

Welcome to the APCD's meeting on the

# South County Community Monitoring Project

January 16, 2013

# Meeting Overview

- Welcome & Introductions
- Air Quality on the Mesa
- Community Monitoring Study
  - Purpose
  - Results
- Air Quality Forecasting
- Why It's Important
- Questions & Answers

# Air Quality on the Mesa

# Air Quality on the Mesa

PM<sub>10</sub> monitoring on Mesa for over 20 years



# Air Quality on the Mesa

- Significantly more exceedances of state and federal air quality standards for PM<sub>10</sub> than elsewhere in County
- Two comprehensive air monitoring studies to determine cause
  - Phase 1 & 2 South County Particulate Matter Studies
    - High PM episodes associated with strong NW winds
    - High levels of both coarse (PM<sub>10</sub>) and fine (PM<sub>2.5</sub>) particulate
    - Main source of PM on high episodes is from the coastal dunes
- Health standard exceedances and high hourly peak concentrations present health concerns

# PM10 AQ Standard Violations

Site	State Exceedance Days (24-hr PM <sub>10</sub> > 50 µg/m <sup>3</sup> )			Federal Exceedance Days (24-hr PM <sub>10</sub> > 150 µg/m <sup>3</sup> )		
	2010	2011	2012	2010	2011	2012
CDF	74	65	70	1	0	3
Mesa2	41	33	37	0	0	0
NRP	2	3	10	0	0	0
SLO	0	2	1	0	0	0

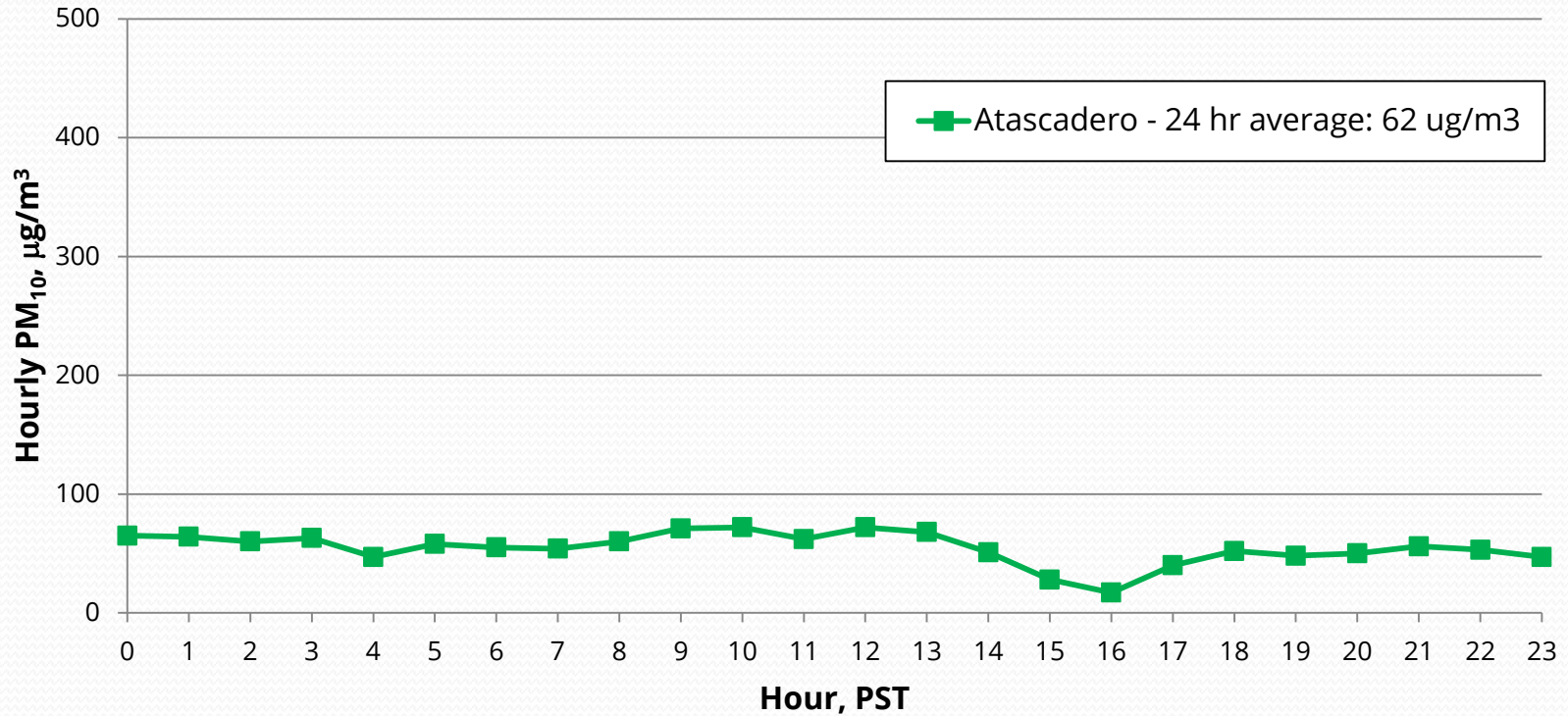


# Air Quality Standards

- Based on public health and medical studies
- Set by U.S. Environmental Protection Agency and California Air Resources Board
- Based on concentration of pollutant over certain time period (e.g. – 24-hour average or 1-hour average)
  - PM<sub>10</sub> and PM<sub>2.5</sub> standards are 24-hour average
- Exposure = concentration x duration
- High peak hourly concentrations in South County represent different exposure than elsewhere

# PM Diurnal Pattern Stagnant Conditions

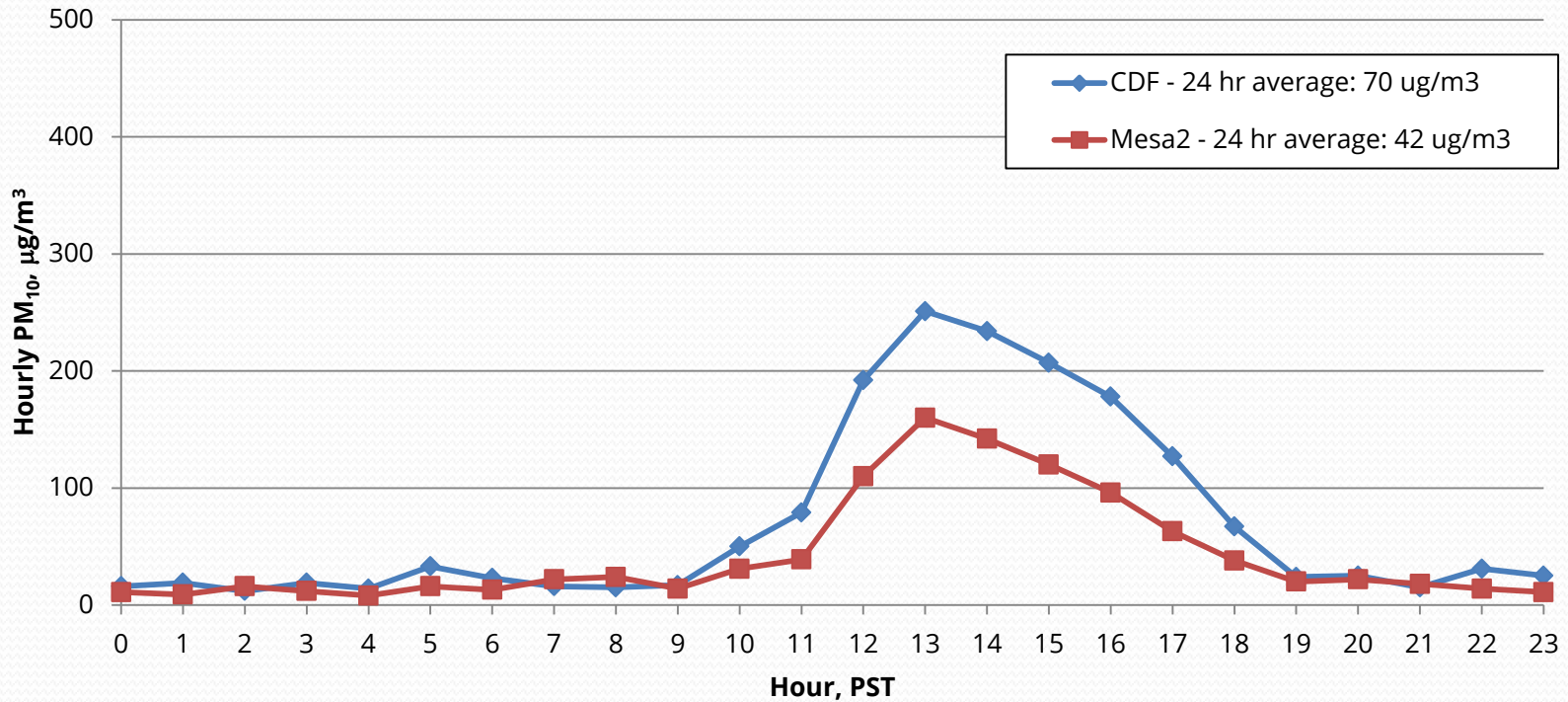
Atascadero, January 13, 2012





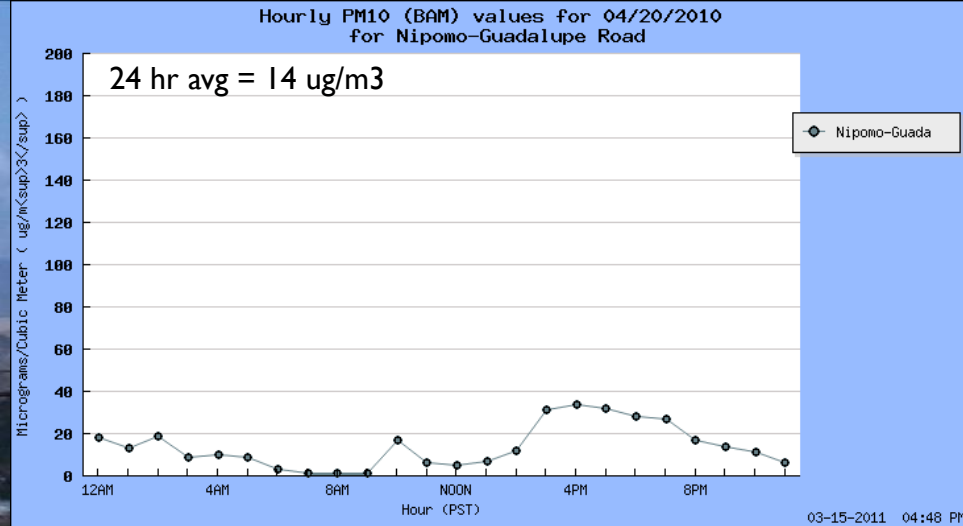
# PM Diurnal Pattern Blowing Dust Event

## CDF and Mesa2, June 25, 2012

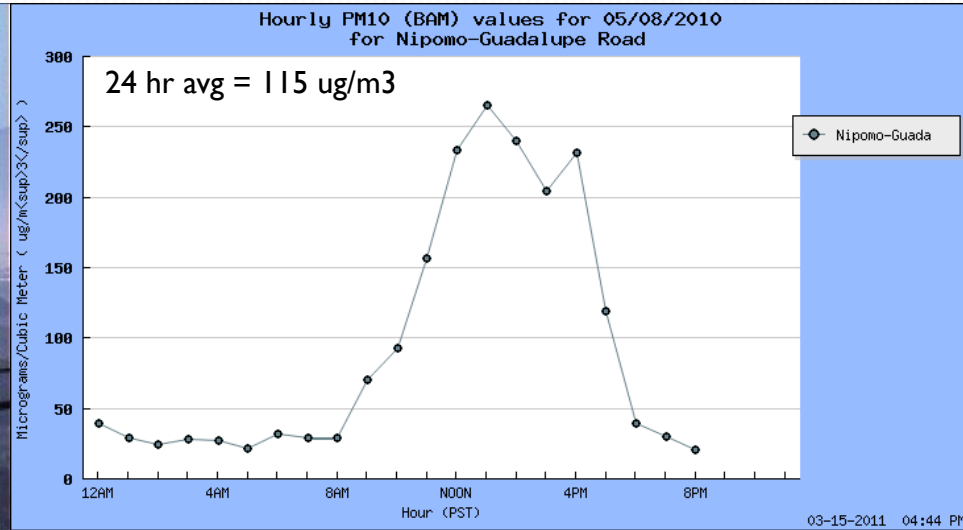


# High vs. Low Concentration Days

24 hr = 14 ug/m<sup>3</sup>

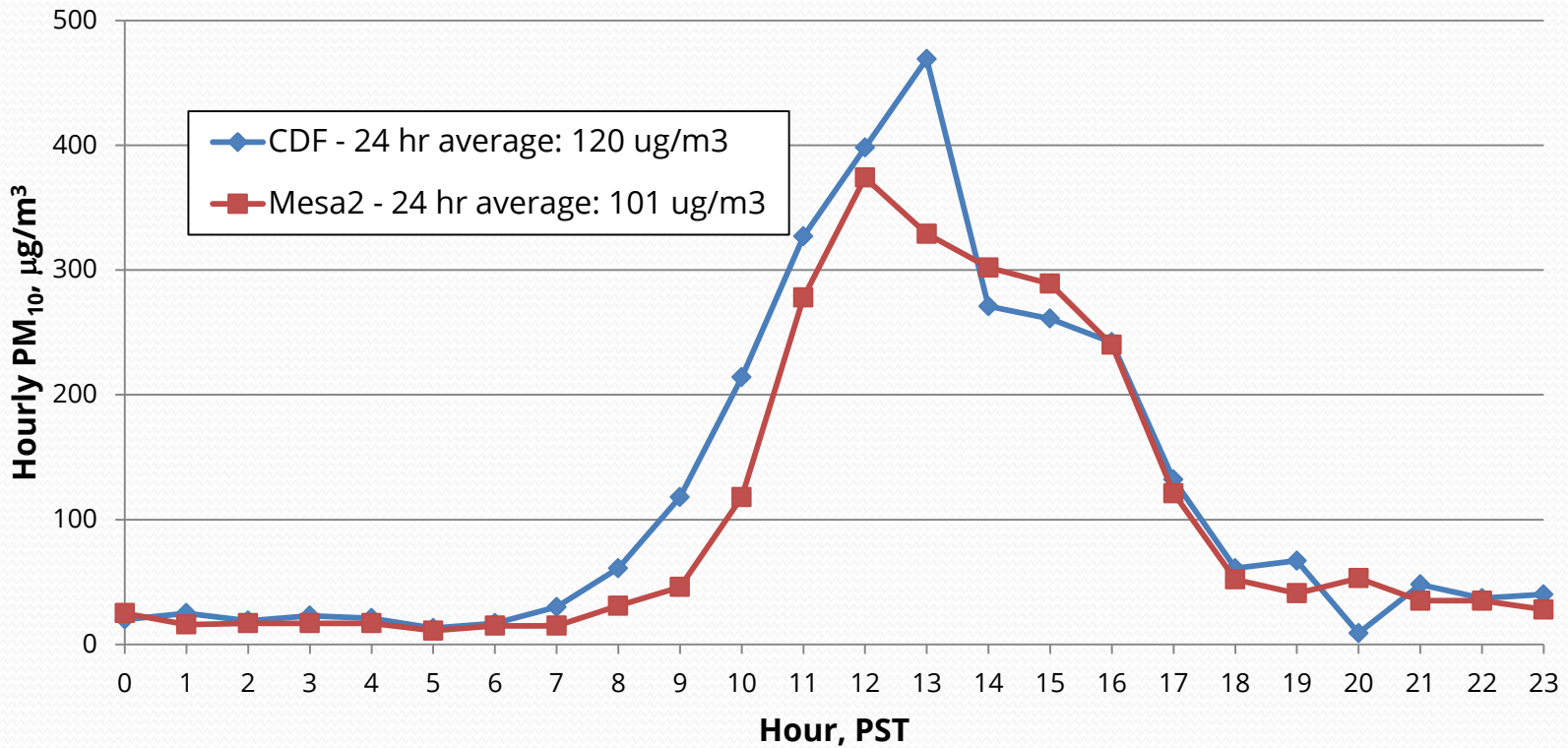


24 hr = 115 ug/m<sup>3</sup>

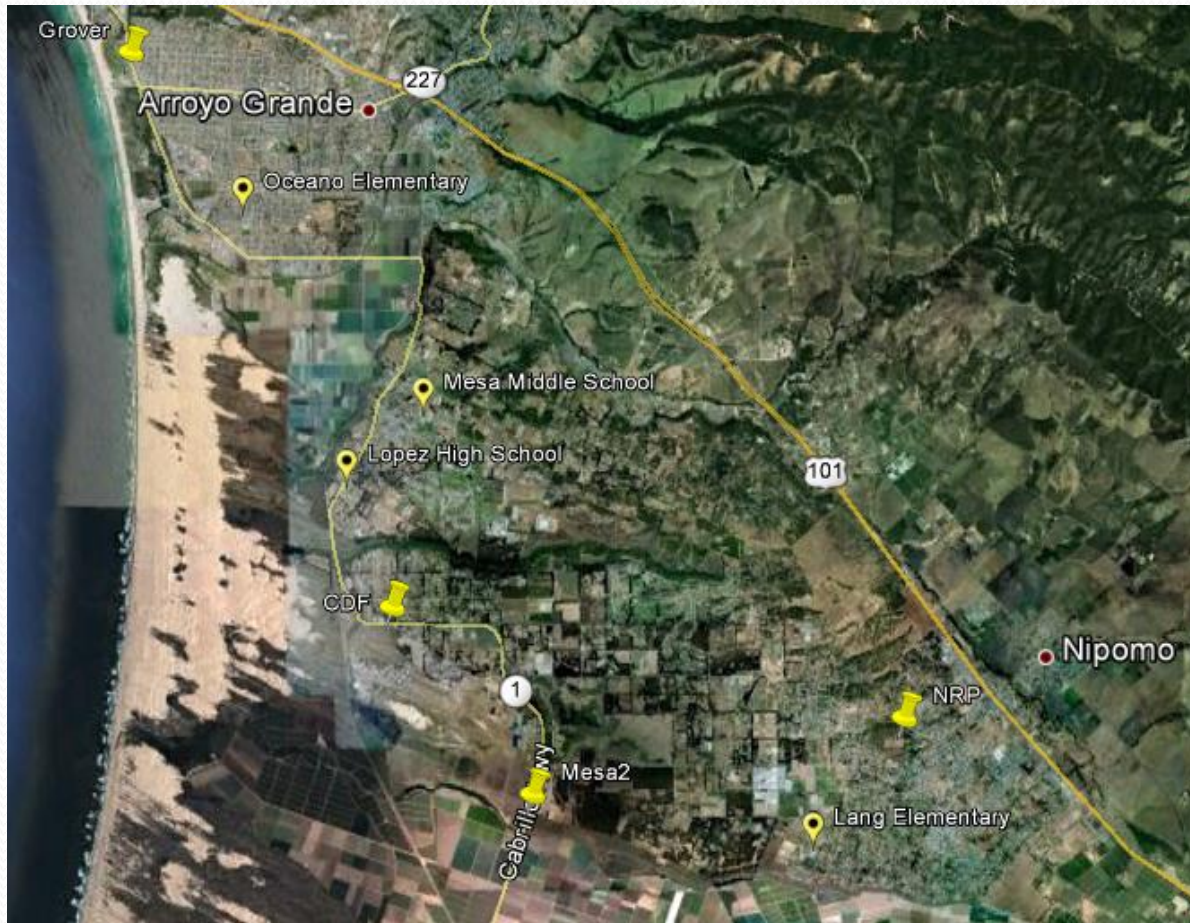


# PM Diurnal Pattern Blowing Dust Event

## CDF and Mesa2, April 28, 2012



# Short-Term Schools Monitoring



# Short-Term Schools Monitoring

- No dust impacts measured at Oceano Elementary
  - Indicates impacts likely confined to Pier Ave area
- No dust impacts measured at Mesa Middle School
  - Indicates school likely situated to north of plume
- Dust impacts measured at Lopez High School
  - Levels less than seen at CDF site
- Dust impacts measured at Dorothea Lange Elementary
  - Levels less than seen at Mesa2 site but higher than NRP
- Results showed need for better understanding of plume path and downwind concentrations



# Community Monitoring Study



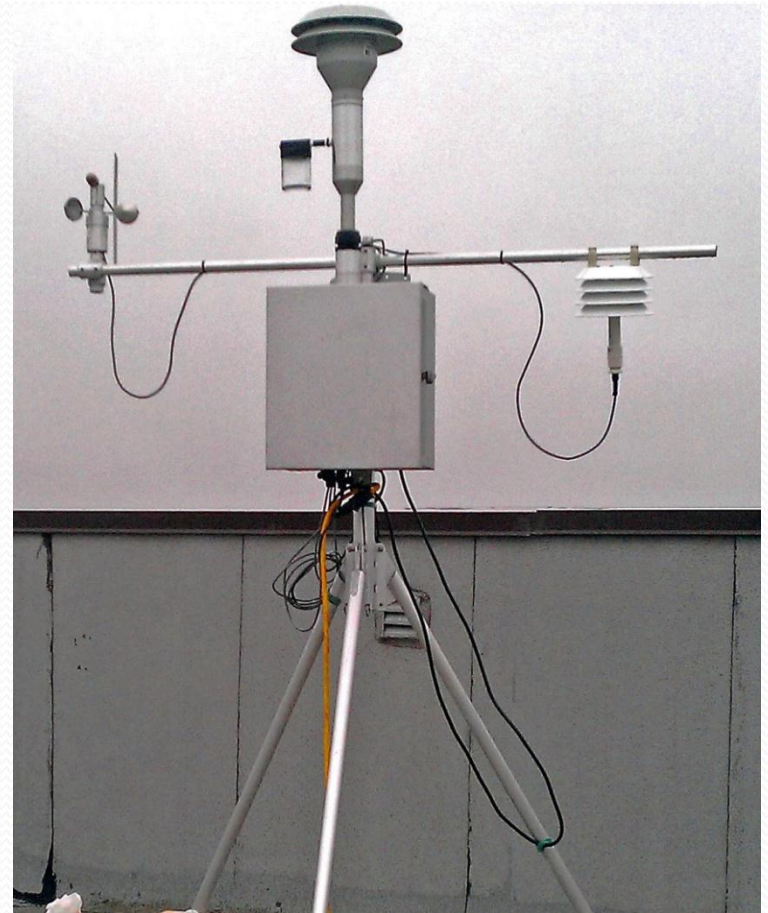
# Purpose

- Conduct a study to better define the extent and neighborhood impacts of the dust plume on the Nipomo Mesa and in Oceano
- Use results to refine and enhance our air quality forecasting for the area and provide better information to affected residents, schools and media
- Help inform the design and implementation of dust controls at the SVRA



# Study Design & Implementation

- Saturation monitoring w/24 portable samplers (EBAMs)
- Sampling during spring high wind season to capture high dust episode period
- Rigid quality assurance program
- Extensive data analysis

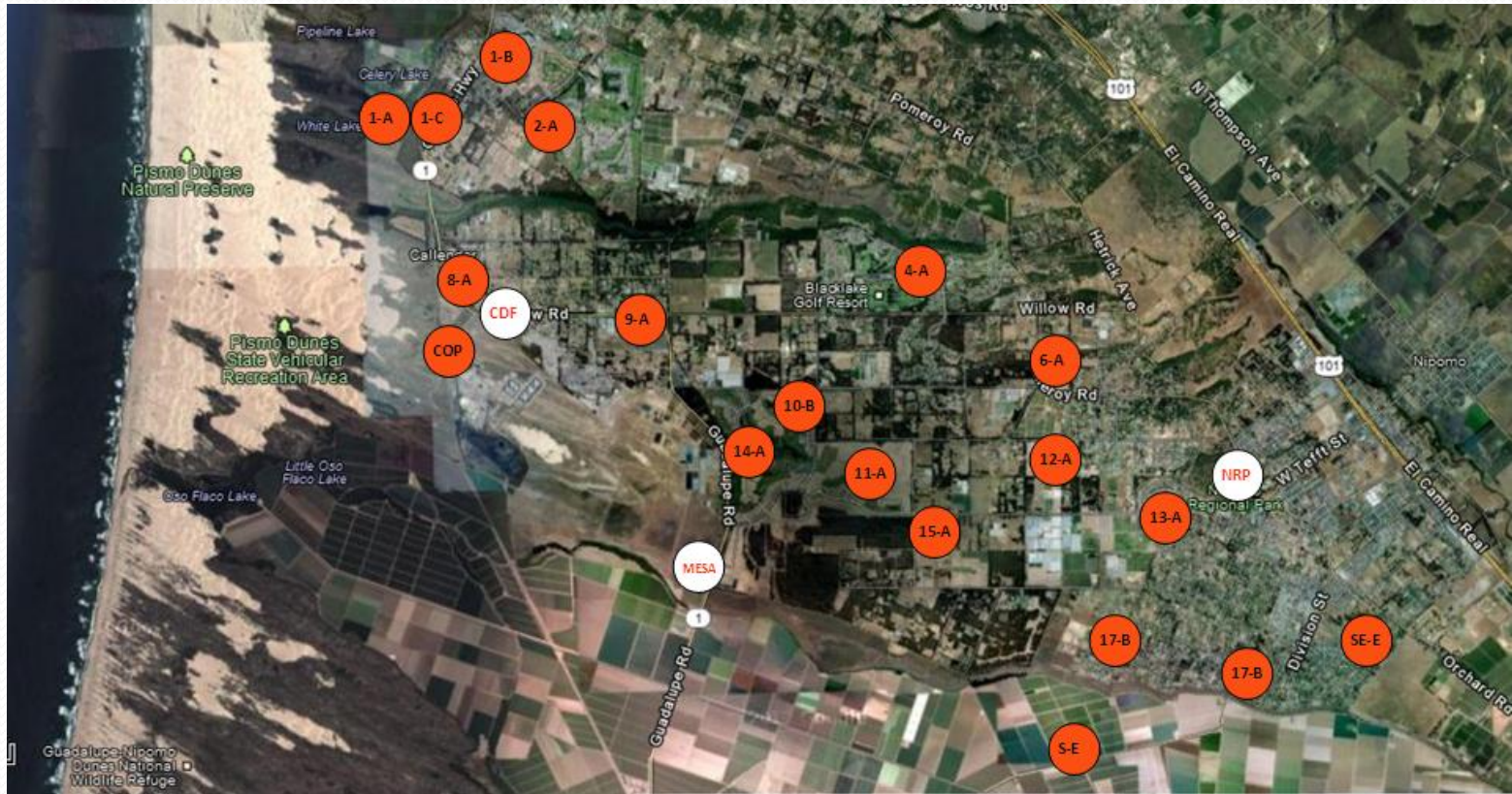


# Monitoring and Data Collection

- EBAMs co-located at Mesa 2 for 3 weeks in February 2012
  - Verified proper operation – calibrated with Mesa2 sampler
  - EBAMs not regulatory sampler
- Deployed in field and operated March – May 2012
  - 19 in Nipomo Mesa neighborhoods; 4 in Oceano; 1 spare
  - Dust chaser vehicle deployed on 5 episode days
- Weekly site visits for data downloads and maintenance
- Extensive quality assurance procedures followed for sampler operations and data review to ensure valid data

# Nipomo Mesa PM Monitors

3 Permanent PM10 BAMs and 20 E-BAMs



Permanent Stations



E-BAM Location

Mesa-2 and NRP had collocated BAM FEM and E-BAM monitors



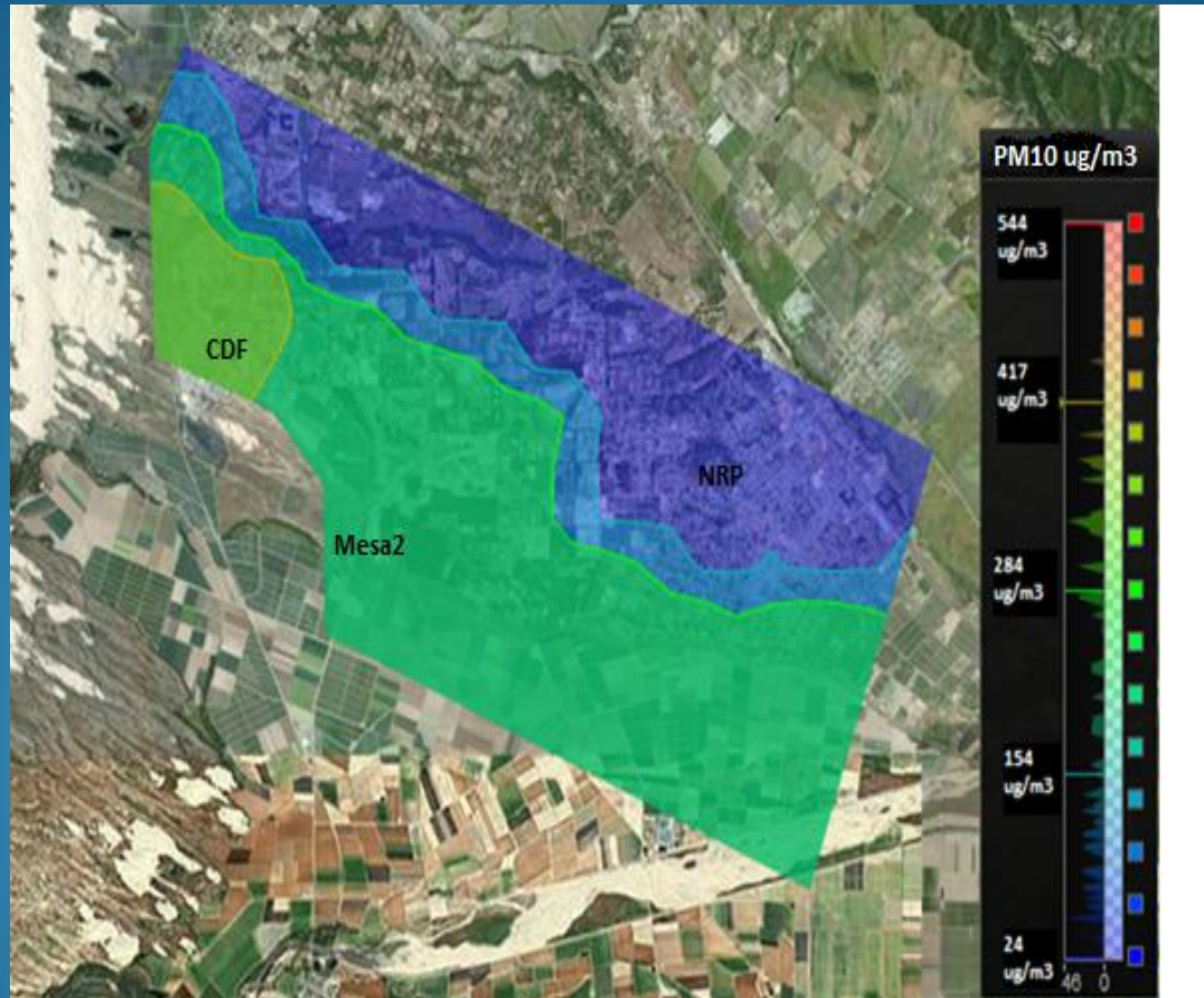
# Oceano PM Monitors

4 E-BAMS



E-BAM Location

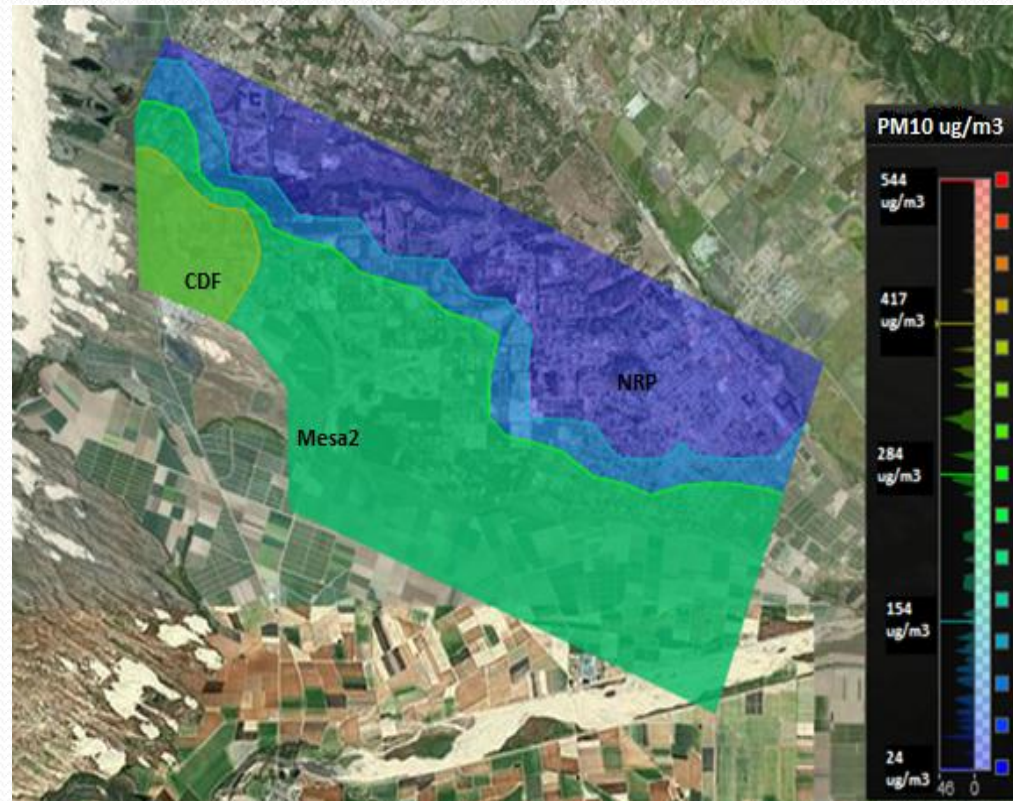
# Study Results – Nipomo Area





# Nipomo Mesa – Typical Plume

- Most episodes showed similar plume extent & concentration
- Low PM levels along northern and northeastern study domain
- Highest PM along western and southern boundaries
- CDF remains highest PM site
- Plume often extends inland to Santa Maria



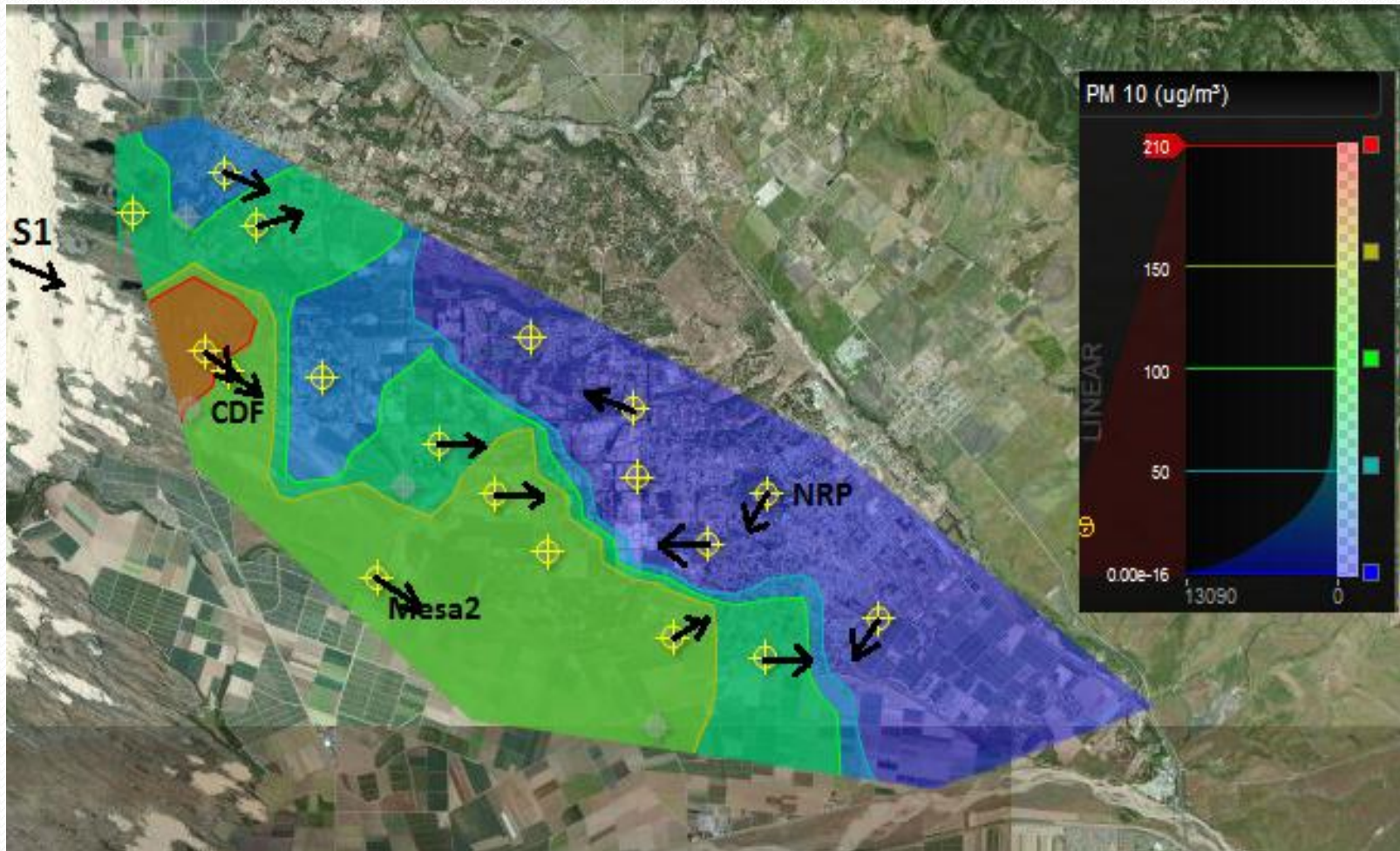
# Nipomo Mesa – Plume Variations

- Strong, consistent NW winds at shoreline on episode days creates dust plume
- Inland winds can vary significantly from shoreline winds
  - Causes variations in plume path and impacts
- April 19 event provides good example
  - Shifts in wind directions inland from 12:00 – 2:00 pm show corresponding shifts in PM concentrations



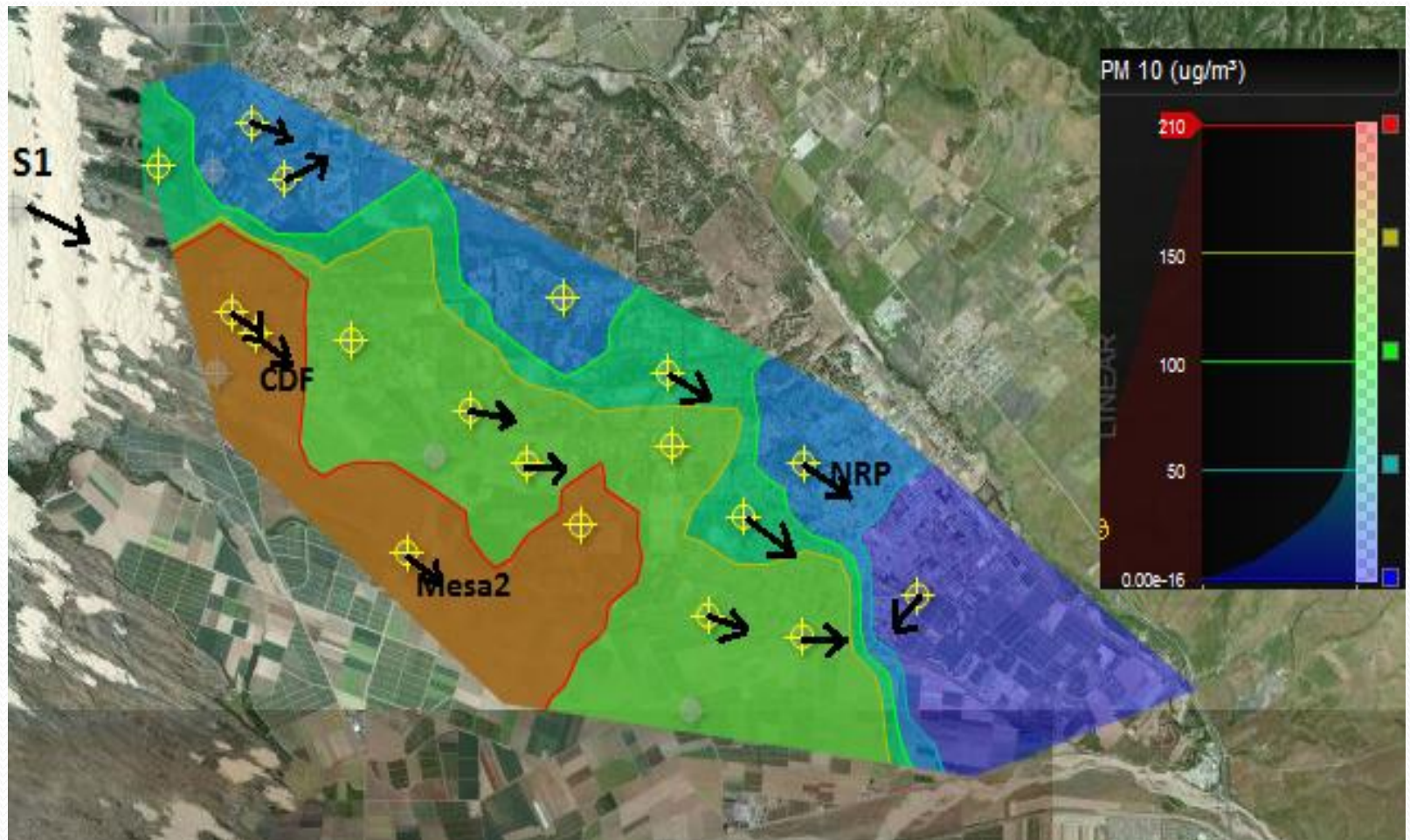
# PM10 and Winds for 4/19/12 at 12:00

NW winds at shoreline - Inland sites showing NE to E winds  
PM at baseline levels at inland sites



# PM10 and Winds for 4/19/12 at 13:00

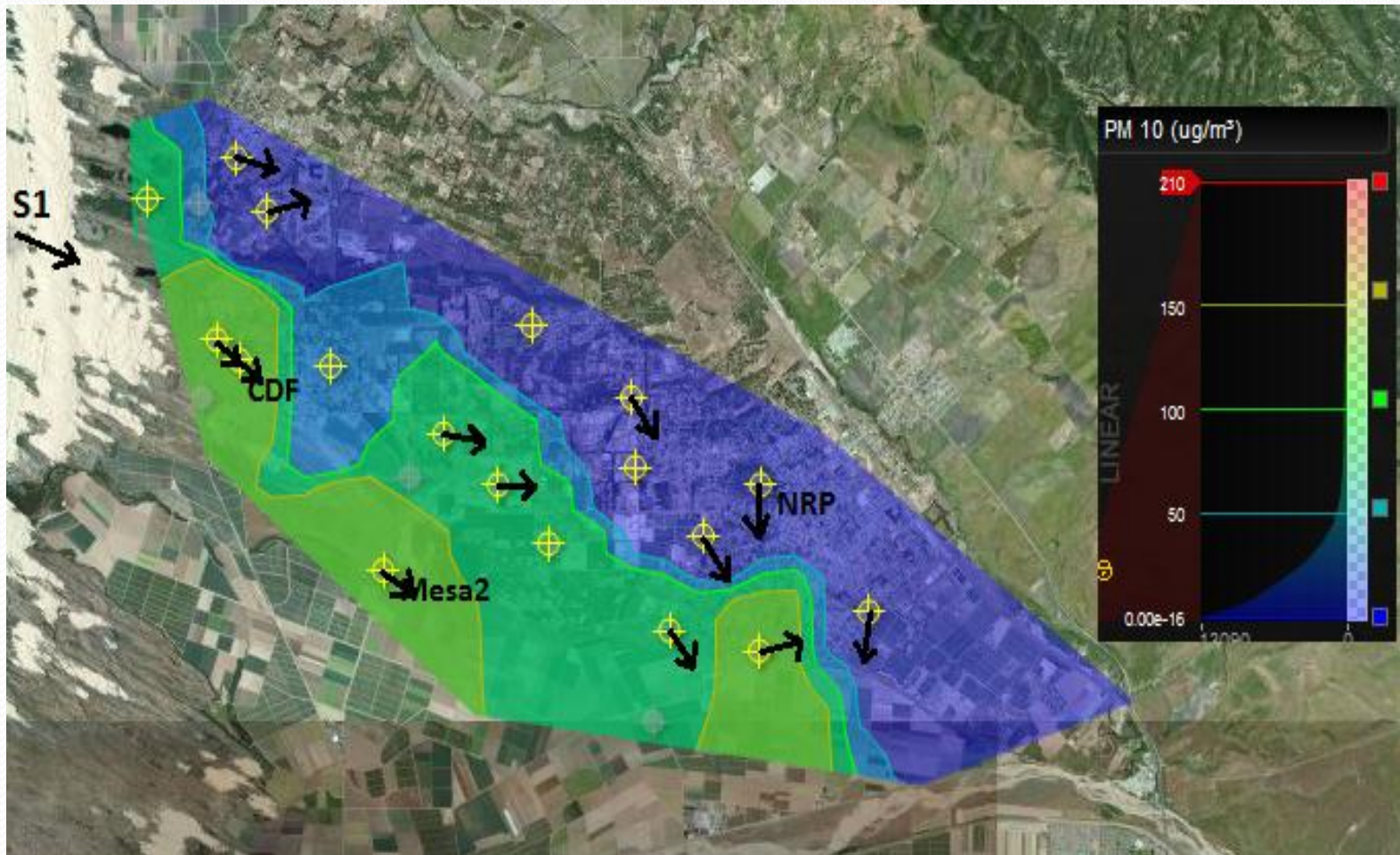
NW winds at shoreline - Inland sites showing NW winds  
PM impacts now seen at inland sites





# PM10 and Winds for 4/19/12 at 14:00

NW winds at shoreline - Inland sites showing northerly winds  
PM impacts back at baseline levels inland



# Nipomo Mesa – Additional Insights

- Under extreme dust events, PM along northern boundary can be significantly higher than background
- Differences in inland wind direction from episode to episode also can result in downwind plume impacts
  - Very little PM impacts in NRP area for episodes with consistent northerly winds at inland sites
  - Episodes with consistent westerly winds inland little plume impact in Santa Maria higher PM near NRP
- These exceptions are infrequent - overall plume pattern observed on most days is very consistent
- Also consistent with visual observations of plume

# Dust Event April 28, 2011

Looking to the Northwest



CDF 24 Hour averages: PM10 135 ug/m3, WD 308 degrees. Max. WS 15.7 MPH



# Dust Event April 28, 2011

Looking to the Southwest



Mesa-2 24 Hour averages: PM10 96 ug/m3, WD 305 degrees. Max. WS 21.6 MPH

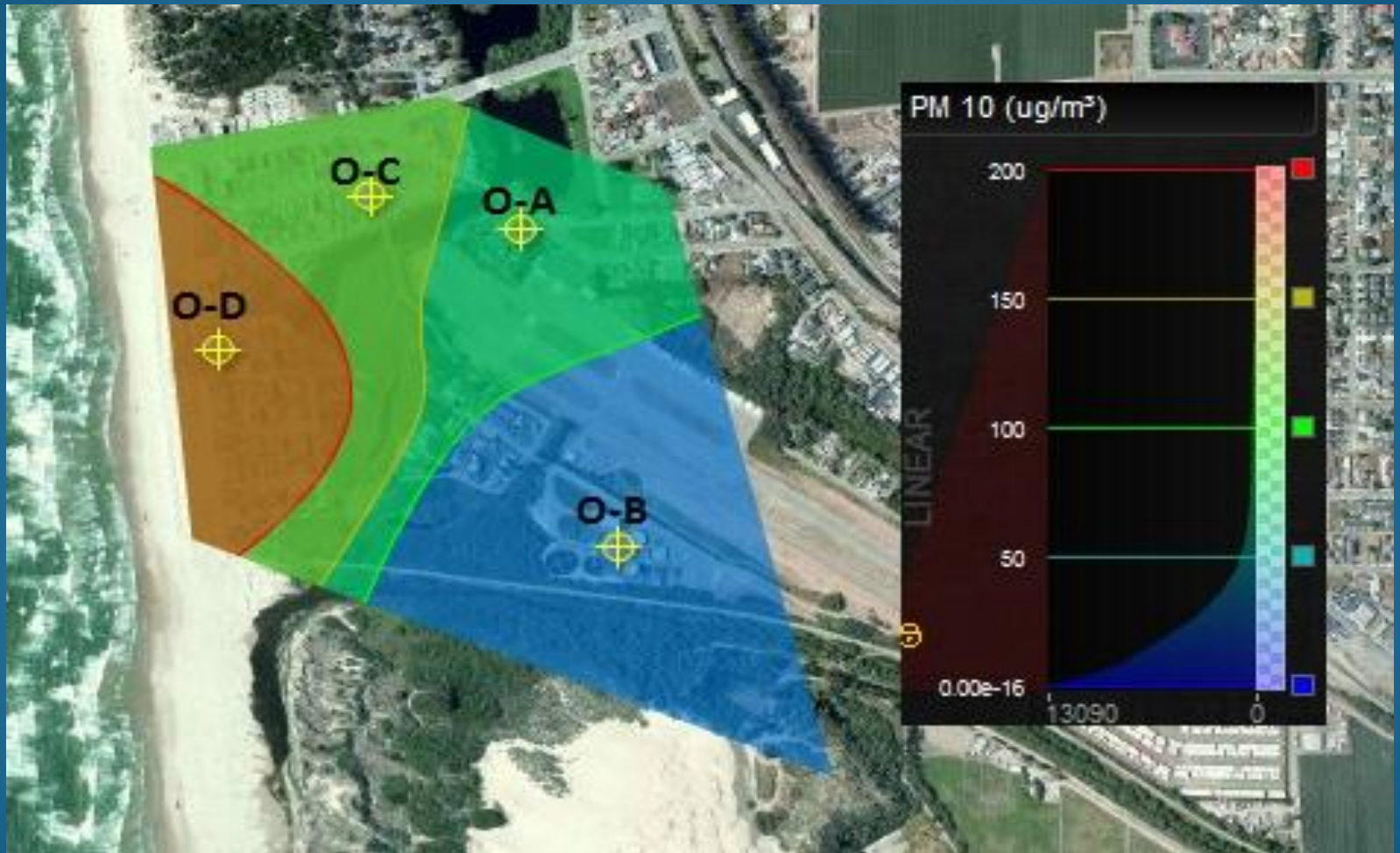
# Dust Event April 28, 2011

Looking to the Southeast



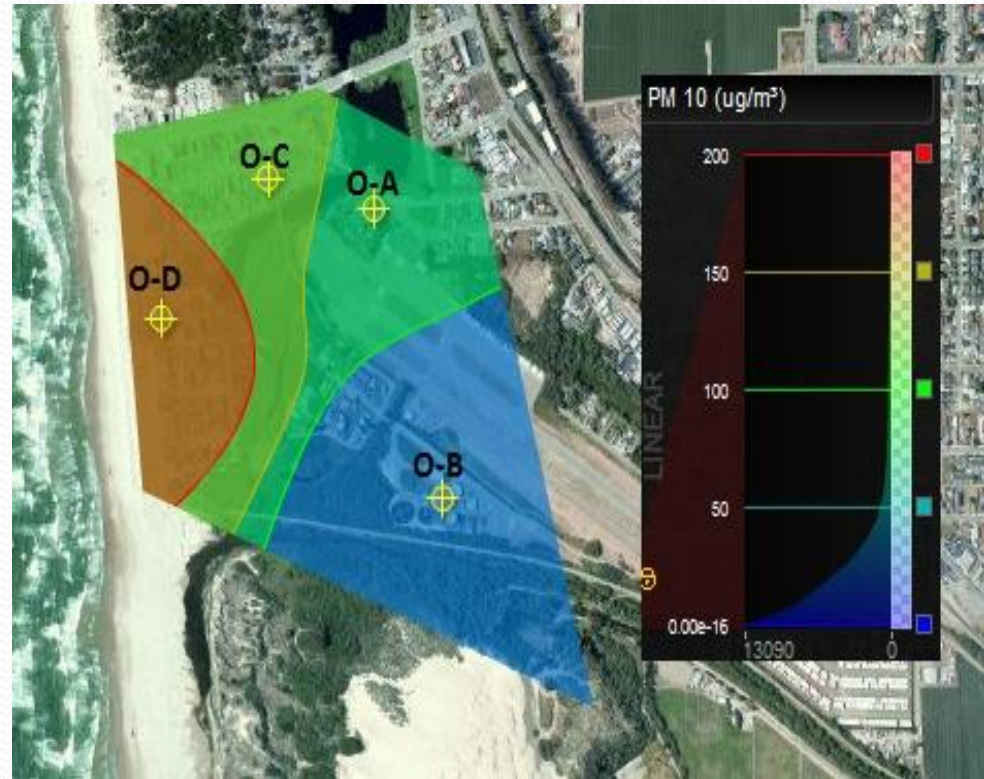


# Study Results – Oceano



# Oceano – Typical Plume

- Shows elevated PM levels near disturbed sand at beach & Pier Ave
- Plume effects very localized – quick drop in PM downwind
  - 40% drop in PM just 0.1 mile downwind of the Pier Avenue
  - No impacts seen at a site < 0.4 mile from the beach



# Oceano – Additional Insights

- Proximity to the ocean complicates data analysis due to added influence of sea salt.
  - Calm days can show high (50%) salt content in PM sample
  - Episode days very consistent: 5-10% salt – similar to Mesa



# Summary & Recommendations



# Summary of Results

- Plume impacts low along northern Mesa study area
- Centerline of plume runs thru CDF, follows inland winds
- Highest PM levels closest to dunes, slowly diminish inland
- Plume impacts often seen in Santa Maria
- High PM in Oceano confined to small area
- Data improves AQ forecasting abilities



# Recommendations



# Air Quality Forecast

Goal:

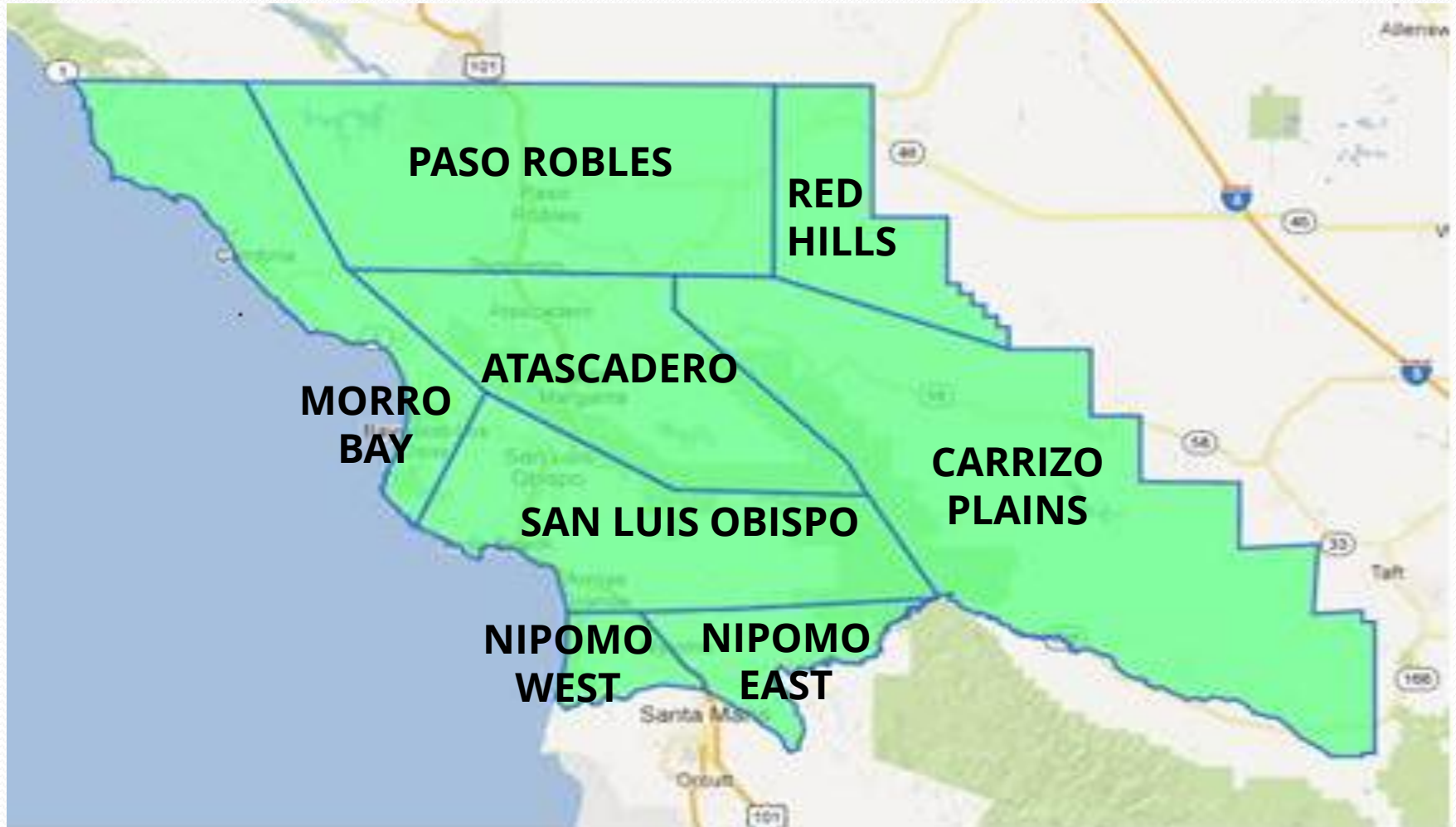
Provide forecasted air quality conditions countywide -  
so public can make decisions to protect health



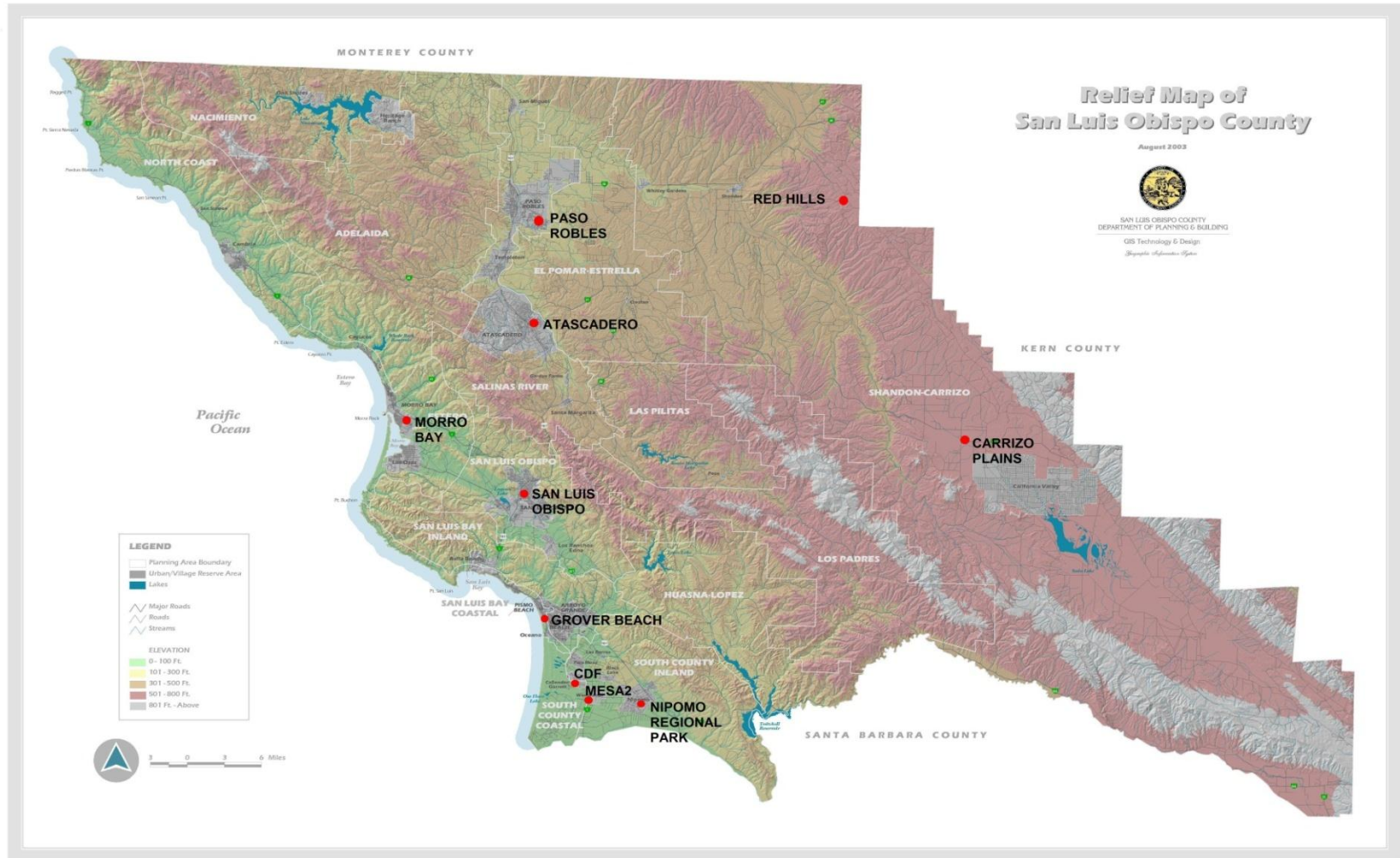
# Air Quality Index

Descriptors COLOR	AQI	Cautionary Statements
Good GREEN	0 - 50	Extremely sensitive individuals with existing respiratory or heart conditions may need to take appropriate precautions. The general public likely will not experience symptoms.
Moderate YELLOW	51-100	Unusually sensitive people should consider reducing prolonged or heavy exertion outdoors.
Unhealthy for Sensitive Groups ORANGE	101-150	Active children and adults, and people with lung disease, such as asthma, should reduce prolonged or heavy exertion outdoors.
Unhealthy RED	151 - 200	Active children and adults, and people with lung disease, such as asthma, should avoid prolonged or heavy exertion outdoors. Everyone else, especially children, should reduce prolonged or heavy exertion outdoors.

# Current Forecast Zones



# SLO COUNTY MONITORING STATIONS



# Study Results

- Updated Air Quality Forecast Zones
- For South SLO County
  - Nipomo Mesa
  - Oceano



# New Forecast Zones

- Zone lines define plume location for:
  - a typical wind blown dust event
  - winds from the northwest

**-Zone lines are not exact boundaries**

**-Plume shape varies with dust events**

# New Forecast Zones

- Forecast zones correspond to particulate monitoring station data measured in that zone:
  - Arroyo Grande - Willow Road (CDF)
  - Nipomo - Guadalupe Road (Mesa 2)
  - Nipomo - Regional Park (NRP)
  - San Luis Obispo – S. Higuera St. (SLO)

# 2012 PM10 State Standard Exceedances

24-hr avg 50 ug/m<sup>3</sup>  
(Number of Days)

- CDF (Willow Road): 70
- Mesa2 (Guadalupe Road): 37
- NRP (Nipomo Regional Park): 10
- San Luis Obispo: 1

Note: Preliminary data - subject to revision

# 2012 PM10 & PM2.5 Federal Standard Exceedances

(Number of Days)

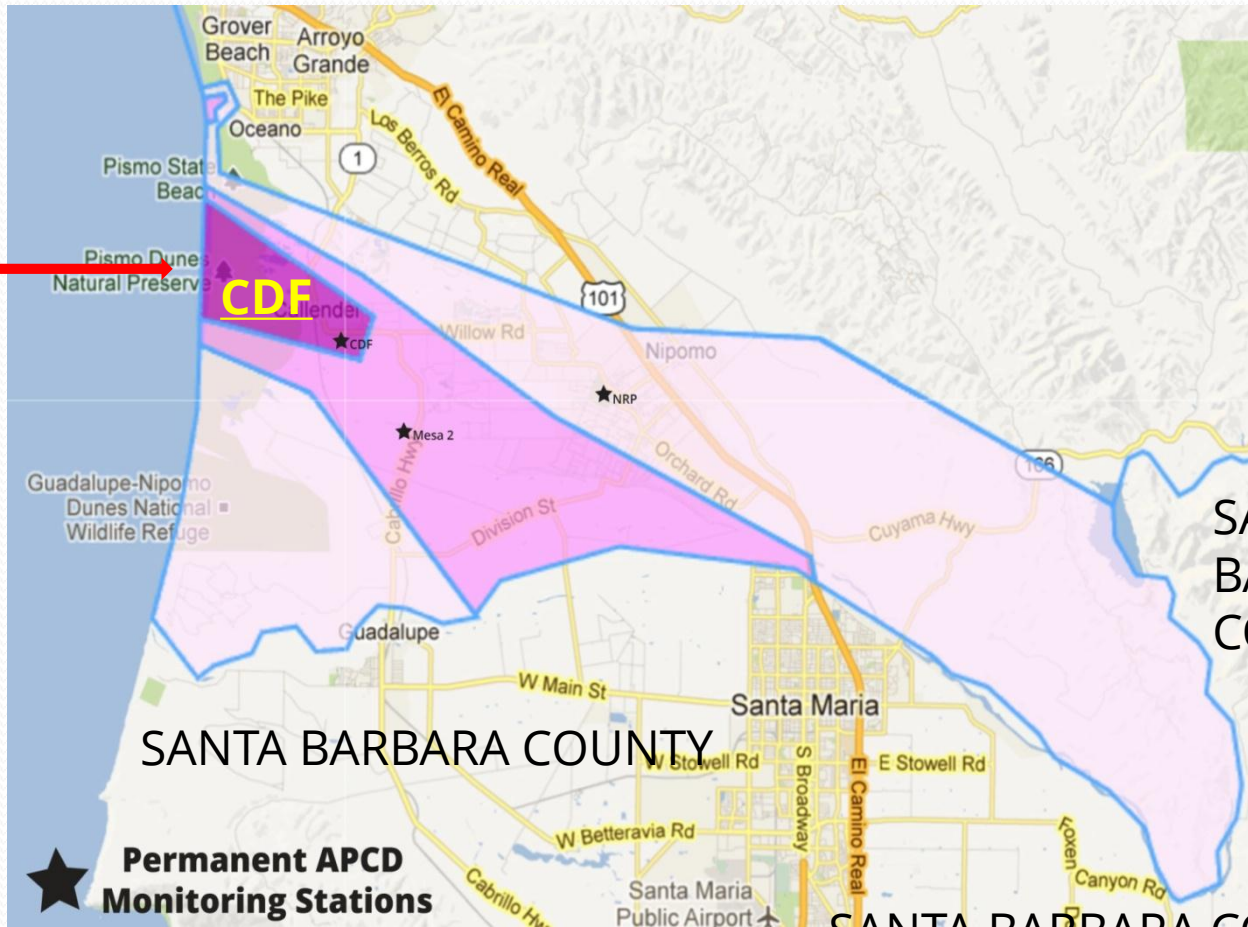
- CDF (Willow Road): 3
- Mesa2 (Guadalupe Road): 0
- NRP (Nipomo Regional Park): 0
- San Luis Obispo: 0

Note: Preliminary data - subject to revision



# New Forecast Zones – CDF

CDF



SANTA BARBARA COUNTY

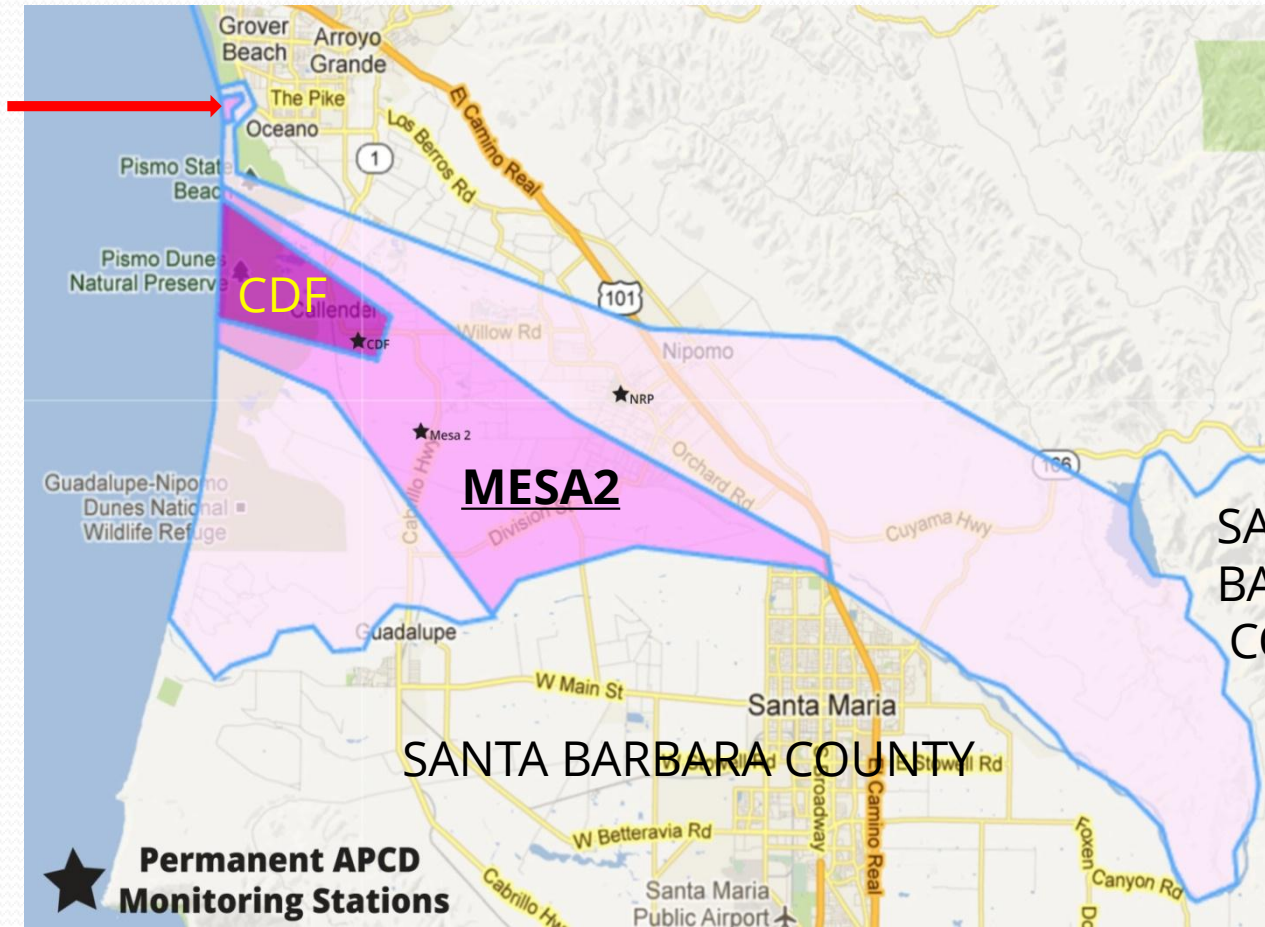
SANTA BARBARA COUNTY

SANTA BARBARA COUNTY

★ Permanent APCD Monitoring Stations

# New Forecast Zones – MESA2

**MESA2**

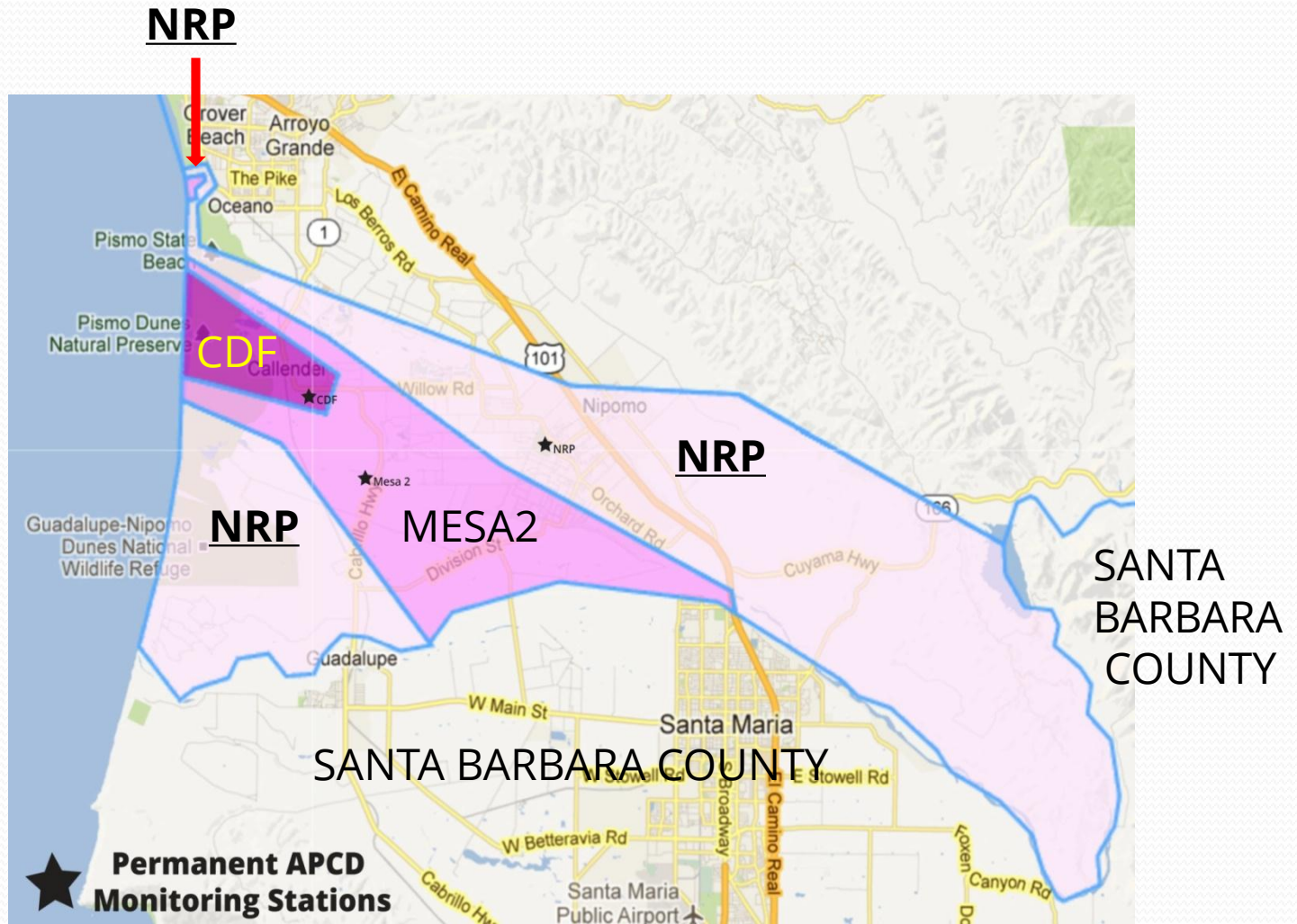


SANTA  
BARBARA  
COUNTY

SANTA BARBARA COUNTY

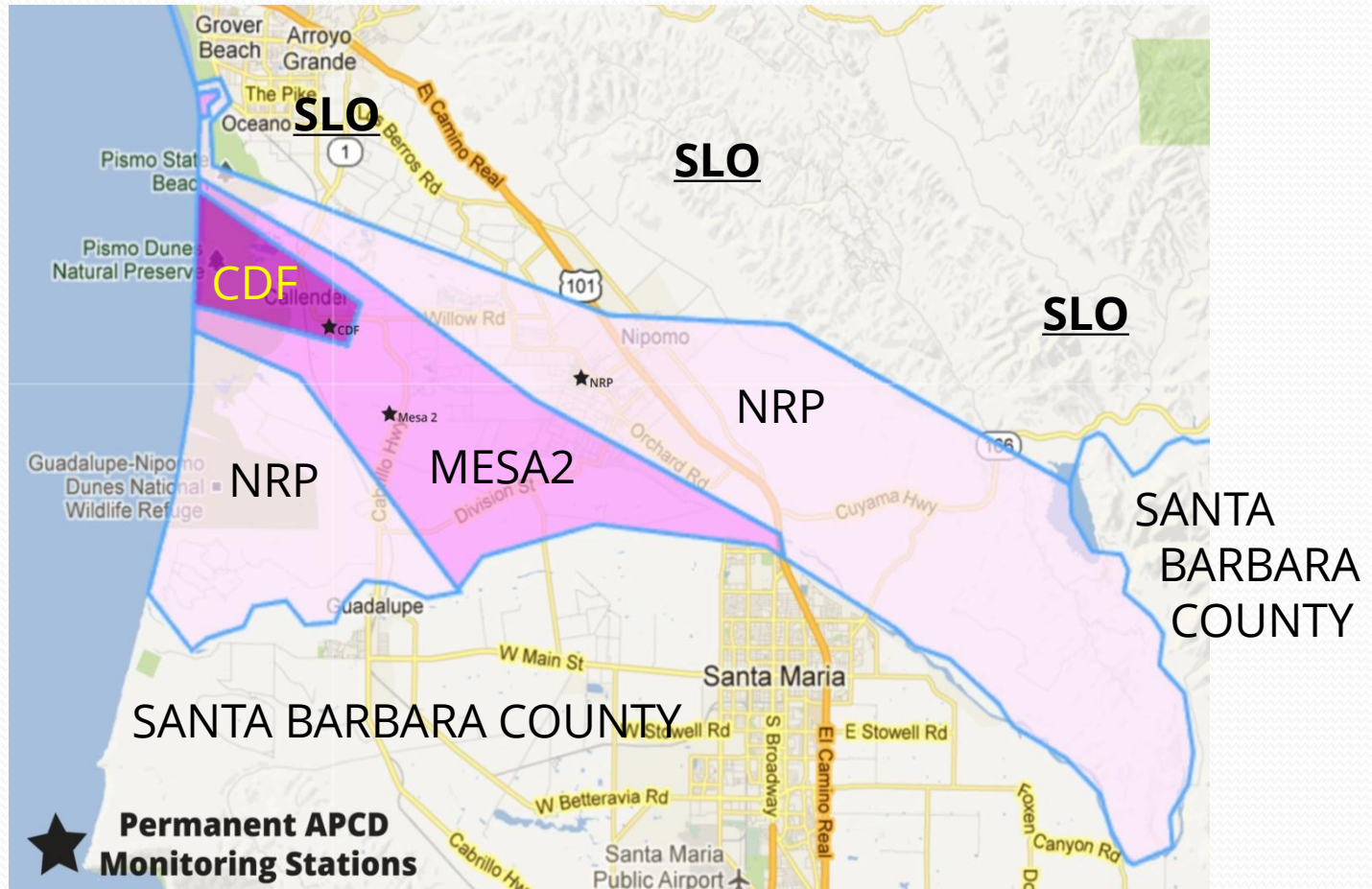
★ Permanent APCD  
Monitoring Stations

# New Forecast Zones – NRP



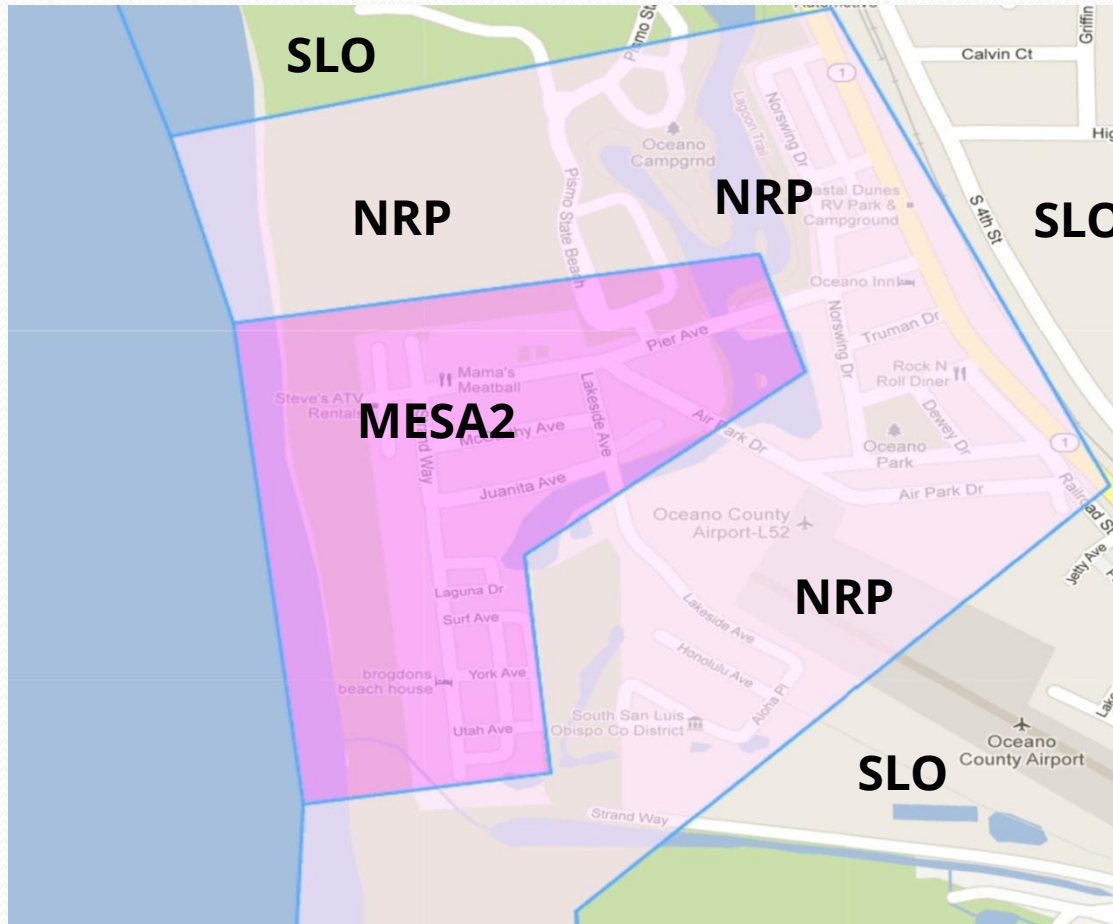


# New Forecast Zones – SLO



# Forecast Zones

## Oceano – Pier Ave & Strand Way



# Air Quality Forecast

Where do I find it?

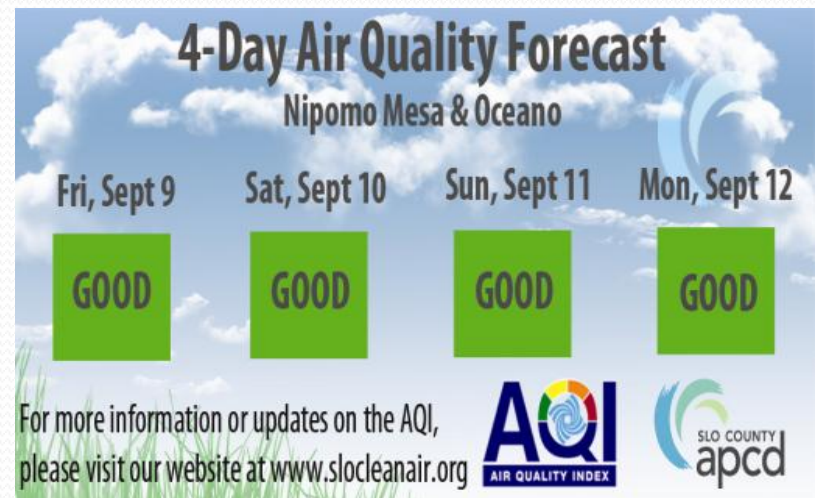
- APCD Website:  
[www.slocleanair.org](http://www.slocleanair.org)
- APCD Forecast Email
- Local Newspapers
- APCD Phone Recording:

805 781 4390



Tribune  
Website

Air  
Quality  
Index



Times Press Recorder & Adobe Press



# Tribune

## Weather Page

-

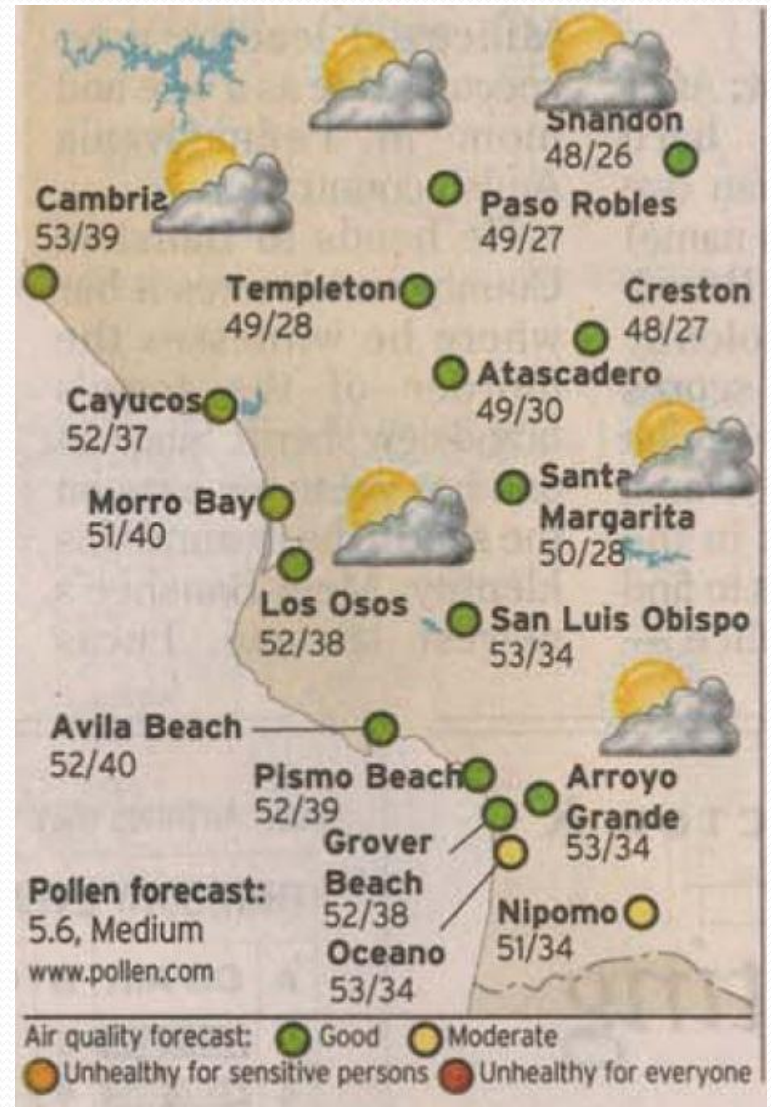
## Air Quality

## Forecast

## Graphic

-

## Dots: AQI Color



# Email - Forecast for Today & Tomorrow

## Forecast for Nipomo, CA

### Today and Tomorrow's Forecast

Monday, June 12:	93 AQI	Moderate	PM10	Yellow
Tuesday, June 13:	39 AQI	Good	Ozone	Green

**Forecast Discussion** – 6/12/12 - Nipomo Area Maximum, 93 AQI \*\*\* CDF, 93 AQI, Moderate \*\*\* Mesa2, 76 AQI, Moderate \*\*\* NRP, 54 AQI, Moderate \*\*\* Better Breathers Alert for CDF, Mesa2, NRP zones: Air Quality is unhealthy for very sensitive persons due to blowing dust and sand. Reschedule outdoor activities to occur when there is no visible dust.

# Complete 6 day Forecast Email

## Forecast for Nipomo, CA

### Today and Tomorrow's Forecast

Monday, June 12:	93 AQI	Moderate	PM10	Yellow
Tuesday, June 13:	39 AQI	Good	Ozone	Green

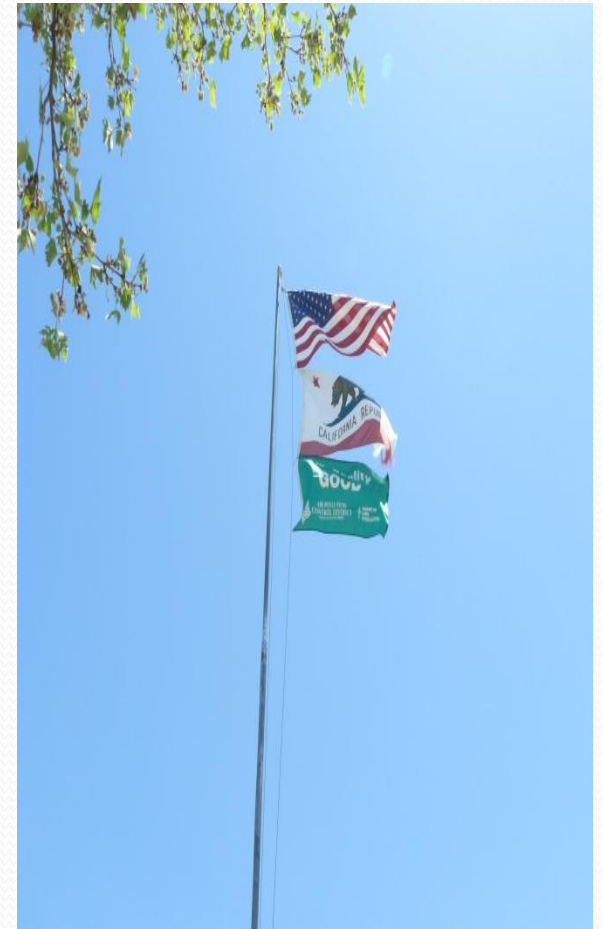
### Extended Forecast

Wednesday, June 14:	36 AQI	Good	Ozone	Green
Thursday, June 15:	35 AQI	Good	Ozone	Green
Friday, June 16:	38 AQI	Good	Ozone	Green
Saturday, June 17:	54 AQI	Moderate	PM10	Yellow

**Forecast Discussion** – **6/12/12** - Nipomo Area Maximum, 93 AQI \*\*\* CDF, 93 AQI, Moderate \*\*\* Mesa2, 76 AQI, Moderate \*\*\* NRP, 54 AQI, Moderate \*\*\* Better Breathers Alert for CDF, Mesa2, NRP zones: Air Quality is unhealthy for very sensitive persons due to blowing dust and sand. Reschedule outdoor activities to occur when there is no visible dust. \*\*\* **6/17/12** - Nipomo Area Maximum, 54 AQI \*\*\* CDF, 54 AQI, Moderate \*\*\* Mesa2, 46 AQI, Good \*\*\* NRP, 40 AQI, Good \*\*\* Better Breathers Alert for CDF zone: Air Quality is unhealthy for very sensitive persons due to blowing dust and sand. Reschedule outdoor activities to occur when there is no visible dust.

# AIR QUALITY FLAG PROGRAM

- Educational Program
- Increases Air Quality Awareness
- Implement at Schools and CDF (Cal Fire Stn)





# Why It's Important

## Air Quality & Your Health

Penny Borenstein, MD, MPH  
County Health Officer  
SLO County Public Health Department

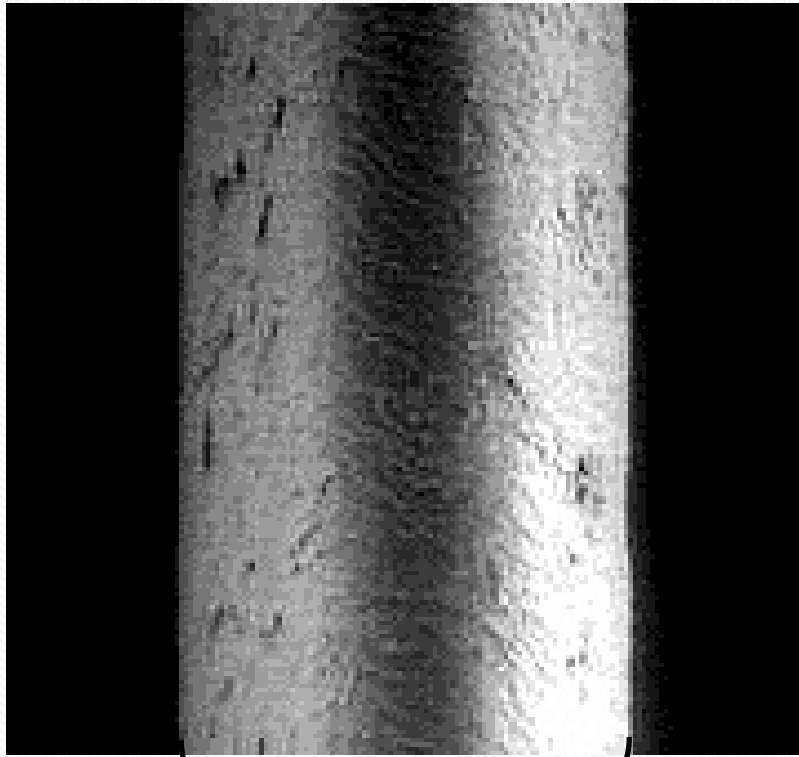
**Public Presentation at Mesa Middle School  
January 16, 2013**

# Understanding Particulate Matter (PM)

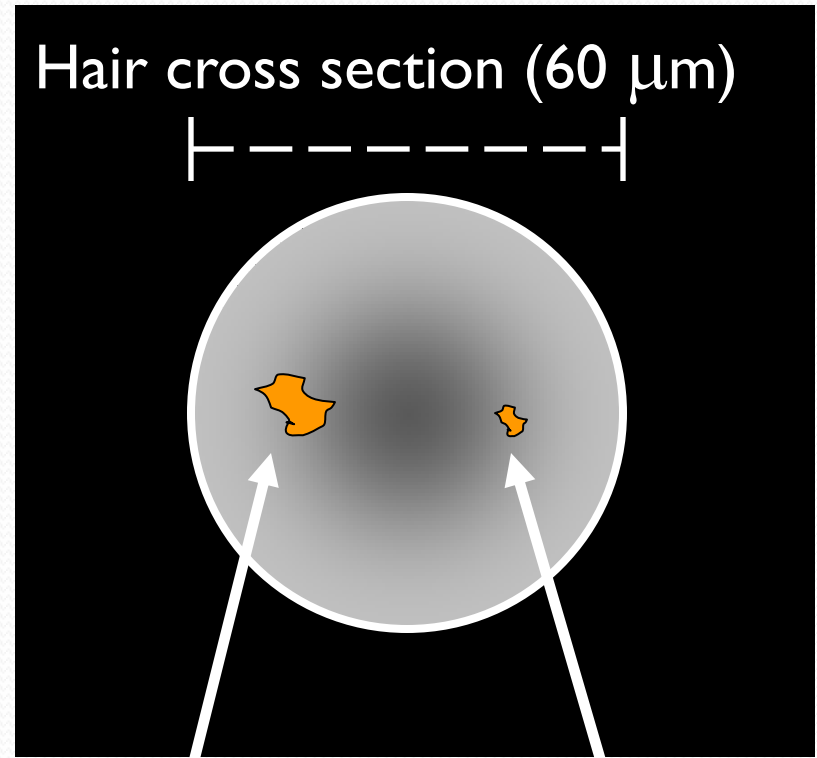
- Coarse vs. Fine PM
- Mechanism of Lung Exposure
- Population Health Effects



# PM in a Cross-hair



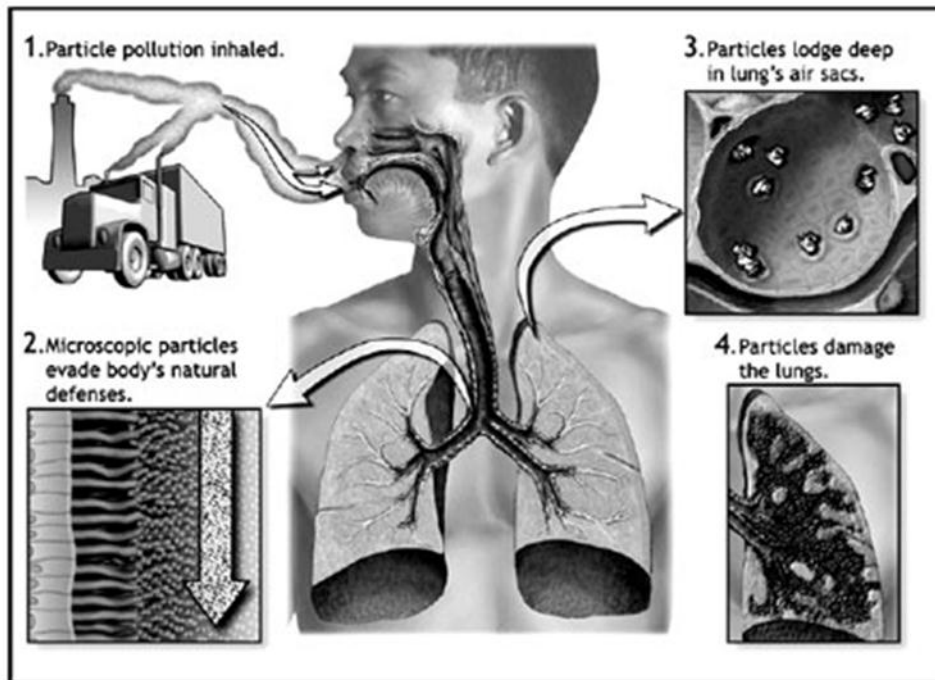
**Human Hair**  
**(60  $\mu\text{m}$  diameter)**



**PM10**  
**(10  $\mu\text{m}$ )**

**PM2.5**  
**(2.5  $\mu\text{m}$ )**

# Mechanism of Lung Exposure





# Health and Economic Impacts

- Respiratory problems in children & adults (asthma, bronchitis)
- Decreased lung function in children and adults
- Hospitalizations & emergency room visits
- Premature birth?
- Premature death
- School absenteeism and work loss
- Health care economic impacts

# Sensitive Populations

- Fetal/Infant - possible decreased lung function growth
- Young Children
- Elderly
- Pre-existing respiratory or heart disease; e.g. asthma exacerbation.

# School Activity Recommendations for Blowing Dust Events

## Air Quality Index (AQI) Chart for Particulate Matter

ACTIVITY	0 to 50 GOOD*	51 to 100 MODERATE	101 to 150 UNHEALTHY FOR SENSITIVE GROUPS	151 to 200 UNHEALTHY
Recess (15 min)	No Restrictions	Exceptionally sensitive individuals should reduce strenuous outdoor activities.	Children with asthma or other respiratory conditions should reduce strenuous outdoor activities.	Indoor recess is advised. Restrict outdoor activities. All students should remain indoors.
P.E. (1 hr)	No Restrictions	Exceptionally sensitive individuals should reduce strenuous outdoor activities. Reschedule activity for morning before wind starts to blow.	Children with asthma or other respiratory conditions should reduce strenuous outdoor activities. Reschedule activity for morning before wind starts to blow.	Indoor recess is advised. Restrict outdoor activities. All students should remain indoors. Reschedule activity for morning before wind starts to blow.
Athletic Practice and Training (2 to 4 hrs)	No Restrictions	Exceptionally sensitive individuals should reduce strenuous outdoor activities. Reschedule activity for morning before wind starts to blow.	Individuals with asthma or other respiratory / cardiovascular condition should medically manage their symptoms. Increase rest periods and substitutions to lower breathing rates. Reschedule activity for morning before wind starts to blow.	Reschedule practice for morning before wind starts to blow. Move indoors if possible. All students should remain indoors.
Scheduled Sporting Events	No Restrictions	Exceptionally sensitive individuals should reduce strenuous outdoor activities. Reschedule activity for morning before wind starts to blow.	Individuals with asthma or other respiratory / cardiovascular conditions should medically manage their symptoms. Increase rest periods and substitutions to lower breathing rates. Reschedule activity for morning before wind starts to blow.	Consideration should be given to rescheduling or relocating event.

Questions?