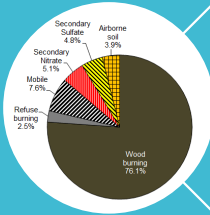


The Importance of Data: End User Perspectives

PQAO Training 2019



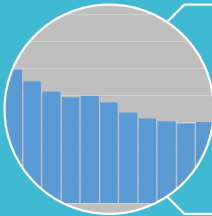
What Is In The Air?



How Did It Get There?



How Can We Reduce It?



How Do We Track Our Efforts?

What Is in the Air?



Publicly Available Data

Region	So Far Today (09/27/2018)		Yesterday (09/26/2018)		7 Days ending (09/26/2018)		This Year-to-Date through 09/26/2018	
	Max 1hr (ppm)	Latest hr (PST)	Max 1hr (ppm)	Max 8hr (ppm)	Max 1hr (ppm)	Max 8hr (ppm)	Max 1hr (ppm)	Max 8hr (ppm)
Sacramento Metropolitan Area ¹	0.053	4	0.081	0.068	0.096	0.089	0.135	0.116
San Diego Air Basin	0.054	4	0.079	0.063	0.084	0.073	0.102	0.082
San Francisco Bay Area Air Basin	0.030	3	0.085	0.063	0.085	0.068	0.099	0.080
San Joaquin Valley Air Basin	0.069	4	0.107	0.089	0.107	0.089	0.129	0.101
South Coast Air Basin	0.036	4	0.092	0.074	0.104	0.088	0.142	0.125

Mountain Counties Air Basin Daily Average PM _{2.5} Data Seven Day Display Ending 12/27/2017 Micrograms/Cubic Meter (ug/m ³)											
Bas	Cnty	Site Name	7 Day Max	12/21/2017	12/22/2017	12/23/2017	12/24/2017	12/25/2017	12/26/2017	12/27/2017	Graph
MC	CAL	San Andreas-Gold Strike Road (B)	22.0	16.8	17.4	17.2	18.6	22.0	21.2	16.5	<input type="checkbox"/>
MC	MPA	Yosemite Village-Visitor Center (A)	15.0	12.8	15.0	9.7	7.2	10.6	7.8	9.8	<input type="checkbox"/>
MC	NEV	Grass Valley-Litton Building (A)	2.8	2.8						2.5	<input type="checkbox"/>
MC	NEV	Grass Valley-Litton Building (C)									<input type="checkbox"/>
MC	NEV	Grass Valley-Litton Building (D)	6.6		6.6	3.6	3.1	0.4	1.8	2.0	<input type="checkbox"/>
MC	NEV	Truckee-Fire Station (A)	10.6	5.6			7.9			10.6	<input type="checkbox"/>
MC	NEV	Truckee-Fire Station (D)	19.3	15.8	19.3	14.9	18.8	14.5	17.1	18.8	<input type="checkbox"/>
MC	PLA	Colfax-City Hall (A)	10.7	8.0	10.7	8.7	6.0	4.8	6.5	6.0	<input type="checkbox"/>
MC	PLU	Chester-222 1st Avenue (C)	30.3	16.4	30.3	22.5	24.3	15.5	15.0	13.4	<input type="checkbox"/>
MC	PLU	Portola-Gulling Street (A)	50.9	22.7						50.9	<input type="checkbox"/>
MC	PLU	Portola-Gulling Street (B)	52.0				24.2			52.0	<input type="checkbox"/>
MC	PLU	Portola-Gulling Street (C)	54.0	23.8	37.8	49.8	37.5	44.5	47.5	54.0	<input type="checkbox"/>
MC	PLU	Portola-Gulling Street (D)	23.5	23.5							<input type="checkbox"/>
MC	PLU	Quincy-N Church Street (A)	25.8	22.9		23.8	25.4	25.1		25.8	<input type="checkbox"/>
MC	PLU	Quincy-N Church Street (C)	28.4	26.3	25.8	25.5	27.3	28.4	22.3	27.7	<input type="checkbox"/>

Get Additional Information on Sites
Download Data: [Quick](#) or [Select Format](#)

.101	0.092
.126	0.107
.111	0.099
.114	0.093

AQMIS: <https://www.arb.ca.gov/aqmis2/aqmis2.php>

Comparing to the Standards

Top 4 Summary: Highest 4 Daily 24-Hour PM2.5 Averages

at Bakersfield-410 E Planz Road

iADAM

	2015		2016		2017	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Jan 9	83.2	Dec 29	51.4	Dec 30	80.1
Second High:	Jan 6	64.3	Jan 1	50.7	Dec 15	73.6
Third High:	Nov 14	56.5	Dec 20	47.7	Dec 12	69.7
Fourth High:	Jan 18	52.9	Nov 8	44.5	Dec 24	69.7
California:						
First High:	Jan 9	83.2	Dec 29	51.4	Dec 30	80.1
Second High:	Jan 6	64.3	Jan 1	50.7	Dec 15	73.6
Third High:	Nov 14	56.5	Dec 20	47.7	Dec 12	69.7
Fourth High:	Jan 18	52.9	Nov 8	44.5	Dec 24	69.7
National:						
Estimated # Days > 24-Hour Std:		38.0		*		32.2
Measured # Days > 24-Hour Std:		13		7		10
24-Hour Standard Design Value:		77		61		59
24-Hour Standard 98th Percentile:		56.5		50.7		69.7
2006 Annual Std Design Value:		20.8		18.4		17.3
2013 Annual Std Design Value:		20.8		18.4		17.3
Annual Average:		17.8		15.8		18.2
California:						
Annual Std Designation Value:		18		18		18
Annual Average:		17.9		*		*
Year Coverage:		94		86		86

iADAM: <https://www.arb.ca.gov/adam/>

Criteria Pollutant Standards

Ambient Air Quality Standards							
Pollutant	Averaging Time	California Standards ¹		National Standards ²			
		Concentration ³	Method ⁴	Primary ^{3,5}	Secondary ^{3,6}	Method ⁷	
Ozone (O ₃) ⁸	1 Hour	0.09 ppm (180 µg/m ³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry	
	8 Hour	0.070 ppm (137 µg/m ³)		0.070 ppm (137 µg/m ³)			
Respirable Particulate Matter (PM10) ⁹	24 Hour	50 µg/m ³	Gravimetric or Beta Attenuation	150 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	
	Annual Arithmetic Mean	20 µg/m ³		—			
Fine Particulate Matter (PM2.5) ⁹	24 Hour	—	—	35 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	
	Annual Arithmetic Mean	12 µg/m ³	Gravimetric or Beta Attenuation	12.0 µg/m ³			15 µg/m ³
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m ³)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m ³)	—	Non-Dispersive Infrared Photometry (NDIR)	
	8 Hour	9.0 ppm (10 mg/m ³)		9 ppm (10 mg/m ³)			
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m ³)		—			
Nitrogen Dioxide (NO ₂) ¹⁰	1 Hour	0.18 ppm (339 µg/m ³)	Gas Phase Chemiluminescence	100 ppb (188 µg/m ³)	—	Gas Phase Chemiluminescence	
	Annual Arithmetic Mean	0.030 ppm (57 µg/m ³)		0.053 ppm (100 µg/m ³)			Same as Primary Standard
Sulfur Dioxide (SO ₂) ¹¹	1 Hour	0.25 ppm (655 µg/m ³)	Ultraviolet Fluorescence	75 ppb (196 µg/m ³)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)	
	3 Hour	—		—			0.5 ppm (1300 µg/m ³)
	24 Hour	0.04 ppm (105 µg/m ³)		0.14 ppm (for certain areas) ¹¹			—
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas) ¹¹			—
Lead ^{12,13}	30 Day Average	1.5 µg/m ³	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption	
	Calendar Quarter	—		1.5 µg/m ³ (for certain areas) ¹²			Same as Primary Standard
	Rolling 3-Month Average	—		0.15 µg/m ³			
Visibility Reducing Particles ¹⁴	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards			
Sulfates	24 Hour	25 µg/m ³	Ion Chromatography				
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m ³)	Ultraviolet Fluorescence				
Vinyl Chloride ¹²	24 Hour	0.01 ppm (26 µg/m ³)	Gas Chromatography				

Criteria Pollutant Standards

Ambient Air Quality Standards							
Pollutant	Averaging Time	California Standards ¹		National Standards ²			
		Concentration ³	Method ⁴	Primary ^{3,5}	Secondary ^{3,6}	Method ⁷	
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	8 Hour	0.070 ppm (137 µg/m ³)		0.070 ppm (137 µg/m ³)			
Respirable Particulate Matter (PM ₁₀) ⁹	24 Hour	50 µg/m ³	Gravimetric or Beta Attenuation	150 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	
	Annual Arithmetic Mean	20 µg/m ³		—			
Fine Particulate Matter (PM _{2.5}) ⁹	24 Hour	—	—	35 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	
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	24 Hour	0.04 ppm (105 µg/m ³)		0.14 ppm (for certain areas) ¹¹			—
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas) ¹¹			—
Lead ^{12,13}	30 Day Average	1.5 µg/m ³	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption	
	Calendar Quarter	—		1.5 µg/m ³ (for certain areas) ¹²			Same as Primary Standard
	Rolling 3-Month Average	—		0.15 µg/m ³			
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Criteria Pollutant Standards

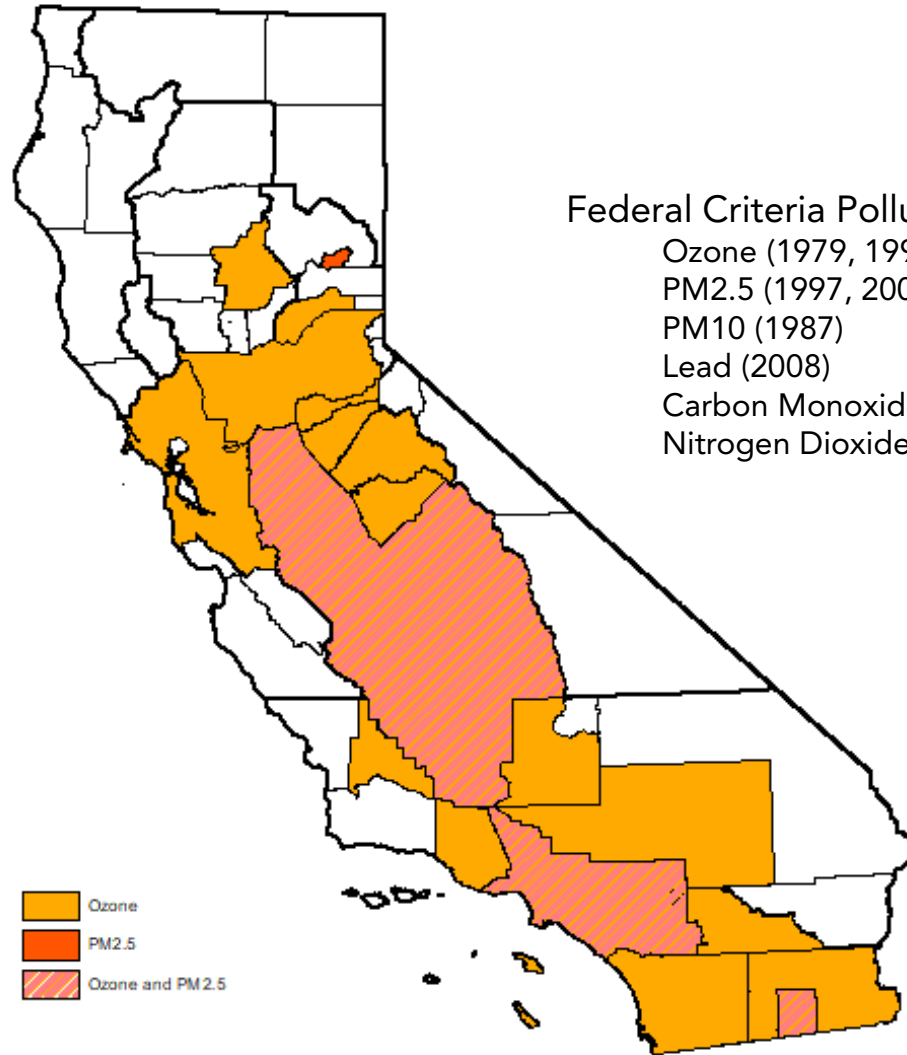
Ambient Air Quality Standards							
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Respirable Particulate Matter (PM ₁₀) ⁹	24 Hour	50 µg/m ³	Gravimetric or Beta Attenuation	150 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	
	Annual Arithmetic Mean	20 µg/m ³		—			
Fine Particulate Matter (PM _{2.5}) ⁹	24 Hour	—	—	35 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	
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	3 Hour	—		—			0.5 ppm (1300 µg/m ³)
	24 Hour	0.04 ppm (105 µg/m ³)		0.14 ppm (for certain areas) ¹¹			—
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Fine Particulate Matter (PM _{2.5}) ⁹	24 Hour	—	—	35 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	
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	24 Hour	0.04 ppm (105 µg/m ³)		0.14 ppm (for certain areas) ¹¹			—
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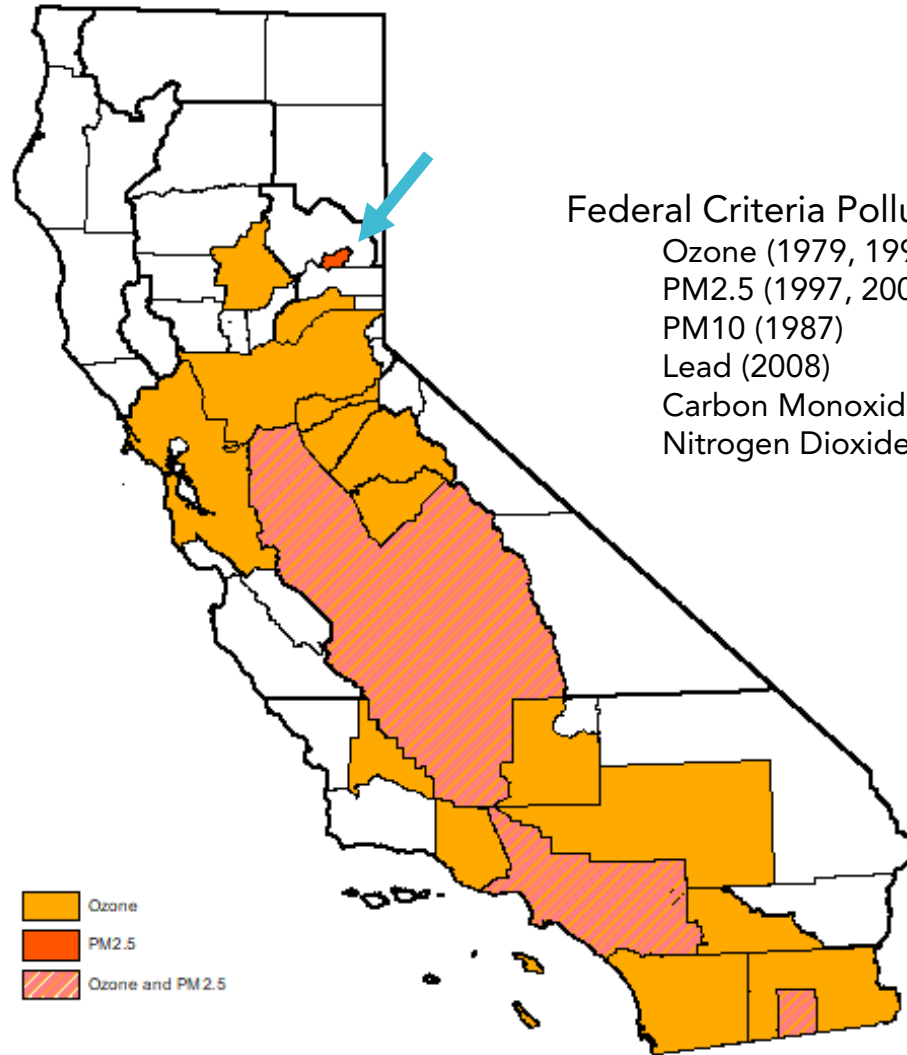
Federal Nonattainment Areas

Annual PM_{2.5} (2012)
and 8-Hour Ozone
(2008)



Federal Nonattainment Areas

Annual PM_{2.5} (2012)
and 8-Hour Ozone
(2008)



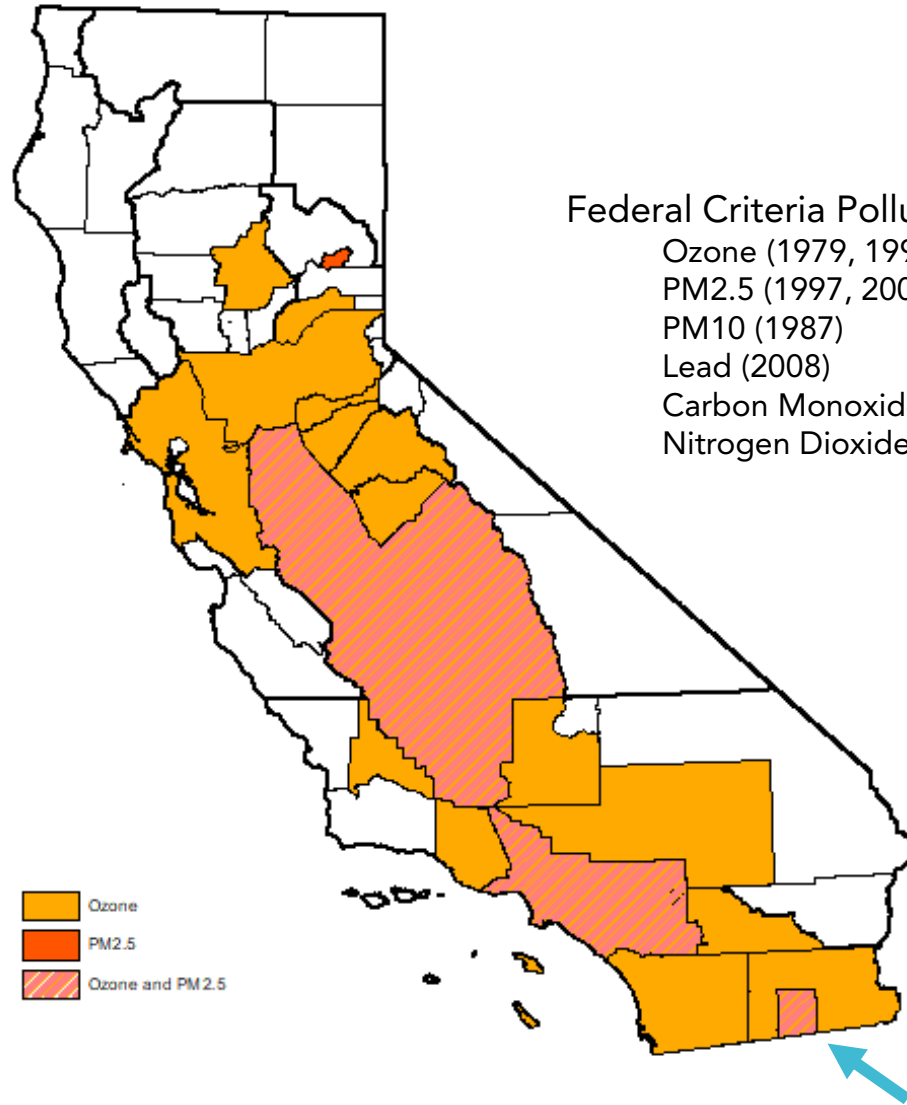
Federal Criteria Pollutants:

Ozone (1979, 1997, 2008, 2015)
PM_{2.5} (1997, 2006, 2012)
PM₁₀ (1987)
Lead (2008)
Carbon Monoxide (1971)
Nitrogen Dioxide (1971)



Federal Nonattainment Areas

Annual PM_{2.5} (2012)
and 8-Hour Ozone
(2008)



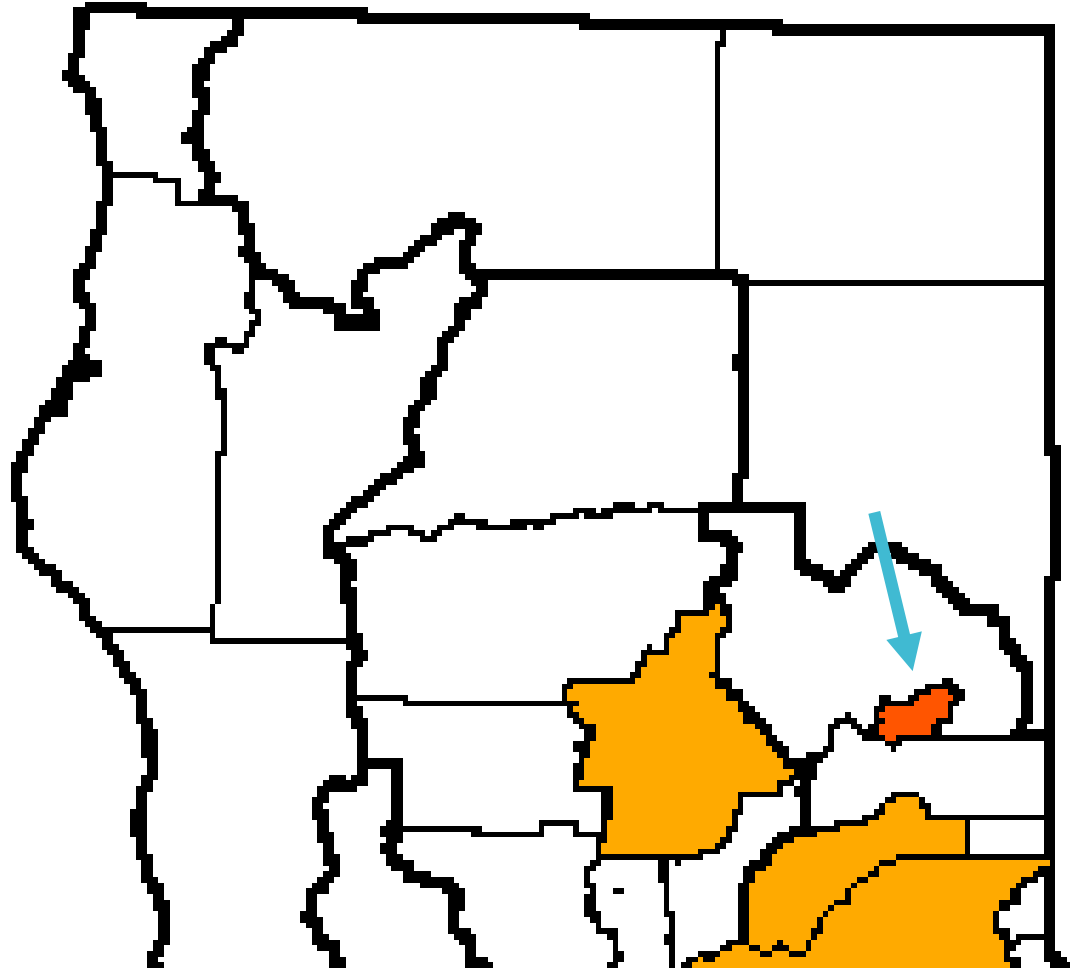
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PM₁₀ (1987)
Lead (2008)
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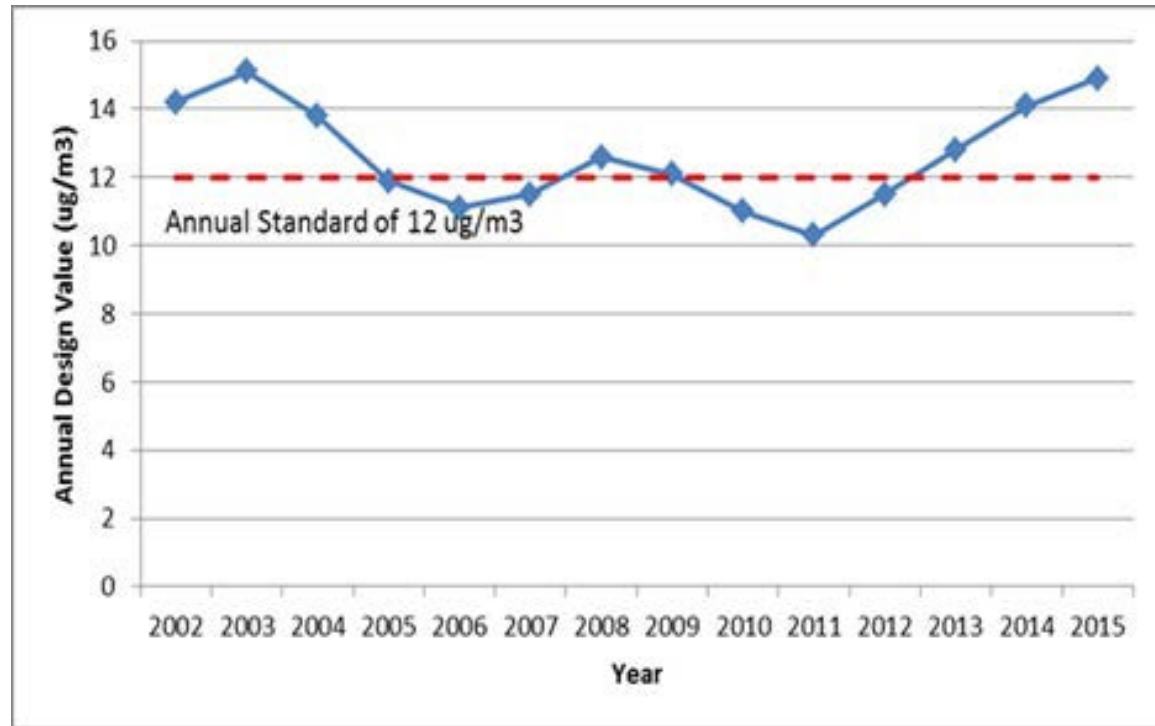
How Did It Get There?



Portola Nonattainment Area

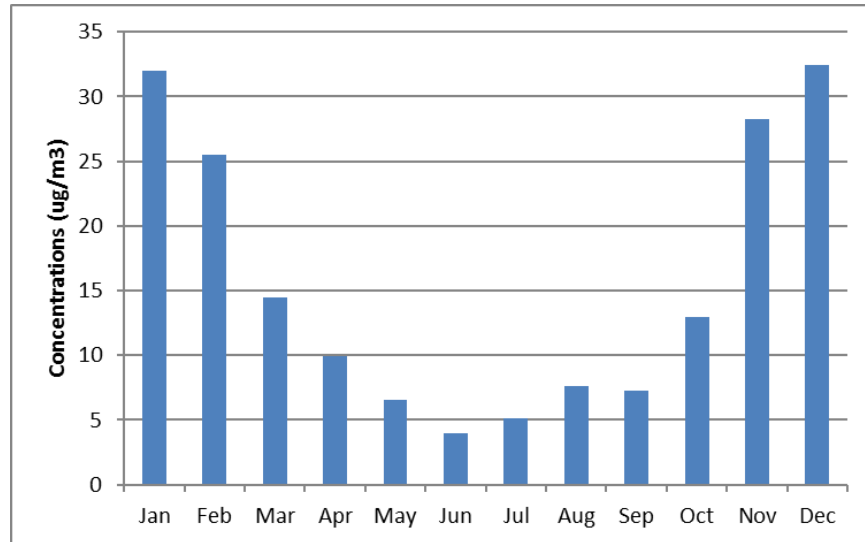


Portola Nonattainment Area

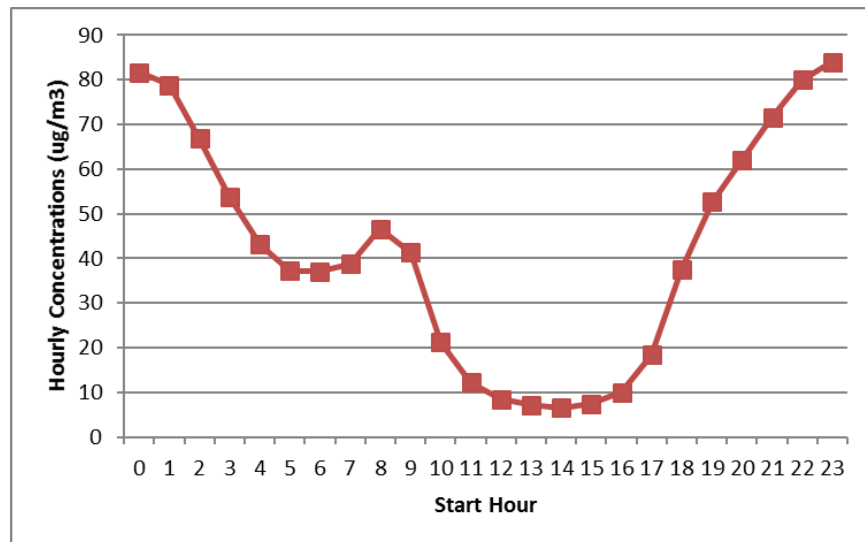


Looking for Trends

Portola Seasonality (all data)



Portola Diurnal (highest winter days)

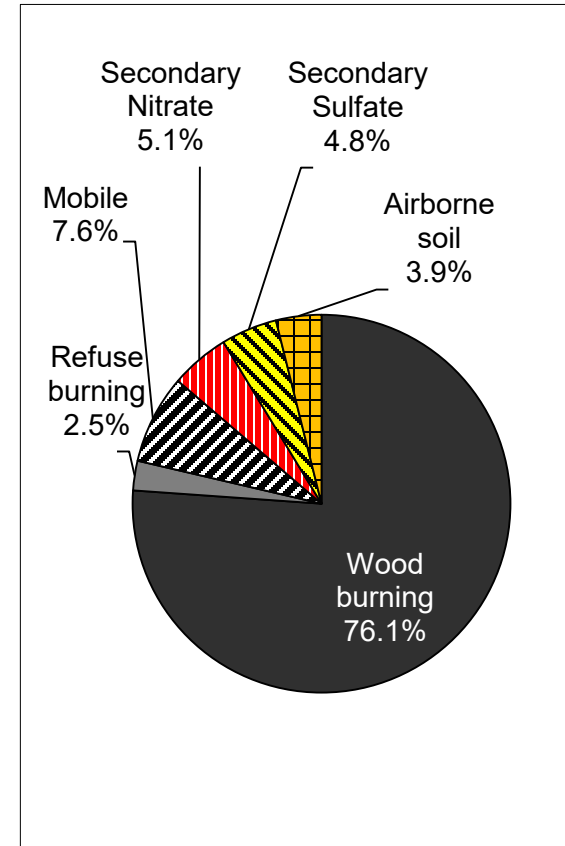
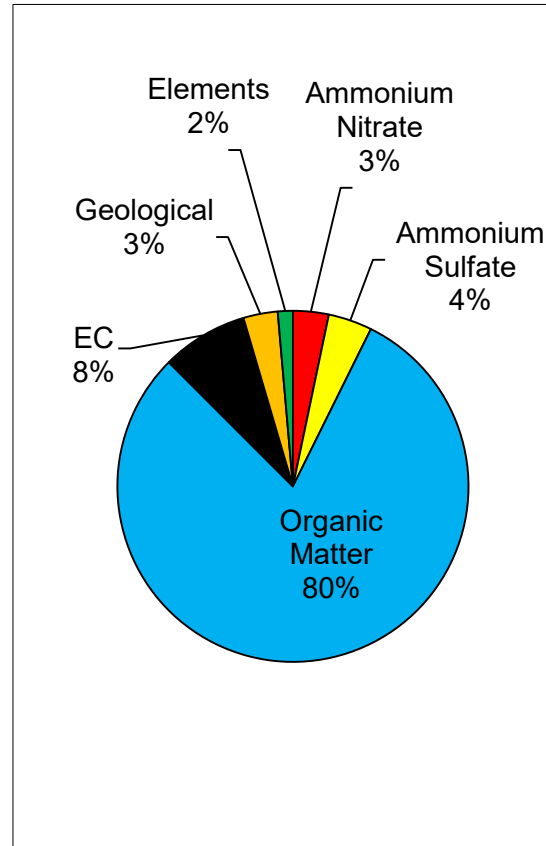


Narrowing Down the Causes

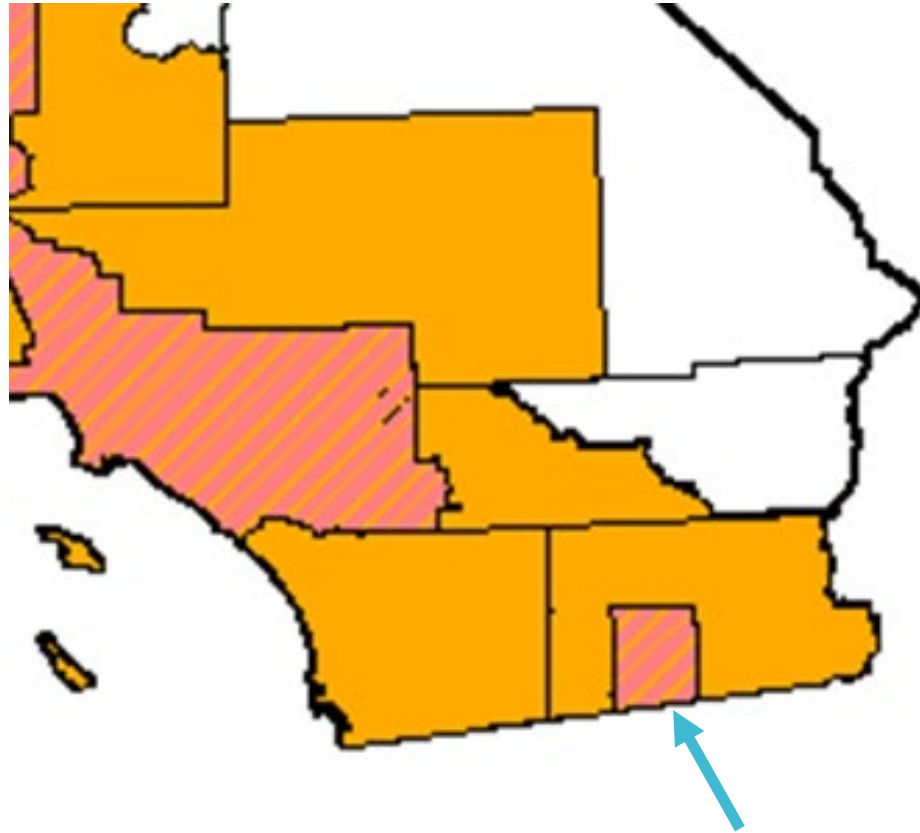
Speciation Data



Modeled Results

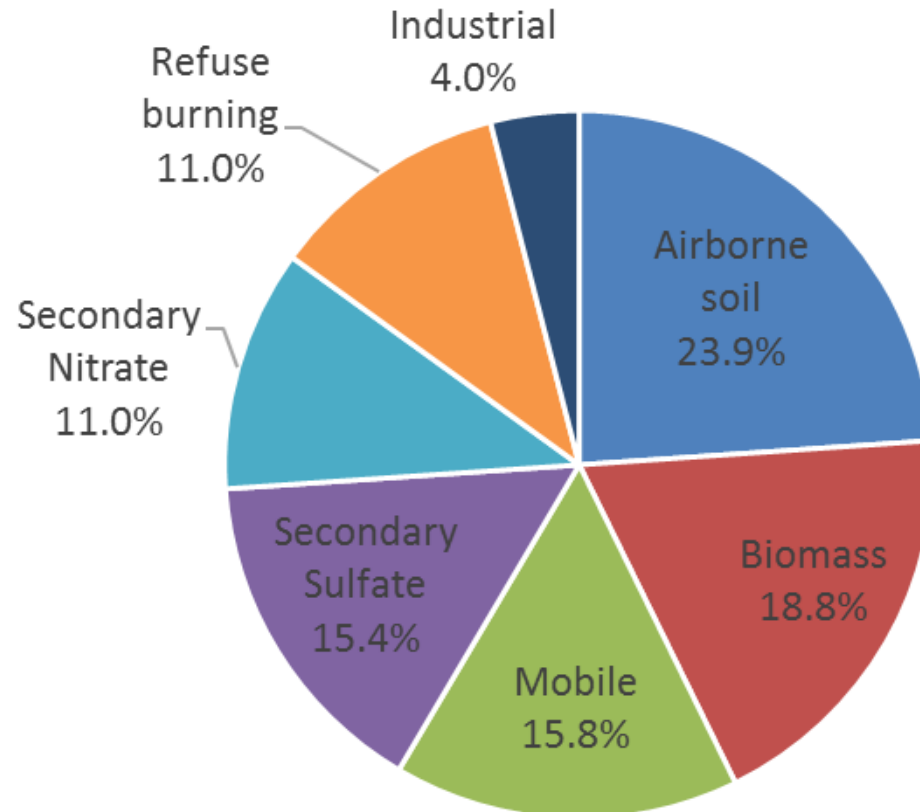


Imperial Nonattainment Area



Finding the Source

Average Source Contribution in Calexico
(2011-2015)



Finding the Source



Border Crossing Area

Source direction: Mobile

How Can We Reduce It?



California State Implementation Plan (SIP)

State Implementation Plan Components



Rules and
Regulations

Rules and
Regulations

Rules and Regulations



A Sample Rule/ Regulation



Analyze District Program

Day	Nov_17	Forecast	What forecast	Forecast correct?	Dec_17	Forecast	What forecast should have been	Forecast correct?	Jan_18	Forecast	What forecast should have been	Forecast correct?	Feb_18	Forecast	What forecast should have been	Forecast correct?
1	15.6	BD	BD	Yes	47.9	UR	UR	Yes	96.9	FA	FA	Yes	48.9	UR	UR	Yes
2	24.2	BD	UR	Under	57.4	UR	UR	Yes	78.5	FA	FA	Yes	47.9	UR	UR	Yes
3	14.6	BD	BD	Yes	27.6	BD	UR	Under	76.3	FA	FA	Yes	54.2	UR	UR	Yes
4	7.8	BD	BD	Yes	16.7	BD	BD	Yes	35	UR	UR	Yes	44	UR	UR	Yes
5	6.1	BD	BD	Yes	37.4	BD	UR	Under	13.5	UR	BD	Over	36	UR	UR	Yes
6	12.4	BD	BD	Yes	30.9	UR	UR	Yes	9.9	UR	BD	Over	27.7	UR	UR	Yes
7	20.1	BD	UR	Under	32.7	UR	UR	Yes	14.8	BD	BD	Yes	32.1	UR	UR	Yes
8	9.3	BD	BD	Yes	34.2	UR	UR	Yes	8.2	BD	BD	Yes	28.1	UR	UR	Yes
9	2.7	BD	BD	Yes	46.3	UR	UR	Yes	6.6	BD	BD	Yes	26.9	UR	UR	Yes
10	4.8	BD	BD	Yes	57.7	UR	UR	Yes	11.3	BD	BD	Yes	21.6	BD	UR	Under
11	11.4	BD	BD	Yes	48.8	UR	UR	Yes	12.7	BD	BD	Yes	9.5	UR	BD	Over
12	19.1	BD	BD	Yes	49.6	UR	UR	Yes	17	BD	BD	Yes	8.1	BD	BD	Yes
13	16.2	BD	BD	Yes	53.7	UR	UR	Yes	27.6	BD	UR	Under	11.1	BD	BD	Yes
14	13.8	BD	BD	Yes	60.5	UR	UR	Yes	30.4	UR	UR	Yes	9	BD	BD	Yes
15	17	BD	BD	Yes	63.6	UR	UR	Yes	25.6	UR	UR	Yes	9.8	BD	BD	Yes
16	7.9	BD	BD	Yes	49.4	BD	UR	Under	23.2	UR	UR	Yes	17.6	BD	BD	Yes
17	3.6	BD	BD	Yes	38	BD	UR	Under	25.7	UR	UR	Yes	23.6	BD	UR	Under
18	15.6	BD	BD	Yes	21.8	UR	UR	Yes	28.2	UR	UR	Yes	12.6	BD	BD	Yes
19	29	BD	UR	Under	10.8	BD	BD	Yes	7.6	BD	BD	Yes	5.4	BD	BD	Yes
20	26.3	BD	UR	Under	29.8	BD	BD	Yes	15.4	BD	BD	Yes	11.7	BD	BD	Yes
21	29.7	UR	UR	Yes	29.8	BD	UR	Under	25.9	BD	UR	Under	15.5	BD	BD	Yes
22	35	UR	UR	Yes	33.3	BD	UR	Under	22.4	UR	UR	Yes	12.2	BD	BD	Yes
23	33.9	UR	UR	Yes	45.9	UR	UR	Yes		UR		--	6.3	BD	BD	Yes
24	40.8	UR	UR	Yes	63.4	UR	UR	Yes		BD		--	10.5	BD	BD	Yes
25	34.5	UR	UR	Yes	67.7	UR	FA	Under	5.8	BD	BD	Yes	13.8	BD	BD	Yes
26	10.2	UR	BD	Over	70.5	UR	FA	Under	17.7	BD	BD	Yes	11.7	BD	BD	Yes
27	5.5	BD	BD	Yes	50.3	FA	UR	Over	25.4	BD	UR	Under	9.6	BD	BD	Yes
28	16.2	BD	BD	Yes	54.4	UR	UR	Yes	34.1	UR	UR	Yes	12.9	BD	BD	Yes
29	25.6	BD	UR	Under	70.1	UR	FA	Under	27.1	UR	UR	Yes				
30	36.6	UR	UR	Yes	69	UR	FA	Under	30.7	UR	UR	Yes				
31					76.5	FA	FA	Yes	40	UR	UR	Yes				

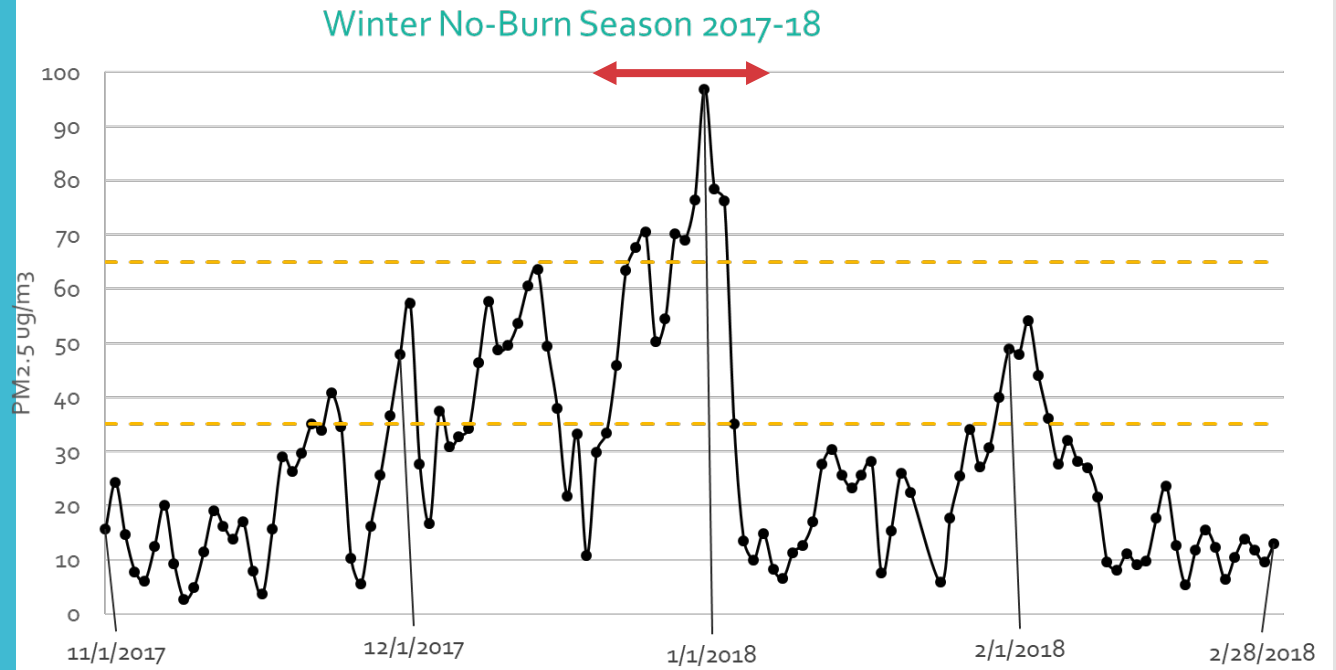
BD – Burn at own Discretion
 UR – No Burn Unless Registered
 FA – No Burn For All

Analyze District Program

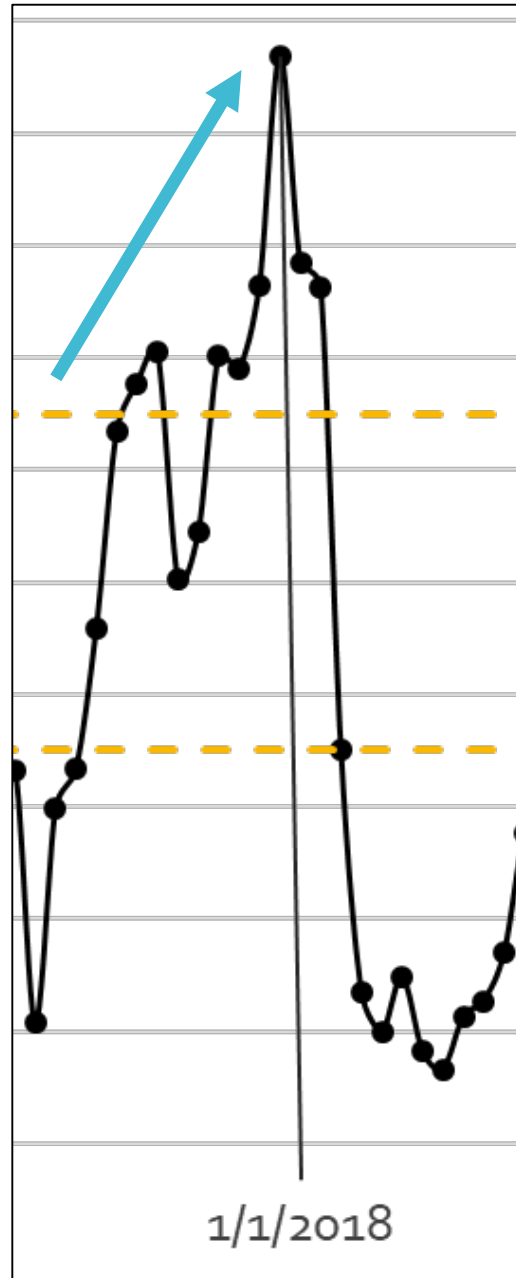
cast act?	Dec_17	Forecast	What forecast should have been	Forecast correct?	Jan_18	Forecast	What forecast should have been	Forecast correct?	P b.
15	47.9	UR	UR	Yes	96.9	FA	FA	Yes	8.
Jer	57.4	UR	UR	Yes	78.5	FA	FA	Yes	7.
15	27.6	BD	UR	Under	76.3	FA	FA	Yes	4.
15	16.7	BD	BD	Yes	35	UR	UR	Yes	44
15	37.4	BD	UR	Under	13.5	UR	BD	Over	38
15	30.9	UR	UR	Yes	9.9	UR	BD	Over	7.
Jer	32.7	UR	UR	Yes	14.8	BD	BD	Yes	2.
15	34.2	UR	UR	Yes	8.2	BD	BD	Yes	8.
15	46.3	UR	UR	Yes	6.6	BD	BD	Yes	6.
15	57.7	UR	UR	Yes	11.3	BD	BD	Yes	1.
15	48.8	UR	UR	Yes	12.7	BD	BD	Yes	9.
15	49.6	UR	UR	Yes	17	BD	BD	Yes	8.
15	53.7	UR	UR	Yes	27.6	BD	UR	Under	11.
15	60.5	UR	UR	Yes	30.4	UR	UR	Yes	9
15	63.6	UR	UR	Yes	25.6	UR	UR	Yes	9.
15	49.4	BD	UR	Under	23.2	UR	UR	Yes	17.
15	50	BD	UR	Under	25.7	UR	UR	Yes	23.
15	21.8	UR	UR	Yes	28.2	UR	UR	Yes	12.
Jer	33.2	UR	UR	Yes	7.6	BD	BD	Yes	5.
Jer	10.8	BD	BD	Yes	5.4	BD	BD	Yes	11.
15	29.8	BD	UR	Under	5.9	BD	UR	Under	15.
15	33.3	BD	UR	Under	2.4	UR	UR	Yes	12.
15	45.9	UR	UR	Yes		UR		--	6.
15	63.4	UR	UR	Yes		BD		--	10.
15	67.7	UR	FA	Under	5.8	BD	BD	Yes	13.
15	70.5	UR	FA	Under	7.7	BD	BD	Yes	11.
15	50.3	FA	UR	Over	5.4	BD	UR	Under	9.
15	54.4	UR	UR	Yes	4.1	UR	UR	Yes	12.
Jer	70.1	UR	FA	Under	7.1	UR	UR	Yes	
15	69	UR	FA	Under	40.7	UR	UR	Yes	
15	76.5	FA	FA	Yes	40	UR	UR	Yes	

BD – Burn at own Discretion
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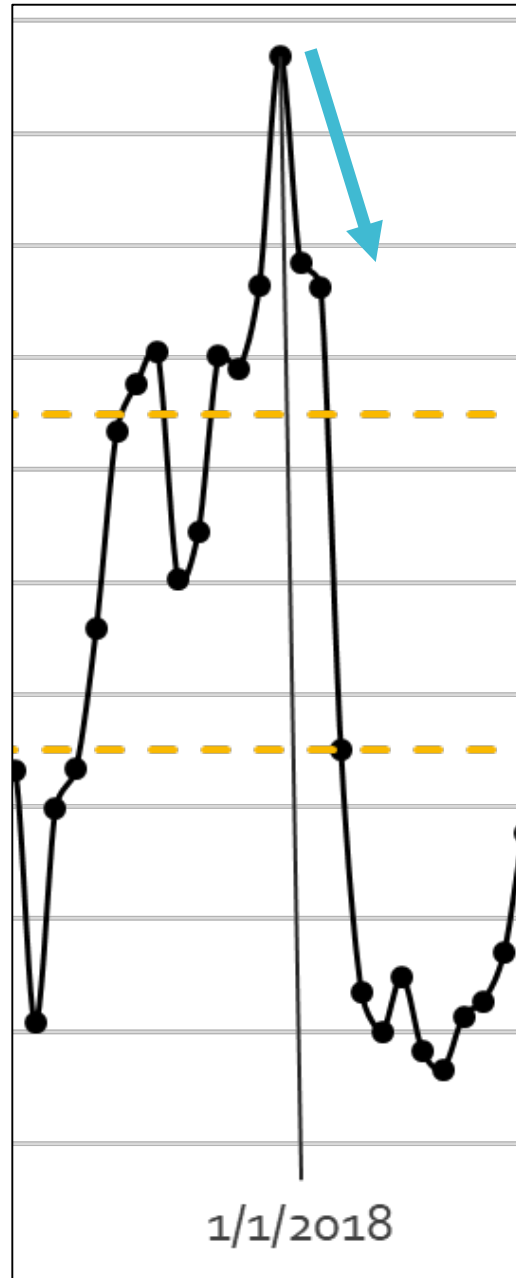
Analyze District Program



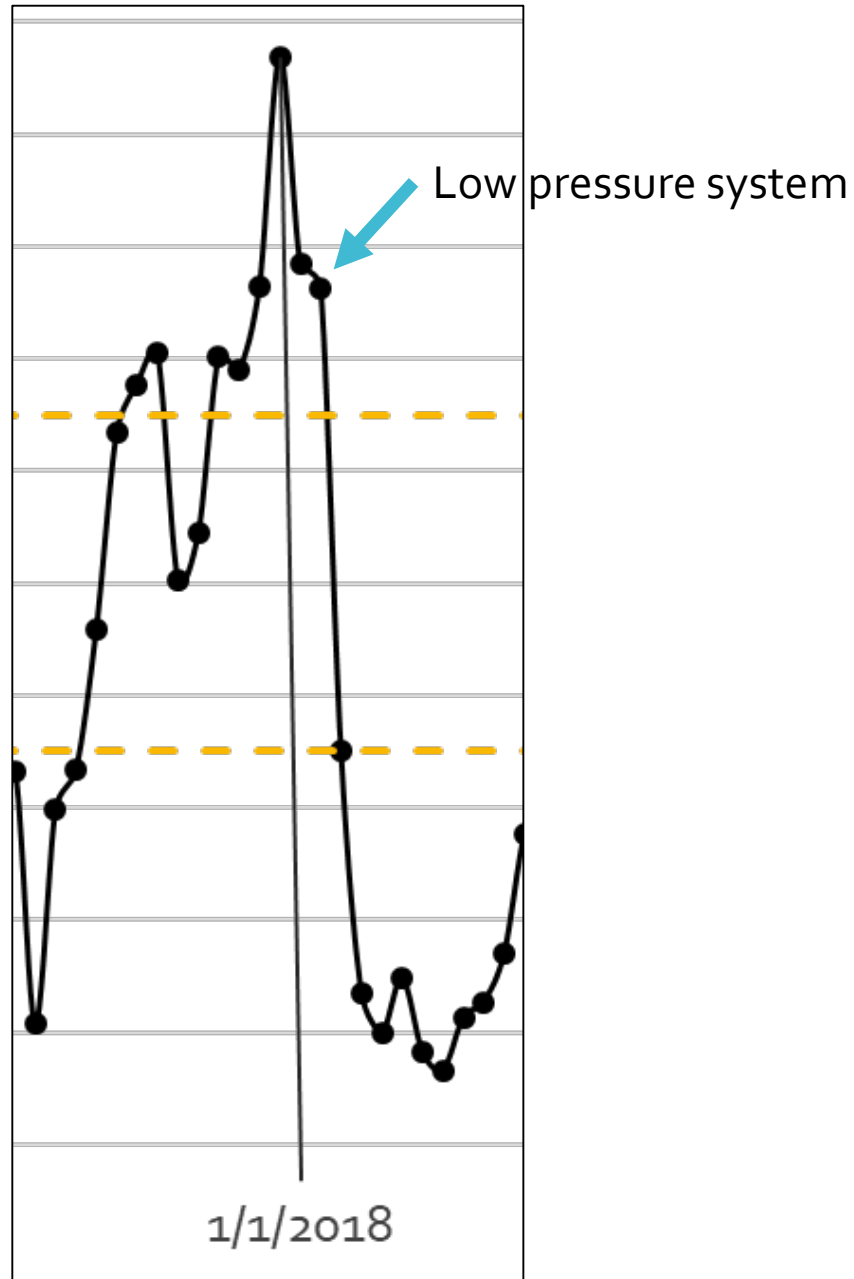
Analyze District Program



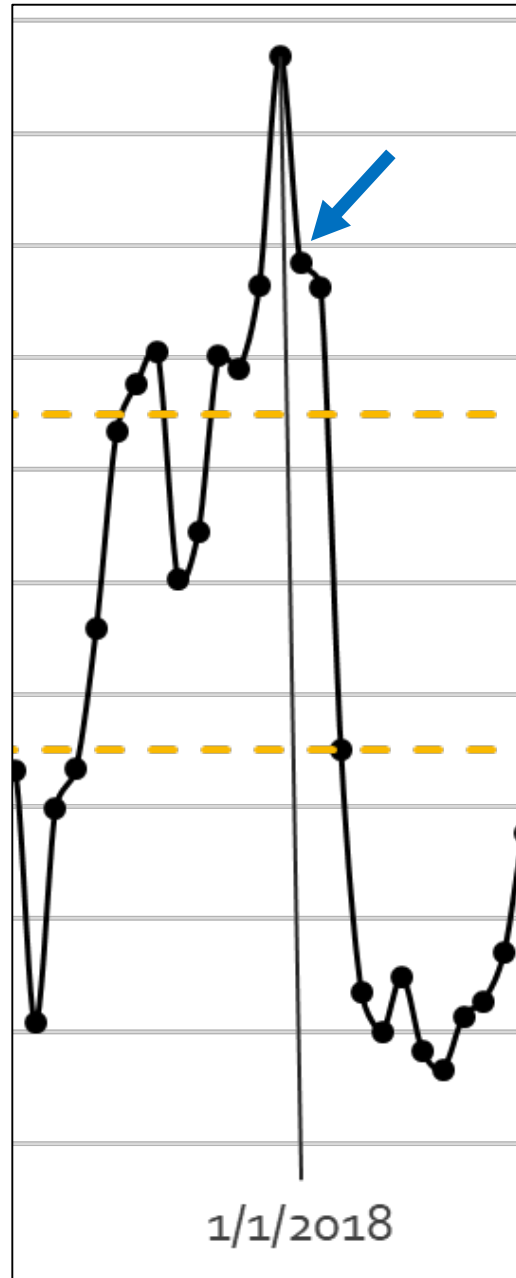
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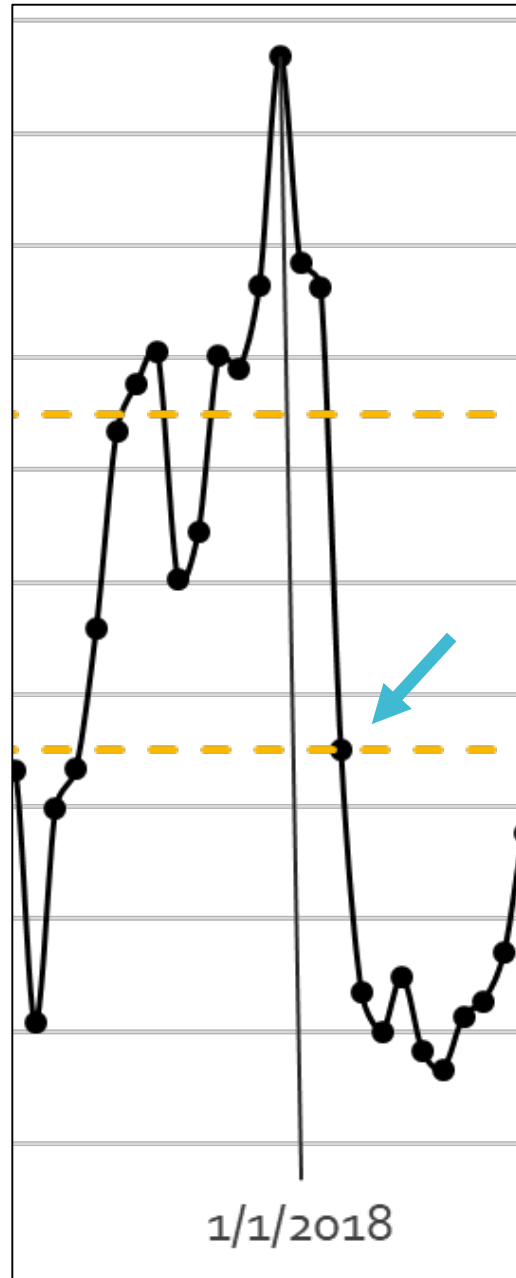
Analyze District Program



Analyze District Program



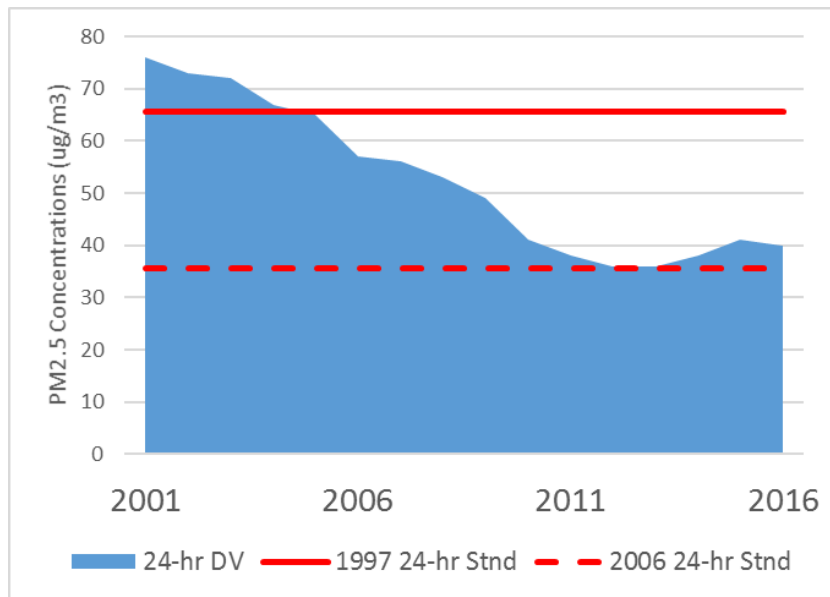
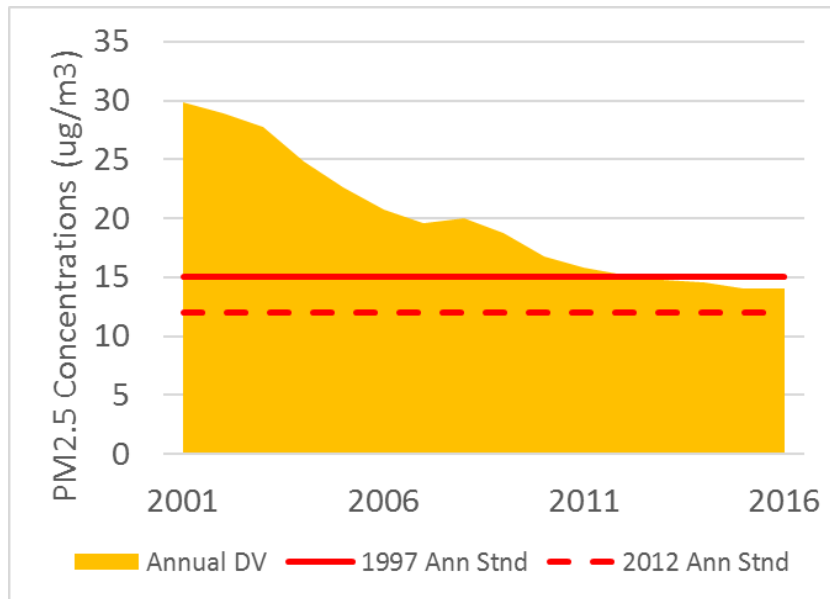
Analyze District Program



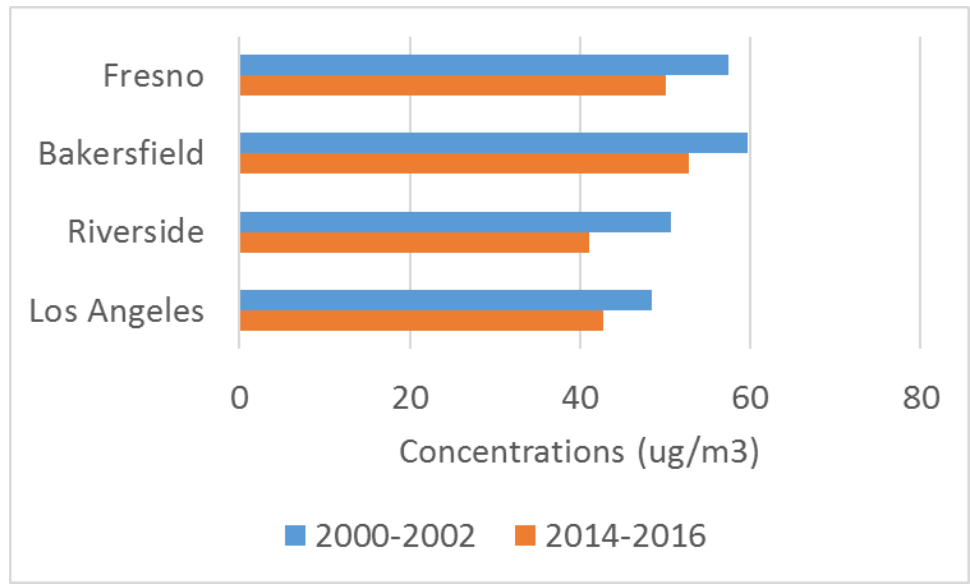
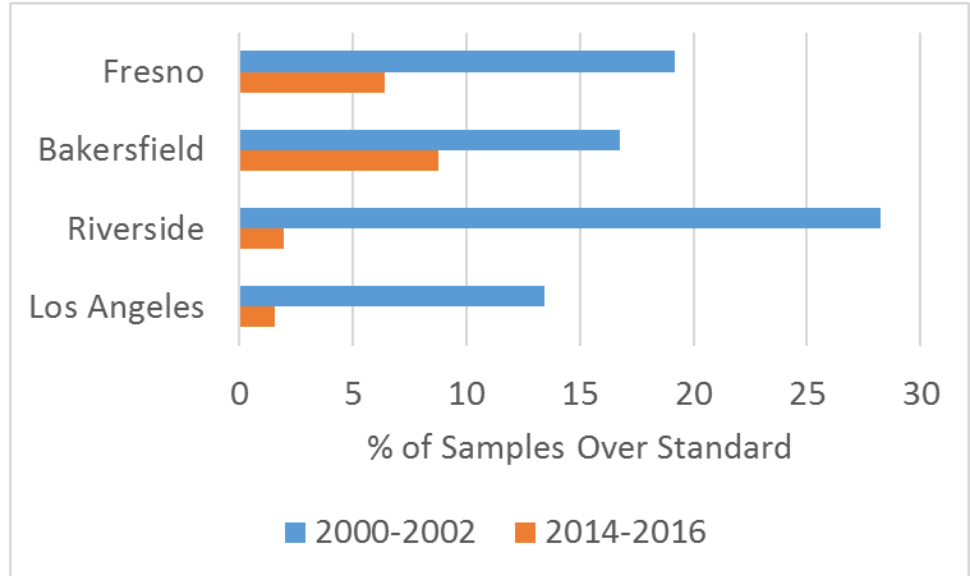
How Do We Track Our Efforts?



Design Value Trends



Days Over the Standard



Conclusions

- Air quality data support multiple objectives
 - SIP development and program evaluation
 - Research
 - Health effects analysis
 - Emergency response
 - Transportation and emission modeling
 - Exceptional event analysis
 - TSA audits
 - ...and many more

Conclusions

- Helps answer fundamental questions
 - What
 - Where
 - Why
 - How

Conclusions

- Must be
 - Consistent
 - Accessible
 - Trustworthy

Conclusions



NOTHING

makes sense without quality
data

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