

Waste burning
For the burning of agricultural waste the South Coast rule requires a Burn Management Plan that is approved in writing by the Executive Officer for projects greater than 10 acres or a project that produces more than one ton of PM. The Imperial County rule does not limit the size of the burn under which the project must abide by the requirements of the CARB approved Smoke Management Plan in Imperial County. Therefore, restrictions upon burning of less than 10 acres are imposed by Rule 701.

The South Coast rule allows for the burning of waste infected with an agricultural pest or disease hazardous to nearby agricultural operations upon the order of the County Agricultural Commissioner. Rule 701 requires consultation with the Agricultural Commissioner should a threat of imminent and substantial economic loss occur. In such an event burning maybe allowed only if smoke impacts, nuisance and visibility are avoided according to Rule 701. It is important to note that historical records show that the threat of imminent and substantial economic loss has never been instituted in Imperial County. Finally, only the South Coast rule requires the allowance of a “Maximum Daily Burn”. The South Coast rule has described the maximum daily acreage burned as 175 acres for agricultural burning. Rule 701 only allows burns, regardless of size, that would not reduce visibility, be a nuisance or impact a sensitive receptor. Therefore, under the ICAPCD rule those burns smaller than 175 acres are required to meet requirements that prevent the reduction of visibility, that are not a nuisance and do not impact sensitive receptors.

Comparatively Imperial County Rule 701 is as stringent as the South Coast rule.

- Placer County APCD Rule 302 - Agricultural Waste Burning Smoke Management adopted February 10, 2011 and revised February 9, 2012

The Placer County APCD rule regulates Agricultural burning within Place County.

Both rules contain similar exemptions and requirements associated with an agricultural operation. Because of the differences in agricultural operations (no rice crops in Imperial County), specific drying times and waste burning differ between both rules.

Drying times
The Placer County rule requires specific drying times for trees and large branches similar to the Imperial County rule both rules require a 6 week drying period. When comparing green waste from field crops, the Placer County rule requires 3 days of drying while the Imperial County rule requires 4 days. For prunings, brush, or small branches the Placer County rule requires 3-6 weeks drying time while the Imperial County rule requires 2 weeks. Except for the number of drying days for green waste from field crops, both rules are similar in requirements.

Waste burning
For the burning of agricultural waste the Placer County rule has detailed information for rice harvesting and burning. Little information is provided for “other” agricultural waste burning so Imperial County looked to the general requirements of the Placer rule for comparison. Both rules have similar requirements for burning agricultural waste, a valid permit and burning only on burn days. Field crops are not allowed before 10 or after 5pm in Placer County while in Imperial County burning is only allowed between 10am and 3pm. Finally, the Placer County rule requires a determination of amount burned daily however no actual acreage is specified. Rather the amount to be burned is a determination by the California Air Resources Board using a formula contained in the approved Sacramento Valley Smoke Management Program. Rule 701 only allows burns, regardless of size, that would not reduce visibility, be a nuisance or impact a sensitive receptor.

Comparatively Imperial County Rule 701 is as stringent as the Placer County rule.

- San Joaquin Valley Unified APCD Rule 4103 - Open Burning adopted June 18, 1992 and revised April 15, 2010

The San Joaquin Valley Unified APCD rule regulates agricultural burning for eight counties: Fresno, Kern (western and central), Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare. San Joaquin Valley agricultural burning reports identify the crop categories regulated by this rule as field crops, prunings, weed abatement, orchard removal, vineyard removal, surface harvested prunings and other materials. Although it would seem that both Imperial and San Joaquin have similar categories, except for orchard and vineyard removals, upon closer inspection this is not the case.

San Joaquin while growing similar filed crops to Imperial has significant differences in the prunings and surface harvested prunings categories. Specifically, Imperial does not grow up to 95% of the crops grown in the San Joaquin Valley, such as apricot, cherries, Christmas trees, kiwi, nectarine, olives, persimmons, a variety of the nuts such as almonds, walnuts, etc to name a few. Therefore up to 95% of the agricultural operations in the San Joaquin Valley operate differently and are not comparable to agricultural operations in Imperial County. In addition, State legislation requires the San Joaquin Valley Unified APCD to practically phase out agricultural burning to a level that is technologically and economically feasible. In any event, Imperial compared existing rule requirements with the San Joaquin rule 4103 as practicable as possible.

Both rules contain similar exemptions and requirements associated with an agricultural operation. Because of the differences in agricultural operations as explained above the San Joaquin rule has a much more extensive description of allowances/disallowances. This is necessary in the San Joaquin Valley because of the sheer variety of agricultural operations and functions. Here in Imperial County, the operational difference between the agricultural operations is minimal allowing for a more streamlined approach. Therefore, the necessity of having a long list of allowances/disallowances is not necessary.

Drying times
The San Joaquin Valley rule requires specific drying times for trees and large branches similar to the Imperial County rule both rules require a 6 week drying period. For prunings and small branches the San Joaquin rule requires 3 weeks while the Imperial County rule requires 2 weeks.

Waste burning/ban on burning
For the burning of agricultural waste the San Joaquin Valley prohibits, by legislative enactment, the burning of specific field crops, prunings, weed abatement, orchard removals, vineyard removal materials, surface harvested prunings and other materials not exempt in sections 5.1 through 5.2. These restrictions are considered BACM and are legislatively mandated. Imperial County cannot ban burning of specific crop types without legislative approval.

However, where burning is allowed for field crops in the San Joaquin rule, per exemption, the Imperial County and the San Joaquin Valley rules are similar. Both rules require a valid permit, burning only on burn days and the allowed hours are similar. Much of the San Joaquin Valley rule details the requirements of rice burning. Imperial County has no rice production. Overall, where both rules pertain to the same agricultural operation the allowed burns must only occur during approved days, times, when waste meets specific content and drying times and when such burning would not be a nuisance, reduce visibility or impact sensitive receptors.

Comparatively, where the same agricultural operations exists between Imperial County and the San Joaquin Valley the Imperial County rule is as stringent as the San Joaquin Valley rule.

5.3.3 Significant Sources of $PM_{2.5}$ Precursors

As mentioned above, Chapter 3, section 3.4 describes the $PM_{2.5}$ EI for the Imperial County $PM_{2.5}$ NA. As to $PM_{2.5}$ Precursor emissions; NOx, SOx, and Ammonia no significant stationary source categories were identified utilizing the methodology explained above (see Chapter 3 section 3.4.1). The solvent evaporation category for VOC's are discussed in some detail but are not considered significant in contributing to an exceedance of the $PM_{2.5}$ standard. It is noteworthy, that while no speciation data for VOC's was available for the days utilized in the North Wind analysis no exceedances of the standard occurred during any of the days identified.

Chapter 3 section 3.4.1.2 explains that utilizing the U.S. EPA guidance found in the 1994 Addendum an equivalent 3.3 percent can be derived for $PM_{2.5}$ precursor significance evaluation using the percent that each chemical species contributes to a $PM_{2.5}$ exceedance from the highest $PM_{2.5}$ winter day from 2010 through 2012 (see Table 3.8 of Chapter 3). Table 3.3 of Chapter 3 shows ammonium nitrate and ammonium sulfate below the 3.3 percent supporting the conclusion that NOx, SOx, VOCs and ammonia sources within the $PM_{2.5}$ NA would not contribute significantly to elevated levels of the $PM_{2.5}$ standard. However, dust (geological), organic carbon and other mass were deemed as contributing to elevated levels of the $PM_{2.5}$ standard.

Utilizing Table 3.6 of Chapter 3 farming operations, unpaved roads, fugitive windblown dust, managed burning and disposal, and aircraft are considered significant for $PM_{2.5}$. As stated above in section 5.3.2 Imperial County has adopted and is currently implementing BACM to address farming operations, unpaved roads, and fugitive windblown dust. For managed burning and disposal the ICAPCD implements rule 701 under the umbrella of the SMP. While aircraft is a source category under the Imperial County EI regulatory jurisdiction lies with U.S. EPA and not the ICAPCD or CARB.

For a brief description of the control measures addressing significant sources of $PM_{2.5}$ within the Imperial County $PM_{2.5}$ NA see Attachment B. In addition to the discussion of the implemented control measures of significant sources of $PM_{2.5}$, Attachment B includes a comparative rule analysis for NOx and VOCs which demonstrates that Imperial County is meeting RACM/RACT for those sources of precursor emissions of $PM_{2.5}$.

5.3.4 Additional Programs in Support of Existing Control Measures

New Source Review (NSR)

NSR is a permitting process required by the CAA to help ensure that any new or modified equipment and facilities (i.e. boilers, turbines, crude oil storage tanks, power plants and factories) do not significantly degrade air quality or slow progress towards clean air. The ICAPCD rule which dictates the NSR requirements is the Rule 207 New and Modified Stationary Source Review. There are two primary components of NSR, the application of BACT and emission offsets. BACT plays a very important role in helping the ICAPCD to meet the no net increase in emissions required by the CAA by acting as an emissions limitation on pollutants emitted from or resulting from any new or modified stationary source. Emissions reduction credits (ERC's) are credits which are issued to sources that have reduced their emissions in excess of what is required by law. ERC's must be permanent, real, enforceable, quantifiable and surplus. ERC's are banked and made available for offsetting emission growth from new or modified emission units.

BACT is currently required for all new or modified emission units which have a potential to emit of 25 pounds per day or more of any non-attainment pollutants, including $PM_{2.5}$. Major new or modified sources are required to offset all emission increases for each nonattainment pollutant, including $PM_{2.5}$ that constitutes a Major Stationary Source or Modification.

The NSR permit program in Imperial County currently enforces two versions of Rule 207. The first is a most recent version adopted as an amendment by the ICAPCD Board of Directors on October 22, 2013 and the second is the SIP approved rule version of Rule 207, Standards for Permit to Construct (except paragraph C.4), approved on November 10, 1980. Both versions of Rule 207 fulfill the requirements of CAA Sections 172(c)(4) and (5), and 189(a)(1)(A) which includes requirements for $PM_{2.5}$.

Incentive Programs

The majority of the new measures in the California state strategy encompass in-use measures which have traditionally resulted in flexible regulation – allowing the most cost-effective method to be used by those having to meet the emission requirements. Therefore, to accomplish early retirement of older more polluting engines the use of funding programs, such as Carl Moyer and Proposition 1B, became an integral part of creating emission reductions for Imperial County.

Carl Moyer Program

The Carl Moyer program essentially encourages the early introduction of clean air technologies onto the on-road and off-road vehicle fleets by providing funds to help purchase new vehicles or new engines (repowers) and for the installation of retrofit units on older engines. A variety of vehicle classes and types are funded under the Carl Moyer Program to help purchase new vehicles or new engines/repowers and for installation of retrofit units on older engines. In particular, this funding provides the technologies that reduce NOx and PM emissions caused by the combustion of diesel powered engines.

In Imperial County, projects funded under the Carl Moyer Program included retrofits and replacement of dirty burning irrigation pumps, agricultural drain cleaners and tractors. In total, 195 projects have been funded since the funding cycle year 3.

Table 5.3
Imperial Emission Reductions from the Moyer Program

	NOx (tons/yr)	ROG (tons/yr)	PM (tons/yr)
2011	0	0	0
2012	8.44	1.50	0.429
2013	22.83	3.79	1.159

Proposition 1B

Proposition 1B which enacts the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 was approved by voters in November 2006. The approved bond specified high-priority transportation corridor improvements, State Route 99 corridor enhancements, trade infrastructure and port security projects, school bus retrofit and replacement purposes, state transportation improvement program augmentation, transit and passenger rail improvements, state-local partnership transportation projects, transit security projects, local bridge seismic retrofit projects, highway-railroad grade separation and crossing improvement projects, state highway safety and rehabilitation projects, and local street and road improvement, congestion relief, and traffic safety to name a few.

In response, in April 2006 the CARB adopted a comprehensive Emission Reduction Plan for Ports and Goods Movement in California. The Goods Movement is a partnership between the CARB and local agencies (i.e air districts, ports, and transportation agencies) to protect public health through the administration of $1 billion in State incentives for cleaner equipment and technologies associated with freight movement.

The key goals are: (1) to reduce the statewide health risk from diesel particulate matter (diesel PM) 85 percent by 2020, (2) to expeditiously reduce the localized health risk from diesel PM in impacted communities, and (3) to reduce the emissions of nitrogen oxides (NOx) that contribute to regional fine particle and ozone pollution to achieve ambient air quality standards.

Projects funded under the Prop 1B program in Imperial County included School Buses and long haul heavy duty trucks.

State Mobile Source Program

Given the significant emission reductions needed for attainment in California, CARB has adopted some of the most stringent control measures nationwide for on-road and off-road mobile sources and the fuels that power them. These measures target both new and in-use equipment. And while California first focused on cleaning up cars – new car emissions have been reduced by 99 percent – the scope of California's program is vast. The State has implemented regulations and programs to reduce emissions from freight transport equipment, including heavy-duty trucks, ocean going vessels, locomotives, harbor craft, and cargo handling equipment. In addition, the State has standards for lawn and garden equipment, recreational vehicles and boats, and other newly manufactured off-road equipment. California has also adopted many measures that focus on achieving reductions from in-use mobile sources that include accelerated replacement of older equipment with newer, less polluting equipment; more stringent inspection and maintenance requirements; and operational requirements such as truck and bus idling restrictions and speed reduction requirements for ocean going vessels.

California has unique authority under the Clean Air Act section 209 to adopt and implement new emission standards for many categories of on-road vehicles and engines, and new and in-use off-road vehicles and engines. Use of this authority is subject to U.S. EPA waiving the applicable federal standard upon their finding that the standards adopted by California are, in the aggregate, at least as stringent as the comparable federal standard.

In 2007, CARB undertook an extensive public consultation process to identify potential SIP measures to support attainment plans submitted to U.S. EPA. New measures developed by CARB as part of this 2007 State Strategy focused on cleaning up the in-use fleet, and increasing the stringency of emissions standards for a number of engine categories, fuels, and consumer products. These measures build on CARB's already comprehensive program that addresses emissions from all types of mobile sources.

In 2011, U.S. EPA approved the State mobile source control program as being RACM in the context of the 2007 and 2008 South Coast and San Joaquin Valley $PM_{2.5}$ plans (76 FR 69896 at 69906). In its proposed approval of the 2008 San Joaquin Valley $PM_{2.5}$ Plan, U.S. EPA recognized that the "State of California has been a leader in the development of some of the most stringent control measures nationwide for on-road and off-road mobile sources and the fuels that power them" (76 FR 41338 at 41345). In the 2007 State Strategy, CARB identified and committed to propose new defined measures for the sources under its jurisdiction. Of these new measures, U.S. EPA noted that "many, if not most, of these measures are being proposed for adoption for the first time anywhere in the nation" (76 FR 41562 at 41570).

California's comprehensive mobile source program continues to be RACM as it expands and further reduces emissions. The 2013 SIP for the 2006 24-Hr $PM_{2.5}$ Nonattainment Area in Imperial County relies on additional regulations adopted since the State's last major SIP revision in 2007. In January 2012, CARB adopted the Advanced Clean Cars program, which combines the control of smog-causing pollutants and greenhouse gas emissions into a single coordinated package of requirements for model years 2017 through 2025. The program was developed in tandem with the federal government over several years, including a joint fact-finding process with shared engineering and technical studies. Benefits from this new program are reflected in emission inventories used in the 2012 $PM_{2.5}$ attainment plans.

5.3.5 Future Further Study (FFS)

With the decision by the U.S. District Court the application of Subpart 4 requirements to $PM_{2.5}$ planning efforts includes addressing ammonia as a precursor unless U.S. EPA makes a determination that ammonia sources do not contribute significantly to PM concentrations. Such a determination must be based on known scientific study and modeling efforts where data is reliable and feasible. As mentioned in previous sections of this chapter, Mexico, a sovereign nation not beholding to the requirements of the United States, does not have a reliable inventory by which the ICAPCD and CARB could utilize to feasibly conduct modeling that identified emissions from Mexico and emissions from within the Imperial County $PM_{2.5}$ NA. Absent such information, the ICAPCD and CARB, utilized the best available data to demonstrate that the Imperial County $PM_{2.5}$ NA is heavily impacted by emissions from Mexico. Likewise, the ICAPCD and CARB identified the local source contributions that significantly impact $PM_{2.5}$ levels within the Imperial County $PM_{2.5}$ NA. The existing implemented controls upon those local sources identified as significantly impacting the $PM_{2.5}$ levels within the Imperial County $PM_{2.5}$ NA have been previously discussed and require no further discussion here.

The type of analysis utilized by ICAPCD and CARB is allowed under the CAA section 179B which "envices a general congressional intent not to penalize areas where emissions emanating from outside the U.S. are the but-for cause of the nonattainment problems".[23] Ensuring the effective use of resources, additional controls should only be required when there is clear scientific evidence that reasonable measures to reduce emissions would be effective in significantly reducing ambient $PM_{2.5}$ levels. As such, the Imperial County $PM_{2.5}$ NA ammonia emissions need not be reduced to address U.S. EPA's $PM_{2.5}$ standard.

The role of ammonia within the Imperial County $PM_{2.5}$ NA is not unlike other known nonattainment areas. Scientific studies, conducted thus far, support scientific conclusions associated with the formation and reactivity of ammonia to levels of $PM_{2.5}$ concentrations. These studies identify ammonium nitrate and ammonium sulfate as those chemical formations that contribute to measurable reductions in $PM_{2.5}$ levels. Section 3.4.1.3, of Chapter 3, provides supporting documentation concerning the chemistry and role of ammonia in the formation of ammonium nitrate.

Scientific studies indicate that nitrate buildup is a signature outcome of multi-day stagnation periods during the winter where warmer seasons showed no such buildup. In order to form ammonium nitrate both nitric acid and ammonia are needed. Studies have also shown that ammonium nitrate formation results with an abundance of ammonia as compared to nitric acid where concentrations of NOx emissions are evident. Such conditions, stagnation during winter seasons, an abundance of ammonia compared to nitric acid and concentrations of NOx emissions are all present and unique to the Calexico area, because of transport of emissions from an international source, where levels of $PM_{2.5}$ are uniquely higher than other Imperial County areas.

[23] Federal Register Volume 59 No. 157 Tuesday, August 16, 1994 Proposed Rules page 42001 footnote 7.

Finally, current scientific studies have indicated that efficacy of reducing NOx emissions relative to ammonia are much greater than ammonia reductions. In areas, such as the San Joaquin Valley reductions in ammonia do not contribute to reductions of $PM_{2.5}$. This has lead the scientific community to conclude that ammonia control measures should only be required when additional ammonia reductions are found to be needed to meet health based air quality standards. As mentioned above, the ICAPCD and CARB have demonstrated that the Imperial County $PM_{2.5}$ NA is in attainment "but-for" emissions from Mexico and as such ammonia emissions do not need to be reduced to address U.S. EPA's $PM_{2.5}$ standard. However, to improve the public health and to prepare for the new annual $PM_{2.5}$ NAAQS, ICAPCD continues to examine the potential role of ammonia within the Imperial County $PM_{2.5}$ NA. The ICAPCD has identified three main sources of ammonia emissions.

- Confined Animal Facilities (ICAPCD Rule 217)
- Composting Facilities (Permitted Facilities)
- Agricultural Fertilizers

FFS.1 - Rule 217 Large Confined Animal Facilities Permits Required

The ICAPCD Rule 217 was originally adopted October 10, 2006 in response to the legislative enactment of Senate Bill 700 (SB700) – Florez – Agricultural Sources. Essentially, prior to SB700 agricultural operations were exempt from any regulatory requirements. With the enactment of SB700 that exemption was eliminated. The purpose of the rule is to limit emissions of VOC's and ammonia emissions from Large Confined Animal Facilities (LCAF). ICAPCD Rule 217 applies to those facilities used for the raising of animals that are corralled, penned, or otherwise restricted to areas of defined dimensions and are fed by means other than grazing. Such facilities include, but are not limited to cattle, calves, chickens, ducks, goats, horses, sheep, swine, rabbits and turkeys. In Imperial County there are only two types of facilities which operate that meet the LCAF definition found in Rule 101, they are:

- Dairy Operations – Those housing operations of milk producing cows
- Beef Feedlots – Those housing operations that raise beef cattle such as heifers and steers for meat production.

There are no chicken, duck, goat, horse, sheep, swine, rabbit or turkey operating facilities that meet the LCAF definition. The adopted thresholds which identify a LCAF in Imperial County are the same as those adopted by CARB for nonattainment areas. Table 5.4 below is a list of the thresholds currently implemented by Imperial County.

TABLE 5.4

Rule 217 Threshold	
Dairy	≥1,000 milk producing cows
Beef Feedlot	≥3,500 Beef Cattle
Other Cattle Facility	≥3,500 Calves, Heifers, other Cattle
Poultry Facilities	
Chicken	≥650,000 Chickens
Duck	≥650,000 Ducks
Turkey	≥100,000 Turkeys
Laying Hens	≥650,000 Laying Hens
Swine Facility	≥3,000 Swine
Horse Facility	≥2,500 horses
Sheep & Goat Facilities	≥15,000 Sheep, Goats, Lambs
Other	≥30,000 Rabbits other

Finally, the Table 5.5 below identifies the current list of the number of mitigation measures implemented in Imperial County for Beef Feedlots and Dairy's.

TABLE 5.5
Current List of the Number of Mitigation Measures Required

	Beef Feedlot	Dairy
Feed and Silage	3 of 9	3 of 10
Milk Parlor	0 of 0	1 of 2
Freestall Barns	0 of 0	2 of 9
Housing	4 of 10	4 of 9
Solid Manure	1 of 5	1 of 5
Liquid Manure	0 of 0	1 of 5
Land Application	2 of 6	2 of 6
TOTAL	10 of 30	14 of 46

The ICAPCD is committed to a continued evaluation of the exiting effectiveness of Rule 217 in order to determine the best possible enhancements to further reduce VOC and Ammonia emissions. This can only occur by examining existing federal rules and regulations as well as examining prohibitory rules in other areas.

FFS.2 - Composting Facilities

Compost is generally fairly understood as the end product of an essential and continuous process of decomposition where organic, or carbon based materials exposed to the elements of nature, particularly air and water, are broken down into smaller compounds by microorganisms. Compost is a nutrient rich organic matter that can be readily digested by soil microbes that make the nutrients available for uptake by plants. The process requires the right mixture of air flow, temperature, nitrogen and carbon. The process of composting requires a closely monitored multi-step process with measured applications of water, air, carbon, nitrogen rich materials and proper aeration, accomplished by turning the mixture regularly. Additional decomposition is accomplished with the aid of worms and fungi. Aerobic bacteria and fungi manage the chemical process by converting the applications into heat, carbon dioxide and ammonium. The ammonium is the form of nitrogen (NH_4) used by plants. When available ammonium is not used by plants it is further converted by bacteria into nitrates (NO_3) through the process of nitrification. Compost, as an end product is used as a soil amendment or as a fertilizer.

In Imperial County there are less than 5 permitted operating composting facilities whose primary composting ingredient is manure from cattle feedlots. Despite the lack of an ICAPCD rule specifically addressing composting of organic matter these facilities are currently subject to conditions that reduce both VOC's and Ammonia within Imperial County. The conditions found within the permits mirror the requirements found within the San Joaquin Rule 4566, considered as the most stringent rule controlling emissions from composting operations. The ICAPCD recognizes the importance of implementing a rule addressing composting operations for the further reduction of VOC and Ammonia emissions in Imperial County as well as for meeting future NAAQS requirements under the revised $PM_{2.5}$ annual standard and 8-hr Ozone standard. ICAPCD is committed to working collaboratively with industry to develop a composting rule that addresses VOC and Ammonia reductions in Imperial County.

FFS.3 – Agricultural Fertilizers

Any material of natural or synthetic origin that is applied to soils or to plant tissues for the purpose of providing plant nutrients essential to the growth of plants is known as a fertilizer. Agricultural fertilizers are used by growers to supply nutrients required for healthy plant life and to enhance the nutritional aspect of crops. There are two broad ways in which fertilizers are applied the most traditional is as an additive. The second method, commonly referred to as soil amendment, is where inputs or materials are applied to the land to enhance the soils ability to efficiently retain water. According to the U.S. EPA fertilizers and soil amendments can be derived from virgin raw material, composts and other organic matter, and wastes, such as sewage sludge and certain industrial wastes. Fertilizer's used in agriculture contain three basic plant nutrients: nitrogen, phosphorus, and potassium. When the application of fertilizers results in overuse these chemicals have been known to result in the contamination of surface water and groundwater. As a result, the State Regional Water Quality Control Board monitors and oversees compliance with regulatory requirements that affect water quality.

Over the years, numerous research projects have investigated different aspects of fertilizer management for crops grown in California. According to information provided by the Fertilizer Research and Education Program (FREP) the purpose of the establishment of the Nitrate Management Program by the Director of the California Department of Food and Agriculture (CDFA) was to identify and prioritize nitrate sensitive areas throughout California, and to develop research and demonstration projects to reduce contribution to groundwater contamination from fertilizer use in agricultural operations. Fertilizer management, storage and application are important performance standard components that have undergone tremendous research with peer-reviewed journal articles and research reports stressing accurate, timely, efficient and effective crop nutrient information such as application rates, time of application, fertilizer placement and types of fertilizers. Such performance standards result not only in limiting contamination of water but in reducing air emissions.

Locally the State Regional Water Control Board regulates all beef and dairy operations under a Regional Board General Order or if applicable under individual orders that ensure compliance with state regulations that protect the beneficial use of water. The following is a list of the types of requirements that are included in either a Regional Board General Order or an individual order:

- A Nutrient Management Plan (NMP), prepared by a certified professional crop advisor or equivalent, designed to control nutrient losses for protection of surface water and groundwater;
- A Waste Management Plan (WMP), prepared by a licensed engineer;
- Environmental sampling and monitoring of soil, manure, water and plant tissue for compliance;
- Routine site inspections, record-keeping, and reporting; and
- Additional groundwater monitoring to assess ongoing water quality protection

These orders prevent the unnecessary runoff or leaching of nitrogen compounds into the environment, where they can negatively impact water quality. The Nutrient Management Plan is designed to assure that the amount of nitrogen excreted by cattle is in reasonable balance with the needs of crops grown by farmers. Nitrogen used on farms is required to be stored safely until it is used. Over application or mistimed application of nitrogen fertilizers can result in unnecessary losses of nitrogen to the environment both as seepage below the root zone or as air emissions of ammonia gas, ammonium and oxides of nitrogen.

The ICAPCD is committed to working collaboratively with the local State Regional Water Quality Control Board to assure that performance standards are properly applied for agricultural fertilizer management, storage and application. Further research by ICAPCD will be required in order to properly evaluate the level of impact such performance standards will have upon emission reductions within the Imperial County $PM_{2.5}$ NA.

5.4 Reasonable Further Progress (RFP)

An area that is designated as nonattainment for the 24-hour $PM_{2.5}$ standard must show how the area is progressing towards attainment of the NAAQS. The ICPCD is required to demonstrate RFP to ensure that emissions within the District's control are decreasing. Sources within the NA must comply with both state and local air pollution control rules to ensure attainment of the $PM_{2.5}$ NAAQS as expeditiously as practicable and to demonstrate RFP. The District has addressed this requirement by controlling emissions in the NA, thereby reducing public exposure to harmful air quality.

Subpart 4, Section 189(c) of the CAA requires an area to demonstrate RFP and quantitative milestones. U.S. EPA's interpretation of the RFP requirement for the federal $PM_{2.5}$ standard is to show generally linear progress in declining emissions from the baseline year to the attainment year as demonstrated at the RFP milestone years. Quantitative milestones are incremental reductions in NA emissions that are demonstrated (via RFP) every three years until the area is redesignated attainment.

As documented in staff's analysis under CAA section 179B for the Imperial County NA $PM_{2.5}$ SIP, the area would not have exceeded the 24-hour $PM_{2.5}$ standard "but for" emissions from Mexicali. Notwithstanding the conclusion of the analysis, that the NA has been in attainment of the 24-hour $PM_{2.5}$ standard since 2012, an RFP demonstration is required for areas that are in attainment of the $PM_{2.5}$ standard "but for" emissions emanating from outside the U.S. For the Imperial NA, attainment is measured as the first year the area would attain "but for" emissions from outside the U.S. This Chapter discusses the ICAPCD's RACM/RACT analysis and demonstrates that the current control measures are sufficient for the NA to attain the $PM_{2.5}$ NAAQS by 2012.

The Imperial County NA $PM_{2.5}$ SIP includes an emission inventory baseline year of 2008 and an attainment emission inventory year of 2012. The years used to demonstrate RFP for the Imperial County NA are 2008, 2011, and 2012. RFP milestone years are required every 3 years after the baseline year so 2011 emissions are included in this demonstration. Figure 5.2 illustrates that $PM_{2.5}$, NO_X, VOC, Sox and NH_3 emissions within the NA decreased linearly or stayed the same from 2008 to 2012. These two years are used in the RFP to show progress in emission reductions by the 2012 attainment year, meeting the original intent of demonstrating progress towards attainment.

Figure 5.2 Reasonable Further Progress Demonstration for the Imperial Nonattainment Area (Winter Emissions Inventory Tons per Day)

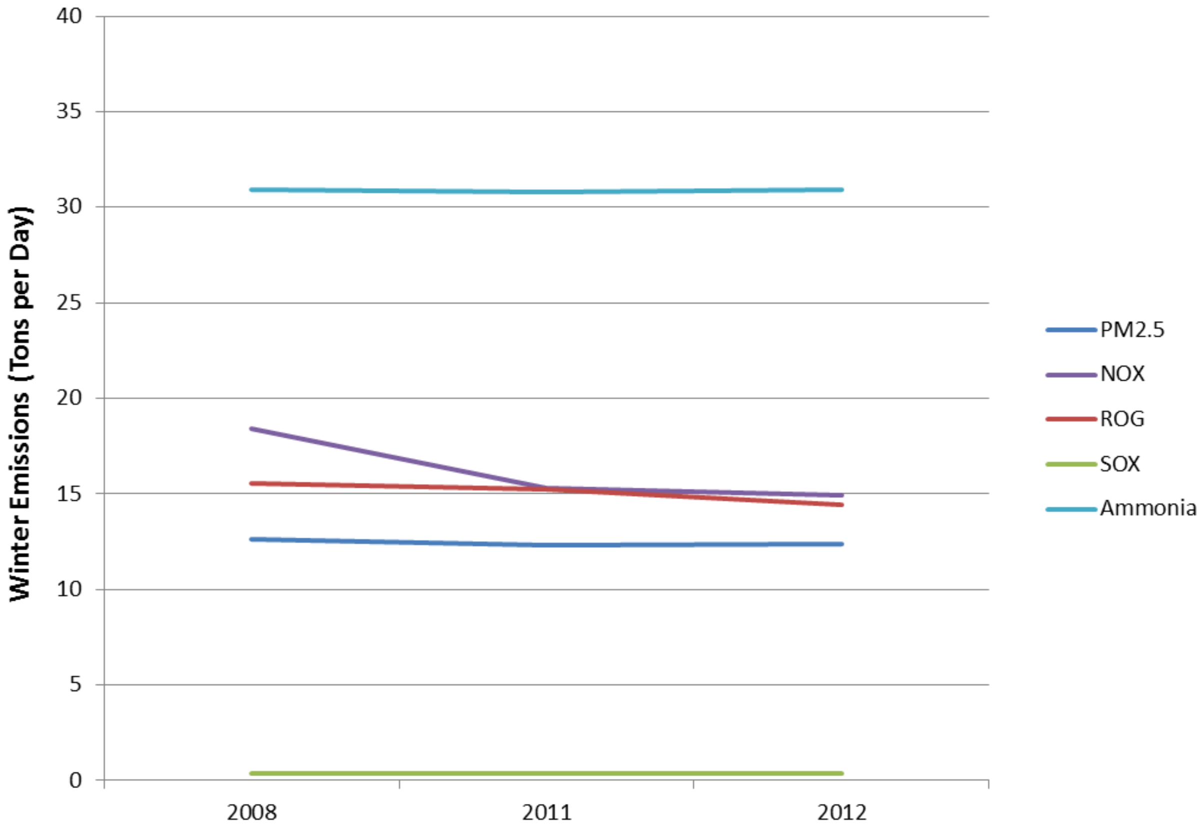


Table 5.6
2008, 2011, and 2012
Winter Emission Inventories
For $PM_{2.5}$ and Precursors

Pollutant	2008	2011	2012
$PM_{2.5}$	13	12	12
NOX	18	15	15
ROG	16	15	14
SOX	<1	<1	<1
Ammonia	31	31	31

5.5 Contingency Measures

The 1994 Addendum which addresses "Serious" PM_{10} nonattainment areas explains on page 42001 that contingency measures are additional measures which are included in the SIP which can be undertaken to reduce emissions if an area fails to make RFP or to attain the primary NAAQS by the applicable attainment date.

As discussed above, the years used to demonstrate RFP included 2008, 2011 and 2012. Because the RFP years are in the past and because the linear decrease or stability between 2008 and 2012 demonstrates progress towards attainment RFP has been met which does not trigger additional measures to reduce emissions in future years. Therefore, consistent with U.S. EPA guidance all reasonable measures have been implemented to assure continued progress towards attainment.

5.6 Transportation Conformity

Transportation conformity requirements are intended to ensure that transportation activities do not interfere with air quality progress. CAA Section 176 requires that transportation plans, programs, and projects conform to applicable air quality plans before being approved by a Metropolitan Planning Organization (MPO). Conformity to an implementation plan means that proposed activities must not:

1 Cause or contribute to any new violation of any standard,
2 Increase the frequency or severity of any existing violation of any standard in any area, or
3 Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

Motor vehicle emissions budgets are the mechanism for assuring that transportation planning activities conform with a SIP. Typically, a SIP analyzes the region's total emissions inventory from all sources for purposes of demonstrating RFP milestones, attainment, and/or maintenance. The portion of the total emissions inventory allocated to highway and transit vehicles in these analyses becomes the "motor vehicle emissions budget." Budgets are set for each criteria pollutant or its precursors, and it is set for each RFP milestone or attainment/maintenance year. Subsequent transportation plans and programs produced by local transportation planning processes are required to conform to the budget levels in the respective SIP.

This $PM_{2.5}$ SIP includes documentation that indicates the 2006 $PM_{2.5}$ NAAQS would not have been exceeded in the NA but for emissions emanating from Mexicali, Mexico. The SIP includes a base year of 2008, an interim year of 2011 to show progress and an attainment year of 2012. As a result, transportation conformity budgets are being established for the attainment year 2012.

5.6.1 $PM_{2.5}$ Requirements

The Transportation Conformity Rule (40 CFR Part 93) addresses the types of motor vehicle emissions that must be addressed when setting transportation conformity budgets. All $PM_{2.5}$ SIP budgets would include directly emitted $PM_{2.5}$ motor vehicle emissions from tailpipe, brake wear, and tire wear. However, under certain circumstances, directly emitted $PM_{2.5}$ from on-road motor vehicles may be found an insignificant contributor to the air quality problem and NAAQS. The precursor NOx must also be addressed unless there is a finding of insignificance.

The additional precursor pollutants VOC, SOx and/or NH_3 must also have a transportation conformity budget in $PM_{2.5}$ nonattainment areas if a finding of significance has been made. In addition, re-entrained road dust from paved and unpaved road travel should be considered if they are determined to be significant contributors.

5.6.2 Conformity Budgets

Based on the analysis presented throughout the plan, conformity budgets are being established for $PM_{2.5}$ and NOx for a winter day in the attainment year 2012. The $PM_{2.5}$ budget includes both onroad mobile exhaust and unpaved road dust from the City/County category of the emissions inventory. Onroad mobile exhaust has been estimated using EMFAC 2011 SG based on transportation activity data provided by the SCAG from the federally approved Amendment No. 1 to the 2012-2035 RTP/SCS and Amendment No. 4 to the 2013 Federal Transportation Improvement Program.

Both state and local control measures which reduce on-road mobile source emissions but are not included in EMFAC 2011-SG have not been included in the conformity emissions budgets, as they are not needed to provide for attainment. However, it is important to note that both the on-road mobile State strategies and the regional fugitive dust controls will continue to provide additional emission reductions into the future.

Table 5.7
Transportation Conformity Budgets*
(tons per winter day)

$PM_{2.5}$	NOx
2.3	6.4

*Rounded up to nearest tenth ton (0.1).

CHAPTER 6 BORDER STRATEGIC CONCEPTS

6.1 Introduction

This chapter discusses the ICAPCD's overall involvement in working cooperatively with our counterparts from Mexico to discuss emissions reductions strategies and projects for air quality improvements at the border and provide public information and education and a forum to border residents. In August 2012, the U.S. and Mexico signed the U.S.-Mexico Environmental Program Border 2020. Border 2020 is a cooperative effort between the US EPA, Mexico's SEMARNAT (federal environmental agency and EPA counterpart), the four U.S. border states (Texas, New Mexico, Arizona, and California) and the six Mexican border states (Tamaulipas, Nuevo León, Coahuila, Chihuahua, Sonora, and Baja California), plus 26 U.S. border tribes. The initiative is to improve the environment by focusing on cleaning the air, providing safe drinking water, reducing the risk of exposure to hazardous waste, and ensuring emergency preparedness along the U.S.-Mexico border. By improving the environment both countries ensure the protection of the health of the people who live on both sides along the border.

The two countries strive to achieve these goals through local input from states, local governments, and citizens. Within the Mexicali and Imperial Valley area, the Air Quality Task Force (AQTF) has been organized to address those issues unique to the border region known as the Mexicali/Imperial air shed. The AQTF membership includes representatives from federal, state and local governments from both sides of the border, as well as representatives from academia, environmental organizations, and the general public. This group was created to promote regional efforts to improve the air quality monitoring network, emission inventories and air pollution transport modeling development, as well as the creation of programs and strategies to improve air quality. Air quality improvement programs are used as a valuable resource by the local environmental managers to determine connections between air quality, land use, communications infrastructure and economic development issues.

Following is a brief summary of some of the projects in which the ICAPCD, in conjunction with the AQTF, CARB and U.S EPA, participate to address or evaluate emissions at the border and educate the communities on the impact of air pollution in this region.

6.1.1 Web-based air quality and health information center

The ICAPCD and the CARB, in cooperation with the U.S. EPA, operates a Web-based air quality and health information center for Imperial County. Through this project, the ICAPCD provides the community with the real-time data collected by our monitoring stations, including Ozone and PM_{10}. The purpose of this project is to enable schools and after-school programs, as well as others in the county to make informed choices on the level of outdoor activity they deem appropriate in order to reduce exposure to air pollutants. The general population benefits from the information that enables them to protect their health on days when pollution exceeds the health-based air quality standards.

Hourly ozone and PM_{10} measurements are currently available in the form of an air quality index (AQI) through a web-based air quality and health information center. Next-day ozone forecast information is made available to the public through the web-site for the summer months. Health and other pertinent information links related to specific levels of these pollutants is also available.

The web-site is capable of notifying registered participants when the levels of air pollutants are unhealthy, including ozone and PM10 episodes. Notifications are sent to registered participants via e-mail and/or cell-phone text-message. The web-based air quality and health information center is available on the internet at the following web site: **www.imperialvalleyair.org**

6.1.2 Flag Alert Program

The ICAPCD in conjunction with the American Lung Association established the Flag Program to Imperial County schools from Elementary to High School. The Flag Program was developed in order to alert administrators, staff, students, parents and the community of the daily particulate level risks. In addition, it serves as a visual communication device by utilizing colored flags based on AQI colors that are easily understood by all ages. Overall, the goal of the program is to alert and improve the health of school population thereby improving attendance and scholastic achievement.

The air quality flag program uses multi-colored flags to indicate the outdoor air quality. Each school day, a flag is raised on the flagpole that corresponds to the color of the AQI. The color of the flag indicates the level of recommended outdoor activity for the day. The ICAPCD, along with other state, local air districts, and the U.S. EPA, use the AQI to provide simple information on local air quality, the health concerns associated with the different levels of alerts and how as individuals we can protect when pollutants reach unhealthy levels.

The process for implementation of the Flag Program at schools is as easy as following these three steps.

- A designated school representative(s) or volunteer(s) should sign up for the Air Pollution Control District free service at http://www.imperialvalleyair.org for air quality alerts that may occur during the day. The alerts notifications will be received via e-mail, text or cell phone when the air quality in the Imperial County reaches unhealthy levels.
- A school representative(s) or volunteer(s), should log on the http://www.imperialvalleyair.org website, preferably in the morning, to view the real time AQI level; and

- The school representative(s) or volunteer(s) will raise the appropriate flag corresponding to the real time AQI level in order for teachers, children, parents and the community, to know what the air quality conditions are for that day.

The program was offered on a voluntary basis to all Imperial County schools, including Calexico. The schools were provided with the education and the materials such as colored flags, banners, and flyers to implement the flag program by the ICAPCD. The schools that chose to continue with the program were periodically provided with new banners and flags and had the ICAPCD support for any assistance they were in need of.

6.1.3 Mexicali and Imperial County Educational Media Campaign

As stated in Chapter 4, the majority of violations of the $PM_{2.5}$ NAAQS occurring at the Calexico monitoring station occur during the months of December and January. It is during these months where continual stagnant conditions with light winds predominate in this region. These conditions coupled with the tradition, in Mexicali, of burning wood, tires, etc. for warmth during cold nights, lead to violations of the PM_{10} and $PM_{2.5}$ standards in Calexico. Uncontrolled open burning in Mexicali is primarily a cultural problem. Also, it is a tradition to use fireworks during the winter holidays in Mexico, which exacerbate the air pollution problem in this area.

Since this problem is primarily cultural, it is imperative that all members of Mexicali's community, in particular children and young adults, learn about the consequences of open burning of tires, wood, fireworks, etc. to instill a change of attitude of the community with respect to this subject. This is expected to be accomplished through an ongoing educational media campaign targeting the city of Mexicali, where all age groups could understand the air quality problem and inform them of how they could help prevent or minimize air pollution in the Mexicali region.

Therefore, through a collaborative and cooperative effort between the Border 2020 program, the US EPA, and the Border Environmental Cooperation Commission (BECC), the ICAPCD and the Imperial Valley-Mexicali AQTF through the Border 2020 program have been funding a "no burn" radio and television Environmental Educational Media Campaign (Campaign) to help educate the Mexicali community concerning the impacts from the open burning upon our air quality. The Campaign encourages a "no burn" mentality and promotes awareness for the well being of our health and the environment. Community education and awareness on the management and prevention of burning is a shared public-private responsibility. Such as, the ICAPCD as the lead agency for this Campaign, and the Secretariat of the State of Baja California (SPA) focused on the media portion of the project. The radio and television Campaign objectives are the following:

- Educate the community in regards to the status of the air quality in the region and the consequences of open burning of tires, wood, fireworks, etc.

- Educate young adults for our goal to create environmental advocates with respect to the care of the environment.
- Raise public awareness of the serious consequences of open burning of tires, wood, fireworks, etc. to our air quality.
- Work towards a plan to achieve goals for a no burn mentality.
- Improve Community Leadership Involvement.

The Media Slogan: ***"Because the future is in your hands: Ambientalizate! (Environmentalize)"*** is the dominant element of the campaign. The Campaign is focused on days that are likely to violate the federal health standard for air quality, traditionally during the Holiday season December - January. Therefore, the media transmissions are aired in phases to capture the period of most pollution. There are three audience profiles the Campaign targets: Children in Kindergarten to Sixth Grade, Young Adults in Junior High to High School and the general public.

The first step of the Campaign targeted the education of the health and air quality impacts resulting from the burning of fireworks, tires and wood. Because of the deeply entrenched cultural tradition behind the practice of open burning and the use of fireworks during holiday celebrations, expectations are that a "no burn" mentality will be difficult to achieve. However, again, there is a need to disseminate a complete awareness to the affected community, of the health and air quality impacts that occur as a result of current cultural traditional practices. The affected community, in turn, can then understand the long term harm that will continue should these cultural traditional practices not change.

The ICAPCD started implementing this Campaign in 2011. The Campaign media ads have a series of five 20-second television and radio spots that are geared towards the "No Burn" mentality. For example, one spot emphasizes the health impacts caused from the burning of wood and tires. Similarly, another spot emphasizes the health impacts caused by fireworks. The ICAPCD is committed to yearly implementation of the Environmental Educational Medial Campaign, as funding allows. The Campaign has opened many avenues of communication with Mexicali's community and it carries tremendous power to educate all audiences.

6.1.4 Vehicle Idling Emissions Study at Calexico East and Calexico West Ports of Entry

Reducing emissions of particulate matter and nitrous oxides from idling vehicles at ports of entry is one of the most important air quality challenges facing the Imperial County and Mexicali region. Even with standards taking effect over the next decade for idling vehicles, millions of vehicles will continue to emit large amounts of nitrogen oxides, particulate matter and air toxics, which contribute to serious public health problems.

It is important to understand the impacts and to evaluate the amount of air emissions generated by idling vehicles at the Calexico East and Calexico West Ports of Entry. On behalf of the AQTF, in 2014, the ICAPCD was selected as a grantee by BECC to study border idling. The ICAPCD hired a consulting firm to develop an analysis with two essential elements. The first element is to determine the vehicle idling impacts at both ports of entry. The second element, crucial to any air quality improvements, is the identification of emission reduction strategies that U.S.-Mexican planning agencies could implement at both ports of entry in order to reduce impacts upon the general population. Estimating emissions from idling vehicles and identifying potential control strategies can be helpful in securing organizational support for federal, state, and local governments on both sides of the border. Overall, this project will (1) estimate PM and NOx emissions from northbound idling vehicles waiting at two Ports of Entry and to (2) identify emissions reduction strategies (with accompanying PM and NOx reductions) that U.S.-Mexican planning agencies could implement at the port of entry.

Several tasks need to be accomplished for this program. Each task will take between two and three months, except for production of the final report where additional review time has been incorporated to allow the BECC, US EPA and stakeholders adequate opportunity to review and provide comments on the draft final report. The time for field surveys and data collection will be early spring (April/May), with summer following (July/August), and finalizing with winter (November/December) 2014. It is expected that the final report will be available by the fall of 2015. The final report will contain comparisons of actual accomplishments to the objectives established for the period when the work was done, quantified outputs and outcomes, and the accomplished objectives and any other pertinent information to the analysis.

6.1.5 Program to Improve Air Quality in Mexicali 2011-2020

The Mexican government has developed a very ambitious program to reduce air emissions in Mexicali. Reducing $PM_{2.5}$ emissions in Mexicali is crucial to the reduction of the transport of air emissions into Imperial County. The reduction of such transport of air emissions will greatly reduce the impact of poor air quality in both air sheds. The ICAPCD actively participated during the development of the air program for Mexicali, as an expert air quality agency, by reviewing and providing constructive comments through bi-national meetings such as the AQTF. It is worthy to note that the ICAPCD, CARB, nor the US EPA has any jurisdictional authority over emission sources in Mexico. This program includes actions to reduce air emissions from different source categories.

CHAPTER 7 CONCLUSION AND SIP CHECKLIST

7.1 Checklist of SIP Requirements and Conclusions

A checklist of the 1997 $PM_{2.5}$ NAAQS requirements pertinent to the 2013 $PM_{2.5}$ SIP (as outlined both in the CAA Part D, Subpart 1, Sections 172, Nonattainment Plan Provisions, and Subpart 4, Section 189, Plan Provisions and Schedules for Plan Submission) for "Moderate" non-attainment areas is presented in Table 7.1. As documented in Table 7.1, all SIP requirements applicable to the 2013 $PM_{2.5}$ SIP have been successfully addressed.

Table 7.1 Clean Air Act (CAA) Regulatory Requirements

General Requirements	CAA Citation	Description	2013 $PM_{2.5}$ SIP
RACT/RACM	172(c)(1) and 189(a)(C)(1)	SIP provisions should provide for the implementation of reasonably available control measures (RACM), including at a minimum, reasonably available control technologies (RACT).	Chapter 5
RFP	172(c)(2)	SIP provisions should provide for reasonable further progress	Chapter 5
Contingency Measures	172(c)(1)	The SIP must contain contingency measures that must be implemented (without the need of additional rulemaking actions) in the event that the control measure regulations incorporated in the plan cannot be successfully implemented or fail to give the expected emission reductions.	Chapter 5
Emissions Inventory	172(c)(3)	The SIP must include a comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutants in the area.	Base-year 2008 $PM_{2.5}$ emissions estimates are presented in Chapter 3.
NSR	172(c)(4-5) and 189(a)(1)(A)	The SIP must identify and quantify the emissions of pollutants with section 173(a)(1)(B), from the construction and operation of major new or modified stationary sources in the area. The SIP must require permits for new or modified stationary sources.	Chapter 5

Table 7.1 Clean Air Act (CAA) Regulatory Requirements

General Requirements	CAA Citation	Description	2013 $PM_{2.5}$ SIP
Attainment Demonstration	179(B) and 189(a)(B)(1)	CAA provides the State with an option to demonstrate that a nonattainment area would meet the NAAQS "but for" emissions emanating from outside of the United States.	Chapter 4 and Attachment A demonstrates the Imperial County nonattainment area would be in attainment "but for" emissions from Mexico.

ATTACHMENT A

179B ATTAINMENT DEMONSTRATION

California Environmental Protection Agency

Air Resources Board

179B Analysis for PM2.5 Emissions Impacting Calexico in Imperial County

September 24, 2014

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Table of Contents

I. Overview

The purpose of this analysis is to identify the origin of emissions impacting PM2.5 concentrations in the Imperial County nonattainment area (Imperial NA) next to the Mexico international border. The Imperial NA is an agricultural community located in the southeast corner of California which shares its southern border with Mexicali, Mexico. The Imperial NA includes three PM2.5 monitoring sites, located in the cities of El Centro, Brawley and Calexico. These three cities are about the same size and, in general, have emission sources that are similar. Calexico is the only violating PM2.5 monitor in the Imperial NA.

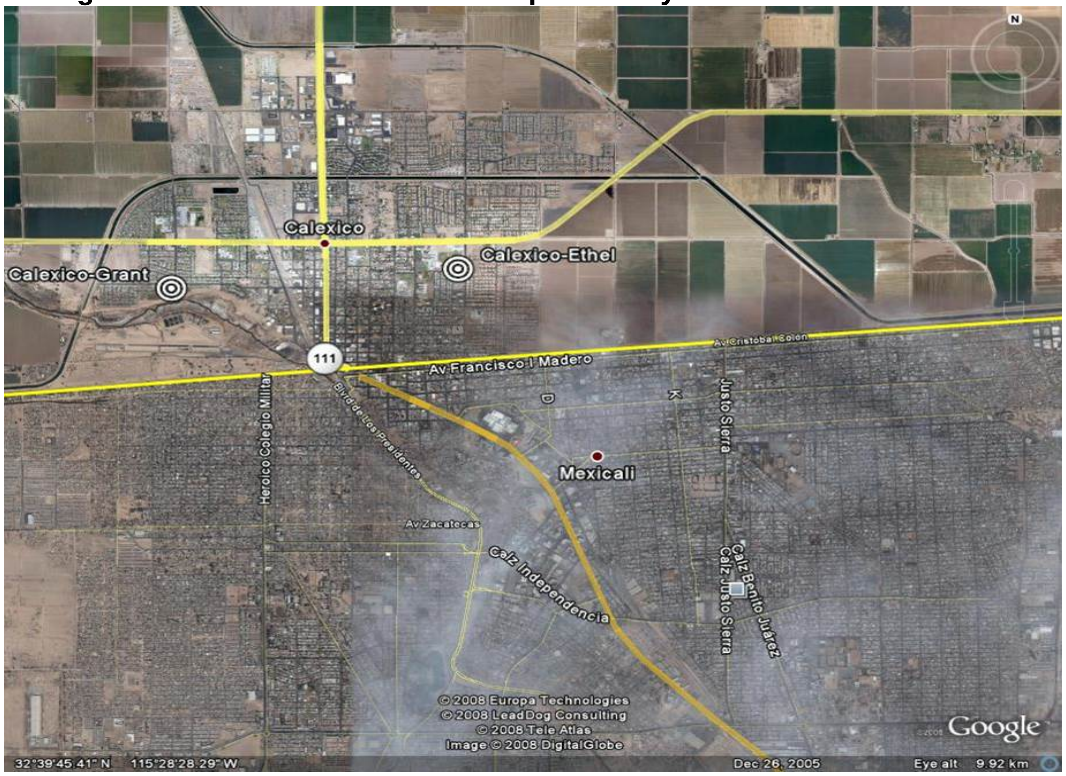
This analysis provides technical documentation that in 2012 the Imperial NA attained the 24-hour PM2.5 standard of 35 micrograms per cubic meter (µg/m3) but for emissions emanating from Mexico. The Clean Air Act (Act) contains a specific provision in Section 179B for areas that are affected by the international cross-border transport of pollutants. Exceedances that occur due to international transport may cause violations of the standard; however, the Act does not require states to develop an attainment strategy addressing pollution that originates from sources beyond United States borders.

U.S. EPA guidelines on demonstrating that an area is in attainment but for emissions emanating from outside the United States identifies five types of information that may be used in evaluating the impact of emissions from outside U.S. borders on a nonattainment area. States may use one or more of these approaches based on the specific circumstances and the data available:

1. Compare emission inventories from each side of the border to assess the magnitude of the emission differences;
2. Evaluate changes in PM2.5 concentrations with wind direction;
3. Analyze filters for specific particles that may be tied to foreign emission sources;
4. Analyze the emission inventory on the U.S. side of the border and demonstrate that the impact of U.S. sources does not cause NAAQS exceedances;
5. Perform air dispersion and/or receptor modeling (source apportionment) to quantify the impacts from U.S. and foreign emission sources.

For this analysis, staff used all of these approaches to evaluate the impact of Mexicali emissions on the Calexico PM2.5 monitor.

Figure 1. Mexicali and Calexico Separated by the International Border



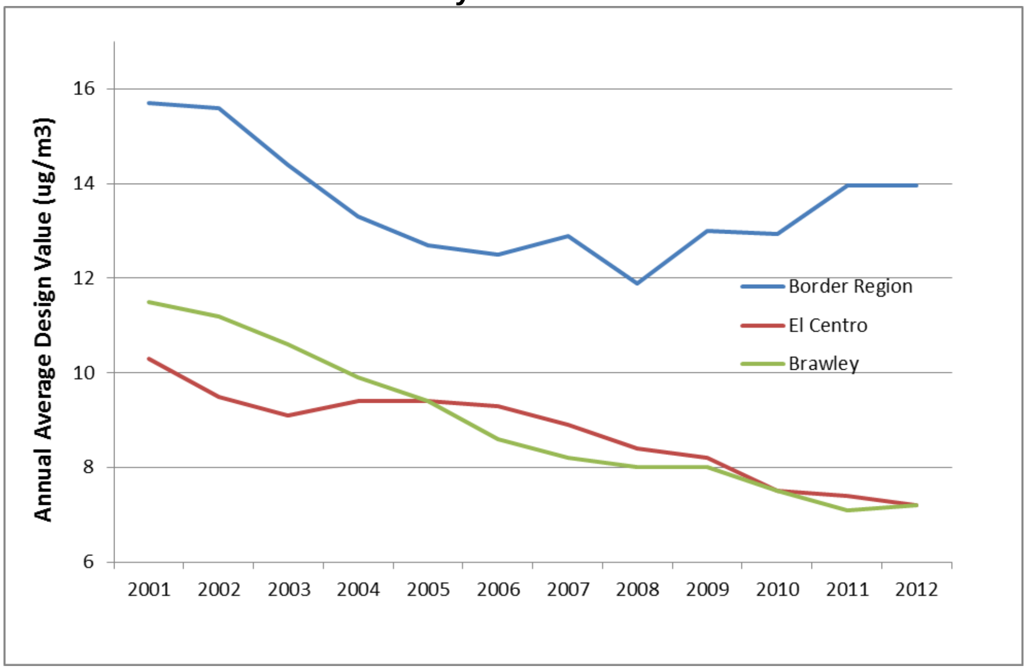
From an air quality perspective, Calexico and the Mexicali Metropolitan Area share a common air shed. Since the topography does not restrict airflow from either side of the border and both areas experience similar meteorology, Mexicali pollution impacts Calexico (Figure 1). The Calexico site is less than one mile from the international border and, according to United States Environmental Protection Agency (U.S. EPA) monitor siting criteria, is representative of air pollution from both Calexico and Mexicali.

The Mexicali Metropolitan Area has a population of close to 1,000,000 (U.N. Data) as compared with the significantly smaller city of Calexico, which has a population of approximately 38,600 (2010 U.S. Census). Figure 2 shows an aerial image of Calexico and Mexicali during the night which highlights the large differences in size and population. Emissions inventory data for Mexicali shows that emissions are orders of magnitude higher than emissions in the Imperial NA. Also, Mexicali ranks as the third most polluted city in the world for PM10 behind cities in India and China. (*Choked*. Retrieved on June 2, 2014 from: http://www.economist.com/blogs/graphicdetail/2013/01/daily-chart-11).

Figure 2. Mexicali and Calexico

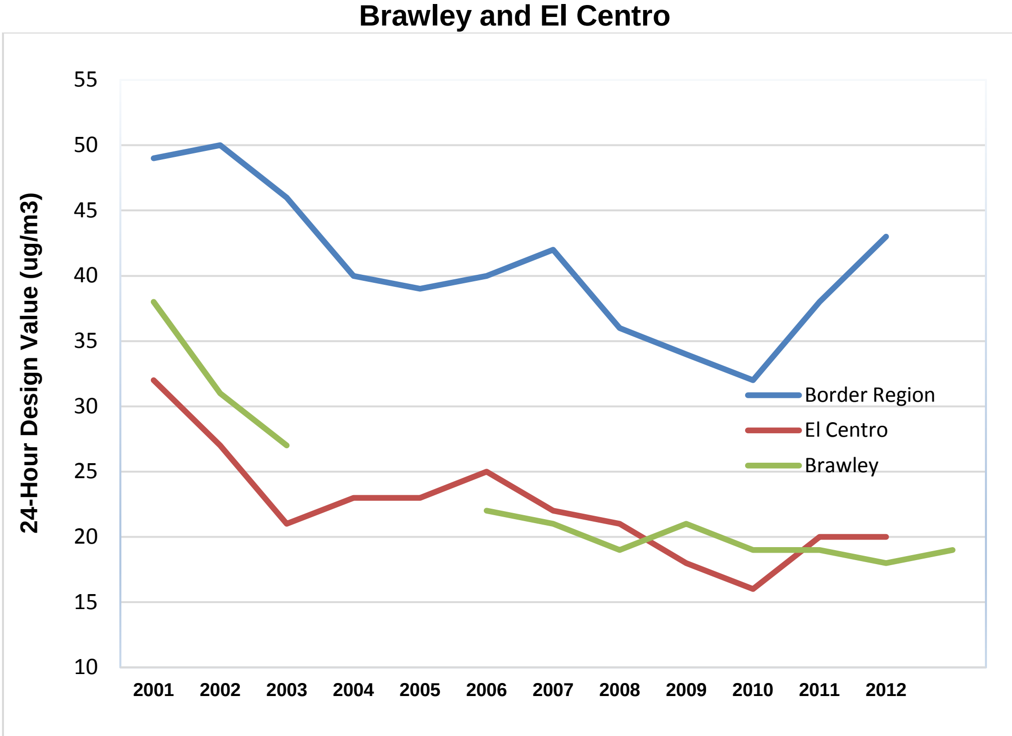
On a daily basis, ambient PM2.5 concentrations in Calexico are significantly impacted by Mexicali emission sources. In Mexicali, a large population of industrial, mobile, and area sources are subject to less stringent emission regulations. Consequently, Mexicali industrial sources emit approximately 15 times more emissions and mobile sources emit almost three times more emissions than the entire Imperial NA. Due to these emission differences, PM2.5 concentrations measured in the Imperial NA typically follow a gradient with the lowest PM2.5 concentrations measured in the north at Brawley and the highest concentrations in the south at Calexico. As shown in Figures 3 and 4, Brawley and El Centro have responded similarly to California control programs and air quality has improved as a result. However, in Calexico, air quality has not improved and remains above the revised federal annual average PM2.5 standard of 12 µg/m3 and the 24-hour PM2.5 standard of 35 µg/m3.

Figure 3. 2001-2012 Annual Design Values for the Border Region, Brawley and El Centro



*Calexico data includes ARB invalidated and transport days in the design value calculation

Figure 4. 2001-2012 24-hour Design Values for the Border Region, Brawley and El Centro



*Calexico data includes ARB invalidated and transport days in the design value calculation

While Calexico is impacted daily by emissions from Mexicali, on a few days every year, that impact is exacerbated resulting in exceedances of the 24-hour PM2.5 standard. Between 2010 and 2012, the Calexico monitor measured PM2.5 concentrations that exceeded the PM2.5 National Ambient Air Quality Standard (NAAQS) on five winter days (Table 1). These days occurred during stagnant weather conditions, often with predominant airflow from the south. Stagnant meteorological conditions impede dispersion and facilitate the build-up of PM2.5 concentrations in the Calexico-Mexicali air shed. Most of these days coincide with wintertime holiday celebrations in Mexico where the use of bonfires and refuse burning along with fireworks displays are commonplace, further increasing emissions in Mexicali. As a result, in 2012, the Calexico 24-hour PM2.5 design value was 43 µg/m3, more than twice that of Brawley and El Centro levels (18 µg/m3 and 20 µg/m3 respectively). On all exceedance days included in this analysis, the average concentration at the Calexico site was more than 60 percent higher than the average concentrations at El Centro and Brawley.

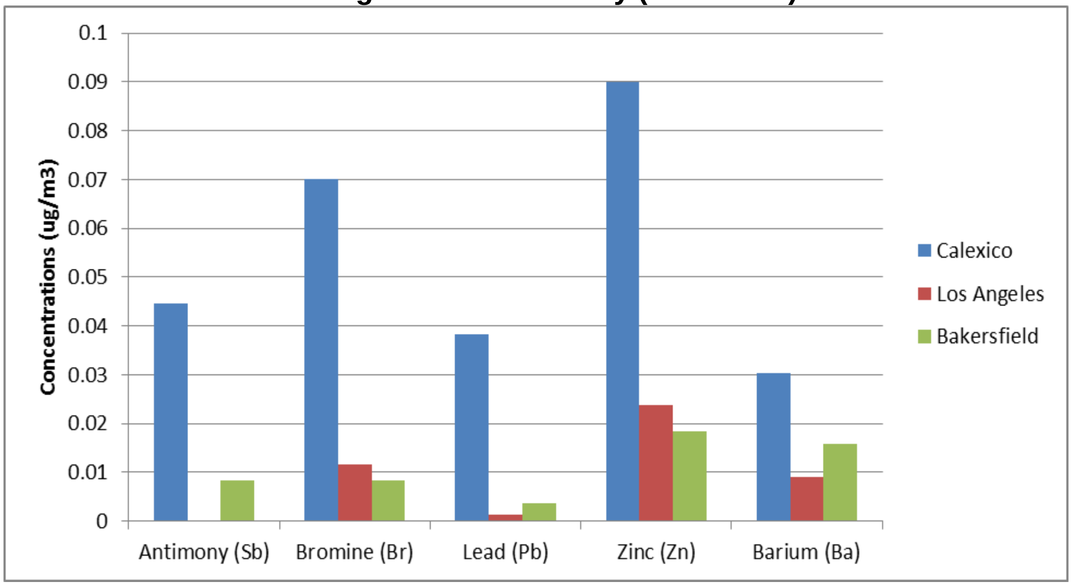
In addition, no exceedances for PM2.5 were recorded at Calexico when the predominant wind flow was from the north, northerly winds defined as winds from the north at least 18 hours per day with speeds in excess of 1.5 meters per second (mps) (see Section IX). A more refined concentration-wind direction analysis presented in this document also shows that no violations of the PM2.5 NAAQS occurred during northerly wind flow over the 2010-2012 time period.

Table 1. PM2.5 Measurements Exceeding the 24-Hour PM2.5 Standard at the Calexico Monitoring Site in 2010-2012

Date	Calexico PM2.5 (µg/m3)
12/4/2010	50.9
2/5/2011	80.3
12/11/2011	44.4
1/31/12	37.7
12/23/2012	64.7

In order to evaluate the impact emission sources in Mexicali on elevated PM2.5 concentrations measured in Calexico, staff analyzed the chemical composition data of PM2.5 samples and compared them with the composition of PM2.5 from monitoring sites around California. The PM2.5 chemical composition provides a signature for identifying types of activities potentially impacting a monitor. On the days exceeding the 24-hour PM2.5 standard, the chemical composition showed high values of organic carbon and elements. The high level of organic carbon indicates that combustion activities are a major source of emissions affecting Calexico. The high levels of organic carbon correlated well with high levels of chlorine and fine particulate antimony. Both chlorine and fine particulate antimony are associated with refuse burning, which is known to occur in Mexico. Some elemental components measured three to thirty times higher than at other sites in California (Figure 5). High concentrations of lead, bromine, zinc and barium, are typically associated with fireworks, tire burning and leaded gasoline. This suggests that source signatures contributing to high Calexico PM2.5 levels were unique to this site and not found at other sites in California. Significantly, open refuse burning, which might produce these analytical results, has been banned in California since 2004.

Figure 5. Concentrations of Select Elemental Species on an Average Exceedance Day (2010-2012)



Further, the ARB laboratory performed additional elemental analysis on PM2.5 filters in Brawley and El Centro coinciding with the five exceedance days. The difference between elemental species concentrations at Calexico and the other two Imperial County sites, El Centro and Brawley, was similar to the difference observed between Calexico and other California sites. As a result, the analysis indicates that emissions impacting the Calexico monitor are not typical of emissions affecting monitors elsewhere in Imperial County, but originate from sources south of the border. Source apportionment modeling substantiated PM2.5 chemical composition analysis and indicated that refuse burning and secondary nitrate were the major contributors to the PM2.5 concentration on transport days.

Overall, the analysis shows that Calexico 24-hour PM2.5 exceedances are due to emission sources not found in California. This interpretation is based on analyses indicating that during stagnant conditions, pollution from holiday activities in Mexicali, including extensive fireworks displays and bonfires containing plastics, tires and other refuse materials fill the entire air shed and drift into Calexico. PM2.5 concentrations at El Centro and Brawley, which are more representative of local emission within Imperial County, were significantly lower on Calexico exceedance days.

These analyses indicated that Calexico PM2.5 levels would have attained the 24-hour PM2.5 standard in 2012 “but for” increased pollution emissions from the Mexicali Metropolitan area. If Mexicali emissions were not impacting the Calexico site, Calexico’s design value would likely be closer to that of El Centro considering the similarity in sources and emission profiles. In addition, Imperial County emissions are expected to continue declining in the future, which ensures continued maintenance of attainment. These analyses and documentation provides evidence for U.S. EPA to approve the Imperial County 2013 PM2.5 SIP under Section 179B of the Clean Air Act.

II. Regulatory Requirements and Guidance

179B Demonstration

Section 179B of the Act includes language that reduces planning requirements in international border areas subject to emissions from outside the United States. Specifically, 179B references requirements for State Implementation Plans as well as Plan revisions:

"Section 179(B) INTERNATIONAL BORDER AREAS

(a) IMPLEMENTATION PLANS AND REVISIONS.—Notwithstanding any other provision of law, an implementation plan or plan revision required under this chapter shall be approved by the Administrator if—

(1) such plan or revision meets all the requirements applicable to it under the Act other than a requirement that such plan or revision demonstrate attainment and maintenance of the relevant national ambient air quality standards by the attainment date specified under the applicable provision of this Act, or in a regulation promulgated under such provision, and

(2) the submitting State establishes to the satisfaction of the Administrator that the implementation plan of such State would be adequate to attain and maintain the relevant national ambient air quality standards by the attainment date specified under the applicable provision of this chapter, or in a regulation promulgated under such provision, but for emissions emanating from outside of the United States."

U.S. EPA Guidance

In addition to statutory language in the Act, U.S. EPA published guidelines to assist in the application of Section 179B. The guidelines outline five types of information that may be used to substantiate the effect of emissions emanating from outside the United States on a nonattainment area. A state may use one or more of these analytical approaches based on the specific case under evaluation and the availability data. Summarized with respect to PM2.5, the five types of information consist of the following:[1]

[1] "State Implementation Plans for Serious PM-10 Nonattainment Areas, and Attainment Date Waivers for PM-10 Nonattainment Areas Generally; Addendum to the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990," 59 Federal Register 157 (16 August 1994), pp. 41998 - 42016.

1. Evaluate and quantify any changes in monitored PM2.5 concentrations with a change in the predominant wind direction (see Sections VII and XI);

2. Comprehensively inventory emissions within the United States in the vicinity of the nonattainment area and demonstrate that the impact of those sources on the nonattainment area after application of reasonably available controls does not cause the NAAQS to be exceeded. Analysis must include an influx of background PM in the area. Background PM levels could be based, for example, on concentrations measured in a similar nearby area not influenced by emissions from outside the United States (see Section IX);

3. Analyze ambient sample filters for specific types of particles emanating from across the border (although not required, characteristics of emissions from foreign sources may be helpful) (see Sections VIII, X, and XI);

4. Inventory the sources on both sides of the border and compare the magnitude of PM emissions originating within the United States to those emanating from outside the United States (see Section VI);

5. Perform air dispersion and/or receptor modeling to quantify the relative impacts on the nonattainment area of sources located within the United States and of foreign sources of PM emissions (this approach combines information collected from the international emission inventory, meteorological stations, ambient monitoring network, and analysis of filters) (see Section XI).

The guidelines also indicate that states may use any of these approaches, or other techniques, “depending on their feasibility and applicability, to evaluate the impact of emissions emanating from outside the United States on the nonattainment area.” States are not required to address all of the approaches, but should provide a weight of evidence that international impacts affect the attainment ability of the area.

It is also important to note that the analysis needs to show that the area would have attained but for international transport, not that all days that are over the standard are due to international transport. The form of the 24-hour PM2.5 standard is the 98th percentile, which allows for some days over the standard. Exceedances recorded on five days from 2010 through 2012 provide a needed subset for demonstrating the impact from Mexico. PM2.5 concentrations from the Imperial County side of the border, as assessed from PM2.5 data screened by wind direction and speed, provide substantial evidence that the Imperial NA is in attainment in the absence of emissions from sources under Mexicali’s jurisdiction.

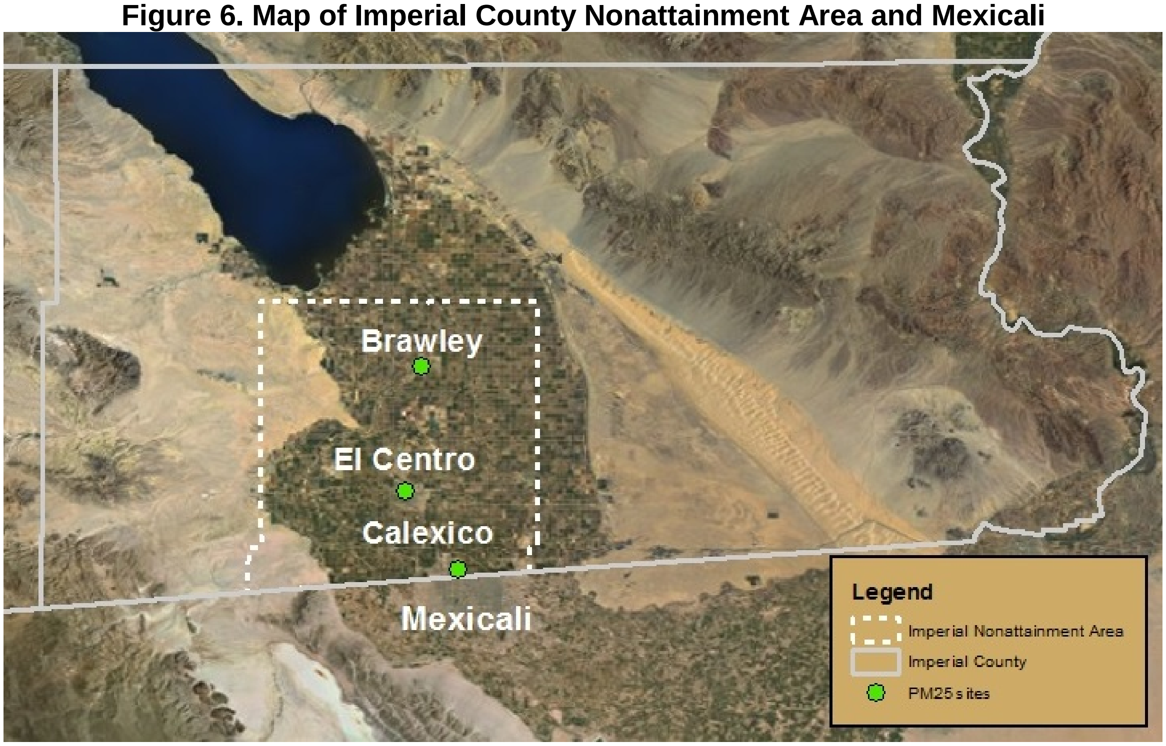
Monitoring data and general meteorological and emissions characteristics for all exceedance days, when available, were examined first. Staff focused closely on the five specific days in Table 1 and examined the available monitoring and meteorology data from Calexico, other Imperial County monitoring sites, and Mexicali, and applied all or portions of the guideline techniques to evaluate the impacts of emissions emanating from Mexicali and from Imperial County on attainment of the 24-hour PM2.5 standard.

III. Profile of Imperial County and Mexicali, Mexico

Imperial County

Located in the southeast corner of California, Imperial County is approximately 4,500 square miles with a population of 174,528 (U.S. Census). The county includes the Imperial Valley with the Santa Rosa Mountain Range to the west, the Chocolate Mountains to the east, and Mexico to the south. The three most populated cities in the county are Brawley, El Centro, and Calexico with populations of about 25,567; 43,107, and 39,310, respectively (U.S. Census). These three cities form a north-south axis through the approximate center of the county from the southern end of the Salton Sea to the Mexican border. Most of the population, commercial activity, and farming operations occur in this relatively narrow land area comprising approximately one-fourth the width of the county. A map of Imperial County, including the cities of Calexico, El Centro, and Brawley, the boundaries of the PM2.5 nonattainment area, and the border area of Mexicali is shown in Figure 6.

Figure 6. Map of Imperial County Nonattainment Area and Mexicali



The area contains relatively few major emission sources, but may experience significant on-road vehicular traffic, particularly near Calexico, given proximity to two international ports of entry into the United States. Other emission sources consist of geothermal power generation, food processing, plaster manufacturing, and light industrial facilities. Imperial Valley agriculture produces a variety of crops including hay, vegetables, and dairy products. Beyond the urban and rural areas of Imperial County are large expanses of open desert and the Salton Sea with little human activity.

Imperial County PM2.5 Nonattainment Area

The Imperial County PM2.5 nonattainment area encompasses about 690 square miles within the central portion of the county. U.S. EPA established the Imperial County nonattainment area based on analysis of air quality around Calexico, the county's only violating monitor. The nonattainment boundary includes the cities of Calexico, El Centro, and Brawley, and a portion of the major roads in southern Imperial County. The nonattainment area comprises the majority of the county's population and mobile source emissions in the county.

Mexicali

Mexicali is one of the largest cities along the U.S.-Mexico border and is the capital of Baja California. The population of Mexicali proper is approximately 690,000 while the entire Mexicali Metropolitan Area is estimated to have nearly one million residents (U.N. Data). Mexicali has a strong agricultural and manufacturing economy that includes manufacturing centers for the aerospace, automotive, medical device, and electronics industries. Agriculture in the region consists of year around irrigated cultivation of cotton, wheat, alfalfa, and vegetables. The climate is hot and arid, averaging about three inches of rainfall a year or less. Mexicali residents celebrate several religious holidays every winter. During these celebrations it is customary to light bonfires. Bonfires and firework displays occur nightly during these celebration periods and will typically continue until the early morning hours.

Table 2 compares the population and area of Imperial County, the nonattainment area, the City of Calexico, and the City of Mexicali. Mexicali is about 5 times the area of Calexico with about 18 times as many residents. This difference in area and population, coupled with the associated difference in area and population-based activities, supports the observed difference in pollution emissions between the two cities.

Table 2. Population and Area of Imperial County, Imperial County Nonattainment Area, Calexico, and Mexicali

	Imperial County	Nonattainment Area	City of Calexico	City of Mexicali
Area (square miles)	4,176	690	8.4	43.9
Population (2010)	174,528	150,094	38,572	689,775

Source: U.S. Census, U.N. Data

IV. Ambient Air Monitoring in Imperial County and Mexicali

PM2.5 Monitoring Stations in Imperial County

The three PM2.5 monitoring stations in Imperial County currently employ filter-based samplers and continuous Beta Attenuation Monitors (BAMs). The Brawley and El Centro stations both include a PM2.5 Federal Reference Method (FRM) filter-based sampler while the Calexico station includes collocated, regulatory Federal Equivalent Method (FEM) filter-based samplers, an FRM filter based sampler, and collocated non-FEM BAMs. In addition to PM2.5 instruments, each of the PM2.5 monitoring locations in Imperial County is equipped with devices for measuring meteorological parameters, including horizontal wind speed (HWS), wind direction (WD), outside temperature (OT), relative humidity (RH), barometric pressure (BP), and solar radiation (SR) (Table 3).

For comparison with Calexico PM2.5 measurements, this 179B analysis incorporates PM2.5 concentrations and meteorological data from the Brawley and El Centro sites. The cities of Brawley and El Centro are similar to Calexico in terms of population and the type and magnitude of local emission sources, with the caveat that Calexico is located adjacent to Mexicali. Logically, air quality in all three cities should also be similar.

Table 3. Imperial County PM2.5 Monitoring Locations

Monitoring Site[2]	Spatial Scale	Meteorological Parameters
Calexico	Neighborhood	OT, RH, WD, HWS, BP, SR
El Centro	Neighborhood	OT, WD, HWS, BP
Brawley	Neighborhood	OT

Source: Imperial County Air Pollution Control District Draft Ambient Air Monitoring Annual Network Plan (June 2014) and California Air Resources Board Monitoring and Laboratory Division.

In ambient air monitoring the spatial scale of representativeness defines a distance over which pollutant concentrations are expected to be the same, given similar emission sources and meteorological conditions. The spatial scale of representativeness for the Calexico PM2.5 monitor is an important factor in establishing the origin of emissions leading to elevated concentrations.

The Calexico air monitoring station was sited to conform to U.S. EPA criteria for the neighborhood spatial scale. Concentrations measured at the neighborhood scale monitor are expected to be relatively uniform over a radius of 2.5 miles around the monitor. Given that the Calexico PM2.5 monitor is about 0.8 miles from the

[2] PM2.5 samplers at the Calexico site include two regulatory, filter-based samplers and two non-FEM BAMs; El Centro and Brawley each have one filter-based sampler.

international border, PM2.5 air quality in Calexico is a function of United States emission sources plus emissions emanating from Mexico and is not limited to sources in the immediate vicinity of the monitor. The common air shed concept is a recognized factor in poor air quality in cities along the U.S.-Mexico border and is referenced in the air pollution reduction goal of the Border 2020 Program.[3]

PM2.5 Monitoring Stations in Mexicali

The air monitoring network in Mexicali consists of six sites, most of which were established between 1996 and 2000 during the U.S.-Mexico Border XXI Program. Only two of the six monitoring sites measure PM2.5. These sites are the Engineering Institute of the Autonomous University of Baja California (UABC) and the Vocational School of Baja California (COBACH). UABC and COBACH are located in the urban area of Mexicali near the border, 2.6 and 2.0 miles from the Calexico monitor, respectively. PM2.5 measurements at UABC and COBACH are made using BAMs. While the availability and quality of PM2.5 monitoring data from UABC and COBACH are often inconsistent, when available, these data are nevertheless useful in providing comparative information regarding the magnitude of PM2.5 concentrations in Mexicali.

V. Imperial County PM2.5 Air Quality

As described above, PM2.5 concentrations measured in Calexico include non-FEM BAM instruments. Appendix N, Section 3.0(a), of 40 CFR Part 50 indicates that all valid FRM and FEM PM2.5 mass concentration data submitted to EPA's Air Quality System (AQS), and meeting applicable requirements of 40 CFR Part 58, shall be used in design value calculations. Evaluating PM2.5 concentrations measured using the *non*-FEM BAM at Calexico were therefore not considered in determining compliance with the NAAQS.[4] Data used for design value calculations, trend analysis, and completeness relies exclusively on 2010-2012 FRM data. However, to better understand the potential influence of emissions from Mexico on the Calexico station, hourly BAM data for 2010 through 2012 were also evaluated. These hourly PM2.5 concentration data are provided in Section XII.

Design Values

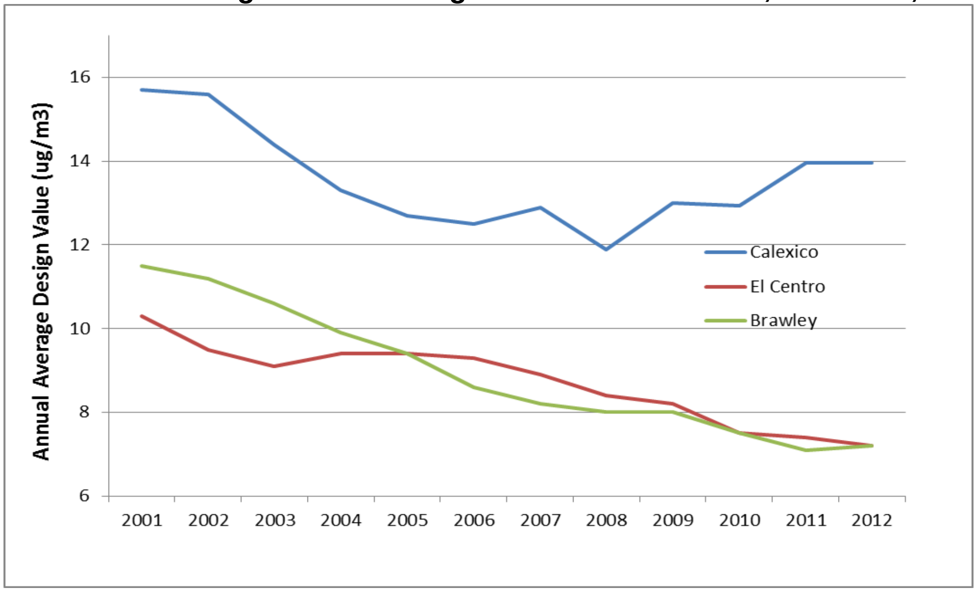
Despite the challenges that geography, climate, and proximity to Mexico pose for Imperial County air quality, the combined efforts of State and local emission control programs have resulted in improving air quality in the region, with the exception of the border area represented by the Calexico monitor. The trend in average annual design

[3] http://www2.epa.gov/border2020/goals-and-objectives

[4] 40 CFR, Part 53, provides requirements for air quality monitors to be considered either "Federal Reference Methods" or "Federal Equivalent Methods". BAMs at the Calexico site (currently and from 2010-2012) are considered non-FEM since they do not meet configuration and/or operating parameters detailed in U.S. EPA's list of Designated Reference and Equivalent Methods (http://www.epa.gov/ttn/amtic/files/ambient/criteria/reference-equivalent-methods-list.pdf). Unless otherwise noted, mention of BAM instruments in this document refers to non-FEM BAMs.

values for Calexico, El Centro, and Brawley are shown in Figure 7. The figure illustrates the extent to which Brawley and El Centro annual average design values track each other and how Calexico differs in the magnitude and trend of the design value.

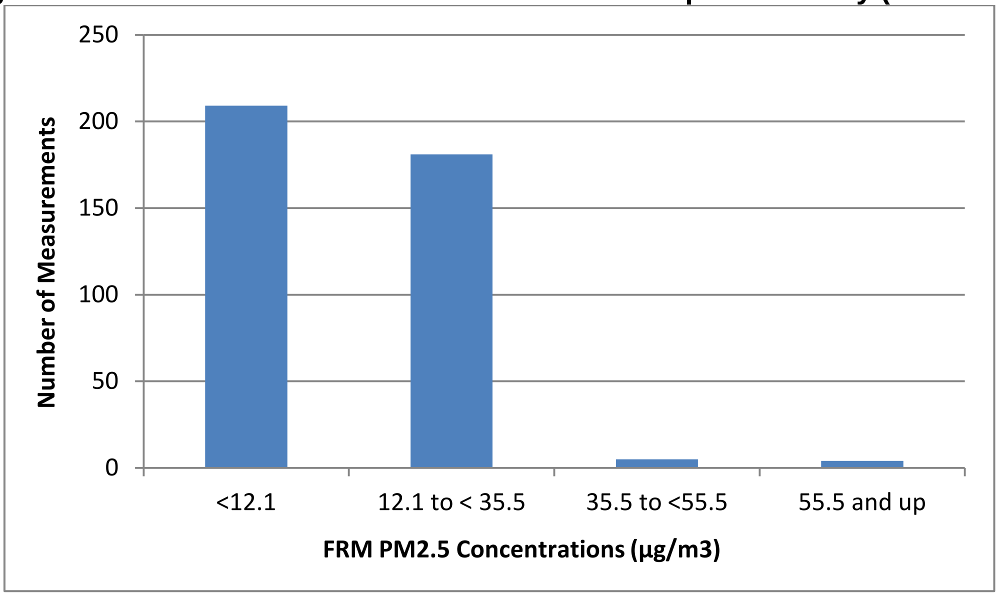
Figure 7. 2001-2012 Average Annual Design Values for Calexico, El Centro, and Brawley



*Calexico data includes invalidated and transport days in the design value calculation

Violations of the 24-hour PM2.5 standard are typically limited to Calexico during the winter months of December through February. Figure 8 shows that more than 52 percent of the PM2.5 concentrations measured in Imperial County between 2010 and 2012 were less than 12.1 µg/m3 and 98 percent were below 35.5 µg/m3.

Figure 8. Distribution of PM2.5 Concentrations in Imperial County (2010-2012)



*Invalidated and transport days are included

The 2012 and 2013 24-hour design values for the Imperial NA are 43 μg/m3 and 42 μg/m3, respectively. The annual average design values for 2012 and 2013 are 14 μg/m3 and 14.1 μg/m3. These design values include three data points that were originally invalidated by ARB's Laboratory, but were nevertheless included in AQS. The investigation into data quality and subsequent invalidation of three data values was prompted by significant differences in mass measured using FRM filter samplers and non-FEM BAM monitors.

PM2.5 FRM Trends

Figure 9 below shows time series plots of FRM PM2.5 concentrations at the Imperial County monitoring sites of Calexico, El Centro, and Brawley from 2010 through 2012 and highlights the extent of exceedances over the three year period. Figure 9 also shows that Brawley and El Centro air quality track well with each other, while Calexico values are significantly different.

Ten exceedances were noted from 2010 through 2012. Five of the ten exceedances occurred in Calexico during the months of December, January, or February. ARB, in consultation with the Imperial County Air Pollution Control District (District), determined that Calexico PM2.5 samples collected on October 15, 2011, March 31, 2012, and May 25, 2012, were not representative of ambient air quality based on analyses indicating that the filter loading included particles significantly larger than PM2.5. These large particles were likely the result of high wind events. These three samples were deemed invalid by ARB.

Excluding the three samples invalidated by ARB results in a 2012 PM2.5 design value for the Calexico site of 32 μg/m3, less than the 24-hour PM2.5 standard of 35 μg/m3. Including these three samples would result in a 2012 PM2.5 design value of 43 μg/m3. However, excluding the five days impacted by transport from Mexicali—the intent of this "but for" analysis—would result in a PM2.5 design value of 29 μg/m3, even if the invalidated samples were included.

Irrespective of the three invalidated samples, transport events from Mexico during the winter months are suspected as the primary cause of PM2.5 exceedances at the Calexico site on the remaining exceedance days, with the exception of two exceedances occurring in summer of 2010 and 2011. The exceedance of June 28, 2010, was determined to have been caused by a fire in Mexico and the August 28, 2011, exceedance is suspected to have been caused by high winds.

Data Completeness

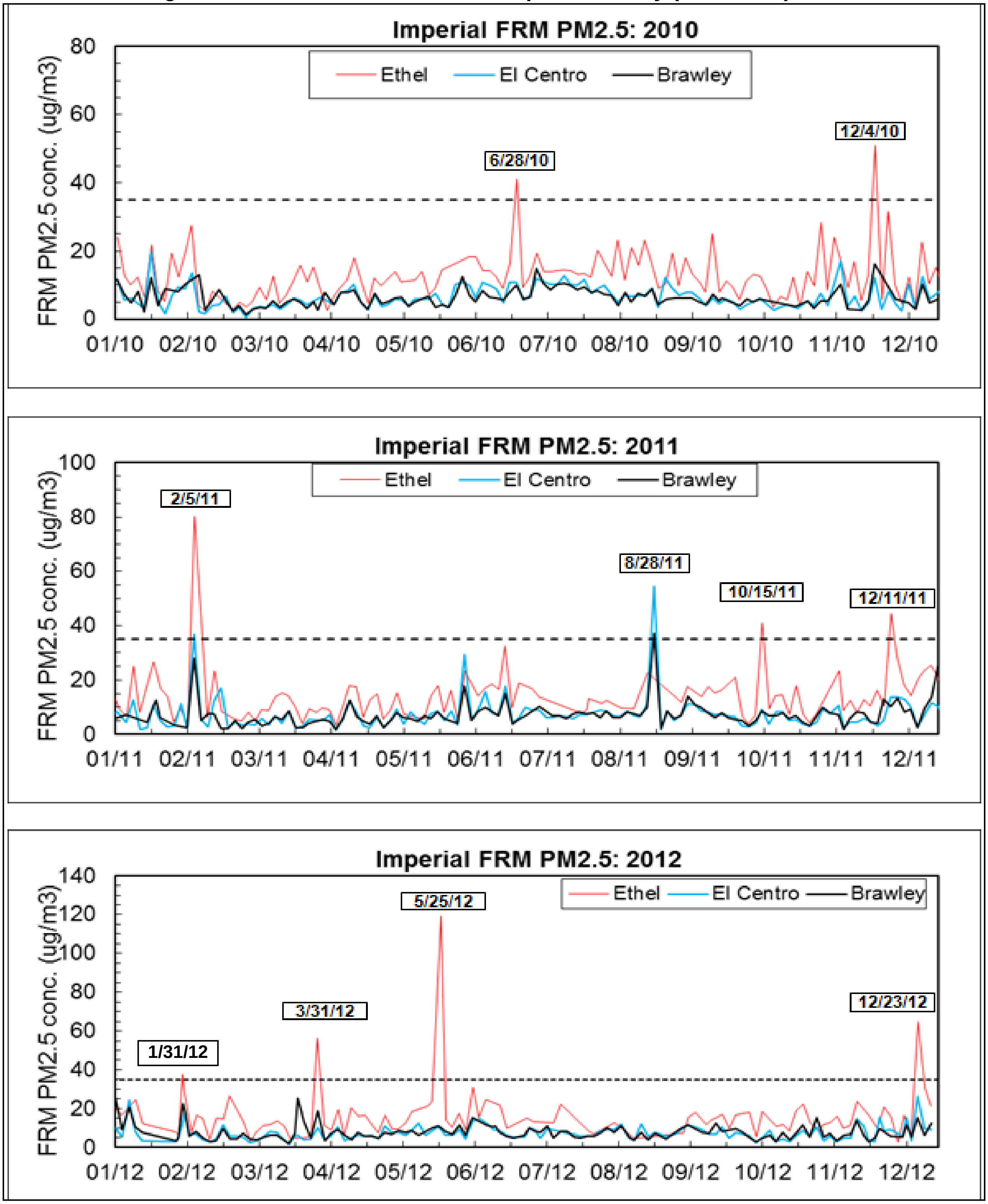
The FRM data are complete for all quarters, except quarter three of 2011 and 2012. The two incomplete quarters had 71 percent data completeness, which means they were 4 percent (or 2 samples) short of the minimum 75 percent required for a complete quarter. The data completeness improved significantly in 2013, with the lowest quarterly data capture of 87 percent. Table 4 provides the design values and data completeness for the Calexico site for all data from 2010-2013.

Table 4. Calexico Design Values and Data Completeness 2010-2013

Year	24-hour Statistics		Annual Statistics		Data Capture			
	98th Percentile	Design Value	Avg	Design Value	Qtr1	Qtr2	Qtr3	Qtr4
2010	31.7	32	12.8	12.9	97	90	97	100
2011	40.9	38	13.2	14	100	97	71	93
2012	56.3	43	15.8	14	84	90	71	100
2013	27.4	42	13.3	14.1	87	97	100	100

*Data includes concentrations on invalidated and transport days

Figure 9. PM2.5 concentrations in Imperial County (2010-2012)



*Speciation data was available for only four of the five exceedance days.

VI. Border Area Emission Inventories

The analyses presented in this discussion focus on identifying emission sources leading to PM2.5 exceedances at the Calexico station and provide the basis for assessing the applicability of Section 179B to the consequences of those exceedances. The analyses show that PM2.5 samples collected in Calexico differ substantially in chemical composition than typical PM2.5 samples collected at other locations around the State and point to Mexicali as the source of emissions impacting the Calexico monitor. Together with the proximity of Calexico to Mexicali, an emission inventory for each area, and an assessment of the prevalent meteorological conditions during exceedance days, the available evidence supports the cross-border impact of Mexicali on the Imperial County nonattainment area.

PM2.5 Emissions in Imperial County and Mexicali

A comparison of PM2.5 emission inventories for the Imperial County nonattainment area and Mexicali shows the relative impact of domestic and international sources on PM2.5 air quality in the Calexico area. Annual emission inventories for the Imperial NA and the Mexicali Metropolitan Area are shown in Tables 5 and 6 below.

Table 5. 2008 Annual Imperial NA Emission Inventory (tons/day)

Source Category	NOx	SOx	VOC	PM2.5
Point Sources	1.9	0.1	1.1	0.5
Area Wide Sources	0.6	0.1	9.3	10.9
On-Road Mobile	8.4	0.0	2.1	0.3
Off-road Mobile	8.0	0.2	5.8	1.1
TOTAL	**18.9**	**0.4**	**18.3**	**12.8**

Table 6. 2005 Annual Mexicali Emission Inventory (tons/day)

Source Category	NOx	SO2	VOC	PM2.5
Point – Federal Sources	38.2	10.0	1.8	0.4
Point – State Sources	1.2	2.7	0.2	*
Area Wide Sources	3.3	0.4	41.9	18.5
On-Road Mobile	23.5	0.5	24.6	1.8
Nonroad Mobile	12.3	0.2	1.5	1.5
TOTAL	**78.5**	**13.7**	**70.0**	**22.1**

** Emissions not estimated.*

The 2005 Mexicali Emissions Inventory developed by Eastern Research Group, Inc., (ERG) is the most recent, verifiable Mexicali inventory available. Point sources within the jurisdiction of the State of Baja California (approximately 173 sources) were not estimated in the ERG inventory; therefore, it is likely that the actual point source PM2.5 emission estimates are higher than the estimate in Table 6. In addition, ARB staff anticipates that the Mexicali emission inventory would be higher if windblown dust was included.

The 2008 Imperial County emission inventory is the base year inventory used for the Imperial NA SIP. A comparison of the 2005 and 2008 annual inventories shows the relative magnitude of the emissions in each area by source category. Emissions from sources in Mexicali are significantly higher than in the Imperial NA for NOx, SOx, and VOCs.

Significantly, the emission inventory for Mexicali does not account for episodic emissions associated with cultural celebrations common in Mexico during the winter months of December and January. These celebrations are known to include extensive fireworks displays and the lighting of bonfires containing plastics, tires, and other materials. If incorporated into an annual emission inventory, the estimate of Mexicali emissions of PM2.5 and other pollutants would increase substantially.

Gridded Emission Inventory for Calexico and Mexicali

To further evaluate local emissions in Calexico and Mexicali, ARB staff analyzed information from a gridded inventory from Imperial County for 2008 and Mexicali for 2005, based on the available PM2.5 and NOx emissions data for both areas (Figures 10 and 11). The emission data sets used for gridding originated from the 2008 National Emissions Inventory (NEI) and the 2005 Mexicali emissions inventory work conducted by ERG.

The gridded inventory allocates emissions spatially and provides further evidence of the emission differences between Calexico and Mexicali. The maximum emissions per grid cell are intended to illustrate the maximum potential difference on each side of the border and underscore the extent of differences between Mexicali and Imperial County.

Figure 10. Gridded PM2.5 Emission Inventory for Calexico and Mexicali (4 km)

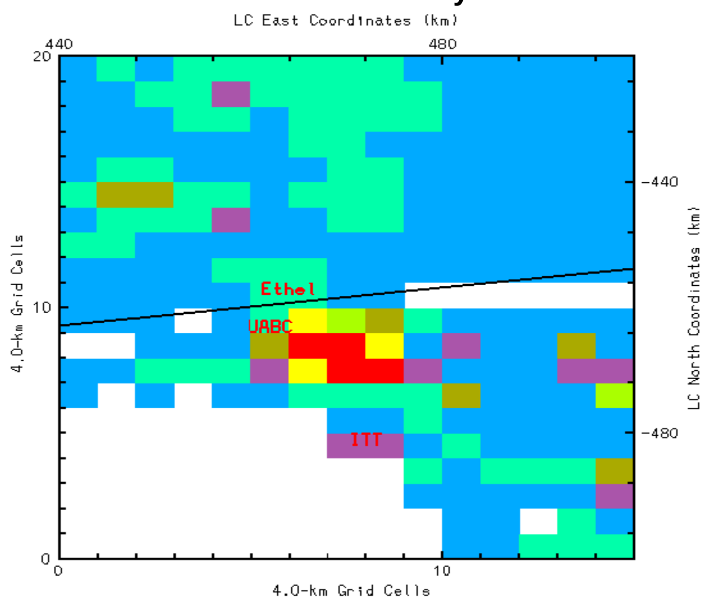


Figure 11. Gridded NOx Emission Inventory for Calexico and Mexicali (4 km)

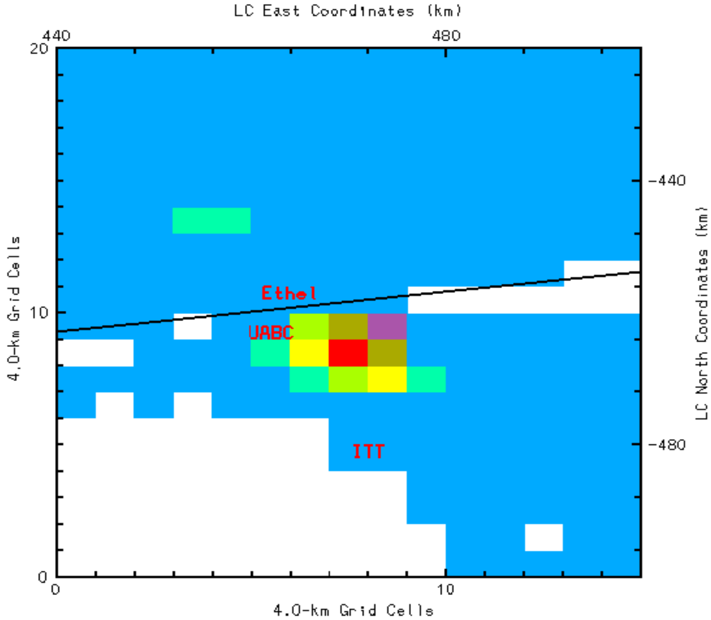
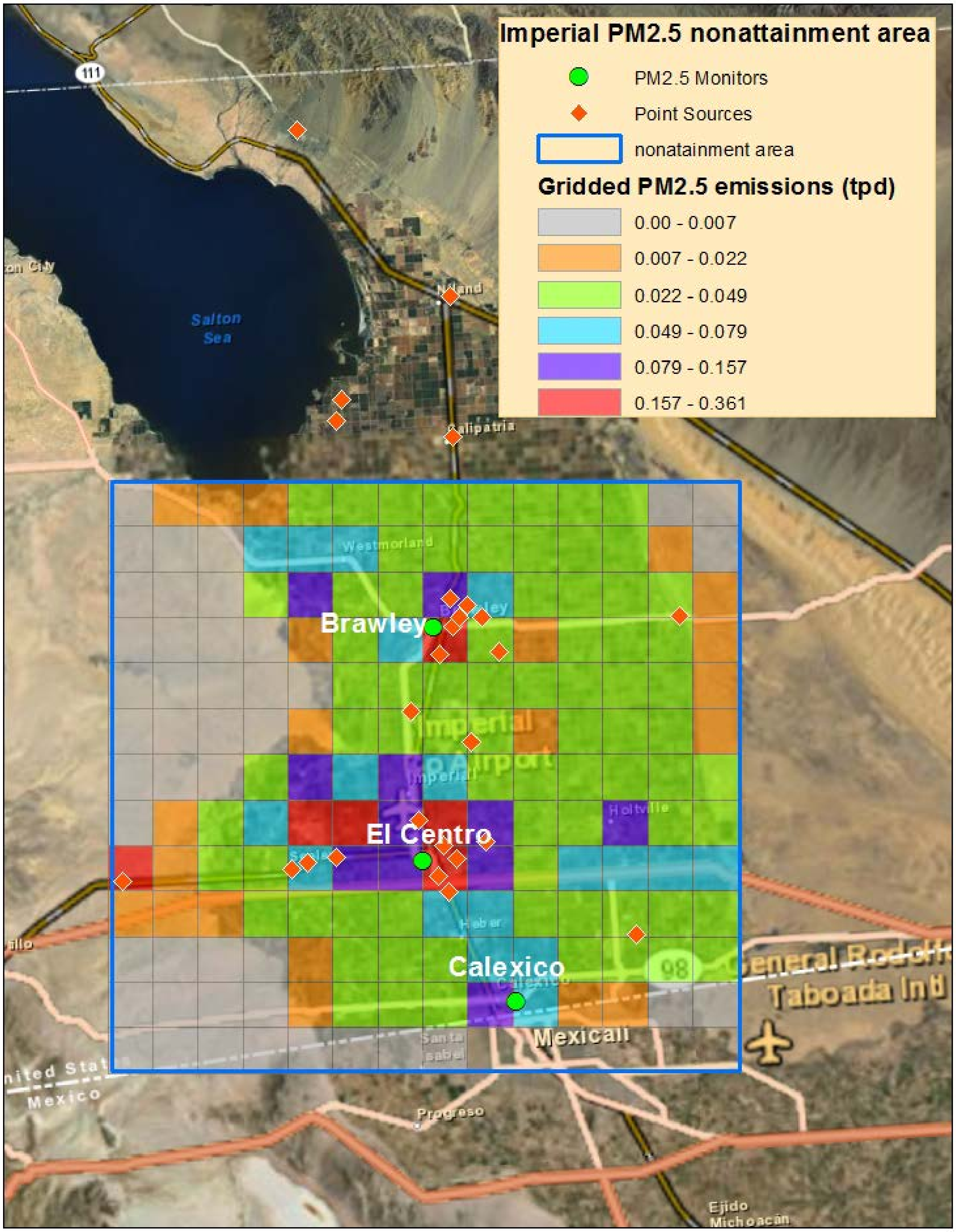


Figure 12 shows the average weekday winter PM2.5 emissions in 2012 for the Imperial NA. The plot displays all sources of emissions in the nonattainment area except for windblown dust, since all of the exceedances occurred on days with stagnant conditions characterized by little or no wind. The plot also shows that PM2.5 emissions are relatively uniform throughout the nonattainment area. The PM2.5 emissions are highest in the grid that contains El Centro. The total emissions for the nonattainment area grid are approximately 6.7 tons per day (tpd) of PM2.5. Considering local emissions only, and based on gridded inventory information, one might expect El Centro to have higher measured concentrations than Calexico. The fact that this is not the case supports the case that higher emissions from outside the Imperial NA are impacting the Calexico monitor.

Figure 12. Gridded PM2.5 Emission Inventory for the Imperial Nonattainment Area



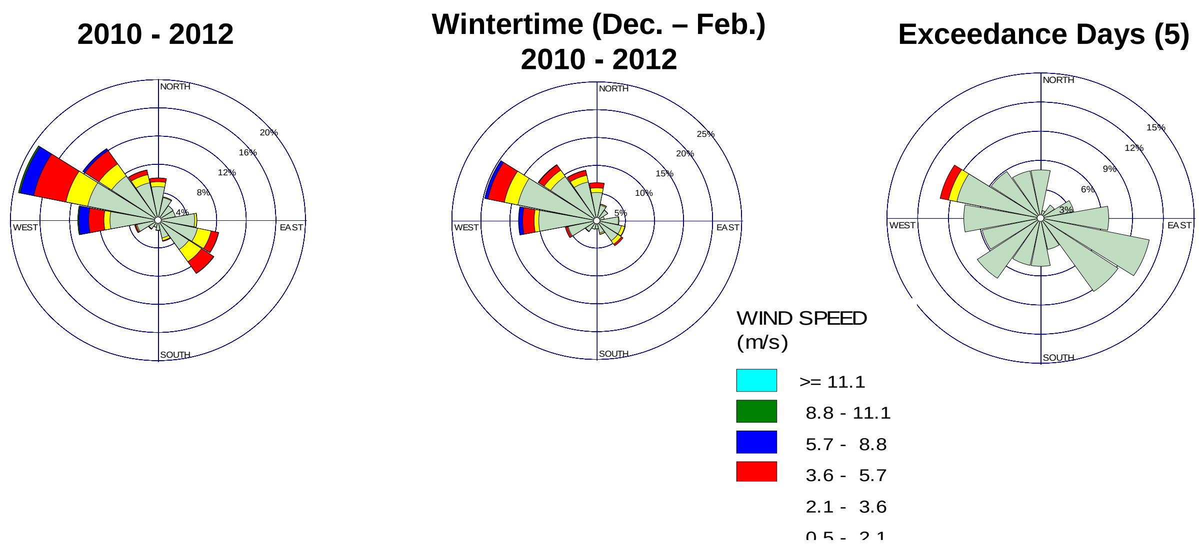
VII. Border Area Meteorology

The majority of exceedances in Imperial County occur in Calexico where the impact of transport from Mexico is greatest. Monitors in Brawley and El Centro may also be impacted by emissions from Mexico, but their PM2.5 design values are below the 24-hour and annual standards. Exceedances in Calexico occur primarily during the winter months when meteorological conditions tend towards atmospheric stagnation with emissions accumulating near the border. These exceedances share the same pattern of low wind conditions coupled with low ambient temperatures. Summer month exceedances in Calexico, occurring once between 2010 and 2012, are atypical. Better dispersion of PM2.5 in the summer occurs as the rising valley floor temperature helps to break up inversions formed at night and in the early morning hours.

Wind Direction

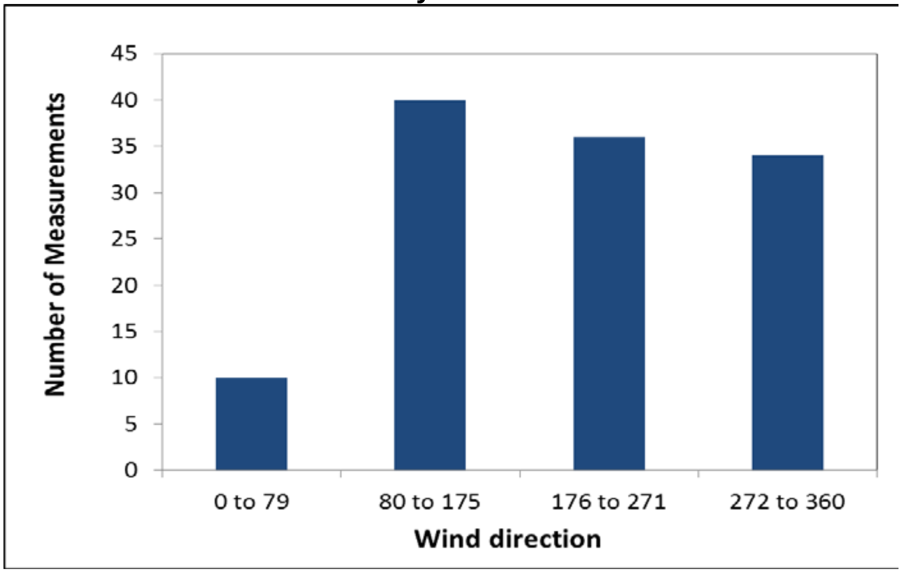
Wind rose plots were made of the hourly average wind direction in Calexico from 2010 through 2012, the hourly average wind direction during the winter months of December through February, and the hourly average wind direction on the five exceedance days (Figure 13). A comparison of the three plots shows that exceedance days were associated with very calm winds with little directionality. Generally, wind vanes exhibit isotropic behavior under calm conditions so that at very low wind speeds, the precise direction of the wind cannot be accurately established. The multi-directional wind rose accompanied by very low wind speed is indicative of stagnant atmospheric conditions. Under these stagnant conditions, pollutants within the Calexico-Mexicali air shed will tend to accumulate and exceedances will occur with greater frequency.

Figure 13. Calexico Wind Rose Plots



To the extent that wind direction did affect transport, BAM PM2.5 measurements were binned by wind direction on exceedance days. From a total of 120 high PM2.5 measurements between 2010 and 2012, approximately two-thirds occurred during southerly winds (79 to 272 degrees) (Figure 14). A description of how wind flow is established as originating from the north or south is detailed later in this document (see Section IX).

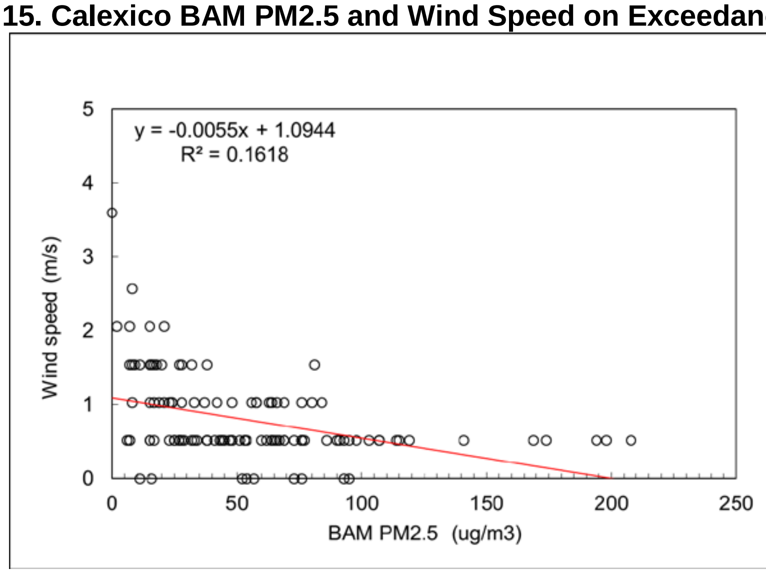
Figure 14. Calexico BAM PM2.5 by Wind Direction on Exceedance Days



Wind Speed

The connection between wind speed and BAM PM2.5 concentrations was evaluated by plotting hourly BAM measurements with wind speed data. Figure 15 illustrates the clustering of higher PM2.5 concentrations with winds equal to or less than about 1.5 mps. This coincides with wind rose data showing that low wind speeds were consistent with exceedances measured in Calexico.

Figure 15. Calexico BAM PM2.5 and Wind Speed on Exceedance Days



Meteorological data suggest that the prevailing atmospheric conditions in Calexico during the winter exceedance days were stagnant with little or no dispersion, leading to elevated PM2.5 concentrations from higher emissions on the Mexicali side of the border.

VIII. Estimate of the Source and Direction of Emissions Impacting Calexico

To assist in identifying the source and location of emissions impacting the Calexico PM2.5 monitor, two analyses were performed. First, Calexico speciation data were evaluated for the presence of specific elements or chemical composition that would help indicate a specific type of emissions source. Since speciation samples are collected at selected California monitoring sites every sixth sampling day, it is also possible to compare the speciation profile and composition from Calexico samples with those from other monitoring sites with known emission impacts.

Second, to estimate the direction of potential sources impacting Calexico, an analysis using conditional probability was performed. The conditional probability function (CPF) for each elemental species uses the concentration coupled with wind direction over the period from 2010 through 2012 to estimate the potential direction of sources impacting the Calexico monitor.

Chemical Composition Data

Compositional analysis of PM2.5 samples provides important information regarding the source of emissions. Samples collected from Calexico indicate that the particulate matter is heavily dominated by carbonaceous aerosols (organic matter plus elemental carbon), which comprise about 58 percent of the PM2.5 mass on an average exceedance day between 2010 and 2012 (Figure 16). Most of the carbonaceous aerosol particles originate from combustion sources (tailpipe emissions, wood burning, etc.). Compared with the annual average, a typical exceedance day contains about 20 percent more organic matter (Figure 17). In contrast, the contribution from geological material is smaller on a typical exceedance day. Fugitive dust from sources such as unpaved roads and open fields is therefore a smaller contributor to PM2.5 exceedances in Calexico. Organic matter concentrations, on the other hand, appear as the primary contributor to exceedance values.

Figure 16. Calexico 2010-2012 Exceedance Day Composition

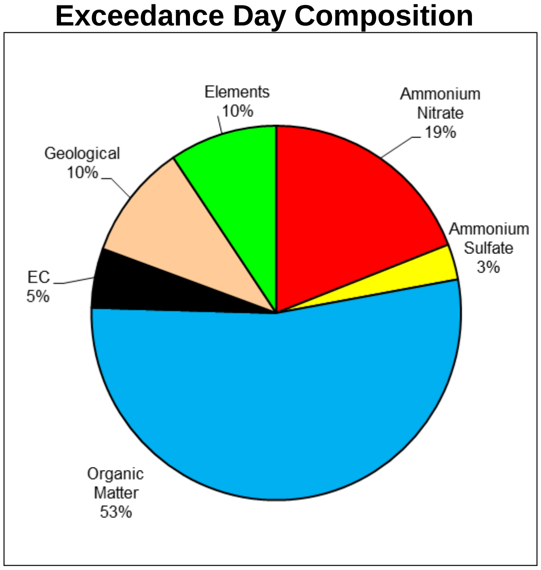


Figure 17. Calexico 2010-2012 Annual Composition

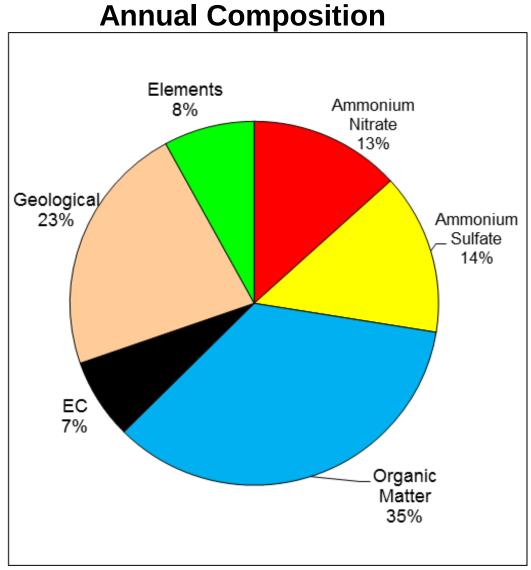
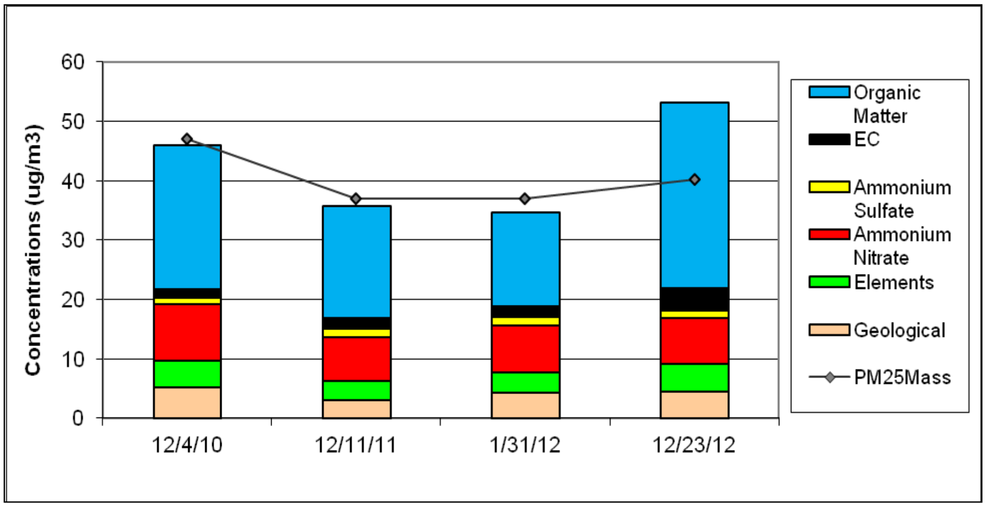


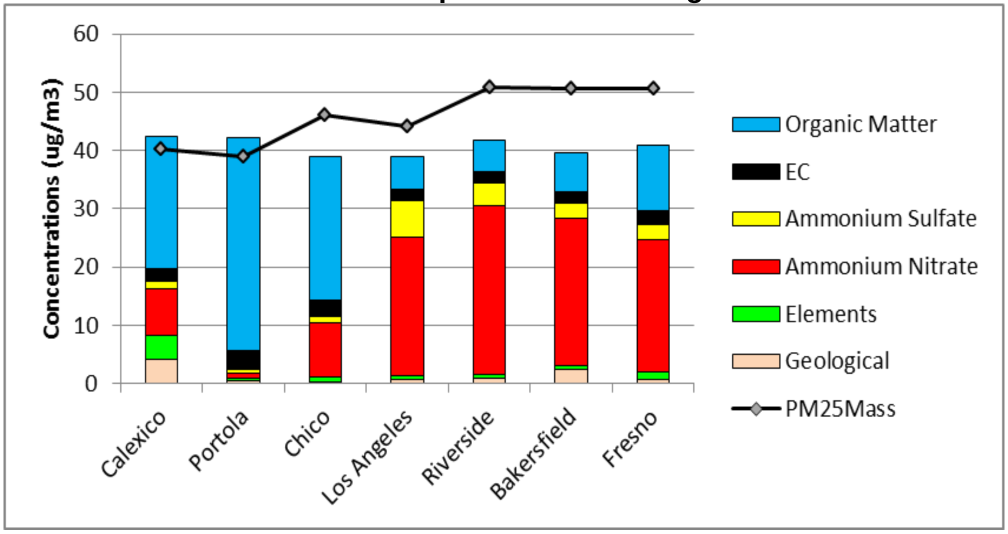
Figure 18 below shows that on days with PM2.5 concentrations exceeding the standard, the proportional composition was consistent. Organic carbon comprised the largest portion of the mass, while ammonium nitrate was the second largest component. Concentrations of elemental species comprised a significant portion (10 percent) of the mass on these exceedance days.

Figure 18. 2010-2012 Chemical Composition on Exceedance Days at Calexico



Staff also compared Calexico speciation data to other locations in the State and noted both similarities and differences in the profiles. Organic matter and elements are present in the Calexico samples, as with other sites in California, but the concentration of elemental species at Calexico is 90 percent higher compared with other sites, including wood burning areas and urban locations. The similar scale of organic matter concentrations among the Calexico, Portola, and Chico monitoring sites suggests combustion as a source of emissions on exceedance days. Chico and Portola organic matter concentrations are associated with wood burning (Figure 19). The similarity in organic matter concentrations in Calexico, Portola, and Chico speciation data suggests that some type of wood burning may also be a factor in emissions impacting the Calexico monitoring site.

Figure 19. 2010-2012 Chemical Composition on Average PM2.5 Exceedance Days



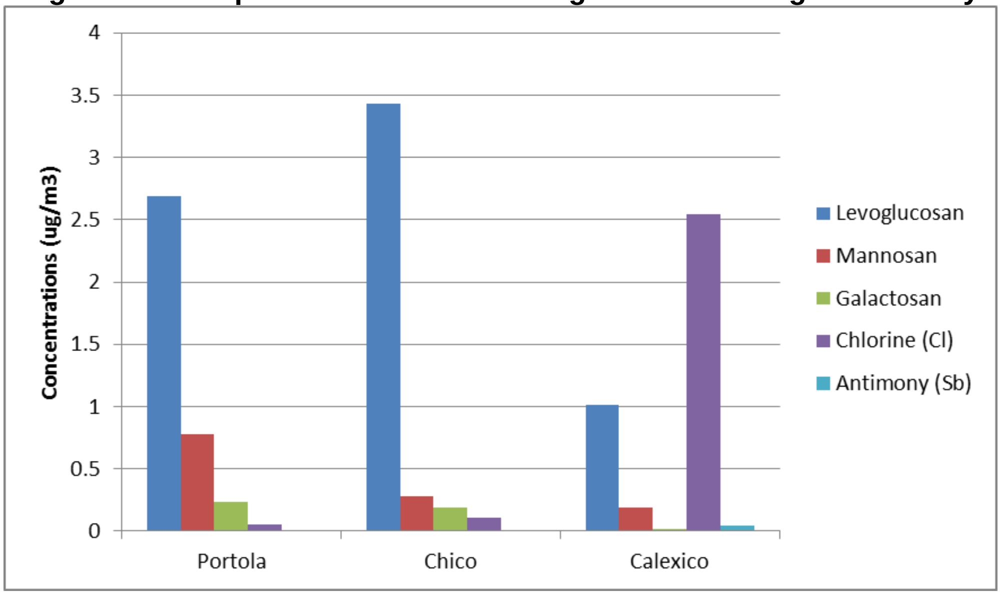
Analysis of Wood Burning Tracers

Levoglucosan, mannosan, and galactosan are combustion byproducts of cellulose and are often used as tracers for identifying biomass combustion. Staff evaluated the Calexico samples for concentrations of these tracers to further help in identifying the type of combustion emissions impacting the Calexico monitor. Areas with wood burning activity generally have elevated levels of all three tracers. At Calexico, concentrations of levoglucosan are elevated, but still up to 70 percent lower compared to Portola and Chico. Similarly, concentrations of mannosan and galactosan are substantially lower at Calexico compared to Chico and Portola.

Higher concentrations of galactosan in a community impacted by wood burning are consistent with research indicating that galactosan is the most promising marker to indicate biomass burning limited to wood only, without refuse, which might contain paper, cardboard, or other wood-related products (Christian et al. 2010). The very low concentrations of galactosan observed at Calexico, coupled with unusually high concentrations of chlorine and antimony (discussed below), help rule out the typical residential or agricultural wood combustion as a probable source of the high PM2.5 concentrations at the Calexico monitor (Figure 20).

These analyses of wood burning tracers substantiate the idea that emissions impacting Calexico are atypical of simple wood burning and more likely indicate combustion associated with wood burning combined with refuse or other non-biomass material. Further elemental analysis was undertaken to help identify the source of the organic matter.

Figure 20. Comparison of Wood Burning Markers on High PM2.5 Day

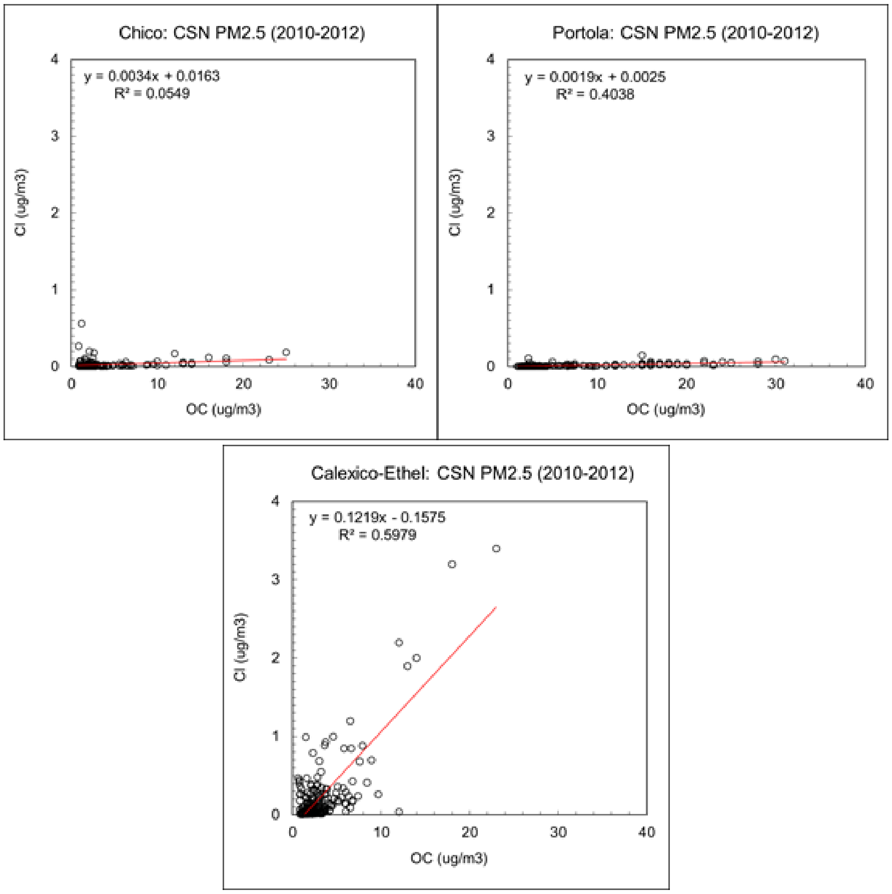


Elemental Analysis

Staff evaluated speciation data by plotting the organic carbon and chlorine concentrations present in Calexico samples from 2010 through 2012. The purpose was to assess if concentrations of organic carbon typically associated with combustion were the same in Calexico and in other California locations. The concentrations of selected elements were added to the plots to help determine what types of materials were burned. Similar plots were made with data from samples collected at monitoring sites in Chico and Portola. Chico and Portola are known to have increased rates of wood burning and comparing the correlations for all three sites further established if the exceedances could be due solely to an increase in biomass/wood burning.

The plots in Figure 21 indicate that Calexico has an unusually high chlorine concentration with a strong correlation between organic carbon and chlorine. Samples from Chico and Portola did not show a similar correlation. This suggests that the Calexico samples were impacted by combustion emissions, but not from biomass burning. The presence of chlorine indicates combustion associated with the burning of plastics or other refuse. Since 2004, ARB's Residential Burning Air Toxics Control Measure (ATCM) has largely prohibited the burning of refuse in California, so it is unlikely that combustion emissions with a trash-burning signature originated on the Calexico side of the border. Rather, the high concentrations of organic carbon and chlorine in samples from Calexico suggest that combustion emissions impacting the monitor were from Mexicali, where the burning of residential refuse is well documented (Li et al., 2012).

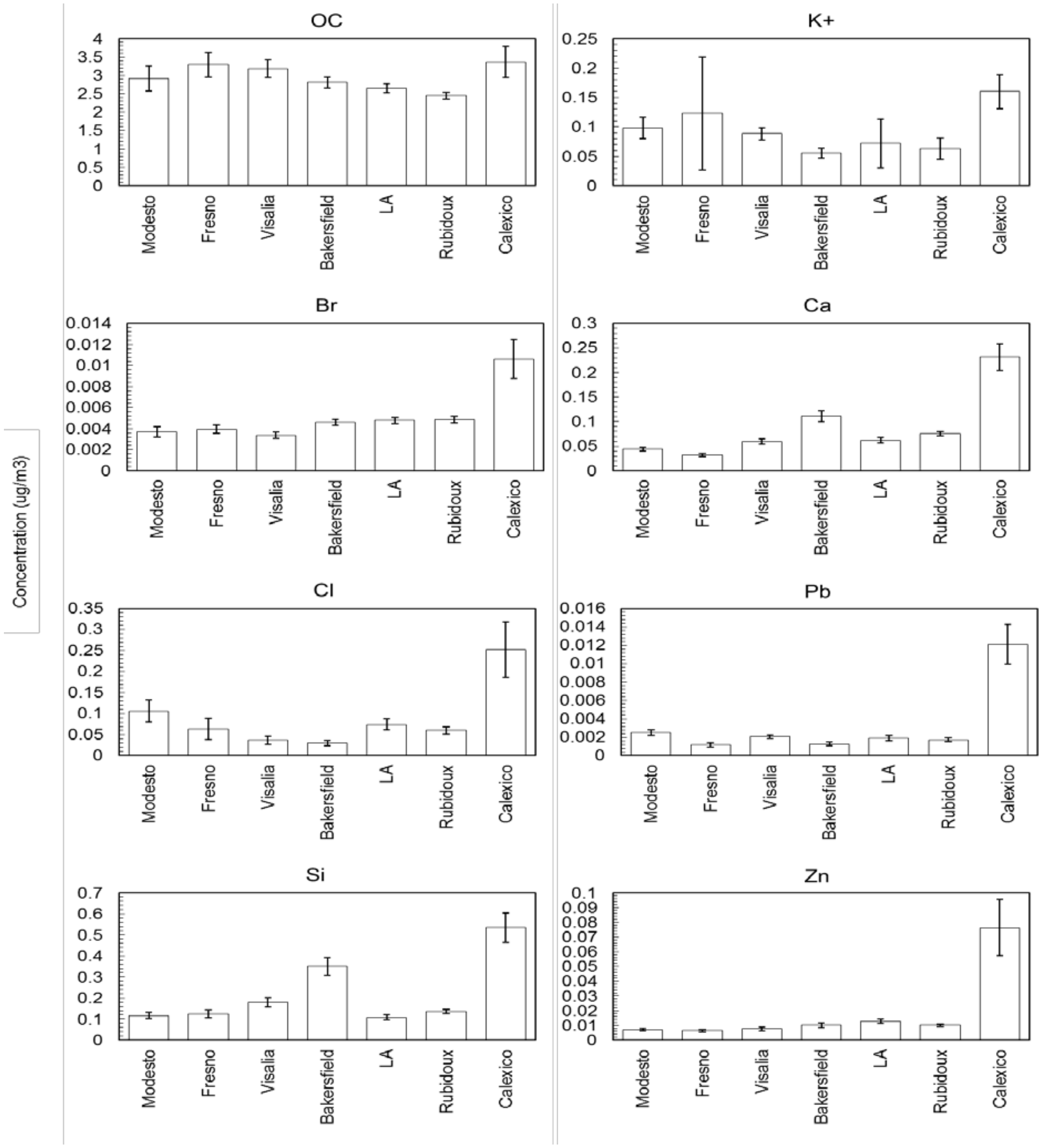
Figure 21. Organic Carbon vs. Chlorine at Calexico, Chico, and Portola (2010-2012)



Identification of potential sources impacting the Calexico monitor was further assessed by comparing speciation data from Calexico with other monitoring locations in the State from 2010 - 2012 (Figure 22). Concentrations of several elemental species besides chlorine are significantly higher at Calexico compared to other California sites. These species include bromine, lead, and zinc and imply that emissions impacting the Calexico monitor are fundamentally different than emissions impacting other monitors around the State.

The comparison sites in the Central Valley and Southern California are impacted by a variety of emission sources and are indicative of the elemental concentrations typically present at California monitoring locations. The differences in measured element concentrations, particularly with respect to elemental lead, an identified toxic air contaminant strictly controlled for decades, indicates that the source of emissions impacting the Calexico monitor are most probably not from within the U.S.

Figure 22. Speciation Analysis: Calexico & Six Other California Locations (2010-2012)



Figures 23 and 24 compare concentrations of select elemental species at Calexico to other sites on exceedance days, including sites known to be impacted by wood burning. Considering only the four exceedance days for which speciation data were available, the most abundant elemental species sampled at Calexico is chlorine. Concentrations of other elemental species, including antimony, bromine, lead, zinc, and barium are 3 to 30 fold greater than at other California sites.

Figure 23. Concentrations of Select Elemental Species on an Average Exceedance Day (2010-2012)

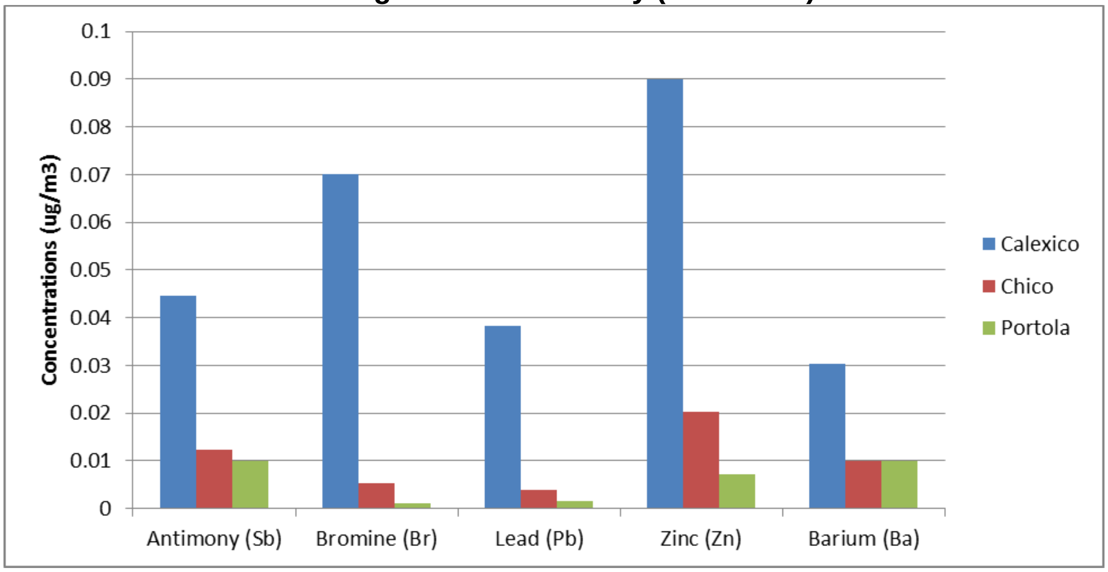
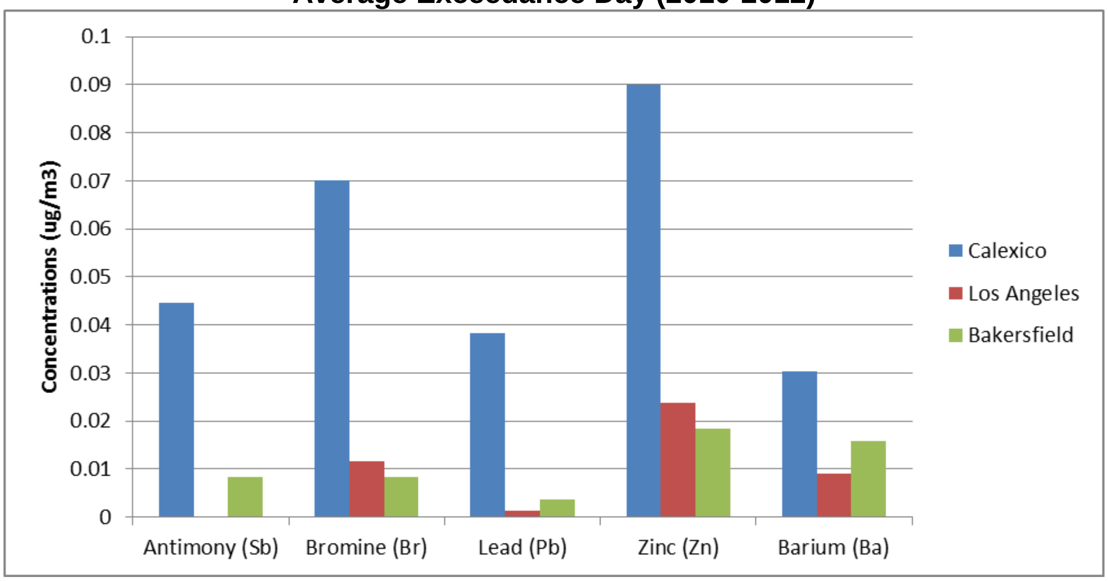


Figure 24. Concentrations of Select Elemental Species on an Average Exceedance Day (2010-2012)



The implications of the data presented in Figures 23 and 24 involve combustion and the elemental signatures typical of combustion. In addition to chlorine, fine particle antimony is a potential tracer of general refuse burning in Mexico, including the burning of plastics, rubber, fabrics, and other waste (Christian et al., 2010 and Hodzic et al., 2012).

Antimony is used as a flame retardant for textiles and in lead alloy batteries and antimony trioxide is used as a catalyst in the production of soft drink bottles and textile polyester fibers, all potential combustible materials. It is possible that industrial sources of antimony and other metals exist in Mexico, but there is currently not enough data to estimate their emissions. High concentrations of both chlorine and antimony, coinciding with high PM2.5 concentrations, indicate that refuse or other non-biomass combustion in Mexicali is likely an important source of PM2.5 mass on Calexico exceedance days.

Elemental Analysis from FRM Filters

Since PM2.5 speciation data are not collected at El Centro and Brawley, FRM filters from the three Imperial County sites matching four of the Calexico exceedance days were analyzed by X-Ray Fluorescence Analysis (XRF) for elements. Sample dates and measured PM2.5 mass are listed in Table 8.

Table 8. PM2.5 filters analyzed by XRF

	PM2.5 Concentrations (µg/m3)		
Date	**Calexico**	**Brawley**	**El Centro**
12/4/2010	50.9	16.2	12.2
12/11/2011	44.4	10.2	13.7
1/31/2012	37.7	22.7	13.0
12/23/2012	64.7	15.5	26.4
Avg. PM2.5	**49.4**	**16.3**	**16.3**

Typically, chemical composition data are obtained by operating a separate multi-filter PM2.5 sampler and subjecting the filters to different types of chemical analysis aimed at qualifying different sets of chemical species. Because the cost of operating and analyzing chemical composition data is very high, Imperial County has only one speciation sampler operating at Calexico.

While FRM Teflon filters normally are not analyzed for PM2.5 species, it is nevertheless possible to perform certain types of chemical analysis on the Teflon substrate. The archived FRM Teflon filters were provided to ARB's Laboratory for chemical analyses to estimate the PM2.5 chemical constituents from a Teflon filter. These new data were intended to determine if elevated concentrations of elemental species are unique to Calexico or common to all Imperial County sites. The lab analyzed Teflon filters by XRF to provide concentrations of elemental species.

The analytical results meet all quality assurance/quality control (QA/QC) criteria for XRF analysis per ARB Monitoring and Laboratory Division's standard operating procedure, except for the non-uniform distribution of particles across the surface area of the filter matrix. This impacts the quantitative accuracy of the XRF analysis. Therefore, the data reflect the general spatial variation in concentrations, but are of limited value in terms of quantitative estimate of elemental species concentrations.

The average concentration of elemental species was five to eight times higher at Calexico compared to El Centro and Brawley (Figure 25). The average concentration of geological material was six to eight times greater at Calexico compared to the other two sites (Figure 26).

Figure 25. Average Elemental Species Concentrations

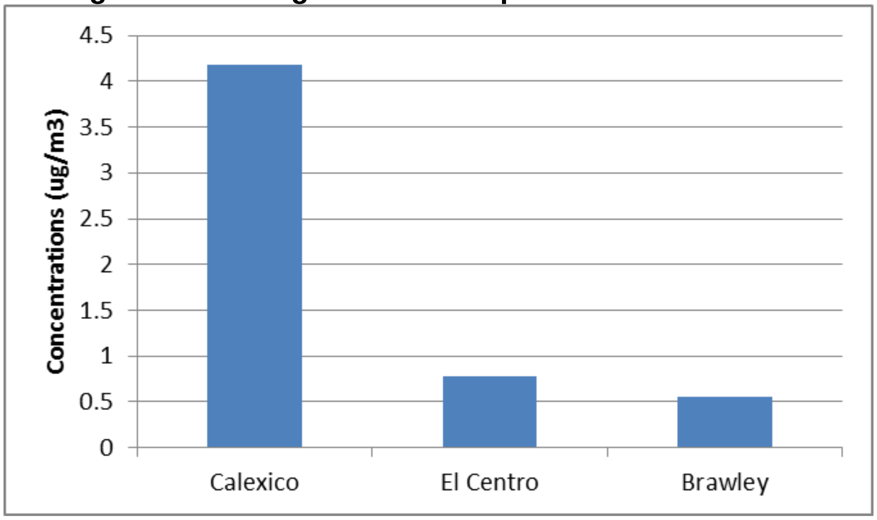
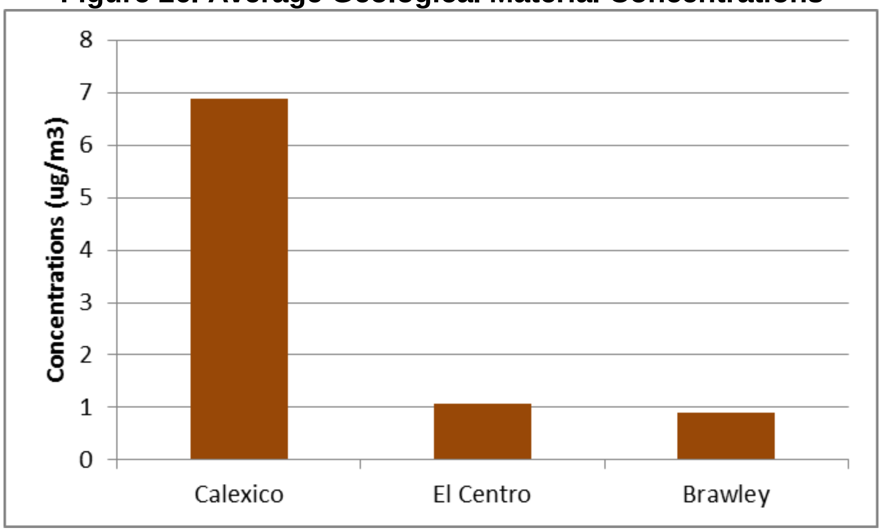


Figure 26. Average Geological Material Concentrations



The difference between elemental species concentrations at Calexico and the other two Imperial County sites, El Centro and Brawley, was similar to the difference observed between Calexico and other California sites. Average concentration of chlorine was 7 to 15 times higher at Calexico (Figure 27). Concentrations of antimony and barium were below the detection limit at El Centro and Brawley, but they were in the 0.03 µg/m3 to 0.05 µg/m3 range at Calexico (Figure 28). Calexico concentrations of bromine, lead, and zinc were 5 to 12 times the levels at the other two sites.

Figure 27. Average Chlorine Concentration at Imperial County

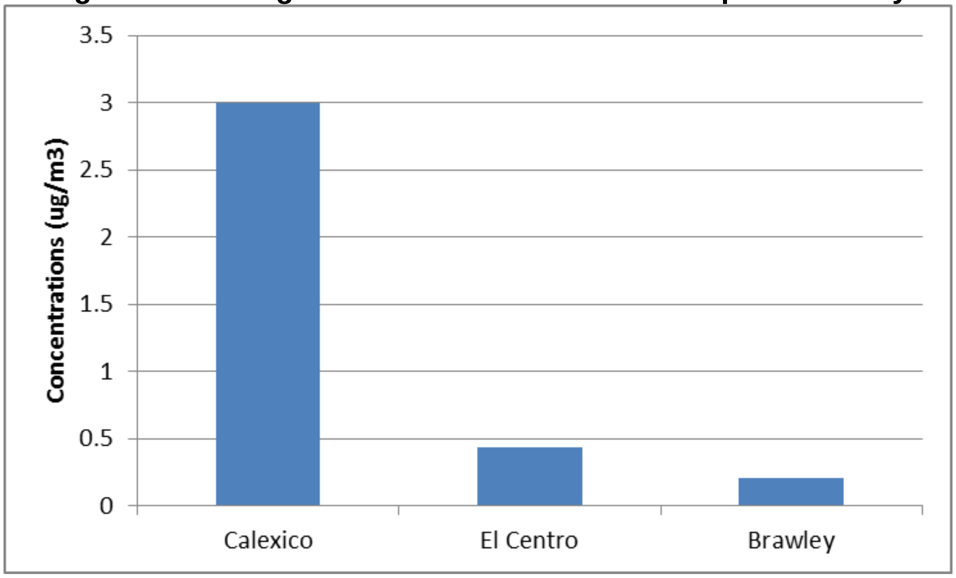
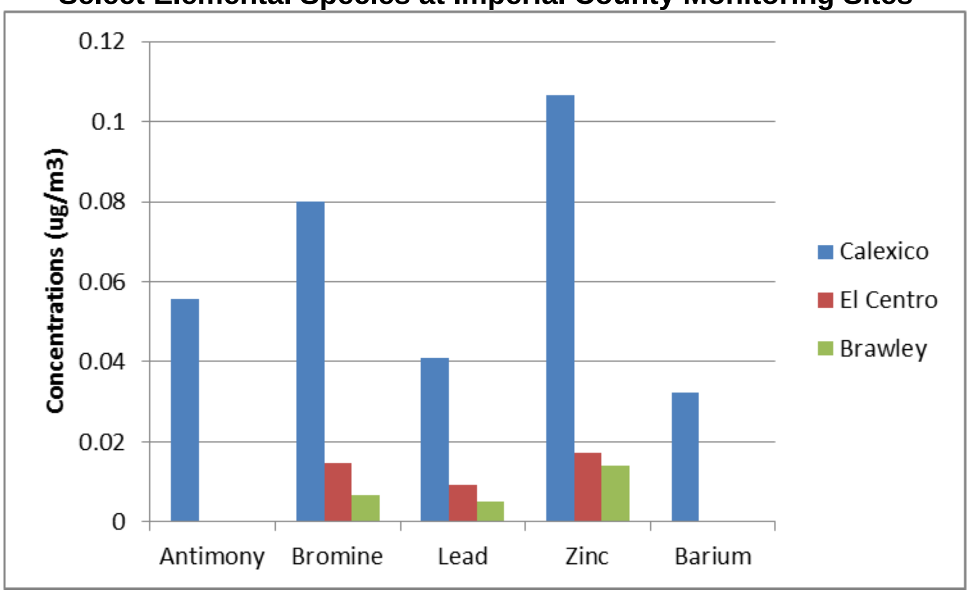
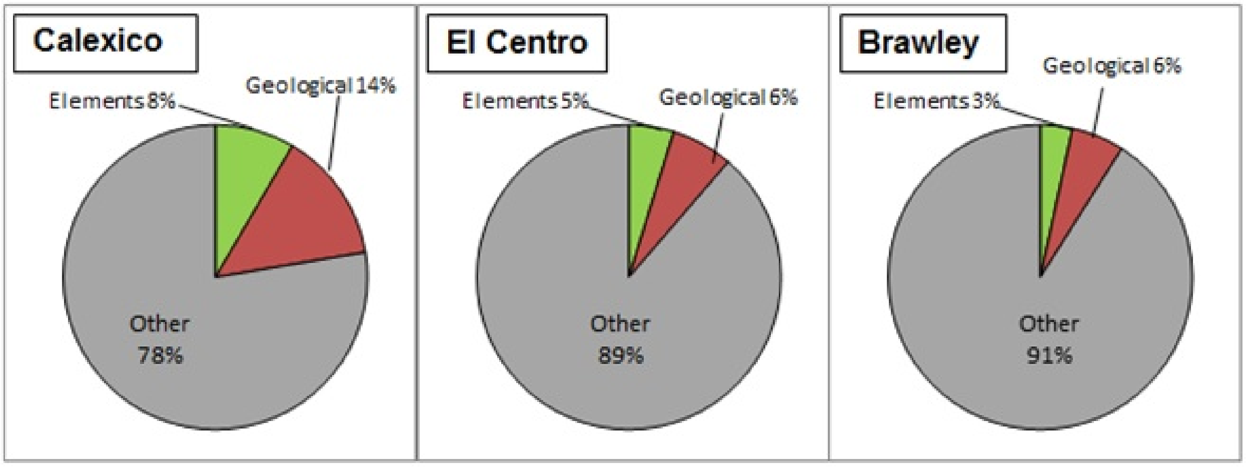


Figure 28. Comparison of Average Concentration of Select Elemental Species at Imperial County Monitoring Sites



The XRF analysis also revealed that on exceedance days the total elemental species comprise a smaller percent of the measured PM2.5 mass with increasing distance north of the border (Figure 29). This further suggests that the elements linked to refuse combustion, as well as other elemental species measured at Calexico, likely originated on the Mexico side of the border.

Figure 29. Elements and Geological Material as Fraction of PM2.5 Mass



<u>Estimate of Emission Source Directions</u>

To estimate the potential direction of the local sources impacting the Calexico monitor, the conditional probability function (Kim and Hopke, 2004) was calculated for each chemical species. The CPF estimates the probability that a chemical species from a given direction will exceed a pre-set high concentration threshold. The CPF plots below show the top 10 percent of species on any given day for 2010-2012. The length of each line for each direction is a probability which ranges from 0 to 1. Potential sources are likely to be located in directions that have high probability values. The same 24-hour concentration was assigned to each hour of a given day to match to the hourly wind data. Very calm winds were excluded from this analysis and 24 wind sectors of 15 degrees were chosen to show the potential directionality of the emission sources.

Motor vehicle emissions are typically identified by high concentration of organic carbon, elemental carbon, nitrate ion, and minor species such as bromine. In Figure 30, the CPF plots for those four species all point southwest from the Calexico monitor and toward the international port of entry. It suggests these concentrations were likely from vehicles at the United States-Mexico border crossing.

As shown in Figure 31, major sources of chlorine were identified as south of the monitoring site and widely distributed. Coupled with the elemental analyses discussed earlier, this result points to refuse burning as one of the major emission sources impacting Calexico.

Figure 32 shows the CPF plots for selected metals (chromium, lead, antimony, and zinc). The potential sources of these metals were located south-southeast of the monitoring site in the direction of Mexicali. Again, activities that produce airborne metals, including combustion of refuse or other non-biomass materials, are the likely source.

Figure 30. Conditional probability function plots for OC, EC, NO3, and Br (Length of each line represents a probability)

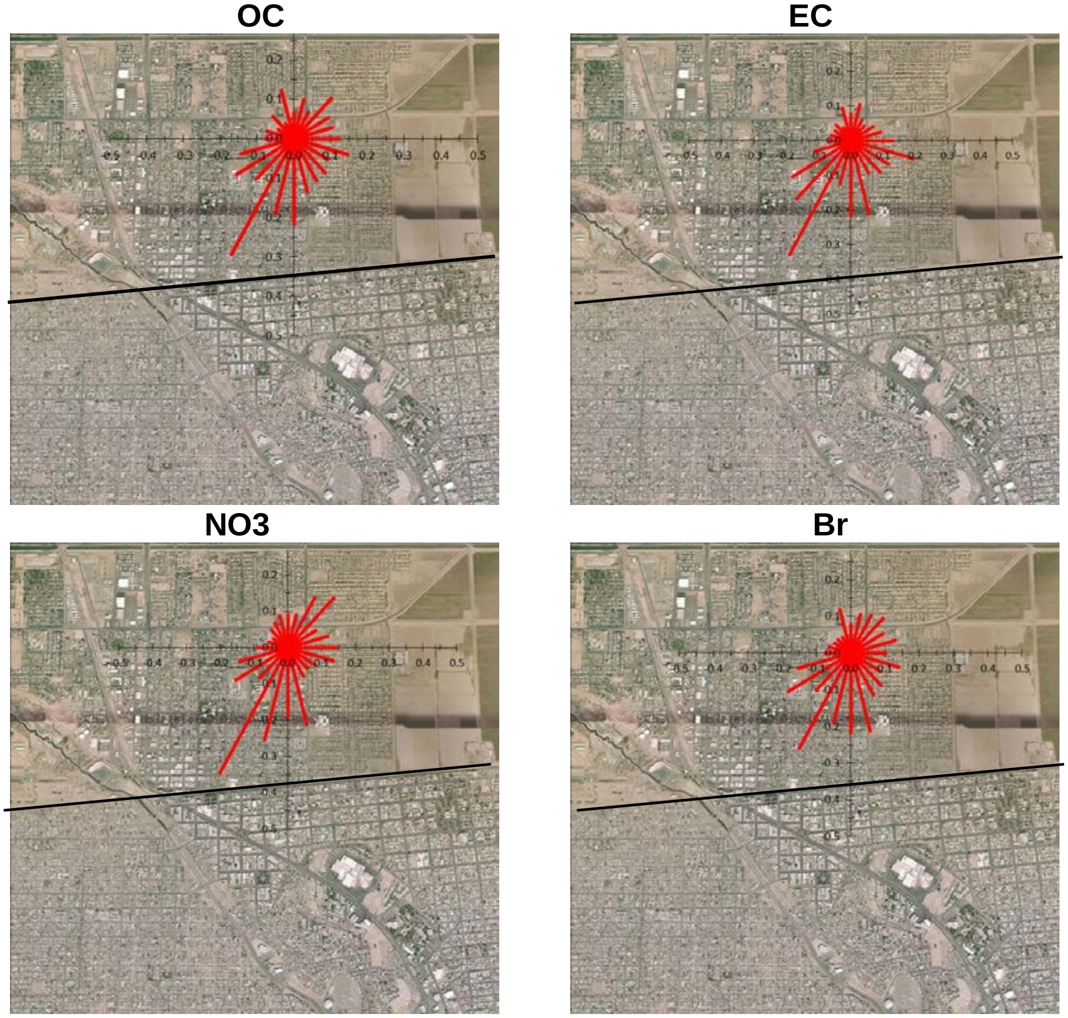


Figure 31. Conditional probability function plot for Cl (Length of each line represents a probability)

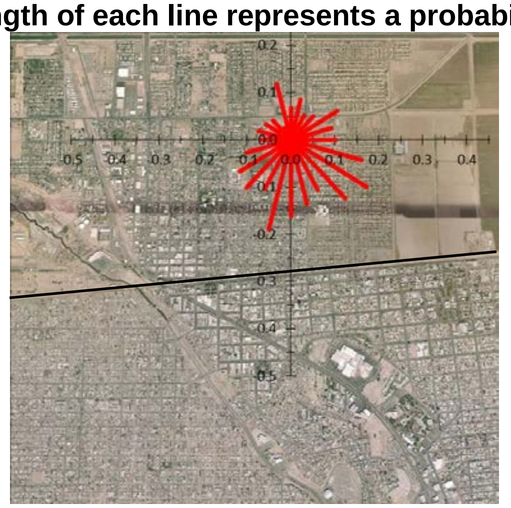
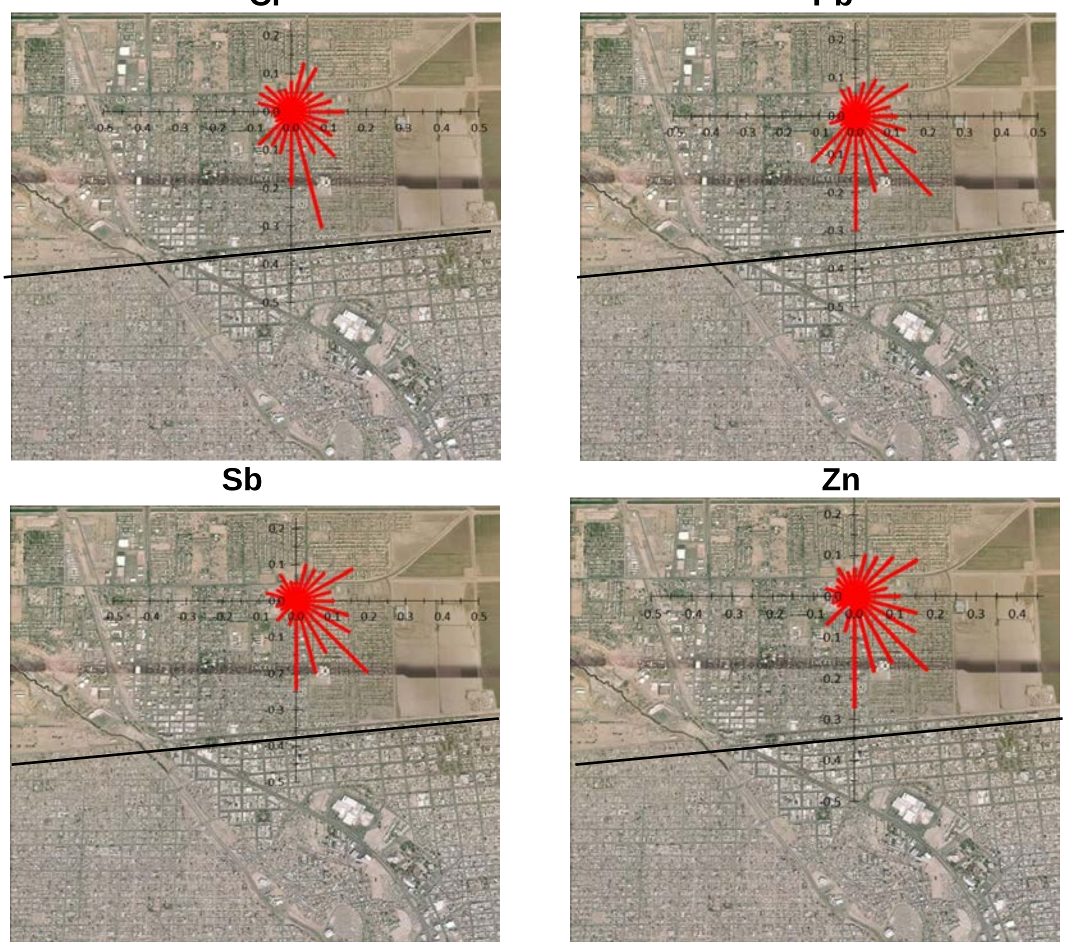


Figure 32. Conditional probability function plots for Cr, Pb, Sb, and Zn (Length of each line represents a probability)



Related to the previously discussed composition analyses, the ratio of BAM-measured PM2.5 to PM10 for the five exceedance days was averaged and compared to one summer day exceedance at Calexico during which both the PM2.5 and PM10 BAMs exceeded the standard. The much larger percentage of PM2.5 during the winter exceedance days is indicative of combustion. The August 9 exceedance—composed of a much higher percentage of PM10—was more likely due to fugitive dust (Table 7).

Table 7. Ratio of BAM PM2.5 to PM10 on Exceedance Days

Date	BAM PM2.5	PM10	% of PM2.5
12/4/2010	50.5	117.3	43
12/10/2010	36.4	91.6	40
12/11/2011	39.6	83.9	47
1/22/2012	36.5	83.1	44
12/23/2012	69.1	117.8	59
Winter Exceedance Average			**47**
8/9/2012	49.1	387.3	13

IX. Estimate of PM2.5 Concentration Impact from Imperial County Emissions

Efforts to isolate the impacts of cross-border transport on PM2.5 concentrations recorded at the Calexico monitor using only hourly pollutant and meteorological data from this site were conducted using several statistical approaches. The approach considered the most appropriate and definitive was one based on the premise that hourly-average winds with speeds above a pre-determined threshold blowing from compass azimuths within an arc bounded by and to the north of the international border would best minimize impacts from cross-border emissions sources. This approach is described below. As with other analyses in this weight-of-evidence 179B demonstration, the results are not conclusive, but provide strong evidence that, but for the impacts of cross-border emission transport, the 24-hour PM2.5 NAAQS was attained during the 2010-2012 evaluation period.

To assure temporal completeness, the analysis was based on all hourly monitoring data collected at the Calexico site during calendar years 2010, 2011, and 2012. Hourly-average PM2.5, wind speed, and wind direction data were recorded at the Calexico site during these three years (AQMIS).

Wind Direction Assessment – Defining North Winds

Wind directions, under which the transport of emissions generated by U.S. sources, were determined by mapping an appropriate compass arc that excluded impacts from non-U.S. sources. An aerial photograph of the Calexico-Mexicali metropolitan area was used to determine an appropriate compass arc of wind directions that would exclude transport of cross-border emissions to the monitor. This photograph/map is shown in Figure 33. Examination of the satellite photograph revealed reasonably clear boundaries of the Mexicali Metropolitan Area, the region within which the vast majority of sources of directly-emitted PM2.5 transported to the Calexico monitor are located. Compass azimuths connecting the location of the monitor to the points where the Mexicali urban edge intersects the international border are shown as straight lines in Figure 34. These azimuths lie at angles of 94 and 257 degrees from true North.

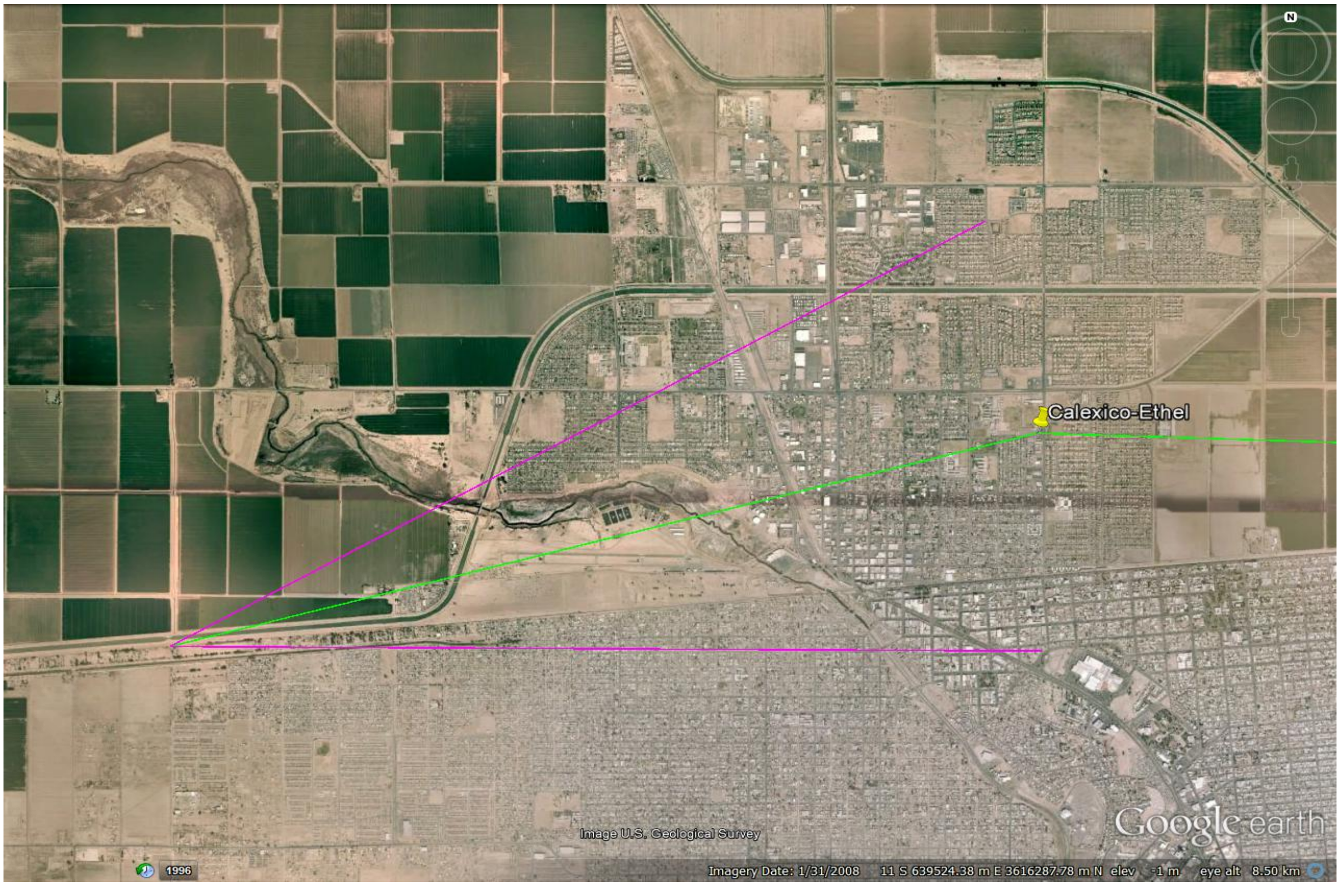
The use of these compass azimuths to bracket wind directions transporting emissions from U.S. sources, and not those under Mexican jurisdiction, provides the starting point for identification of bracketing wind directions that separate plumes from U.S. sources from those under Mexican jurisdiction.

Historical research and recent dispersion modeling analysis show that the full arc subtended by an airborne emission plume as measured from the point of pollutant release ranges from approximately 20 degrees to about 30 degrees, and is a function of wind speed and vertical mixing potential (Bierly, 1962; MAG 2012 Five Percent Plan for PM10 for the Maricopa County Nonattainment Area). Airborne emission plumes are generally symmetrical about downwind centerlines and, thus, plume half-arcs—as measured from the centerline to the edge of a plume—generally range from 10 to 15 degrees. Figure 34 shows the effective outer edges (as purple lines) of a hypothetical

30-degree arc emission plume with a release point at the intersection of the international border and the edge of the Mexicali urban area and a plume centerline (shown as a green line) that passes over the Calexico monitoring site (which replicates the western azimuth shown in Figure 33).

Figure 33. Wind Direction Azimuths Extending From the Calexico Monitor to Subtend an Arc Bounding the Mexicali Urban Area

Figure 34. Boundaries of a Hypothetical Emission Plume Generated by a Border Source with a Lateral Spread of 30 Degrees and a Centerline Crossing Over the Calexico Monitoring Site



In order to avoid a border-source emission plume as shown in Figure 34 from being included in the analysis of U.S. sources impacting the Calexico monitor, the western wind azimuth bracketing the directional arc of cross-border sources must be rotated clockwise by the maximum plume half-arc (15 degrees) from the plume centerline shown in green in Figure 34. At this orientation, the hypothetical worse case plume centerline would remain in Mexican territory, represented by the lower purple line in Figure 34, and the edge of the plume would just touch the Calexico monitor. In that case, the plume would not contribute to PM2.5 concentrations measured at the monitor.

To assure that emissions from cross border sources did not influence an analysis of the impacts of sources under U.S. jurisdiction, the wind directions bounding an arc within which only U.S. sources would lie upwind of the Calexico monitor (i.e., northerly winds) were selected to be 79 degrees (= 94 degrees – 15 degrees) and 272 degrees (= 257 degrees + 15 degrees) from true north. The subsequent analyses of north wind impacts at the Calexico monitor were based on the northern arc bracketed by these two wind directions.

Analysis of peak PM2.5 days recorded at the Calexico monitor during calendar years 2010, 2011, and 2012 revealed that a most days on which the 24-hour average PM2.5

concentration exceeded the 24-hour standard of 35 $\mu g/m^3$ were winter days during which stagnation wind conditions were recorded. On these days, mixing heights during nocturnal hours dropped to within 100 meters of the surface, wind speeds ranged between 0.0 and 1.0 mps, and PM2.5 emissions generated within the shared urban area tended to move as much by lateral diffusion as by wind transport.

As discussed earlier (Section VII), with low wind speeds in the range of 0.0 to 0.5 mps, the reported wind direction is not representative of the true wind direction. High hourly PM2.5 concentrations measured during such hours most likely represented impacts from sources within a few kilometers of the monitor on both sides of the international border, within the common Calexico-Mexicali air shed. Because of the suspected contribution of sources under Mexican jurisdiction to PM2.5 concentrations measured at the Calexico monitor during nocturnal stagnation hours, data from these hours were also omitted from the analysis of impacts from U.S. sources. The 1.5 mps threshold for stagnating winds was chosen since on the transport exceedance days, concentrations were highest when the winds were below 1.5 mps.

Average PM2.5 Concentrations during Non-Transport Hours

Because of the 24-hour averaging time of the standard, this portion of the 179B demonstration focuses on estimating the resultant daily average historical PM2.5 concentrations at the Calexico monitor in the absence of impacts from Mexicali. From the evaluations described above, hours of cross-border transport were determined to be those hours during which hourly average wind speeds exceeded 1.5 mps and wind azimuths were less than 79 degrees or greater than 272 degrees.

Consideration was given to the backfilling of excluded hourly PM2.5 concentrations recorded during south wind or stagnation wind speed hours in order to include representative non-cross-border PM2.5 values to facilitate an assessment of potential attainment but for the impacts from Mexico. A search for continuous PM2.5 monitors located in Imperial County to provide replacement PM2.5 values found no other continuous monitors operating during this period. As a result, analyses of the PM2.5 hourly concentrations at the Calexico monitor were conducted using the screened dataset that did not contain any values substituted for those excluded in the north wind screening process. These data were reasonably well distributed by hour of day and month as is shown in Figures 35 and 36.

Figure 35. Number of Hourly PM2.5 Values in Screened 2010-2012 Calexico Data Grouped By Hour of the Day

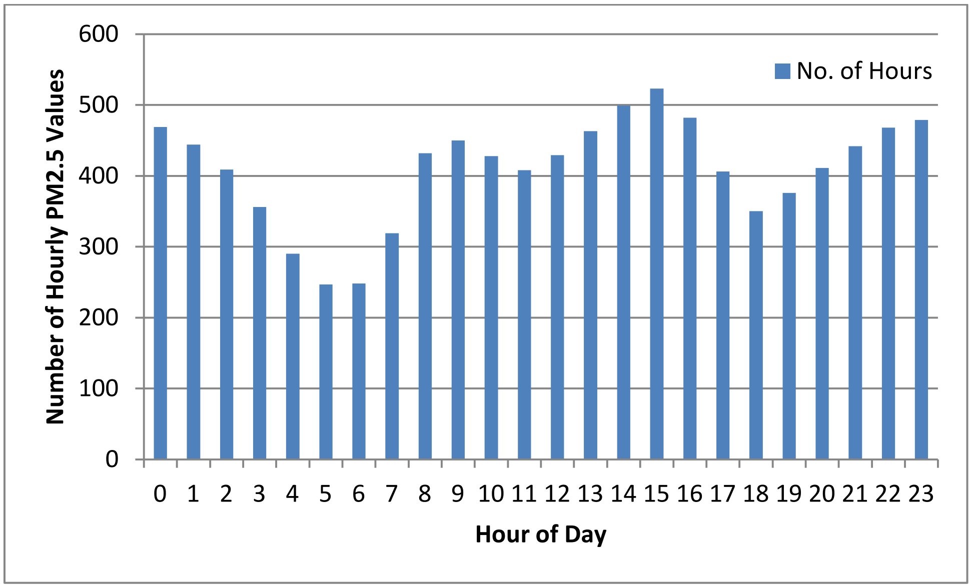
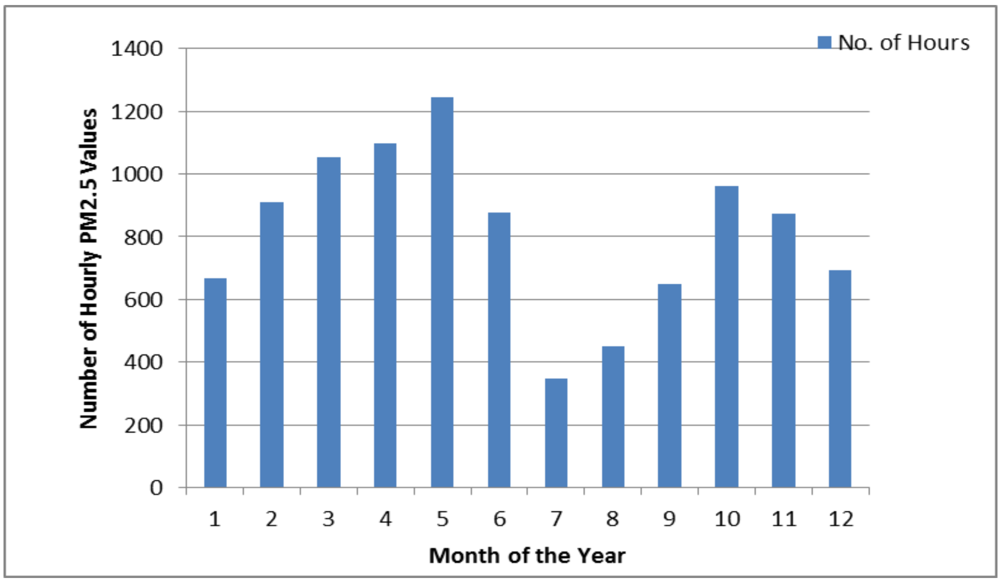


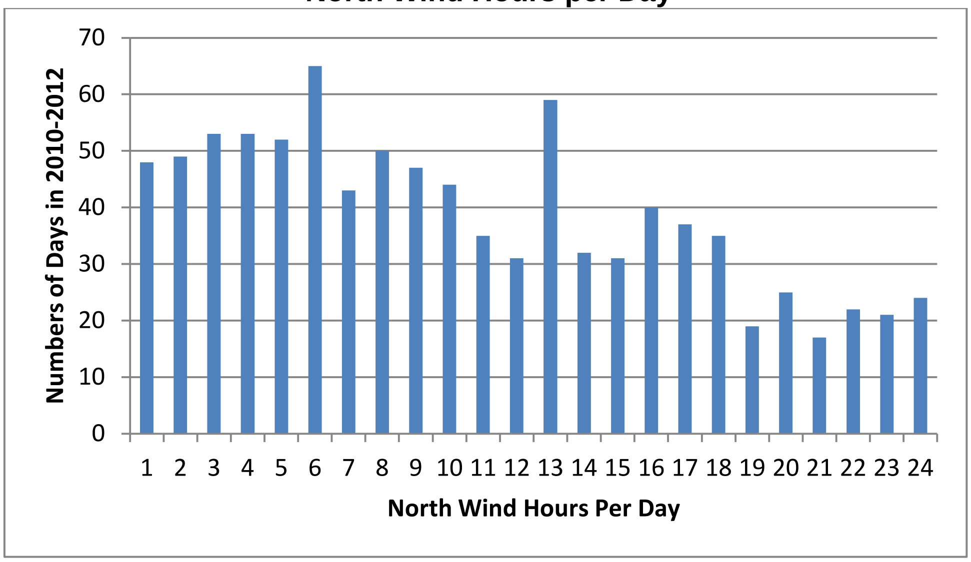
Figure 36. Number of Hourly PM2.5 Values in Screened 2010-2012 Calexico Data Grouped By Month of the Year



These distributions of hourly PM2.5 values by hour-of-the-day and month-of-the-year suggest that the sub-population of screened data is reasonably representative of the full database with the possible exception of values recorded in July and August, for which there are very few data points. During the summer months, few elevated PM2.5 days are recorded at the Calexico monitor, suggesting that the relatively low number of data points found in these months will not have a significant impact on data representativeness. The screened data were analyzed to determine the potential for the Calexico monitor to show attainment under north/non-stagnant wind speed hours.

The average PM2.5 concentration from all hours that satisfied north wind/non-stagnation wind speed (“north wind”) screens was calculated for each day in which at least one hour satisfied screening requirements. This grouping of hours by date produced records for 932 days. The range of north wind hours per day extends from 1 to 24 hours. When days with the same numbers of north wind hours are grouped, the resulting distribution of total days per number of north wind hours generally declines from the total of days with 1 qualifying hour (48 days) to those with 24 qualifying hours (24 days). A plot of these days-per-number of north wind hours is shown in Figure 37.

Figure 37. Numbers of Days in 2010-2012 Grouped by the Numbers of North Wind Hours per Day



The distribution of daily average PM2.5 concentrations reported by the screened hourly PM2.5 values was plotted against the number of north wind hours per day to determine whether the numbers of exceedances of the 24-hour PM2.5 standard declined with increasing numbers of north wind hours per day. This plot is shown in Figure 38.

Figure 38. Daily Average PM2.5 Concentrations for Days in 2010-2012 Grouped by the Numbers of North Wind Hours per Day

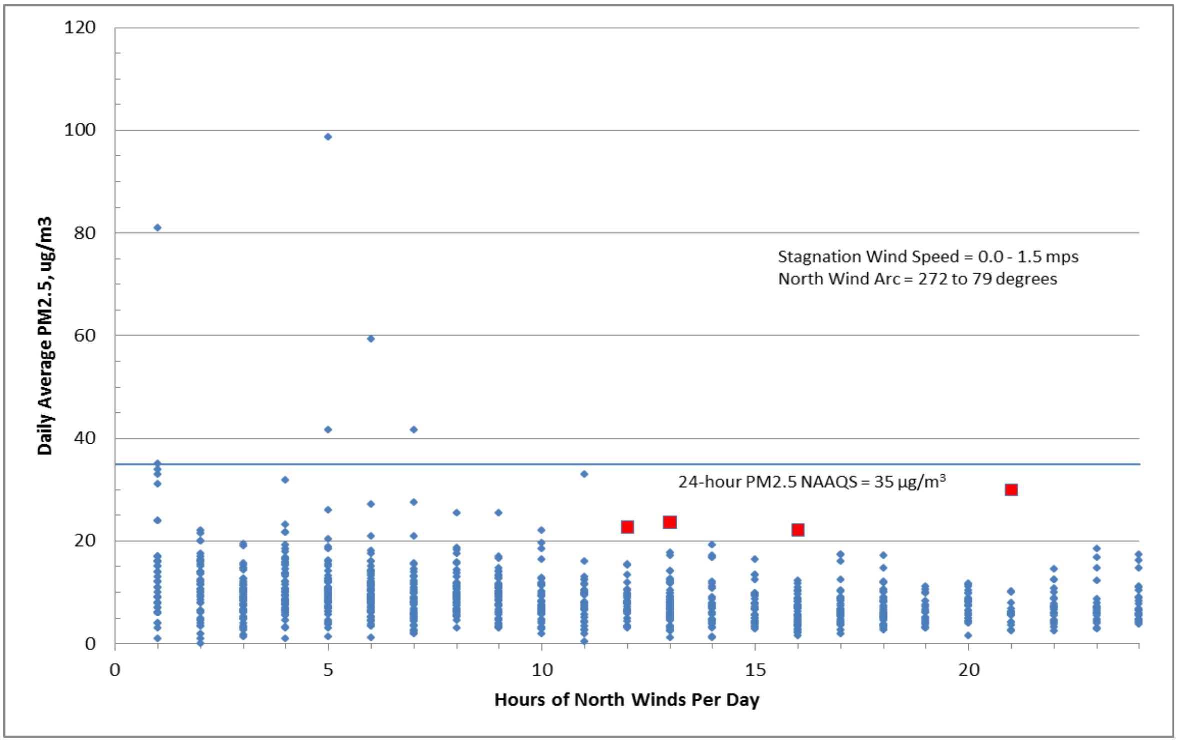


Figure 38 shows no daily average PM2.5 concentration above the level of the PM2.5 standard for all days having 15 or more north wind hours. The plot also shows that only six days between 2010 and 2012 would have exceeded under this screening approach. A calculation of the design value produced a value of 24.0 µg/m^3.

Staff assessed the cause of high "outlier" PM2.5 daily averages for days having 12 or more north wind hours. For this subset of days, a threshold value of 20 µg/m^3 daily average PM2.5 concentration was used to define high (or outlier) PM2.5 days when winds impacting the Calexico monitor were primarily from the north. The days satisfying these two conditions (i.e., 12 hours or more of north winds, daily average PM2.5 exceeding 20 µg/m^3) were identified from the plot in Figure 38 (as red squares) and are tabulated in Table 9.

Table 9. Daily Average PM2.5 Concentrations for Outlier Days Under All Wind and North Wind Conditions

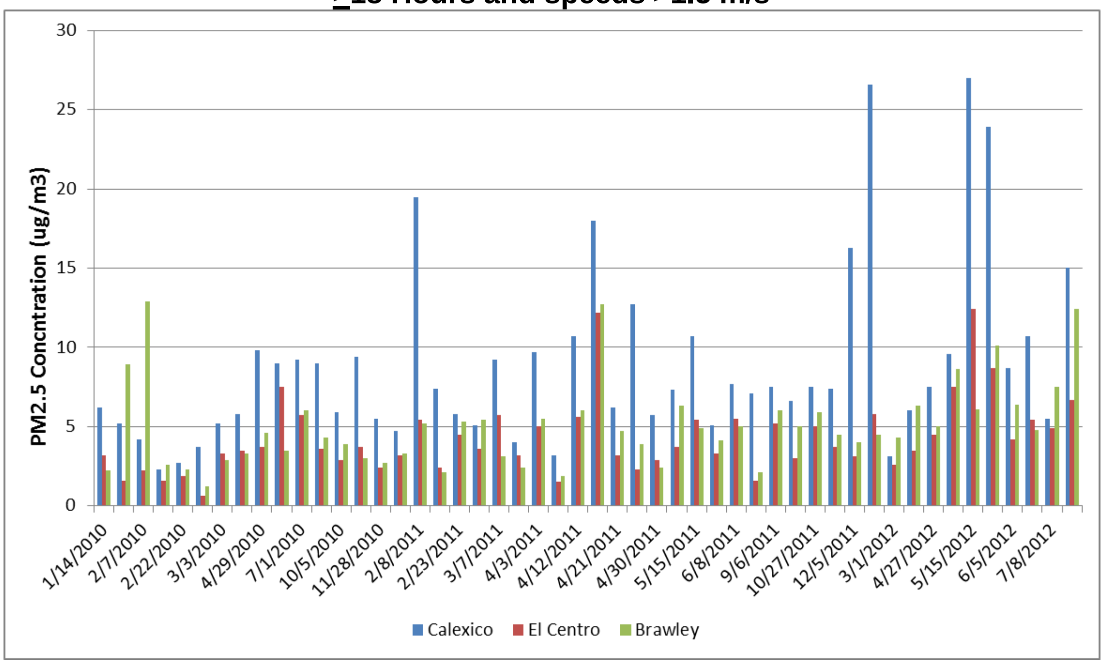
Date	Number of North Wind Hours	Daily Average PM2.5 Concentration (µg/m^3)	
		All Wind Hours	North Wind Hours Only
August 11, 2010	16	19.5	22.6
April 14, 2011	16	24.6	22.2
June 5, 2011	13	24.6	23.6
May 15, 2012	21	27.2	30.0

Daily Average Concentrations in the Imperial NA

Staff also used hourly meteorological data to obtain days during 2010-2012 when winds were from the north at least 18 hours per day and wind speeds were non-stagnant (i.e., >1.5 mps). The resulting days were matched with FRM sampling dates for the Calexico, El Centro, and Brawley sites. Figure 39 displays the resulting 50 days.

The results show that for the majority of days, concentrations at Calexico recorded higher values than the other two sites. This is consistent with data seen from all wind directions throughout this time period. More important is the fact that under these north wind conditions, there were no exceedances of the 24-hour PM2.5 standard.

Figure 39. FRM PM2.5 Concentrations in 2010-2012 when North Winds ≥18 Hours and speeds >1.5 m/s



Using available speciation data for four of the five FRM exceedance days, staff compared the average speciation on these four days to the average speciation (mass) values that met the above criteria for wind direction and speed (Section IX). From these data, the exceedance days are associated with significant increases in organic matter, ammonium nitrate, and elements. Generally, the mass speciation on days with north winds is significantly less than the mass speciation seen on days where transport from Mexicali occurred (Table 10).

Table 10. Average Speciation on Exceedance Days and North Wind Days

Exceedance day speciation mass averages						
OC	EC	Geological	Elements	Nitrate	Sulfate	Ammonium
22.6	2.2	4.2	4.0	6.3	0.9	3.0
Average Speciation on 31 North Wind Days						
2.0	0.4	1.5	0.6	0.6	0.9	0.4

X. Estimate of PM2.5 Concentration Impact from Mexicali Emissions

To estimate the impact of Mexicali emissions on the PM2.5 concentrations experienced at the Calexico monitor on the five exceedance days, staff binned PM2.5 measurements made at each site during the period of 2010 - 2012 by meteorological conditions that were present during the five exceedance days at Calexico. The differences in the binned concentrations were evaluated based on the following considerations:

First, by limiting the comparison of concentrations to those measurements made under similar meteorological conditions, any differences due to meteorology are minimized. The variables affecting the concentrations at each site are reduced and the focus becomes the emission sources surrounding each site.

Second, the size and type of U.S. sources surrounding all three sites (Calexico, El Centro, and Brawley) are similar and, therefore, in the absence of other sources, it is expected that all three sites would experience the same PM2.5 concentrations during similar meteorological conditions. Observed differences in PM2.5 concentrations suggest that emission sources outside of Imperial County and the Imperial County nonattainment area are impacting the concentrations.

The meteorological conditions used to segregate the concentration data were those conditions observed on the five Calexico exceedance days during the first 10 hours of the day (midnight to 10:00 am) during the months of December through February. Specifically, average wind speed less than or equal to 1.5 mps and average ambient temperature less than 66° F. Wind speeds of 1.5 mps or less typically reflects stagnant conditions and renders the influence of wind direction negligible.

On average, concentrations measured at Calexico are almost three times higher than the other two urban sites in Imperial County when stagnant, cold conditions are present:

Imperial County Monitoring Site	Number of Days Binned by Similar Meteorology (2010 – 2012)	Average Concentration (µg/m3)
Calexico	22	26.4
El Centro	27	9.9
Brawley	12	9.1

Under similar meteorological conditions, and with similar nearby United States sources, one would expect that PM2.5 concentrations measured at the Calexico monitor would be within a relatively narrow range of the El Centro and Brawley monitors. An average difference of 16.9 µg/m3 suggests that emission sources outside the United States are significantly impacting the Calexico monitoring site beyond what would be expected from known sources on the U.S. side.

XI. Calexico Day-Specific Analyses

The following section details day-specific information for five days in which ambient concentrations of PM2.5 exceeded the 24-hour NAAQS of 35µg/m3 at the Calexico monitoring site. These analyses use both FRM data and non-FEM BAM data to further evaluate the exceedance days. Non-FEM BAM data were used to track the PM2.5 on an hourly basis with corresponding meteorological information. Although non-FEM BAM data is non-regulatory and is therefore not used in the calculation of an area's design value, these data were valuable in evaluating diurnal and other patterns observed on exceedance days. The conclusion that the five days listed in Table 11 would not have exceeded the standard but for emissions from Mexico is substantiated for each day using elemental analysis data derived from filter particle loadings, meteorological data, and other supporting information, where available.

Table 11. PM2.5 Measurements Exceeding the 24-Hour PM2.5 Standard at the Calexico Monitoring Site in 2010-2012

Date	Day	Calexico PM2.5 (µg/m3)	Speciation Data?
12/4/2010	Saturday	50.9	Yes
2/5/2011	Saturday	80.3	No
12/11/2011	Sunday	44.4	Yes
1/31/2012	Tuesday	37.7	Yes
12/23/2012	Sunday	64.7	Yes

Significantly, four of the five exceedance days occurred on a weekend day. Information on these weekend days indicates holiday celebrations were the likely source of elevated PM2.5 concentration measurements.

December 4, 2010

Analysis Methods

For the December 4, 2010, exceedance day analysis, staff evaluated the following information: (1) PM2.5 concentration gradient within the Imperial NA plus the Air Quality Index (AQI) for Imperial County; (2) changes in the non-FEM BAM PM2.5 concentrations with the wind speed and atmospheric mixing height; (3) predominant wind speed and wind direction in the area from December 2 through December 5; (4) an air parcel back-trajectory starting at the hour of highest hourly recorded concentration at the Calexico site; (5) speciation data on December 4, to identify the major components of PM2.5, including a further breakdown of elemental species; and, (6) source apportionment results using receptor based modeling.

Data not available for this analysis include concentrations from monitoring stations in Mexicali from December 4; specific media reports from either north or south of the border, which would substantiate activities impacting air quality in the area; clear satellite imagery for detecting smoke from combustion activities; and PM2.5 BAM data for Brawley and El Centro. However, PM2.5 mass and speciation data, coupled with meteorological data and back-trajectory analysis, provide strong supporting evidence that the Calexico monitor would not have recorded an exceedance of the 24-hour NAAQS in the absence of emissions from Mexico.

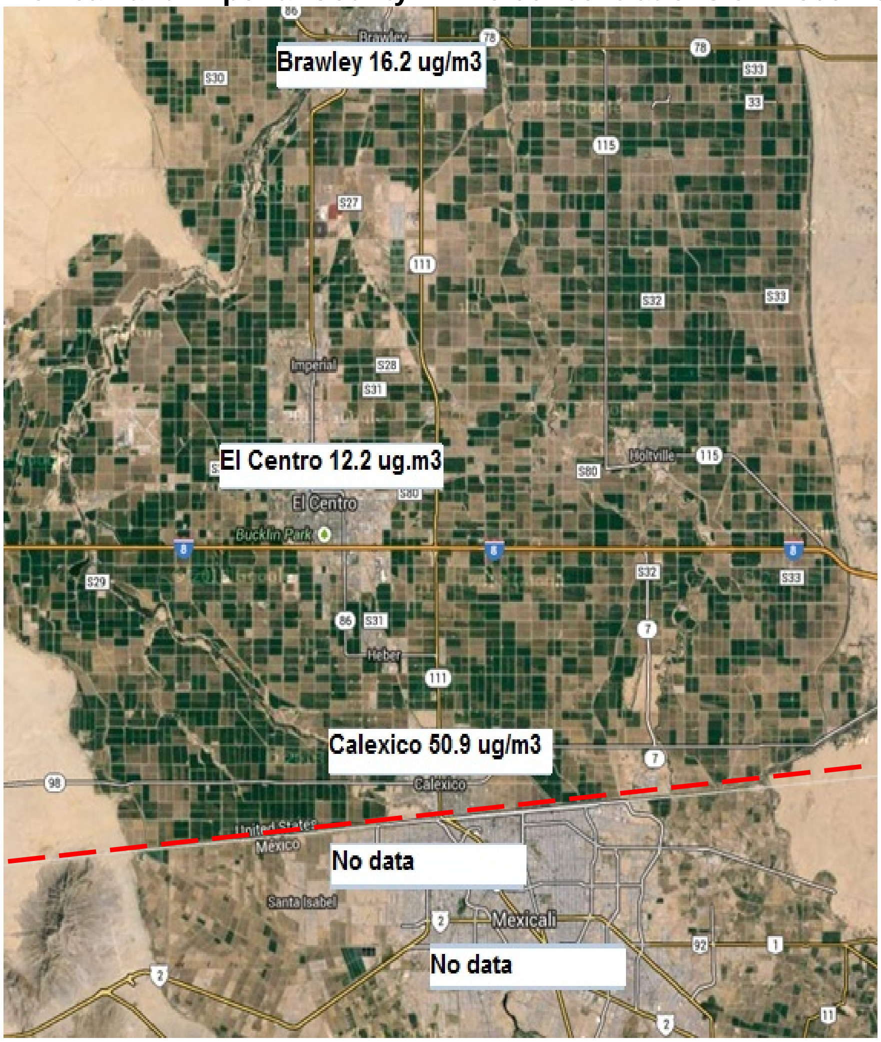
<u>PM2.5 Concentrations</u>

On Saturday, December 4, the Calexico monitor recorded a 24-hour average PM2.5 concentration of 50.9 µg/m3. Filter-based PM2.5 measurements at the El Centro and Brawley monitoring sites were 12.2 and 16.2 µg/m3, respectively. Continuous PM2.5 monitors at Calexico began recording increased PM2.5 concentrations on the night of December 2. Concentrations remained high the morning and night of December 3 and this trend continued into December 4. The AQI value on this day was 139 (unhealthy for sensitive groups) and was the highest AQI value recorded in Imperial County for 2010.

The PM2.5 concentration was roughly half the measured PM10 concentration on December 4, suggesting that the PM impact was largely influenced by combustion sources. Agricultural burning was either not permitted or did not occur in Imperial County on December 2, 3, or 4, and District records indicate no burning violations or complaints were received during those days. Although not all of the combustion emissions are expected to have come from Mexicali, the combination of the magnitude of the emission inventory in Mexicali, the number of stationary sources in Mexicali, the number and age of motor vehicles in Mexicali, and the lack of agricultural burning in Imperial County implies that most of the combustion emissions originated from outside the County.

Figure 40 shows the spatial distribution of 24-hour average PM2.5 concentrations recorded at each monitoring site in the Imperial NA on December 4. The 50.9 µg/m3 concentration measured at Calexico was nearly three times the annual average for that site in 2010. The strong PM2.5 concentration gradient from the Calexico monitor—less than a mile from Mexicali—to the Brawley and El Centro sites just to the north suggests that the emissions impact on the Calexico monitor differs substantially from the impact experienced by the Brawley and El Centro monitors. With similar sources and meteorology, the expectation is that PM2.5 concentrations measured at Calexico, El Centro, and Brawley would be similar. The decreasing gradient northward is consistent with the Calexico-Mexicali single air shed concept and points to cross-border emissions as the source of high concentrations measurements at Calexico.

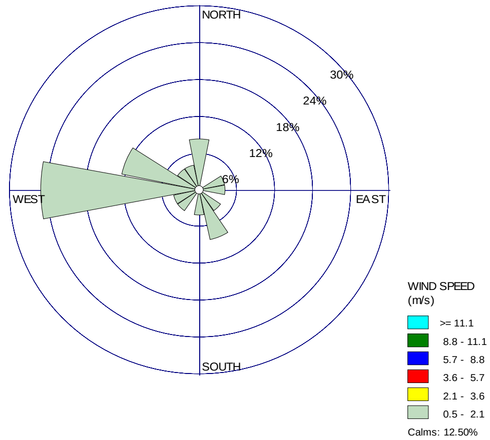
Figure 40. Mexicali and Imperial County PM2.5 concentrations on December 4, 2010



Meteorology

Surface hourly wind data collected at the Calexico station indicate that variable, low wind speed conditions were prevalent throughout the day on December 4. The 24-hour average wind speed at Calexico was 0.6 mps with maximum wind speeds reaching 1.6 mps. Wind direction was variable with approximately 24 percent of the winds originating from the west. A wind rose plot for December 4 (Figure 41) indicates that low wind speeds on that day are coupled with variable wind direction. These conditions are typically associated with stagnant meteorological conditions. For purposes of these analyses, wind speeds of 1.5 mps or less are used to identify stagnant conditions and indicate little or no dispersion, i.e., emissions within the common Calexico-Mexicali airshed result in high measured values. Identifying meteorological stagnation in terms of low wind speed in the range of 0 to 1.5 mps is consistent with earlier cross-border transport studies (Chow et al., 2000).

Figure 41. Wind Rose on December 4, 2010[5]

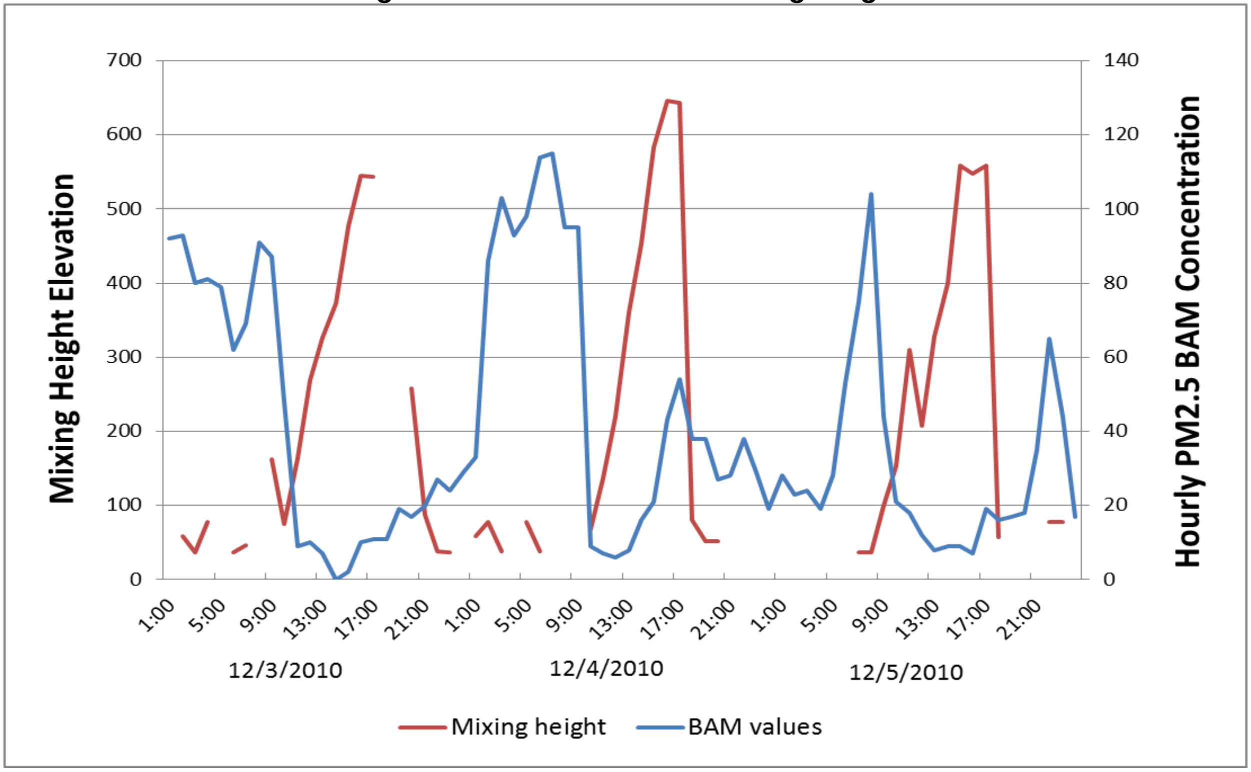


To further characterize meteorological conditions on December 4 which may have influenced PM2.5 concentrations measured at the Calexico station, staff evaluated data on atmospheric mixing height and its correlation with PM2.5 mass data. The nearest routine data collection points to Calexico for radiosonde data are Yuma, Arizona, and Tucson, Arizona. Both of these locations have topography similar to that of Calexico. Appropriate data from the Yuma site were unavailable for December 4, so Tucson data were used to generate a plot of hourly mixing heights over a three day period that includes the December 4 exceedance. All mixing height data originate from the National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory website and are research-quality data.

Figure 42 displays the mixing height and hourly PM2.5 BAM measurements at Calexico. While data gaps exist for the atmospheric soundings, the overall trend over the three day period shows an inverse relationship between mixing height and concentrations. Decreasing mixing height corresponds to increasing PM2.5 concentrations as low vertical mixing confines pollutants. This plot corroborates surface wind data and supports the concept that emissions from Mexicali, confined to the Calexico-Mexicali air shed with reduced pollutant dispersion due to low wind speed and reduced mixing height, resulted in higher PM2.5 concentrations on December 4 than would have been observed in the absence of emissions from Mexico.

[5] Wind rose plot generated using Lakes Environmental WRPLOT View™ software program. This program uses <0.5 mps as the default wind speed threshold for identifying “calm” winds.

Figure 42. PM2.5 BAM vs. Mixing Height

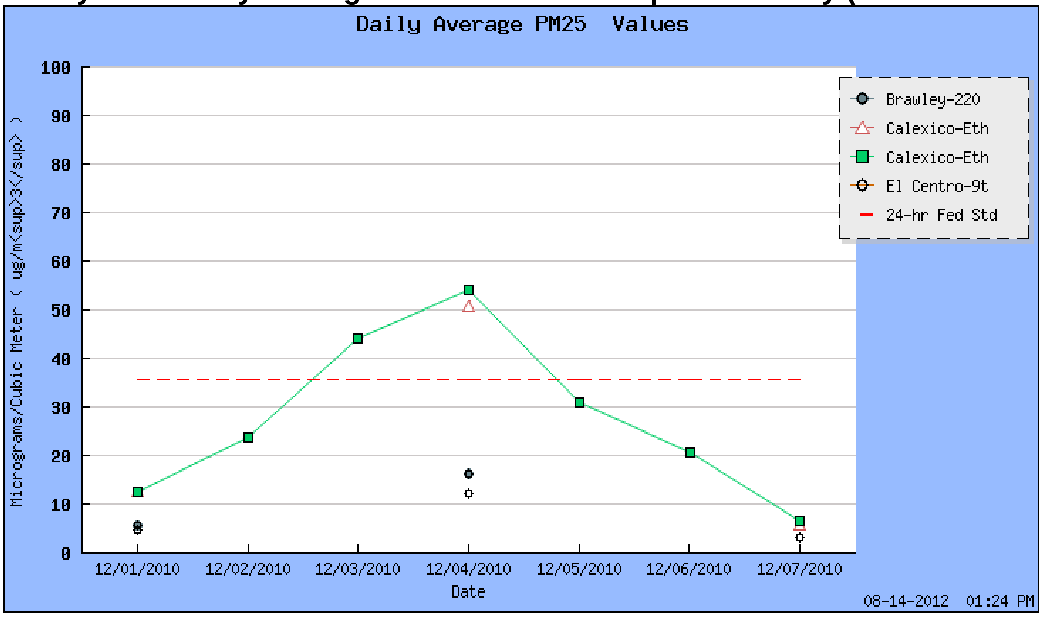


<u>Analysis of the Event</u>

To place Calexico PM2.5 values in the context of the Imperial NA's other PM2.5 monitoring sites Figure 43 shows the daily and hourly PM2.5 concentration data measured during the first week of December 2010. The data show lower PM2.5 values at the El Centro and Brawley sites with somewhat elevated concentrations on December 4. This pattern is consistent with the spatial gradient shown in Figure 40 and suggests that emissions from south of the border may be influencing measurements further to the north. The plot also illustrates the consistency between the FRM measurements at Calexico (POC 1) and non-FEM BAM measurements at Calexico (POC 3) on December 4 as well as on December 7. The BAM value on December 4, for example, was 50.5 µg/m3, consistent with that day's FRM value of 50.9 µg/m3.

While high PM2.5 concentrations at the Calexico monitoring site occurred under stagnant meteorological conditions, when the wind speed and direction changed prior to, during, and following the exceedance day, those changes were matched with hourly PM2.5 concentration data to reveal any patterns that might better characterize the temporal nature of PM2.5 concentrations. Wind speed and wind direction data were plotted with BAM PM2.5 concentration measurements from December 2 through December 5 (Figures 44 and 45).

Figure 43. Daily and Hourly Average PM2.5 Values in Imperial County (12/1/2010 – 12/7/2010)



*POC1 is on a 1-in-3 day sampling schedule and POC3 records hourly data

Figure 44. PM2.5 BAM vs. Wind Speed at Calexico for December 2-5, 2010

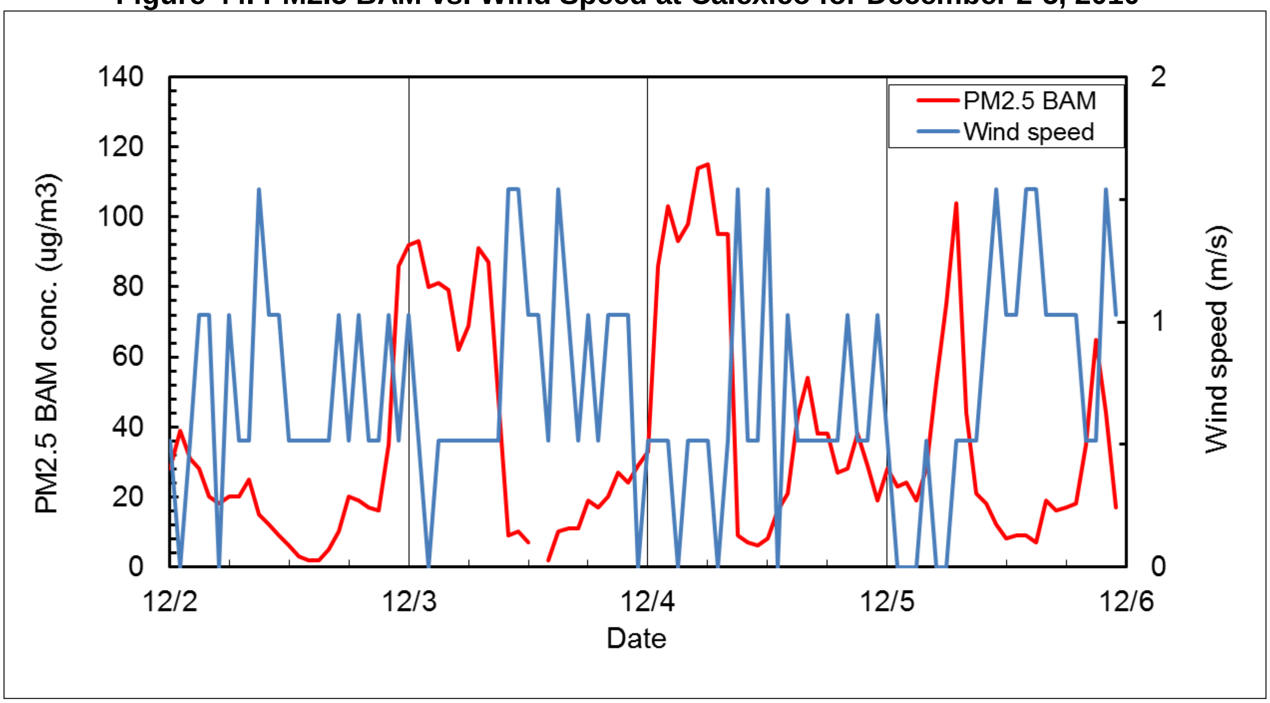
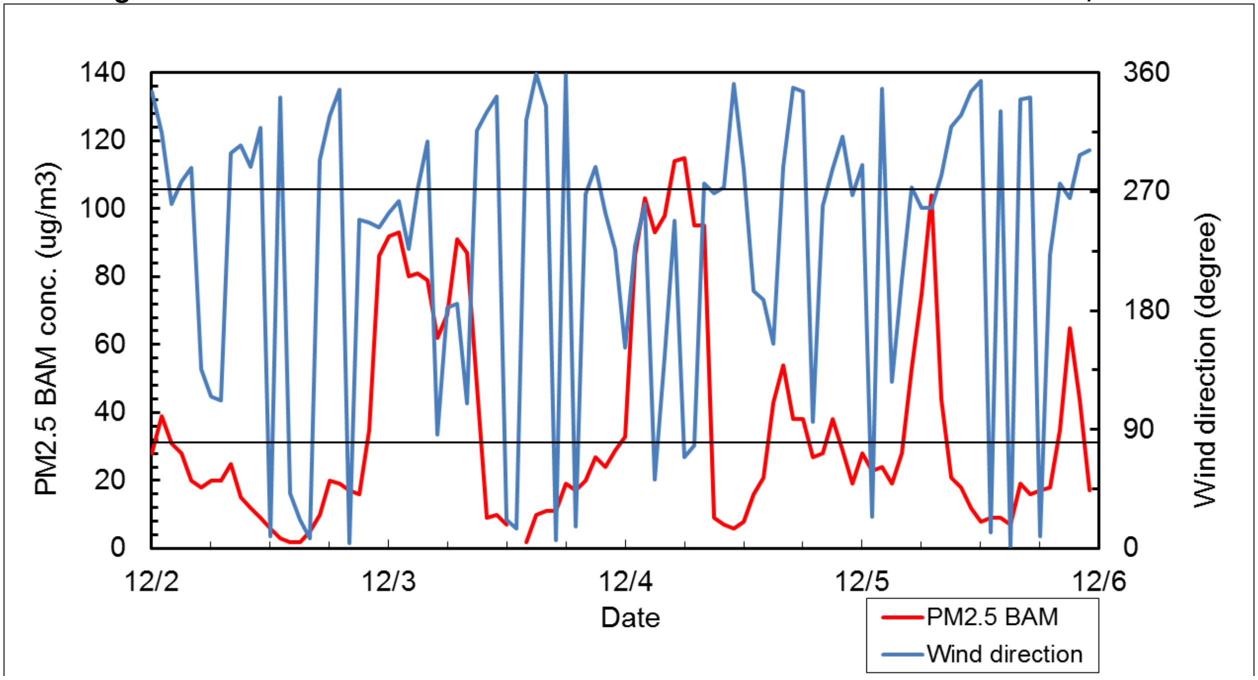


Figure 45. PM2.5 BAM vs. Wind Direction at Calexico for December 2 - 5, 2010



*79-272 degree winds are from the south. 273-78 degree winds are from the north.

Hourly PM2.5 concentrations began to increase substantially at approximately 10:00 pm on December 2 when the wind direction changed from a northern to a south/south west flow. Concentrations remained elevated above 20 µg/m3 until 8:00 am on the following day, December 3, while the wind direction continued from a southerly direction. When the wind direction changed to a northern flow, PM2.5 concentrations began to decrease. In the evening of December 3, concentrations increased again and remained high until mid-morning on December 4, consistent with a shift to a southern flow. PM2.5 concentrations were very high (85-115 µg/m3) from 1:00 am through 8:00 am and decreased after another wind shift to the north. Concentrations began to increase again after 2:00 pm, with a wind direction shift to a more southerly flow, and remained moderately high for the rest of the day, as wind direction became more variable.

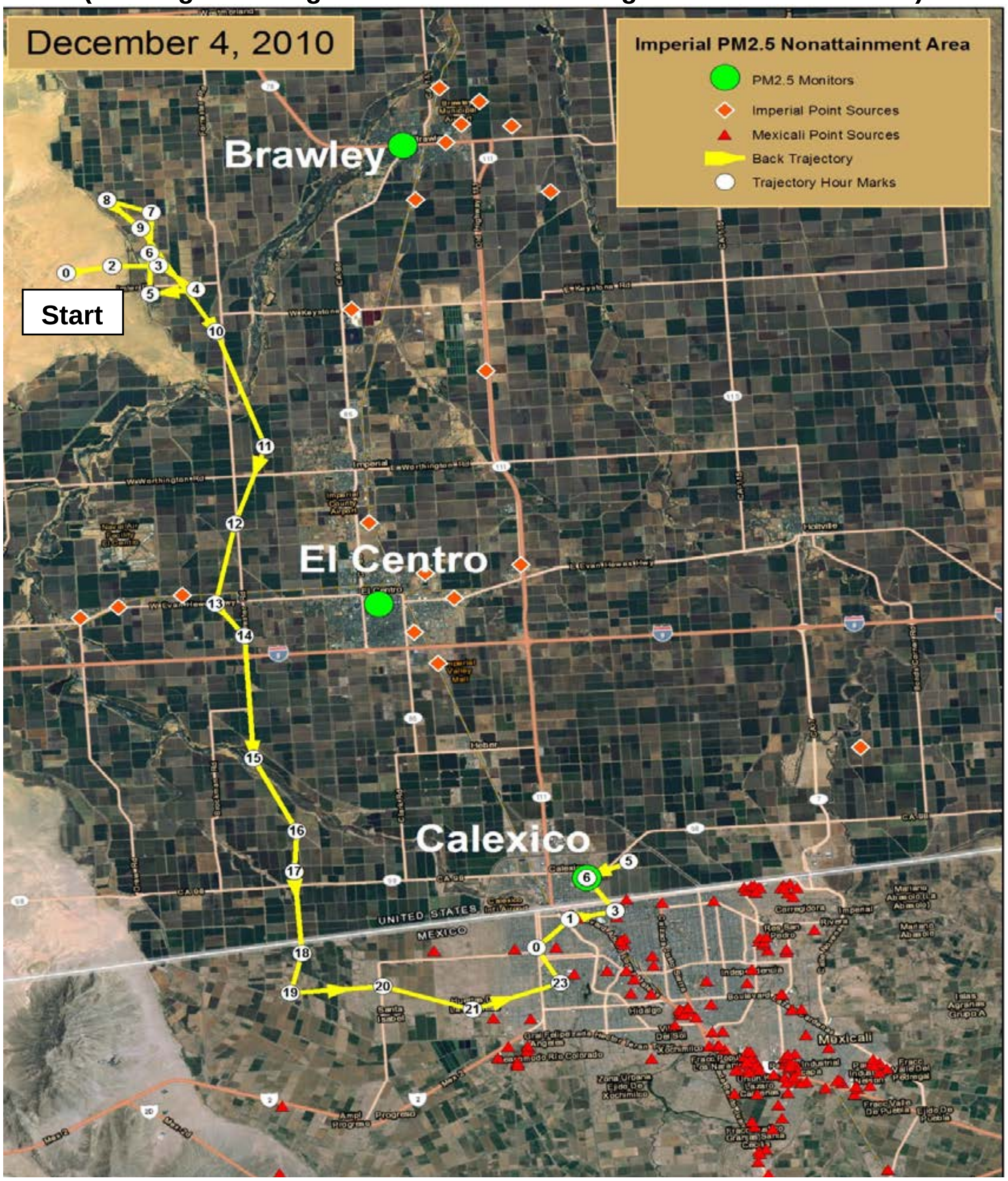
Data from Figure 44 show that low wind speeds, particularly in the early morning hours, are correlated with higher PM2.5 concentrations. Generally, the highest concentrations on December 4 were seen under southerly flow conditions (79 to 272 degrees) in the early morning hours (Figure 45) (see Section IX for wind direction analysis).

The spatial nature of the December 4 exceedance event was assessed using a back-trajectory plot (Figure 46). The objective of a back-trajectory plot is to discern the pathway that an air parcel traveled prior to passing over the site of a continuous pollutant monitor, i.e., a PM2.5 BAM. By calculating the coordinates of this traverse and overlaying the resulting travel path onto an aerial photograph, the potential for transport of emissions from sources under the path to the monitor may be evaluated (see Appendix A for complete back-trajectory methodology).

Coordinate calculations for the back-trajectory are conducted in a stepwise fashion beginning at the monitor location and using the wind speed and direction data for each preceding hour to compute path coordinates back to zero hours on the day prior to December 4. The back-trajectory plot in Figure 46 begins at the hour of the highest PM2.5 BAM concentration (6:00 am) and traced the pollution back to midnight (00 hours) on December 3. From this analysis, it may be concluded that the air parcel impacting the Calexico station at 6:00 am on December 4 was in Mexicali in the early morning hours of the December 4 and the late night hours on December 3. The low temperatures, low inversion height, and increased emissions in Mexicali impacted the PM2.5 concentration at the Calexico site. The shorter line in between the trajectory hours also shows that the air parcel traveled less distance over the time period in Mexicali, which caused pollution to accumulate under these stagnant conditions. Mexicali point sources are included in the photo to gauge the potential influence these emission sources have on the air parcel prior to its reaching the Calexico station.

We considered a back-trajectory analysis using the HYSPLIT model in combination with one of several available meteorological databases. During winter stagnation episodes, wind speeds are typically less than 3.0 mps and hourly back-trajectory vectors range from 2 to 10 kilometers (km) in length. The meteorological databases used by the HYSPLIT model use grid sizes varying from 6 to 40 km. As a result of this difference in grid resolution, HYSPLIT was not used since it would not provide the micro scale back-trajectories needed to appropriately determine the traverse on United States side of the border versus the traverse in Mexico prior to arriving at the Calexico station.

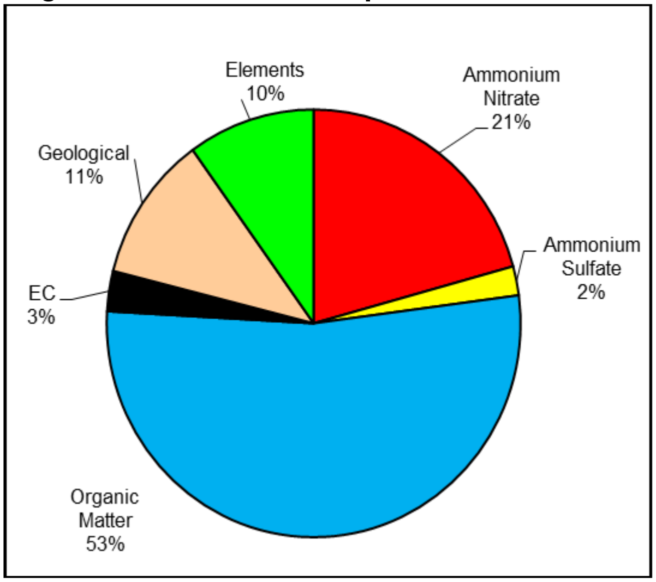
Figure 46. December 4, 2010 Air Parcel Back-Trajectory
(Starting at midnight on 12/3/10 and ending at 6:00 am on 12/4/10)



Identification of Emissions

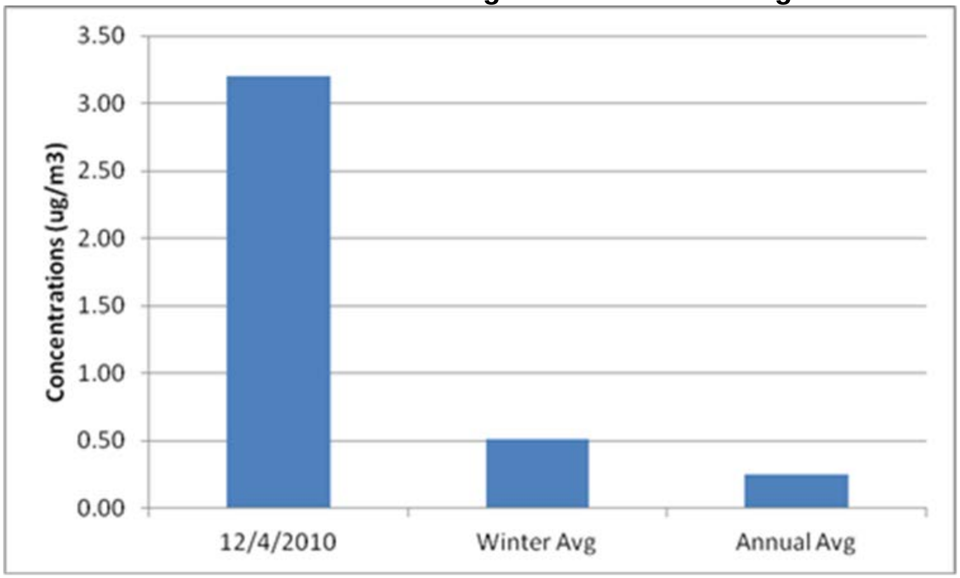
To aide in identifying the source of emissions potentially impacting the Calexico monitor, staff analyzed speciation data available on December 4. The speciation data show that over half of the concentration was from organic matter and 21 percent was from ammonium nitrate. High concentrations of elemental species were also present on this day. High concentrations of carbonaceous aerosols suggest that combustion was the main source of PM2.5, while high concentrations of elemental species suggest that emissions come from non-fossil fuel sources (Figure 47). See Section VIII for supporting information.

Figure 47. 12/4/2010 Composition at Calexico



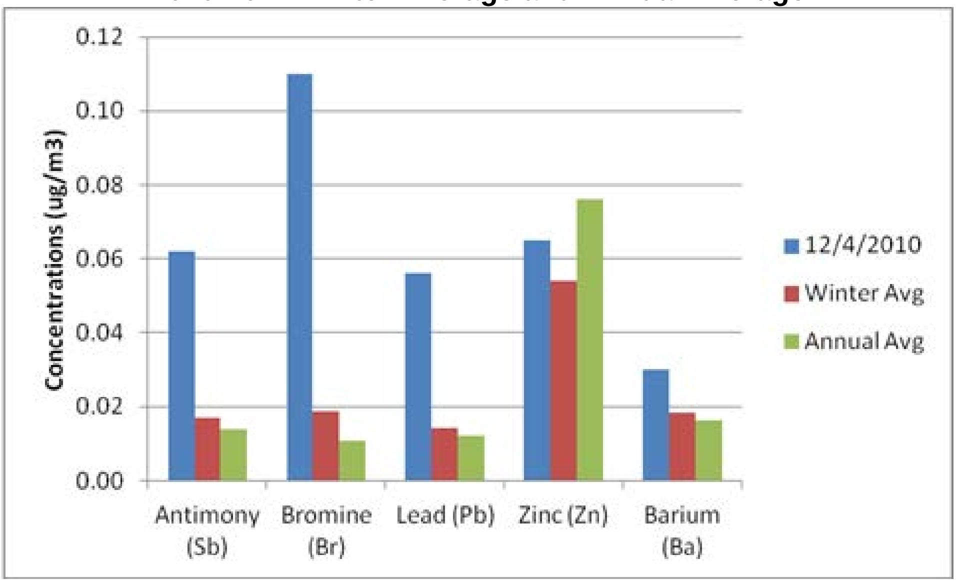
On December 4 elemental species concentrations at Calexico were elevated compared to both winter average and annual average concentrations. Concentrations of elemental chlorine were six times higher compared to winter average and 13 times higher compared to annual average (Figure 48). Concentrations of antimony, bromine, lead, and chlorine were four to six times higher compared to winter concentrations and four to 13 times higher compared to annual average. Concentrations of zinc and barium were close to the average levels (Figure 49).

Figure 48. Comparison of Chlorine Concentrations on 12/4/2010 to 2010-2012 Winter Average and Annual Average



*This data does include transport days but does not include invalidated days

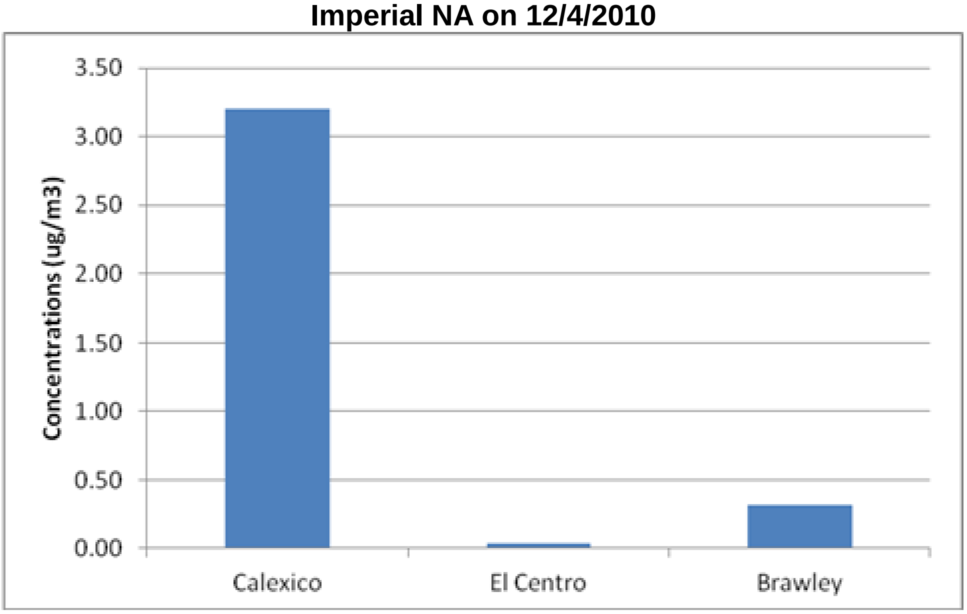
Figure 49. Comparison of Select Species Concentrations on 12/4/2010 to 2010-2012 Winter Average and Annual Average



*This data does include transport days but does not include invalidated days

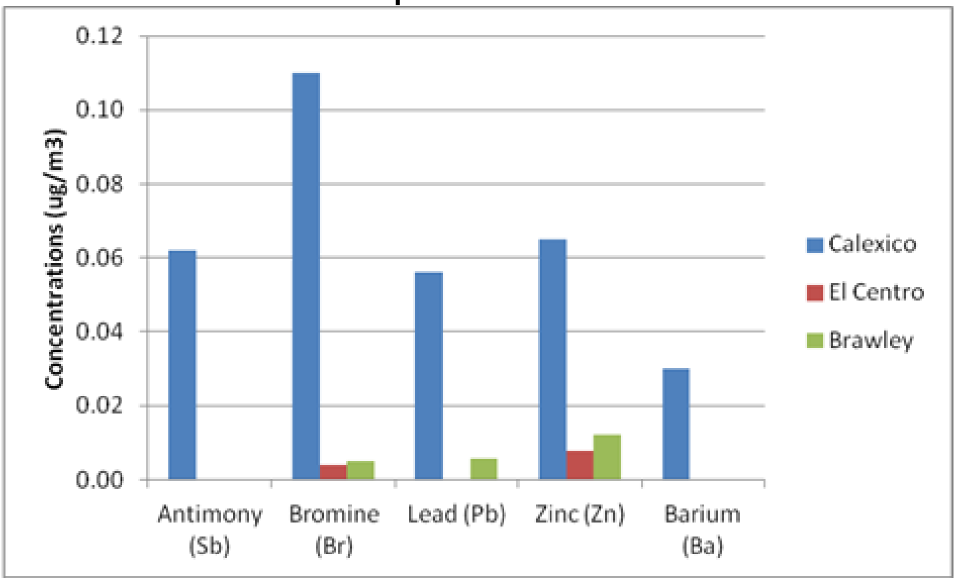
The December 4 data across the Imperial NA reveals that Calexico was the only site with elevated elemental species concentrations. Brawley and El Centro had concentrations below or close to the detection limits (Figures 50 and 51).

Figure 50. Comparison of Chlorine Concentrations Across Imperial NA on 12/4/2010



*This data does include transport days but does not include invalidated days

Figure 51. Comparison of Select Elemental Species Concentrations Across Imperial NA on 12/4/2010

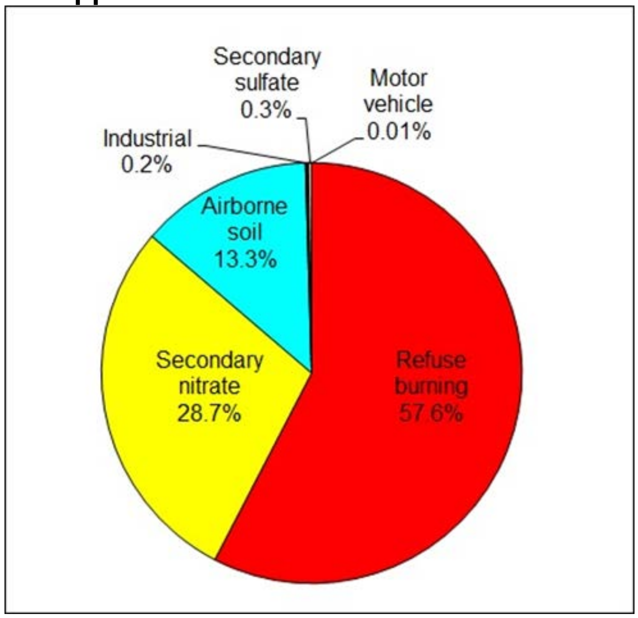


*This data does include transport days but does not include invalidated days

To provide information on possible sources of emissions impacting the Calexico monitor, PM2.5 speciation data were analyzed using a source apportionment model—Positive Matrix Factorization 2 (PMF2). PMF2 is a multivariate receptor model based on the positive matrix factorization (PMF) method. Fundamentally, this model analyzes characteristics of pollutants at the receptor site and, using mathematical algorithms, estimates the source contributions. This model is based on a weighted least square method that weights data points by their analytical uncertainties. A detailed description of the PMF2 model procedure for Calexico is included in Appendix B.

For the PMF2 analysis, a total of 159 samples and 27 species including PM2.5 concentrations collected between 2010 and 2012 were analyzed and six major sources/chemical components were identified: airborne soil, motor vehicle, secondary sulfate, secondary nitrate, refuse burning, and industrial sources. Figure 52 suggests that refuse burning and secondary nitrate were the major sources of emissions on December 4. Refuse burning is estimated to contribute 29.3 µg/m3 of the 50.9 µg/m3 concentration recorded at Calexico. Since refuse burning is not a permitted activity in Imperial County, this impact—coupled with meteorological data presented earlier—is strongly suggestive that these emissions originate from Mexicali.

Figure 52. Source Apportionment PM2.5 Contribution on December 4, 2010



To link results of the PMF2 analysis to specific emitting activities, percentages for refuse burning and industrial emissions were used to estimate the PM2.5 contribution at Calexico on December 4 (Table 12). Without refuse burning emissions, it is likely that concentrations at the Calexico monitor would not have exceeded the 24-hour PM2.5 standard. If industrial emissions from Mexicali are excluded, the concentration on this day decreases further. This decrease is significant given that refuse burning and industrial emissions of the type identified PMF2 are essentially non-existent on the U.S. side of the border in Imperial County, but are known to occur in Mexicali.

Table 12. Contribution of Refuse Burning and Industrial Emissions to PM2.5 Concentrations on December 4, 2010

FRM Concentration	Without Refuse Burning Emissions	Without Refuse Burning & Industrial Emissions
50.9 µg/m3	21.6 µg/m3	21.5 µg/m3

February 5, 2011

Analysis Methods

Consistent with U.S. EPA guidance, staff evaluated the following data to analyze PM2.5 concentrations recorded on the February 5 exceedance day: (1) U.S. EPA PM2.5 Air Quality Index (AQI) map for February 5; (2) the PM2.5 concentration gradient within the Imperial County PM2.5 NA; (3) daily wind rose information; (4) atmospheric mixing height data; (5) local media reports; (6) hourly wind speed and direction data from stations in southern Imperial County for the period of February 3 through February 6, 2011; (7) the relationship between the hourly BAM PM2.5 concentrations, wind speed and wind direction recorded by the Calexico monitor; and, (8) air parcel back-trajectory plots identifying the areas from which emitted PM2.5, contributing to peak hourly impacts on February 5, 2011, was transported to the Calexico and El Centro monitoring sites.

Data not available for this analysis included hourly and daily average PM2.5 concentrations from monitoring stations in Mexicali; clear satellite imagery for detecting smoke from combustion activities; hourly BAM PM2.5 concentrations recorded at the Brawley and El Centro sites; and PM2.5 speciation data for February 3 through February 5. In the absence of speciation data, useful tools like positive matrix factorization (PMF) were also not available for use in this analysis.

PM2.5 Concentrations

On Saturday, February 5, 2011, the Calexico and El Centro filter based monitors recorded 24-hour average PM2.5 concentrations of 80.3 µg/m3 and 36.9 µg/m3, respectively. On the same day, a filter-based monitor at the Brawley monitoring site recorded a 24-hour average PM2.5 concentration of 28 µg/m3. The Calexico PM2.5 data downloaded from the U.S. EPA’s AQS online database included a flag signifying the monitoring technician’s observation of PM2.5 impacts at the monitor from very low temperatures and subsequent burning in Mexicali.

Elevated hourly PM2.5 concentrations at the Calexico station were recorded over a three day period in early February 2011. The observed trend using continuous PM2.5 monitors at Calexico recorded increased PM2.5 concentrations on the night of February 3. Hourly PM2.5 concentrations remained high during the next two days and into the morning of February 6. The AQI value on February 5 was 164 (unhealthy) which was the highest AQI value recorded in Imperial County for 2011 (Figure 53).

Initial discussions with District staff revealed that February 4 and 5 were no burn days; however, open burning was allowed on February 3. On February 3, a total of 925 agricultural acres were burned along with a much smaller number of acres on non-agricultural lands. No burning violations or complaints were recorded by the District during those days. Figure 54 shows the locations of all of the February 3, 2011 agricultural burns (in green) and miscellaneous burns (in red) for which permits were issued and post-burn reports were submitted. Ignition times for the agricultural burns were reported to be between noon and 2:30 pm. The non-agricultural burns were reported to have ignition times between 10:00 am and 3:00 pm and most were reported to be 1 to 2 piles in size. Although there were a number of pile burns near the Brawley monitor, the PM2.5 values recorded on February 3 were below the standard at this station. The yellow tacks on Figure 53 show the locations of PM2.5 monitors. The agricultural burning conducted on February 3 may have contributed to increased background PM2.5 concentrations throughout the valley on February 4 and 5, but ARB staff does not believe these fires were the primary cause of the exceedances.

A review of meteorological data collected at the Calexico site indicates that the lowest nighttime temperature during the 2010-2011 winter was recorded in the early morning of February 3, 2011. Low temperatures were also recorded in the early morning hours of February 4 and 5, 2011. These low temperatures occurred in combination with low wind speeds, resulting in stagnant conditions on these nights in Imperial County. These stagnant conditions, more than agricultural burning, were the likely key factor resulting in elevated concentrations on February 5. In addition, increased rates of fuel combustion for residential heating and outdoor fires in Mexicali were documented in one of the city's local newspapers *La Cronica*.

Figure 53. Daily Peak AQI Map on February 5, 2011

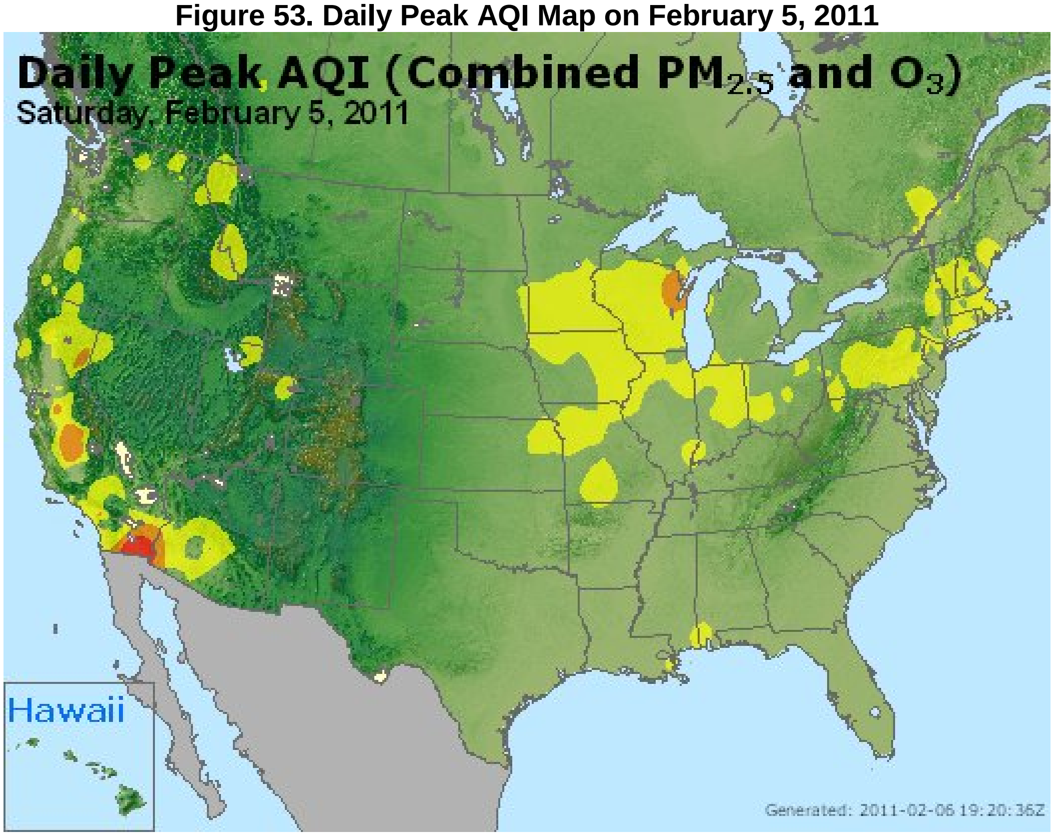


Figure 54. Agricultural and Pile Burns in Imperial County on February 3, 2011

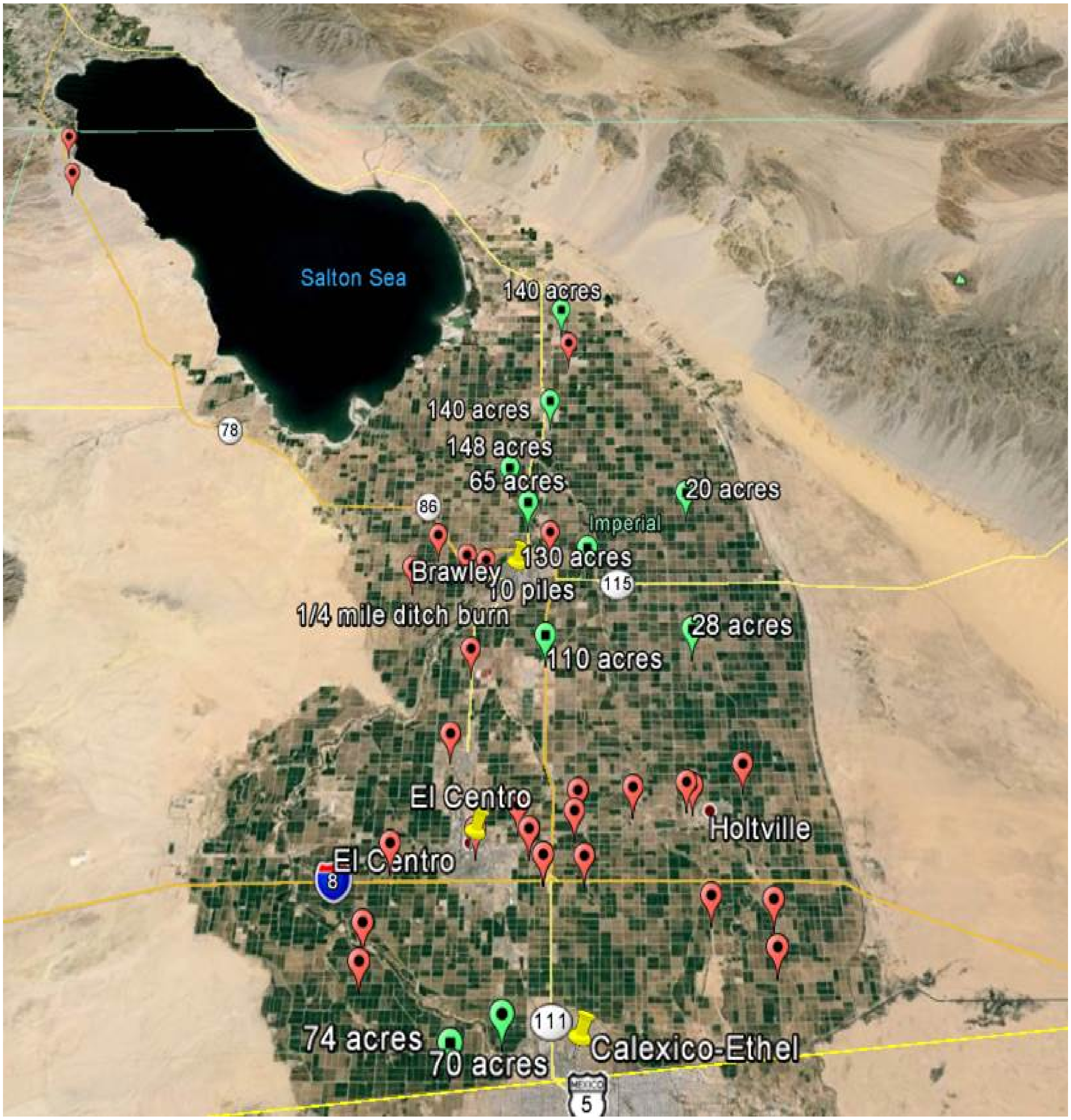
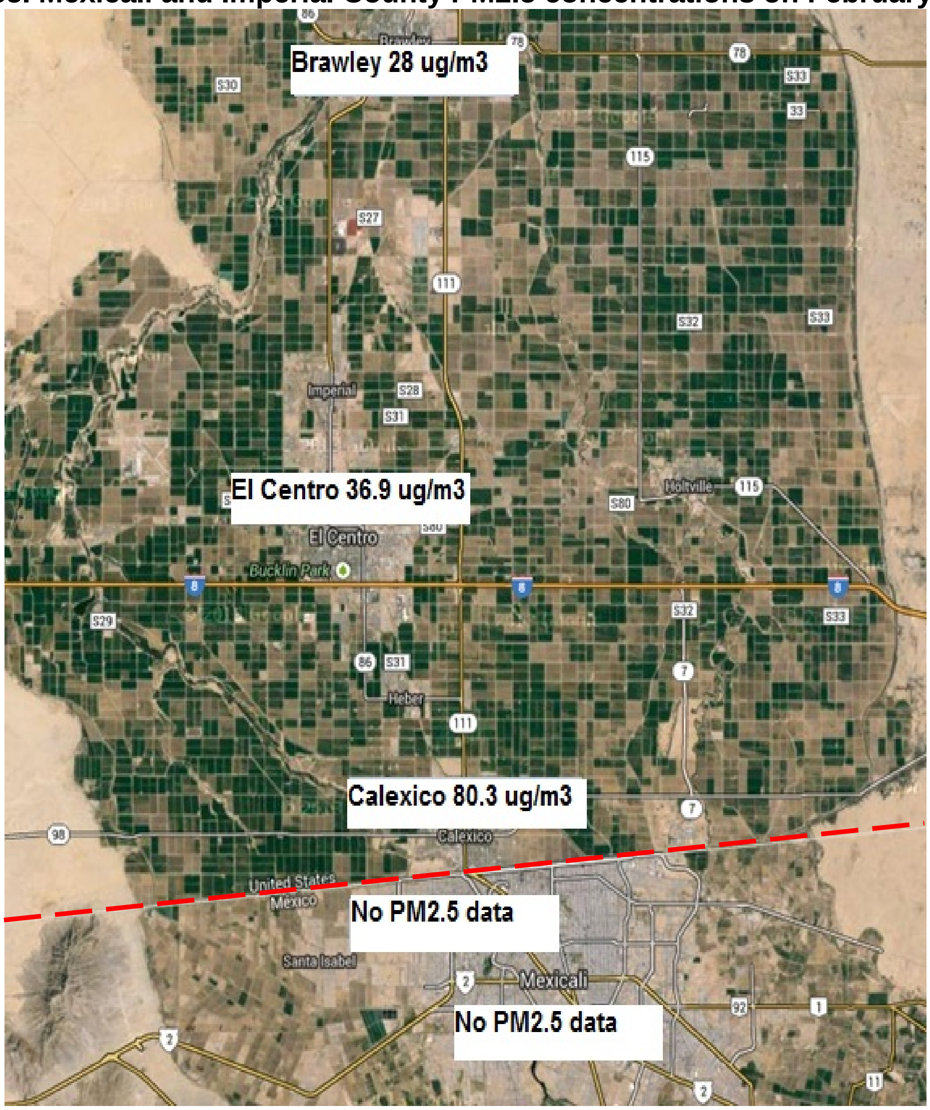


Figure 55 shows the spatial distribution of 24-hour average PM2.5 concentrations recorded at each monitoring site in the Imperial NA on February 5. The 80.3 µg/m3 concentration measured at Calexico was nearly six times the annual average for that site in 2011. Notably, the 80.3 µg/m3 measurement on February 5, 2011 was an outlier from the 2010-2012 data stream as it was more than nine standard deviations above the mean value at this site recorded in those years.

The strong PM2.5 concentration gradient from the Calexico monitor to the Brawley and El Centro sites to the north suggests that the emissions impact on the Calexico monitor differs substantially from the impact experienced by the Brawley and El Centro monitors. As with the analysis for December 4, with similar sources and meteorology, the expectation is that PM2.5 concentrations measured at Calexico, El Centro, and Brawley would be similar. The decreasing PM2.5 concentration gradient northward suggests the predominance of a high emission source area to the south of the Calexico station. Although the El Centro site exceeded the 24-hour PM2.5 standard on this day, the concentration at Calexico was more than twice the concentration measured at El Centro.

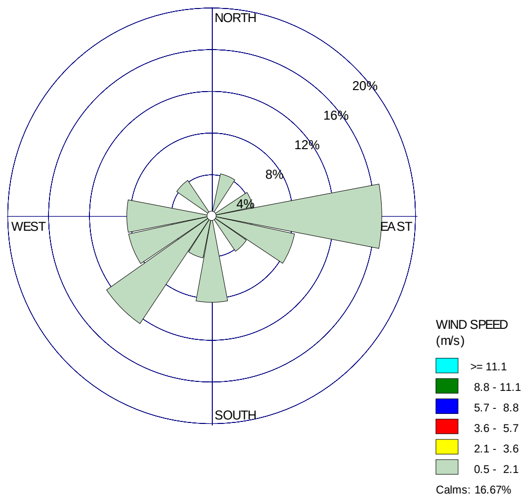
Figure 55. Mexicali and Imperial County PM2.5 concentrations on February 5, 2011



Meteorology

Meteorological data collected at the Calexico monitoring site confirm that stagnant surface conditions occurred throughout the day on February 5. The 24-hour average resultant wind speed at Calexico was 0.6 mps and the maximum was 1.5 mps. In addition, the majority of the hourly wind directions were from the south (16 out of 24 hourly measurements). Winds were calm on this day in Calexico as shown in the February 5 wind rose (Figure 56).

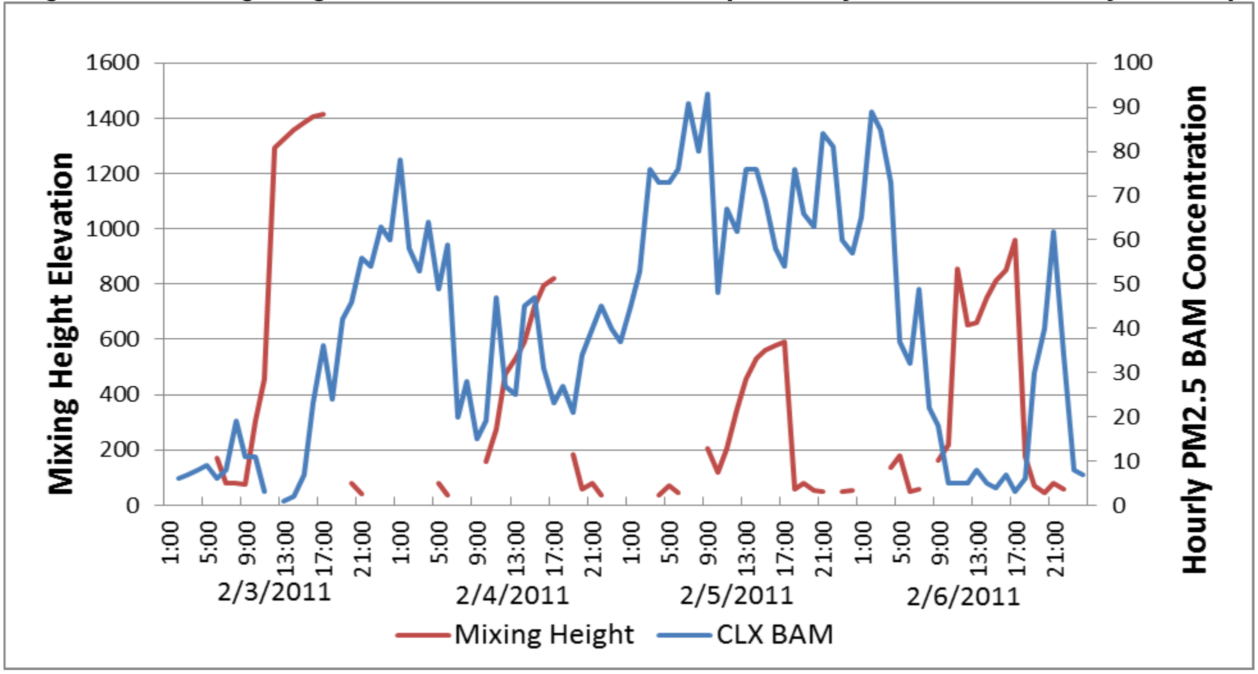
Figure 56. Wind Rose on February 5, 2011



Staff evaluated the relationship between atmospheric mixing heights and PM2.5 concentrations recorded on February 5. The nearest radiosonde data collection sites to Calexico are Yuma, Arizona, and Tucson, Arizona. Both of these locations have climatology similar to that of Calexico. Both sites also reported incomplete mixing height datasets for February 5, but the Tucson dataset was more complete (18 hours) than the Yuma dataset (13 hours) on this day. For those hours during which sufficient measurement data existed at both sites to calculate mixing heights, the mixing heights were very similar to each other. Data from Tucson were used to generate a plot of hourly mixing heights over a three day period that includes the February 5 exceedance.

Figure 57 displays the Tucson mixing height estimates and hourly Calexico PM2.5 BAM measurements for February 3 through February 6, 2011. The overall trend over the four day period shows an inverse relationship between mixing height and concentrations. Similar to the December 4 exceedance day mixing height trend, this plot suggests that stagnant meteorological conditions occurred during this period, which is corroborated by the very low surface wind speeds recorded and supports the concept that emissions from Mexicali mixed with those of Calexico to produce higher PM2.5 concentrations than would have been observed in the absence of emissions from Mexico.

Figure 57. Mixing Height and BAM Concentrations (February 3, 2011 – February 6, 2011)



Analysis of the Event

At the end of January and the beginning of February, a low pressure trough was situated just east of Calexico. This trough maintained a west-to-east pressure differential that caused resultant hourly wind speeds at Calexico to average approximately 2.2 mps, with maximum hourly wind speeds up to 5.1 mps. 24-hour average PM2.5 concentrations at the Calexico BAM monitors were low, less than 10 µg/m3. On February 3, the low pressure trough moved eastward and its place was taken by the edge of the Pacific high pressure cell. Hourly wind speeds dropped to less than 0.9 mps and temperatures dropped at night. This created stagnant meteorological conditions that prompted the District to declare a ban on agricultural burning for February 4 and 5.

PM2.5 concentrations began to rise at the Calexico monitoring station after 2:00 pm on February 3, coincident with a slight increase in wind speeds and a shift in a general direction from southeast to southwest. Concentrations remained elevated throughout the day, reaching a maximum of 69 µg/m3 at 10 pm. A portion of the PM2.5 concentration rise at this time may have been due to the burning of 143 acres of hay stubble just west of Calexico earlier that day.

As noted earlier, February 3 was the coldest day of 2011 in Imperial County. Calexico's temperature dropped to 32° F while the El Centro Naval Facility recorded 21° F. Accuweather.com reported a freeze in Imperial County on February 3 and 4. Figure 58 discusses the damage to the winter vegetables and fruit in Imperial County from the sub-freezing temperatures. The low temperatures in the morning hours of February 4 were generally a few degrees warmer than those of the previous night and nighttime temperatures continued to rise—at most monitoring sites in Imperial County—by 10 degrees or more by February 6. This temperature trend supports the concept that cold, stagnant air creates conditions conducive to the formation of elevated PM2.5 levels in the Imperial NA, heavily influenced by emissions originating from south of the border.

Figure 58. **Another Freeze for the Imperial Valley, Other Agricultural Areas**

Another Freeze for the Imperial Valley, Other Agricultural Areas

February 4, 2011; 6:02 AM ET

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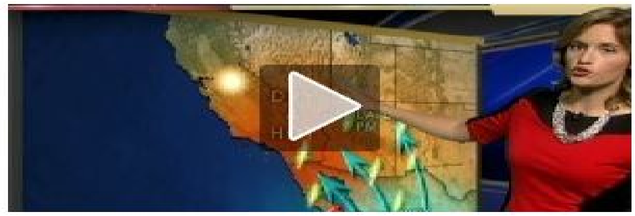


Temperatures dipped close to all-time record lows in a number of locations over the Imperial Valley of California and other agricultural areas Thursday morning, with another freeze occurring Friday morning.

El Centro dropped to 19 degrees Thursday morning, one degree shy of their all-time record low of 18 degrees set in Jan. 4, 1949. El Centro did set their all-time lowest February record, shattering the old record of 24 set on Feb. 12, 1965.

Multiple hours of sub-freezing temperatures were experienced in not only the Imperial Valley, but also the Gila Valley of California and in the lower Colorado Valley of Arizona.

Photo by photos.com

There undoubtedly was some damage to these areas Thursday morning and more sub-freezing temperatures were beginning to occur early Friday morning, but not quite to the severely low levels just 24 hours earlier.

These regions produce winter vegetables and fruit to the U.S. and other areas.

South Texas has also been hit with sub-freezing temperatures recently. In fact, part of the lower Rio Grande Valley never recovered to the freezing mark Thursday, after dipping into the upper 20s Thursday morning.

While clear skies at night were contributing to the low temperatures in the Southwest, including sub-zero readings in Arizona, cloud cover and a "norther" were contributing to the freeze in Texas.

The extent of the damage from these freezes is not yet known, but it could impact prices at your local grocery store in the coming weeks, if the supply of quality fruit and vegetables is reduced or has to be retrieved from more distant locations.

The cold weather did not hit the Central Valley of California nearly as hard with low temperatures generally at or above the freezing mark. Temperatures have remained and should continue to remain well above cold levels in central and southern Florida in the coming days and weeks.

After a cold start, temperatures will rebound markedly over the Southwest by this afternoon, but a slower temperature recovery is in store for South Texas with more record cold in store Saturday morning in the lower Rio Grande Valley.

The relatively low temperatures recorded on February 3, 2011, resulted in an increase in residential space heating and outdoor fires which produced emissions that likely continued as nighttime minimum temperatures remained below 40° F through February 5. Documentation of this activity is contained in an article published on February 5 in the Mexicali newspaper, *La Cronica*. Figure 59 discusses how people in Mexicali began burning very early in the morning for comfort heat. This burning activity, together with the very low mixing height estimated, may have produced the abrupt increase in PM2.5 concentrations seen after midnight on the morning of February 5.

Figure 59. Mexicali newspaper article published on February 5, 2011 regarding freezing temperatures and burning "Improved Climate after Passage of Cold Front"

Sábado
5 de febrero de 2011

En la colonia Agualeguas, Alejandra Martínez y María, madre e hija, se levantaron muy temprano a encender una fogata para calentarse un poco, luego de una noche muy fría.

Mejorará clima tras paso de frente frío

Las condiciones climatológicas mejoraran considerablemente en la región tras el paso de un frente que trajo heladas para Mexicali y el Valle, informó Enrique Dávalos.

El técnico de Meteorología de la Universidad Autónoma de Baja California (UABC) mencionó que para este fin de semana se incrementan las temperaturas, además que habrá días despejados, vientos débiles.

Explicó que la helada que se registró el jueves, se debió a que en el Estado había un sistema frontal que no estaba tan fuerte pero en combinación con un frente continental ocasionó las heladas.

"Fue un frío muy seco, sin lluvias que provocó heladas, no nevadas, el agua se pude congelar de los 4 grados para abajo y ése fue el fenómeno que se vivió con algunos congelamientos de árboles, fuentes y agua", apuntó.

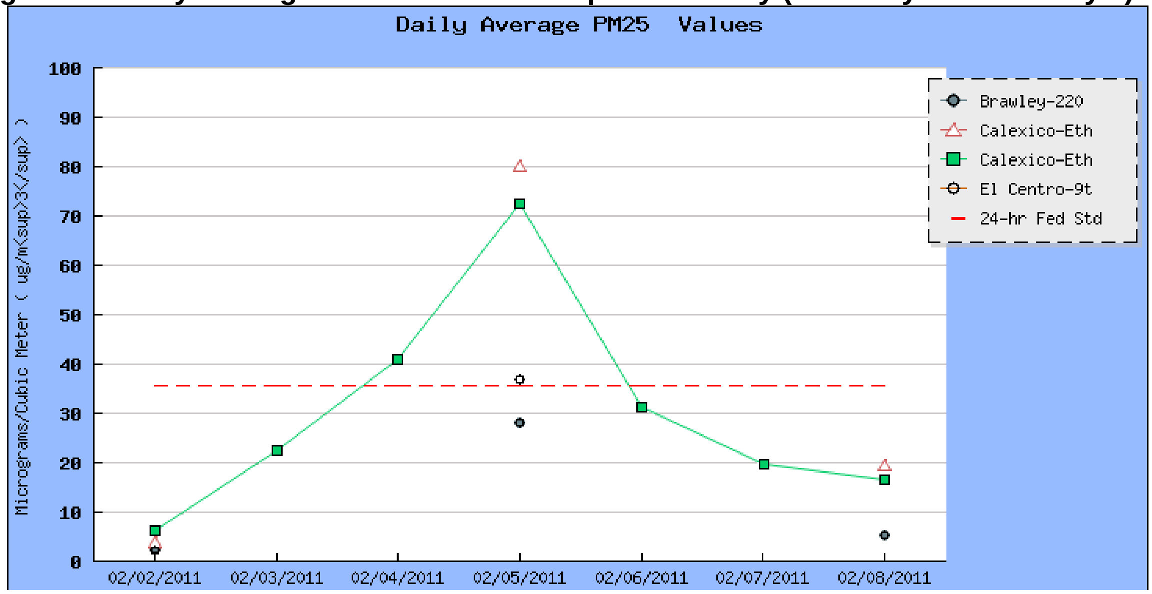
La temperatura del jueves que se registró durante la madrugada ha sido la más baja en lo que va del año y fue de 1.5 grados centígrados, mientras que el viernes la más baja fue de 2.8 grados centígrados.

Para hoy sábado se espera un día soleado con algunas nubes, además de temperaturas mínimas de 8 grados centígrados y máximas de 24; mientras que para el domingo el termómetro podría alcanzar mínimas de 10 grados centígrados y máximas de 27.

– POR YADIRA MURILLO

Figure 60 shows the daily PM2.5 concentration data recorded between February 2 and February 8, 2011. The data show lower PM2.5 values at the El Centro and Brawley sites with somewhat elevated concentrations on February 5. This pattern is consistent with the spatial gradient shown in Figure 55 and suggests that emissions from south of the border may be influencing measurements further to the north. The plot indicates consistency between the FRM measurements at Calexico and non-FEM BAM measurements at Calexico on February 5 as well as on February 8. The BAM value on February 5, for example, was 69 μg/m3, relatively close to that day's FRM value of 64.7 μg/m3.

Figure 60. Daily Average PM2.5 Values in Imperial County (February 2 – February 8)



*POC1 is on a 1-in-3 day sampling schedule and POC3 records hourly data

The wind direction on February 5, 2011 was predominantly from either a southern direction or too calm to determine. BAM PM2.5 concentrations remained high throughout the day, regardless of the wind speed, which averaged 0.6 mps, or the direction, which was predominantly from the south. The AQI classification was increased to Unhealthy. All hourly PM2.5 concentrations on February 5 at the Calexico site were above 40 µg/m^3 and reached as high as 103 µg/m^3. Concentrations did not begin to significantly decrease until after 9 pm, the same time that the wind speed increased to almost 1.8 mps and shifted from south to north.

February 6, 2011 began with high hourly PM2.5concentrations for the first five hours. These concentrations reached 90 µg/m3 but decreased rapidly to 5 µg/m3 by 9:00 am as wind directions shifted toward the north, wind speeds increased to 3.0 mps, and temperatures increased to above 70 degrees—evidence also that mixing heights had risen dramatically. Under these meteorological conditions, hourly PM2.5 concentrations remained below 10 µg/m^3 for the remaining daylight hours. A drop in wind speeds and onset of falling mixing heights after 5:00 pm was accompanied by a sharp, but short-lived, rise in PM2.5 concentrations. The 24-hour average PM2.5 concentration, although high, remained below the NAAQS.

Wind speed and wind direction data were plotted with the BAM PM2.5 concentration measurements from February 3 through February 6. These data show that low wind speeds, particularly in the early morning hours, are correlated with higher PM2.5 concentrations (Figure 61). Generally, the highest concentrations on February 5 were seen under a combination of southerly flow conditions (79 – 272 degrees) (Figure 62) and calm to low winds.

Figure 61. PM2.5 BAM vs. Wind Speed at Calexico on February 3 – February 6

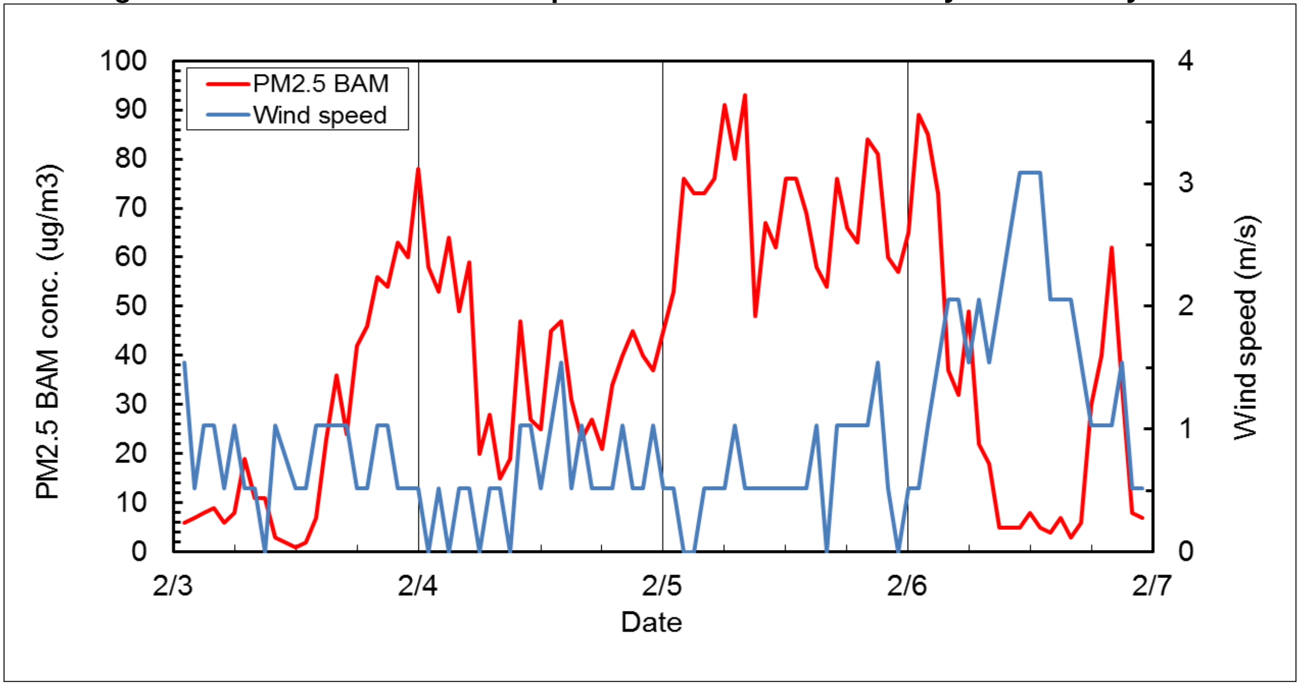
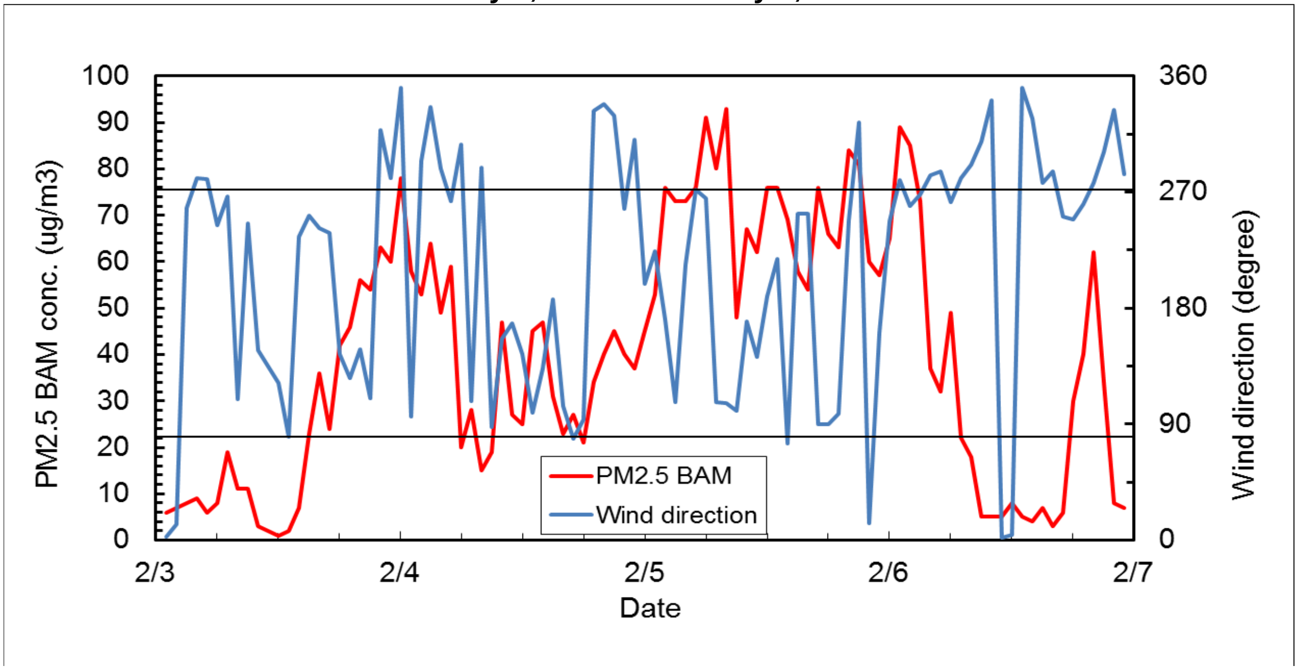


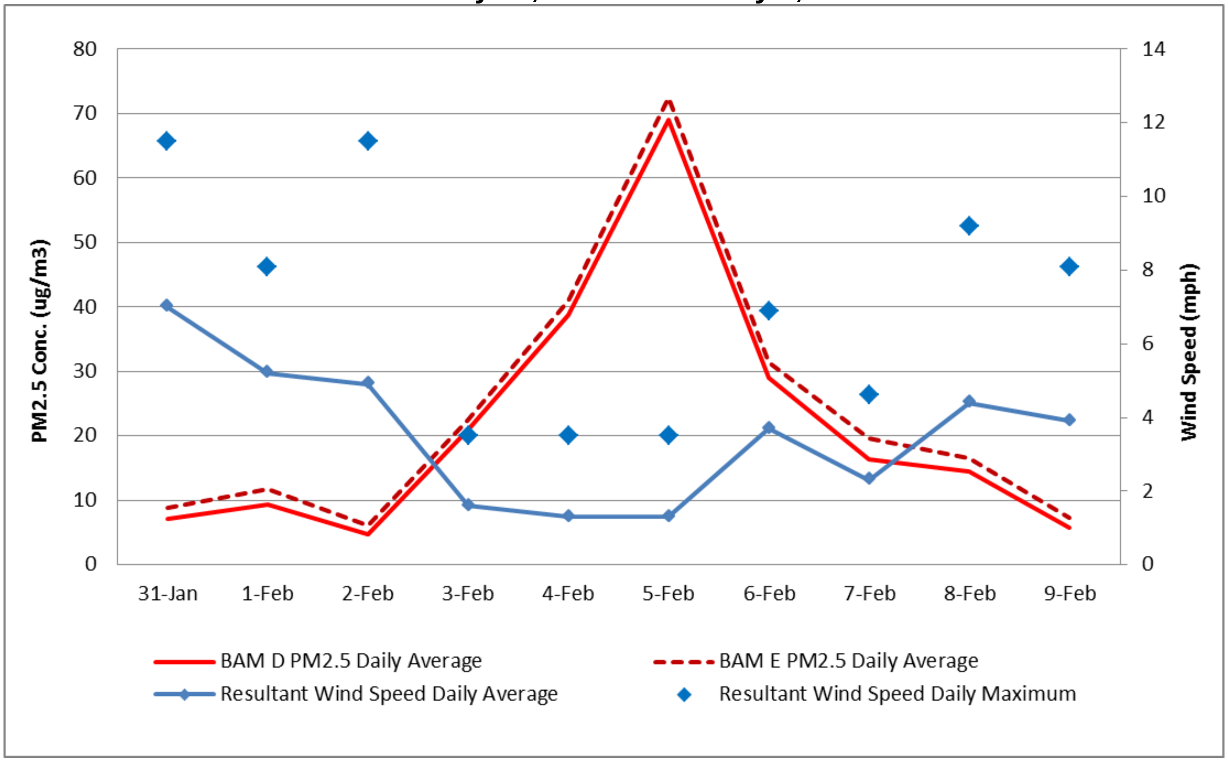
Figure 62. PM2.5 BAM vs. Wind Direction at Calexico on February 3, 2011 – February 6, 2011



*79-272 degree winds are from the south. 273-78 degree winds are from the north.

Figure 63 shows the daily average PM2.5 BAM concentrations, daily average resultant wind speed (mph) and daily maximum resultant wind speed for January 31 through February 9. When the maximum and average wind speed decreased on February 3 through February 5, the BAM values increased. As wind speeds increased after February 5, concentrations began to decline.

Figure 63. Calexico Wind Speeds and PM2.5 Concentrations
January 31, 2011 – February 9, 2011



The back trajectory developed for February 5, 2011 started at the hour of the highest BAM PM2.5 concentration and traced the pollution back to 1:00 am and noon on February 4, 2011 (for Calexico and El Centro). The air parcel that impacted the Calexico site at 8:00 am on February 5 were in Mexicali in the early morning hours of February 5 and the late night hours on February 4 when concentrations were elevated (Figure 64). Figure 65 displays the back trajectory for El Centro. The El Centro site was 1.9 µg/m3 over the 24-hour PM2.5 standard and, although the trajectory does not pass into Mexicali, it is reasonable to assume that this site was likely impacted by 1) agricultural burning that occurred in Imperial County two days prior; 2) low temperatures on February 5; 3) a low mixing height inversion; and, 4) emissions transport from Mexicali.

Figure 64. February 5 Calexico air parcel back-trajectory (Starting at 1:00 am on 2/4/11 and ending at 8:00 am on 2/5/11)

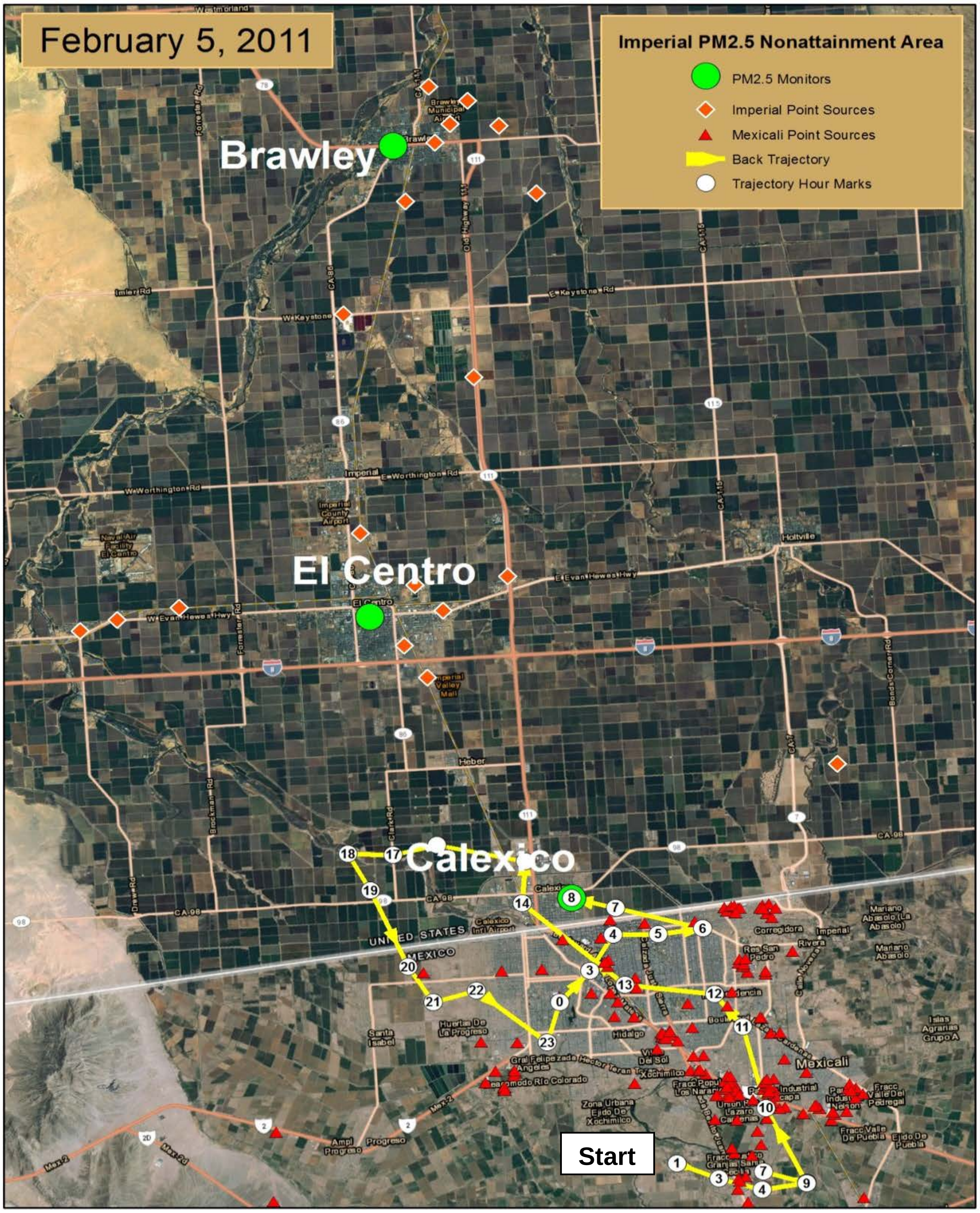
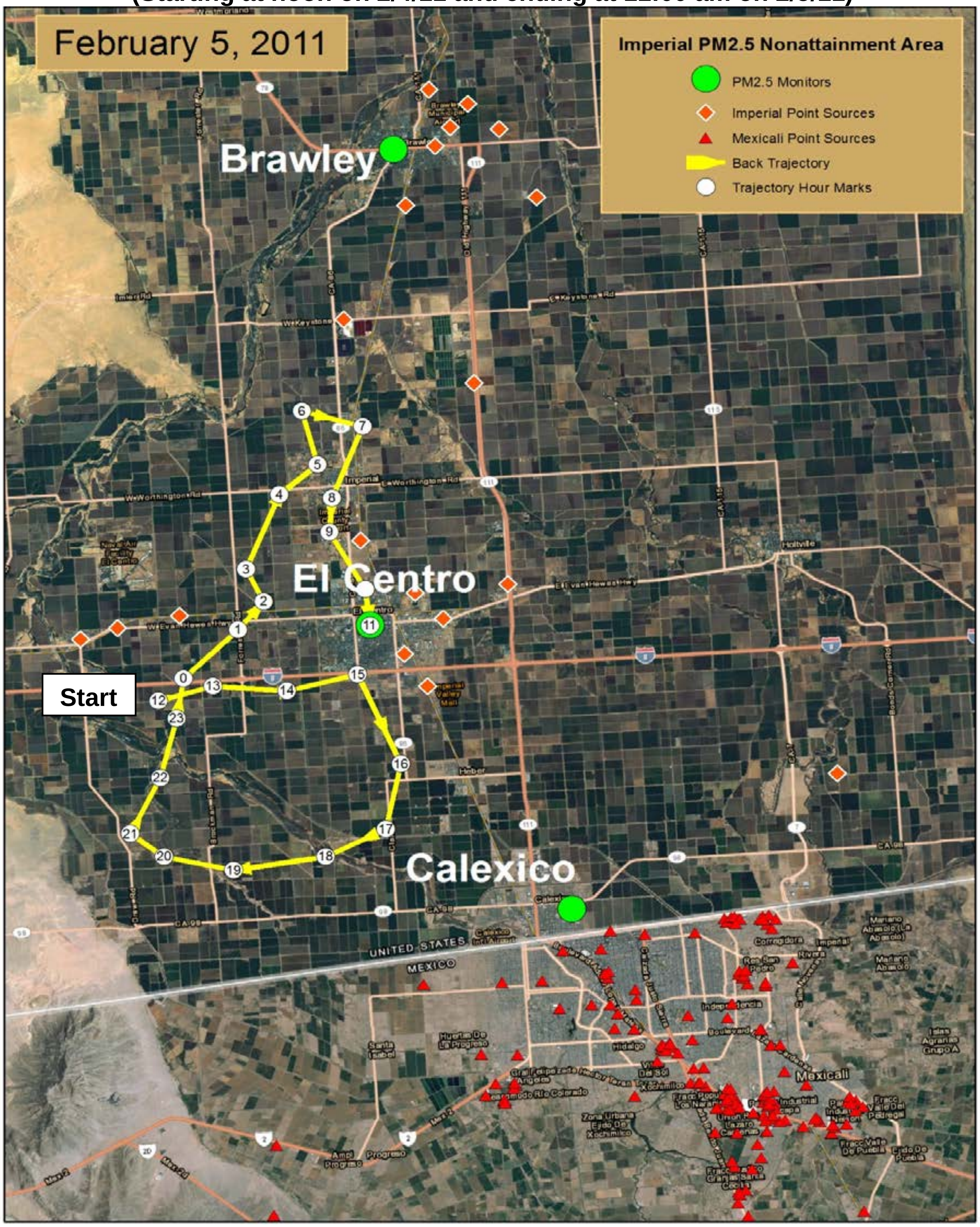


Figure 65. February 5 El Centro Air Parcel Back-trajectory (Starting at noon on 2/4/11 and ending at 11:00 am on 2/5/11)



December 11, 2011

Analysis Methods

Staff evaluated the following data for December 11, 2011: (1) PM2.5 concentration gradient within the Imperial County NA and Mexicali; (2) predominant wind speed and wind direction in Calexico; (3) mixing height data for December 9 through December 12; (4) local media reports; (5) changes in the hourly BAM PM2.5 concentrations with the wind speed and direction; (6) air parcel back-trajectory starting at the hour of highest concentration at the Calexico site; (7) speciation data to aide in identifying the major components of PM2.5, including a further breakdown of elemental species; and, (8) a quantification of the emissions impact on concentrations at the Calexico site for chemical species.

Data not available for this analysis include; half of the hourly PM2.5 data at the Mexicali sites; satellite imagery (obscured by clouds); and the PM2.5 BAM data for Brawley and El Centro. However, hourly PM2.5 data coupled with meteorological data, speciation data, and a back-trajectory analysis, provide evidence that the Calexico monitor would not have recorded an exceedance of the 24-hour NAAQS but for emissions from Mexicali on December 11.

PM2.5 Concentrations

On Sunday, December 11, the Calexico FRM monitor recorded a 24-hour average PM2.5 concentration of 44.4 µg/m3. From filter-based measurements, PM2.5 concentrations at the El Centro and Brawley monitoring sites were 13.7 and 10.2 µg/m3, respectively. The AQI value on this day was 123 (unhealthy for sensitive groups) and was the third highest AQI value recorded in Imperial County for 2011. As shown in Figure 66, a high value was only recorded at Calexico, further indicating it was not a region-wide event.

The PM2.5 concentration was more than half the measured PM10 concentration on December 11, suggesting that the PM impact was largely influenced by combustion sources. Agricultural burning was not permitted and did not occur in Imperial County on December 9, 10, or 11, and no burning violations or complaints were received during those days. Although not all of the combustion emissions are expected to originate from Mexicali, the combination of the magnitude of the emission inventory in Mexicali, the number of stationary sources in Mexicali, the number and age of motor vehicles in Mexicali, and the lack of agricultural burning in Imperial County implies that most of the combustion emissions originated from outside the County.

Figure 66. Daily Peak AQI Map on December 11, 2011

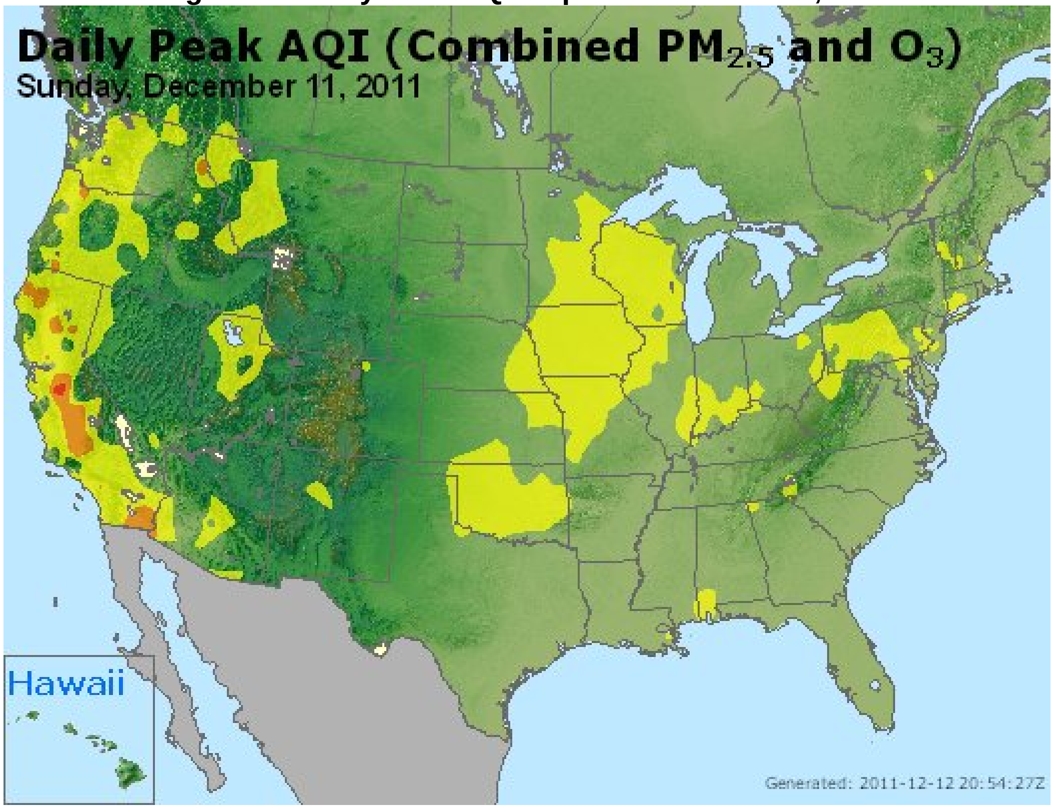
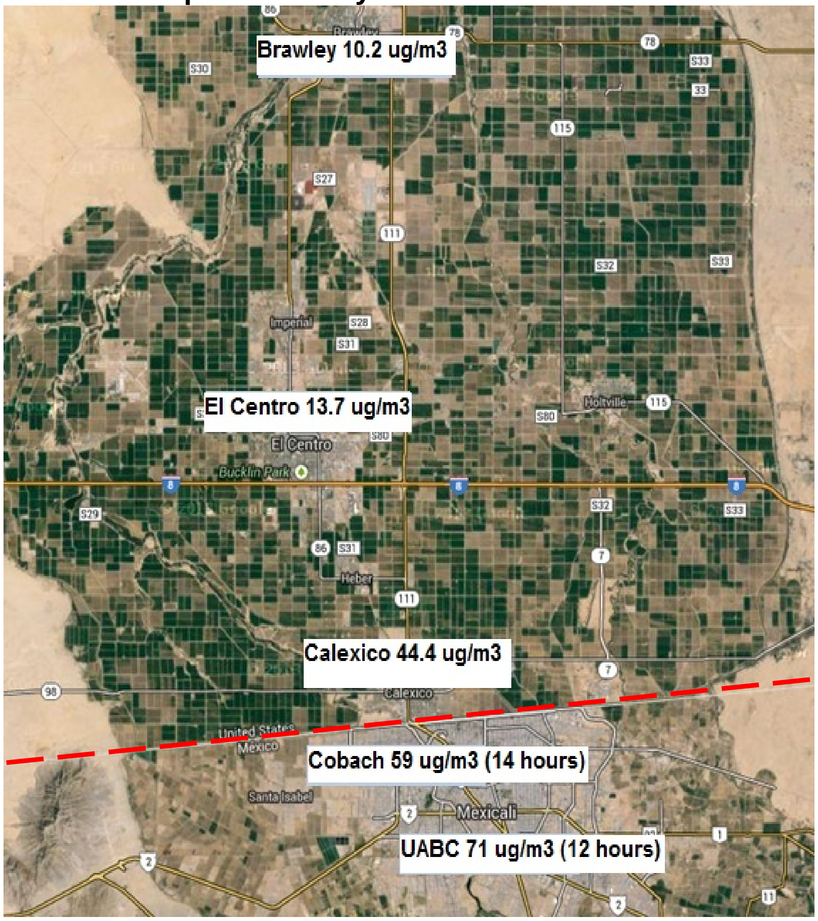


Figure 67 shows the spatial distribution of 24-hour average PM2.5 concentrations recorded at each monitoring site in Imperial County on December 11. The 44.4 µg/m³ concentration measured at Calexico was more than three times the annual average for that site in 2011. The PM2.5 concentration gradient from the Calexico monitor to the Brawley and El Centro sites to the north suggests that the emissions impact on the Calexico monitor differs from any impacts experienced by the Brawley and El Centro monitors.

The COBACH and UABC sites in Mexicali recorded partial data on December 11 (COBACH recorded an average of 59 µg/m3 over 14 hours; UABC 71 µg/m3 over 12 hours). The PM2.5 concentrations drop off significantly between Mexicali and Brawley. With similar emission sources and meteorology, the expectation is that PM2.5 concentrations measured at Calexico, El Centro, and Brawley would be similar. The decreasing gradient northward is consistent with the Calexico-Mexicali single air shed concept and points to cross-border emissions as the source of high concentrations measurements at Calexico.

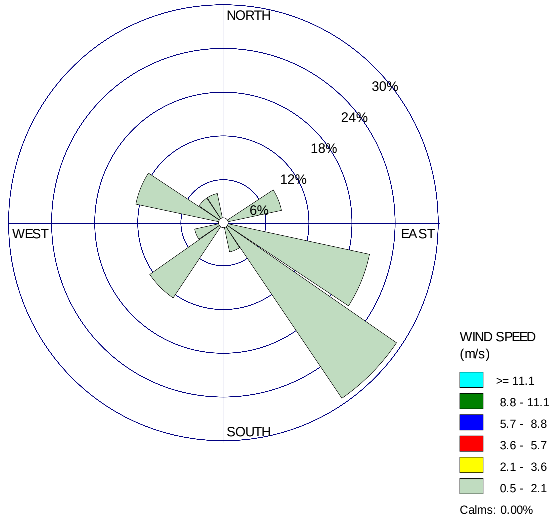
Figure 67. Mexicali and Imperial County PM2.5 concentrations on December 11, 2011



Meteorology

Meteorological data collected at the Calexico monitoring site confirm that stagnant surface conditions occurred throughout the day on December 11. The 24-hour average wind speed at Calexico was 1.1 mps and the maximum was 2.0 mps. In addition, the majority of the hourly wind directions were from the south (17 out of 24 hours). Winds were calm on this day in Calexico as shown in the December 11 wind rose (Figure 68)

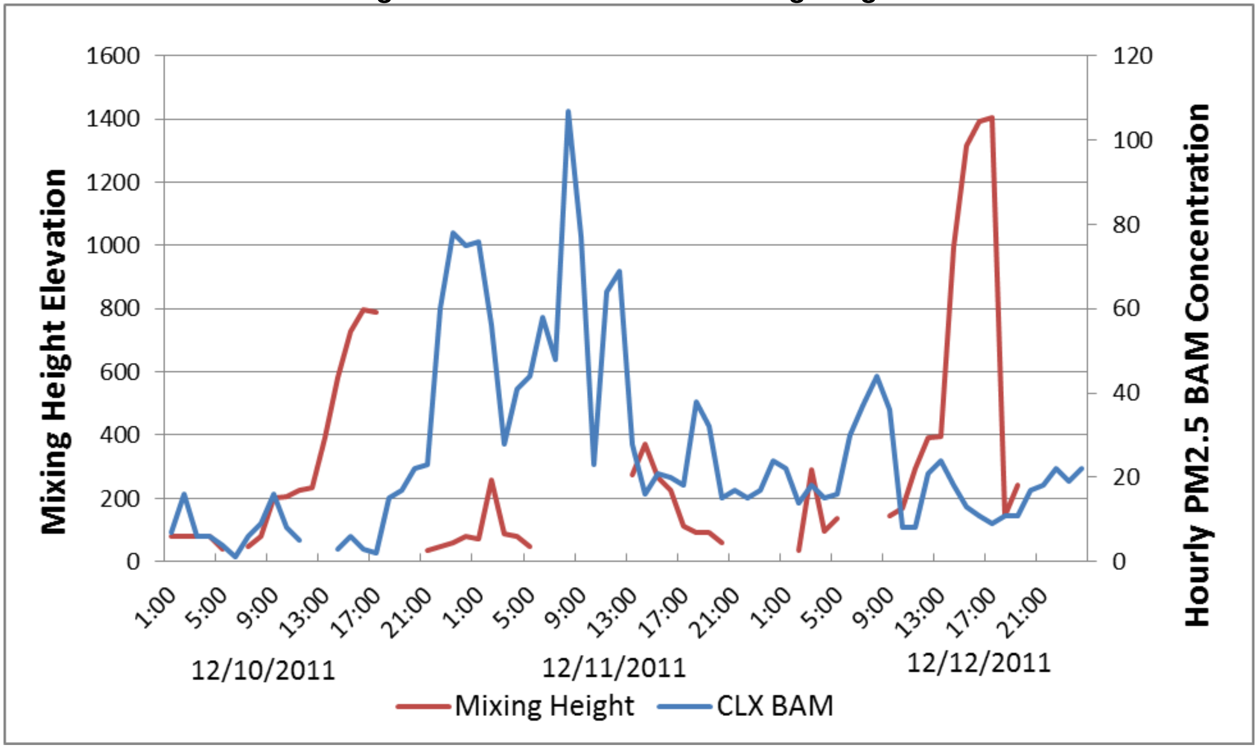
Figure 68. Wind Rose on December 11, 2011



To further characterize meteorological conditions on December 11 which may have influenced PM2.5 concentrations measured at the Calexico station, staff evaluated data on atmospheric mixing height and its correlation with PM2.5 mass data. The nearest routine data collection points to Calexico for radiosonde data are Yuma, Arizona, and Tucson, Arizona. Both of these locations have topography similar to that of Calexico. Yuma data were incomplete for December 11, data from Tucson were therefore used to generate a plot of hourly mixing heights over a three-day period that includes the December 11 exceedance.

Figure 69 displays the mixing height and hourly PM2.5 BAM measurements at Calexico. While data gaps exist for the atmospheric soundings, the overall trend over the three day period shows an inverse relationship between mixing height and concentrations. Decreasing mixing height corresponds to increasing PM2.5 concentrations as low vertical mixing confines pollutants. This plot corroborates surface wind data and supports the concept that emissions from Mexicali, confined to the Calexico-Mexicali air shed with reduced pollutant dispersion due to low wind speed and reduced mixing height, resulted in higher PM2.5 concentrations on December 11 than would have been observed in the absence of emissions from Mexico.

Figure 69. PM2.5 BAM vs. Mixing Height



<u>Analysis of the Event</u>

The December 11 exceedance occurred on a Sunday, the day before a major religious holiday in Mexico ("Our Lady of Guadalupe") on December 12. During the prior week, thousands of residents of Mexicali gather less than three miles from the Calexico air monitoring station for the celebrations. As with other religious celebrations in Mexico, merchants will typically set up booths in the area, attracting crowds with merchandise, food, and entertainment, along with customary bonfires and fireworks. Unusually high levels of PM2.5 are noted each year in Mexico on December 11 and 12 as a result of firework shows, the higher volume of vehicular traffic, and the burning of wood, tires, and garbage in bonfires. It is appropriate to assume that most of the festivities occurred over the weekend prior to the December 12 holiday and that these activities resulted in elevated ambient PM2.5 concentrations in and around the border region.

Figure 70 is an article published in 2013 in the local Mexicali newspaper, *La Cronica*. The article discusses the typical holiday celebrations for the winter, including the use of fireworks (*quema del castillo*).

Figure 70. La Cronica Article "Everything is ready to celebrate the Day of the Virgin"

Está todo listo para celebrar el Día de la Virgen

El mismo miércoles, a partir de las 22:00 horas iniciará el programa especial guadalupano y las Mañanitas a la Virgen, seguidas de la y misa solemne que será presidida por el obispo de la Diócesis de Mexicali, José Isidro Guerrero Macías a las 23:00 horas.

Publicada: 11/12/2013 1:20 Por: Martha Sánchez msanchez@lacronica.com A+ AUMENTAR A− REDUCIR

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MEXICALI, Baja California(PH) Como ya es tradición, la Catedral de Nuestra Señora de Guadalupe tiene todo preparado para la típica celebración mañana del Día de la Virgen de Guadalupe.

La celebración comenzará este miércoles 11 y concluirá hasta la noche del jueves, integrando las diferentes tradiciones, que los miles de asistentes esperan, en esta que es una de las fiestas principales de los católicos mexicanos.

El programa marca como actividad inicial el miércoles 11, una "fiesta popular", en la que se presentarán bailables, solistas y grupos locales de las 18:00 a las 23:00 horas, mientras que las escenificaciones de las apariciones, tendrán dos horarios a las 19:00 y las 21:00 horas.

El mismo miércoles, a partir de las 22:00 horas iniciará el programa especial guadalupano y las Mañanitas a la Virgen, seguidas de la y misa solemne que será presidida por el obispo de la Diócesis de Mexicali, José Isidro Guerrero Macías a las 23:00 horas.

A partir del jueves 12 de diciembre, los cachanillas católicos podrán asistir a las celebraciones de la Santa Misa, que se realizará cada hora de las 06:00 a las 13:00 horas y de las 16:00 a las 21:00 horas.

El jueves 12 también se llevará a cabo la Misa de las Rosas, la cual se tiene programada a las 11:00 horas y la Misa del Seminario a las 19:00 horas, mientras que durante todo el día se celebrará un kermés.

Durante la kermés en la que se venderán antojitos mexicanos y habrá juegos mecánicos y diversiones para toda la familia, también se contará con un escenario en el que se desarrollarán, bailables y cantarán solistas y grupos locales de 11:00 a 22:00 horas.

Como última actividad a desarrollarse, a las 22:00 horas se tiene programa la típica quema del castillo, en la que se espera participen las cientos de familias que se espera.

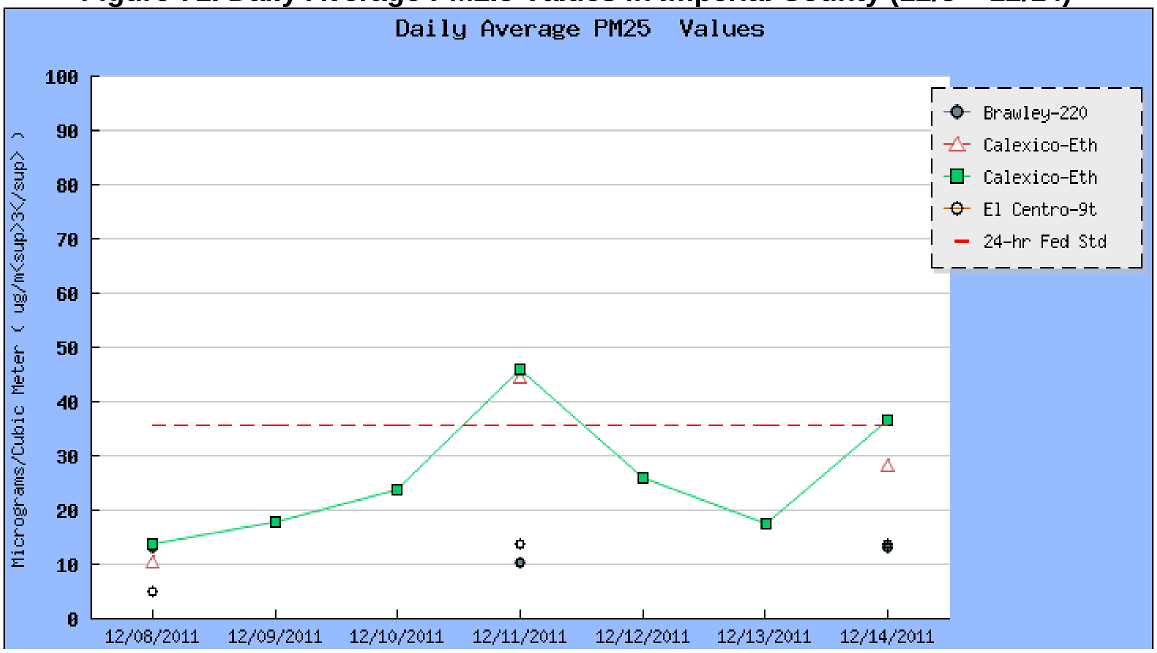
http://www.lacronica.com/EdicionEnLinea/Notas/Noticias/11122013/785016-Esta-todo-listo-para-celebrar-el-Dia-de-la-Virgen.html

To place Calexico PM2.5 values in the context of the Imperial NA's other PM2.5 monitoring sites, Figure 71 shows the daily and hourly PM2.5 concentration data measured from December 8 through December 14. The data show lower PM2.5 values at the El Centro and Brawley sites with somewhat elevated concentrations on December 11. This pattern is consistent with the spatial gradient shown in Figure 67 and suggests that emissions from south of the border may be influencing measurements further to the north. The plot also illustrates the consistency between the FRM measurements at Calexico (POC 1) and non-FEM BAM measurements at Calexico (POC 3) on December 11 as well as on December 14. The BAM value on December 11, for example, was 39.7 µg/m3, consistent with that day's FRM value of 44.4 µg/m3.

The continuous PM2.5 monitors at Calexico began recording increased PM2.5 concentrations after 4:00 pm on December 10 when the wind direction shifted from a northern to a southern direction. Concentrations peaked at 10 pm and remained high the morning of December 11, dropping only when winds briefly shifted from south to north. A peak PM2.5 concentration at 8:00 am of 107 µg/m3 occurred with a wind direction shift from southwest to south, with a further decrease in wind speeds. A wind shift to the north saw concentrations again decreasing, followed by an increase when the winds shifted back to the south. Concentrations decreased after noon with an increase in mixing height, along with slight wind speed increases. Concentrations remained moderately low for the remainder of the day.

Concentrations on December 12, after most of the Mexicali festivities had been completed, were half that seen on the previous day and followed a more typical workday pattern for Calexico. Hourly PM increases were seen during commute hours, but generally remained low throughout the day.

Figure 71. Daily Average PM2.5 Values in Imperial County (12/8 – 12/14)



*POC1 is on a 1-in-3 day sampling schedule and POC3 records hourly data

Wind speed and wind direction data were plotted with the BAM PM2.5 concentration measurements from December 9 through December 13. These data show that low wind speeds, particularly in the early morning and night hours, are correlated with higher PM2.5 concentrations (Figure 72). Generally, the highest concentrations on December 11 were seen under southerly flow conditions (79 - 272 degrees) in the early morning hours (Figure 73).

Figure 72. PM2.5 BAM vs. Wind Speed at Calexico on 12/9-12/13/11

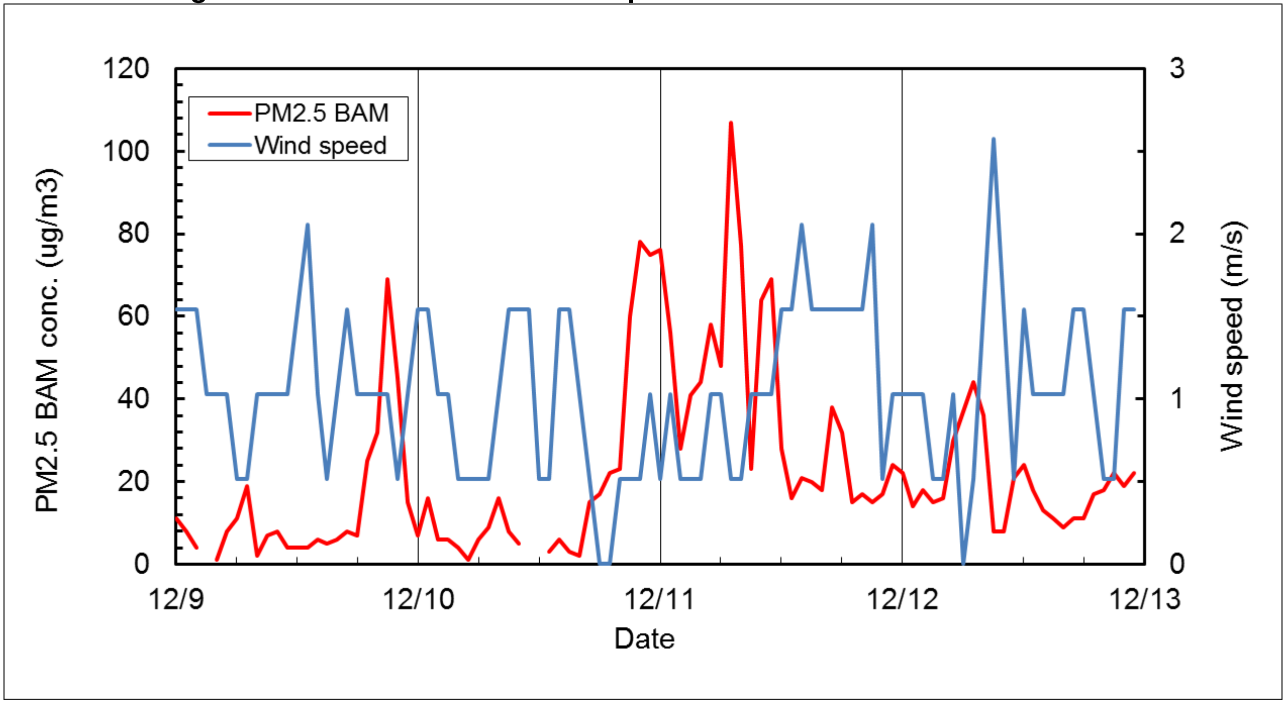
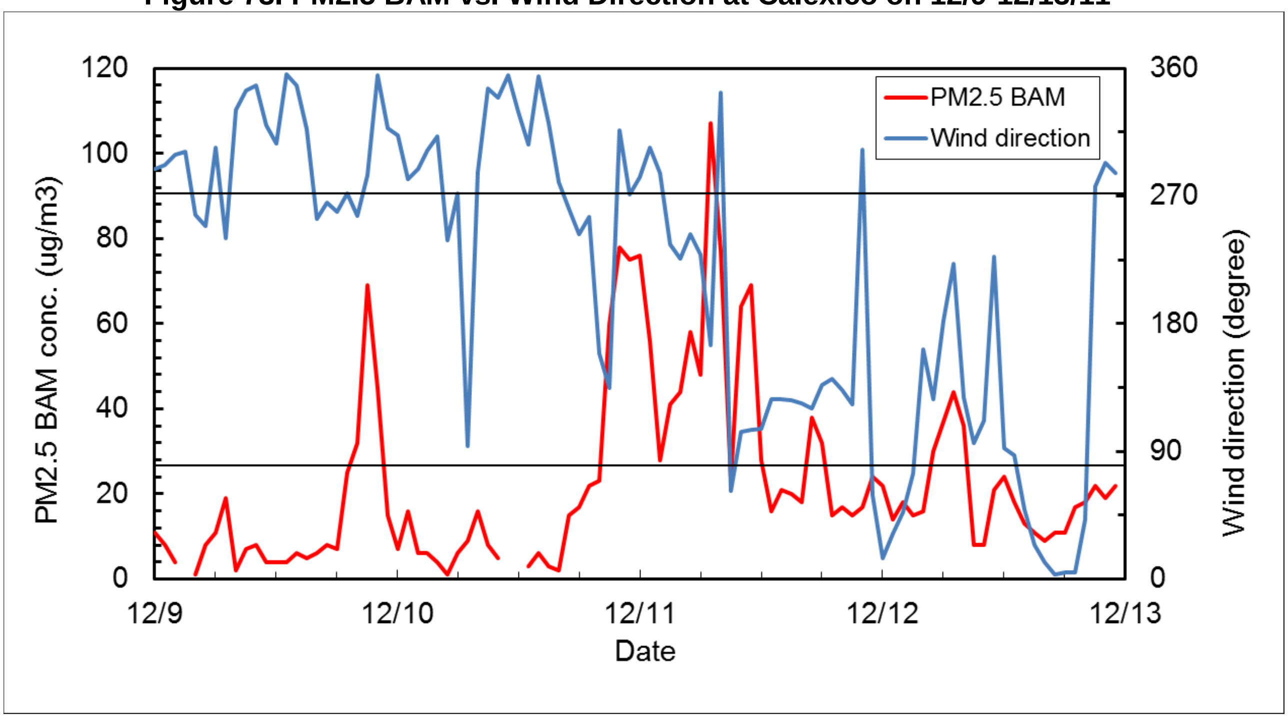


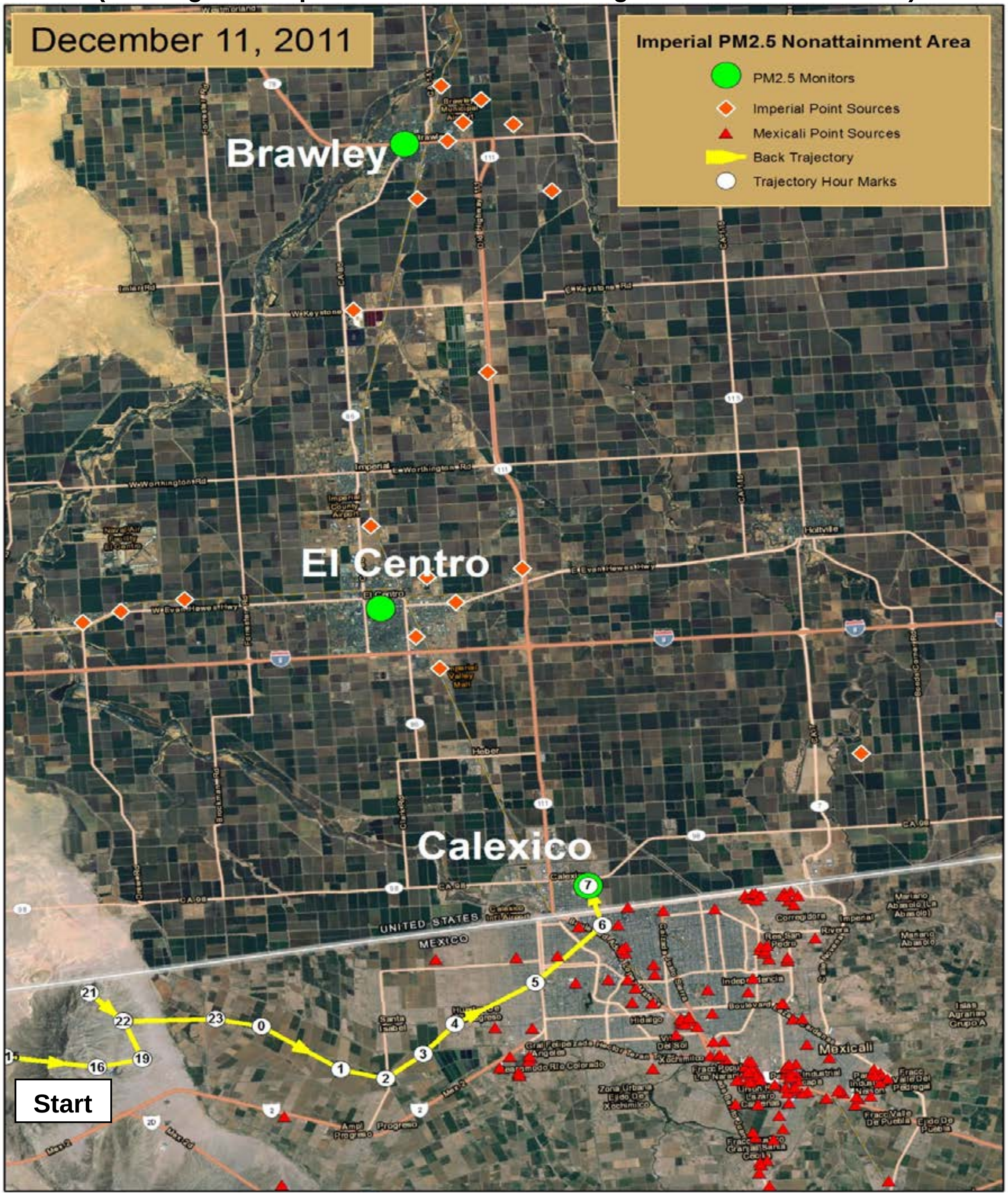
Figure 73. PM2.5 BAM vs. Wind Direction at Calexico on 12/9-12/13/11



*79-272 degree winds are from the south. 273-78 degree winds are from the north.

The spatial nature of the December 11 exceedance event was assessed using a back-trajectory plot (Figure 74). The objective of a back-trajectory plot is to discern the pathway that an air parcel traveled prior to passing over the site of a continuous pollutant monitor, i.e., a PM2.5 BAM. By calculating the coordinates of this traverse and overlaying the resulting travel path onto an aerial photograph, the potential for transport of emissions from sources under the path to the monitor can be quickly assessed by visual inspection.

Figure 74. December 11 air parcel back-trajectory (Starting at 3:00 pm on 12/10/11 and ending at 7:00 am on 12/11/11)

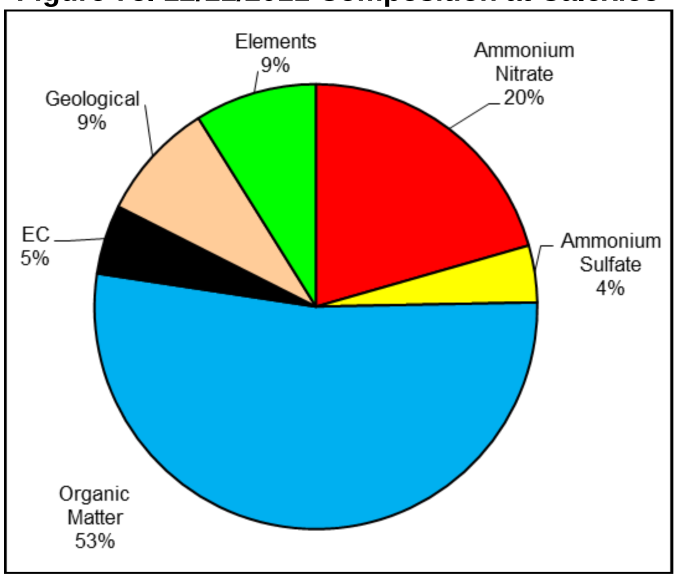


The back trajectory developed for December 11, 2011 started at the Calexico monitor at the hour of the highest PM2.5 BAM concentration (7:00 am) and followed an air parcel back to 3:00 pm on December 10, 2011. This indicates the air parcel that impacted the Calexico site at 7:00 am on December 11 passed through Mexicali in the late night hours on the 10th and the early morning hours of the 11th when concentrations were elevated.

Identification of Emissions

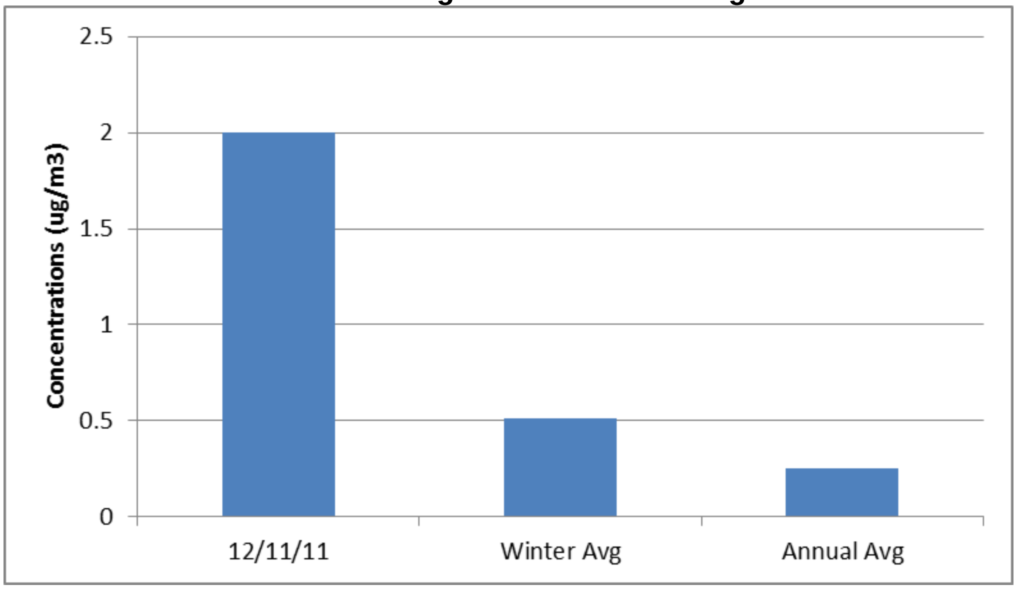
To aide in identifying the source of emissions potentially impacting the Calexico monitor, staff analyzed speciation data available at the station on December 11. The speciation data shows that over half of the concentration was from organic matter and 20 percent was from ammonium nitrate. High concentrations of elemental species were also present on this day. High concentrations of carbonaceous aerosols indicate that combustion is the main source of PM2.5 while high concentrations of elemental species suggest that emissions come from non-fossil fuel sources on December 11 (Figure 75).

Figure 75. 12/11/2011 Composition at Calexico



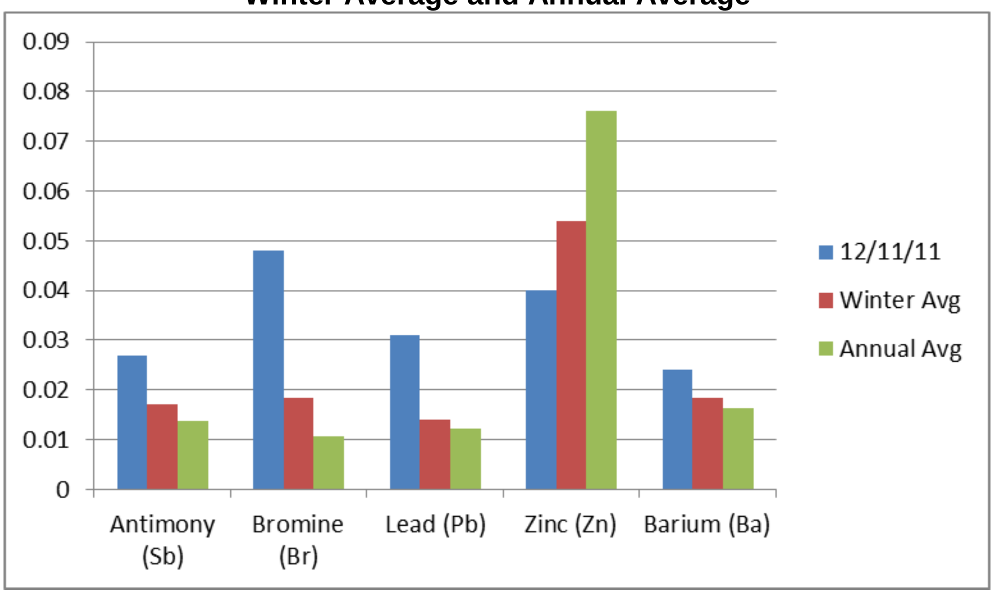
On December 11, 2011 elemental species concentrations at Calexico were elevated compared to both winter average and annual average concentrations. Concentrations of elemental chlorine were four times higher compared to winter average and eight times higher compared to the annual average (Figure 76). Concentrations of antimony, bromine, and lead were two times higher compared to winter concentrations and two to five times higher compared to annual average (Figure 77).

Figure 76. Comparison of Chlorine Concentrations on 12/11/2011 to 2010-2012 Winter Average and Annual Average



*This data does include transport days but does not include invalidated days

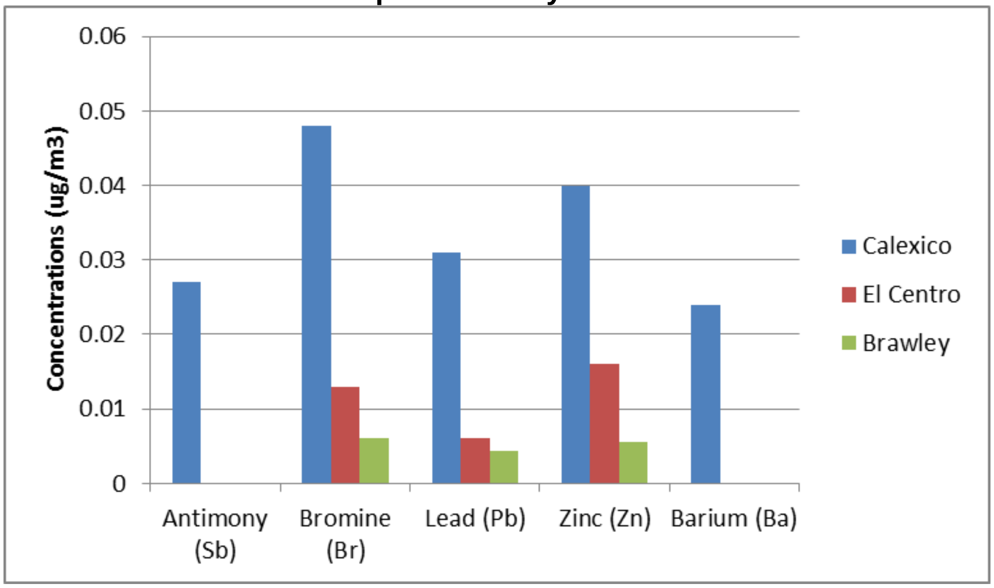
Figure 77. Comparison of Select Species Concentrations on 12/11/2011 to 2010-2012 Winter Average and Annual Average



*This data does include transport days but does not include invalidated days

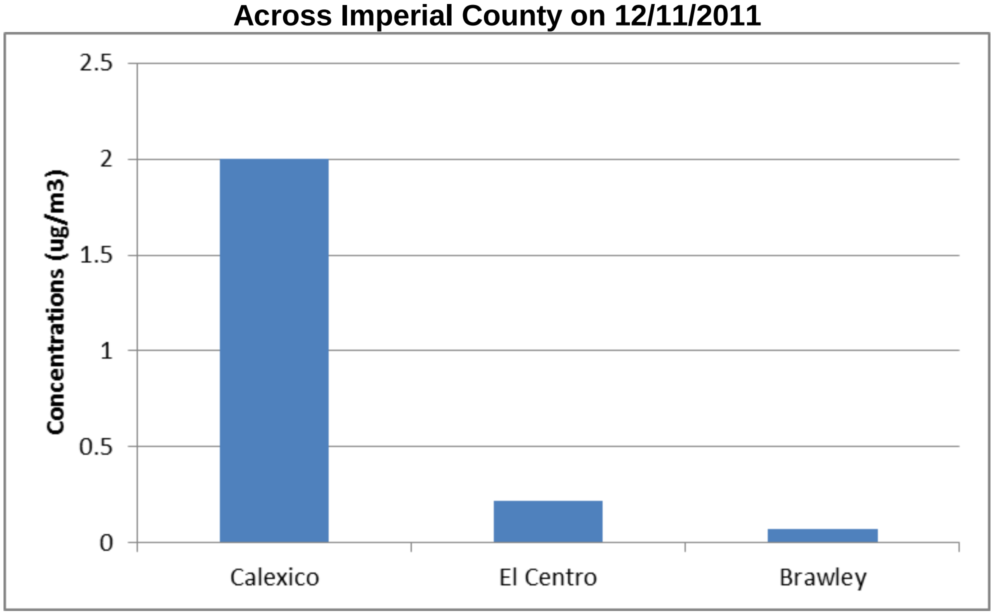
In comparing elemental data at all Imperial County sites for this day, it is obvious that Calexico was impacted at a level far higher than the two sites just a few miles to the north. These other two sites, Brawley and El Centro, had elemental concentrations close to or below the detection limit (Figure 78). Concentrations of antimony and barium at both El Centro and Brawley were below the detection limits. Concentrations of bromine, lead, and zinc at Calexico were three to eight times higher, while chlorine was nine times higher compared to El Centro and 27 times higher compared to Brawley (Figure 79).

Figure 78. Comparison of Select Elemental Species Concentrations Across Imperial County on 12/11/2011



*This data does include transport days but does not include invalidated days

Figure 79. Comparison of Chlorine Concentrations Across Imperial County on 12/11/2011

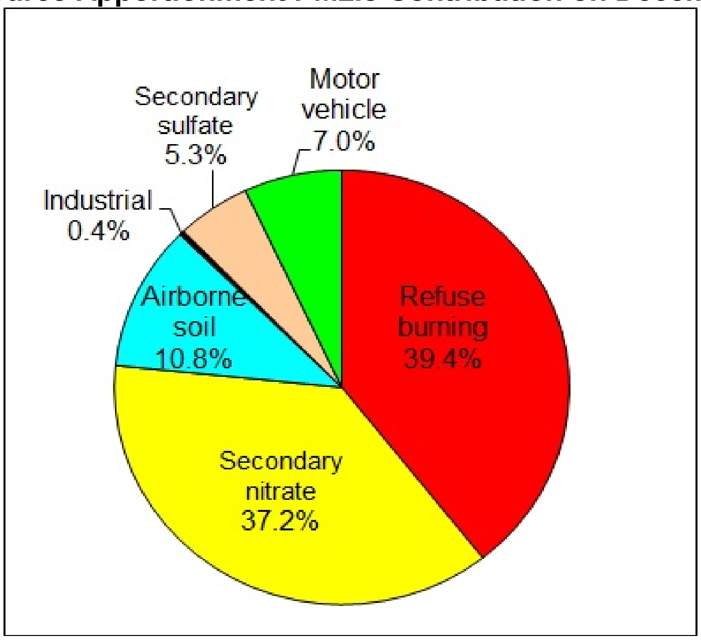


*This data does include transport days but does not include invalidated days

To provide information on the possible sources of emissions impacting the Calexico monitor, PM2.5 speciation data were analyzed using source apportionment model, Positive Matrix Factorization 2 (PMF2). PMF2 is a multivariate receptor model based on the positive matrix factorization (PMF) method. Fundamentally, this model analyzes characteristics of pollutants at the receptor site and, using mathematical algorithms, estimates the source contributions. This model is based on a weighted least square method that weights data points by their analytical uncertainties. A detailed description of PMF2 model procedure for Calexico is included in Appendix B.

In this analysis, a total of 159 samples and 27 species including PM2.5 concentrations collected between 2010 and 2012 were analyzed and six major sources were identified: Airborne soil, motor vehicle, secondary sulfate, secondary nitrate, refuse burning, and industrial. Figure 80 suggests that refuse burning and secondary nitrate were the major sources on December 11. This refuse burning was estimated to contribute 17.5 µg/m3 of the 44.4 µg/m3 concentration recorded at Calexico. Since refuse burning is not permitted in Imperial County, this impact—coupled with meteorological data—may be attributed to emissions from Mexicali.

Figure 80. Source Apportionment PM2.5 Contribution on December 11, 2011



The source apportionment percentages for refuse burning and industrial emissions were used to estimate the PM2.5 contribution at Calexico on December 11 (Table 13). Based on receptor modeling results, without refuse burning emissions occurring on December 11 the Calexico monitor would likely not have exceeded the 24-hour PM2.5 standard. If industrial emissions from Mexicali are excluded, the concentration on this day decreases further. These are important findings given that refuse burning and industrial emissions of the type identified through receptor modeling are essentially non-existent on the U.S. side of the border in Imperial County.

Table 13. Contribution of Refuse Burning and Industrial Emissions to the PM2.5 Concentration on December 11, 2011

FRM Concentration	Without Refuse burning emissions	Without Refuse Burning & Industrial emissions
44.4 µg/m3	26.9 µg/m3	26.8 µg/m3

January 31, 2012

Analysis Methods

For the January 31, 2012 exceedance day analysis, staff used various methods to evaluate the impact of emissions on the Calexico PM2.5 monitor. Referencing guidance from U.S. EPA, staff evaluated the following data: (1) PM2.5 concentration gradient within the Imperial County NA and Mexicali, including the AQI; (2) predominant wind speed and wind direction at Calexico on January 31; (3) mixing height vs. non-FEM BAM data for January 30 - February 1; (4) changes in the hourly BAM PM2.5 concentrations with the wind speed and direction experienced at the Calexico monitor on January 29 - February 1; (5) an air parcel back-trajectory starting at the hour of highest hourly recorded concentration at the Calexico site; (6) speciation data on January 31, to identify the major components of PM2.5, including a further breakdown of elemental species; and, (7) a quantification of the emissions impact on concentrations at the Calexico site for certain chemical species on January 31.

Data not available for this analysis include; PM2.5 BAM data at Brawley and El Centro; and specific media reports, from either north or south of the border, which would substantiate activities impacting air quality in the area were unavailable. However, hourly PM2.5 data coupled with meteorological data, speciation data, and a back-trajectory analysis, provide evidence that the Calexico monitor would not have recorded an exceedance of the 24-hour NAAQS but for emissions from Mexicali on January 31.

PM2.5 Concentrations

On Tuesday, January 31, 2012, the Calexico FRM monitor recorded a 24-hour average PM2.5 concentration of 37.7 µg/m3. From filter-based measurements, PM2.5 concentrations at the El Centro and Brawley monitoring sites were 13.0 and 22.7 µg/m3, respectively. The AQI value on this day was 111 (unhealthy for sensitive groups) and was the second highest AQI value recorded in Imperial County for 2012 (Figure 81). As shown in Figure 82, a high value was only recorded at Calexico, further indicating a localized event. January 30 was declared a no burn day. On January 31, three permitted agricultural burns totaling 214 acres occurred from 1:00 pm to 3:00 pm. 144 of the 214 acres burned were in the western part of Calexico and the burns occurred between 1:00-3:00 pm when the PM2.5 levels were low. In addition, there were approximately 30 miscellaneous burns of brush piles. All of these burns were compliant with the District’s Open Burning rule.

Figure 81. Daily Peak AQI for January 31, 2012

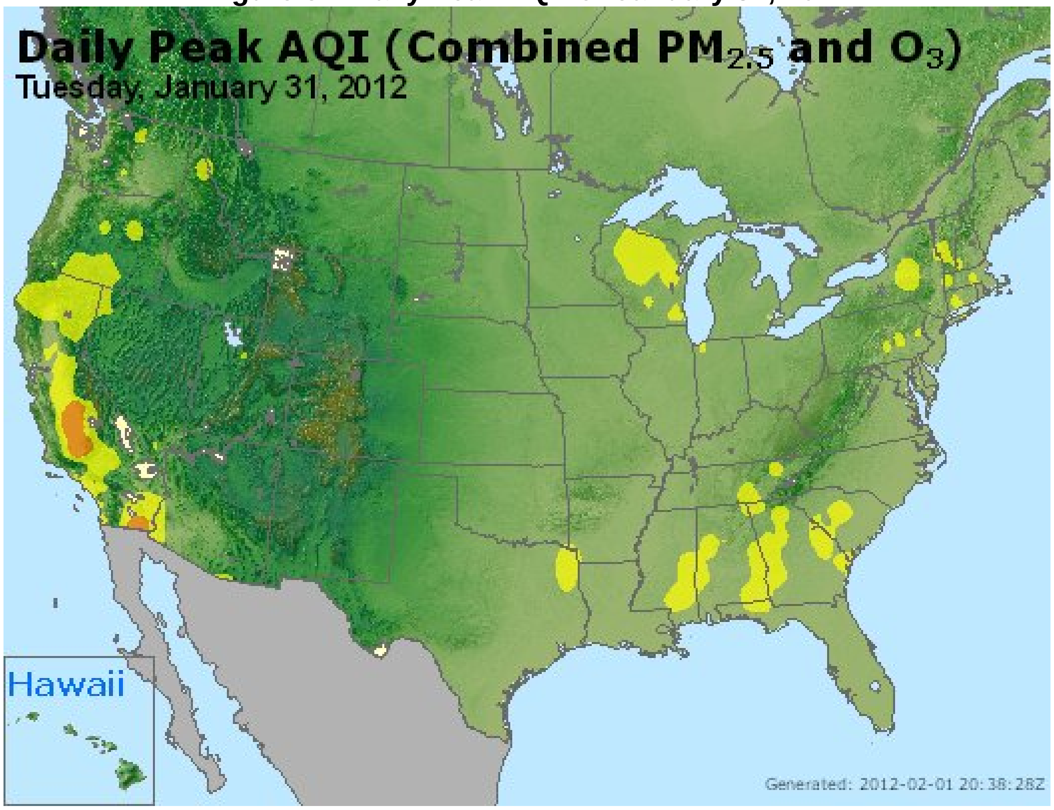
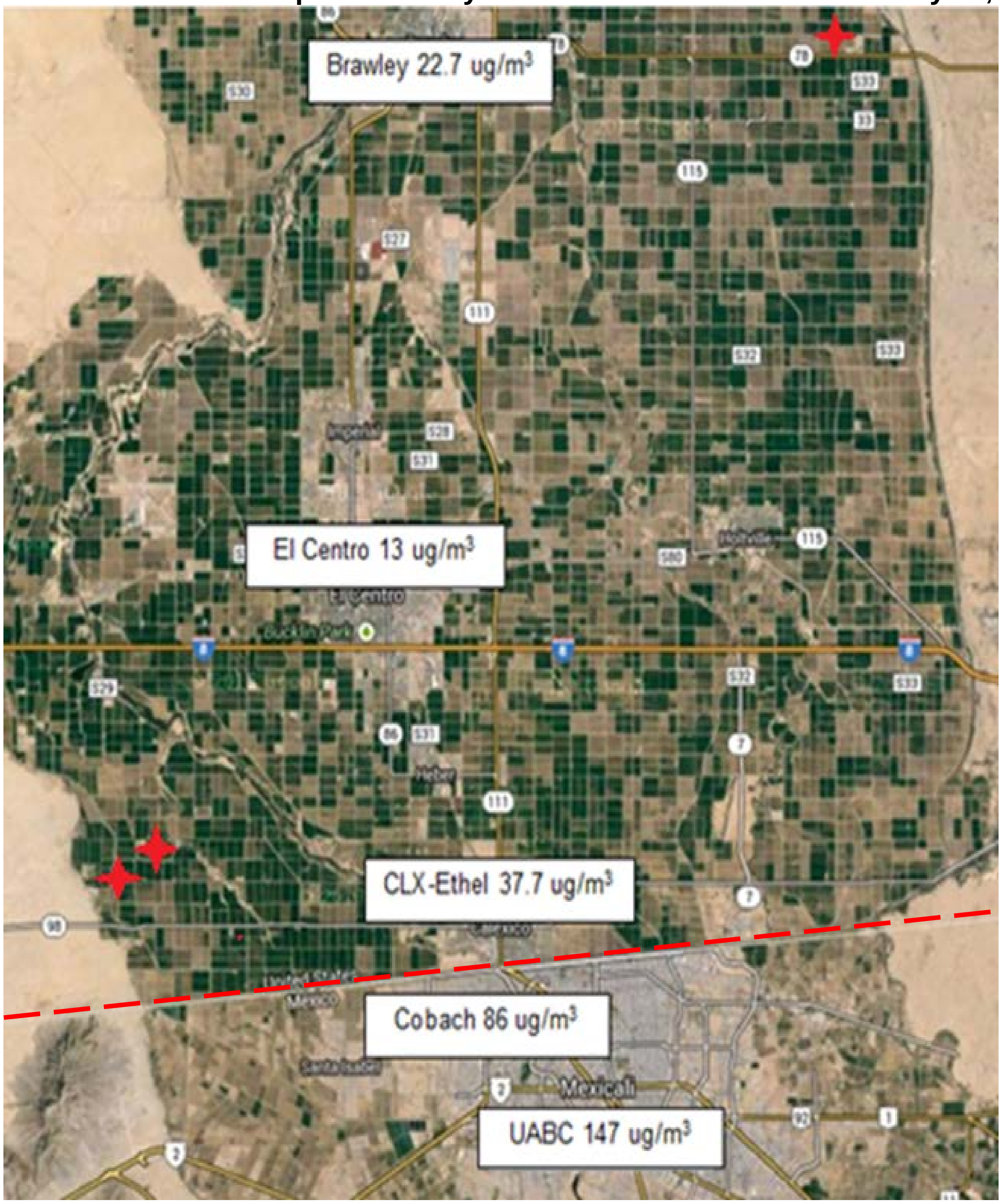


Figure 82 shows the spatial distribution of 24-hour average PM2.5 concentrations recorded at each monitoring site in Imperial County on January 31. The 37.7 µg/m3 concentration measured at Calexico more than twice the annual average for that site in 2012. The strong PM2.5 concentration gradient from the Mexicali monitors to the Calexico monitor—less than a mile upwind from Mexicali—to the Brawley and El Centro sites just to the north suggests that the emissions impact on the Calexico monitor differs substantially from the impact experienced by the Brawley and El Centro monitors. Although the concentration gradient differs on January 31 as compared to other Calexico exceedance days, concentrations were still much higher near the border. The decreasing concentration gradient from south-to-north, typical of other Calexico exceedance days, is very evident. In addition, ambient data from two Mexicali PM2.5 monitoring sites, COBACH and UABC (COBACH recorded an average of 86 µg/m3; UABC 147 µg/m3), further supports the contention that the emission sources responsible for these high concentrations are located south of the border and are not of U.S. origin.

With similar sources and meteorology, the expectation is that PM2.5 concentrations measured at Calexico, El Centro, and Brawley would be similar. The decreasing gradient northward is consistent with the Calexico-Mexicali single air shed concept and points to cross-border emissions as the source of high concentrations measurements at Calexico.

Figure 82. Mexicali and Imperial County PM2.5 concentrations on January 31, 2012

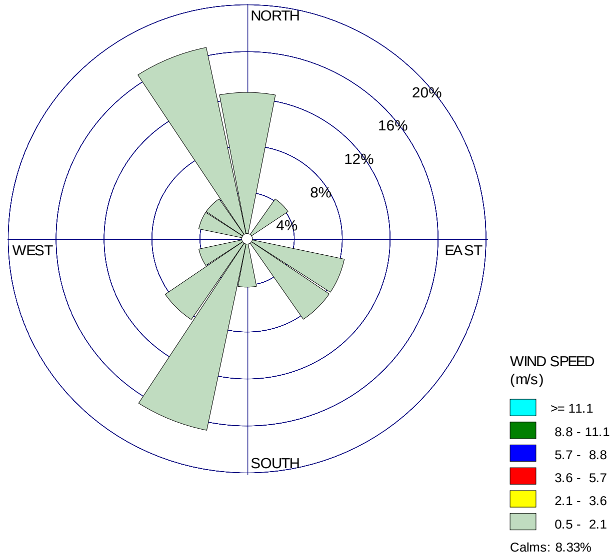


**Red markers indicate the locations of agricultural burns*

Meteorology

As with the other Calexico exceedance days in this analysis, surface hourly resultant wind data show that stagnant conditions were prevalent on January 31. The 24-hour average resultant wind speed measured at Calexico was 0.7 mps and the maximum was 1.6 mps. The wind rose data indicates that the directionality was evenly divided between winds from north and those from the south (Figure 83), although with winds of this magnitude, directionality has a higher degree of uncertainty. In the early morning hours temperatures were as low as 45° F, increasing the possibility of emissions from household heating (e.g., fireplace and wood stove burning).

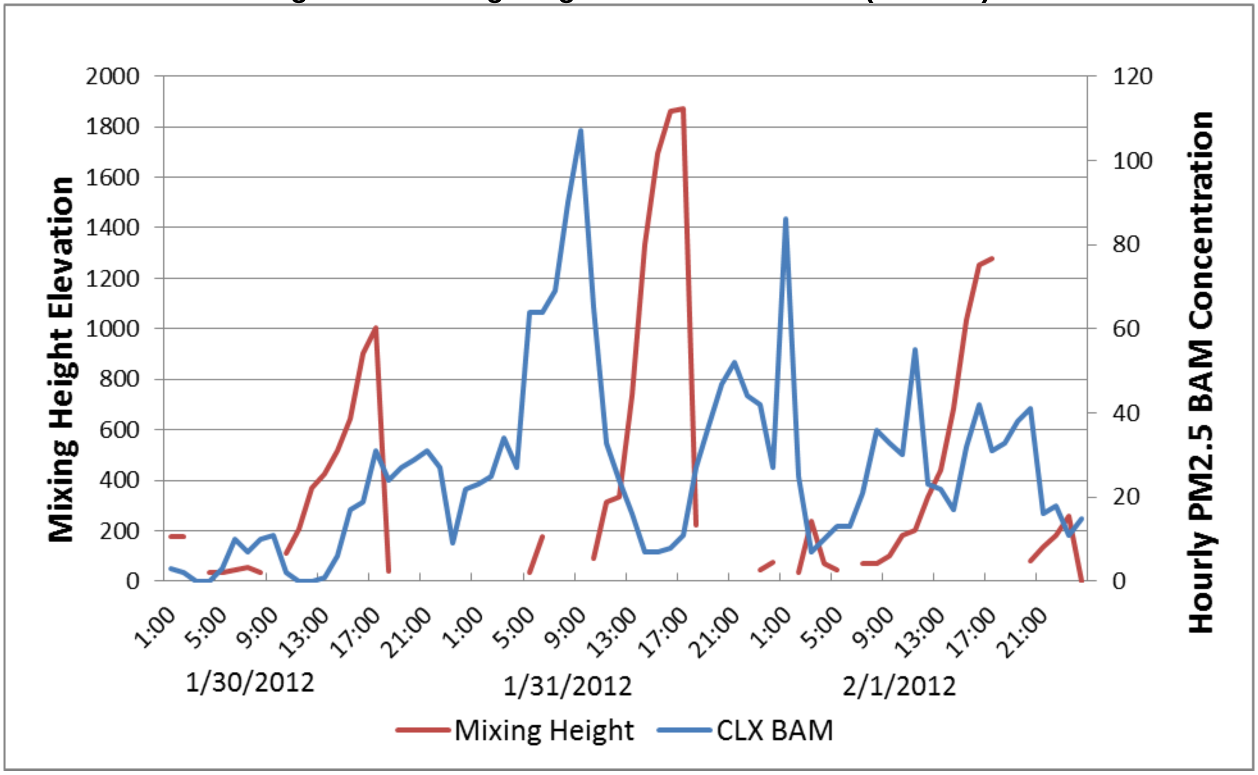
Figure 83. Wind Rose on January 31, 2012



To further characterize meteorological conditions on January 31 which may have influenced PM2.5 concentrations measured at the Calexico station, staff evaluated data on atmospheric mixing height and its correlation with PM2.5 mass data. The nearest routine data collection points to Calexico for radiosonde data are Yuma, Arizona, and Tucson, Arizona. Both of these locations have topography similar to that of Calexico. Yuma data were less complete for January 31, so data from Tucson were used to generate a plot of hourly mixing heights over a three day period that includes the January 31 exceedance.

Figure 84 displays the mixing height and hourly PM2.5 BAM measurements at Calexico. While data gaps exist for the atmospheric soundings, the overall trend over the three day period shows an inverse relationship between mixing height and concentrations. Decreasing mixing height corresponds to increasing PM2.5 concentrations as low vertical mixing confines pollutants. This plot corroborates surface wind data and supports the concept that emissions from Mexicali, confined to the Calexico-Mexicali air shed with reduced pollutant dispersion due to low wind speed and reduced mixing height, resulted in higher PM2.5 concentrations on January 31 than would have been observed in the absence of emissions from Mexico.

Figure 84. Mixing Height vs. Calexico BAM (1/30-2/1)



<u>Analysis of the Event</u>

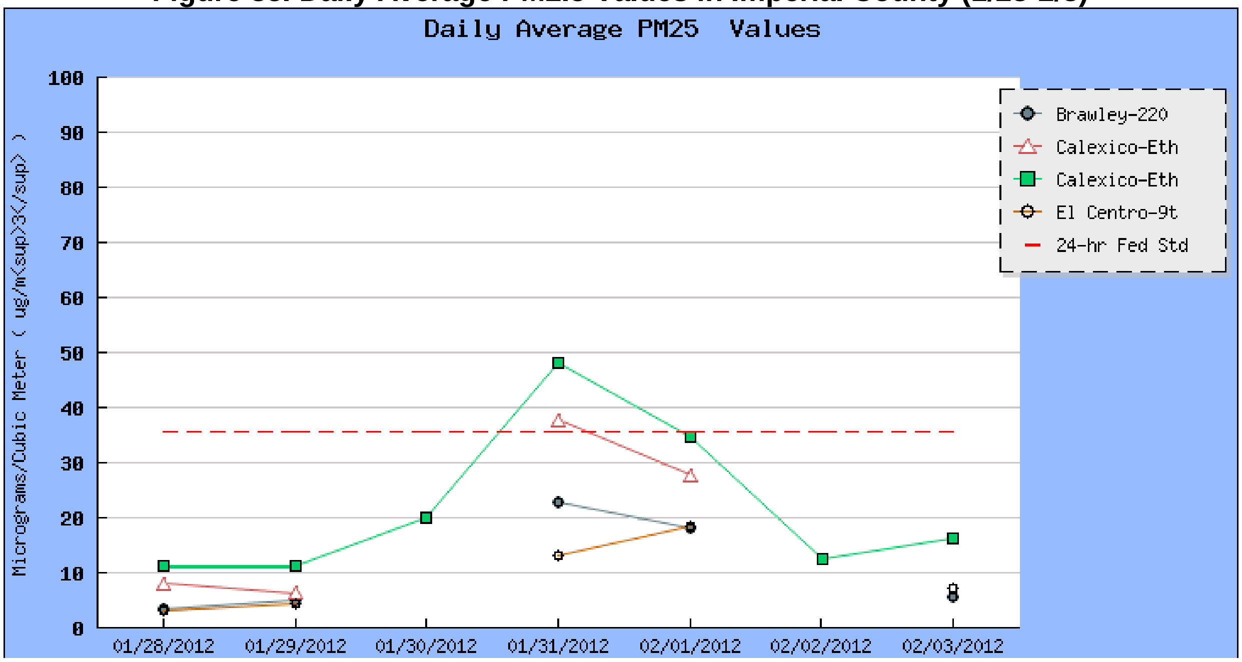
Toward the end of January, resultant wind speeds at Calexico averaged around 1.3-2.0 mps, with maximums as high as 3.6 mps. On the days prior to January 31, the 24-hour average PM2.5 concentrations at the Calexico BAM monitors were low, less than 20 $\mu g/m^3$. On January 31, the wind speed average dropped to 0.7 mps and the PM2.5 BAM concentrations increased, ultimately leading to an exceedance of the 24-hour PM2.5 standard.

PM2.5 concentrations began to build at the monitoring station after noon on January 30 and remained fairly high throughout the morning of January 31. The concentrations remained between 23 and 34 ug/m3 from midnight until 3:00 am, increasing to 64 µg/m3 at 4:00 am, and reaching a maximum of 107 µg/m3 at 8:00 am. The high PM2.5 concentrations in the morning hours coincided with the low temperatures on that day (45 to 61° F). PM2.5 concentrations began to decrease after the 8:00 am peak, due in part to a shift in wind direction to the north, a slight increase in the wind speeds, increasing temperatures, and an increase in the mixing height. Under the influence of the north wind, concentrations decreased to a low of 7 µg/m3 around 1:00 pm and stayed fairly low until 4:00 pm. A wind shift back to the south, and a lowering of the mixing height, saw concentrations at Calexico peaking at 52 µg/m3 at 8:00 pm.

At midnight on February 1, the PM2.5 concentration was 86 µg/m3. Concentrations decreased rapidly to 7 µg/m3 by 2:00 am, when the wind briefly shifted to the north.

Concentrations rose from 10 to 55 µg/m^3 under south winds, with a brief decrease around noon, again when the wind directly shifted to the north, and the resulting 24-hour BAM PM2.5 concentration was 27.8 µg/m3. This 24-hour average, although high, remained below the NAAQS. Figure 85 shows the daily average PM2.5 values (FRM and BAM) from January 28 through February 3, 2012.

Figure 85. Daily Average PM2.5 Values in Imperial County (1/28-2/8)



*POC1 is on a 1-in-3 day sampling schedule and POC3 records hourly data

Wind speed and direction were plotted with the BAM PM2.5 concentration measurements from January 29 through February 1. These data show that low wind speeds, particularly in the early morning and late night hours, are correlated with higher PM2.5 concentrations (Figure 86). Generally, the highest concentrations on January 31 were seen under a combination of southerly flow conditions (79 - 272 degrees) (Figure 87) and/or calm to low winds.

Figure 86. PM2.5 BAM vs. Wind Speed at Calexico on 1/29-2/1

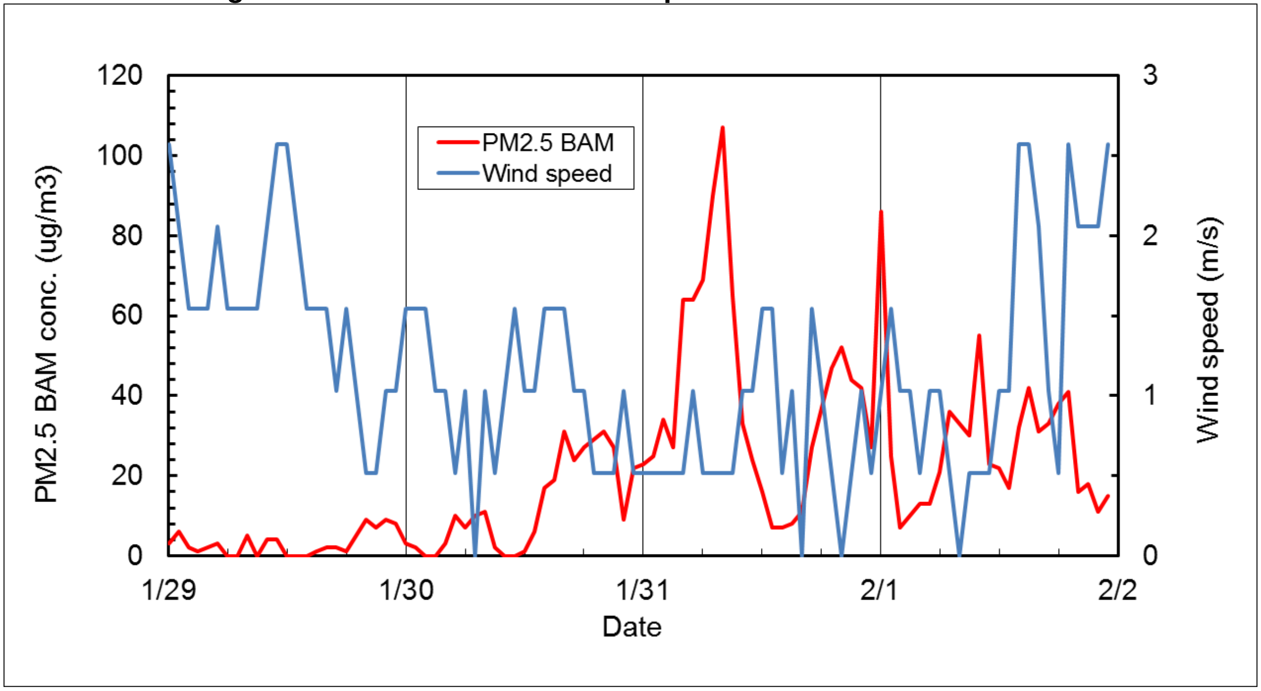
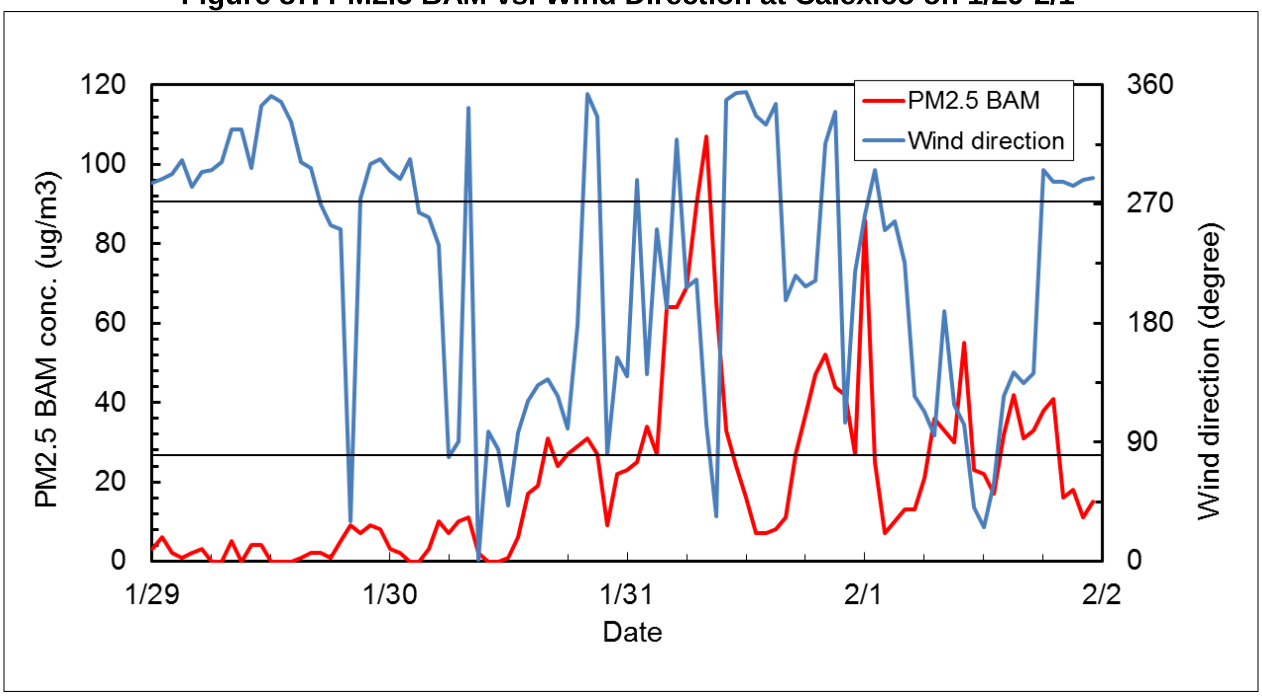


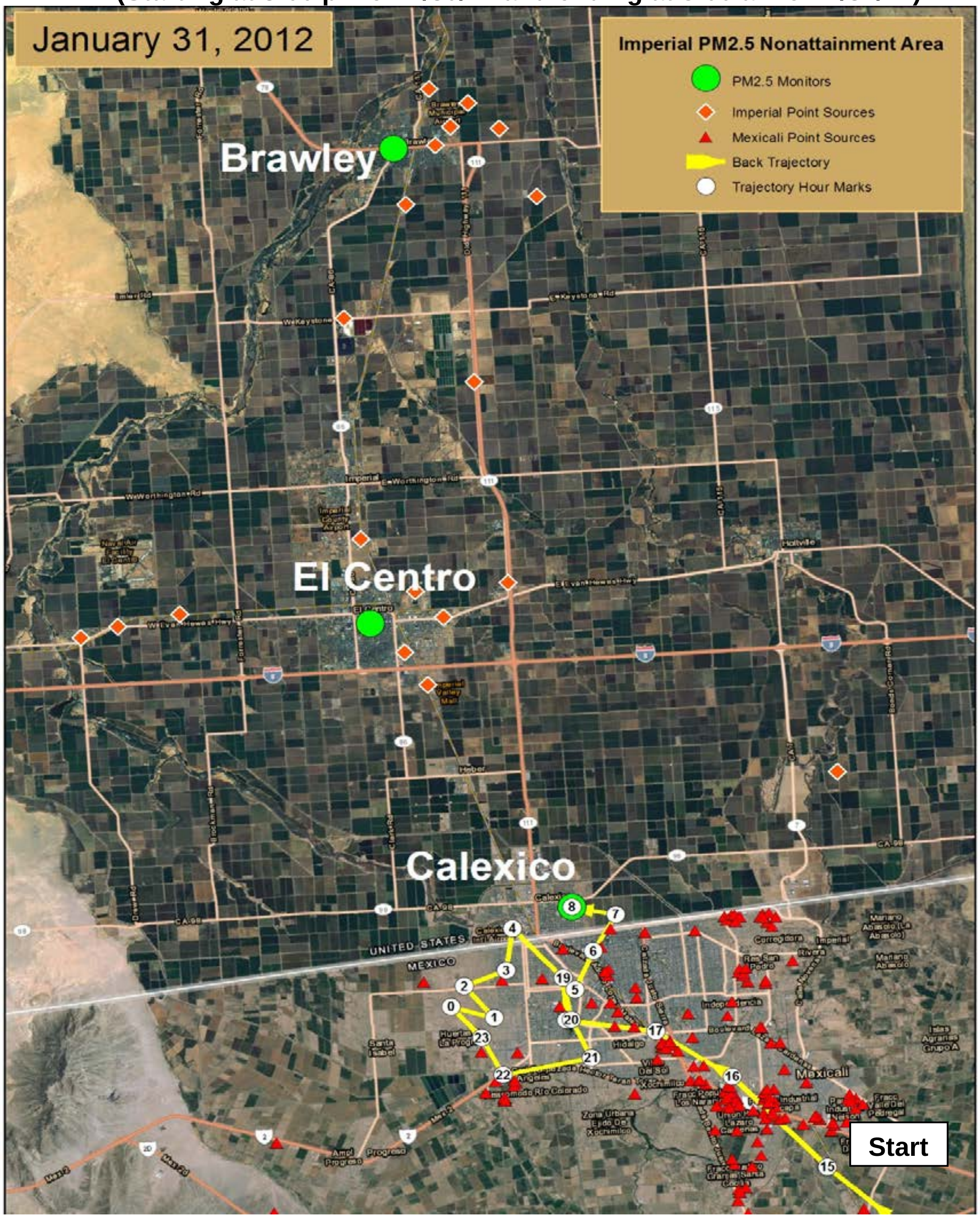
Figure 87. PM2.5 BAM vs. Wind Direction at Calexico on 1/29-2/1



*79-272 degree winds are from the south. 273-78 degree winds are from the north.

The spatial nature of the January 31 exceedance event was assessed using a back-trajectory plot (Figure 88). The objective of a back-trajectory plot is to discern the pathway that an air parcel traveled prior to passing over the site of a continuous pollutant monitor, i.e., a BAM. By calculating the coordinates of this traverse and overlaying the resulting travel path onto an aerial photograph, the potential for transport of emissions from sources under the path to the monitor can be quickly assessed by visual inspection.

Figure 88. January 31 air parcel back-trajectory (Starting at 3:00 pm on 1/30/12 and ending at 8:00 am on 1/31/12)



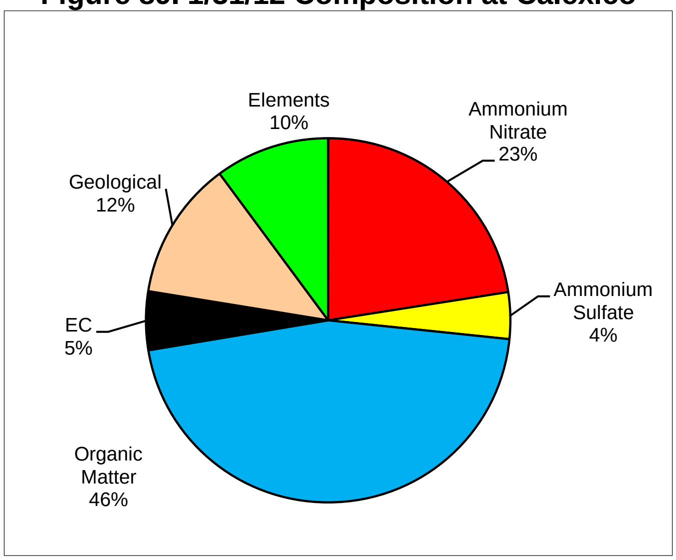
The back trajectory developed for January 31, 2012 started at Calexico at the hour of the highest PM2.5 BAM concentration (8:00 am) and followed an air parcel back to

3:00 pm on January 30, 2012. This indicates the air parcel that impacted the Calexico site at 8:00 am on January 31 was in Mexicali in the late night hours on the 30 and the early morning hours of the 31 when concentrations were elevated.

Identification of Emissions

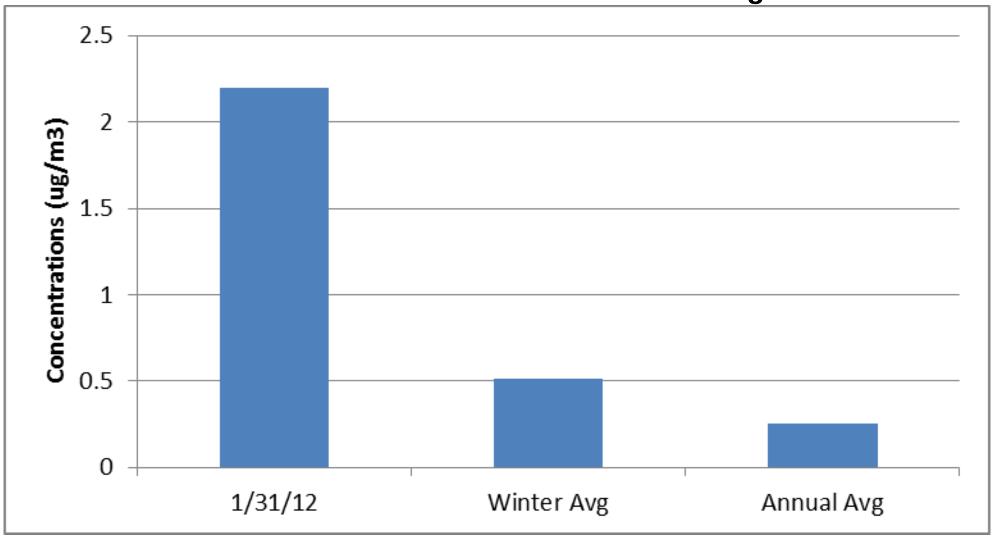
To aide in identifying the source of emissions potentially impacting the Calexico monitor, staff analyzed speciation data available at the station on December January 31. The speciation data shows that almost half of the concentration was from organic matter and 23 percent was from ammonium nitrate. High concentrations of elemental species were also present on this day. High concentrations of carbonaceous aerosols indicate that combustion is the main source of PM2.5 while high concentrations of elemental species suggest that emissions come from non-fossil fuel sources on January 31 (Figure 89). Agricultural burning was allowed on this day in Imperial County. However, the amount burned was only 214 acres at three separate locations and occurred between 1:00 pm and 3:00 pm when PM2.5 levels were low.

Figure 89. 1/31/12 Composition at Calexico



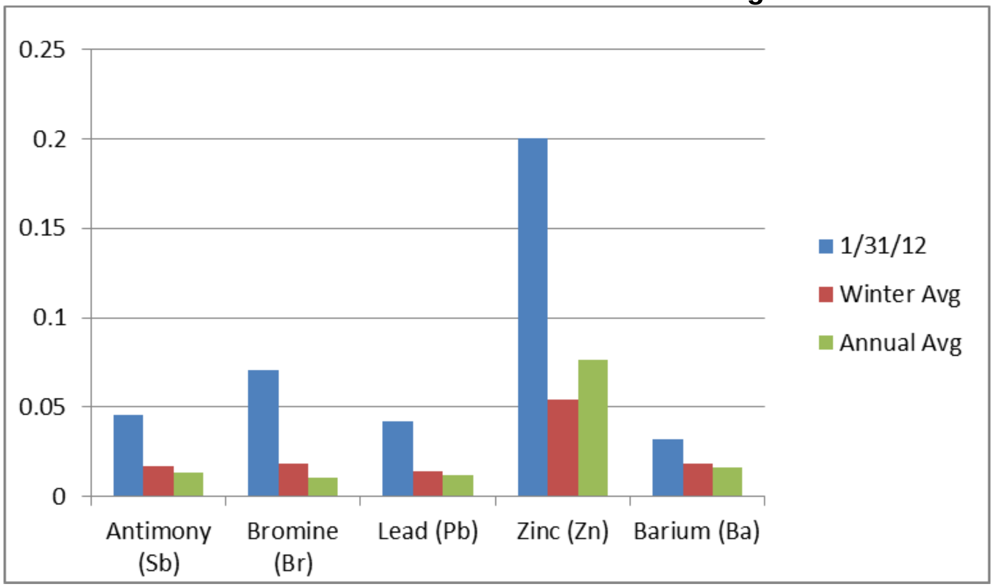
On January 31, 2012 elemental species concentrations at Calexico were elevated compared to both winter and annual average concentrations. Concentrations of elemental chlorine were four times higher compared to the winter average and nine times higher compared to the annual average (Figure 90). Concentrations of antimony, bromine, lead, zinc, and barium were two to four times higher compared to winter concentrations and two to seven times higher compared to the annual average (Figure 91).

Figure 90. Comparison of Chlorine Concentrations on 1/31/2012 to 2010-2012 Winter and Annual Average



*This data does include transport days but does not include invalidated days

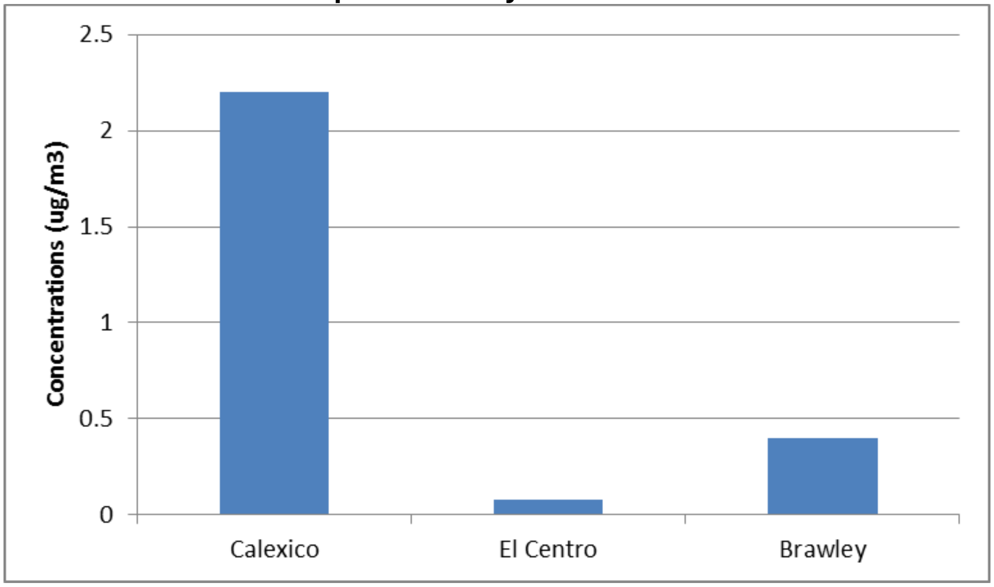
Figure 91. Comparison of Select Species Concentrations on 1/31/2012 to 2010-2012 Winter and Annual Average



*This data does include transport days but does not include invalidated days

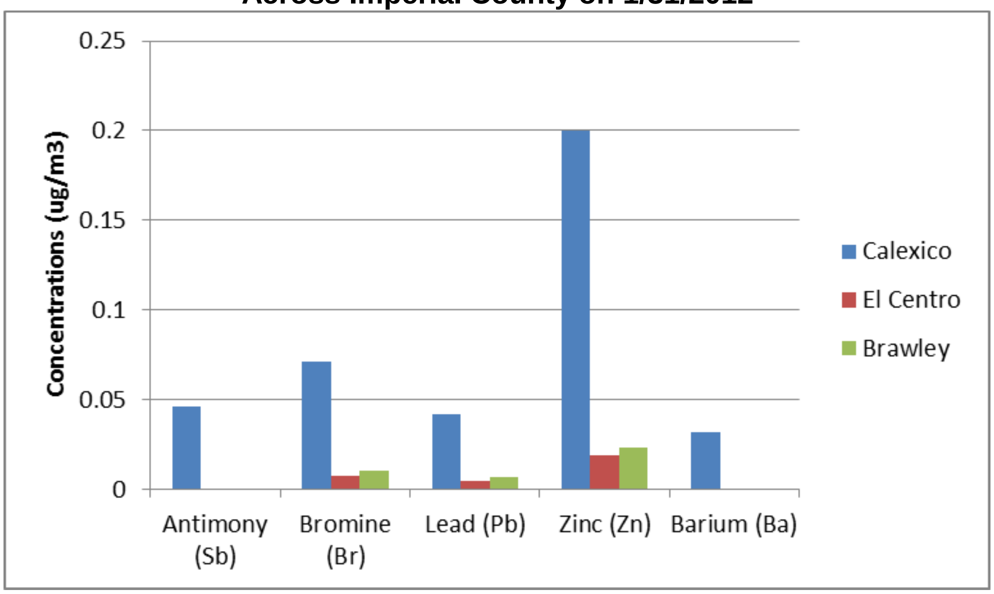
In comparing elemental data at all the Imperial County sites for this day, it is obvious that Calexico was impacted at a far higher level than the other two sites. These other sites, Brawley and El Centro, had concentrations close to or below the detection limits. Concentrations of antimony and barium at both El Centro and Brawley were below the detection limits. Concentrations of bromine, lead, and zinc at Calexico were seven to eleven times higher, while chlorine was six times higher compared to Brawley and 29 times higher compared to El Centro (Figure 92 and 93).

Figure 92. Comparison of Chlorine Concentrations Across Imperial County on 1/31/2012



*This data does include transport days but does not include invalidated days

Figure 93. Comparison of Select Elemental Species Concentrations Across Imperial County on 1/31/2012

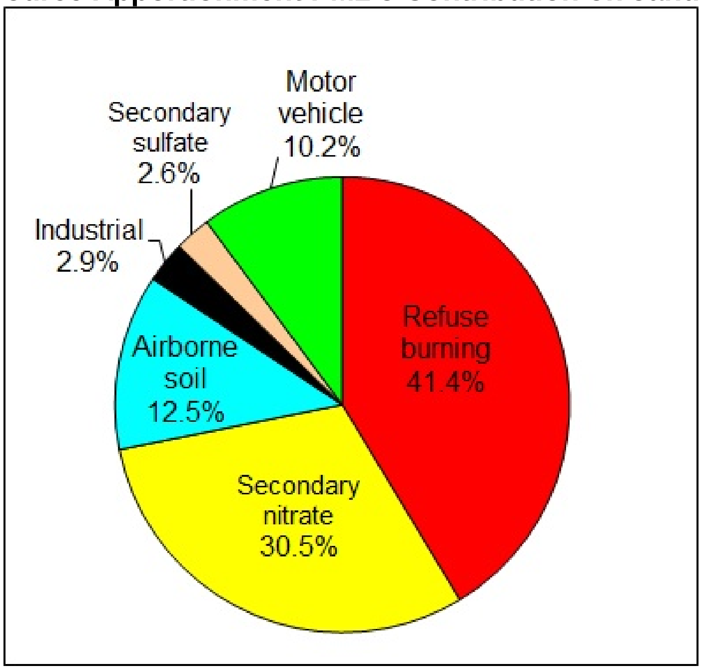


*This data does include transport days but does not include invalidated days

To provide information on the possible sources of emissions impacting the Calexico monitor, PM2.5 speciation data were analyzed using source apportionment model, Positive Matrix Factorization 2 (PMF2). PMF2 is a multivariate receptor model based on the positive matrix factorization (PMF) method. Fundamentally, this model analyzes characteristics of pollutants at the receptor site and, using mathematical algorithms, estimates the source contributions. This model is based on a weighted least square method that weights data points by their analytical uncertainties. A detailed description of PMF2 model procedure for Calexico is included in Appendix B.

In this analysis, a total of 159 samples and 27 species including PM2.5 concentrations collected between 2010 and 2012 were analyzed and six major sources were identified: Airborne soil, motor vehicle, secondary sulfate, secondary nitrate, refuse burning, and industrial. Figure 94 suggests that refuse burning and secondary nitrate were the major pollutant sources on January 31. Refuse burning was estimated to contribute 16.7 µg/m3 of the 37.7 µg/m3 concentration recorded at Calexico. Since refuse burning is not permitted in Imperial County, this impact—coupled with meteorological data—may be attributed to emissions from Mexicali.

Figure 94. Source Apportionment PM2.5 Contribution on January 31, 2012



The source apportionment percentages for refuse burning and industrial emissions were used to estimate the PM2.5 contribution at Calexico on January 31 (Table 14). Based on receptor modeling results, without refuse burning emissions occurring on January 31 the Calexico monitor would likely not have exceeded the 24-hour PM2.5 standard. If industrial emissions from Mexicali are excluded, the concentration on this day decreases further. These are important findings given that refuse burning and industrial emissions of the type identified through receptor modeling are essentially non-existent on the U.S. side of the border in Imperial County.

Table 14. Contribution of Refuse Burning and Industrial Emissions to the PM2.5 Concentration on January 31, 2012

FRM Concentration	Without Refuse burning emissions	Without Refuse Burning & Industrial emissions
37.7 µg/m3	22.1 µg/m3	21.0 µg/m3

December 23, 2012

Analysis Methods

For the December 23, 2012 exceedance day analysis, staff used various methods to evaluate the impact of emissions on the Calexico PM2.5 monitor. Referencing EPA guidance, staff evaluated the following data: (1) PM2.5 concentration gradient within the Imperial County NA and Mexicali with associated AQI; (2) predominant wind speed and wind direction at Calexico on December 23; (3) mixing height vs. non-FEM BAM data for December 22-December 24; (4) changes in the hourly BAM PM2.5 concentrations with the wind speed and direction experienced at the Calexico monitor on December 21-December 24; (5) an air parcel back-trajectory starting at the hour of highest hourly recorded concentration at the Calexico site; (6) speciation data on December 23, to identify the major components of PM2.5, including a further breakdown of elemental species; and, (7) a quantification of the emissions impact on concentrations at the Calexico site for certain chemical species on December 23.

Data not available for this analysis include; PM2.5 BAM data for Brawley and El Centro; and specific media reports, from either north or south of the border, which would substantiate activities impacting air quality in the area was unavailable. However, hourly PM2.5 data coupled with meteorological data, speciation data, and a back-trajectory analysis, provide evidence that the Calexico monitor would not have recorded an exceedance of the 24-hour NAAQS but for emissions from Mexicali on December 23.

PM2.5 Concentrations

On Sunday, December 23, 2012, the Calexico FRM monitor recorded a 24-hour average PM2.5 concentration of 64.7 µg/m3. From filter-based measurements, PM2.5 concentrations at the El Centro and Brawley monitoring sites were 26.4 and 15.5 µg/m3, respectively. The AQI value on this day was 156 (unhealthy for sensitive groups) and was the highest AQI value recorded in Imperial County for 2012 (Figure 95). Small green waste only burns were allowed on December 22 outside of Calexico, but December 23 - 26 were declared “no burn” days in Imperial County.

Figure 95. Daily Peak AQI for December 23, 2012

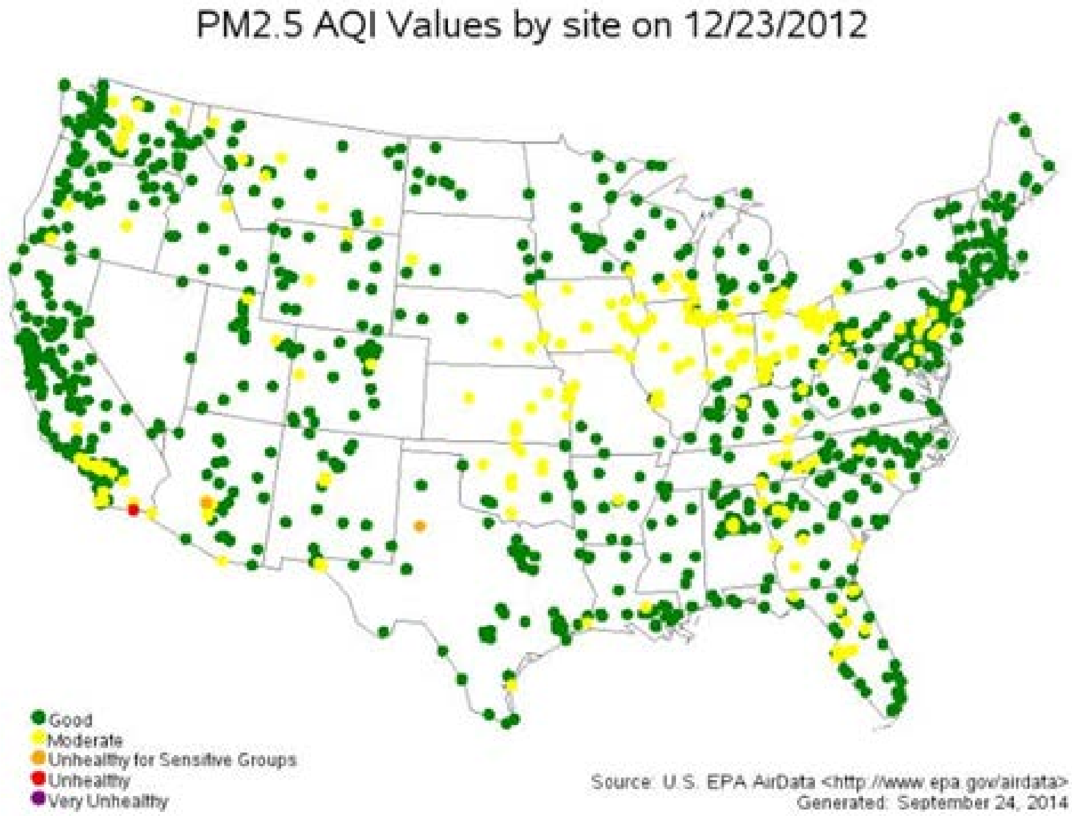
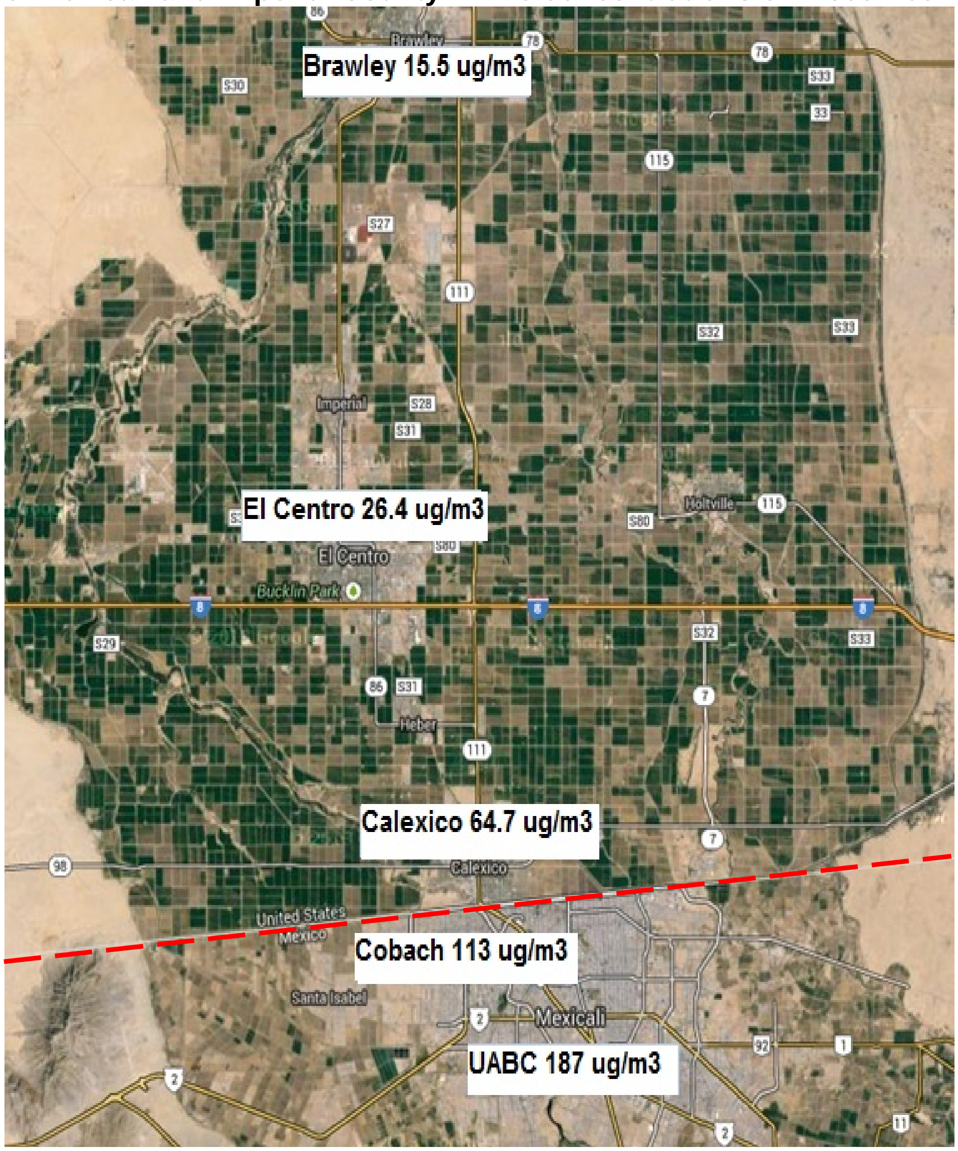


Figure 96 shows the spatial distribution of 24-hour average PM2.5 concentrations recorded at each monitoring site in Imperial County on December 23. The 64.7 μg/m3 concentration measured at Calexico was more than four times the annual average for that site in 2012. The strong PM2.5 concentration gradient from the Mexicali monitors to the Calexico monitor—less than a mile upwind from Mexicali—to the Brawley and El Centro sites just to the north suggests that the emissions impact on the Calexico monitor differs substantially from any impacts experienced by the Brawley and El Centro monitors. Although the concentration gradient differs on December 23 as compared to other Calexico exceedance days, concentrations are much higher near the border. The decreasing concentration gradient from south-to-north, typical of other Calexico exceedance days, is seen on December 23 as well. In addition, ambient data from two Mexicali PM2.5 monitoring sites, COBACH and UABC, were available on December 23. Ambient PM2.5 concentration data from these two sites, (COBACH recorded an average of 113 μg/m3; UABC 187 μg/m3), adds further support that emission sources responsible for these high concentrations were located south of the border and not of U.S. origin.

With similar emission sources and meteorology, the expectation is that PM2.5 concentrations measured at Calexico, El Centro, and Brawley would be similar. The decreasing gradient northward is consistent with the Calexico-Mexicali single air shed concept and points to cross-border emissions as the source of high concentrations measurements at Calexico.

Figure 96. Mexicali and Imperial County PM2.5 concentrations on December 23, 2012

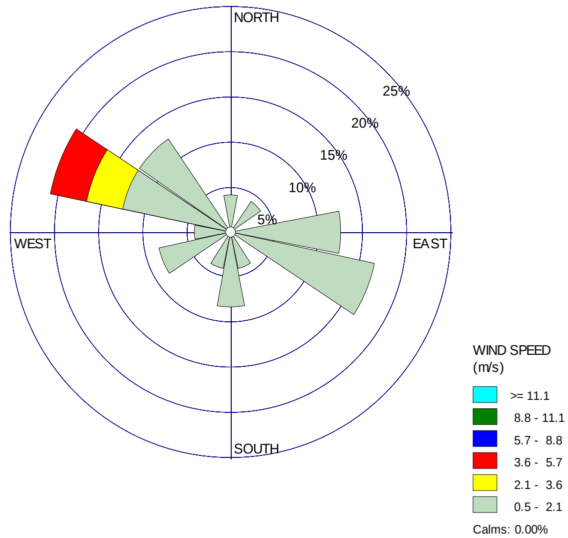


Meteorology

As with the other Calexico exceedance days in this analysis, surface hourly wind data show that stagnant conditions were prevalent on December 23. The 24-hour average resultant wind speed measured at Calexico was 2.1 mph and the hourly maximum was 8.1 mph. The wind rose data indicates that the directionality was divided between winds from north and those from the south (Figure 97). In addition, in the early morning hours, temperatures in Calexico were as low as 43° F.

Surface hourly wind speed data collected in Calexico were generally low. Diurnal plots of PM2.5 BAM concentration, wind speed, and wind direction indicate that the higher wind speeds from the west-northwest were associated with low PM2.5 concentrations. Although winds were from the south at the beginning and toward the end of the day, the higher wind speeds later in the day likely caused dilution of the PM2.5 in the air shed, resulting in decreased concentrations.

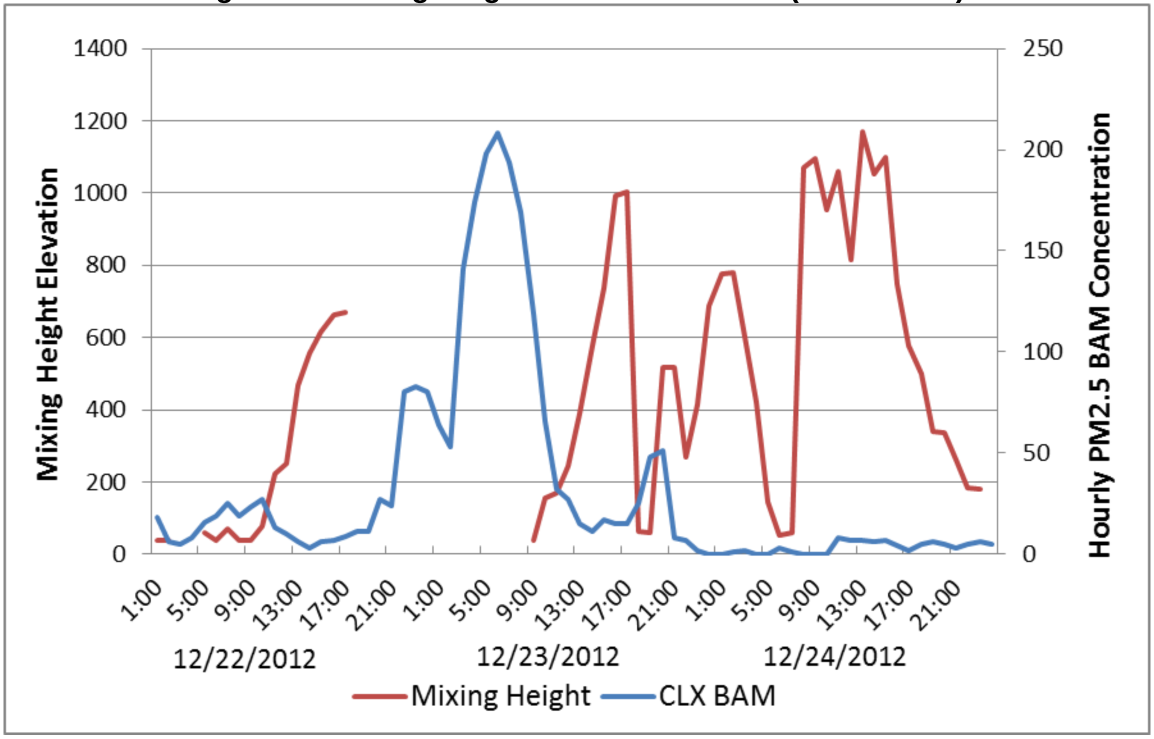
Figure 97. Wind Rose on December 23, 2012



To further characterize meteorological conditions on December 23 which may have influenced PM2.5 concentrations measured at the Calexico station, staff evaluated data on atmospheric mixing height and its correlation with PM2.5 mass data. The nearest routine data collection points to Calexico for radiosonde data are Yuma, Arizona, and Tucson, Arizona. Both of these locations have topography similar to that of Calexico. Yuma data were less complete for December 23, so data from Tucson were used to generate a plot of hourly mixing heights over a three day period that includes the December 23 exceedance.

Figure 98 displays the mixing height and hourly PM2.5 BAM measurements at Calexico. While data gaps exist for the atmospheric soundings, the overall trend over the three day period shows an inverse relationship between mixing height and concentrations. Decreasing mixing height corresponds to increasing PM2.5 concentrations as low vertical mixing confines pollutants. This plot corroborates surface wind data and supports the concept that emissions from Mexicali, confined to the Calexico-Mexicali air shed with reduced pollutant dispersion due to low wind speed and reduced mixing height, resulted in higher PM2.5 concentrations on December 23 than would have been observed in the absence of emissions from Mexico.

Figure 98. Mixing Height vs. Calexico BAM (12/22-12/24)



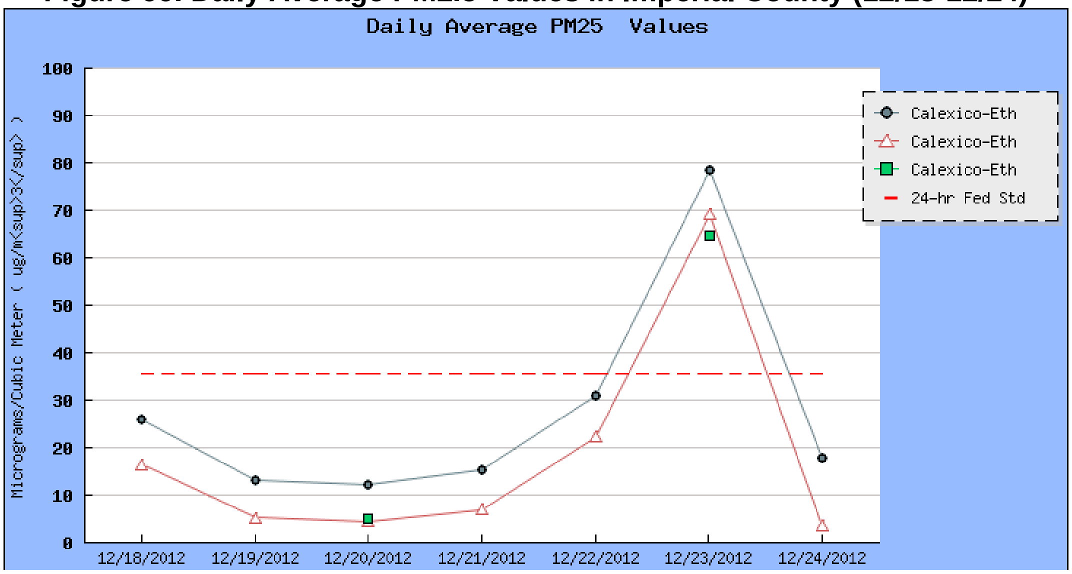
Analysis of the Event

On Sunday, December 23, 2012, the 24-hour PM2.5 concentration at the Calexico monitor was 64.7 µg/m3. The *Las Posadas* festivities occur every year in Mexicali on December 23. *Las Posadas* are religious holidays celebrated each evening from December 16 to December 24. El Centro and Brawley recorded values 2.5 and 4 times lower, respectively. PM2.5 concentration data were also available from Mexicali monitors (UABC and COBACH) for December 23. The UABC and COBACH PM2.5 monitoring stations recorded 24-hour PM2.5 concentrations of 187 and 113 µg/m3, respectively. The gradient of PM2.5 concentrations on December 23 is similar to the gradient seen on December 11; highest concentrations in the south and decreasing moving northward.

PM2.5 concentrations began to build at the Calexico monitoring station at 9:00 pm on December 22 and concentrations remained in the 80 µg/m3 range for the rest of the night. Concentrations remained high throughout the next morning, ranging from 53 to 208 µg/m3, until after 11:00 am when the winds shifted from the south to the north. The maximum concentration 208 µg/m3 at 5:00 am was consistent with a wind shift from west to southeast. Under the auspices of a north wind, PM2.5 concentrations remained low from 11:00 am through 4:00 pm. This wind shift was accompanied by a slight increase in wind speeds and an increase in the mixing height. From 5:00-7:00 pm the PM2.5 concentrations again increased (25 - 51 µg/m3) with another wind shift from north to south. At 7:00 pm the winds shifted back to north and PM2.5 concentrations decreased substantially from 8:00 pm on. The BAM measured a 24-hour average concentration of 69.1 µg/m3 on December 23 at the Calexico monitor with the peaks occurring between midnight-9:00 am and 5:00 and 7:00 pm. The temperatures in the morning hours of December 23 were as low as 43° F at the Calexico station.

Figure 99 shows the daily average PM2.5 values (FRM and BAM) at Calexico from December 18 through December 24, 2012.

Figure 99. Daily Average PM2.5 Values in Imperial County (12/18-12/24)



*POC1 is on a 1-in-3 day sampling schedule and POC3 records hourly data

Wind speed and wind direction data were plotted with the BAM PM2.5 concentration measurements from December 21 through December 24. These data show that low wind speeds, particularly in the early morning hours, are correlated with higher PM2.5 concentrations (Figure 100). Generally, the highest concentrations on December 23 were seen under a combination of southerly flow conditions (79 - 272 degrees) (Figure 101) and calm to low winds.

Figure 100. PM2.5 BAM vs. Wind Speed at Calexico on 12/21-12/24

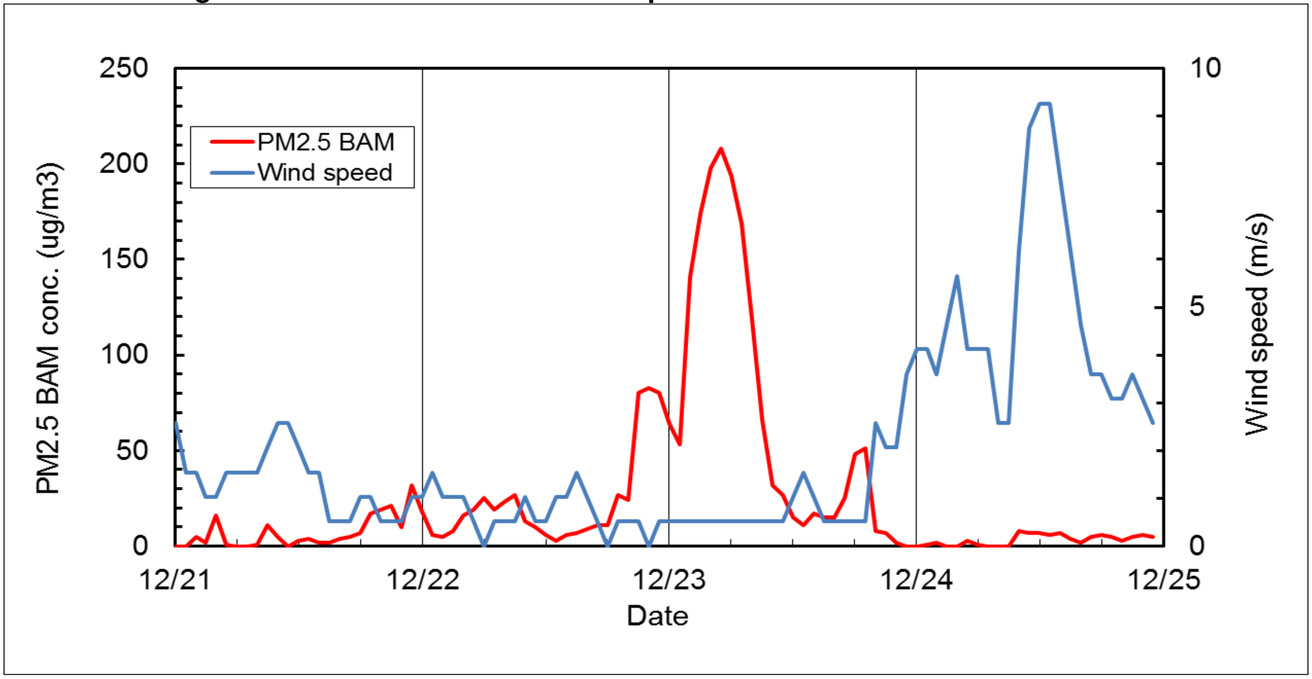
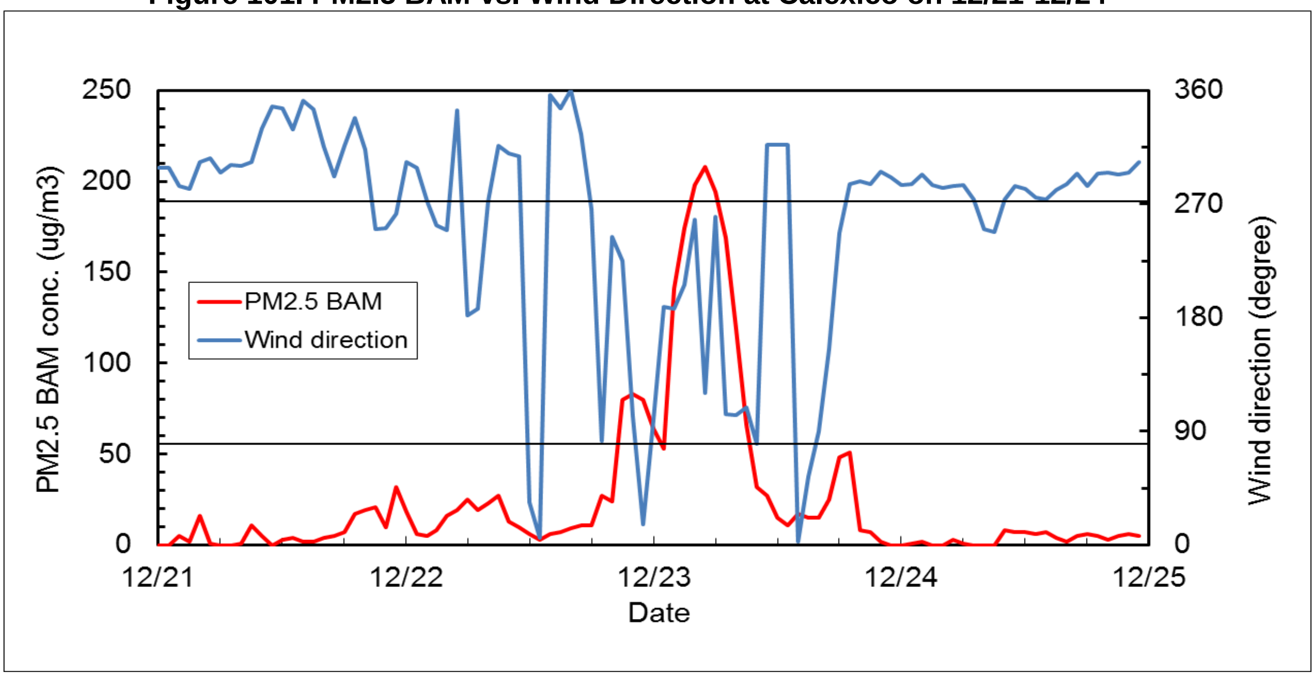


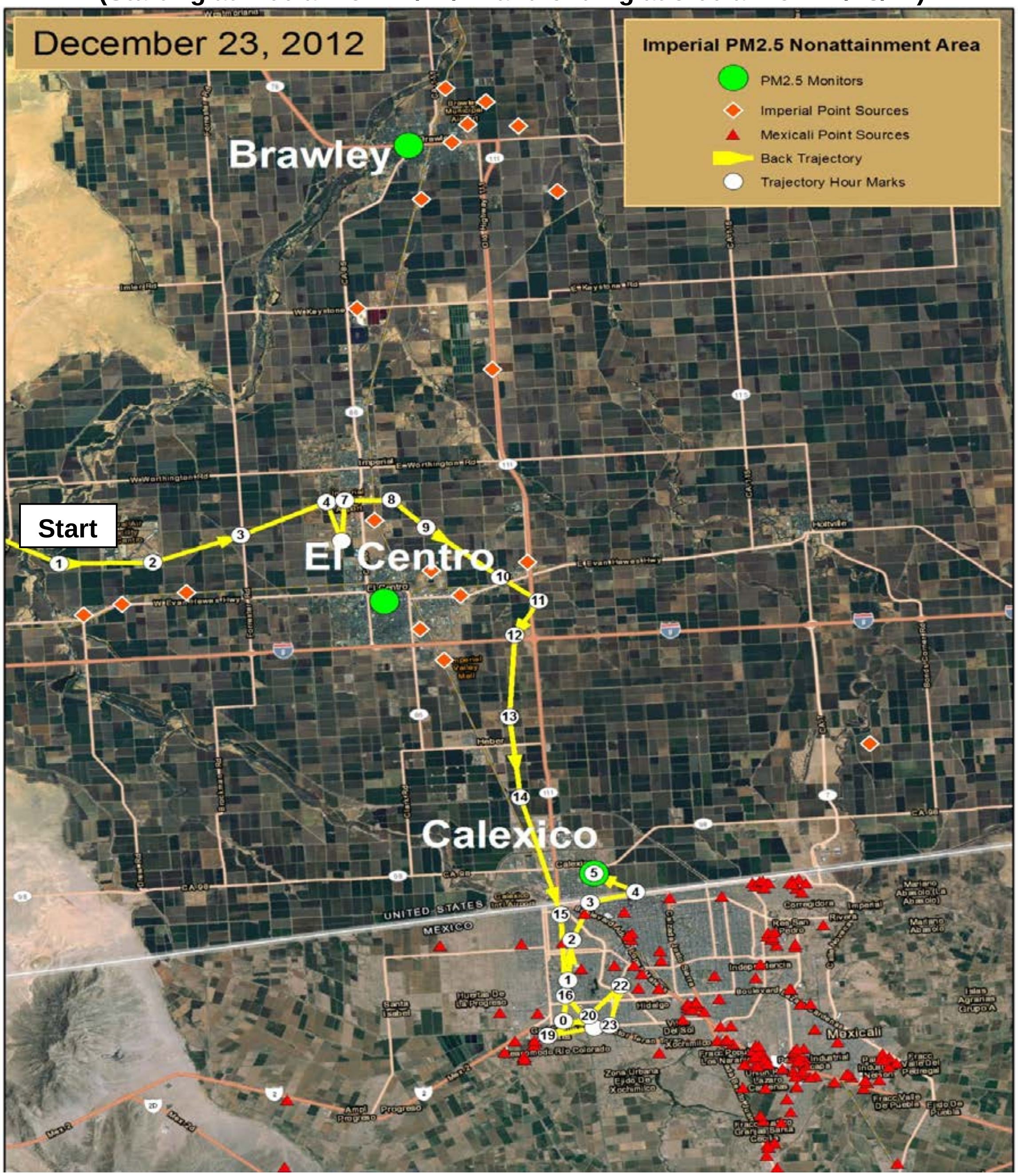
Figure 101. PM2.5 BAM vs. Wind Direction at Calexico on 12/21-12/24



*79-272 degree winds are from the south. 273-78 degree winds are from the north.

The spatial nature of the December 23 exceedance event was assessed using a back-trajectory plot (Figure 102). The objective of a back-trajectory plot is to discern the pathway that an air parcel traveled prior to passing over the site of a continuous pollutant monitor. By calculating the coordinates of this traverse and overlaying the resulting travel path onto an aerial photograph, the potential for transport of emissions from sources under the path to the monitor can be quickly assessed by visual inspection.

Figure 102. December 23 air parcel back-trajectory (Starting at 1:00 am on 12/22/12 and ending at 5:00 am on 12/23/12)

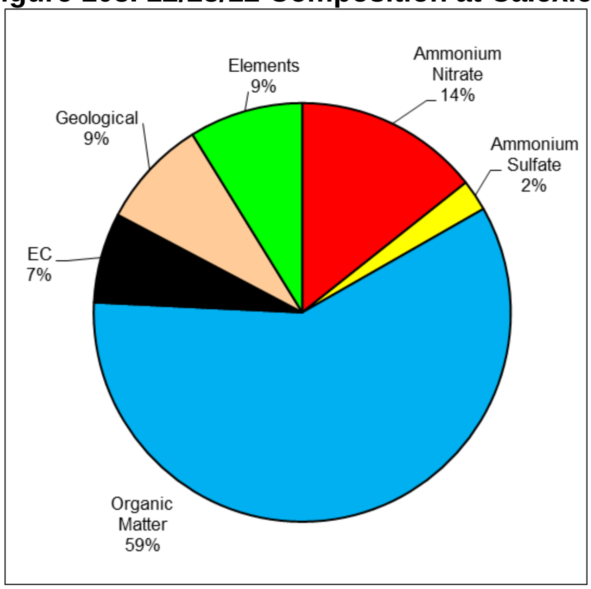


The back trajectory developed for December 23, 2012 started at Calexico at the hour of the highest PM2.5 BAM concentration and followed an air parcel back to midnight on December 22, 2012. This indicates the air parcel that impacted the Calexico site at 5:00 am on December 23 passed through Mexicali in the late night hours on December 22 and the early morning hours of December 23 when concentrations were elevated.

Identification of Emissions

To aide in identifying the source of emissions potentially impacting the Calexico monitor, staff analyzed speciation data available at the station on December 23. The speciation data shows that almost 60 percent of the concentration was from organic matter and 14 percent was from ammonium nitrate. High concentrations of elemental species were also present on this day. High concentrations of carbonaceous aerosols indicate that combustion is the main source of PM2.5 while high concentrations of elemental species suggest that emissions come from non-fossil fuel sources on December 23 (Figure 103). As mentioned, this profile is suggestive of combustion of non-fossil fuels and may be indicative of refuse burning, celebratory bonfires, or other combustion activity in Mexicali. Agricultural burning was not allowed on this day.

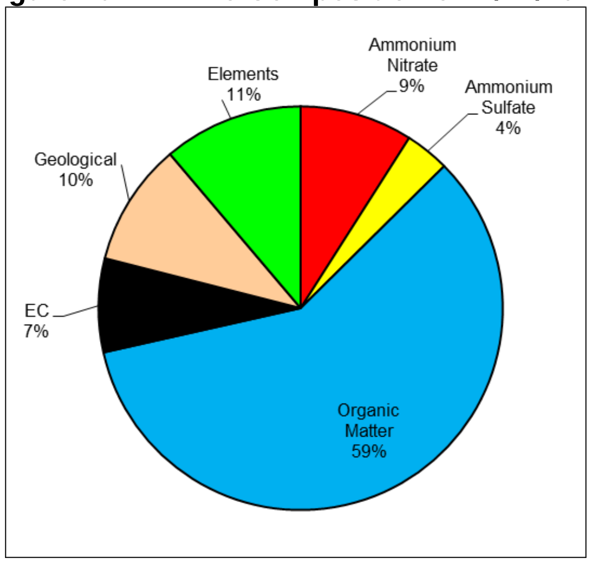
Figure 103. 12/23/12 Composition at Calexico



On December 23, 2012, elemental species concentrations at Calexico were elevated compared to both winter average and annual average concentrations. Concentrations of elemental chlorine were seven times higher compared to winter average and 13 times higher compared to the annual average. Concentrations of antimony, bromine, lead, and barium were two times higher compared to winter concentrations and two to five times higher compared to the annual average. Concentrations of zinc measured on December 23, 2012 were similar to winter and annual average concentrations.

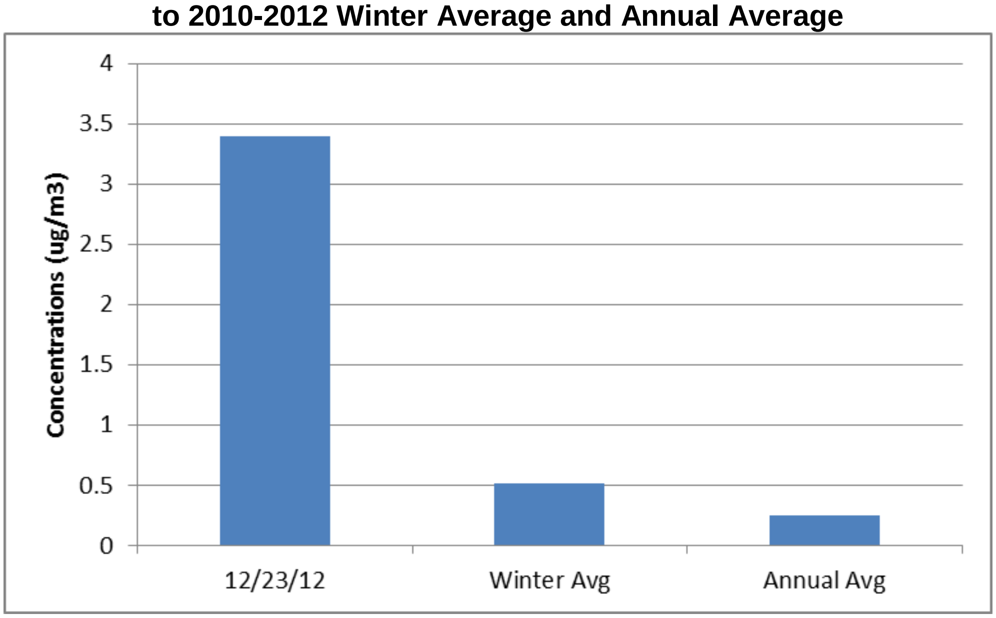
As mentioned in Section XI, the composition on December 23 is generally similar to other exceedance days, as measured by FRM and BAM instruments. It closely resembles the chemical composition data available for the single day the BAM monitor exceeded the level of the standard, January 22, 2012 (Figure 104). Exceedance days, regardless of whether they determined via FRM or BAM instruments, appear to exhibit similar chemical composition profiles.

Figure 104. PM2.5 Composition on 1/22/2012



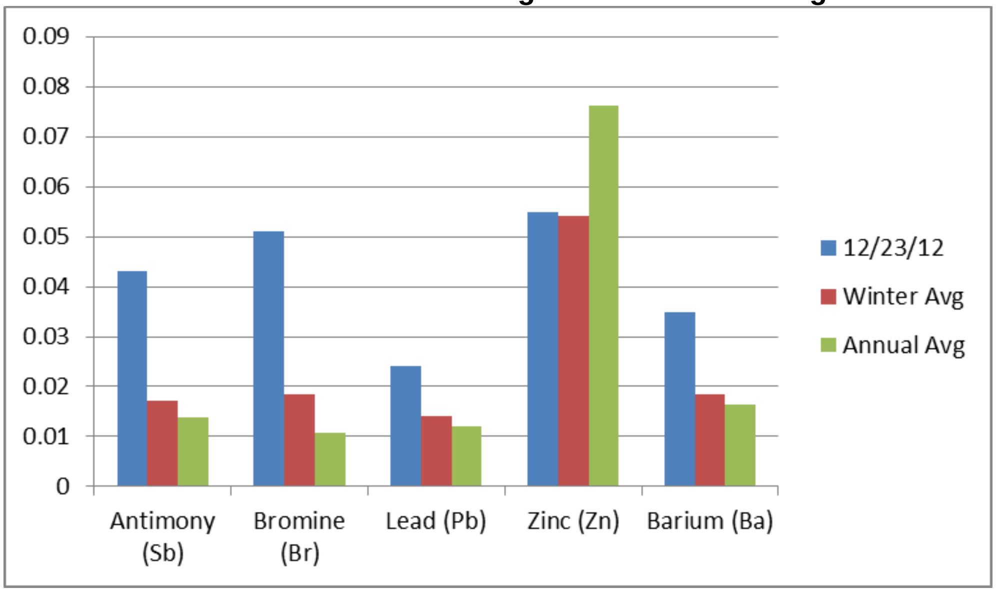
On December 23, 2012 elemental species concentrations at Calexico were elevated compared to both winter average and annual average concentrations. Concentrations of elemental chlorine were seven times higher compared to winter average and 13 times higher compared to annual average (Figure 105). Concentrations of antimony, bromine, lead, and barium were two times higher compared to winter concentrations and two to five times higher compared to annual average. Concentrations of zinc measured on December 23, 2012 were similar to winter and annual average concentrations (Figure 106).

Figure 105. Comparison of Chlorine Concentrations on 12/23/2012 to 2010-2012 Winter Average and Annual Average



*This data does include transport days but does not include invalidated days

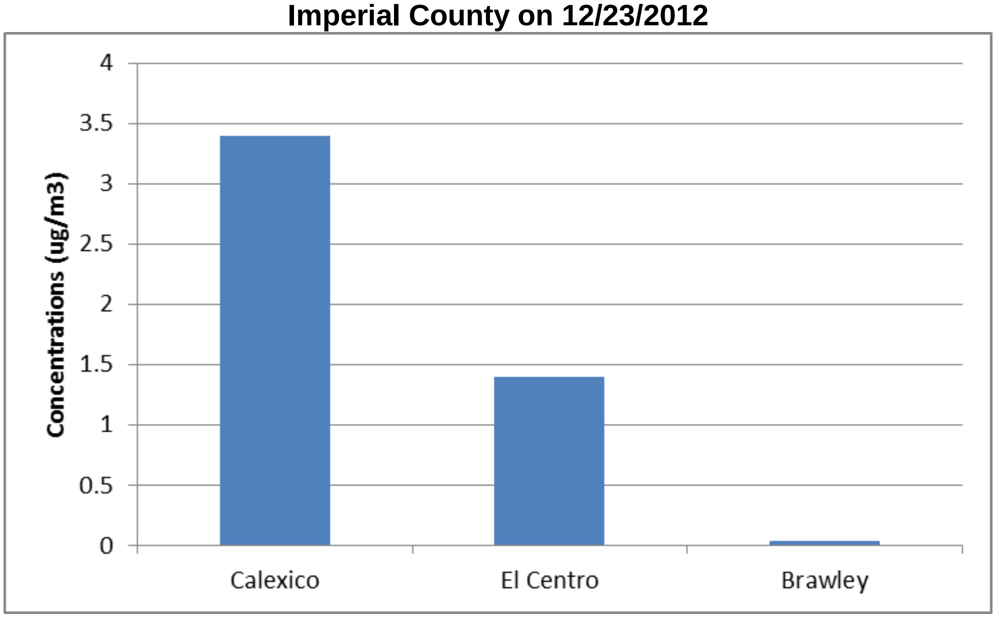
Figure 106. Comparison of Select Species Concentrations on 12/23/2012 to 2010-2012 Winter Average and Annual Average



*This data does include transport days but does not include invalidated days

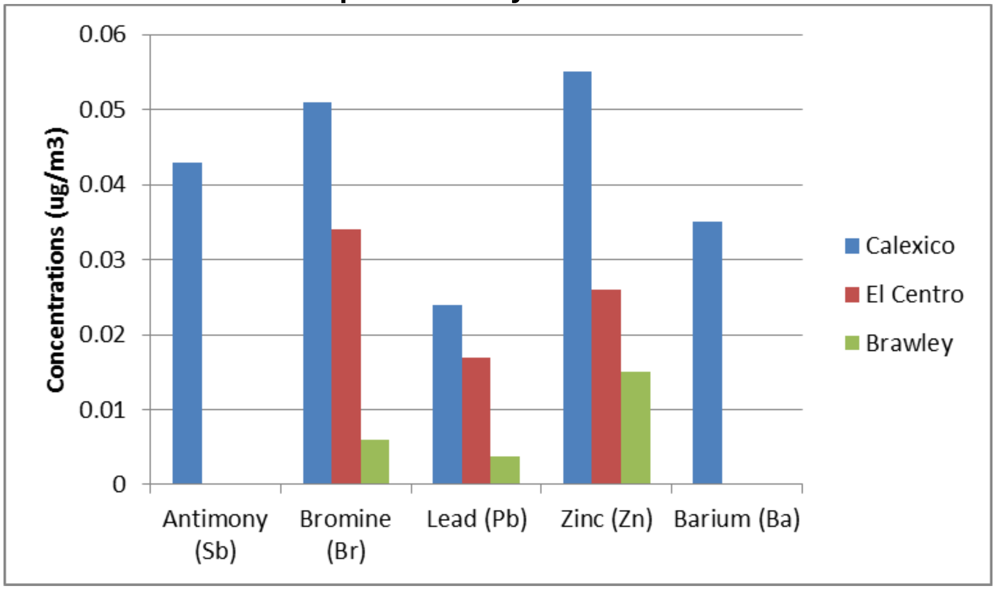
In comparing elemental data at all the Imperial County sites for this day, it is obvious that Calexico was impacted at a much higher level than the two sites just a few miles north. The other two sites, Brawley and El Centro, had concentrations close to or below the detection limits (Figure 107). Concentrations of antimony and barium at both El Centro and Brawley were below the detection limits. Concentrations of bromine, lead, and zinc at Calexico were two to nine times higher, while chlorine was twice as high as concentrations at El Centro and 94 times higher compared to Brawley (Figure 108).

Figure 107. Comparison of Chlorine Concentrations in Imperial County on 12/23/2012



*This data does include transport days but does not include invalidated days

Figure 108. Comparison of Select Elemental Species Concentrations In Imperial County on 12/23/2012

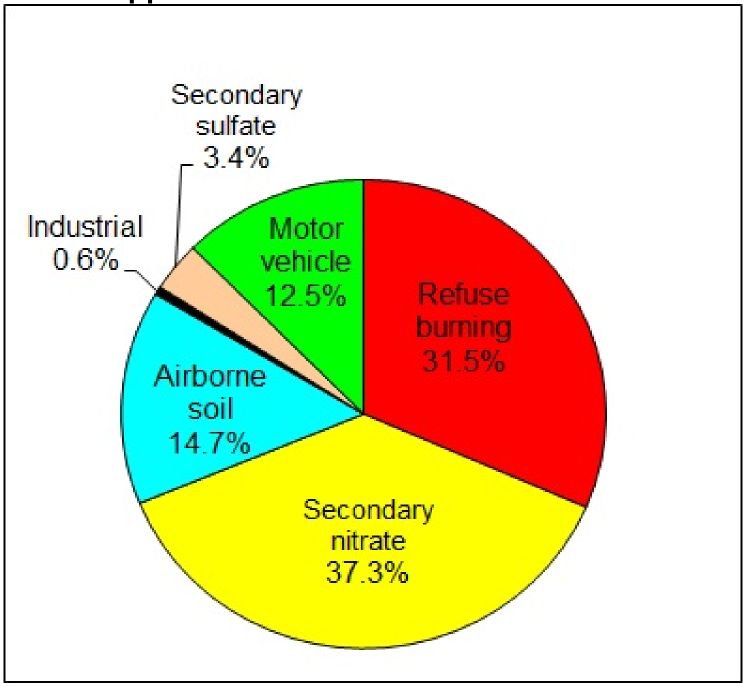


*This data does include transport days but does not include invalidated days

To provide information on the possible sources of emissions impacting the Calexico monitor, PM2.5 speciation data were analyzed using source apportionment model, Positive Matrix Factorization 2 (PMF2). PMF2 is a multivariate receptor model based on the positive matrix factorization (PMF) method. Fundamentally, this model analyzes characteristics of pollutants at the receptor site and, using mathematical algorithms, estimates the source contributions. This model is based on a weighted least square method that weights data points by their analytical uncertainties. A detailed description of PMF2 model procedure for Calexico is included in Appendix B.

In this analysis, a total of 159 samples and 27 species including PM2.5 concentrations collected between 2010 and 2012 were analyzed and six major sources were identified: Airborne soil, motor vehicle, secondary sulfate, secondary nitrate, refuse burning, and industrial. Figure 109 suggests that refuse burning and secondary nitrate were the major sources of PM2.5 on December 23. Secondary nitrate and refuse burning were estimated to contribute 24 µg/m3 and 20.4 µg/m3, respectively, of the 37.7 µg/m3 concentration recorded at Calexico. Since refuse burning is not permitted in Imperial, this impact—coupled with meteorological data—may be attributed to emissions from Mexicali.

Figure 109. Source Apportionment PM2.5 Contribution on December 23, 2012



The source apportionment percentage for refuse burning and industrial emissions is compared to the PM2.5 concentration at Calexico on December 23, 2012 in Table 15. Because refuse burning does not occur in Calexico ARB Staff attribute all of the refuse burning to be from Mexicali. In addition, there are no industrial emission sources in the City of Calexico so these emissions are also attributed to Mexicali. Although the Calexico site still shows a concentration above the 35 µg/m3 standard when refuse burning and industrial emissions are taken out, it is not assumed that all of the remaining emissions came from the U.S. side of the border. A portion of additional mass (based on sources apportionment of secondary nitrate, airborne soil, secondary sulfate, and motor vehicles) is also likely from Mexicali, but given the resolution of our analysis, ARB staff is unable to definitively apportion *all* PM2.5 mass to either Mexicali or U.S.-based sources.

Table 15. Contribution of Refuse Burning and Industrial Emissions to the PM2.5 Concentration on December 23, 2012

FRM Concentration	Without Refuse burning emissions	Without Refuse Burning & Industrial emissions
64.7	44.3	43.9

XII. Non-FEM Beta Attenuation Monitor

To assist in evaluating data trends between 2010 and 2012, staff evaluated non-FEM BAM data. There were 28 days when 24-hour concentrations recorded by the BAM exceeded the level of the standard. This includes the five exceedance days identified in Table 1 (page 8). Of these 28 days, 25 days occurred between November and February, corroborating FRM data that shows the majority of PM2.5 exceedances in Calexico occur during winter with an overall trend of higher concentrations occurring during the early morning hours and late evening hours. Figure 110 below shows the diurnal pattern of the 28 non-FEM exceedance days. For the majority of the days, the high PM2.5 levels occur early in the morning and late at night when temperatures are lower with corresponding lower mixing heights. Concentration “spikes” were also noted on a limited number of summer days and may have been linked to higher-than-usual winds speeds.

The availability of chemical composition data for evaluating exceedances measured by the BAM was limited to five days; specifically, December 4, 2010; December 11, 2011; January 31, 2012; December 23, 2012; and, January 22, 2012. These days correspond to the speciation days for which FRM data were also available, with the exception of January 22, 2012. Chemical composition analysis for January 22 closely matches analyses conducted for the other wintertime exceedance days; specifically, the composition closely resembles that of December 23. The January 22 composition is shown in the day-specific analysis for December 23 on page 114.

To place BAM measurements on exceedance days in the context of temperature and wind speed, staff plotted the average hourly concentrations, as measured by the BAM, with average wind speeds and temperatures. Figure 111 illustrates the average diurnal pattern of the 28 BAM exceedance days. The trend over the majority of these days indicates that higher PM2.5 levels occur during early morning hours and late in the evening when ambient temperatures are lower. During these colder temperatures, atmospheric mixing heights also tend to be lower. Mixing height trends are discussed for each of the exceedance days in Section XI of this document.

Figure 110. PM2.5 Hourly BAM Values For Days Exceeding the 24-hour PM2.5 Standard

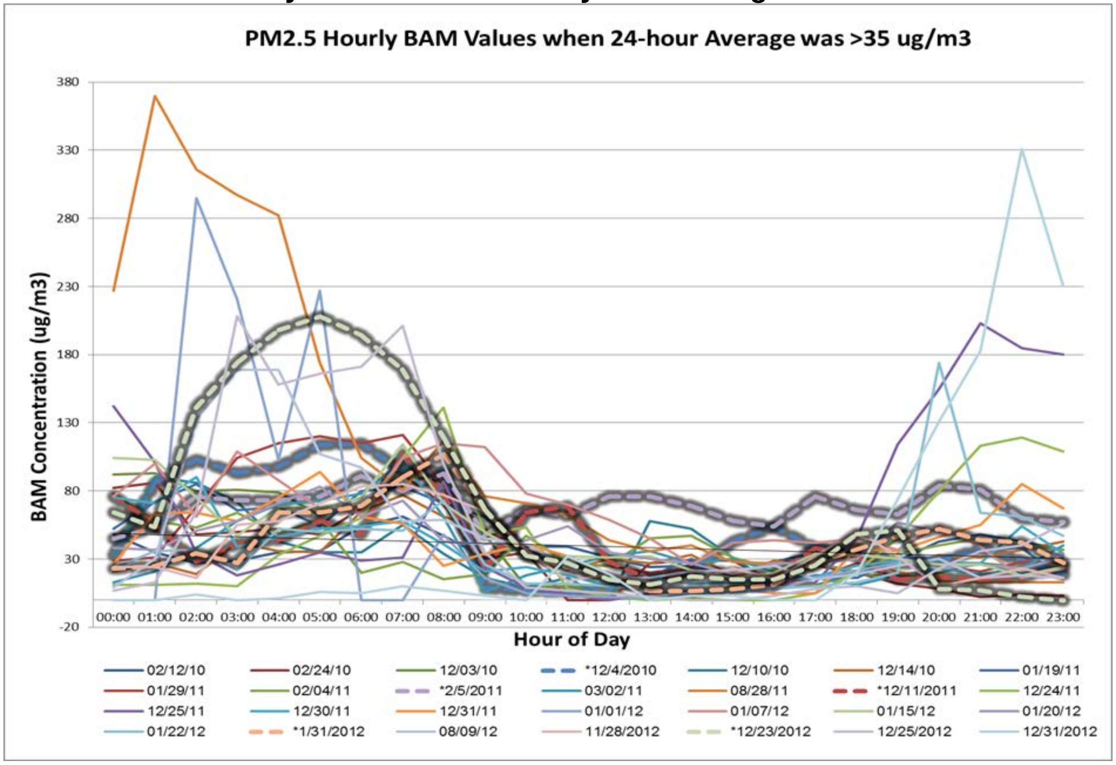
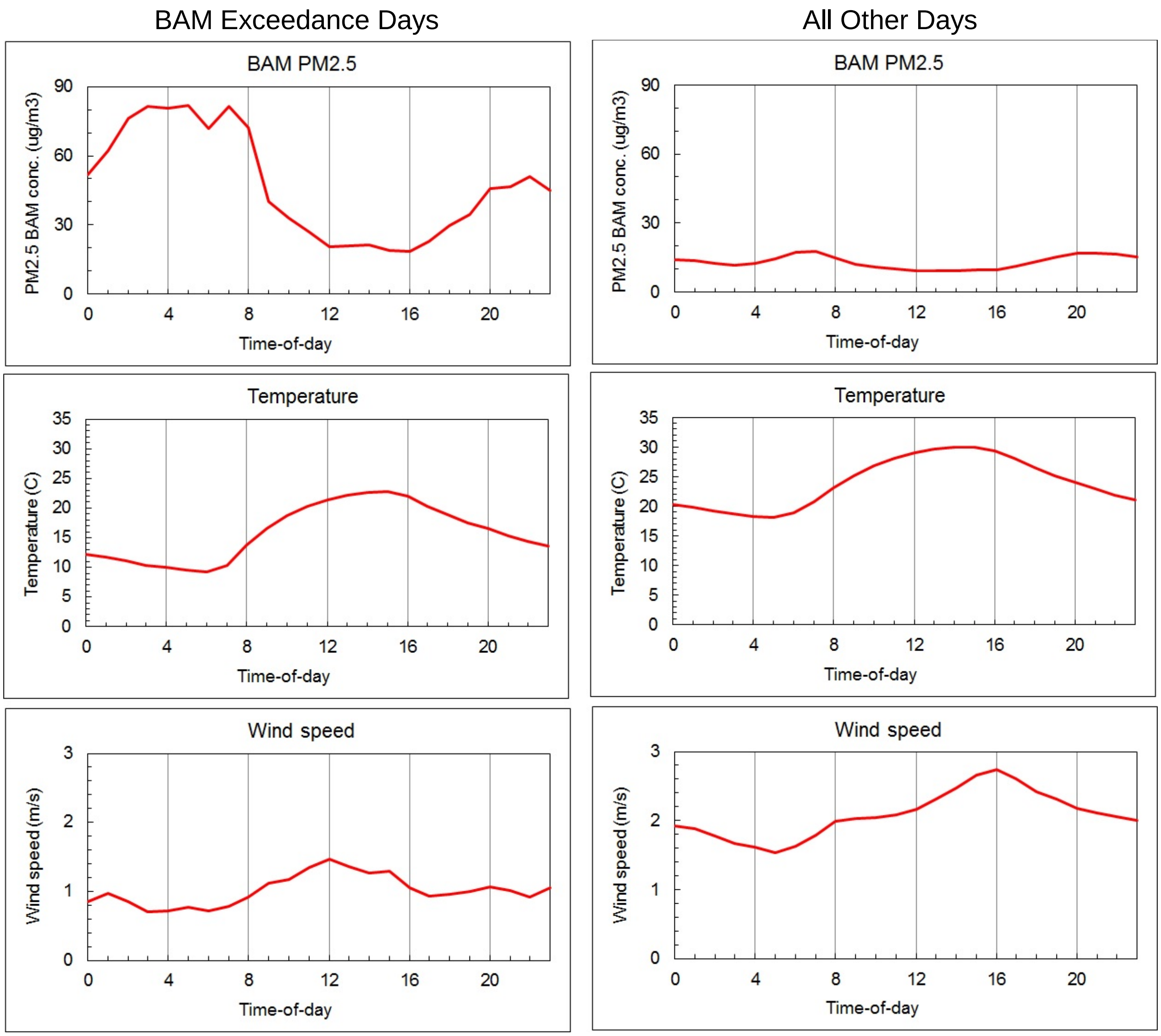


Figure 111. Average Wind Speed, Concentration, and Temperature on all BAM Exceedance Days (2010-2012)

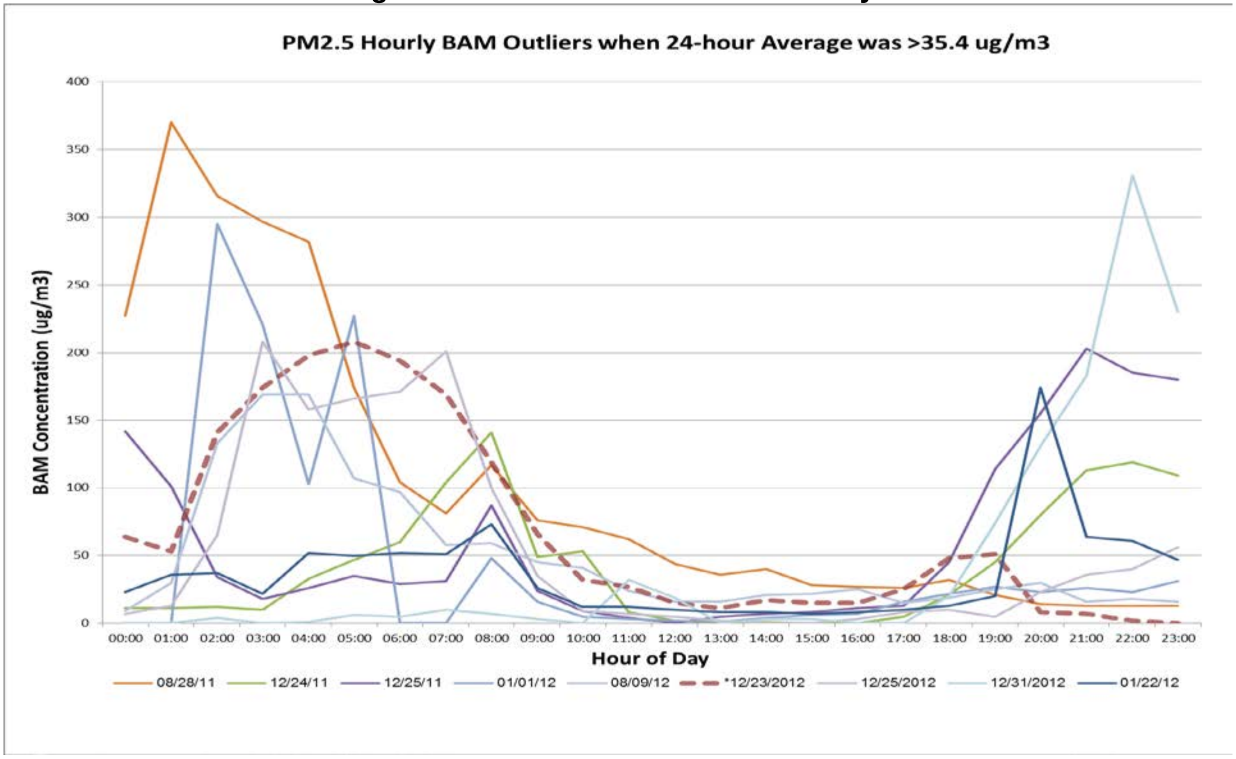
Figure 112 plots trends in the hourly PM2.5 concentrations, temperature and wind speed for the 28 non-FEM exceedance days and provides a comparison to the trend seen for all other days in 2010-2012. This comparison shows that the 28 exceedance days differ from all other days at Calexico. The high PM2.5 in the morning, lower temperatures and decreased wind speed all provide an environment for increased PM2.5 concentration at Calexico.

Figure 112. Comparision of Trends on BAM Exceedance Days and All Other Days (2010-2012)



From Figure 110, nine outliers were identified that did not fit the normal diurnal pattern of the Non-FEM BAM exceedance days. These days were looked at more closely to help determine the cause of their high values. Figure 113 displays the nine outlier days. Appendix C includes more detail on the diurnal pattern for PM2.5, wind speed, temperature, wind rose plots, and speciation (where available) for all nine of these outlier days.

Figure 113. Non-FEM BAM Outlier Days



*December 23, 2012 is part of the day specific analysis in Section XI

Figure 113 shows that two of these days occurred in August when thunderstorm activity was impacting the PM10 and PM2.5 concentrations in Imperial County. Six of these days occurred on a major holiday in Imperial County or Mexicali, Mexico. Table 16 lists all of the outlier days and the corresponding event or holiday that caused the Non-FEM BAM to exceed the standard on these days.

Table 16. Non-FEM Nine Outlier Exceedance Days, Concentration, and Possible Emission Sources

Non-FEM Exceedance Day Outlier	PM2.5 Concentration	Possible Impact on Exceedance
8/28/2011	103.5	Thunderstorm activity in Imperial
12/24/2011	49.2	Christmas Eve
12/25/2011	63.7	Christmas Day
1/1/2012	55.3	New Year's Day
1/22/2012	36.5	Possible Influence from Combustion Emissions
8/9/2012	49.2	Thunderstorm in Phoenix. High Winds in Imperial.
12/25/2012	60.4	Christmas Day
12/31/2012	62.5	New Year's Eve

The January 22, 2012 sample mimics the diurnal pattern we see for winter days during the morning and afternoon hours but the PM2.5 peaks at 8:00 pm to 180 µg/m3. Further information gathered from the speciation profile on January 22, 2012 shows that the speciation matches very closely to that of December 23, 2012. Cold temperatures and an increase in burning could have caused this peak at night on January 22.

Six of these events fell on Mexican and U.S. celebrated holidays. As noted in the 179B analysis, these holidays are celebrated every year in Imperial County and Mexicali and the use of fireworks, bonfires, and burning of refuse material in Mexicali is prevalent on these days. December 23, 2012 is in the 179B documentation as a day impacted by transport from Mexico and the celebrations during the Mexican holiday, *Las Posadas*.

Two of the nine days non-FEM exceedance days fell outside of the normal winter season when PM2.5 exceedances typically occur in Imperial County. These events occurred on August 28, 2011 and August 9, 2012. Concentrations of PM2.5 and PM10 were very high on August 28, 2011 in Imperial County. The Calexico monitor recorded a 24-hour concentration of 103.5 at the hourly PM2.5 monitor. Increased PM2.5 concentrations were also seen at El Centro and Brawley, where the 24-hour PM2.5 concentrations were 54.4 ug/m3 and 37 ug/m3, respectively. In addition, the hourly 24-hour PM10 concentrations were 231.8 ug/m3 at Brawley and 269.1 ug/m3 at Niland on August 28, 2011.

On the night of August 27, 2011 the National Weather Service issued a severe thunderstorm warning for east central Imperial County. The report noted winds in excess of 60 mph, very heavy rain, and small hail. The report also mentioned that dense blowing dust would accompany this severe storm. Yuma, Arizona, San Diego and the South Coast also received alerts of the thunderstorm, high winds, and blowing dust for August 27 - 28, 2011. The wind gusts in Yuma were over 50 mph and left more than 10,000 people in the County without power. Mexicali news reports also discussed the blackouts experienced on August 28, 2011 from the thunderstorms and high winds. The District flagged this day in AQS as a high wind event.

August 9, 2012 was flagged in AQS as a high wind event and was impacted from thunderstorm activity in Phoenix, Arizona. The high easterly winds raised dust in Phoenix, Arizona, which was transported into Imperial County. Remnant dust from overnight thunderstorms pushed outflow boundaries into Imperial County. The hourly 24-hour PM10 concentrations in Imperial County were also very high; Calexico (387.3 ug/m3), Brawley (239.7 ug/m3), and Niland (196.5 ug/m3). The Calexico hourly PM2.5 monitor recorded a 24-hour concentration of 49.2 ug/m3. Magdalena, Mexico had news reports that discussed the summer storm that produced wind gusts up to 50 mph, four inches of rain in one day, and the severe flooding of homes that occurred for this storm. The city of Magdalena issued a state of emergency from the damage done by the storm.

Design Value Calculation

The 24-hour PM2.5 standard design value is determined by first ranking all of the PM2.5 samples for each year from the highest concentration to the lowest concentration. The third highest value recorded for each year is averaged over the three years (2010-2012) to determine what the 3-year 98th percentile design value is for that site.

Table 17 below includes the five highest concentrations measured each year between 2010 and 2013. The green cells represent the third highest value in each year under each scenario and the red cells represent the transport days excluded under each scenario. If U.S. EPA approves of all five of the transport days at Calexico, the 24-hour design value using 2010 - 2012 data would be 29 µg/m3. However, U.S. EPA would not need to approve of all of the transport events in order for the Imperial NA to show that they attained the standard in 2012. Concurrence on the transport analyses would be needed from U.S. EPA for December 11, 2011, and December 23, 2012, in order for Imperial to demonstrate attainment. If these two events are excluded from the design value calculation, the new design value at the Calexico monitor for 2010-2012 would be 34 µg/m3 and Imperial would have demonstrated that they attained the 24-hour PM2.5 standard.

Table 17. Imperial PM2.5 NAA 2010-2013 24-Hour Design Value Calculations

	2010		2011		2012		2013		Design Value	
Rank	Date	(ug/m3)	Date	(ug/m3)	Date	(ug/m3)	Date	(ug/m3)	2012	2013
Design Values Based on All Data										
1	12/4/10	50.9	2/5/11	80.3	5/25/12	119.3	11/9/13	36.3		
2	6/28/10	41	12/11/11	44.4	12/23/12	64.7	4/8/13	28.2		
3	12/10/10	31.7	10/15/11	40.9	3/31/12	56.3	5/4/13	27.4		
4	11/10/10	28.4	6/23/11	32.4	1/31/12	37.7	12/18/13	26		
5	2/4/10	27.5	12/14/11	28.4	6/8/12	30.7	6/18/13	25.8		
98th Percentile		**31.7**		**40.9**		**56.3**		**27.4**	**43**	**42**
Design Values Without Five Transport Days										
1	12/4/10	50.9	2/5/11	80.3	5/25/12	119.3	11/9/13	36.3		
2	6/28/10	41	12/11/11	44.4	12/23/12	64.7	4/8/13	28.2		
3	12/10/10	31.7	10/15/11	40.9	3/31/12	56.3	5/4/13	27.4		
4	11/10/10	28.4	6/23/11	32.4	1/31/12	37.7	12/18/13	26		
5	2/4/10	27.5	12/14/11	28.4	6/8/12	30.7	6/18/13	25.8		
98th Percentile		**28.4**		**28.4**		**30.7**		**27.4**	**29**	**29**
Design Values Without Three Transport Days (12/4/10, 12/11/11, and 12/23/12)										
1	12/4/10	50.9	2/5/11	80.3	5/25/12	119.3	11/9/13	36.3		
2	6/28/10	41	12/11/11	44.4	12/23/12	64.7	4/8/13	28.2		
3	12/10/10	31.7	10/15/11	40.9	3/31/12	56.3	5/4/13	27.4		
4	11/10/10	28.4	6/23/11	32.4	1/31/12	37.7	12/18/13	26		
5	2/4/10	27.5	12/14/11	28.4	6/8/12	30.7	6/18/13	25.8		
98th Percentile		**28.4**		**32.4**		**37.7**		**27.4**	**33**	**33**
Design Values Without Two Transport Days (12/11/11 and 12/23/12)										
1	12/4/10	50.9	2/5/11	80.3	5/25/12	119.3	11/9/13	36.3		
2	6/28/10	41	12/11/11	44.4	12/23/12	64.7	4/8/13	28.2		
3	12/10/10	31.7	10/15/11	40.9	3/31/12	56.3	5/4/13	27.4		
4	11/10/10	28.4	6/23/11	32.4	1/31/12	37.7	12/18/13	26		
5	2/4/10	27.5	12/14/11	28.4	6/8/12	30.7	6/18/13	25.8		
98th Percentile		**31.7**		**32.4**		**37.7**		**27.4**	**34**	**33**

XIII. Conclusion

Analyses were performed using techniques referenced in U.S. EPA guidelines for evaluating the impact of emissions originating from outside the United States on ambient PM2.5 concentrations. The analyses consisted of assessing emission inventories from Imperial County and Mexicali; evaluating the composition and elemental make up of samples collected on Calexico exceedance days; reviewing the meteorology associated with high concentration measurements; and, performing directional analysis of the sources potentially impacting the Calexico PM2.5 monitor.

These analyses demonstrate that emissions originating in Mexico impacted measured PM2.5 levels in Calexico during five exceedance days between 2010 and 2012. The analyses also shows that Imperial County would have attained the 24-hour PM2.5 NAAQS but for international transport. The key findings supporting this conclusion are as follows:

- Calexico is similar in scale regarding population and emission sources to Brawley and El Centro with the only difference being Calexico's proximity to the international border;
- The area represented by the Calexico monitor shares a common air shed with the large metropolitan city of Mexicali, Mexico;
- Calexico experiences stagnant atmospheric conditions during the wintertime, which results in little or no dispersion—emissions from Mexicali remain in the border region;
- The Calexico PM2.5 air quality data is significantly different than the other two sites, Brawley and El Centro;
- Elemental analysis of Calexico exceedance day PM2.5 samples indicates that combustion of refuse or other non-biomass material is the probable source of Calexico PM2.5 exceedances;
- The chemical signature of PM2.5 samples on exceedance days differ significantly from other PM2.5 samples in the State and indicate high levels of chlorine and other elements;
- Traditional celebrations in Mexico occur during the winter and are known to include bonfires fueled with tires, wood, and other materials not routinely burned in Calexico.

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Windrose plots. WRPLOT View. Lakes Environmental Software.

Appendix A

Methodology for Developing Air Parcel Back-Trajectories

Plots of air parcel back-trajectories were developed as part of the analysis of PM2.5 source-receptor relationships on winter stagnation days in Calexico, California. The objective of a back-trajectory plot is to discern the pathway that an air parcel traveled prior to passing over the site of a continuous pollutant monitor. By calculating the coordinates of this traverse and overlaying the resulting travel path onto an aerial photograph, the potential for transport of emissions from sources under the path to the monitor can be quickly assessed by visual inspection. This tool is especially useful for identifying possible local source contributions to peak hourly PM2.5 concentrations on meteorologically stagnant days. On these days, peak concentrations are typically measured during nocturnal hours when mixing heights are tens of meters above the ground and vertical dispersion is severely limited. As wind velocities are also low at these times, the distances that air parcel move in each hour are short and plots of nocturnal back-trajectories show path lengths that remain within a few miles of the monitor.

For the analysis of PM2.5 exceedances on stagnation days at the Calexico Street monitoring site, the designated end-point of each back-trajectory plot was the monitoring site itself. To identify nearby sources that produced the greatest impacts on hourly PM2.5 concentrations, the ending hour of each back-trajectory analysis was selected to be the hour during which the highest 1-hour average PM2.5 concentration was recorded on each design day. The hourly meteorological data for the back-trajectory analyses were extracted from ARB's online monitoring data repository – AQMIS2 – which is accessible at: http://www.arb.ca.gov/aqmis2/aqmis2.php. The identification of the peak PM2.5 hour for each design day was based on hourly concentration data stored on the same website. Table A1 displays the highest hourly PM2.5 concentration for each design day that determined the ending hour of each back-trajectory.

Table A1. Calexico Transport Day
Ending Hour and PM2.5 Concentration

Date (Design Day)	Ending Hour	PM2.5Concentration ($\mu g/m^3$)
December 4, 2010	06	115
February 5, 2011	08	93
December 11, 2011	07	107
January 31, 2012	08	107
December 23, 2012	05	208

Hourly meteorological data recorded at a 10-meter tower located adjacent to the Calexico Street PM2.5 monitor were used to compute the beginning and ending coordinates of each hourly air parcel trajectory or vector. Because the calculations of vector coordinates proceed in a reverse-time mode for the back-trajectory, the calculation of vector coordinates for each hour started with the ending coordinates and used the wind speed and the reverse of the wind azimuth to compute the beginning coordinates for that hour. The coordinate calculation was conducted in a stepwise fashion beginning at the monitor location and using the wind speed and direction data for each preceding hour to compute path coordinates back to 00 hours on the day preceding each design day. To facilitate the calculation, the coordinates of the monitoring station (i.e., N 32.67618 latitude, W -115.48307 longitude[6]) were converted to Universal Transverse Mercator (UTM) units (642225.23 mE, 3616403.65 mN) using the coordinate display algorithm embedded with the Google Earth global mapping program.[7] After coordinates for each hourly vector were determined in UTM units, these coordinates were converted to latitude/longitude using an online model developed by Dr. Steve Dutch of University of Wisconsin-Green Bay.[8]

The hourly vector coordinates are plotted as an overlay on a map of the nonattainment area using ArcMap 10, ESRI's geographic information systems (GIS) software. The coordinates were imported in ArcMap 10 and formatted as a point-to-line file. The coordinates of each hours' endpoint and start point were configured to appear linked by a vector arrow in the overlay file, such that the full set of hourly data for a single design day appeared as a connected trajectory starting at 00 hours on the day before the design day and ending at the Calexico Street monitor at the highest PM2.5 hour of the design day. The resulting back-trajectory plots thus reveal approximately where air parcels containing the highest PM2.5 concentrations traveled before arriving at the monitor. These plots inform the investigation into identification of potentially significant sources that raise PM2.5 concentrations to levels in excess of the 24-hour NAAQS at the Ethel Street monitor.

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[6] Site Information for Calexico-Ethel Street; Quality Assurance Air Monitoring Site Information; CARB; http://www.arb.ca.gov/qaweb/browsetest.php?year=2013&s_arb_code=13698, accessed on April 15, 2014.
[7] http://www.google.com/earth/explore/products/, accessed on April 15, 2014.
[8] http://www.uwgb.edu/dutchs/usefuldata/ConvertUTMNoOZ.HTM,accessed on February 14, 2014

Appendix B

Source Apportionment of $PM_{2.5}$ Measured at the Calexico Monitoring Site

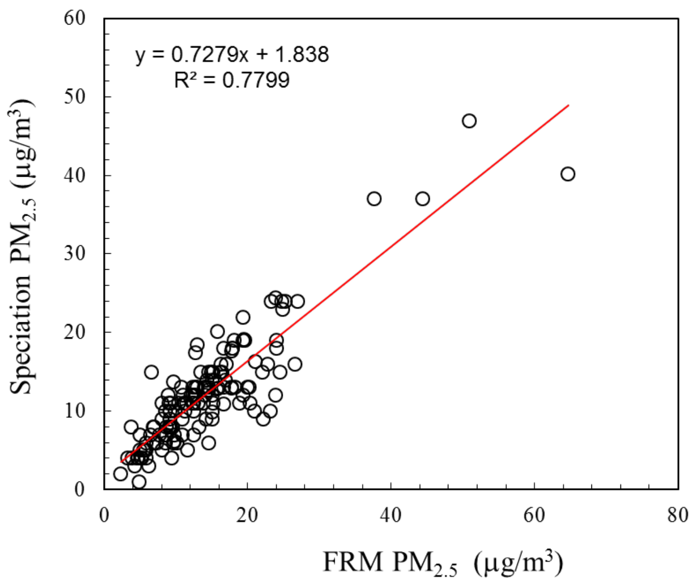
Positive matrix factorization (PMF) is a multivariate source apportionment method that deduces source profiles as well as contributions from $PM_{2.5}$ speciation data. PMF is one of several EPA recommended receptor modeling methods (U.S.EPA, 2008). To identify major $PM_{2.5}$ sources affecting Calexico monitoring site, PMF2 (bilinear PMF) was used in this study.

1. Sample Collection and Data Screening

The $PM_{2.5}$ speciation samples that were analyzed were collected by Spiral Aerosol Speciation Samplers (SASS; Met One Instruments, Grants Pass, OR) on a one-in-three day schedule at Calexico SLAMS (State and Local Air Monitoring Stations) network monitoring site located in the Imperial County.

Comparing $PM_{2.5}$ data measured by the speciation sampler and the collocated Federal Reference Method (FRM) sampler in Figure B1 shows reasonable agreement using 142 data points between 2010 and 2012 (*slope* = 0.73, *Intercept* = 1.84, r^2 = 0.78).

Figure B1. FRM $PM_{2.5}$ versus Speciation $PM_{2.5}$ between 2010 and 2012



For the source apportionment, samples were excluded from the data set for which the $PM_{2.5}$, OC, or EC data had an error flag, or for which OC or EC data were not available. Samples for which the sum of all measured species were larger than $PM_{2.5}$ concentrations or the sum of all measured species were less than 50% of $PM_{2.5}$ concentrations were excluded. Overall, 12.6 % of the data were excluded in this study.

Table B1. Summary of $PM_{2.5}$ species mass concentrations at Calexico

Species	Arithmetic mean (µg/m^3)	Geometric mean (µg/m^3)	Minimum (µg/m^3)	Maximum (µg/m^3)	Number of below MDL[1] values (%)	S/N ratio[2]
$PM_{2.5}$	12.3868	10.9095	3.0000	47.0000	0.0	NA[3]
OC	3.4302	2.7759	0.7000	23.0000	0.0	NA
EC	0.8264	0.6332	0.0500	3.7000	2.5	328.0
SO4	1.2341	1.0488	0.2340	4.7000	0.0	NA
NO^{3-}	1.2126	0.8387	0.2000	7.3900	0.0	NA
NH_4^+	0.6159	0.4765	0.0900	3.7300	0.0	NA
Al	0.1634	0.1018	0.0065	1.5000	6.3	172.7
Ba	0.0163	0.0141	0.0100	0.0510	61.0	0.8
Br	0.0112	0.0069	0.0010	0.1100	6.9	80.4
Ca	0.2339	0.1838	0.0310	1.2000	0.0	NA
Cl	0.2541	0.1044	0.0070	3.4000	0.0	NA
Co	0.0024	0.0019	0.0015	0.0150	78.0	0.5
Cr	0.0022	0.0017	0.0015	0.0370	86.2	0.3
Cu	0.0158	0.0117	0.0020	0.0670	6.9	56.6
Fe	0.1995	0.1634	0.0250	0.8700	0.0	NA
K^+	0.1682	0.1122	0.0650	1.6000	66.7	1.3
Mn	0.0061	0.0042	0.0015	0.0290	25.2	7.6
Na^+	0.2342	0.1685	0.0400	0.8900	20.1	10.1
Ni	0.0023	0.0019	0.0015	0.0200	87.4	0.3
Pb	0.0126	0.0068	0.0015	0.1100	22.0	18.6
P	0.0052	0.0036	0.0020	0.0310	60.4	1.6
Sb	0.0139	0.0122	0.0100	0.0620	81.8	0.4
Se	0.0021	0.0013	0.0010	0.0330	83.6	0.8
Si	0.5388	0.4115	0.0490	4.2000	0.0	NA
Sr	0.0029	0.0022	0.0015	0.0110	51.6	1.4
Ti	0.0145	0.0114	0.0020	0.0880	3.8	95.4
Zn	0.0786	0.0268	0.0010	0.9300	1.3	3125.5

[1] Minimum detection level
[2] Signal-to-noise ratio (Paatero and Hopke, 2003)
[3] not available (infinite S/N ratio caused by no below average MDL value)

For the chemical species screening, X-Ray Fluorescence (XRF) S was excluded from the analyses to prevent double counting of mass concentrations since XRF S and Ion Chromatography (IC) SO_4^{2-} were highly correlated (*slope* = 2.7, r^2 = 0.95). Due to the higher analytical precision compared to XRF Na and XRF K, IC Na^+ and IC K^+ were included in the analyses. Chemical species below the minimum detection level (MDL) (values more than 90%) were excluded. The species that have Signal-to-Noise (*S/N*) ratio below 0.2 were excluded (Paatero and Hopke, 2003). Thus, a total of 159 samples and 27 species including $PM_{2.5}$ mass concentrations collected between 2010 and 2012 were analyzed. A summary of $PM_{2.5}$ speciation data is provided in Table B1.

The application of PMF2 depends on the estimated uncertainties based on the analytical uncertainties for each of the measured data. Since the SLAMS data were not accompanied by analytical uncertainties, the fractional uncertainties suggested for PMF2 analysis by Kim et al (2005) were used (Table B2).

Table B2. Estimated fractional uncertainties[1] for SLAMS data at Calexico

Species	Fractional uncertainty	Species	Fractional uncertainty
OC	0.07	Fe	0.05
EC	0.07	K^+	0.07
SO4	0.07	Mn	0.05
NO^{3-}	0.07	Na^+	0.07
NH_4^+	0.07	Pb	0.05
Al	0.10	P	0.10
Br	0.05	Si	0.10
Ca	0.11	Sr	0.05
Cl	0.10	Ti	0.05
Cr	0.05	V	0.05
Cu	0.05	Zn	0.05

[1] Kim et al. (2005)

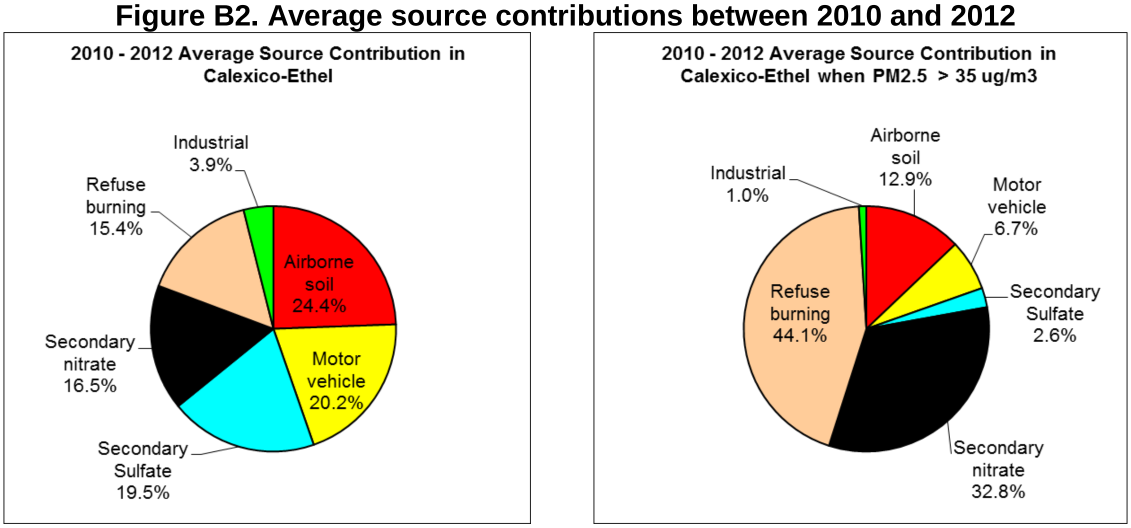
To assign input data for PMF2, the procedure of Polissar et al. (1998) is used. The measurement values are used for the input concentration data, and the sum of the analytical uncertainty and one-third of the detection limit value is used as the input uncertainty data assigned to each measured value. Concentration values below the detection limit are replaced by half of the detection limit values, and their input uncertainties are set at five-sixth of the detection limit values. Missing values are replaced by the geometric mean of the measured values for each species, and to down-weight these replaced data and then to reduce their influence on the solution, their accompanying uncertainties are set at four times of this geometric mean value.

To estimate the potential directions of the local source impacts, the conditional probability function (CPF, Kim et al. 2003) was calculated for each source using the source contribution estimates from PMF coupled with the wind directions. The same 24-hour contribution was assigned to each hour of a given day to match to the hourly wind data. The CPF estimates the probability that a given source contribution from a given wind direction will exceed a predetermined threshold criterion. The sources are likely to be located in directions that have high CPF values. In this study, from tests with several values of percentiles of the contribution and different azimuths of wind sectors, a threshold criterion of the upper 25% of the source contributions and 24 wind sectors of 15 degrees were chosen to show the directionality of the sources. Calm winds (< 1 m/sec) were excluded from this analysis due to the isotropic behavior of wind vane under calm winds.

2. Results and Discussions

A six-source model without matrix rotation (rotational parameter FPEAK = 0) provided the most physically interpretable source profiles for Calexico site. As recommended by Paatero and Hopke (2003), which is to down-weight the variable in the analysis so that the noise does not compromise the solution, it was found necessary to increase the input uncertainties of Cl by a factor of 3, and K^+ and Na^+ by a factor of 5 to obtain physically interpretable PMF2 results. Figure B2 and Table B3 present average source contributions. The pie chart showing high (> 35 µg/m^3) $PM_{2.5}$ days average source contributions indicates that secondary nitrate and refuse burning were the major sources in high $PM_{2.5}$ days at Calexico. Figure B3 shows monthly average source contributions.

Figure B2. Average source contributions between 2010 and 2012

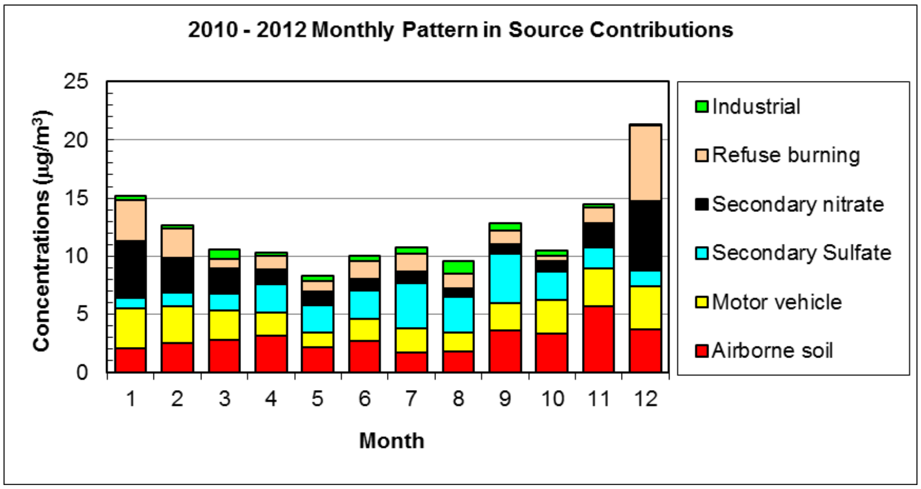


Comparisons of the reconstructed $PM_{2.5}$ mass contributions (sum of contributions from all sources) with measured $PM_{2.5}$ mass concentrations in Figure B4 shows that the resolved sources effectively reproduce the measured values and account for most of the variation in the $PM_{2.5}$ mass concentrations (*slope* = 0.96, r^2 = 0.90). The source profiles, corresponding source contributions, monthly variations of source contributions, weekday/weekend variations, annual variations, and potential source direction are presented in Figures B5 through B9.

Table B3. Average source contributions (μg/m^3) to $PM_{2.5}$ mass concentration

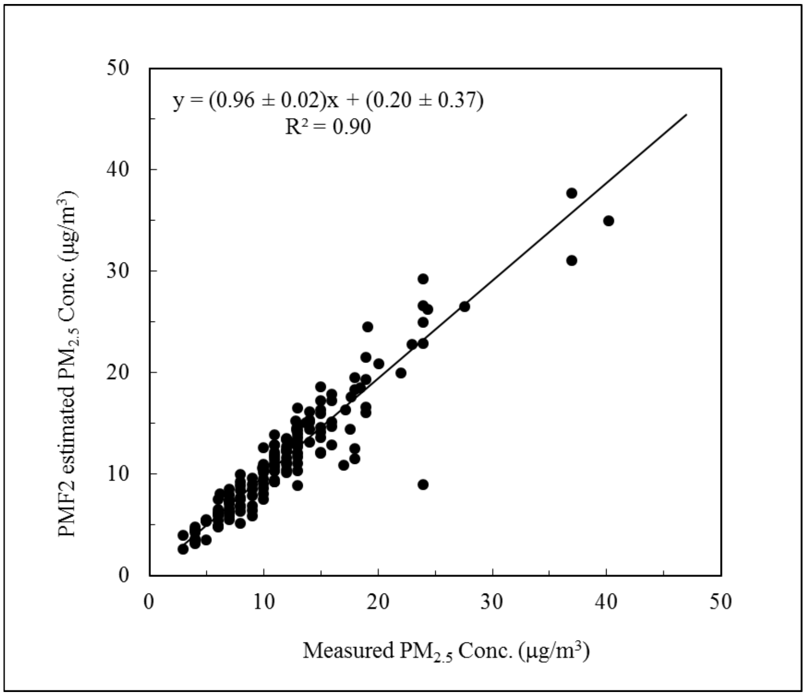
Sources	Average source contribution (± 95 % distribution)
Airborne soil	2.96 (0.45)
Motor vehicle	2.45 (0.23)
Secondary sulfate	2.36 (0.24)
Secondary nitrate	2.00 (0.42)
Refuse burning	1.86 (0.50)
Industrial	0.48 (0.14)
Estimated $PM_{2.5}$ (μg/m^3)	12.11 (1.07)
Measured $PM_{2.5}$ (μg/m^3)	12.39 (1.05)

Figure B3. Monthly average source contributions between 2010 and 2012



Airborne soil has high concentrations of Si, Fe, Al and Ca. It contributed the most accounting for 24% of the $PM_{2.5}$ mass concentration at Calexico. The airborne soil category reflects wind-blown dust as well as re-suspended crustal materials by road traffic as indicated by the presence of OC and EC in the source profile in Figure B5. Airborne soil contribution at Calexico showed high variation in the spring and fall (Figure B7) and also on weekdays (Figure B8). The CPF plot for airborne soil points southwest suggesting high contributions from the US/Mexico border crossing area (Figure B9).

Figure B4. Measured versus PMF2 predicted $PM_{2.5}$ mass concentrations



Motor vehicle emissions are identified by their high concentration of OC and EC, and minor species such as Fe (Watson et al., 1994). It also includes some soil dust constituents (Si, Ca) indicating that resuspended road dust by vehicle traffic is not separable because of the same temporal variation. The ratio of OC/EC for motor vehicle exhaust (2.5) is similar with 2.6 (Imperial County) and 2.7 (Mexicali) for $PM_{2.5}$ (Watson and Chow, 2001). The average contribution from motor vehicle to $PM_{2.5}$ mass concentration was 20% at Calexico. Motor vehicle emissions show a winter-high seasonal trend and a weak weekday high variation. The CPF plot for motor vehicles at Calexico also suggests high contributions from the US/Mexico border crossing area.

Secondary sulfate is identified by its high concentration of SO_4^{2-} and NH_4^+. It consists of $(NH_4)_2SO_4$ and several minor species such as secondary OC and EC, Na^+, and K^+ that transport together. Secondary sulfate contributed 19% of the $PM_{2.5}$ mass concentrations. Secondary sulfate shows strong seasonal variation with higher concentrations in summer when the photochemical activity is highest. Secondary sulfate does not have weekday/weekend variation. The CPF plot for secondary sulfate points south indicating strong influence from Mexicali. Na^+ in secondary sulfate indicates that secondary sulfate source also includes aged sea salt that reflects particles in which Cl^- in the fresh sea salt is partially displaced by acidic gases during the transport and collected along with SO_4^{2-} (Song and Carmichael, 1999). K^+ in the source profile seems to reflect field burning smoke from the surrounding agricultural area. Agricultural burning emissions were not separated from secondary sulfate because they originated from a similar wind direction and had a similar summer-high temporal behavior. The smoke from agricultural burning widely located in the Mexicali area was likely transported with secondary sulfate by the southeast wind starting in the spring.

Secondary nitrate has high concentrations of NO_3^- and NH_4^+. It consists of NH_4NO_3 and secondary OC and EC. It accounts for 17% of the $PM_{2.5}$ mass concentration at Calexico. Secondary nitrate has a winter-high trend with the highest occurring in December. Secondary nitrate shows a weak weekend high variation. Secondary nitrate has a strong source directionality to the southwest, suggesting high contributions from the US/Mexico border crossing area.

Refuse burning is characterized by OC, EC, and Cl (Christian et al., 2010; Hodzic et al., 2012; Li et al., 2012). The refuse burning smoke category reflects contributions from burning of wood as well as garbage in bonfires. The high Cl concentration in this source likely reflects the burning of tires and polyvinyl chloride in garbage. Higher contributions from refuse burning in the winter as shown in Figure B6, indicate bonfires during the Mexicali festival “Las Posadas” in December. The high peak on December 11, 2011 was likely caused by a major holiday in Mexico. This source contributed 15% to the $PM_{2.5}$ mass concentration at Calexico. Refuse burning shows a winter-high trend with the highest in December and a weekend high variation. As shown in Figure B9, major sources of refuse burning were located south of Calexico and are widely distributed.

Industrial sources characterized by high concentrations of EC, SO_4^{2-}, NO_3^-, Cl, Fe, Na^+, Pb, Si, and Zn were identified. Potential industrial sources include metal processing, fly ash/emissions from brick kilns, cement kilns, and various incinerators. This source accounts for 4% of the $PM_{2.5}$ mass concentrations. Industrial sources show a summer-high trend and have weekend high variations. The CPF plot for the industrial source suggests high contributions from the south and southeast.

3. Conclusions

$PM_{2.5}$ speciation data and related meteorological data collected at the Calexico monitoring site between 2010 and 2012 were analyzed. Using PMF2, the multivariate source apportionment tool, six major $PM_{2.5}$ sources were identified: Airborne soil, motor vehicle, secondary sulfate, secondary nitrate, refuse burning, and industrial sources. The source directionality analyses showed that most of the $PM_{2.5}$ at Calexico originated from the US/Mexico border crossing area or were internationally transported $PM_{2.5}$ from Mexicali area.

4. References

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Figure B5. Source profiles deduced from $PM_{2.5}$ samples measured at Calexico (prediction ± standard deviation)

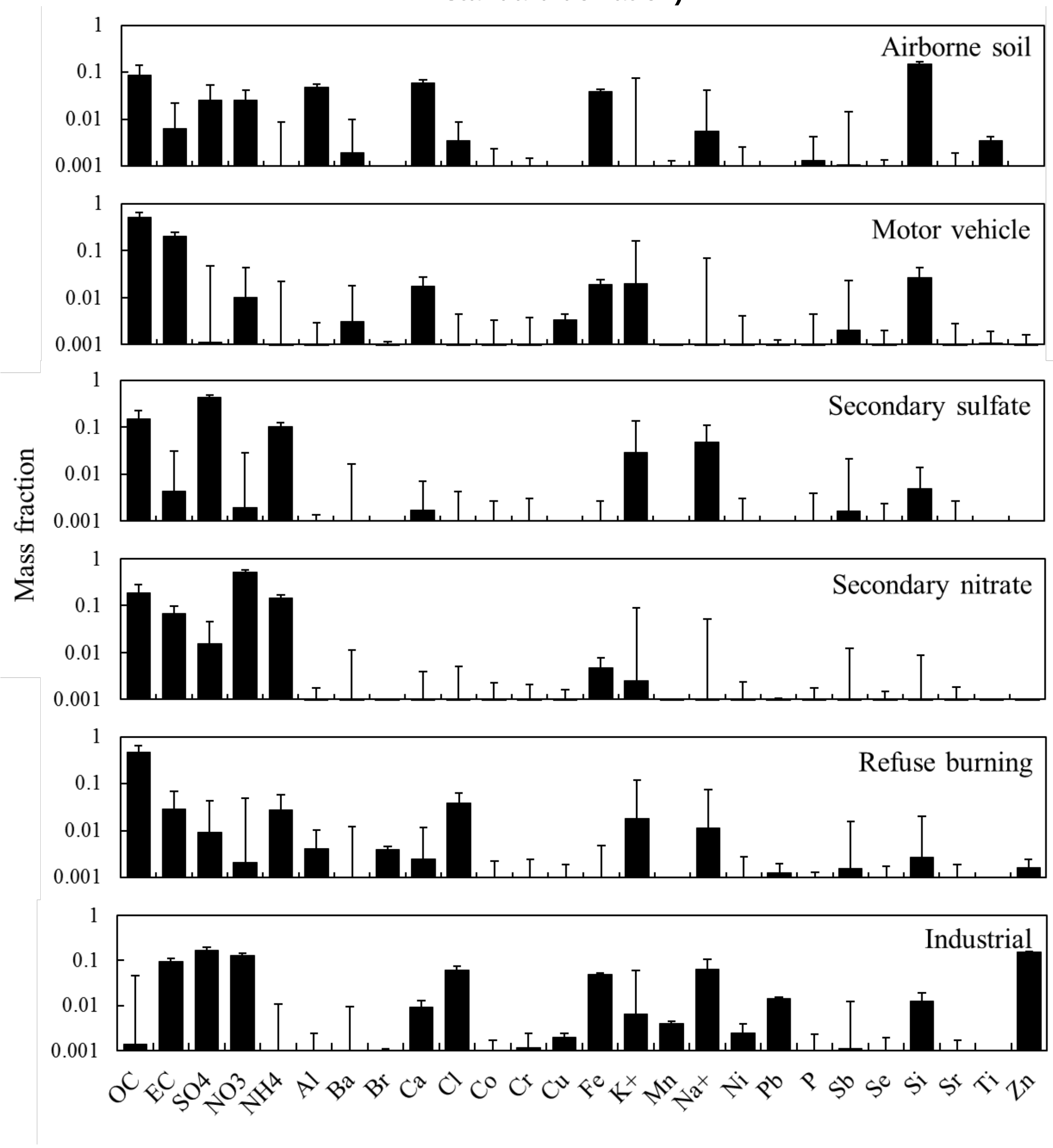


Figure B6. Source contributions deduced from $PM_{2.5}$ samples measured at Calexico

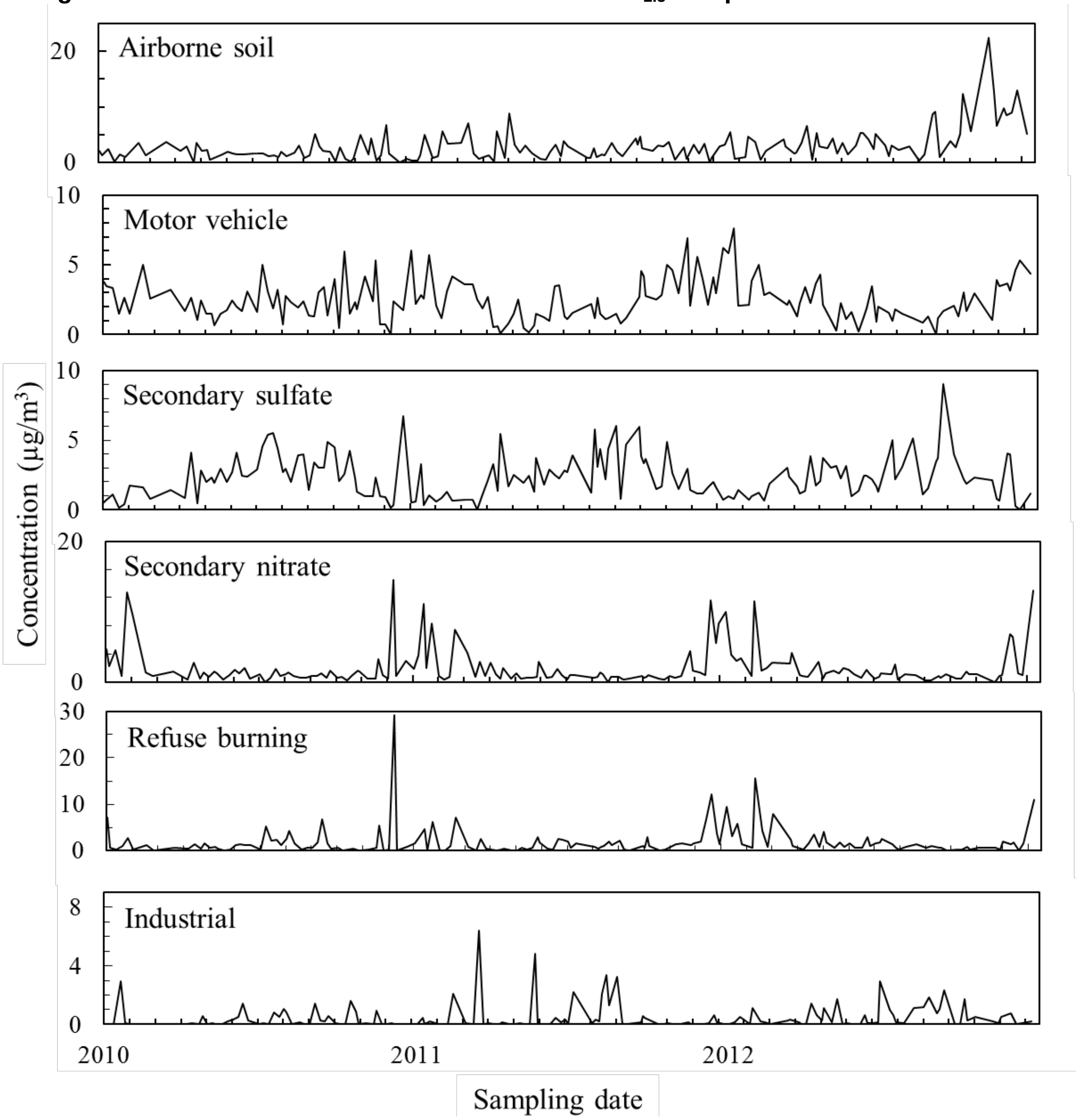


Figure B7. Monthly variations of source contributions to $PM_{2.5}$ mass concentration at Calexico (mean ± 95 % distribution)

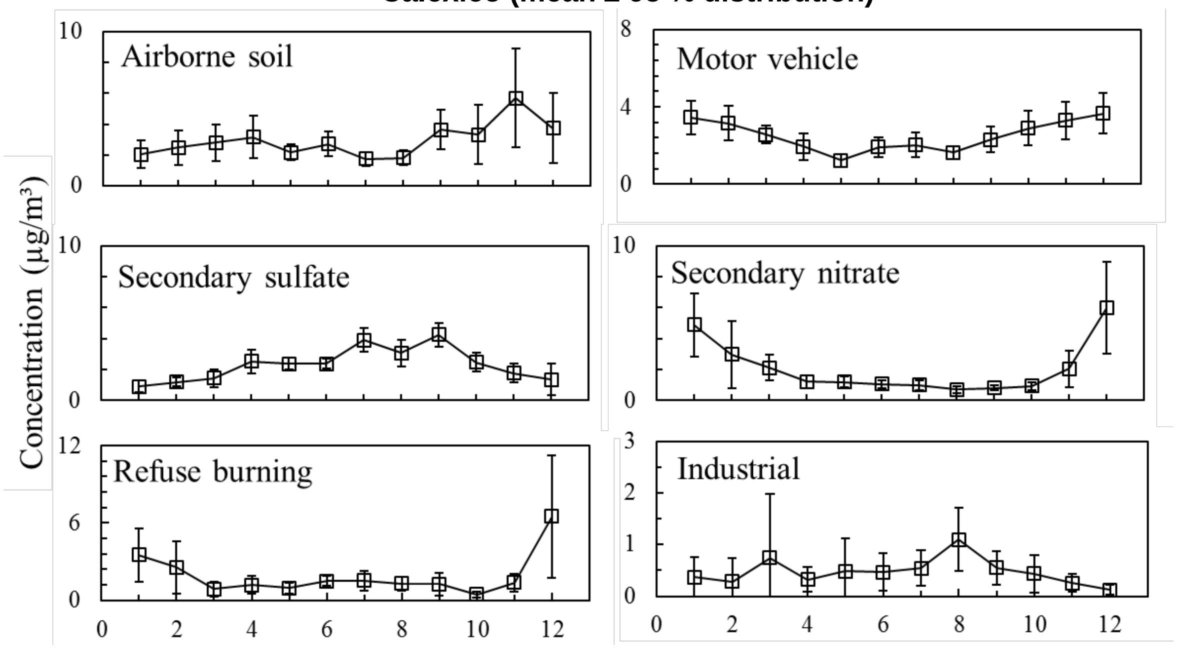


Figure B8. Weekday/weekend variations of source contributions to $PM_{2.5}$ mass concentration at Calexico. (mean ± 95 % distribution)

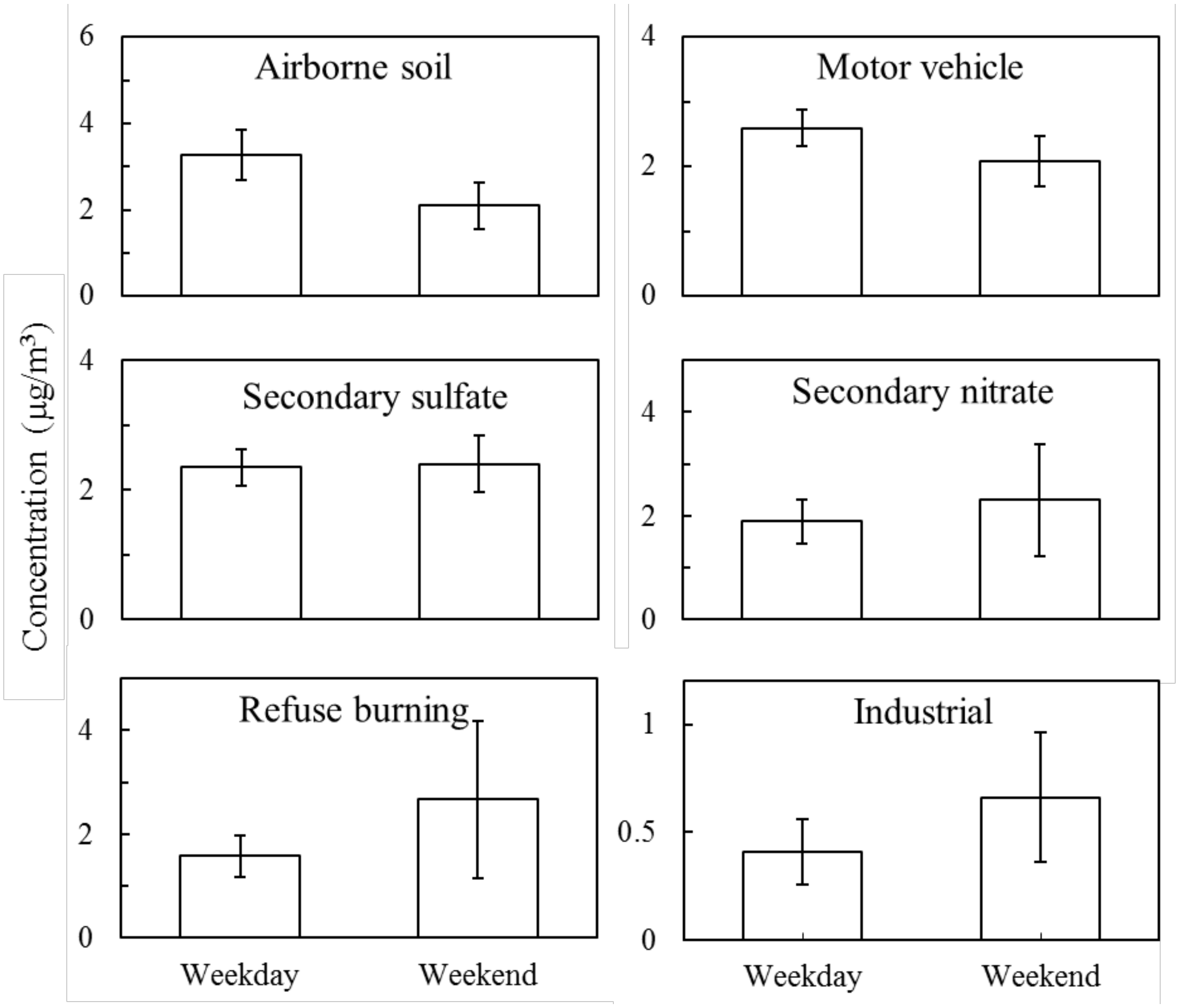
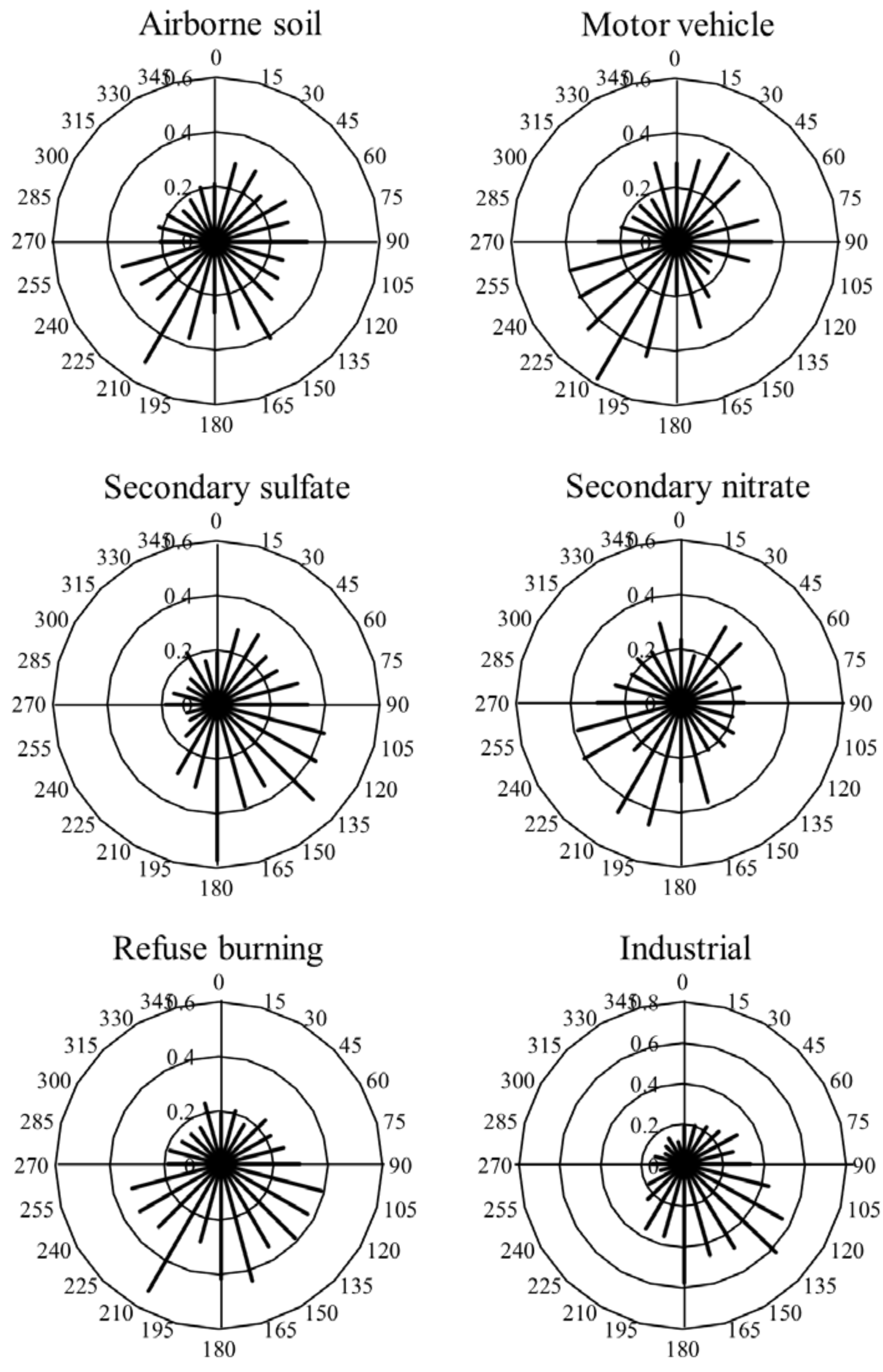


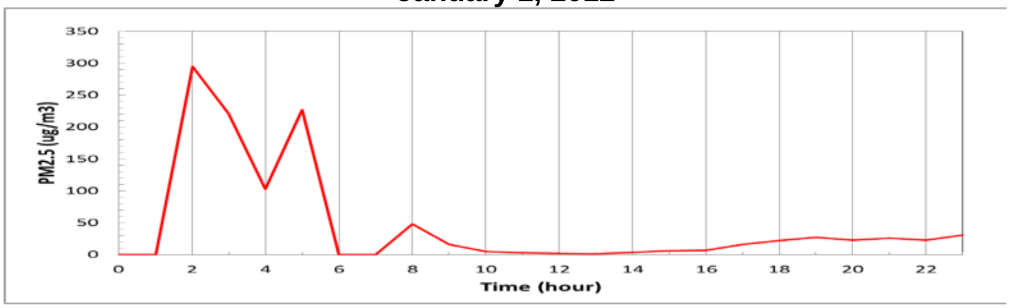
Figure B9. Conditional probability function plots for the highest 25 % of the source contributions

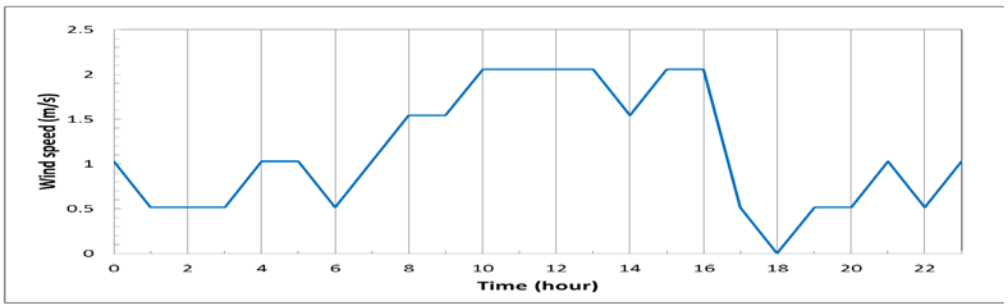


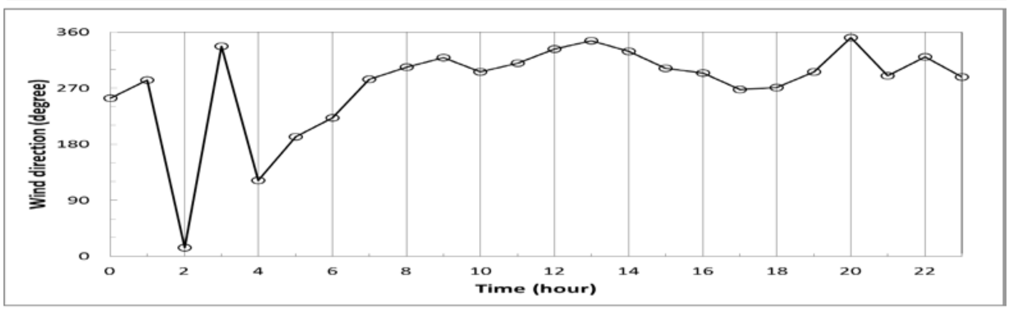
Appendix C

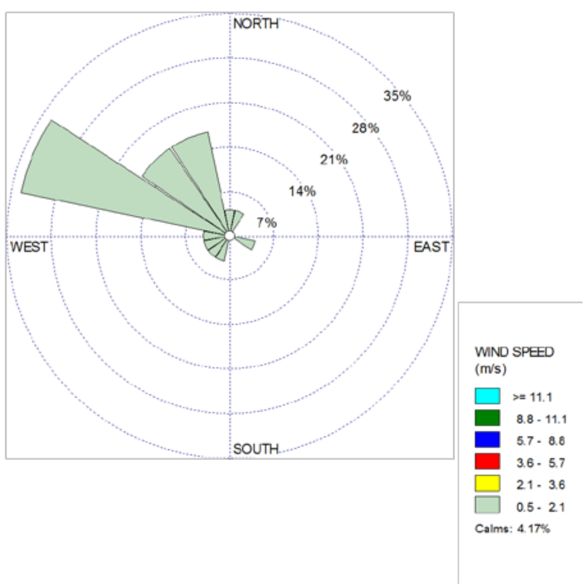
Diurnal Patterns and Wind Roses for Nine Non-FEM Outlier Days

January 1, 2012

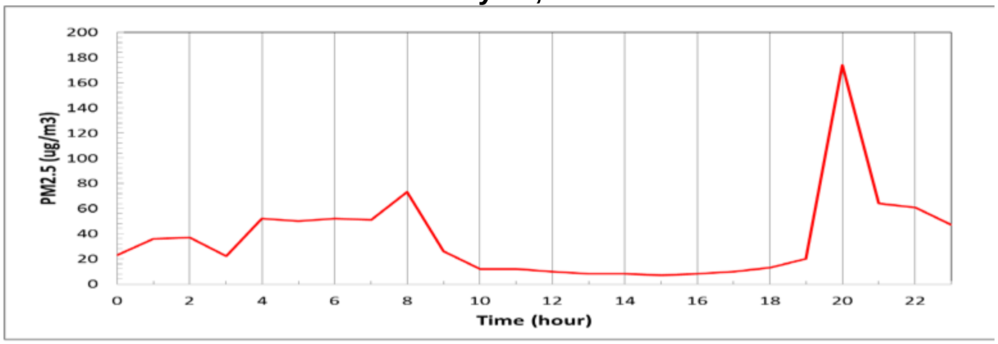


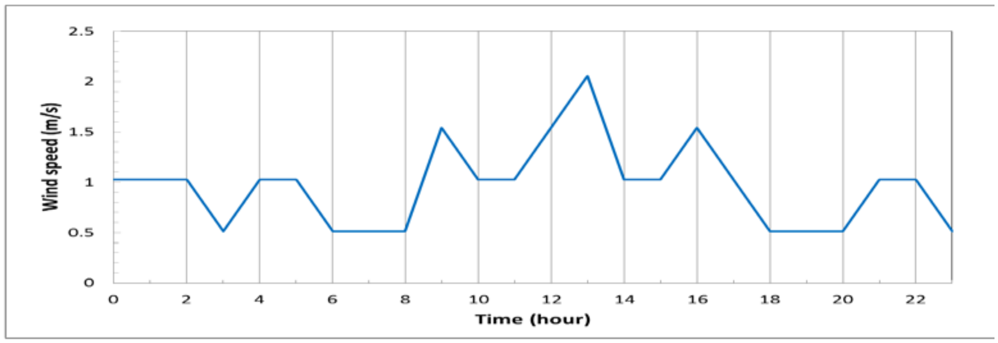


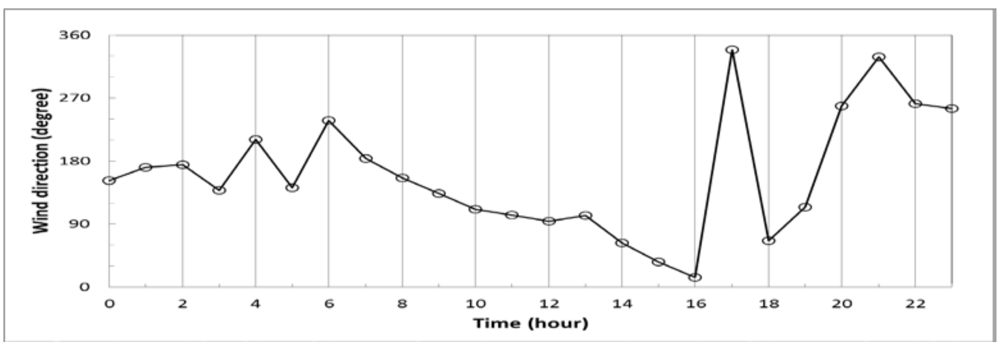


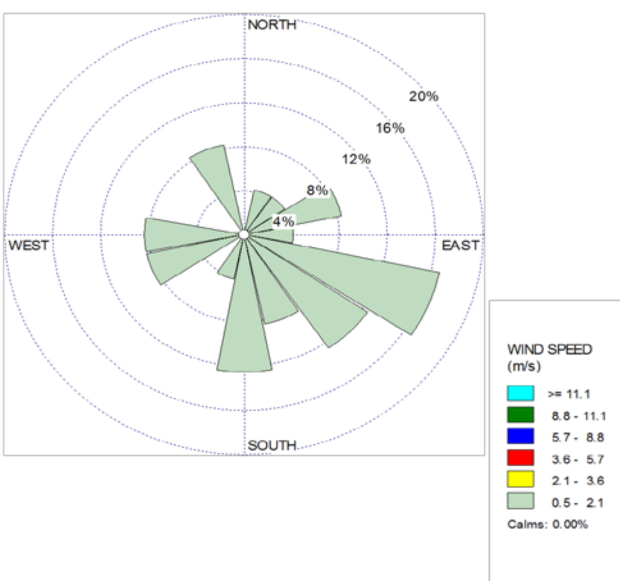


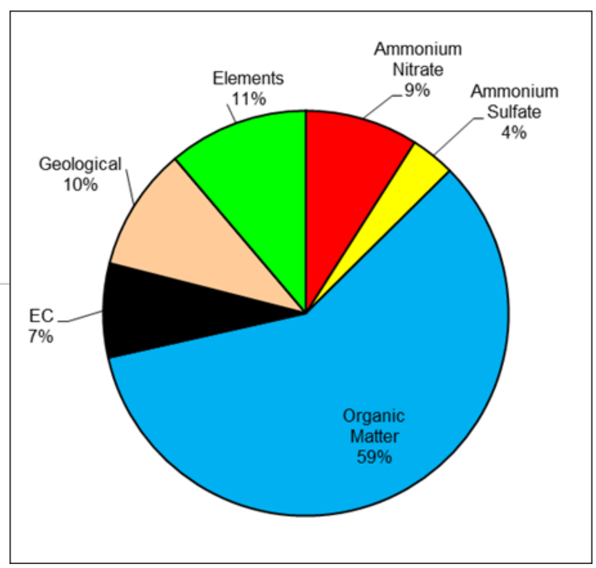
January 22, 2012



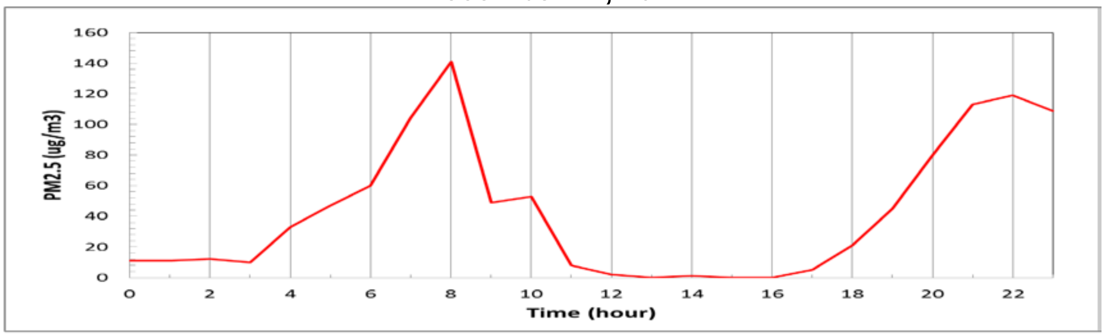


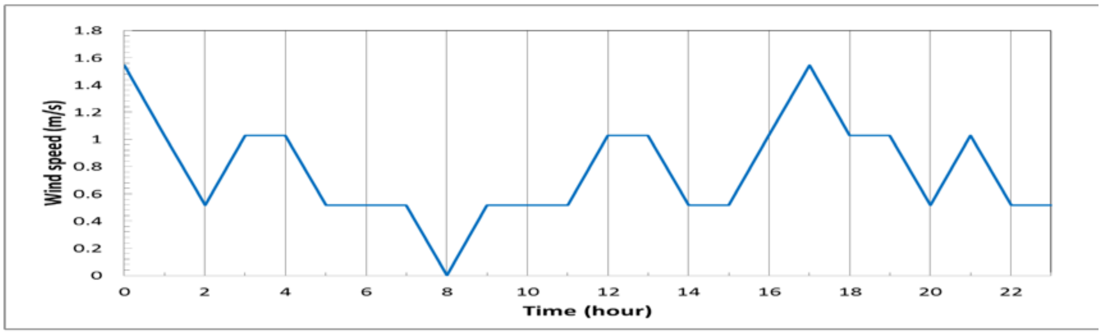


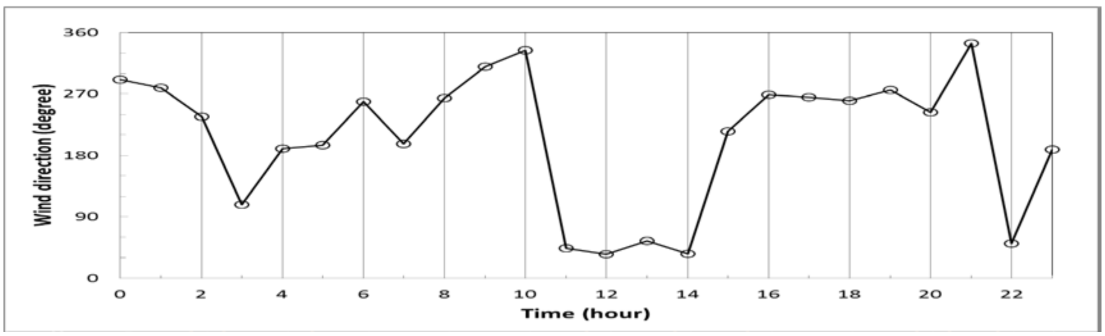


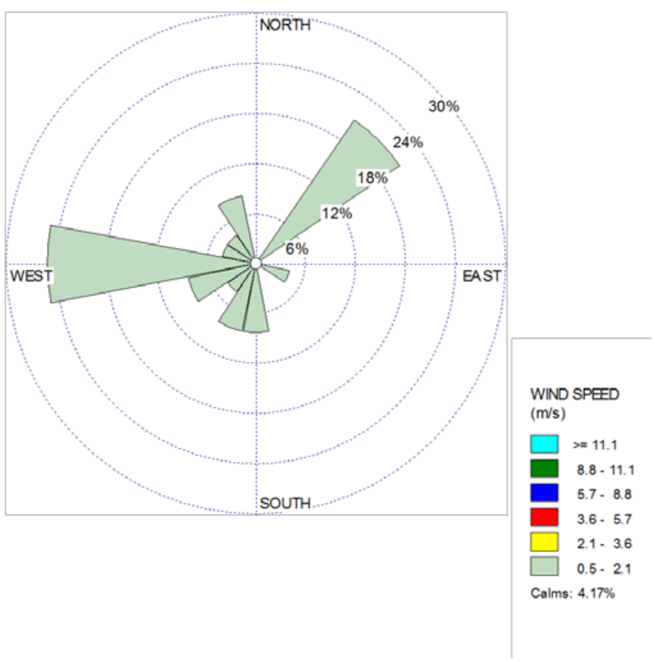


December 24, 2011

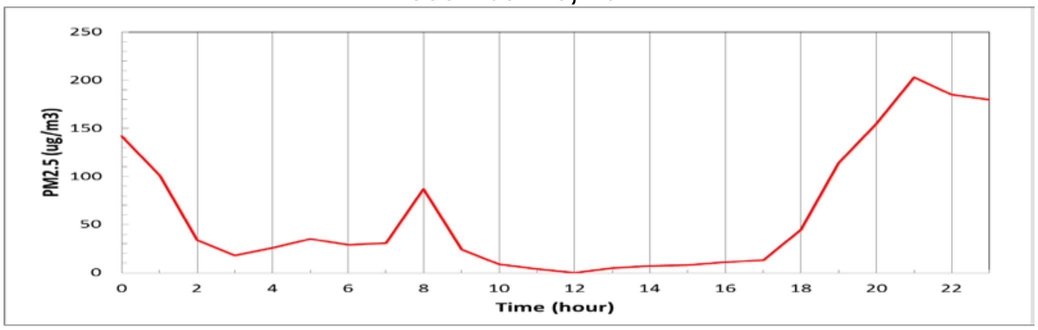


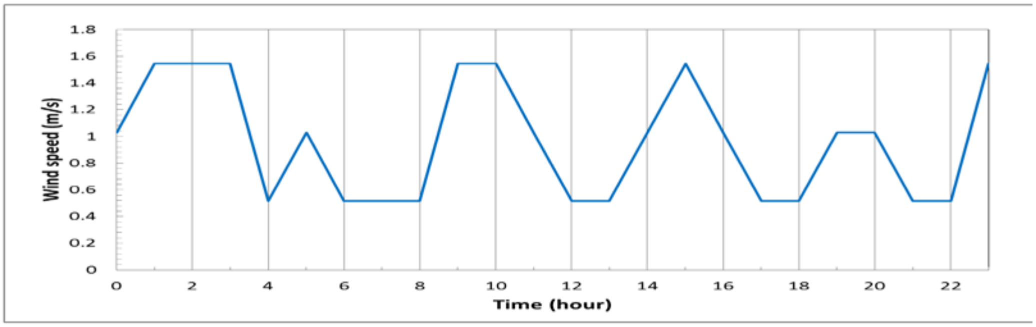


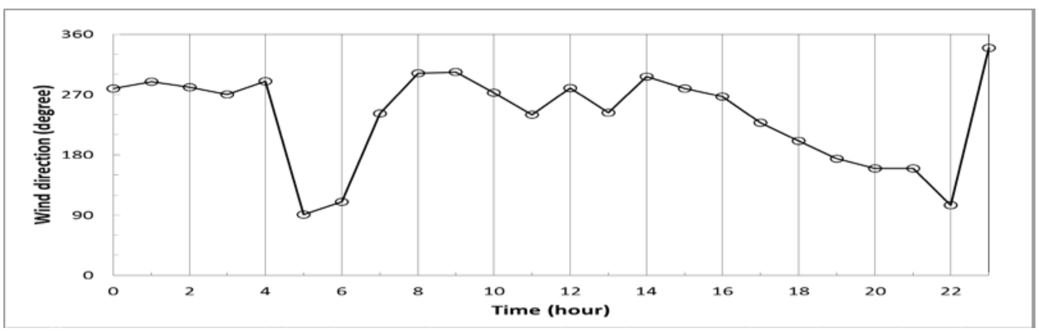


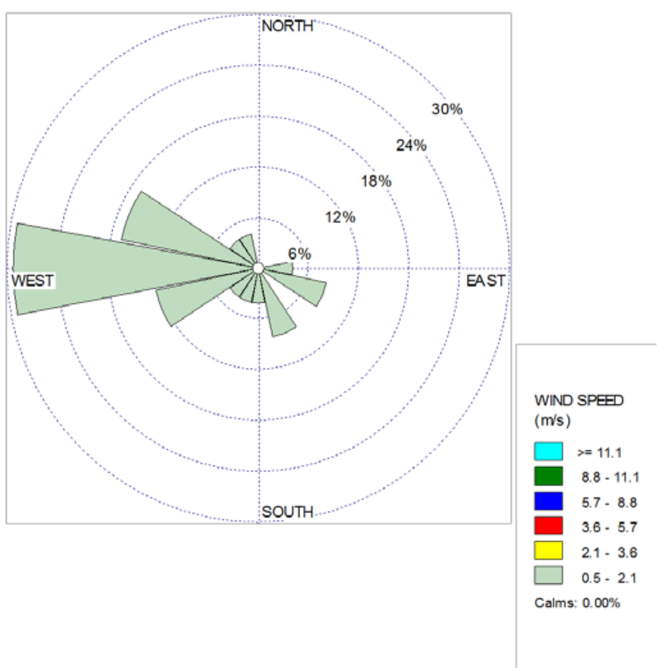


December 25, 2011

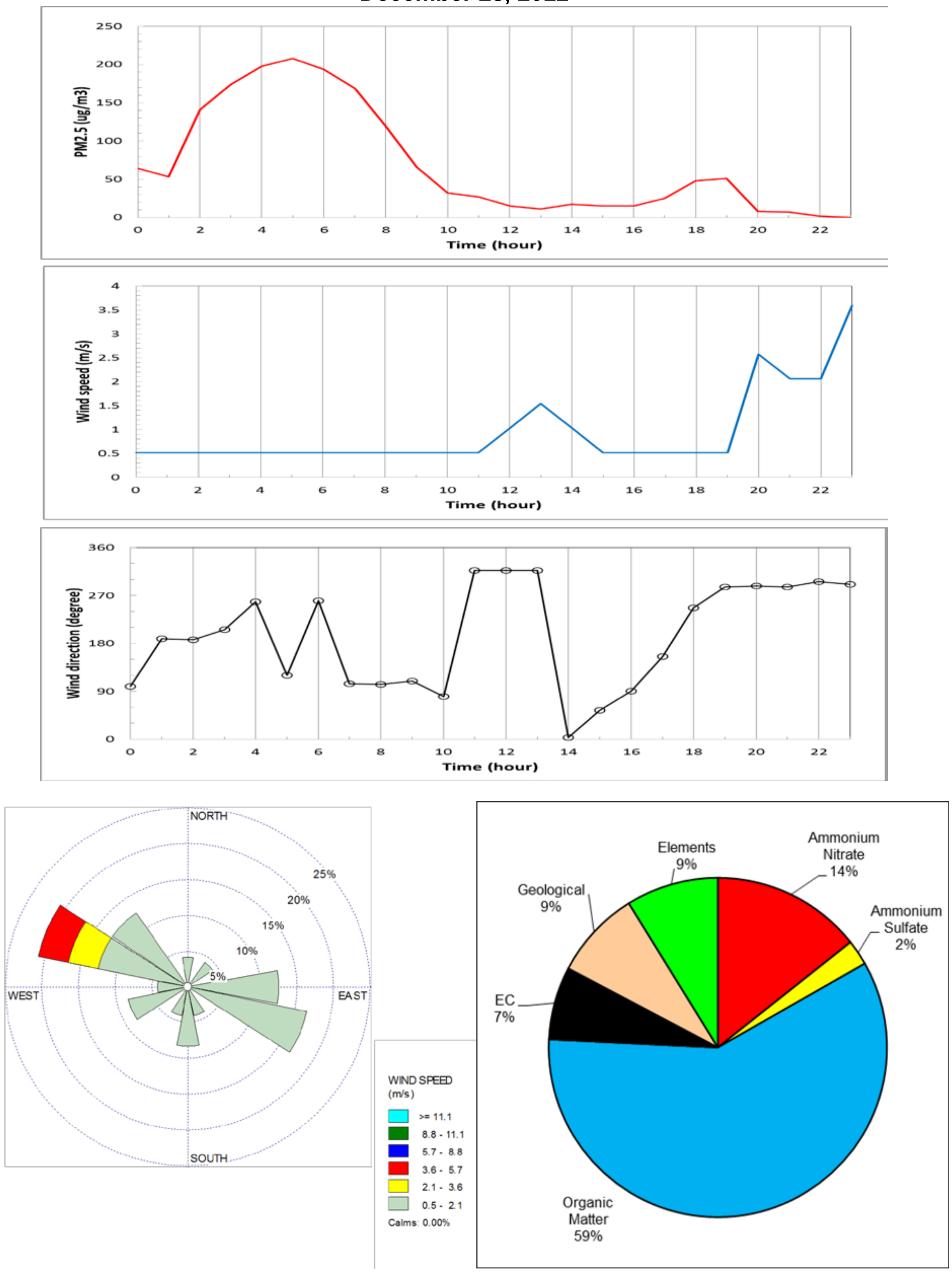








December 23, 2012



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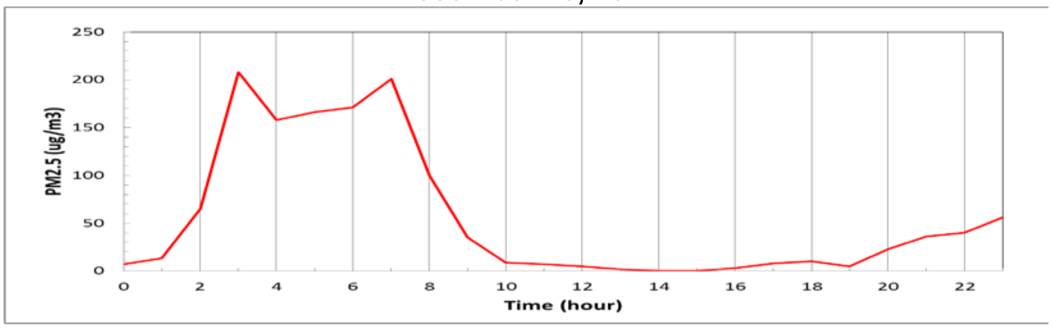

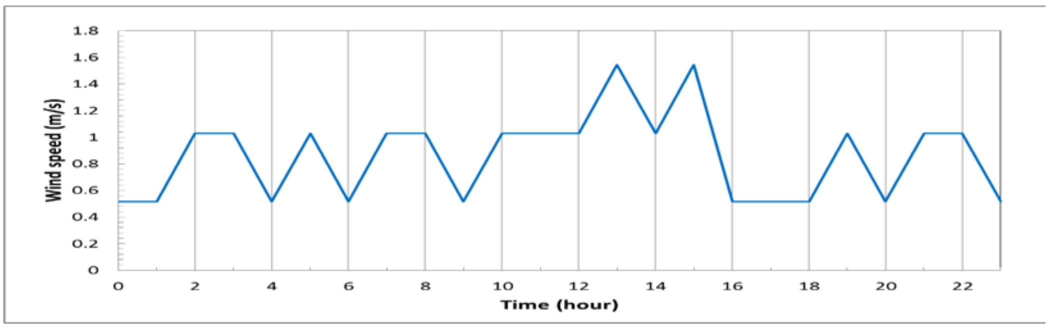

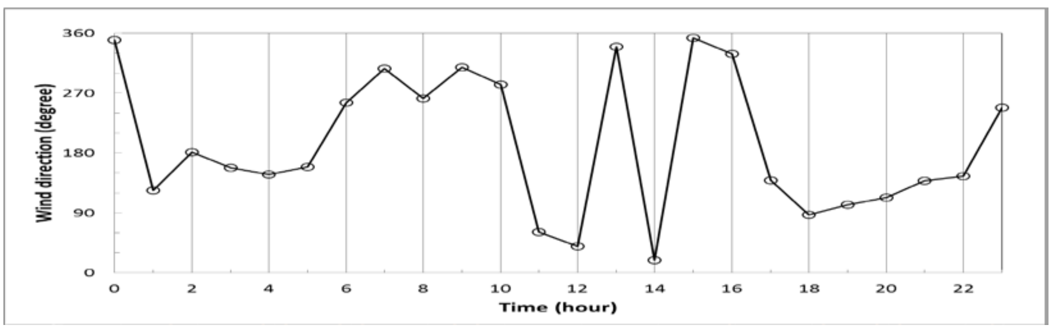

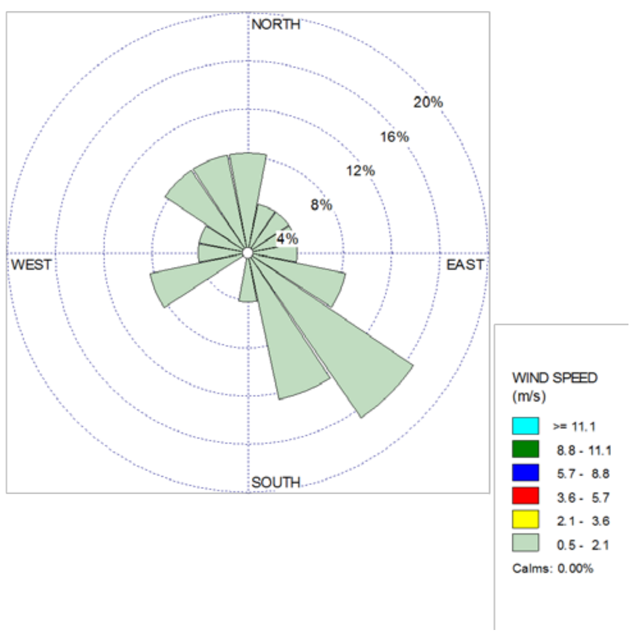

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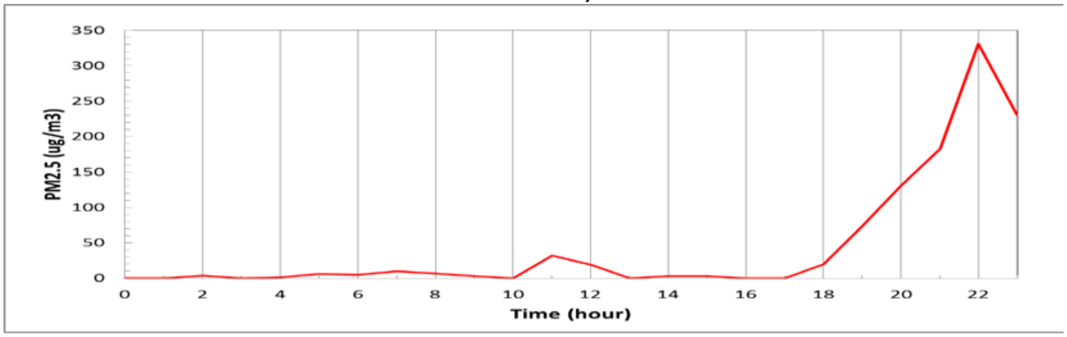

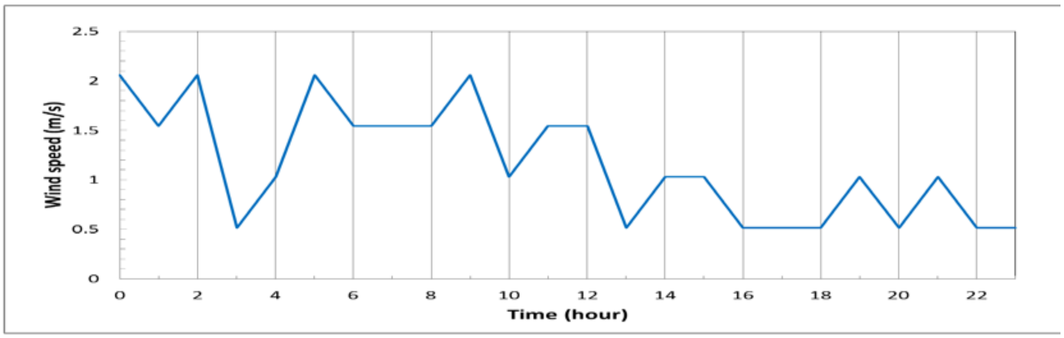

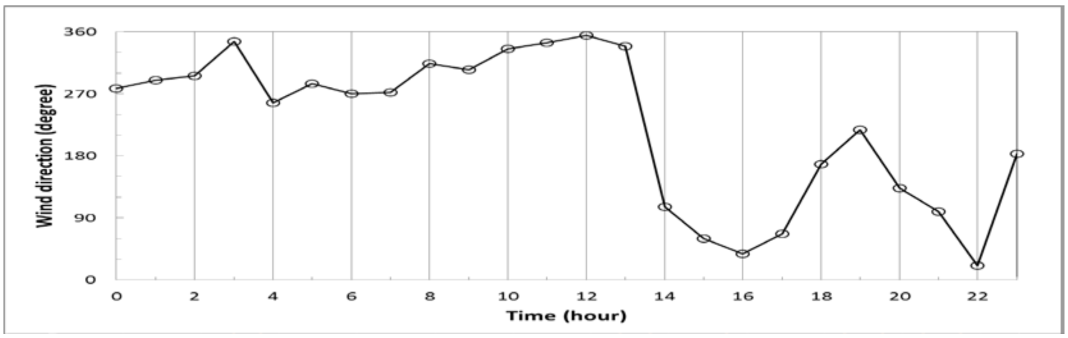

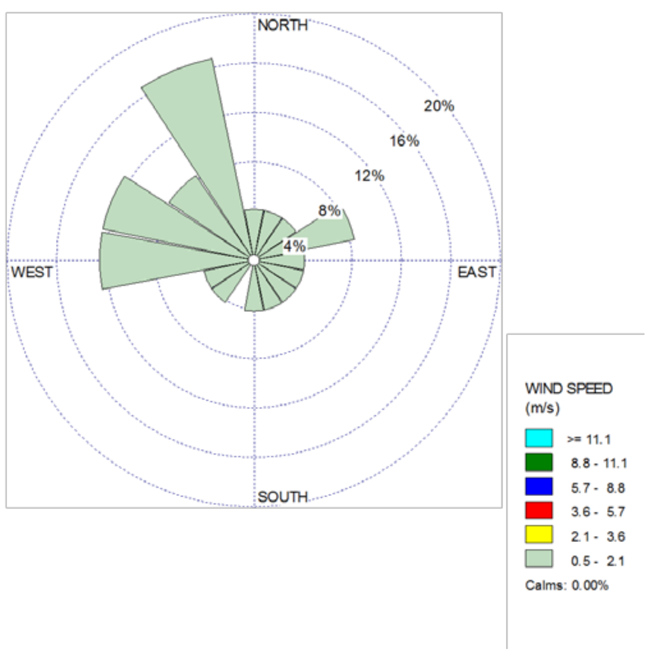

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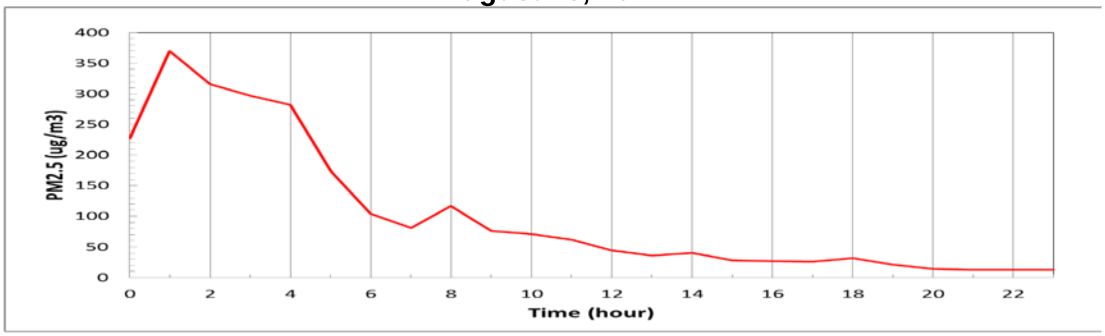

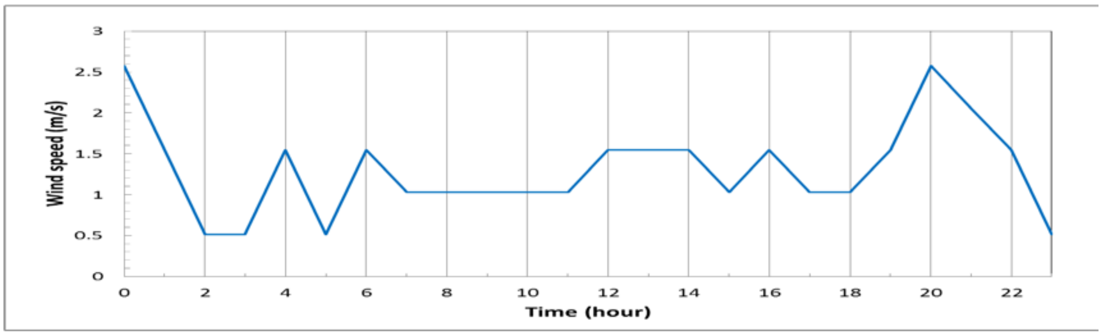

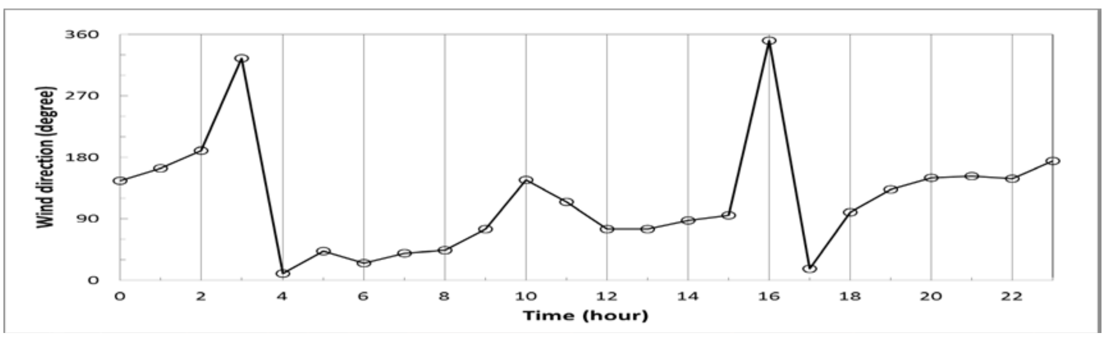

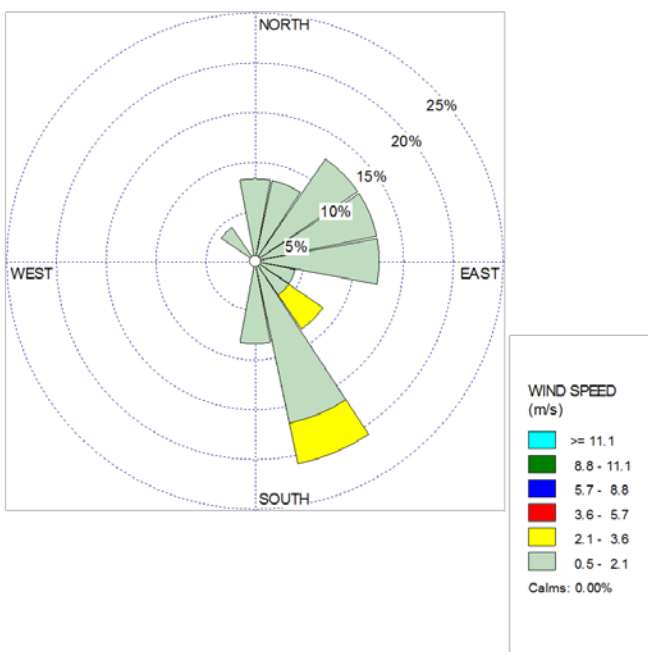

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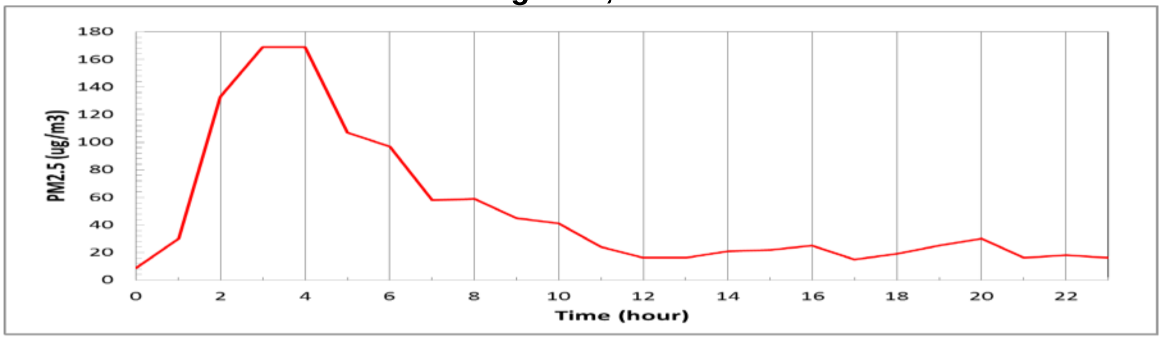

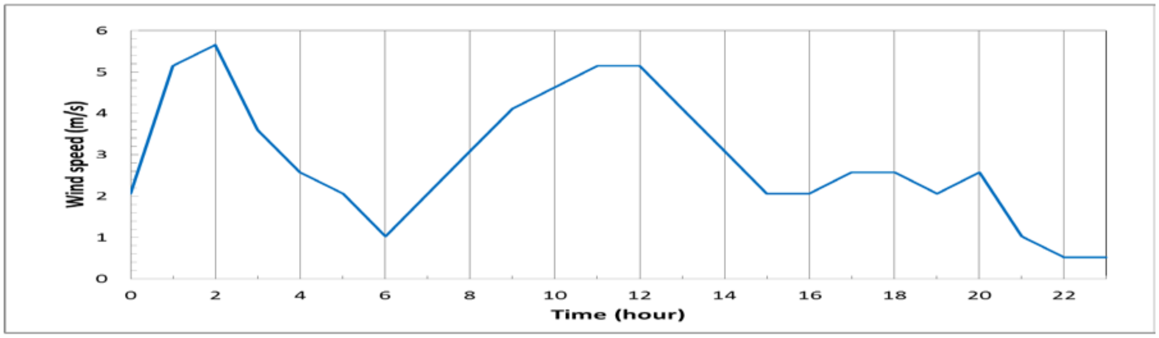

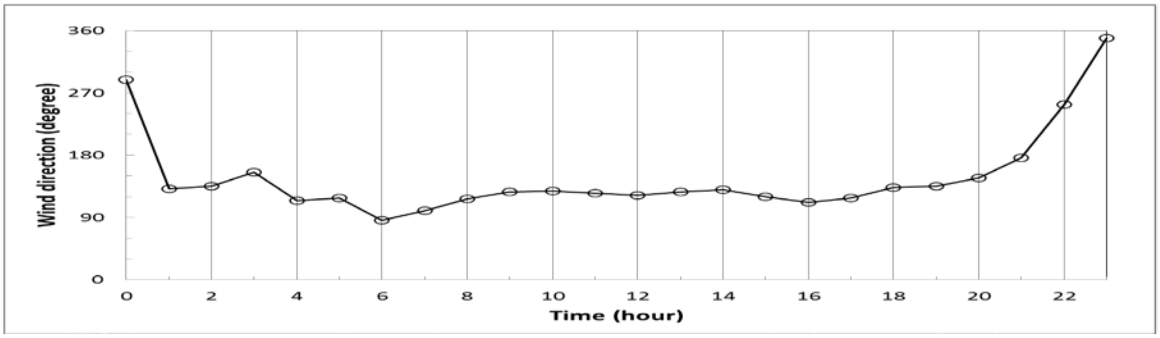

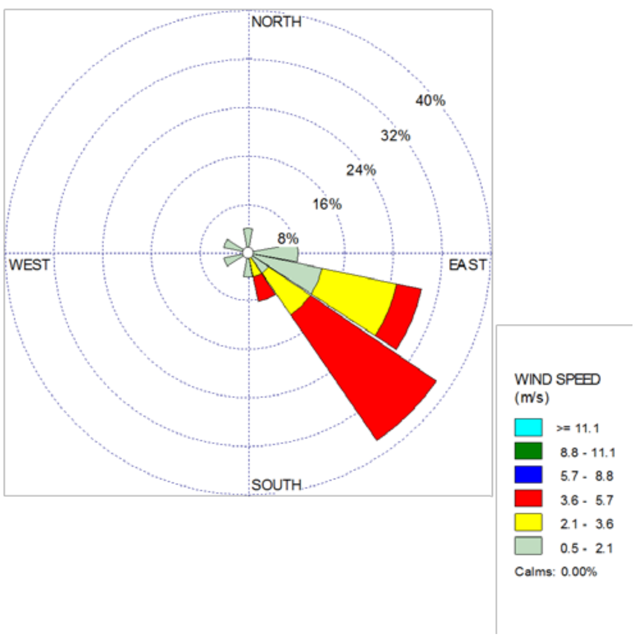

ATTACHMENT B

RULE COMPARISONS

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
General:	Limit visible emissions to not more than 20% opacity (PAR800)	Limit visible emissions to not more than 20% opacity (Ref: R8021, Sect. 5.0; R8031, Sect 5.0; R8041, Sect. 5.7.2; R8051, Sect. 5.0; R8061, Sect. 5.2; R8071, Sect. 5.1; and 8081, Sect. 5.0)	No visible emissions across property line. (Ref: R403(d)(1))	Limit visible emissions to not more than 20% opacity (Ref R310, Sect. 301)	Limit visible emissions to not more than 20% opacity (Ref: AQR Section 91.2.1.4; AQR Section 92.2.1.3; AQR Section 93.2.1.5; AQR Section 94.5.3)
Visible Dust Emissions	o All non-exempt sources (Ref: PAR 800)	· Opacity test methods, including for unpaved road traffic. (Ref: R8011, Appendix A, Sections 1 and 2)		· Opacity for dust generating activities based on minimum 12 observations, spaced 15 seconds apart (Ref: R310, Section 501.1(a))	· Opacity based on six vehicles, two readings per vehicle for unpaved surfaces And minimum 12 observations, spaced 15 seconds apart, for other sources. (Ref AQR Section 91.4.1.1 and AQR Section 94 AQR Section 94.5.3)
	o Construction / demolition (de minimis source) (Ref : PR 802, Section E.1)			· Opacity for unpaved parking lots and unpaved haul/access roads based on six vehicles, two readings per vehicle (Ref: R310, Section 501.1 (a) and (b))	· Limit construction visible emissions to not more than 100 yards (Ref: AQR Section 94.5.2(a))
	o Bulk materials (de minimis source) (Ref : PR 802, Section E.1)				
	o Open areas (significant source) (Ref : PR 804, Section E.1)				
Visible Dust Emissions	o Unpaved roads and traffic areas (significant source) (Ref : PR 805, Section E.1)				

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Visible Dust Emissions	· Test methods, including for unpaved road traffic in Appendix A and B (PAR800, G)				

General:	· A surface is considered to be stabilized if it meets at least one of the following conditions specified in below or as determined by test methods outline in Appendix B.	· Any disturbed surface that is resistant to wind blown fugitive dust and meets at least one of the following conditions:	· Stabilized surface means any previously disturbed surface area or open storage pile which, through the application of dust suppressants, shows visual or other evidence of surface crusting and is resistant to wind driven	· Must meet at least one of the following standards:	· Stabilization standards:
Definition of Stabilized Surface	1. Visible crust; or	1. A visible crust	· Fugitive dust and is demonstrated to be stabilized; (Ref: R403, (C)(28))	1. Maintain a visible crust	1. Establish visible crust
	2. Threshold frictional velocity of 100 cm/sec or greater; or	2. A threshold friction velocity of 100 cm/sec or greater		2. Maintain a threshold friction velocity of 100 cm/sec or greater	2. Establish cover of at least 20% with non-erodible materials
	3. Flat vegetative cover of at least 50% that is attached or rooted vegetation; or unattached vegetative debris lying on the surface with a predominant horizontal orientation (not subject to wind movement); or	3. A vegetative cover of at least 50% that is attached or rooted		3. Maintain standing (rooted, vertical) vegetative cover of at least 30%, or 10% cover where the soil threshold friction velocity is at least 43 cm/sec	3. Establish soil threshold friction velocity of at least 100 cm/sec
	4. Standing vegetative cover over 30% that is attached or rooted	4. Unattached horizontal vegetative cover of at least 50% and wind-movement resistant		4. Maintain flat (rooted or horizontal debris not subject to wind movement) of at least 50%	4. Comply with specially-approved alternative method

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Definition of Stabilized Surface	5. A standing vegetative cover of at least 10% that is attached or rooted with a predominate vertical orientation where the TFV is at least 43 centimeters per second when corrected for non-erodible elements	5. Vertical, rooted vegetation with at least 30% cover, or 10% cover where the soil threshold friction velocity is at least 43 cm/sec		5. Maintain a cover of at least 10% with non-erodible materials	
	6. A surface greater than or equal to 10% of non-erodible elements such as rocks, stones, or hard-packed clumps of soil (Ref: 800 C.28)	6. A surface that is at least 10% covered with non-erodible materials (Ref: R8011, Section 3.58)		6. Comply with specially-approved alternative method	
	Test methods:			(Ref: R310, Section 302.3)	
	Test methods in Appendix A and B shall be used to determine compliance with the Regulation VIII rules (Ref PAR800, Section G)				

Unpaved Roads:	· Unpaved Haul/ Access Roads: All roads (Ref: PR805, Section E.1)	· 26 annual average vehicle daily trips or more (Ref: R8061, Section 5.2.1)	· For meeting standards of rule:	· 150 vehicles or more per day (Ref: R310.01, Section 304)	· For new unpaved roads, there is no VDT limit (Ref AQR Section 91.2.1)
Applicability	· Unpaved Roads: 50 or more average daily vehicle trips (Ref: PR805, Section E.2)		o more than 50' wide at all points, or		· For existing unpaved roads (prior to June 22, 2000), the control measures apply to roads with 150 or more vehicles per day.
	· Canal Roads: 20 or more ADT (Ref: PR805, Section E.3)		o are not within 25' of property line, or		

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Applicability			o more than 20 vehicle trips per day (Ref: R403(g)(2)(B)(iii))		
			· For treating unpaved roads:		
			All roads greater than the average ADT of all unpaved roads within its jurisdiction, up to a set number of miles by 2006 (Ref: R1186(d)(4))		

Unpaved Roads:	· For roads with 50 ADVT or mores, limit VDE to 20% opacity and comply with the requirements of a stabilized unpaved road surface by application and/or maintenance of at lease one of the following control requirements (Ref: PR805, Section E.2):	· For unpaved roads with greater than 26 annual average vehicle trips per day, limit VDE to 20% opacity and implement at least one of the following control measures:	· Annually treat unpaved public roads beginning in 1998 and continuing for each of 8 years thereafter by implementing one of the following (Ref: R1186(d)(4)):	· For 150 vehicles or more per day, implement at least one of the following BACM	· Implement one control measure on 1/3 of unpaved roads with 150+ VDT by June 1, 2001 (Ref: AQR Section 91.2.1.1(a))
Control Requirements	a) Pave (Ref: PR805, Section F.1.a)	a) apply water	a) Pave at least one mile with typical roadway material (Ref: ibid, (d)(4)(A))	(Ref: R310.01, Section 304):	· Implement one control measure on 2/3 of unpaved roads with 150+ VDT by June 1, 2002 (Ref: ibid, (b))
	b) Apply chemical stabilization (Ref: PR805, Section F.1.b)	b) apply uniform layer of washed gravel	b) Apply chemical stabilizers to at least two miles to maintain stabilized surface	a) Pave	· Implement one control measure on all unpaved roads with 150+ VDT by June 1, 2003 (Ref: ibid, (c))

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Control Requirements	c) Apply and maintain gravel, asphalt, or other material of low silt content of a depth of 3 or more inches (Ref: PR805, Section F.1.c)	c) apply chemical/organic dust suppressant	(Ref: ibid, (B))	b) Apply dust suppressants	· For any unpaved road with newly found levels of 150+ VDT, implement one control measure within 365 days (Ref: ibid, (d))
	d) Apply water one ore more times daily (Ref: 805, section F.1.d)	d) use vegetative materials	c) Speed control (15 mph) on at least three miles of road surface:	c) Uniformly apply and maintain surface gravel	· For unpaved roads with less than 150 VDT, maintain stabilized surface standards within 365 days of determination of non-stabilized surface (Note: this is not a SIP measure, Ref: ibid, (e))
	e) Permanent road closure (Ref: PR805, Section F.1.e)	e) pave		(Ref: ibid, Section 304.1)	· No new unpaved roads are to be constructed in public thoroughfares after June 22, 2000 (Ref: AQR Section 91.2.1.2)
	f) Restrict unauthorized vehicle access (Ref: PR805, Section F.1.f)	f) use any other approved method to limit VDE to 20% opacity and meets the condition of a stabilized unpaved road (Ref: R8061, Section 5.2.1)		· For existing roads, BACM, as above, must be implemented by:	· Applicable control measures are as follows:
	g) Any other method that limits VDE to 20% opacity and meets conditions of a stabilized unpaved road (Ref: PR805, Section F.1.g)	· As option to above, obtain Fugitive PM_{10} Management Plan (Ref: ibid, Section 5.2.1) with specific requirements.		a) June 10, 2000 for more than 250 vehicle trips	a) Pave

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Control Requirements				b) June 10, 2004 for more than 150 vehicle trips	b) Apply dust palliatives to meet stabilization standards
				(Ref: ibid, 304.2)	(Ref: ibid, 91.2.1.3)
				· BACM must meet the following standards:	· Stabilization standards:
				a) Limit VDE to 20% opacity	a) Limit VDE to 20% opacity
				b) Do not equal or	b) Do not equal or exceed
				c) Do not exceed 6% silt content	c) Do not exceed 6% silt content
				(Ref: ibid, 304.3)	(Ref: ibid, 91.2.1.4)

Unpaved Lots:	· Unpaved traffic areas larger than one (1) acre and with 75 or more average vehicle trips per day shall comply with one or more of the requirements of Section F.3 so as to limit VDE to 20% opacity (Ref: PR805, Section E.4)	· Areas with AVDT of 50 or more (Ref: R8071, Section 4.1)	(Note: South Coast does not have rule language specifying this category. It is presumed that Rule 403 provisions for either unpaved roads, or disturbed surface areas would apply.)	· Over 100 vehicles entering or parking (Ref: R310.01, Section 303)	· No minimum vehicle limit specified for parking lots. (Ref: AQR, Section 92.2.1)
Applicability		· Agricultural sources exempt from Rule 8081 are also exempt from R8071.			· No minimum vehicle limit specified for staging areas (Ref: AQR Section 94 Handbook, CST 17)

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Unpaved Lots:	For unpaved traffic areas larger than one (1) acre and with 75 or more average vehicle trips per day shall comply with one or more of the requirements of Section F.3 (listed below) so as to limit VDE to 20% opacity:	· For days with 50 or more vehicle trips, limit VDE to 20% opacity and implement at least one of the following control measures:	(No specific rule language for this category. See measures for "Unpaved Roads" for presumed applicable BACM.)	· If utilized less than 35 days per year, use one of following:	· For unpaved parking lots, use one of following:
Requirements	· Pave or (Ref: PR805, Section F.3.a)	o apply water		a) Apply dust suppressants to maintain stabilized surface	a) Pave
	· Apply chemical stabilizers (Ref: PR805, Section F.3.b)	o apply uniform layer of washed gravel		b) Apply and maintain gravel to maintain stabilized surface	b) Apply dust palliatives to maintain stabilized surface
	· Apply and maintain gravel, recrushed/recycled asphalt or other material of low silt content to a depth greater than 3 inches (Ref: PR805, Section F.3.c)	o apply chemical/organic dust suppressant		(Ref: R310.01, Section 303, and 303.1)	c) Apply dust palliatives to travel lanes, and apply gravel to a depth of two inches in the parking areas to maintain stabilized surface (Ref: AQR Section 92.2.1 and 92.2.1.2)
		o use vegetative materials		· If utilized at least 35 days per year:	· If parking lot is used intermittently, less than 35 days per year, and the lot was in existence prior to June 22, then application may be limited to period of use (Ref; ibid, 92.2.1 and 92.2.1.1)
		o pave		a) Add option, to above, to pave	· For staging areas:

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Requirements		o use any other method to limit VDE to 20% opacity (Ref: R8071, Section 5.1.1)		(Ref: ibid; also R310, Table 1, 1B,2B,3B)	o Limit size of staging areas (Ref AQR, Section 94 Handbook, CST 17-1)
		· For days with 100 or more vehicle trips, as above and comply with requirements for stabilized surface (Ref: ibid, Section 5.1.2)			o Apply water (Ref: ibid, CST 17-2)
		· On each day that 25 or more VDT with 3 or more axles will occur on an unpaved vehicle/equipment traffic area, special requirements (Ref: R8071, Section 5.1.3).			o Apply dust palliative (Ref: ibid, CST 17-3)
		· On each day when a special event will result in 1,000 or more vehicles, special requirements. (Ref: R8071, Section 5.1.4).			o Limit vehicle speeds to 15 mph (Ref: ibid, CST 17-4)
		· As option to above, obtain Fugitive PM_{10} Management Plan (Ref: ibid, Section 5.2.1, 5.2.2, and 5.2.3)			o Limit ingress and egress points (Ref: ibid, CST 17-5)

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Unpaved Roads: Canal Roads	· For Canal Roads with 20 or more ADT (Ref: PR805, Section E.3)	(No requirements specified.)	(No requirements specified.)	(No requirements specified.)	(No requirements specified.)
	a) Stock Triploid Grass carp in canals to reduce maintenance vehicle trips or (Ref: PR805, Section F.2.a)				
	b) Install remote control delivery gates to eliminate manual gate operation or (Ref: PR805, Section F.2.a)				
	c) Implement Silt removal program to delay grading of spoil piles deposited after cleaning operations or (Ref: PR805, Section F.2.a)				
	d) Permanent road closure or (Ref: PR805, Section F.2.a)				
	e) Convert open canals to pipeline or (Ref: PR805, Section F.2.a)				
	f) Line canals to eliminate maintenance for silt/week control or (Ref: PR805, Section F.2.a)				
	g) Initiate canal bank surface maintenance (Ref: PR805, Section F.2.a)				

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Disturbed Open Areas:	· 0.5 acres or larger in urban areas, or 3.0 acres or more in rural areas; and contains at least 1,000 square feet of disturbed surface area (Ref: PR804, Section B)	· This rule applies to any open area having 0.5 acres or more within urban areas, or 3.0 acres or more within rural areas; and contains at least 1000 square feet of disturbed surface area (R8051, Section 2.0).	· No limit	Rule 310, Section 102 exempts disturbed open areas which are not located at sources requiring "any permit under these rules." However, most open areas will not have need for permits. Section 303 requires a dust control plan (presumed to be what is referred to in Section 102 as a "permit"), for all sources that involve earthmoving operations of 0.10 acres or greater. Since soil disturbances can occur for reasons other than earthmoving, for example, off-road vehicle traverses, it appears that many disturbed open areas, vacant lots, etc, may be exempt under these rules.	· 5,000 square feet or larger (non-ag) (Ref: AQR Section 90.1.2 and 90.2.1)

Disturbed Open Areas:	· Limit open areas to VDE of 20% opacity (Ref: PR804, Section E.1)	· Apply water/dust suppressants to unvegetated areas sufficient to limit VDE to 20% opacity (Ref: R8051, Table 8051-1, A1)	· Apply chemical stabilizers (Ref: R403 Handbook, BACM (Q))	· Restore vegetative ground cover and soil characteristics similar to native Conditions (Ref: R310, Table 1, 1E)	· Upon evidence of soil disturbance by motor vehicles, prevent trespass, parking, and access by installing barriers, curbs, fences, gates, posts, signs, shrubs, and trees. (Ref: AQR Section 90.2.1.1(a))

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Control Measures	· Prevent unauthorized vehicle access by posting “No Trespassing” signs or installing physical barriers such as fences, gates, posts, and/or appropriate barriers to prevent access (Ref: PR804, Section E.2)	· Establish vegetation to limit VDE to 20% opacity (Ref: ibid, A2)	· Water with sufficient frequency to establish a surface crust (Ref: ibid, (R))	· Pave, apply gravel, apply stabilizer to meet stabilized standards (Ref: ibid, 2E)	· Apply gravel or chemical stabilizers to meet one of stabilization standards (Ref: ibid, (b))
	· Apply and maintain water or dust suppressant to all unvegetated areas (Ref: PR804, Section F.1.a)	· Pave, apply gravel, apply stabilizers to limit VDE to 20% opacity (Ref: ibid, A3)	· Establish (drought-resistant) vegetation as quickly as possible (Ref: ibid, (T))	· Establish vegetation to meet stabilized standards (Ref: ibid, 3E)	· Stabilization standards (Ref: AQR Section 90.2.1.2)
	· Establish vegetation on all previously disturbed areas (Ref: PR804, Section F.1.b)	· Upon evidence of trespass, post “no trespass” signs or install barriers to prevent access to area (Ref: ibid, B)		· Stabilized standards, one of the following (Ref: R310, Section 302.3):	o Establish visible crust
	· Pave, apply gravel, chemical stabilizers/suppressants (Ref: PR804, Section F.1.c)				o Establish cover of non-erodible elements of at least 20%
					o Establish threshold friction velocity of 100 cm/sec or higher

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Disturbed Open Areas:	There are no specific exemptions for wind events in the proposed Regulation VIII amendments, thus no requirements for windblown dust are specified. However, opacity and stabilized surface requirements remain, independent of wind speed.	(No specific requirements)	As contingency measures for a high-wind exemption from certain rule requirements:	·Apply gravel or dust suppressants (Ref: R310, Table 2, 1B)	(No specific wind requirements, however, the general requirements for disturbed surface areas include provisions which are intended to reduce windblown dust:
Windblown			· If inactive, apply water or chemical stabilizers to maintain a stabilized surface for six months (Ref: R403, Table 3, 0B)	·Apply water 3 times per day; if evidence of wind driven fugitive dust, increase watering to 4 times per day (Ref: ibid, 2B)	· Prevent access to limit soil disturbance (Ref: AQR Section 94 Handbook, CST 11)
			· Apply chemical stabilizers prior to wind event (Ref: ibid, 1B)		· Stabilize soil, using dust palliative or vegetation to maintain stabilized surface
			· Apply water 3 to 4 times per day (Ref: ibid, 2B)		(Ref: ibid, CST 11-4 and 11-5)
			· Establish vegetative ground cover within 21 days after active operations have ceased (Ref: ibid, 3B)		· Pave or apply surface rock to maintain stabilized surface (Ref: ibid, CST 11-6))

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
Agricultural Sources:	For owner/operators of commercial farms on sites greater than or equal to 40 acres, implement at least one of the following in each category:	SJVAPCD Rule 4550 requires the submittal of a conservation management plan for sites with more than 100 acres with 1 conservation management practice (CMP) for each category:	For agricultural operations within the South Coast Air Basin, with combined disturbed surface area of 10 acres or more, the standards of Rule 403 apply after July 1, 1999 unless Best Management Practices as delineated in the Rule 403 Agricultural Handbook are implemented. (Ref: R403(h)(1))	In May 2000, the Agricultural BMP Committee adopted the agricultural PM_{10} general permit, which became effective by rule on May 12, 2000 (Arizona Administrative Code [AAC], R18-2- 610 and 611). The Committee identified 34 BMPs that focus on feasible, effective, and common sense practices while minimizing negative economic impacts on local agriculture. (These BMPs were based on the BMP's in the South Coast Agricultural Handbook).	(No requirements for this source)
				The general permit requires that a commercial farmer implement at least one BMP to control PM10 for each of the following three categories: tillage and harvest, non-cropland, and cropland. The general permit requires a commercial farmer to comply by December 31, 2001.	

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
CMPs	· Land preparation and cultivation (Ref: PR806, Section E.1):	· Land preparation and cultivation: same as Imperial County with addition of floor management (nut crops), time of planting and transplanting (some vegetable crops) options.			
	a. alternative till	· Harvest: same as Imperial County with addition of continuous tray/D.O.V. (dry fruit crops), fallowing land; and floor management (nut crops) options.	Best Management Practices as described in the Agricultural Handbook are as follows:		
	b. bed/row size spacing	· Unpaved farm roads and traffic areas: same as Imperial County with the addition of mechanical pruning (tree and vine crops) option.	a) Active conservation practices		
	c. chemical/fertigation		b) Inactive conservation practices		
	d. combined operations		c) Farm yard areas		
	e. conservation irrigation		d) Trackout conservation practices		
	f. conservation tillage		e) Unpaved road conservation practices		
	g. cover crops		f) Storage pile conservation practices		
	h. equipment changes				

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
CMPs	i. fallowing land		· (Ref: Guide to Agricultural PM_{10} Dust Control Practices, dated June 1999)		
	j. pest control				
	k. mulching				
	l. night farming				
	m. non tillage/chemical tillage				
	n. organic practices				
	o. precision farming				
	p. transgenic crops				
	· Harvesting (Ref: PR806, Section E.2):				
	a. bailing/large bails				
	b. combined operations				
	c. equipment changes				
	d. green chop				
	e. hand harvesting				
	f. fallowing land				
	g. nigh harvesting				
	h. no burning				
	i. pre-harvesting soil preparation				
	j. shed packing				
	k. shuttle system / large carrier				

CONTROL CATEGORY	IMPERIAL	SAN JOAQUIN VALLEY	SOUTH COAST	MARICOPA COUNTY	CLARK COUNTY
CMPs	· Unpaved farm roads and traffic areas (Ref: PR806, Section E.3,4):				
	a. chips/mulches, organic materials, polymers, road oil and sand				
	b. gravel				
	c. paving				
	d. restricted access				
	e. speed limit				
	f. track-out control				
	g. water				
	h. wind barrier				

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
ADOPTED		Prior to 10/15/1979	6/18/1992	10/8/1976	2/10/2011	4/16/2003
LAST AMENDED		Aug 13, 2002	Apr 15, 2010	Jul 12, 2013	Feb 09, 2012	Feb 19, 2014
RULE APPROVAL BY EPA		01/31/2003	01/04/2012	Not SIP approved	01/31/2013	Not SIP approved
FEDERAL REGISTER		68 FR 4929	77 FR 214		78 FR 6736	
PURPOSE			1.0	(a)	101	1.1
PURPOSE			The purpose of this rule is to permit, regulate, and coordinate the use of open burning while minimizing smoke impacts on the public.	The purpose of this rule is to ensure open burning in the District is conducted in a manner that minimizes emissions and impacts, and that smoke is managed consistent with state and federal law in order to protect public health and safety	To establish standards and administrative requirements under which agricultural burning, including the burning of agricultural wastes, limited to the growing of crops or raising of fowl or animals, may occur in a reasonably regulated manner that manages the generation of smoke and reduces the emission of particulates and other air contaminates from such burning To establish the requirements pursuant to Title 17 CCR Subchapter 2 - Smoke Management Guidelines for Agricultural and Prescribed Burning, Article 2 - District Smoke Management Program	To codify requirements and standards regarding the use of open outdoor fires within the boundaries of the Monterey Bay Unified Air Pollution Control District (Air District).
APPLICABILITY			2.0	(b)	102	Part 1; 1.2
APPLICABILITY			This rule applies to open burning conducted in the San Joaquin Valley Air Basin, with the exception of prescribed burning and hazard reduction burning as defined in Rule 4106 (Prescribed Burning and Hazard Reduction Burning).	The provisions of this rule shall apply to any person conducting or allowing any open burning including, but not limited to:	The provisions of this rule shall apply to all agricultural burning located in Placer County except where otherwise prohibited by a local jurisdiction	apply to all persons who set or maintain open outdoor fires set within the boundaries of the Air District.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
APPLICABILITY				(1) Agricultural burning (2) Disposal of Russian thistle (Salsola kali or "tumbleweed") (3) Prescribed burning (4) Fire prevention/suppression training (5) Open detonation or use of pyrotechnics (6) Fire hazard removal		
DEFINITIONS			3.0 - Includes 40 difinitions	(7) Disposal of infectious waste,	200 - Includes 11 definitions	Part 2 - Includes 50 definitions
EXCEPTIONS		B	4.0	(10) Residential burning (11)	103	Part 1; 1.3
EXCEPTIONS	**General**	B.1 The Air Pollution Control Officer may grant an exception to Section A.4. allowing burning on a No-Burn Day so designated by the Air Resources Board or the Imperial County APCD when there is a threat of imminent and substantial economic loss. The Air Pollution Control Officer may seek the advice of the County Agricultural Commissioner, the County Farm Advisor, or other informed sources. Said exception shall be provided pursuant to the following provisions:	4.1 The requirements of this rule shall not apply to: 4.1.1 Open outdoor fires used solely for the purpose of cooking food for human consumption, campfires, and religious ceremonial fires, where the combustible material is clean, dry wood or charcoal. 4.1.2 The prevention of an imminent fire hazard declared by a fire agency that cannot be abated by any other means.	(1) The provisions of paragraphs (d)(1) and (d)(5) of this rule shall not apply in the case of an imminent fire hazard, as defined in this Rule. (2) The provisions of subparagraphs (d)(1)(A), (d)(1)(B), (d)(1)(D) and clause (d)(1)(C)(ii) shall not apply to fire prevention/suppression training exercises or research, conducted by fire protection agencies, provided that:	103.1 Rule Exemptions 103.1.1 Burning conducted pursuant to Rule 301; NONAGRICULTURAL BURNING SMOKE MANAGEMENT is exempt from this Rule. 103.1.2 Burning conducted pursuant to Rule 303, PRESCRIBED BURNING SMOKE MANAGEMENT is exempt from this Rule.	1.3.1 The following types of open outdoor fires are exempt from the provisions of Section 3.1 of this Rule, except as provided at Subsection 3.1.1.*[no person shall use open outdoor fires within the boundaries of the Monterey Bay Unified APCD for the purpose of disposal or burning of household rubbish and/or waste (as defined in Part 2 of this Rule).]*

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
EXCEPTIONS	**General**	B.1.a the Air Pollution Control Officer may only authorize such burning when downwind populated areas are forecast by the Imperial County APCD to achieve the ambient air quality standards. B.1.b the Air Pollution Control Officer shall limit the amount of acreage that can be burned on any one no-burn day. B.1.c the granting of an exemption does not exempt the applicant from any other Imperial County APCD or fire control regulations.	4.1.3 The setting of backfires necessary to save life, and/or in the defense of assets at risk pursuant to Section 4426 of the Public Resources Code. 4.1.4 The burning, in a respectful and dignified manner, of an unserviceable American Flag that is no longer fit for display. 4.1.5 The burning of agricultural waste or crops pursuant to a lawful abatement order issued by the local county agricultural commissioner as described in Section 5403 and 5404 of the California Food and Agricultural Code.	(A) For training exercises not conducted within existing structures: (i) Each training fire is limited to no more than 30 minutes duration, (ii) The total cumulative burn time in a 24-hour period does not exceed: (a) Four (4) hours for Light Fuel (b) Six (6) hours for Heavy Fuels or a mixture of Light and Heavy Fuels (iii) Only Authorized Ignition Fuels are used. (B) For training exercises conducted within existing structures, each training fire is limited to no more than 30 minutes in duration.	103.1.3 Burning conducted pursuant to Rule 304, LAND DEVELOPMENT BURNING SMOKE MANAGEMENT is exempt from this Rule. 103.1.4 Burning conducted pursuant to Rule 305, RESIDENTIAL ALLOWABLE BURNING is exempt from this Rule. 103.1.5 Burning conducted pursuant to Rule 306, OPEN BURNING OF NON-INDUSTRIAL WOOD WASTE AT DESIGNATED DISPOSAL SITES is exempt from this Rule.	1.3.1.1 With notification of the APCO, except in emergencies, when such fire is set or permission for such fire is given in the performance of the official duty of any public officer, and such fire in the opinion of such officer is necessary: 1.3.1.1.1 for the instruction of public employees in the methods of fighting fire; or 1.3.1.1.2 for disposing of Russian thistle (Salsola kali); or 1.3.1.1.3 for the setting of backfires necessary to save life or valuable property pursuant to Section 4426 of the Public Resources Code; or
		B.1.d The applicant shall submit in writing on the form provided, his reasons for the exception.	4.2 The following activity is exempt from rule requirements, but may only be conducted pursuant to Air Pollution Control Officer (APCO) written authorization:	(3) The provisions of subparagraphs (d)(1)(A), (d)(1)(B), (d)(1)(D) and clause (d)(1)(C)(ii) shall not apply to fire prevention/suppression training exercises or to product testing conducted by non-fire protection agencies provided that:	103.1.6 The use of orchard or citrus heaters for the prevention of frost damage is provided for under Rule 208, ORCHARD OR CITRUS HEATERS. 103.2 Exemptions from Section 304, Burn Days	1.3.1.1.4 for the abatement of fire hazards pursuant to Section 13055 of the H&SC which cannot be abated by other means; or 1.3.1.1.5 for disease or pest prevention, where there is an immediate need for and no reasonable alternative to burning.

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
EXCEPTIONS	**General**	B.2 The burning of empty sacks or combustible containers which contained pesticides is permitted on No-Burn Days, providing the sacks or containers are within the definition of "Open Burning in Agricultural Operations in the Growing of Crops or Raising of Fowls or Animal" in Rule 101.	4.2.1 fire set by or authorized by any public officer authorized in the performance of his official duty to engage in fire protection activities provided that a burn plan, as described in Section 6.2.1, has been previously submitted to and approved by the APCO and such a fire is necessary for the instruction of employees in fire fighting methods.	(A) Each fire is limited to no more than 30 minutes in duration, (B) The total burn time does not exceed four (4) hours in a 24-hour period, and (C) Only Authorized Ignition Fuels are used.	103.2.1 Empty Sacks or Containers: The APCO may, by special burn permit, authorize the burning of empty sacks or containers which contained pesticides or other toxic substances on the premises where used, provided the sacks or containers are within the definition of agricultural wastes.	1.3.1.2 With notification of the APCO, except in emergencies, when such fire is set pursuant to SM permit on property used for industrial purposes for the purpose of instruction of employees in methods of fighting fire.
			4.3 The following activities are exempt from the no-burn day restrictions of Section 6.1.8, subject to APCO authorization and permit requirements. These activities are not exempt from the provisions of Sections 5.1 through 5.5: 4.3.1 The burning of empty sacks which contained pesticides or other toxic substances, provided that the sacks are within the definition of agricultural burning in Section 3.1.3. 4.3.2 The burning of paper raisin trays.	(4) The provisions of subparagraphs (d)(1)(A) and (d)(8)(E) of this rule shall not apply to open burning as an emergency measure to protect crops from freezing provided that: (A) Open burning is the most immediate or only option available; (B) The temperature at the time of the requested open burning is reasonably anticipated to be below 40° Fahrenheit; (C) An Emergency Burn Plan submitted by the person seeking to conduct open burning is approved by the Executive Office prior to conducting the burn. The Plan shall include, but not be limited to, the following:	103.2.2 Burn Day Exemption for Threat of Imminent and Substantial Economic Loss: The APCO may, by burn permit, allow agricultural burning on days designated by the ARB or APCO as "no burn days" if the denial of the burn permit would threaten imminent and substantial economic loss. The granting of an exception does not exempt the applicant from any other District or fire control regulations. Such authorization shall be limited to the amount of acreage which can be burned in any one day and only authorizes burning which is not likely to cause or contribute to exceedances of air quality standards or result in smoke impacts to smoke sensitive areas.	1.3.1.3 (Inclds 1.3.1.3.1-1.3.1.3.2) Agricultural burning necessary to maintain and continue an agricultural operation, <u>including:</u> fires set in the course of any agricultural operation in the growing of crops, or raising of fowls, animals or bees; fires for the control and disposal of agricultural wastes 1.3.1.4 With notification of the APCO, except in emergencies, burning for right-of-way clearing by a public entity or utility where access by chipping equipment is not available by existing means, or for levee, reservoir, and ditch maintenance.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
EXCEPTIONS	General		4.3.3 Other agricultural burning, if the denial of such burning would threaten imminent and substantial economic loss, and which is conducted pursuant to the following provisions:	(i) Location, types, and amounts of material to be burned (ii) Type of crop being protected (iii) Estimate of potential economic loss (iv) Expected dates, time, and duration of the fire from ignition to extinction (v) Identification of responsible personnel, including telephone contacts	103.3 Exemptions, Minimum Drying Times 103.3.1 The burning of standing green vegetation associated with right-of-way clearing, levee, ditch, and reservoir maintenance burning, is exempt from Section 305 when such vegetation may need to be burned green.	1.3.1.5 The personal use of pyrotechnics (as allowed by local fire jurisdictions) or for the creation of special effects during organized community events.
			4.3.3.1 The APCO may only authorize such burning when downwind metropolitan areas are forecast by the District to achieve the ambient air quality standards and/or a fire agency has not declared a no-burn day due to safety issues.	(vi) Identification and location of all smoke sensitive areas (D) All site-specific conditions imposed by the Executive Officer as part of the approved Emergency Burn Plan are met; and	103.3.2 The APCO may grant an exemption to the drying times specified in Section 305 if the denial of such burning would threaten imminent and substantial economic loss	1.3.1.6 The use of pyrotechnics during the filming of motion pictures, videotaping of television programs or other commercial filming or video production activities.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
EXCEPTIONS	General		4.3.3.2 The District shall limit the amount of acreage that can be burned on any one no-burn day in any one county to 200 acres. 4.3.3.3 The granting of an exemption does not exempt the applicant from any other District or fire control regulations. 4.3.3.4 Within fifteen (15) days of the granting of an exemption, the applicant shall return a signed application form that provides the reasons for requesting the exemption and shall pay the required District fee for said exemption.	(E) The person conducting the open burn shall notify the Executive Officer no more than 24 hours following the authorized burn to report the total amount of agricultural material burned (5) The provisions of this rule shall not apply to: (A) Open burning located on islands 15 miles or more from the mainland coast. (B) Fireworks displays. (C) Pyrotechnics used for creation of special effects at theme parks.		1.3.1.7 Contraband in the possession of public law enforcement personnel provided they demonstrate that open burning is the only reasonably available method for safely disposing of the material. 1.3.1.8 Disposal of infectious waste, other than hospital waste, upon the order of the County Health Officer to abate a public health hazard.
			4.3.4 The burning of contraband is exempt from the no-burn day restrictions of Section 6.1.8, but may only be conducted pursuant to APCO written authorization and the preparation of a burn plan as described in Section 6.2.2. Contraband burning is subject to the provisions of Section 5.7.	(D) Detonation of explosives during: (i) Quarry or mining operations (ii) Bomb disposal by a law enforcement agency (iii) Demolition of buildings or structures (E) The use of pyrotechnics, detonation of explosives, or fire effects for creation of special effects during theatrical productions, filming of motion pictures, videotaping of television programs or other commercial filming or video production activities provided that:		1.3.2 Exemptions from Subsection 3.3.1 (SM permit requirement)*[No person shall set or permit to be set any open outdoor fire including agricultural fires without first obtaining an approved SM permit and daily authorization from the Air District or local fire protection agency - fees maybe collected]* Exemption does not affect any burn pemits that may be required by local fire agencies.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
EXCEPTIONS	General			(i) Each fire effect is limited to no more than 30 minutes in duration, and (ii) The fuel is untreated wood, charcoal, or Authorized Ignition Fuels. (6) Except for the requirements of subparagraph (d)(3) and (d)(4), the provisions of this rule shall not apply to:		1.3.2.1 fires described in subsection 1.3.1.1 where the entity conducting the fire is the permitting agency; 1.3.2.2 fires described in subsection 1.3.1.5 (personal use of pyrotechnics and for organized community events)
				(A) Recreational fires or ceremonial fires, including fires conducted pursuant to United States Code, Title 4, Chapter 1, Section 8. (B) Open burning of natural gas, propane, untreated wood, or charcoal for the purpose of: (i) Preparation or warming of food for human consumption; or		1.3.2.3 fires described in subsection 1.3.1.7 (disposal of contraband) 1.3.2.4 fires described in subsection 1.3.1.8 (disposal of infectious waste) 1.3.2.5 cooking fires (as defined in Section 2.14)
				(ii) Generating warmth at a social gathering. (7) The distance and spacing provisions of clause (d)(3)(G)(ii) shall not apply to beach burning devices that are made available to comply with the Americans with Disabilities Act by making the beach burning device accessible via a continuous unobstructed concrete, asphalt or other		1.3.2.6 recreational fires (as defined in Section 2.39) that are less than 3-fee in diameter and 2-fee in height 1.3.2.7 warming fires (as defined in Section 2.46) 1.3.2.8 fires used to instruct in the proper operation of fire extinguishers.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
EXCEPTIONS	**General**			permanent pathway that crosses the surface of the beach. This paragraph does not exempt the beach burning devices that are made available for the Americans with Disabilities Act compliance from the total device count specified in sub-clause (d)(3)(G)(ii)(III).		1.3.3 Exemptions from Section 3.4 (Burn Days and "No-burn" Days) *[No person shall set, or permit to be set, any open outdoor fire on any day designated by the CARB as a "no-burn" day, except as provided at subsection 1.3.3. Fires allowed shall only be set during burn days designated by CARB or the Air District. The Air District may allow limited burning on CARB marginal burn days.]*
						1.3.3.1 cooking fires (as defined in Section 2.14) 1.3.3.2 recreational fires (as defined in Section 2.39)
						1.3.3.3 warming fires (as defined in Section 2.46) 1.3.3.4 fires described in subsection 1.3.1.5 (personal use of pyrotechnics and for organzied community events)
						1.3.3.5 fires described in subsection 1.3.1.7 (disposal of contraband) 1.3.3.6 fires described in subsection 1.3.1.8 (disposal of infectious waste)

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
EXCEPTIONS	**General**					1.3.3.7 fires described in subsection 1.3.1.1.1 (fire-fighting instruction for public employees) 1.3.3.8 fires described in subsection 1.3.1.2 (industrial fire-fighting instruction)
						1.3.3.9 agricultural fires set upon APCO approval where denial of such approval would threaten imminent and substantial economic loss as provided in H&SC 41862 and
						1.3.3.10 a prescribed burn project which has been declared a test burn jointly by the CARB and the Air District for the purpose of evaluation alternative criteria for making burn day decisions. 1.3.3.11 fires used to instruct in the proper operation of fire extinguishers.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
EXCEPTIONS	**General**					1.3.4 Exemption from Section 3.7 (Standards for Vegetative Material to be Burned) Fires qualifying for exemption under subsection 1.3.3.8 may be exempted by the APCO from certain requirements of Section 3.7. *[Materials must conform with requirements involving dryness, free of surface moisture, free of dirt and soil, drying days for tree stumps, waste, arrangement for adquate aeration, use of burn barrels, poison oak could be burned, the use of non approved ignition devices would be allowed, and burning when the wind direction was unfavorable would be allowed.]*
						1.3.5 Limited Exemption For Invasive Plant Species If allowed for in the Permit issued pursuant to Section 3.3, Invasive Plant Species may be exempt fromt he material drying time contained in Subsection 3.7.1, 3.7.3, 3.7.4, and 3.7.5. *[Material dry and reasonably free of visible surface moisture, drying day for different size tree stumps, branches, prunings]*
						1.4 Effective Date of Rule The Rule in its present form is effective on February 19, 2014

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
EXCEPTIONS	General					1.5 References California Health and Safety Code Sections 39011 et seq., 39665 et seq., 41800 et seq., 41850 et seq.; and California Code of Regulations, Title 17, Subchapter 2, Sections 80100 et. seq. and 93113 et seq.
REQUIREMENTS			5.0	(d)	300	PART 3
REQUIREMENTS	General		5.1 Except as otherwise provided in this rule, no person shall set, permit, or use an open outdoor fire for the purpose of disposal or burning of petroleum wastes; demolition or construction debris; residential rubbish; garbage or vegetation; tires; tar; trees; woodwaste; or other combustible or flammable solid, liquid or gaseous waste; or for metal salvage or burning of motor vehicle bodies	(1) A person shall not conduct or allow open burning unless all of the following are met: (A) The Executive Officer has declared the day a permissive burn day or a marginal burn day on which burning is permitted in the applicable source/receptor area and such burning is not prohibited by the applicable public fire protection agency.	301 PROHIBITIONS ON OPEN BURNING**:** Except as provided in Regulation 3, no person shall use open outdoor fires (including the use of a burn barrel) for the purpose of disposal or burning of any disallowed combustibles. 302 BURN PERMITS 302.1 A person shall not ignite or allow agricultural burning, including the burning of agricultural wastes, without first obtaining a valid burn permit from the District.	3.1 Except as otherwise provided in this Rule, no person shall use open outdoor fires within the boundaries of the Monterey Bay Unified Air Pollution Control District for the purpose of <u>disposal or burning of household rubbish and/or waste</u> (as defined in Part 2 of this Rule).

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**General**		5.2 The APCO shall allocate burning based on the predicted meteorological conditions and whether the total tonnage to be emitted would allow the volume of smoke and other contaminants to cause a public nuisance, impact smoke sensitive areas, or create or contribute to an exceedance of an ambient air quality standard 5.3The APCO shall restrict the time of day when burns are ignited and conducted, as necessary. 5.4 No open burning shall be permitted that will create a nuisance as defined in Section 41700 of the California Health and Safety Code.	(B) The Executive Officer or the applicable fire protection agency has issued a written permit for the burn. For disposal of Russian thistle, subject to paragraph (d)(2)(C), a permit may also be issued by the Director of Forestry and Fire Protection or a County Agricultural Commissioner, pursuant to California Health and Safety Code Section 41809. (C) The Executive Officer has authorized the burn by issuing a Burn Authorization Number for each day for each open burning event.	302.2 A separate burn permit may also be required by the fire protection agency that has jurisdiction in the area of the proposed burn project. 303 BURN PERMIT VALIDITY: No burn permit shall be construed to authorize open outdoor fires for any day during which: 303.1 It is a no-burn day. 303.2 Open burning is prohibited by a fire protection agency for fire control or prevention. 304 BURN DAYS 304.1 No person shall knowingly ignite or allow ignition of agricultural waste burning on no burn days or when burning is prohibited by fire protection agency.	3.1.1 Notwithstanding the exemptions at Subsection 1.3.1 *et seq*., no person shall use open outdoor fires within the boundaries of the Monterey Bay Unified APCD for the purpose of disposal or burning of treated wood under any circumstances. However, the Air District may exempt specific lots of wood from this prohibition upon the request on any person who can prove to the Air District that the wood sought to be exempt, while chemically treated does not contain arsenic, chromium or other chemical compound that substantially adds to the toxicity of the emissions from burning.
				(i) The Executive Officer has received the Burn Authorization Number request by 4:00 p.m. on the day prior to the burn. (ii) The Executive Officer may delay issuing a Burn Authorization Number until such time that an inspection of the proposed Burn Project can be conducted, in order to determine whether the open burning event complies with the provisions of the rule.	304.2 Burn Hours: No field crop burning shall commence before 10:00 AM or after 5:00 PM of any day unless otherwise designated. The District may further restrict burning hours if it is deemed necessary to prevent adverse impacts to downwind receptors.	3.2 Prohibition On Use Of Open Outdoor Fires For Entites Other Than Single or Two-Family Dwellings Except as otherwise provided in this Rule, no entity other than single or two-family dwelling which is a non-business entity shall be authorized the use of open outdoor fires within the boundaries of the Monterey Bay Unified APCD

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	General			(D) All site-specific permit conditions are met, pursuant to Rule 208 – Permit and Burn Authorization for Open Burning.		3.3 General Smoke Management Permit Requirements
				(2) The Executive Officer may authorize open burning for: (A) Agricultural burning (B) Prescribed burning (C) Disposal of Russian thistle (D) Abatement of a fire hazard that a fire protection agency determines cannot be abated by an economically, ecologically and logistically viable option		3.3.1 No person shall set, or permit to be set, any open outdoor fire including agricultural fires without first obtaining an approved SM permit and daily authorization from the Air District or local fire protection agency, except as provided in subsection 1.3.2 of this Rule. Fees may be collected by the Air District for processing SM permits for backyard burning after July 1, 2013.
				(E) Disposal of waste infected with an agricultural pest or disease hazardous to nearby agricultural operations and upon the order of the County Agricultural Commissioner (F) Disposal of infectious waste, other than hospital waste, upon the order of the County Health Officer to abate a public health hazard		3.3.2 In reviewing and approving a SM permit to conduct a burn, the Air District or local fire protection agency may limit the amount of such material that can be burned in any one day and the hours of the day during which material may be burned.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	General			(G) Use of pyrotechnics for the creation of special effects during filming of motion pictures, videotaping of television programs or other commercial filming or video production activities provided untreated wood, charcoal or Approved Ignition Fuels are used		3.3.3 In full recognition of the fact that each local fire protection agency has the prerogative and responsibility to constrain or prohibit open burning altogether, fire protection agencies shall be authorized to issue SM permtis on behalf of the Air District at their request.
				(H) Disposal of contraband in the possession of public law enforcement personnel provided they demonstrate that open burning is the only reasonably available method for safely disposing of the material (I) Fire prevention/suppression training exercises, provided notifications and compliance with all requirements of Rule 1403 –Asbestos Emissions from Demolition/Renovation Activities shall be required when applicable		3.4 Burn Days, "No-Burn" Days, and Marginal Burn Days No person shall set, or permit to be set, any open outdoor fire on any day designated by the CARB as a "no-burn" day, except as provided at subsection 1.3.3 of this Rule. Fires allowed pursuant to this Rule shall only be set during burn days as designated by the CARB or by the Air District. The Air District may allow limited burning on CARB designated marginal burn days.
				(J) Researching or testing fire retardant properties of materials (or enclosures) or the efficacy of fire suppression techniques or devices (3) A person is prohibited from open burning for:		3.5 Burn Authorization No person shall set, or permit to be set, any open outdoor fire unless a burn authorization is provided by the Air District or the local fire jurisdiction.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	General			(A) Residential burning (B) Disposal of waste, except as specified in (d)(2) above, including hospital waste (C) Disposal of materials generated as a result of land use conversion for non-agricultural purposes		3.6 Tracking of Materials Burned All persons who set, or permit to be set, any open outdoor fire burn shall provide the Air District or the jurisdiction issuing the smoke management permit the type and quantity of materials burned.
				(D) Disposal of materials from the production or storage of military ordnance, propellants, or pyrotechnics unless a fire protection agency, law enforcement agency or governmental agency having jurisdiction determines that onsite burning or detonation in place is the only reasonably available method for safely disposing of the material		3.7 General Standards for Vegetative Materials to be Burned All materials to be burned shall conform to the following requirements to ensure rapid and complete combustion to minimize smoke generation: 3.7.1 Materials to be burned shall be dry and reasonably free of visible surface moisture prior to burning.
				(E) Suppression of wildland fires, except those set by fire protection agencies, for the purpose of saving life or property		3.7.2 Materials to be burned shall be reasonably free of dirt and soil.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**General**			(F) Complete burning of existing structures for fire prevention/ suppression training exercises (G) Effective March 1, 2014, beach burning, unless: (i) PM2.5 AQI of 100 or less has been forecast for the coastal source receptor area; and (ii) beach burning occurs in devices that are: (I) at least 700 feet from the nearest residence;. or		3.7.3 Tree stumps more than six inches in diameter shall have been dried for at least 180 days prior to burning. (This does not apply to backyard burning where the burning of stumps is prohibited). 3.7.4 Trees, branches and prunings more than two inches but equal to or less than six inches in diameter shall have been dried for at least 60 days prior to burning.
				(II) at least 100 feet apart from one another; or (III) at least 50 feet apart from one another, if there are no more than 15 devices per contiguous beach area within the city's boundaries.		3.7.5 Trees, branches and prunings equal to or less than two inches in diameter and plant trimmings shall have been dried for at least 30 days prior to burning.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	General			(4) Notwithstanding the provisions of subparagraph (d)(3)(G), if a city or county has declared, pursuant to Public Resources Code section 30005(b) or Health and Safety Code section 41509(a), that designated beach burning devices within its boundaries cause a nuisance, as defined in Civil Code section 3479 or Health and Safety Code section 41700(a), due to wood smoke exposure, then those devices may not be made available by a state or local authority (5) A person shall not commence:		3.7.6 Wastes from field crops that are cut in a green condition shall have been dried for at least 10 days prior to burning. 3.7.7 Material to be burned shall be arranged to provide adequate aeration to allow the material to burn with a minimum of smoke. 3.7.8 The use of burn barrels to burn materials is prohibited, unless authorized by the local fire agency with jurisdiction. Burn barrels shall only be used to burn materials consistent with the provisions of Subsection 1.3.1.4 (residential burning).
				(A) Open burning for agricultural field crops before 10:00 a.m. or later than 5:00 p.m. (B) Open burning, other than for agricultural field crops, except as authorized in an approved Smoke Management Plan:		3.7.9 Material containing poison oak shall not be burned where in the opinion of the Air Pollution Control Officer the smoke from the burning operations could adversely affect adjacent or nearby residences.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**General**			(i) Earlier than one hour after sunrise (ii) Lat than two hours before sunset, with no new ignition, or fuels added to an existing fire (6) A person shall use only approved ignition devices to ignite open burning. (7) A person shall not transport vegetative waste for the purpose of open burning from one property to another, unless it is necessary to avoid burning within 1,000 feet of a sensitive receptor		3.7.10 Only approved ignition devices shall be used for ignition. 3.7.11 Burning shall not commence when the wind direction would blow smoke toward a Smoke Sensitive Area or populated area which would be adversely affected by the smoke.
						3.8 Mechanized burning, e.g., trench burning, may be used for the purpose of disposing of agricultural wastes, or wood waste from trees, vines, bushes, or other wood debries free of non-wood materials as provided in Section 41812 of the California Health and Safety Code.
						3.9 Prohibition of Nusiances Notwithstanding any other provision of this Rule, no fire shall constitute a nuisance as defined in District Rule 402 (Nuisances).

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Agricultural**	A.1 No person knowingly shall set or permit Agricultural Burning unless he has a valid permit from the Air Pollution Control Officer. The Air Pollution Control Officer shall issue Agricultural Burning permits subject to the rules and regulations of the Imperial County Air Pollution Control District, and the California Health and Safety Code and implementing regulations.	5.5 The following conditions are in addition to those requirements specified in Sections 5.1 through 5.4	(d)(8) Additional requirements for agricultural burning:	305 VEGETATION PREPARATION AND DRYING TIMES	PART 4
		A.2 Each applicant for a permit shall provide information as required by the Air Pollution Control Officer. A.3 Prior to the burn, notice of intent shall be given by the permittee to the Air Pollution Control Officer.	5.5.1 No permit shall be issued for the burning of the following categories of agricultural waste, except for crops covered by Section 5.5.2:	(A) A person shall not conduct or allow the open burning of agricultural waste unless it has been allowed to dry for the following minimum times: (i) Trees and large branches (3 in. or greater): 6 weeks	305.1 Rice Harvesting - Mechanical Straw Spreader: All rice harvesting shall employ a mechanical straw spreader to ensure even distribution of the straw, with the following exception.	The purpose of this Part is to codify standards and requirements for burning of agricultural wastes within the Air District. The provisions of this Part shall apply to all persons who set or maintain fires used for burning agricultural wastes within the Air District.
		A.4 No permit shall be valid for any day during a period in Which Agricultural Burning is prohibited by the California Air Resources Board or the Air Pollution Control District.	5.5.1.1 - 5.5.1.7 Field Crops, Prunings, Weed Abatement, except for categories covered by Section 5.5.3, Orchard Removals, Vineyard Removal Materials, Surface Harvested Prunings, and Other Materials	(ii) Prunings and small branches (1 in. to less than 3 in. diameter): 4 weeks (iii) Wastes from field crops that are cut in a green condition: 4 weeks (iv) Fine fuels (0.25 in. to less than 1 in. diameter): 3 weeks (v) Very fine fuels (less than 0.25 in.): 10 days	305.1.1 Rice straw may be left in rows, provided it meets the drying time criteria prior to a burn, as described in Section 306.1. 305.1.2 After harvest, no spread rice straw shall be burned prior to a three day drying period. No rowed rice straw shall be burned prior to a ten day drying period.	4.1 Burning Hours No field crop burning shall commence before 10:00 a.m. or after 5:00 p.m. of any day, unless local conditions indicate that other hours are appropriate. (California Health and Safety Code Section 80150(a)(2)).

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RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Agricultural**	A.5 No permit shall be valid for any day in which burning is prohibited by the designated fire control agency having jurisdiction over the site of the burn for the purposes of fire control or prevention.	5.5.2 The District may postpone the prohibitions in Section 5.5.1 and may issue permits for the burning of any agricultural waste, if all of the following criteria are met:	(B) A person shall not conduct or allow the open burning of agricultural waste unless it is free of dirt, soil, and visible moisture.	305.2 Other Agricultural Waste Burning: To assure rapid and complete combustion with a minimum of smoke, and to lower the moisture content of the vegetation being burned, (from when the vegetation was cut and is to be burned), the following are drying times.	4.2 Fertilizer and Pesticide Sacks or Containers Empty fertilizer and pesticide sacks or containers may be burned on burn days only in the field where the sacks or containers are emptied.
		A.6 All agricultural wastes to be burned must be free of tires, rubbish, tar paper, construction debris, and all other material that is not produced in an agricultural operation. A.7 All agricultural wastes to be burned shall be arranged in such manner as to promote drying and insure combustion with a minimum of smoke production. All agricultural wastes to be burned shall be free of excessive dirt, soil, and visible surface moisture.	5.5.2.1 The Board determines that there is no economically feasible alternative means of eliminating the waste. 5.5.2.2 The Board determines that there is no long-term federal or state funding commitment for the continued operation of biomass facilities in the San Joaquin Valley or development of alternatives to burning.	(C) A person shall ignite rice, barley, oat and wheat straw only by strip-firing or by backfiring into the wind unless a fire protection agency declares such actions would constitute a fire hazard.	305.2.1 A minimum of three days for other agricultural waste such as field crop residue (other than rice stubble), vegetable tops, and seed screenings to assure rapid and complete combustion with a minimum of smoke 305.2.2 A minimum of 15 days of drying time for fine prunings or cuttings, less than 3 inches in diameter, at the cut end.	4.3 Garlic Tops The burning of garlic tops in harvesting operations is prohibited.

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RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Agricultural**	A.8 All agricultural wastes to be burned shall be ignited only by an approved ignition device as defined in Rule 101. A.9 The following types of agricultural waste materials to be burned must be dried for the following minimum time periods or equivalent: A.9.a Green field stubble: 4 days following harvest A.9.b Dry cereals: 0 days A.9.c Prunings and small branches: 2 weeks A.9.d Large branches and trees: 6 weeks	5.5.2.3 The Board determines that the continued issuance of permits for that specific category or crop will not cause, or substantially contribute to, a violation of an applicable federal ambient air quality standard. 5.5.2.4 The California Air Resources Board concurs with the Board's determinations pursuant to this section	(D) A person shall not conduct or allow the open burning of agricultural waste unless a Burn Management Plan is approved in writing by the Executive Officer for any project greater than 10 acres or a project that produces more than one ton of particulate matter emissions, as determined using EPA AP-42 or equivalent emissions factors approved by the Executive Officer, CARB, and EPA. At a minimum, the Burn Management Plan shall contain the following information:	305.2.3 A minimum of three to six weeks of drying time for prunings or brush or small branches 3 to 6 inches in diameter, at the cut end. 305.2.4 A minimum of six weeks of drying time for trees, stumps, and large branches greater than 6 inches in diameter, at the cut end. 305.2.5 No vegetation shall be burned unless it is reasonably free of dirt, soil, and surface moisture and shall be burned in a manner to prevent excessive smoke. Excessive smoke is that which causes a nuisance.	

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	Agricultural	A.10 Materials to be burned shall be ignited between 10:00 a.m. and 3:00 p.m., and all burning shall be terminated by sunset of each day. A.11 No burning of agricultural waste materials shall be permitted which will create a nuisance as defined in Section 41700 of the California State Health and Safety Code. A.12 The Air Pollution Control Officer may restrict Agricultural Burning to selected permittees on designated Burn Days if the total tonnage to be ignited would total more than 5% of the total annual tonnage burned in Imperial County if visibility is less than 10 miles for two observations one (1) hour apart, when the relative humidity is less than 70%.	5.5.3 Owner/operators shall use at least one of the Best Management Practices for the control of other weeds and maintenance listed in Attachment 1, or other practices as approved by the APCO, for the control of star thistle, dodder weeds, tumble weeds, noxious weeds, and weeds located along ditch banks or canal banks, and the disposal of pesticide sacks or fertilizer sacks. The APCO shall not approve any alternative practice unless it is demonstrated that the alternative is at least as effective in controlling emissions as the listed practices.	(i) Location, types, and amounts of material to be burned (ii) Expected duration of the fire from ignition to extinction (iii) Identification of responsible personnel, including telephone contacts (iv) Identification and location of all smoke sensitive areas (v) Calculation of the particulate emissions tonnage, when the particulate emissions tonnage is selected as the criteria for determining the project size	305.2.6 Vegetation stacked for burning shall not be burned unless it is stacked in such a manner to promote drying and ensure combustion with a minimum amount of smoke. 305.2.7 The vegetation to be burned shall be free of disallowed combustibles and other material that is not produced in an agricultural operation 306 STRAW MOISTURE DETERMINATION (CRACKLE TEST)	
		A.13 The Air Pollution Control Officer may declare a No-Burn Day for the District when the visibility is below 5 miles. (Amended 6-1-77)	5.5.4 Agricultural waste shall not be burned unless it is arranged or loosely stacked in such a manner as to promote drying and insure combustion with a minimum of smoke production	(E) A person shall not conduct or allow the open burning of agricultural waste unless the burn is located farther than 1,000 feet from a sensitive receptor location	306.1 Water Moisture: After a rain exceeding 0.15 inches, the provisions of Section 305.1.2, notwithstanding, rice straw shall not be burned unless the straw makes an audible crack when tested just prior to burning. The method of testing shall be as described in subsection 306.2.	

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Agricultural**	A.14 In addition to the provisions of this rule, burning within one and one half miles of a residential area (three or more contiguous, inhabited dwellings), rural school, or adjacent to heavily traveled roads, is subject to the following conditions:	5.5.5 Agricultural waste to be burned shall be ignited only with an approved ignition device 5.5.6 Agricultural waste shall not be burned unless it is free of excessive dirt, soil, and visible surface moisture		306.2 Straw: When checking a field for moisture a composite sample of straw from under the mat in the center of the mat and from different areas of the field shall be taken to ensure a representative sample. The provisions of Section 305.1 notwithstanding, straw shall only be deemed dry enough to burn if a handful of straw selected crackles audibly when it is bent sharply	
		A.14.a An Air Pollution Control District inspector must be present prior to, and at the time of ignition, and must give approval before the burn may be started. A.14.b The inspector may require backfiring, strip lighting, or use of needed fire breaks. A.14.c The inspector may withhold approval if meteorological conditions are not appropriate. Such conditions may be strong or gusty winds, smoke drift toward residential or sensitive areas or across traveled roads, low inversion layer, or excessive moisture, and low visibility.	5.5.7 Agricultural waste does not include and shall not be burned unless it is free of such items as plastic, rubber, ornamental or landscape vegetation, shop wastes, construction and demolition material, garbage, oil filters, tires, tar paper, broken boxes, pallets, sweatboxes, packaging material, packing boxes or any other material produced in the packing or processing of agricultural products, and pesticide and fertilizer containers (except sacks burned in the field where they were emptied)		307 LIGHTING PRACTICES: Field crop straw and residue shall be ignited only by strip firing into-the-wind or by backfiring except when and where an extreme fire hazard is declared by a fire protection agency or where crops are determined not to lend themselves to these techniques. 308 APPROVED IGNITION DEVICES: All open outdoor fires as authorized by this regulation shall be ignited only with approved ignition devices. The vegetation to be burned should be ignited as rapidly as practicable within applicable fire control restrictions.	

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
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TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Agricultural**	A.14.d A responsible person shall remain at the fire until it is out. A.14.e A sufficient number of competent persons shall be available to caution or direct traffic in the event smoke may obscure vision on roads adjacent to the burn.	5.5.8 Orchard or vineyard removal waste, or any other material, generated as a result of land use conversion from agricultural to nonagricultural purposes shall not be burned. 5.5.9 Agricultural waste shall not be burned unless it has been allowed to dry for the following minimum time periods:		309 WIND DIRECTION: Burning shall be curtailed when smoke is drifting into a nearby populated area or which is or may become a nuisance or hazard. 310 DETERMINATION OF AMOUNT BURNED DAILY: 310.1 Sacramento Valley Air Basin:	
		A.14.f Fields must be disced within 48 hours after the burn for wheat and barley, and for other crops as may be required by the inspector. A.14.g The permittee or responsible agent must make an appointment to meet an inspector. A requested schedule for burning may be denied or delayed if an inspector is not available, or if an excessive amount of burning is being requested for the same local area and time.	Rice Straw = See Section 5.5.14.4 Prunings and Small Branches = Three (3) Weeks Large Branches = Six (6) Weeks 5.5.10 Agricultural burning shall be monitored and attended prevent smoldering 5.5.11 No agricultural waste shall be burned except during daylight hours. 5.5.12 No agricultural waste shall be added to an existing fire after 5:00 p.m.		310.1.1 The daily acreage allotment on permissive burn days for open outdoor burning in agricultural operations in the growing of crops or the raising of fowl or animals shall be no more than that amount determined by the ARB from the daily basin wide acreage allotment equation contained in the approved Sacramento Valley Smoke Management Program.	

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Agricultural**	A.14.h Levee, ditch, right-of-way, and spot burns need not have an inspector present to burn, and shall comply with A.14.a and A.14.b above. A.15 The Air Pollution Control Officer may restrict Agricultural Burning to selected permittees on designated Burn Days if the total tonnage to be ignited would discharge a volume of contaminants into the atmosphere sufficient to cause adverse conditions. (Amended 6-1-77)	5.5.13 All burning shall be ignited as rapidly as practiable within applicable fire control restrictions. 5.5.14 Field crop burning: The requirements of Section 5.5.14 do not apply to vines and tree pruning burning. 5.5.14.1 No field crop burning shall commence before 10:00 a.m., or after 2:00 p.m., of any day, unless local conditions indicate that other hours are appropriate.		310.1.2 A prescribed burn conducted under a Smoke Management Plan, shall be considered a part of the daily agricultural burn acreage allocation. 310.2 Mountain Counties and Lake Tahoe Air Basins: Only that amount of vegetation that can be reasonably expected to burn completely within 24 hours of ignition.	
			5.5.14.2 Rice, barley, oat, and wheat straw shall be ignited only by strip firing into-the-wind or by backfiring, except under a special permit issued by the District when and where extreme fire hazards are declared by the public fire protection agency to exist, or where crops are determined by the District not to lend themselves to these techniques		311 RIGHT-OF-WAY CLEARING, LEVEE, DITCH, AND RESERVOIR MAINTENANCE BURNING: The following conditions apply: 311.1 Disallowed combustibles must be removed prior to burning. 311.2 Vegetation has been prepared by stacking, drying, or other methods to promote combustion as specified by the District.	

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Agricultural**		5.5.14.3 All rice harvesting shall employ a mechanical straw spreader to ensure even distribution of the straw with the exception that rice straw may be left in rows, provided it meets drying time criteria, as specified in Section 5.5.14.4 prior to a burn. Rice straw may also be left standing, provided it is dried and meets the crackle test criteria described in Section 5.5.14.5			
			5.5.14.4 After harvesting, no rice straw shall be burned prior to the following drying periods:			
			5.5.14.4.1 Spread rice straw: three (3) days; or 5.5.14.4.2 Rowed rice straw: ten (10) days. 5.5.14.4.3 Sections 5.5.14.4.1 and 5.5.14.4.2 shall not apply if the rice straw makes an audible crackle when tested just prior to burning with the test method described in Section 5.5.14.5			

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	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	Agricultural		5.5.14.5 When checking the field for moisture, a composite sample of straw from under the mat, in the center of the mat, and from different areas of the field shall be taken to insure a representative sample. A handful of rice straw from each area will give a good indication. Rice straw is dry enough to burn if a handful of straw selected as described above crackles when it is bent sharply.			
			5.5.14.6 After a rain exceeding fifteen hundredths (0.15) inch, notwithstanding Section 5.5.14.3, rice straw shall not be burned unless the straw makes an audible crackle when tested just prior to burning with the test method described in Section 5.5.14.5			
			5.5.14.7 The APCO may require additional conditions based on the condition of the materials to be burned			
			5.6 Ditch Bank and Levee Maintenance			

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Agricultural**		The following conditions are in addition to those requirements specified in Sections 5.1 through 5.4 for burning on-site grown vegetative material for right- of-way clearing, levee, and ditch bank maintenance by a public entity or utility:			
			5.6.1 Trash and debris must be removed prior to burning.			
			5.6.2 The material has been prepared by stacking, drying, or other methods to promote combustion as specified by the District			
			5.7 Contraband Materials The following conditions are in addition to those requirements specified in Sections 5.1 through 5.4 for the disposal of contraband materials by burning:			
			5.7.1 No contraband confiscated outside the District may be transported into the District for disposal by burning. Only contraband confiscated within the San Joaquin Valley Air Basin boundaries may be disposed of by burning.			

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Agricultural**		5.7.2 Prior to the burn, a written notification of the planned burn must be submitted to the APCO pursuant to Section 6.2.2 of the rule.			
			5.7.3 Fires shall only be set or allowed by a peace officer or public fire official in the performance of official duty.			
			5.7.4 To the extent possible, materials must be burned in areas and in conditions limiting the possibility of smoke impacts on nearby neighbors and/or other smoke sensitive areas			
			5.8 Russian Thistle (Salsola Kali) (tumbleweeds)			
			A District Permit is required for the burning of tumbleweeds. The Permit shall be issued in accordance with Sections 5.8.1, 5.8.2, and 6.1 and is only valid when the Permit applicant has received a burn authorization from the APCO that will allow burning on a particular day.			

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	Agricultural		5.8.1 The burn site must be maintained in a fire safe condition according to the local fire protection agency			
			5.8.2 The smoke and air contaminants shall not impact smoke sensitive areas, cause or contribute to a nuisance pursuant to Rule 4102 (Nuisance), or create or contribute to an exceedance of an ambient air quality standard. The APCO reserves the right to deny a Permit request if it might create a nuisance			
			5.9 Diseased Materials			
			A conditional burning permit is required for fires set for the purpose of disease or pest prevention. A conditional burning permit shall authorize the burning of only the identified diseased crop, animal, fowl, pest or infected material.			

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Agricultural**		5.9.1 A conditional burning permit will be issued by the APCO, if all of the following criteria are met:			
			5.91.1 The material to be burned is specifically described in the conditional burning permit.			
			5.9.1.2 The applicant has not been cited for a violation of burning rules or regulations in the past 3 years, unless the violation was of a de minimis nature, as determined by the APCO and the county agricultural commissioner, and			
			5.9.1.3 The county agricultural commissioner has determined all of the following:			
			5.9.1.3.1 There is no economically feasible alternative means of eliminating the disease or pest other than burning, and			

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	Agricultural		5.9.1.3.2 There is the presence of a disease or pest that will cause a substantial, quantifiable reduction in yield or poses a threat to the health of adjacent vines, trees, or plants in the field proposed to be burned, during the current or next growing season, or there is the presence of a disease or pest that will cause a substantial, quantifiable reduction in production of animals or fowl.			
			5.9.2 The holder of a conditional burning permit may not transfer, sell or trade the burning permit to any other individual.			
	Prescribed			(d)(9)		PART 5
REQUIREMENTS	Prescribed			(A) A person shall conduct or allow prescribed burning only when the fires are set by, under the jurisdiction of, or pursuant to the orders or requirements of a fire protection agency.		The purpose of this Part is to codify standards and requirements for prescribed burning within the Air District. The provisions of this Part shall apply to all persons who set or maintain fires used for prescribed burning within the Air District.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Prescribed**			(B) A person shall not conduct or allow prescribed burning unless a Smoke Management Plan is approved in writing by the Executive Officer for any project greater than 10 acres or that produces more than one ton of particulate matter emissions, as determined using EPA AP-42 or equivalent emissions factors approved by the Executive Officer, CARB, and EPA. Smoke Management Plans shall be updated annually. At a minimum, the Smoke Management Plan shall contain the following information:		5.1 Requirements for All Prescribed Burning (5.1.1) Prescribed burn projects must be registered with the Air District annually or seasonally. Information to be submitted includes but is not limited to: project name; project location; approximate total number of tons (for piled material) or acres (for standing material) of vegetation; type of vegetation; expected time of year (which months) the burning project may be conducted; applicant contact information.
				(i) Location, types, and amounts of material to be burned (ii) Expected duration of the fire from ignition to extinction (iii) Identification of responsible personnel, including telephone contacts (iv) Identification and location of all smoke sensitive areas		5.1.2 Smoke Management Permit Requried No person shall conduct or permit to be conducted any prescribed burning within the boundaries of the Air District without first having obtained a SM permit from the Air District and CAL FIRE or other designated agency with jurisdiction, as required by such agencies.

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	Prescribed			(v) Calculation of the particulate emissions tonnage (C) A person shall not conduct or allow prescribed burning unless a Smoke Management Plan is approved in writing by the Executive Officer for any project greater than 100 acres or that produces more than 10 tons of particulate matter emissions, as determined using EPA AP-42 or equivalent emissions factors approved by the Executive Officer, CARB, and EPA. Smoke Management Plans shall be updated annually. At a minimum, the Smoke Management Plan shall contain the information required by subparagraph (d)(9)(B) and the following information: (i) Identification of meteorological conditions necessary for burning		5.1.3 Smoke Management Plan and Smoke Management Permit Applicant Form Before a SM permit may be issued by the Air District for prescribed burning, a completed Smoke Management Plan and SM Permit Application form consistent with the requirements of Title 17 to mitigate and monitor smoke impacts, and describing how the burn is to be carried out, shall be submitted by the owner, or his/her agent, of the land on which the burn is proposed, to the Air District and be approved by the Air District.
						This information shall include a list of any "Smoke Sensitive Areas" (SSAs) within 10 miles of the burn, with compass directions to the nearest of eight prime compass points; and contingency measures to be followed in case of significant downwind smoke impacts from the project.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Prescribed**			(ii) Smoke management criteria the land manager will use for making burn ignition decisions (iii) Projections, including a map, of where the smoke from burns is expected to travel both day and night (iv) Spe contingency actions (such as fire suppression or containment) that will be taken if smoke impacts occur or meteorological conditions deviate from those specified in the Smoke Management Plan		5.1.4 Prescribed burns may only be conducted after receiving authorization from the Air District. The burner must receive authorization from the Air District any time within the 24 hours before burning by calling (831) 647-9411 during the Air District's normal business hours (Mondays through Fridays; 8:00 A.M. to 5:00 P.M.).
				(v) Evaluation of and consideration of emission reduction techniques including environmentally, economically, and logistically viable alternatives to burning (vi) Discussion of public notification procedures (D) The Executive Officer shall prioritize burn authorization requests based upon:		5.1.4.1 If the burn will be conducted on weekends or holidays, or if the burner cannot otherwise comply with the 24-hour requirement, the burner must contact the Air District before the burn during the Air District's normal business hours to receive Provisional Authorization. Provisional Authorization will allow the burn to be conducted on a burner-selected future date.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Prescribed**			(i) The level of training of the person conducting the burn as identified in the Burn Management Plan and Smoke Management Plan. (ii) The measures identified in the Smoke Management Plan proposed to reduce emissions.		5.1.5 Restrictions on Poor Air Quality Days No prescribed burns may be conducted on days when air quality conditions (including high ozone concentrations) have been predicted to result in smoke impacts or to be unacceptable for burning for the region.
				(E) Notwithstanding subparagraph (d)(1)(A), the Executive Officer may allow prescribed burning on marginal burn days, provided a Smoke Management Plan has been approved.		5.1.6 Public Notification Direct public notification of sensitive downwind receptors shall be required for prescribed burn projects with potentially significant air quality impacts.
						5.1.7 Daily Emissions Allocation The total emissions from all prescribed burn projects on each day in the air basin shall remain within the Air District's adopted Air Quality Maintenance Plan VOC and NOx emission inventories during the ozone season (May through October).

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	Prescribed					5.1.7.1 The Air Pollution Control Officer (APCO) may modify the above restriction on total emissions if limiting the proposed burn would: require multiple burns that would result in prolonged smoldering and expose sensitive receptors to air pollutants over multiple days; or, substantially increase costs; or, affect public services such as roadway access; or, be in an area where several smaller burns would be difficult to conduct and/or would require firebreaks that would increase erosion or landslide potential or disturb cultural resources or endangered plants or species.
						5.1.8 Use of Approved Ignition Devices The material shall be ignited only by devices and methods approved by the California Department of Forestry and Fire Protection and ignition shall be rapid as practicable within applicable fire control restrictions.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	Prescribed					5.1.9 Certification by Department of Fish and Wildlife Burning conducted primarily for improvement of land for wildlife and game habitats shall require the permittee to file with the Air District a statement obtained from the Department of Fish and Game certifying the burning is desirable and proper for the improvement of land for wildlife and game habitat.
						5.1.10 Reporting of Actual Materials Burned Within 30 days of completion of a prescribed burn project, the burner shall report to the Air District the date and amount of fuel actually consumed for each day of burning conducted. The reporting period may be reviewed by the District and may be reestablished, if deemed appropriate, based on the availability of a statewide electronic reporting system for prescribed burn projects.
						5.2 Additional Requirements for the Burning of Woody Wastes from Developments

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Prescribed**					In addition to the requirements of Section 5.1 of this Rule, the following requirements apply to the burning of woody wastes from developments:
						5.2.1 The purpose of this Section is to provide requirements for the disposal by burning of woody wastes from trees, vines, or bushes or natural vegetation grown on property being developed for commercial or residential purposes.
						5.2.2 The provisions of this Section shall apply to all persons who set or maintain fires within the Air District for the burning of woody wastes on land being developed for commercial or residential purposes, provided that the wastes resulted from trees, vines, or bushes or other natural vegetation grown on the land being developed.
						5.2.3 No person shall conduct or allow the conduct of burning of woody wastes on land being developed within the boundaries of the Air District without first obtaining a written SM permit from the Air District.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Prescribed**					5.2.4 After consideration of the amount of woody waste to be burned, the season of the year, the ambient air quality and the proximity of the waste to developed areas, the APCO may grant a SM permit to burn woody wastes from developments.
						5.2.5 Where economically and technically feasible, brush shall be treated by chemical or mechanical means at least six months prior to a proposed burn, to kill or uproot the brush to insure rapid combustion.
						5.2.6 During Burn Season All fires allowed under this Section shall be conducted only during the burn season as defined in Section 2.11 of this Rule.
						5.3 Additional Requirements for Forest Management and Range Improvement Burning
						In addition to the requirements of Section 5.1 of this Rule, the following requirements apply to forest management and range improvement burning:

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Prescribed**					5.3.1 All materials to be burned during forest management and range improvement burning when permitted shall conform to the following requirements to ensure rapid burning and ignition and to minimize smoke generation:
						5.3.1.1 Where economically and technically feasible, brush shall be treated by chemical or mechanical means at least six months prior to a proposed burn, to kill or uproot the brush to insure rapid combustion.
						5.3.1.2 Unwanted trees over six inches in diameter expected to burn or those not effectively treated at the time of the brush treatment shall be felled at least three months prior to the burn, but a longer time may be required where conditions warrant.
						5.4 Additional Requirements for Wildland Vegetation Management Burning
						In addition to the requirements of Section 5.1 of this Rule, the following requirements apply to wildland vegetation management burning:

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Prescribed**					5.4.1 When a natural ignition occurs on a no-burn day, the initial "go/no-go" decision to manage the fire for resource benefit will be a "no-go" unless:
						5.4.1.1 After consultation with the Air District, the Air District decides, for smoke management purposes, that the burn can be managed for resource benefit; or
						5.4.1.2 For periods of less than 24 hours, a reasonable effort has been made to contact the Air District, or if the Air District is not available, the CARB.
						5.4.1.3 After 24 hours, the Air District has been contacted, or if the Air District is not available, the CARB has been contacted and concurs that the burn can be managed for resource benefit.
						5.4.2 A "no-go" decision does not mean that the fire must be extinguished, but that the fire cannot be considered as a prescribed fire.

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Prescribed**					5.4.3 For naturally-ignited wildland fires managed for resource benefits that are expected to exceed 10 acres in size, a smoke management plan must be submitted to the Air District within 72 hours of the start of the fire.
REQUIREMENTS	**Maximum Daily Burn**			(e) The Executive Officer may allow the Maximum Daily Burn Acreage for Agricultural Burning and Prescribed Burning as follows:		
				(1) For all areas within the District jurisdiction, excluding the Coachella Valley:		
				(A) 175 acres for prescribed wildland and range burning; and (B) 175 acres for agricultural burning;		
				(2) For the Coachella Valley: (A) 6 acres for prescribed wildland and range burning; and (B) 41 acres for agricultural burning; and		

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	Maximum Daily Burn			(3) The provisions of this subdivision, limiting the maximum daily acreage, shall not apply to prescribed burning when a land manager has:		
				(A) Demonstrated that the prescribed burn is required to reduce a fire hazard that jeopardizes public health or safety; and		
				(B) Submitted a satisfactory Smoke Management Plan that has been approved by the Executive Officer.		
	Backyard Burning					PART 6
REQUIREMENTS	Backyard Burning					The purpose of this Part is to codify standars and requirements for backyard burning within the Air District. The provisions of this Part shall apply to all persons who perform backyard burning within the Air District.
						6.1 Burning Hours No backyard burning shall commence before 8:00a.m. and no additional fuels may be added after 3:00 p.m. on any day. All burns must be extinguished by 4:00pm on the same day.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Backyard Burning**					6.2 Burn Pile Sizes Burning piles are recommended to be no larger than 4-feet in diameter and 4-feet high. Burn pile size shall be consistent with local fire protection district requirements. Where a fire protection district has no published burn pile size, the individual conduting the burn should contact their fire protection district regarding recommended burn pile size for fire safety considerations.
						6.3 Burn Season Backyard burning shall only occur during the Burn Season as defined in Section 2.11
						6.4 Fire Safety The following fire safety requirements must be followed:
						6.4.1 All flammable material and vegetation must be cleared within 10-feet of the outer edge of the burn pile

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Backyard Burning**					6.4.2 A water source and appropriate fire fighting tools (shovel, rake, hoe, etc.) must be at the burn site location.
						6.4.3 An adult must be in attendance at all times until the fire is extinguished, and no burning shall be undertaken unless weather conditions are such that burning can be considered safe.
						6.4.4 No burning shall be undertaken unless weather conditions are such that burning can be considered safe.
						6.4.5 Property Size Backyard burning shall be limited to parcels 1/2 acre or greater, except in areas where curbside yard waste pick-up is not available. A waiver may be granted at the discretion of the Air District following a site inspection.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Backyard Burning**					6.4.6 Distance from Structures Backyard burning shall be conducted at least 100 feet from any residential or commercial structure on an adjacent property. A waiver may be granted at the discretion of the Air District following a site inspection.
Residential REQUIREMENTS	**Residential**					Part 7 The purpose of this Part is to codify standards and requirements for residential burning within the Air District. The provisions of this Part shall apply to all persons who perform residential burning within the Air District.
						7.1 Requirements for All Residential Burning
						On burn days only, fires for disposal of dry, non-glossy paper and cardboard originating from and being burned on the premises of a single or two-family dwelling (residential burning) if that dwelling meets all the following criteria:

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Residential**					7.1.1 the single or two-family dwelling is not in an incorporated place; and
						7.1.2 the single or two-family dwelling lies within the boundaries of a Census Zip Code within the Air District where the population density is equal to or less than 3.0 people per square mile, as calculated from the last decennial United States Census data; and the single or two-family dwelling is in an area not served on a weekly basis by an organized waste disposal service; and the single or two-family dwelling does not lie within the boundary of a jurisdiction which prohibits the burning of dry, non-glossy paper and cardboard. The current zip codes that meet the population density criteria are: 95043, 93210, 93451, and 93461.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
Monterey Peninsula/Carmel Valley Smoke Sensitive Area						PART 8
REQUIREMENTS	**Monterey Peninsula/Carmel Valley Smoke Sensitive Area**					Notwithstanding other provisions of this Rule, open burning, except agricultural burning, is prohibited within the Monterey Peninsula/ Carmel Valley Smoke Sensitive Area (MP/CV SSA) as defined in Section 2.29 unless all the following conditions are met:
						8.1 Such burning is permitted only in those local fire protection agency jurisdictions which have adopted enforceable local fire protection agency rules that limit the total number of burns, including agricultural burns, to no more than 25 such burns per burn day.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Monterey Peninsula/Carmel Valley Smoke Sensitive Area**					Local fire protection agency rules shall be deemed to comply with this Section only if such rules provide that the local fire protection agency shall maintain a log of each permittee authorized by said agency to burn on any given burn day, and shall assign either a daily authorization number or a local agency burn permit number. Such rules shall further provide that said log of 25 or fewer authorized permittees per burn day shall be made available to the Air District upon request, and shall be maintained for a period not less than 90 calendar days from the date of each burn day. Burning delineated in this Section and agricultural burning is permitted only after a burn permit has been obtained from the proper local fire protection agency. The burn permit is valid:
						8.1.1. only on burn days as determined by the California Air Resources Board and the Air District; and,

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	Monterey Peninsula/Carmel Valley Smoke Sensitive Area					8.1.2. upon receipt of a daily authorization number issued by the local fire protection agency having jurisdiction.
						8.2 Upon written approval of the Air Pollution Control Officer, any local fire protection agency subject to the provisions of Section 8.1 may delegate to the Air District its responsibility and authority to issue daily authorization numbers which therefore validate on a daily basis burn permits issued pursuant to Section 8.1. Should such delegation occur, the issuance or denial of a daily authorization number by the Air District shall respectively validate or invalidate the subject burn permit for that respective day as if such action had occurred by the local fire protection agency having jurisdiction in accordance with other provisions of this Rule.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**Monterey Peninsula/Carmel Valley Smoke Sensitive Area**					8.3 The defined perimeter of the MP/CV SSA, and the limit on number of burns each day shall be reviewed by the Air District periodically and may be reestablished, if deemed appropriate, based on recent meteorological and open burning related data.
San Lorenzo Valley Smoke Sensitive Area						Part 9
REQUIREMENTS	**San Lorenzo Valley Smoke Sensitive Area**					Notwithstanding other provisions of this Rule, open burning, except agricultural burning, is prohibited within the San Lorenzo Valley Smoke Sensitive Area (SLV SSA) as defined in Section 2.41 unless all the following conditions are met:
REQUIREMENTS	**San Lorenzo Valley Smoke Sensitive Area**					9.1 Burning is limited within the SLV SSA to no more than four permitted backyard burns per day for each local fire district, for a total not to exceed 20 permitted backyard burns per day.

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**San Lorenzo Valley Smoke Sensitive Area**					The SLV SSA fire districts are: · Zayante Fire Protection District (FPD) · Felton FPD · Ben Lomond FPD · Boulder Creek FPD · California Department of Forestry and Fire Protection
						9.2 Burning delineated in this Section and agricultural burning is authorized only after a smoke management permit has been approved by the Air District. The permit is valid:
						9.2.1 only on burn days as determined by the California Air Resources Board or the Air District; and,
						9.2.2 only for the day that it is authorized.
						9.3 Backyard burning within the SLV SSA shall be limited to parcels one acre or greater, except in areas where yard waste pick-up is not available. A waiver may be granted at the discretion of the Air District following a site inspection.

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
REQUIREMENTS	**San Lorenzo Valley Smoke Sensitive Area**					9.4 Additional restrictions may be set by the Air District for the SLV SSA even on California Air Resources Board declared “burn days”.
REQUIREMENTS	**San Lorenzo Valley Smoke Sensitive Area**					9.5 The defined perimeter of the SLV SSA, and the limit on number of burns each day shall be reviewed periodically by the Air District and may be modified, if deemed appropriate, based on meteorological and open burning related data

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
ADMINISTRATIVE			6.0	(f)	400	
ADMINISTRATIVE	Administrative		6.1 Open Burn Permits 6.1.1 No person shall knowingly set or permit open burning unless the person has a valid Permit issued by the APCO and/or the designated agency having jurisdiction in the area where the open burning will take place. 6.1.2 A Permit applicant shall provide information as requested by the APCO and or designated agency. No Permit or authorization shall be deemed valid unless the applicant has provided the required information. 6.1.3 A Permit shall be valid only on the lands specified on the Permit. 6.1.4 No material shall be burned unless it is clearly described and quantified as material to be burned on a valid Permit.	(1) An Annual Post Burn Evaluation Report shall be submitted on or before January 31st of each calendar year for any open burn projects that require a Smoke Management Plan or a Burn Management Plan. The Report shall include, but not be limited to, the following: (A) The type of material burned (B) The total acreage permitted to burn (C) The total acreage burned (D) The total tons of material burned (E) The estimated fuel loading in tons per acre (F) The total of the estimated PM emissions (2) Fire Protection Agencies within the District must submit copies of written burn permits to the Executive Officer quarterly.	401 BURN PERMIT APPLICATION INFORMATION 401.1 Type of burning; 401.2 Name and/or Business Name and address of the permittee; 401.3 Location of the proposed burn; 401.4 Distance from the proposed burn to the nearest neighboring home or structure; 401.5 The type of vegetation or agricultural waste to be burned; 401.6 Acreage or estimated tonnage or size of pile of the vegetation to be burned 401.7 Reason for burning; 401.8 Applicant's signature with date signed. The applicant signing the burn permit shall read and attest to the accuracy of the information provided.	

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
ADMINISTRATIVE	**Administrative**		6.1.5 Applications to burn orchard or vineyard removal waste must be reviewed and shall not be granted if the materials were generated in the process of land use conversion to nonagricultural purposes. 6.1.6 No burning shall be conducted pursuant to such a Permit without prior authorization for burning on a specified day from the District.		401.9 Each burn permit issued shall bear a statement of warning containing the following words or words of like or similar import: "THIS BURN PERMIT IS VALID ONLY FOR THOSE DAYS ON WHICH THE STATE AIR RESOURCES BOARD DOES NOT PROHIBIT AGRICULTURAL BURNING PURSUANT TO SECTION 41855 OF THE HEALTH AND SAFETY CODE."	
			6.1.7 No burning shall be conducted contrary to the conditions specified on the Permit. 6.1.8 Except for burning conducted pursuant to Section 4.3, a permit shall only be valid on those days not designated as no-burn days and the APCO has authorized the burning as being within a particular day's burn system allocation for the region in which burn site is located. 6.1.9 Any Permit issued by a designated agency shall be subject to the rules and regulations of the District.		401.10 The applicant or representative shall have the burn permit available for inspection at the burn site during the burn	

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
ADMINISTRATIVE	**Administrative**		6.2 Burn Plans for Fire 6.2.1 Fire Suppression Training The lead fire agency planning to conduct fire suppression training must submit a burn plan to the APCO for approval a minimum of 15 days prior to the date of the proposed burn. A burn plan is not required for training conducted at stationary fire training structures located at fire training facilities when used for the primary purpose of conducting fire training. The burn plan shall address the following:		402 REVOCATION OF A BURN PERMIT**:** The APCO, or his/her designee, may revoke a burn permit if it is found that the burn permit conditions, any state or federal laws, or the provisions of this Rule have been violated. The designated agency or the APCO shall notify the burn permit holder in writing of the revocation and the reasons for the revocation. Service of the notification of revocation may be by personal delivery or certified mail. In the case of service by mail, service shall be deemed complete at the time of deposit of the notification in the United States Post Office, or a mail box, sub-Post Office, substation, or mail chute, or other like facility.	
			6.2.1.1 The location of the fire training. 6.2.1.2 The fire agencies involved with the training, the number of personnel participating with the training, the name(s) and title(s) of personnel who are responsible for the training, and the approximate date the training will occur, including expected burn starting and ending times.		402.1 Within ten days after service of the notice of revocation specified in Section 402, the burn permit holder may petition the Hearing Board in writing for a public hearing. The Hearing Board, after notice and a public hearing held within 30 days after filing the petition, may sustain or reverse the decision of the APCO or the designated agency	

	DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
	RULE NUMBER	701	4103	444	302	438
	TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
ADMINISTRATIVE	**Administrative**		6.2.1.3 If a structure is involved with the fire training, the burn plan shall include an assessment for the presence and removal of asbestos containing materials within the structure(s), subject to the requirements of Rule 4002 and the National Emission Standards for Hazardous Air Pollutants (Subpart M, Part 61, Chapter 1, Title 40, Code of Federal Regulations). 6.2.1.4 Proposed contingencies to prevent a nuisance, per Rule 4102 (Nuisance).		403 SMOKE MANAGEMENT PROGRAM 403.1 Sacramento Valley Air Basin: The Sacramento Valley Smoke Management Program applies to agricultural and other burning operations, as defined by Section 80101 of Title 17 of the CCR, which are conducted at all elevations in the Sacramento Valley Air Basin. Policies and procedures specified by the Sacramento Valley Smoke Management Program apply throughout the year unless otherwise specified in the program.	
			6.2.2 Contraband Pursuant to the requirements of Section 5.7, a written notification from the law enforcement agency or fire agency conducting the burn shall be submitted to the APCO for approval a minimum of 15 days prior to the planned burn. In special circumstances, the APCO may waive the 15- day notice requirement. The notification shall provide the following information:		403.2 Mountain Counties and Lake Tahoe Air Basins: The Placer County Smoke Management Program applies to agricultural and other burning operations, as defined by Section 80101 of Title 17 of the CCR, which are in the Mountain Counties and Lake Tahoe Air Basins. Policies and procedures specified by this program apply throughout the year unless otherwise specified in the program.	

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
ADMINISTRATIVE	**Administrative**		6.2.2.1 A description of the contraband, including its origin and the amount of material that will be destroyed by fire. 6.2.2.2 The date and location of the burn. 6.2.2.3 A description of alternative disposal methods other than burning and an explanation of why the contraband must be destroyed by the use of fire.		404 APCO APPROVAL: No person shall commence an agricultural burn without receiving permission from the APCO, or his/her designee. For those air basins using a daily allocation system, the APCO shall distribute the daily allocated acreage for the purposes of minimizing the density of emissions and protecting downwind urban areas	
			6.2.2.4 The law enforcement agency and/or fire protection agency involved with the burn. 6.3 The APCO shall prepare the "Staff Report and Recommendations on Agricultural Burning" document (Report) for any Board determination made pursuant to Section 5.5.2 and in accordance with the following:			
			6.3.1 The Report shall be presented to the Board for review and approval. Board-approved Report shall be submitted to ARB and EPA for inclusion into the State Implementation Plan.			
			6.3.2 The APCO shall review and update, as appropriate, the Report at least once every five (5) years. Updated Reports shall be approved according to Section 6.3.1.			

DISTRICT		IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER		701	4103	444	302	438
TITLE		Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
FEES				(g)	405	
FEES				If required by District Rule 306, any person conducting or allowing any open burning shall accompany the submittals required by subparagraphs (d)(8)(D), (d)(9)(B), (d)(9)(C), (h)(4)(C), and paragraph (f)(1) with applicable filing and evaluation fees pursuant to District Rule 306	BURN PERMIT FEES: Burn permits are valid only following receipt of fees specified in Rule 607, BURN PERMIT FEES.	
SEVERABILITY				(i)		
SEVERABILITY				If any provision of this rule is held by judicial order to be invalid, or invalid or inapplicable to any person or circumstance, such order shall not affect the validity of the remainder of this rule, or the validity or applicability of such provision to other persons or circumstances.		

DISTRICT	IMPERIAL COUNTY	SAN JOAQUIN	SOUTH COAST	PLACER	MONTEREY BAY
RULE NUMBER	701	4103	444	302	438
TITLE	Agricultural Burning	Open Burning	Open Burning	Agricultural Waste Burning Smoke Management	Open Outdoor Fires
MONITORING/RECORDING				500	
MONITORING/RECORDING				501 BURN REPORTS Annual Report: A report of agricultural burning conducted shall be submitted to the ARB by the District within 45 days of the end of each calendar year. The report shall include the estimated tonnage or acreage of each agricultural waste type burned from open outdoor burning in agricultural operations and the location of where the burning was performed.	
				501.2 Special Burn Permits Issuance Report: A report of burn permits issued, each year, pursuant to subsection 103.2.2 shall be submitted to the ARB within 45 days of the end of the calendar year. The report shall include the number of such burn permits issued, the date of issuance, the person or persons to whom the burn permit was issued, an estimate of the amount of agricultural wastes burned, and a summary of the reasons why denial of each burn permit would have threatened imminent and substantial economic loss, including the nature and dollar amounts of such loss	

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	400	474	No General NOx Rule	4301	474
TITLE	Fuel Burning Equipment	Fuel Burning Equipment		Fuel Burning Equipment	Fuel Burning Equipment - Oxides of Nitrogen
ADOPTED	2/21/1972	5/7/1976		5/21/1992	5/7/1976
LAST AMENDED	Sep 14, 1999	Aug 25, 1997		Dec 17, 1992	Dec 04, 1981
EMISSIONS LIMITS	140 lbs/hr Nitrogen Oxides (NO_2)	125 ppm by volume (ppmv) when operated on gaseous fuel; 225 ppmv when operated on liquid and/or solid fuels		Combustion point of discharge, 0.1 grain per cubic foot of gas calculated to 12% of carbon dioxide at dry standard conditions. 200lbs/hr of sulfur compounds ($SO_{2)}$; 140 lbs/hr of nitrogen oxides (NO_2); Ten (10) lbs/hr of combustion contaminants as defined in Rule 1020 (Definitions)	3% oxygen on a dry basis averaged over a minimum of 15 consecutive minutes: Ranges GAS: 300 ppm to 125 ppm and LIQUID or SOLID: 400 ppm to 225 ppm based on level of Kilogram Thermal Calories of 140 to ±540 or British Thermal Units of 555 to ±2143. Steam (NO2) calculated at 3% oxygen on a dry basis averaged over a minimum of 15 minutes: GAS 125 ppm LIQUID or SOLID 225 ppm based on Kilogram Calories of 140 or more and British Termal Units of 555 or more.
RULE APPROVAL BY EPA	03/24/2003	01/11/1999		05/18/1999	07/06/1982
FEDERAL REGISTER	68 FR 14161	64 FR 1517		64 FR 26876	47 FR 29231

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	400.1	1159	74.23	4703	1134 1135
TITLE	Stationary Gas Turbine(s) - Reasonably Available Control Technology (RACT)	Stationary Gas Turbines	Stationary Gas Turbines	Stationary Gas Turbines	Emission of Oxides of Nitrogen from Stationary Gas Emissions of Oxides of Nitrogen from Electric Power Generating Systems
ADOPTED	2/23/2010	2/22/1995	3/14/1995	8/18/1994	*8/4/1989
LAST AMENDED		Sep 28, 2009	Jan 08, 2002	Sep 20, 2007	Aug 08, 1997 Jul 19, 1991
EMISSIONS LIMITS	Applies to new or existing Stationary Gas Turbines of 1 megawatt (MW) and/or larger - NOx limits on any new or existing Stationary Gas Turbine(s) - 42 ppmv when operated on a gaseous fuel. 65 ppmv when operated on a liquid fuel except when operating less than 400 hours per calendar year or during startup, shutdown or a change in load	Applies to new or existing non-utility, commercial, industrial or institutional Stationary Gas Turbine of 0.3 MW and larger - Units operating > 877 hrs/yr with ratings > 10 MW NOx Limits are 5ppmv for gas fuel, 25ppmv for liquid fuel. Units 2-10MW range between 25-35ppmv for gas fuel and 65ppmv for liquid fuel.	Applies to all stationary gas turbines rated 0.3 MW or greater - 0.3 and less 42 ppmv for gaseous fuel and 65ppmv for liquid. Greater than 0.3 but <10.0 25x E/25ppmv for gaseous fuel and 65ppmv for liquid.	Applies to all stationary gas turbines with ratings of 0.3 MW or greater - Tier 1 Limits 4MW and > operating <877 hrs/yr and units Units >.3 <10 operating ≥877 hrs/yr 42ppmv for gas and 65 ppmv for oil. Units 10MW and > operating ≥877 hrs/yr range 15xEFF/25 & 9xEFF/25 for gas and 42xEFF/25 & 25xEFF/25 for liquid.	Applies to all existing stationary gas turbines 0.3 MW and > - Units < 2.9MW to over 10MW range in limits from 9ppm to 25ppm. For Rule 1135 District wide Daily limits set for Southern California Edison, Los Angeles Department of Water and Power, City of Burbank, Glendale and Pasadena
		Units <2MW 42ppmv for gas fuel and 50ppmv for liquid fuel. Units operating < 877 hrs/yr and >10 MW 25ppmv for gas fuel and 42ppmv for liquid fuel. - Specific limits apply for specific model turbines belonging to the Southern California Gas Company	Units 10.0 and greater range between 9xE/25 to 15xE/25ppm for gaseous fuel and 25xE/25 to 42xE/25ppm for liquid. Units operating <877 hrs/yr rated at 4.0 and up 42ppmv for gaseous fuel and 65 for liquid fuel. **Where E= unit efficiency.**	Specific unit limits 18xEFF/25 & 50 for gas and 42xEFF/25 & 50 for liquid. Tier 2 Specific model and systems- standard and enhanced limits range between 3ppmvd to 50ppmvd for gas fueland 25ppmvd to 65ppmvd for liquid. Tier 3 operating < or >877 hrs/yr from < 3MW to >10MW limits range from 5ppmvd to 25ppmvd for gas fuel and 25ppmvd to 42ppmvd for liquid fuel.	
RULE APPROVAL BY EPA	01/18/2012	10/25/2012	06/23/2003	10/21/2009	08/01/2000 08/11/1998
FEDERAL REGISTER	77 FR 4269	77 FR 65133	68 FR 33018	74 FR 53888	65 FR 46876 63 FR 42721

* Both referenced rules have the same adoption date

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	400.2	1157	74.15	4351	4352	1146
			74.15.1	4305		1146.1
TITLE	Boilers, Process heaters and Steam Generators	Boilers and Process Heaters	*Boilers, Steam Generators and Process Heaters	Boilers, Steam Generators and Process Heaters - Phase I	Solid Fuel Fired Boilers, Steam Generators and Process heaters	Emissions of Oxides of Nitrogen From Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters
				Boilers, Steam Generators, and Process Heaters - Phase 2		Emissions of Oxides of Nitrogen From Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters
ADOPTED	2/23/2010	10/26/1994	3/28/1989	10/20/1994	9/14/1994	9/6/1988
			5/11/1993	12/16/1993		10/5/1990
LAST AMENDED		May 19, 1997	Nov 08, 1994	* Aug 21, 2003	May 18, 2006	Nov 17, 2000
			Sep 11, 2012			Sep 05, 2008
EMISSIONS LIMITS	Applies to new or existing Process Heaters, Boilers or Steam Generators heat input rating of 5 million Btu per hour - NOx limits 30ppmv or 0.036lbs/million Btu on gaseous fuel; 40ppmv or0.052lbs/million Btu on liquid fuels - combined gas and liquid heat-input weighted average of the limits. - ppmv limits at dry stack-gas conditions and 30% volume stack-gas oxygen hrly average.	Applies to new and existing boilers, steam generators, and process heaters rated heat ≥ 5 million Btu/hr - RACT standards, NOx in excess of 70ppmv and/or 0.084lbs/MMBtu of heat input gaseous fuel, NOx in excess of 115ppmv and/or 0.150lbs/MMBtu of heat input liquid or solid fuels, NOx in excess heat input weighted average of the limits in combined gas and liquid and/or solid fuels.	Applies to boilers, steam generators and process heaters ≥ 5 million Btu/hr annual heat input rate ≥ $9x10^9$ Btu's per calendar year - NOx 40ppmv. ≥ 5 million Btu/hr annual heat input rate less $9x10^9$ Btu's/calendar year operational requirements. Rule 74.15.1 applies to ≥ 1 million Btu/hr and < 5 million Btu/hr.- Annual heat input rate ≥ $1.8x10^9$ BTU, NOx	Applies to boiler, steam generator or process heater rated heat input > 5 million Btu/hr (Major NOx source) - less then 9 million Btu/yr operating requirements. Units> 9 million Btu/yr gas fuel 95ppmv, natural & induced 147ppmv; Distillate Oil 115ppmv,natural & Induced 155ppmv; Residual Oil 165ppmc,natural & Induced 194ppmv; Crude oil 165ppmv, natural & Induced 194ppmv.	SOLID FUEL - Municipal Solid Waste, Biomass (Hearth Furnace) and all others Tier I NOx limits 200ppmv, .35 lb/MMBtu and .20 lb/MMBtu. Tier 2 NOx limits 200ppmv, 115ppmv and 115ppmv respectively.	Applies to units ≥5 million Btu/hr - NOx limits All units gaseous fuel 30ppm, non-gaseous fuels 40ppm, Landfill gas 25ppm, Digester gas 15ppm, Atmospheric units 12ppm: Group I - 5 ppm, Group II and III 9ppm. Enhanced limited are 5ppm. **Rule 1146.1** - NOx limits any units landfill gas 25ppm, and Digester gas 15ppm, Atmospheric units 12ppm. Natural gas 9ppm
	≤ 30% annual capacity fact 70ppmv gas and liquid fuel. Biomass - exhaust 120ppmv corrected to 12% 3 hr average. NOx reduced 80% uncontrolled exhaust gas steam.		emissions excess 30ppmv and/or annual heat input rate ≥$0.3x10^9$ BTU	Phase 2- Gas fuel 30ppmv, box or cabin 147ppmv; Liquid fuel 40ppmv, box or cabin 155ppmv. Combined fuels NOx limit heat input weighted average of limits. Phase 3 - not analyzed as it pertains to refineries		
RULE APPROVAL BY EPA	01/07/2013	04/20/1999	02/09/1996	05/18/2004	11/06/2012	11/17/2000 Version approved on 04/08/2002
			10/10/2001			05/13/1994 version approved on 04/06/1995
FEDERAL REGISTER	78 FR 896	64 FR 19277	61 FR 4887	69 FR 28061	77 FR 66548	67 FR 16640
			66 FR 51576			60 FR 46220

* Referenced rules either have the same title or date

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	413	1104	74.6	4662	1122 1171
TITLE	Organic Solvent Degreasing Operations	Organic Solvent Degreasing Operations	Surface Cleaning and Degreasing	Organic Solvent Degreasing Operations	Solvent Degreasers Solvent Cleaning Operations
ADOPTED	1/16/2001	9/28/1994	5/29/1979	4/11/1991	3/2/1979 8/2/1991
LAST AMENDED			Nov 11, 2003	Sep 20, 2007	May 01, 2009
EMISSIONS LIMITS	Design, Control and safety switch requirements: Freeboard height shall provide Freeboard Ratio greater than or equal to 0.75 High Volatility Solvents use of water cover and overall capture and control of 85%	Manufacturer recommendations. No leaks, stored in closed containers, containers must be labeled, disposal according to reclamation service or licensed facility or recycle.	Solvent Cleaning: Maximum limits: ROC composite Partial Pressure 33 mm Hg@20ºC and ROC content 900 grams per liter all other solvent cleaning 25 grams per liter. Cold Cleaners has operating requirements	Till Sep 20, 2008 use non-halogenated cleaning material with VOC content of 50grams VOC per liter solvent or less. Sep 20, 2008 use non-halogenated cleaning material with VOC content of 25grams VOC per liter solvent or less. Design, operation and VOC emission control systems with an overall capture and control efficiency of 85% by weight.	Cold Cleaners, Open-Top Vapor Degreasers, conveyorized degreasers, air-tight and airless cleaning systems with VOC or NESHAP halogenated solvent. Work practice requirements, Design requirements, Cleaning requriements and NESHAP compliance. For Standards Both Batch-Loaded Cold Cleaners and Conveyorized shall have a VOC content of 25grams/liter or less.| Cleaning activity VOC Limits in grams/liter range from 25 to 800 depending on activity.
RULE APPROVAL	11/05/2002	04/30/1996	10/25/2005	07/30/2009	02/08/2006 07/27/2004
FEDERAL REGISTER	67 FR 67313	61 FR 18962	70 FR 61561	74 FR 37948	71 FR 6350 69 FR 44599

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	414	462	71.2	4623	463
TITLE	Storage of Reactive Organic Compound	Storage of Organic Liquids	Storage of Reactive Organic Compound	Storage of Organic Liquids	Organic Liquid Storage
ADOPTED	12/11/1979	1/9/1976	6/20/1978	4/11/1991	8/15/1977
LAST AMENDED	May 18, 2004	Nov 02, 1992	Sep 26, 1989	May 19, 2005	Nov 04, 2011
EMISSIONS LIMITS	No storage with Tank capacity less than 40,000 gallons with a true vapor pressure equal to or greater than .5 lbs/sq inch absolute (psia) must have a submerged fill pipe or a vapor loss control device. Tank capacity greater than or equal to 40,000 with a tue vapor pressure equal to or greater than 1.5 psia must have a vapor control device. Tank capacity of 10,000 or more but less than 20,000 with a 1.5 psia must have a pressure vacuum relief valve. Tank capacity of 20,000 or more but less than 40,000 with a 1.5 psia must have a vapor loss control device. No storage tank with a true vapor pressure equal to or greate than 11.0 without having a working pressure tank.	No storage with Tank capacity 39,630 gallons or less with a true vapor pressue of 77.5 mm Hg (1.5 psia) or greater. Tank capacity more than 39,630 gallons with a true vapor pressure of 77.5 mm Hg (1.5 psia) or greater.	No storage with Tank capacity equal to or less than 40,000 gallons with a modified vapor pressure greater than 0.5 lbs/sq inch absolute (psia) must have a submerged fill pipe or vapor loss control devices. Above ground storage tanks equal to or greater than 10,000 gallons and less than 20,000 gallons for crude oil and ROC liquids with a modified Reid Vapor Pressure of 1.5 psia or greater must have a pressure-vacuum relief valve with minimum pressure and vacuum settings of 90% of the maximum, safe	Tank capcity of 1,100 gallons or greater with ranging true vapor pressure variations between 0.5 psia to greater than 11 psia require relief valve, internal, external floating roofs, vapor recovery systems or pressure vessel. All must be maintained leak free.	Organic liquid tank capacity 75,000 liter or 19,815 gallons or greater and gasoline between 950 liters (251 gallons) and 75,000 liters (19,815 gallons) Tank roof requirements, external floating roof, internal floating type cover, and vapor recovery system
RULE APPROVAL BY EPA	Version adopted 05/18/2004 approved 11/24/2008	Superseded by rule 461 by EPA 5/13/1995	12/06/1993	09/13/2005	03/28/2013
FEDERAL REGISTER	73 FR 70883	60 FR 21702	58 FR 64157	70 FR 53937	78 FR 18854

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	415	461	70	4621	461
TITLE	Transfer and Storage of Gasoline	Gasoline Transfer and Dispensing	Storage and Transfer of Gasoline	Gasoline Transfer into Stationary Storage Containers, Delivery Vessels, and Bulk Plants	Gasoline Transfer and Dispensing
ADOPTED	11/4/1977	1/9/1976	6/25/1974	4/11/1991	1/9/1976
LAST AMENDED	May 18, 2004	May 25, 1994	Nov 11, 2003	Dec 19, 2013	Apr 06, 2012
EMISSIONS LIMITS	Stationary container capacity of more than 250 gallons must have permanent submerged fill pipe, phase I Vapor Recovery System, vapor return lines are connected between tank truck and stationary storage container, all lines gravity drained, pressure vacuum relief valve, vapor control systems, vapor pressure of 11 psia or greater not allowed.	Stationary Storage container with a capacity of more than 251 gallons must comply with Rule 463-Storage of Organic Liquids or have a permanent submerged fill pipe and vapor recovery system with 95% recovery, along with proper connection of all lines, hatch openings limited to no more than 3 minutes, gravity drained lines, above ground tanks equipped with dry breaks, no defects.	Storage of gasoline in containers more than 40,000 are regulated by Rule 71.2-Storage of Reactive Organic Compound Liquids. Stationary Storage conatiner with a capacity of more than 250 gallons must have a permanent submerged fill pipe, phase I vapor recovery system preventing 95% displaced vapors, leak free and gravity drained.	Storage at bulk plants greater than 250 gallons but less than 19,800 gallons. Others are 250 gallons and greater. Loading and vapor collection equipment must be leak free. Gasoline storage and liading must have ARB certified permanent submerged fill pipe and ARB certified Phase I vapor recovery system, ARB pressure-vacuum relief valve set at 3.0±0.5 inches and 8.0±2.0 inches water column vacuum relief.	Phase I: Stationary capacity 950 liters (251 gallons) or more - Mobile 454 liters (120 gallons): Underground tanks CARB certified enhanced vapor recovery system with efficiency of 98%. Above ground tanks CARB certified vapor recovery system with efficiency of 95%. All fill tubes and dry breaks have vapor tight caps and seals. Gasoline transfer requires Phase II requirements.
			Storage tanks greater than 250 gallons must have CARB certified pressure-vacuum relief valve. Phase II vapor recovery required when dispensing into motor vehicles preventing 95% displacement of vapors		
RULE APPROVAL BY EPA	02/22/2005	05/03/1995	01/31/2011	10/30/2009	04/11/2013
FEDERAL REGISTER	70 FR 8520	60 FR 21702	76 FR 5277	74 FR 56120	78 FR 21543

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	416	464	74.8	4625	1176
TITLE	Oil Effluent Water Separator	Oil-Water Separators	Refinery Vacuum Producing Systems, Wastewaster Separators and Process Turnarounds	Wastewater Separators	VOC Emissions from Wastewater Systems
ADOPTED	12/11/1979	5/7/1976	6/19/1979	4/11/1991	11/3/1989
LAST AMENDED	Sep 14, 1999	Aug 25, 1997	Jul 05, 1983	Dec 15, 2011	Sep 13, 1996
EMISSIONS LIMITS	Recovery of 200 gallons or more petroleum in any one day from equipment with a Reid vapor pressure of 0.5 lbs/sq inch or greater. Vapor recovery system which reduces the emission of all hydrocarbon vapors and gases into the atmosphere by at least 90% by weight	Vapor loss control devices required; fixed cover or floating cover with required seals and enclosure of liquid contents. All vapors are routed to a control device with an overall control efficiency of at least 90% by weight of VOC's. All forebays must have a fixed cover such that no liquid surface is exposed to the atmosphere. Requirements for covers and fugitive vapor leak constitutes a violation	Use of control equipment such as a firefox, a flare or additio~~ng~~ of vapors to refinery fuel gas or feedstocks. Inlet heater or compartment of a wastewater separator must be equipped with a solid cover, a floating cover with specified dimensions. Venting not allowed, uncondensed ROC gases are to the fuel gas system or to a flare.	Must use vapor loss control devices: solid cover all openings sealed and totally enclosed, a floating pontoon or double-deck type cover with closure seals with no holes or tears. The vapor recovery system shall have a control efficiency of at least 95% by weight. All wastewater separator forbays shall be covered.	Wastewater systms and closed vent systems shall not emit VOC emissions greater than 500 ppm above background levels according to specific compliance dates. Several Unit, Equipment, Device and Control requirements.
RULE APPROVAL BY EPA	07/26/2001	09/27/1995	04/17/1987	10/22/2012	10/07/2002
FEDERAL REGISTER	66 FR 38939	60 FR 49772	52 FR 12522	77 FR 64427	67 FR 62376

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	417	442	74.6.1	4661	442
TITLE	Organic Solvents	Usage of Solvents	Batch Loaded Vapor Degreasers	Organic Solvents	Usage of Solvents
ADOPTED	11/4/1977	5/7/1976	5/29/1979	5/21/1992	5/7/1976
LAST AMENDED	Sep 14, 1999	Feb 27, 2006	Nov 11, 2003	Sep 20, 2007	Dec 15, 2000
EMISSIONS LIMITS	Solvent exposure to flame, baking or oxidizing: no discharge of more than 15 lbs in ony one day nor more than 3 lbs in any one hour of organic solvent vapors. Using or applying photochemically reactive solvent no discharge of more than 40 lbs in any one day nor more than 8 lbs in any one hour.	No VOC discharge in excess of 540 kilograms (1,190 lbs) per month per facility. No VOC organic solvent excess of 272 kilograms (600 lbs) per day as calculated on a thirty (30) day rolling average. Use of VOC emission collection and control system with a reduction of 85%. Storage shall be in non-absorbent, non-leaking containers kept closed at all times.	No specific limit addressed work practices include freeboard specifications; spray capabilities, condenser flow and switches, automated parts handling systems and control devices such as superheated vapor zone. Minimizing solvent carryout, controlling leaks, storage and disposal.	Solvent subject to heat: no discharge of more than 15 lbs of VOC emissions in any one (1) day. Any VOC emissions control system must be approved by the APCO and have an overall capture and control efficiency of at least 85% by weight. Photochemically reactive solvents: no discharge of more than 40lbs of VOC emissions in any one(1) day. On and after March 21, 2008 no discharge in excess of 833 lbs VOC per calendar month per facility	No discharge unless emissions reduced by at least 85%. Materials exposed to heat not to exceed 6.5 kilograms (14.3lbs)/day. Materials exposed photochemically are limited to 18 kilogram (39.6lbs)/day. Material not exposed to photochemical reactive solvent~~w~~s are limited to 272 kilograms (600lbs)/day. Effective 01/01/2003 emissions in excess of 833 lbs/month per facility are not allowed.
RULE APPROVAL BY EPA	11/05/2002	09/17/2007	11/11/2003 version approved on 10/25/2005	05/05/2010	05/23/2002
FEDERAL REGISTER	67 FR 67313	72 FR 52791	70 FR 61561	75 FR 24406	67 FR 36105

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	424	1113	74.2	4601	1113
TITLE	Architectural Coatings	Architectural Coatings	Architectural Coatings	Architectural Coatings	Architectural Coatings
ADOPTED	11/9/1982	2/20/1979	6/19/1979	4/11/1991	9/2/1977
LAST AMENDED	Feb 23, 2010	Feb 24, 2003	Jan 12, 2010	Dec 17, 2009	Jun 03, 2011
EMISSIONS LIMITS	VOC content limits effective 05/01/2005 Coating limits range from 100 to 730 grams of VOC per liter of Coating. VOC content limits effective 01/01/2011 and 01/01/2012 have coating limits range from 50 to 730 grams of VOC per liter of Coating. Most restrictive VOC content limit applies.	VOC content limits effective 01/01/2004 coating limits range from 100 to 730 grams of VOC per liter of Coating Most restrictive VOC content limit applies	VOC Content Limits effective 01/01/2011 Coating limits range from 50 to 730 grams of VOC per liter of Coating. Most restrictive VOC content limit applies. Flat Coatings 50 g/l, Primers, sealers, and undercoaters 100 g/l, Rust preventative coatings 250 g/l, specialty primers, sealers & undercoaters 100 g/l effective 1/1/2012.	VOC Content Limits effective 01/01/2004 Coating limits range from 100 to 730 grams of VOC per liter of Coating. Most restrictive VOC content limit applies	VOC Content Limits effective 07/01/2008 Coating limits range from 50 to 730 grams of VOC per liter of Coating. Most restrictive VOC content limit applies
RULE APPROVAL BY EPA	07/06/2011	01/02/2004	07/06/2011	11/08/2011	08/14/2011
FEDERAL REGISTER	76 FR 39303	69 FR 34	76 FR 39303	76 FR 69135	76 FR 50891

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	425	1118	74.13	4605	1124
TITLE	Aerospace Coating Operations	Aerospace Vehicle Parts and Products Coating Opeations	Aerospace Assembly and Component Manufacturing Operations	Aerospace Assembly and Component Coating Operations	Aerospace Assembly and Component Manufacturing Operations
ADOPTED	8/5/1989	10/28/1996	4/15/1986	12/19/1991	7/6/1979
LAST AMENDED	Feb 23, 2010		Sep 11, 2012	Jun 16, 2011	Sep 21, 2001
EMISSIONS LIMITS	ROC Content Limits for Primers, Coatings, Adhesives, Sealants, Maskants and Lubricants range from 250 to 1000 grams/liter	VOC limits for Primers, Coatings, Adhesives, Sealants, Maskants and Lubricants range from 50 to 1000 grams/liter	ROC Content Limits for Primers, Coatings, Adhesives, Sealants, maskants and Lubricants range from 50 to 1000 grams/liter	VOC limits for Primers, Coatings, Adhesives, Sealants, maskants and Lubricants range from 50 to 1000 grams/liter	VOC Content Limits for Primers, Coatings, Adhesives, Sealants, Maskants and Lubricants range from 250 grams/litter to 1000g/liter
RULE APPROVAL BY EPA	11/01/2011	08/17/1998	10/25/2005	11/16/2011	08/13/2002
FEDERAL REGISTER	76 FR 67369	63 FR 43884	70 FR 61561	76 FR 70886	67 FR 52611

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	426	1103	74.4	4641	1108 1108.1
TITLE	Cutback Asphalt and Emulsified Paving Materials	Cutback and Emulsified Asphalt	Cutback Asphalt	Cutback, Slow Cure, and Emulsified Asphalt, paving and Maintenance Operations	Cutback Asphalt Emulsified Asphalt
ADOPTED	2/10/1981	12/21/1994	6/19/1979	4/11/1991	5/4/1979 8/3/1979
LAST AMENDED	Sep 14, 1999		Jul 05, 1983	Dec 17, 1992	Feb 01, 1985 Nov 04, 1983
RULE APPROVAL BY EPA	04/19/2001	02/05/1996	04/17/1987	03/09/2010	07/12/1990 01/24/1985
FEDERAL REGISTER	66 FR 20084	61 FR 4215	52 FR 12522	75 FR 10690	55 FR 28624 50 FR 3338

DISTRICT	IMPERIAL COUNTY	MOJAVE DESERT	VENTURA	SAN JOAQUIN	SOUTH COAST
RULE NUMBER	427	1116	74.18	4602 4612	1115
TITLE	Automotive Refinishing Operations	Automotive Refinishing Operations	Motor Vehicle and Mobile Equipment Coating Operations	Motor Vehicle and Mobile Equipment Coating Operations Motor Vehicle and Mobile Equipment Coating Operations Phase II	Motor Vehicle Assembly Line Coating Operations
ADOPTED	9/14/1999	3/2/1992	1/28/1992	4/11/1991 9/21/2006	3/2/1979
LAST AMENDED	Feb 23, 2010	Aug 23, 2010	Nov 11, 2008	Sep 17, 2009 Oct 21, 2010	May 12, 1995
EMISSIONS LIMITS	VOC Limits for Primers, Topcoats, Coatings range from 60 to 680 grams/liter	VOC Limits for Group I and Group II Vehicles for Primers, Topcoats, Coatings range from 250 to 780 grams/liter	ROC Limits for automotive coatings for motor vehicles, mobile equipment for Primers, Topcoats, Coatings range from 60 to 680 grams/liter	VOC Limits for Group I and Group II Vehicles during finishing or refinish using Primers, Topcoats, Coatings have a range from 200 to 900 grams/liter. |VOC Limits fro Group I and Group II Vehicles using Primers, Topcoats, Coatings have a range from 60 to 680 grams/liter	Electrophoretic primer: VOC content in excess of 145 grams/liter (1.2lbs/gal) of coating not allowed. Final repair coating: VOC content in excess of 580grams/liter (4.8lbs/gal) of coating not allowed. Alternatives include an Emission Control Plan and An approved Emission Control System with a reduction equivalent or greater than the required limits.
RULE APPROVAL	11/01/2011	08/09/2012	09/24/2013	11/01/2011 02/12/2012	07/14/1995
FEDERAL REGISTER	76 FR 67369	77 FR 47536	78 FR 58459	76 FR 67369 77 FR 7536	60 FR 36227

COMMENTS

From:	Yannayon, Laura
To:	Monica Soucier; Reyes Romero
Subject:	Rule 207 question
Date:	Thursday, October 23, 2014 10:30:41 AM

Hi guys,

We are working on our evaluation of Rules 206 and 207 and I am stuck on a requirement. The requirement is found in 51.165(a)(3)(ii)(C)((1)(ii) and reads as follows:

> (C)
>
> (*1*) Emissions reductions achieved by shutting down an existing emission unit or curtailing production or operating hours may be generally credited for offsets if they meet the requirements in paragraphs (a)(3)(ii)(C)(*1*)(*i*) through (*ii*) of this section.
>
> (*i*) Such reductions are surplus, permanent, quantifiable, and federally enforceable.
>
> (*ii*) The shutdown or curtailment occurred after the last day of the base year for the SIP planning process. For purposes of this paragraph, a reviewing authority may choose to consider a prior shutdown or curtailment to have occurred after the last day of the base year if the projected emissions inventory used to develop the attainment demonstration explicitly includes the emissions from such previously shutdown or curtailed emission units. However, in no event may credit be given for shutdowns that occurred before August 7, 1977.

This pertains to when emission reductions from shutdowns or reductions in operations may be used. Rule 207 already contains provisions that cover paragraph (i), but I can not find anything specific for paragraph (ii). Most District's address the use of pre-base year emission reductions in their attainment plans. The basic intent of (ii) is that if the shutdown occurred before the base year, then those emissions must be included in the inventory so that they can be modeled as if they were "in the air". This can be done in one of two ways. The first is to add the amount of pre-baseline ERCs in the Districts bank to the EI for attainment planning purposes (if there is a large quantity in the bank that may affect the ability to show attainment, then the District can project how many ERCs might be used based on historical usage and put that quantity into the inventory.) The second way is to show that the projected EI used for modeling includes the emissions from all new and modified sources that would require offsets.

I spoke with Wienke Tax of the planning office and she said that neither your submitted ozone plan, nor your draft PM2.5 plan has any discussion on the use of pre-baseline ERCs. I think you could address this in the PM2.5 plan, since it still draft and not yet adopted or submitted. For the other NA pollutants (NOx, VOC, PM10, SOX) can you find out how many pre-baseline ERCs are in your bank? Sources could of course use these offsets to meet the state requirements, it only becomes a problem when the sources is a federal Major source (ie 100 tpy for VOC and 70 tpy for PM10). I would also like to know how many Federal major source or major modification projects you have had in the last 5 years or that you know about in the upcoming future.

Please give me a call if you have questions, but I will better be able to discuss options if you have the data about the amount of pre-baseline ERCs in the bank and how many major projects you've had or may have.

Thanks!

Laura Yannayon
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"EPA is not required to re-prove the existence of the atom every time it approaches a scientific question." Coalition for Responsible Regulation v. EPA, 684 F.3d 102, 120 (D.C. Cir. 2012)

3.9 Emission Reduction Credits (ERC's)

Currently, Imperial County is designated nonattainment for the NAAQS for ozone, PM_{10} and $PM_{2.5}$. A key tool for enabling nonattainment areas to reach attainment and/or to maintain the NAAQS is the implementation of NSR. The ICAPCD NSR program (described in Chapter 5) ensures that air quality is not significantly degraded from the addition of new and modified stationary sources. Rule 207, New and Modified Stationary Source Review is the implementing regulation within the ICAPCD that assures the public that any large new or modified industrial source will be as clean as possible.

Rule 207 requires new or modified industrial stationary sources that increase their air emissions above certain thresholds to apply the Best Available Control Technology (BACT) and to provide offsets for a portion or all of the emissions increase. The purpose of the emission offset requirement is to provide mitigation, on a nonattainment pollutant-specific basis, for the regional impacts that might otherwise result from the increased emissions of that nonattainment pollutant.

Offsets occur as a result of equipment shutdowns or the voluntary reduction of emissions at a stationary source. These offsets can be registered or banked with an air district as Emission Reduction Credits (ERC's) which can be later used as an offset to compensate for emission increases at the same stationary source or at other stationary sources. U.S. EPA must approve offsets which are required for major stationary sources prior to use.

In order to use ERC's banked before the base year emission inventory, 40 CFR 51.165(a)(3)(ii)(C)(1)(ii) requires the inclusion of the available pre-base year banked ERC's in the base and forecasted years of an attainment demonstration's planning emissions inventory. Therefore, the unused banked ERC's for this $PM_{2.5}$ SIP which occurred prior to the 2008 baseline year are 121.32 tons of NOx, 12.36 tons of VOC's, 11.286 tons of SOx, and 4.60 tons of PM10. The amount of ERC's in the ICAPCD's bank did not change for 2011 and 2012. The ERCs in the ICAPCD's bank for 2008, 2011 and 2012 are found in Table 3.11. The NOx, VOC and SOx emission inventories for the years 2008, 2011 and 2012 have been updated accordingly. No $PM_{2.5}$ ERC's are available in the ICAPCD's bank; however, for the purpose of this plan, we have conservatively assumed that all combustion PM_{10} ERCs may be used to offset $PM_{2.5}$ emission increases.

Table 3.11
Emission Reduction Credits
Added to the Annual Emissions Inventory
(tons/day)

	2008	**2011**	**2012**
NOx Emission Reduction Credits	0.33	0.33	0.33
NOx Emission Inventory	18.79	15.55	15.21
NOx Total	19.12	15.88	15.54
VOC Emission Reduction Credits	0.03	0.03	0.03
VOC Emission Inventory	18.03	16.55	16.59
VOCTotal	18.06	16.58	16.62
SOx Emission Reduction Credits	0.03	0.03	0.03
SOx Emission Inventory	0.40	0.37	0.37
SOx Total	0.43	0.40	0.40
PM_{10} Emission Reduction Credits	0.012	0.012	0.012
$PM_{2.5}$ Emission Inventory	12.82	12.50	12.53
$PM_{2.5}$ Total	12.832	12.512	12.542