

INTERNATIONAL TRANSPORT: PM2.5 EMISSIONS IN THE CALEXICO-MEXICALI BORDER AREA

OCTOBER 1, 2014

California Environmental Protection Agency

 **Air Resources Board**

Overview

- Border Region
- Calexico PM2.5 Air Quality and Emissions
- Transport Analysis
- Attainment of PM2.5 Standard
- Improving Border Air Quality

U.S.-Mexico Border

- Approximately 1,900 miles long
- Adjacent border cities often experience similar air quality
- California-Mexico border includes two binational sister cities
 - San Diego-Tijuana
 - Calexico-Mexicali



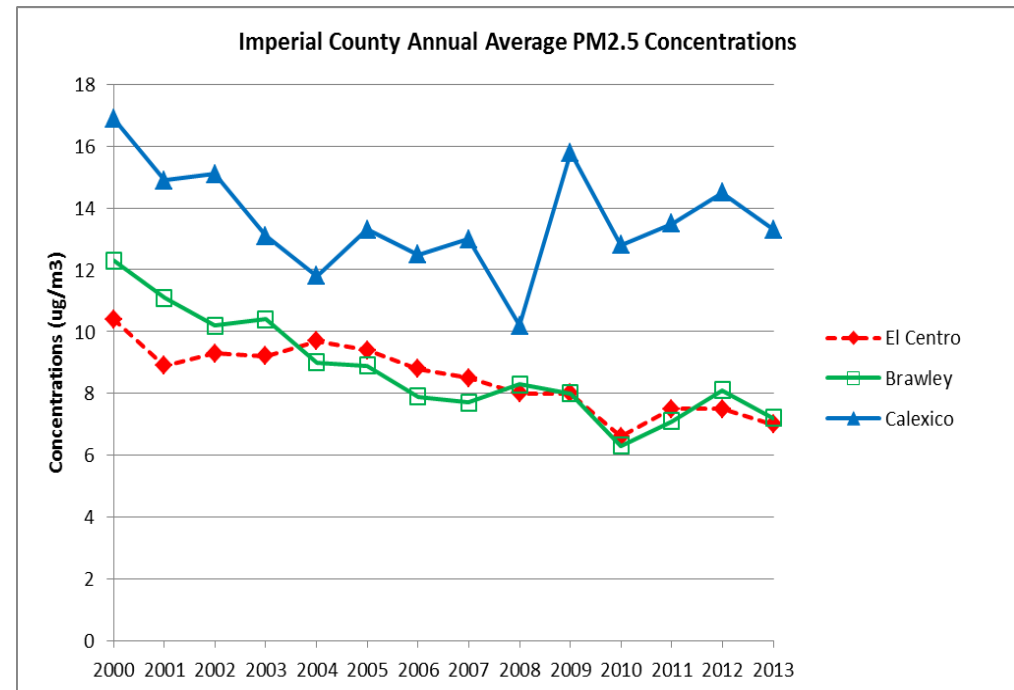
Imperial County

- Agricultural region
- Largest cities: Brawley, El Centro, and Calexico
- Portion of county nonattainment for federal PM_{2.5} standard of 35 $\mu\text{g}/\text{m}^3$



PM2.5 Air Quality Trends

- All three cities with similar emission sources and activity patterns
- Air quality improving in El Centro and Brawley
- Similar air quality trend expected in Calexico



Calexico & Mexicali

- Common airshed
- Significant difference in urbanized area and population
- Differences in population and activity patterns impact air quality

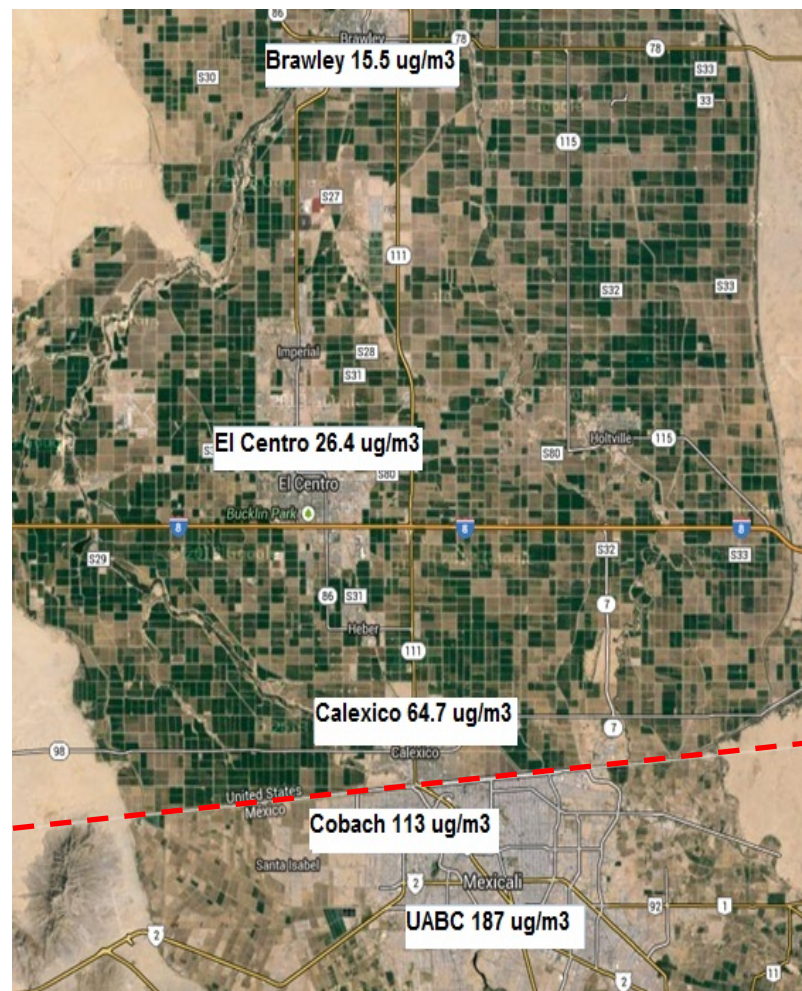


	Calexico	Mexicali
Area (sq. miles)	8.4	44
2010 Population	38,512	689,775

PM2.5 Gradient

- PM2.5 concentrations decrease with increasing distance from border
- Gradient pronounced during winter months (Dec.-Feb.)
- Concentrations over 35 ug/m³ standard observed in multiple years at Calexico air monitoring station

PM2.5 concentrations from December 23, 2012



Clean Air Act and Emissions Transport

- Clean Air Act
 - Section 179B of the Clean Air Act reduces planning requirements in border areas impacted by emissions from outside the U.S.
- U.S. EPA Guidance
 - One or more of five analyses to substantiate transport:
 - Evaluate measured concentrations and wind direction
 - Analyze emission inventory from U.S. side of the border
 - Compare emission inventories from both sides of the border
 - Analyze of particles from filters
 - Model impacts from U.S. and foreign emission sources

Five High Concentration Days

- Objectively evaluate the origin of emissions resulting in high concentration days
- Begin with U.S. EPA guidance
- Comprehensive analyses using best available data
 - ✓ PM2.5 mass
 - ✓ Analysis of wind speed/direction during high concentration days
 - ✓ Particulate composition and elemental analysis
 - ✓ Emission inventory analysis
 - ✓ Atmospheric mixing height data
 - ✓ Back trajectory analysis
 - ✓ Source apportionment (PMF)

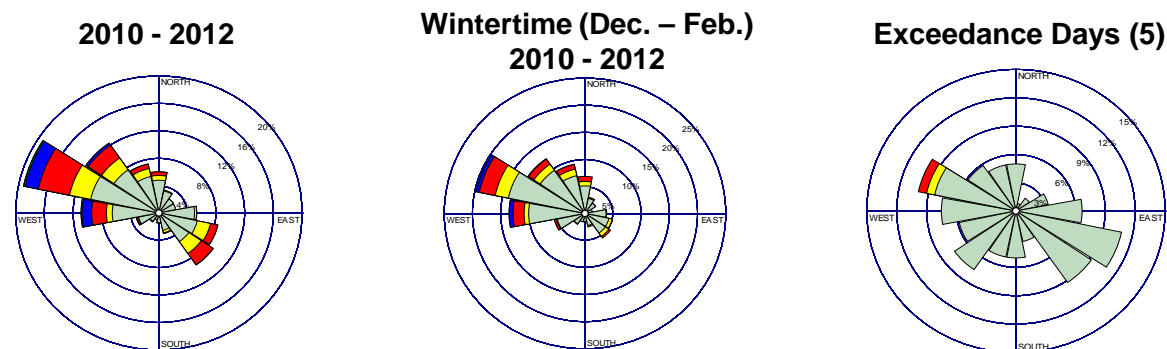
<u>Date</u>	<u>Calexico PM2.5 (ug/m3)</u>
December 4, 2010	50.9
February 5, 2011	80.3
December 11, 2011	44.4
January 31, 2012	37.7
December 23, 2012	64.7

Federal 24-hr Standard for PM2.5: 35 ug/m3

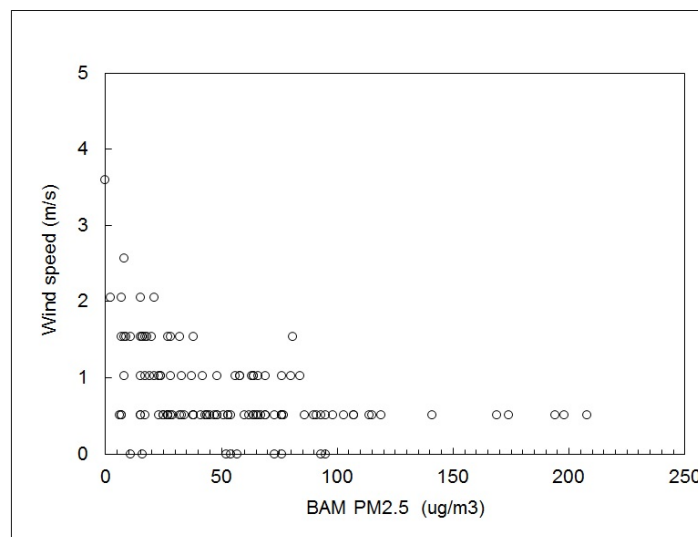
Meteorology on Elevated PM2.5 Days

- High PM2.5 concentrations linked to variable wind direction, low wind speeds
- Stagnant atmospheric conditions with low mixing heights

Calexico Wind Rose Plots



Calexico PM2.5 Concentrations and Wind Speed on Exceedance Days



Emission Inventory Analysis

- Imperial County emission inventory includes latest ARB updates for on-road and off-road sources, unpaved road dust, ag and prescribed burning, and farming operations
- Magnitude of emission inventories consistent with differences in Calexico - Mexicali population and emission sources

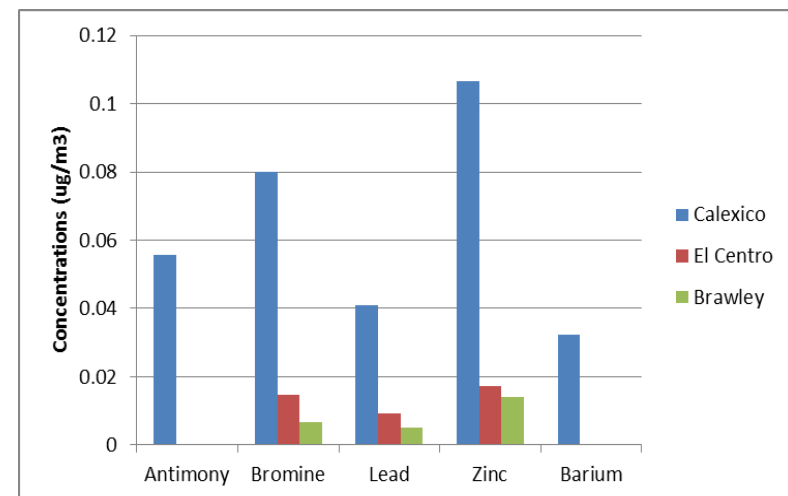
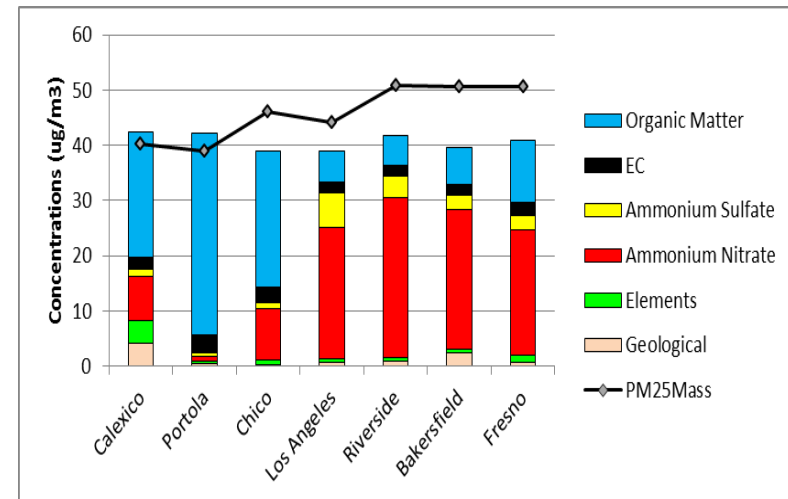
Draft PM2.5 Emissions Inventory (annual average tons/day)*		
Source Category	Imperial County	Mexicali Metropolitan Area**
Point Sources (<i>stationary facilities</i>)	0.5	0.4
Areawide Sources (<i>consumer products, road dust</i>)	11.3	18.5
On-Road Mobile (<i>cars, trucks</i>)	0.3	1.8
Off-Road Mobile (<i>trains, ships</i>)	1.1	1.5
TOTAL	13.2	22.2

*Imperial County point source data from 2008; Mexicali data from 2005

**Partial data available for point sources

PM2.5 Sample Analysis

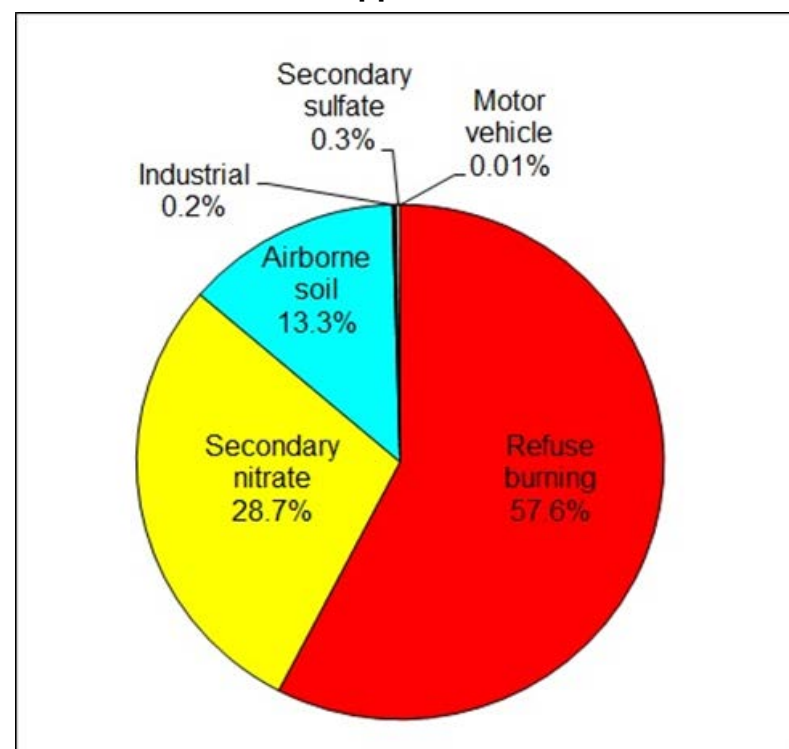
- Unusual chemical composition of PM2.5 particles collected in Calexico
- Differs from other sites in California and within Imperial County
- No known emission sources in Imperial County with similar profiles



Source Apportionment

- Estimates PM_{2.5} source contributions based on modeled pollutant impact at the monitor
- 159 PM_{2.5} samples analyzed from Calexico between 2010 and 2012
- Refuse burning identified as a major contributing source
- ARB's ATCM has effectively banned waste burning in CA since 2004
- Waste burning known to occur in Mexicali

Calexico source apportionment - 12/4/2010



Analysis Summary

- Population and activity patterns suggest that Calexico, El Centro, and Brawley should have similar air quality
- Meteorology, emission inventories, sample chemical composition, and source apportionment indicate that PM_{2.5} measured in Calexico originate outside the U.S.
- Known emission activities in Mexicali support concept of a shared airshed and accumulation of high levels of PM_{2.5}
- Emissions from Mexicali may affect air quality in Calexico on a daily basis

Attainment of PM_{2.5} Standard

- Clean Air Act contains provision to address cross-border emissions
- Evaluating emissions transport is important in evaluating air quality planning requirements
- Analysis indicates that transport from Mexicali to Imperial County contributed to PM_{2.5} exceedance days resulting in county's nonattainment status
- Imperial County would attain the 35 ug/m³ PM_{2.5} standard “but for” emissions from Mexico

Improving Border Air Quality

Local, state, and federal agencies are working together with counterparts in Mexico

- Imperial County APCD
- Air Resources Board
- U.S. EPA
- SEMARNAT

- ✓ Mexicali/Imperial Air Quality Task Force (AQTF)
- ✓ Border 2020 Program
- ✓ Diesel Truck Inspection Program
- ✓ Mexicali Monitoring Study
- ✓ POE Vehicle Idling Study
- ✓ Community Outreach - AQI Alerts and other web-based information
- ✓ School Flag Alert Program
- ✓ Mexicali and Imperial County Environmental Education Campaign



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QUESTIONS