



Spring 2012 Columbus & Palomas Dust Study

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Presented at Border 2020 NM-Chihuahua Rural Task Force

Columbus/Palomas Public Meetings

November 12 & 14, 2013



Motivation

Dust and dust storms are a nuisance, but more importantly, present a significant health hazard to those living in it.



Project Goals & Objectives

- Collect dust samples from the air to understand typical levels found in the Columbus and Palomas area
 - during low and high winds
- Estimate how dust varied across the towns and around the cattle facility over time

Small Dust Particles

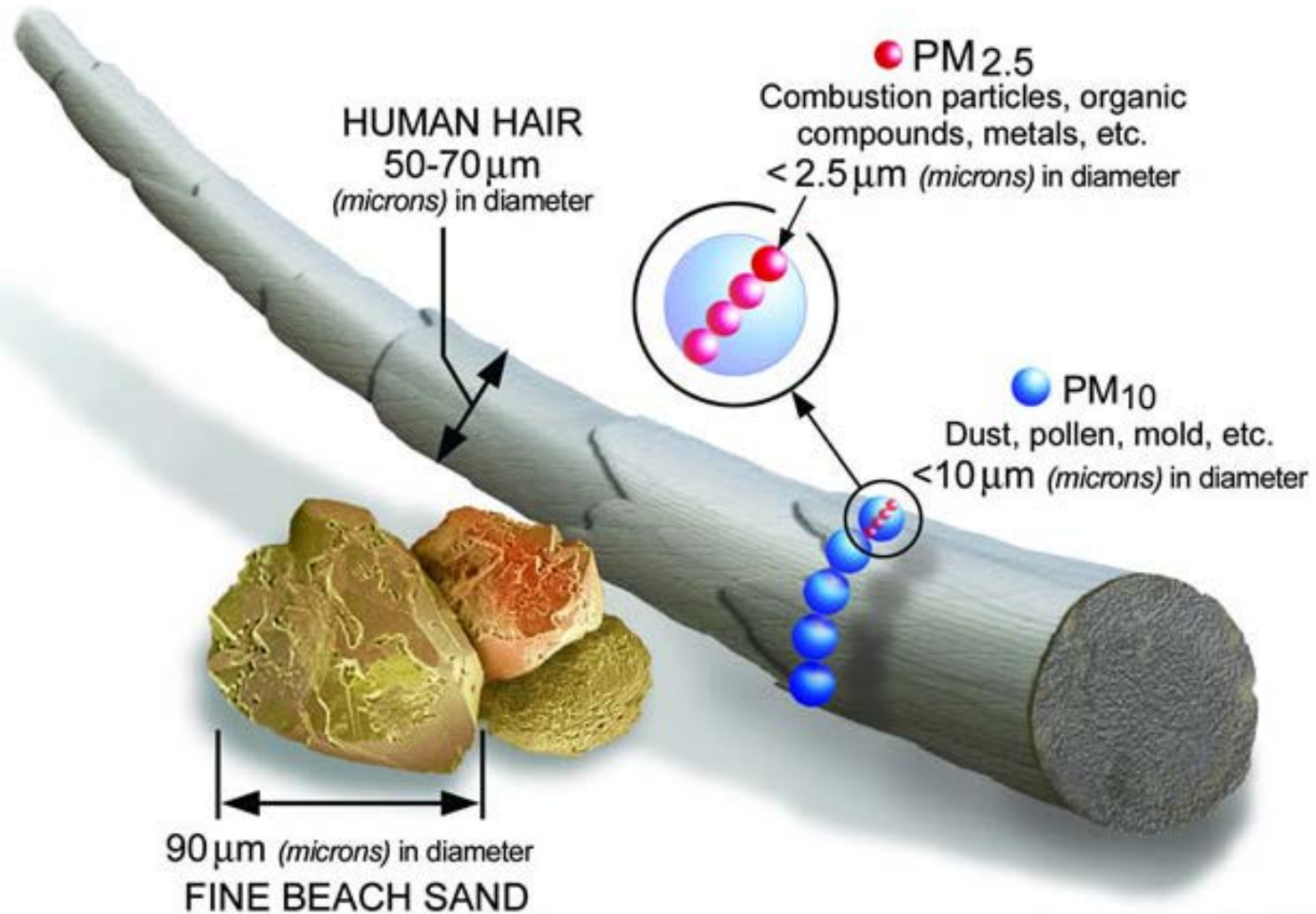


Image courtesy of the U.S. EPA

PM10 Methods

- Did not use Federal Reference Method so PM10 values not “official”



MetOne E-
BAM

BGI PQ-100
(unfortunately
had problems)

PM10 Methods

- In Palomas we used MiniVol PM10 with Teflon filters



Dust Inhalation Pathways

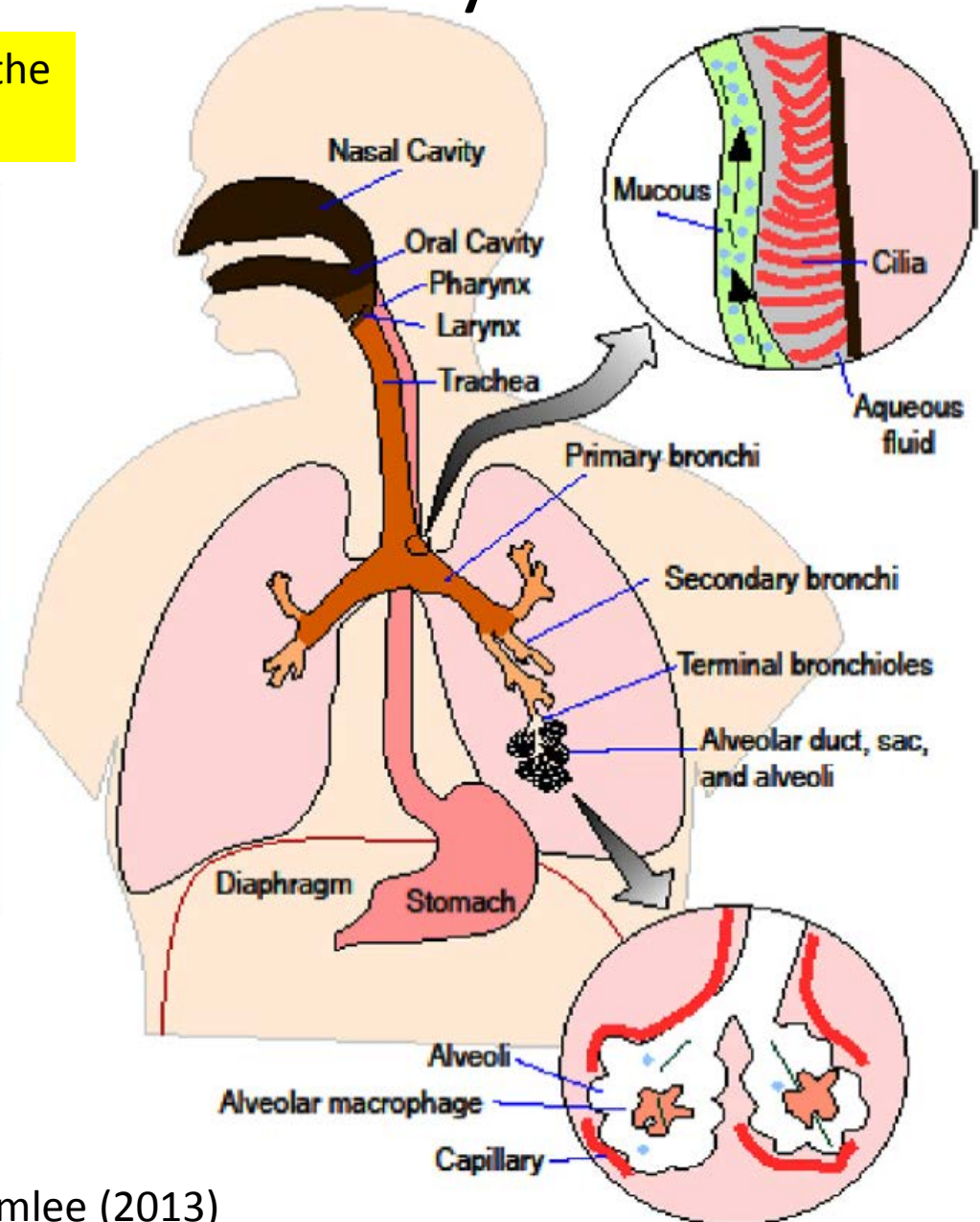
How far do the dust particles go into the lung?

Upper respiratory tract filters out large particles

Lower respiratory tract important for small particles

Approximate particle size deposition in respiratory tract (microns)

7-10
5-7
3-5
2-3
1.0-2.5
0.5-1.0



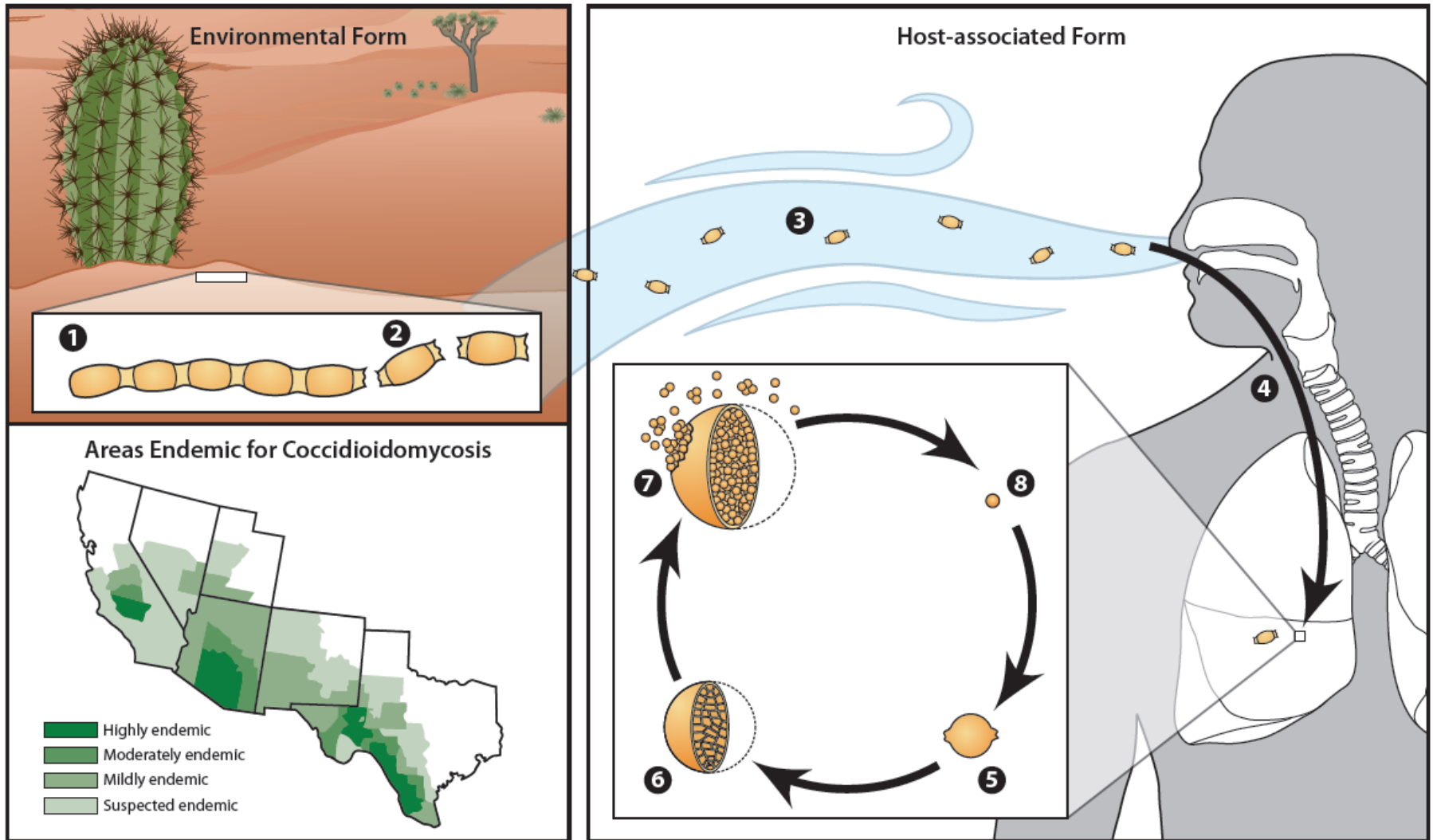
People Most Sensitive to Air Pollution

- Infants
- Children
- Elderly
- Asthmatics
- People with existing lung and heart disease, COPD, emphysema

Health Effects of Dust

- A recent study linking dust levels in El Paso with hospital admissions (Grineski et al. 2010)
 - Dust events were significantly associated with children's acute bronchitis admissions
 - Dust and low wind events were associated with increased odds of hospital admissions for asthma and acute bronchitis amongst all ages and children, and the same was true for adults and dust

Coccidioidomycosis “Valley Fever”



Cocci in New Mexico

- Expected that Coccidioidomycosis (Valley Fever) is underreported in New Mexico

- Misdiagnosed (pneumonia, COPD, bronchitis, asthma, TB, lung cancer)
- Ineffective treatments (often antibiotics)

- Education and awareness campaign for clinical providers in New Mexico and public

- Increase testing and diagnosis
- Increase reporting

Coccidioides endemic zone

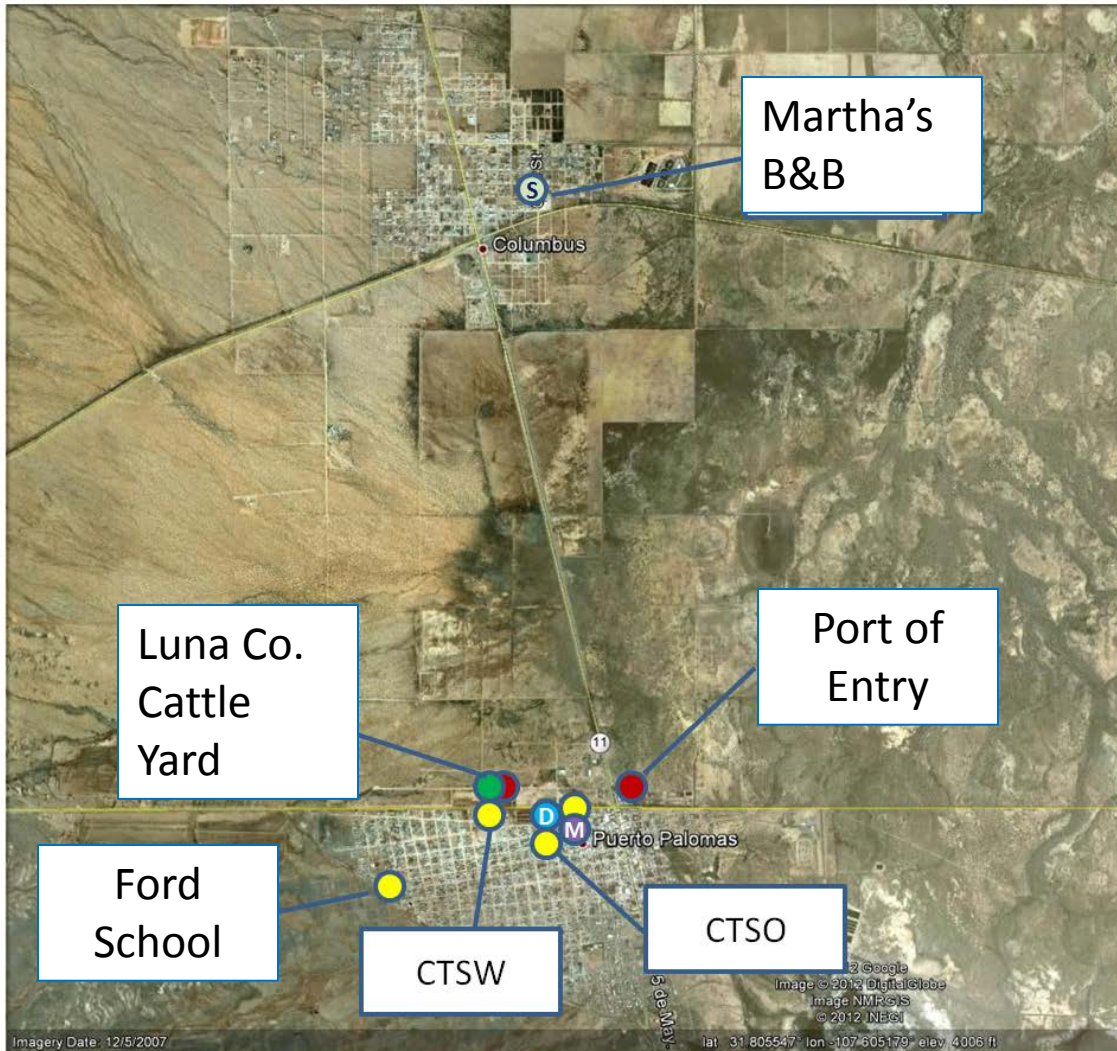


Fisher et al. 2007

Health, Safety, and Air Quality

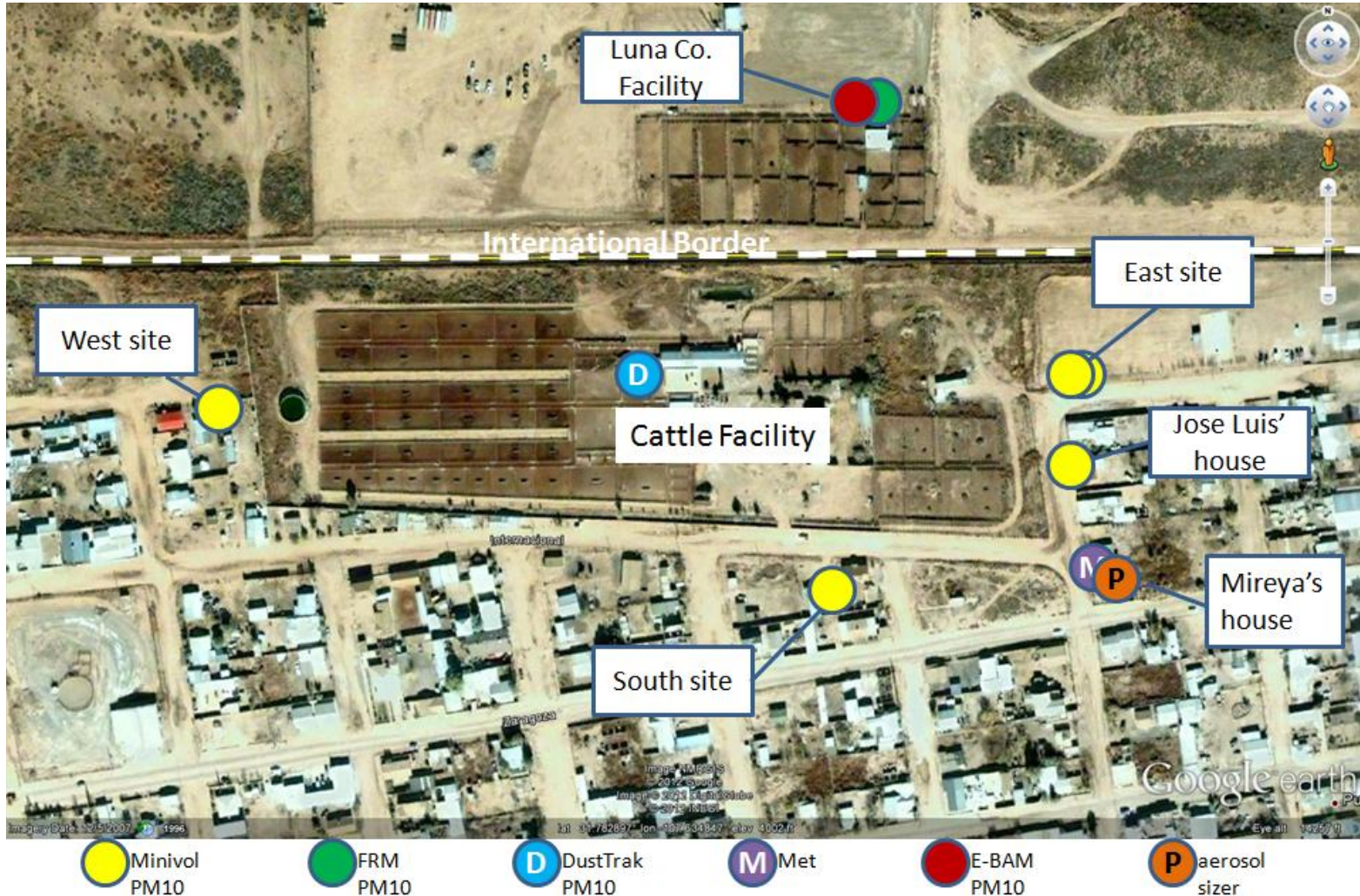
- Major Impacts to
 - Human health
 - Travel safety
 - Worker down time
- 2011 and 2012 had above average number of dust storms in southern NM and west TX
- March 18, 2012 storm was worst since 2003
 - More than 10x EPA standard for 24-hour PM₁₀ in Dona Ana County

Dust and Weather Stations

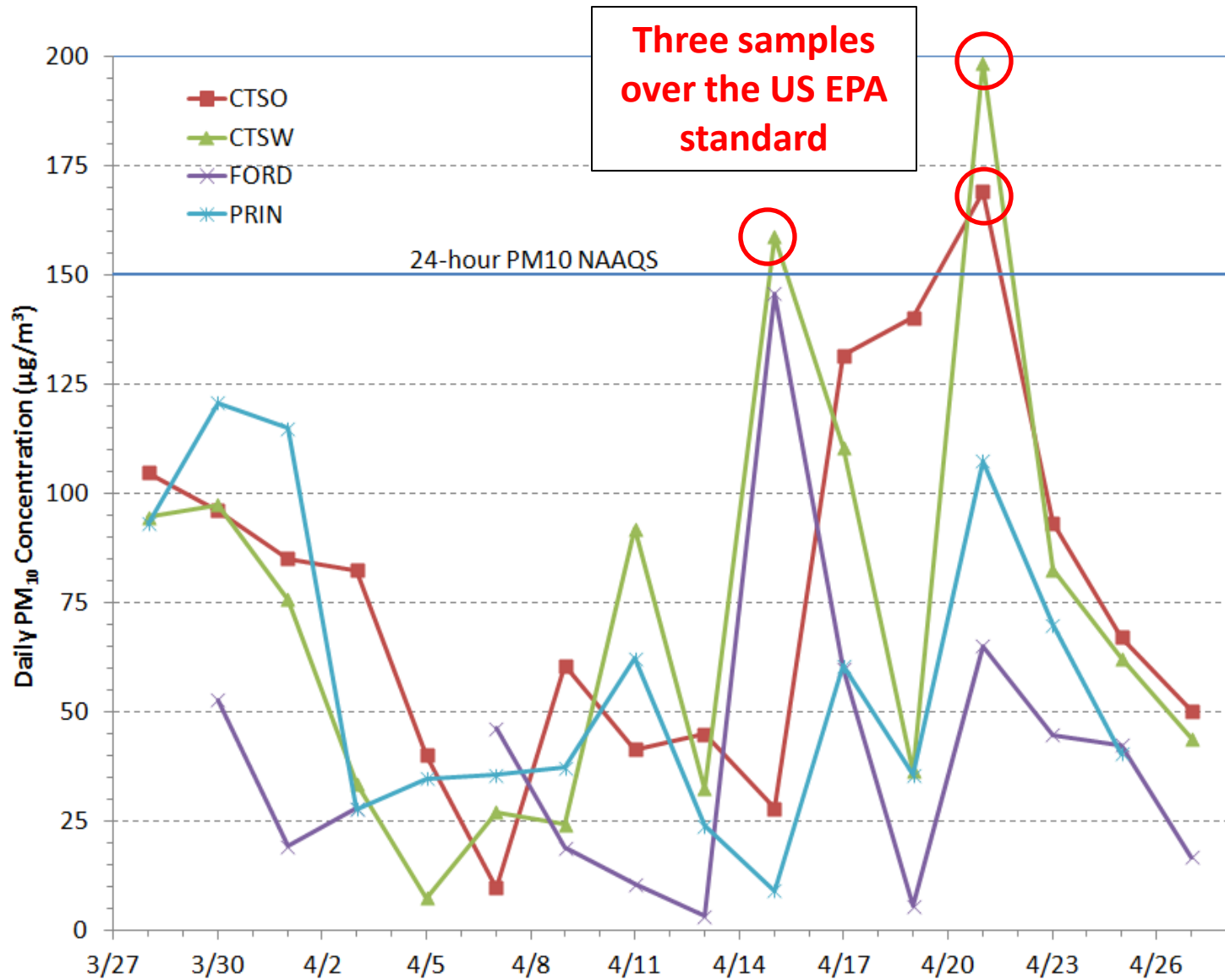


- Minivol PM₁₀
- FRM PM₁₀
- DustTrak PM₁₀
- Met
- E-BAM PM₁₀
- Satellite site (met + sizer)

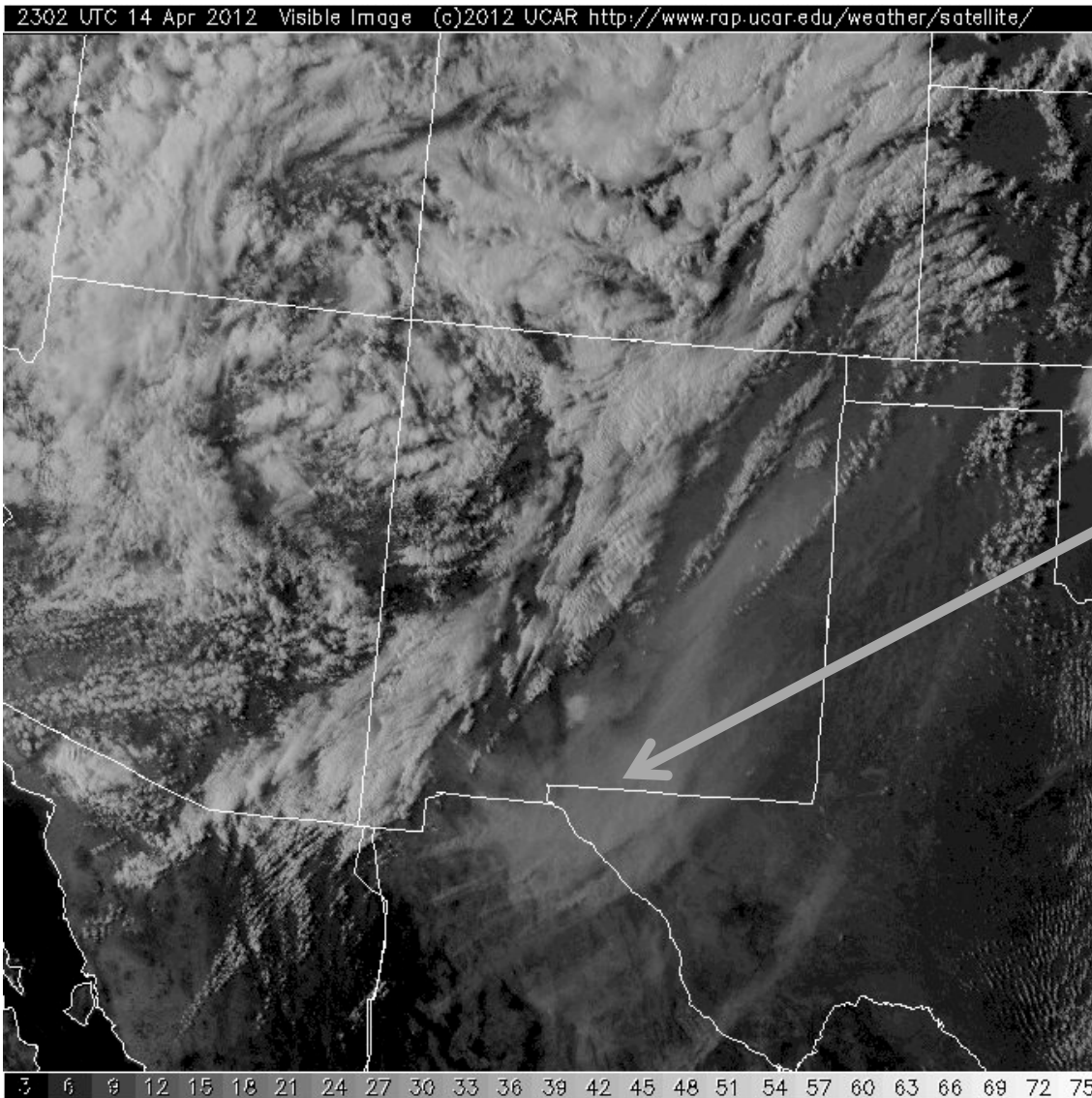
Dust Collection Locations



Palomas PM10



April 14, 2012 Storm



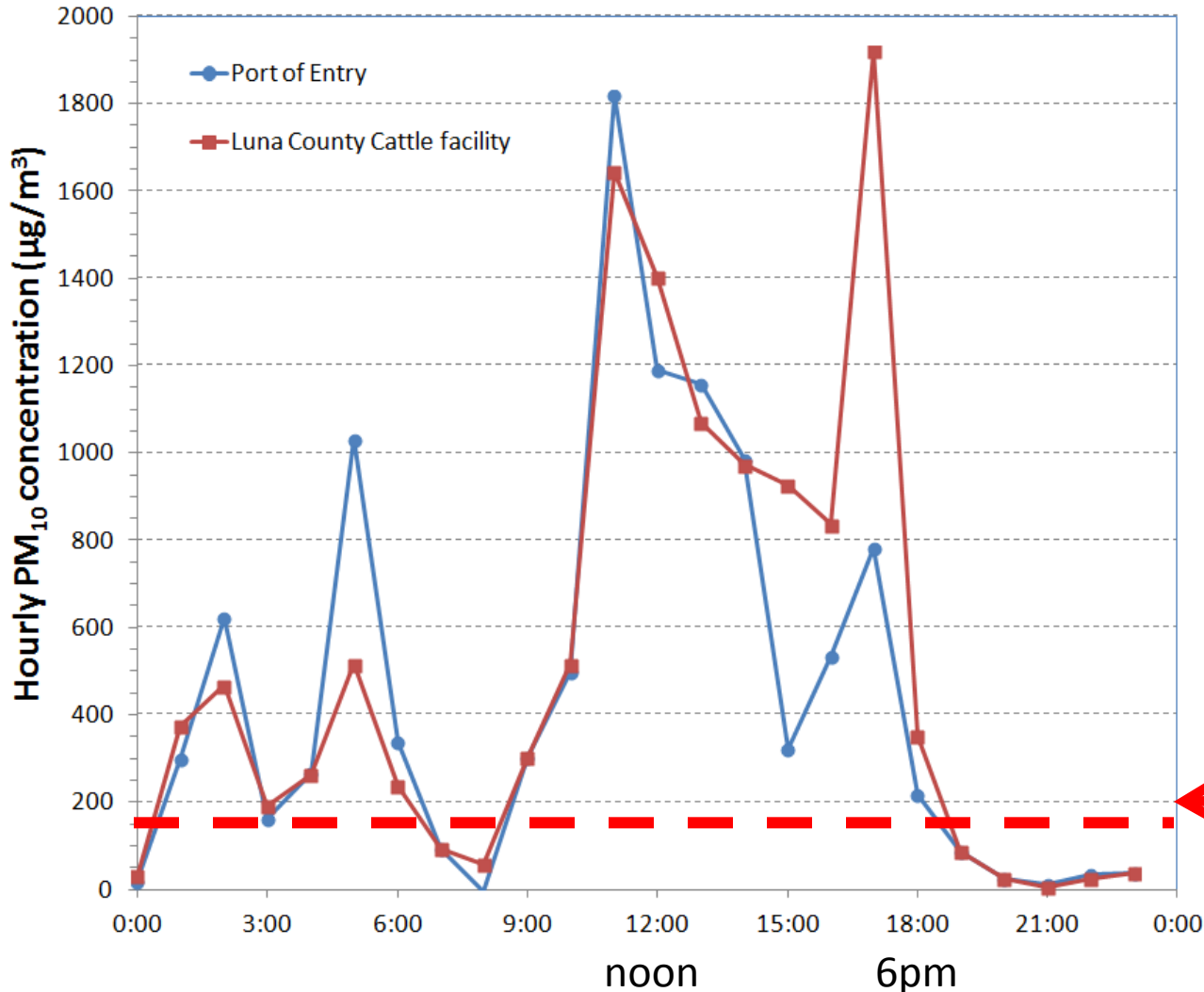
Satellite image of the afternoon of the 14th

Gray area is dust generated by the high winds

PM10 was 340% of standard at Luna County cattle yard

301% of standard at Columbus Port of Entry

April 14, 2012 Storm



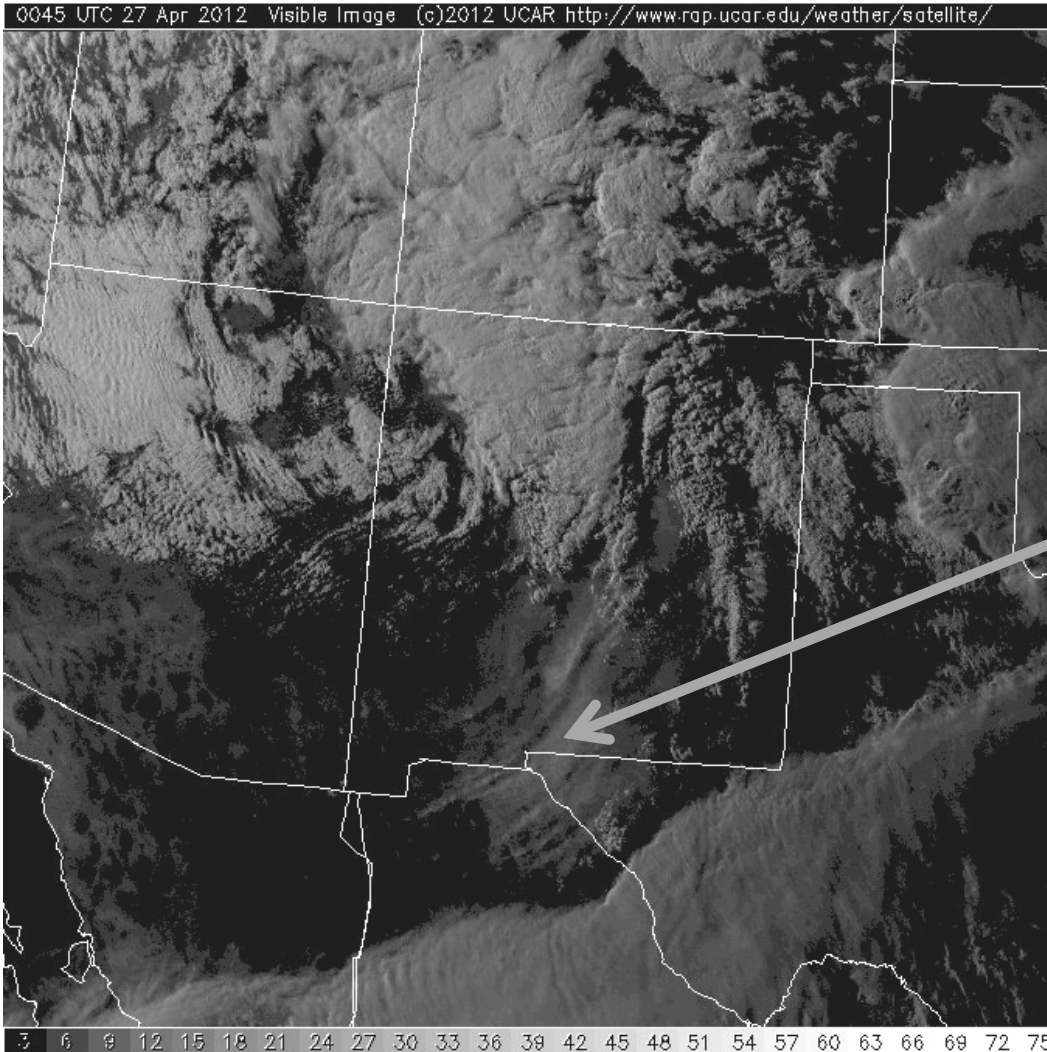
PM10 measurements in Luna County

Red = County cattle yard (24-hr average 515 $\mu\text{g}/\text{m}^3$)

Blue = US Port of Entry (451 $\mu\text{g}/\text{m}^3$)

US EPA air quality standard

April 26, 2012 Storm



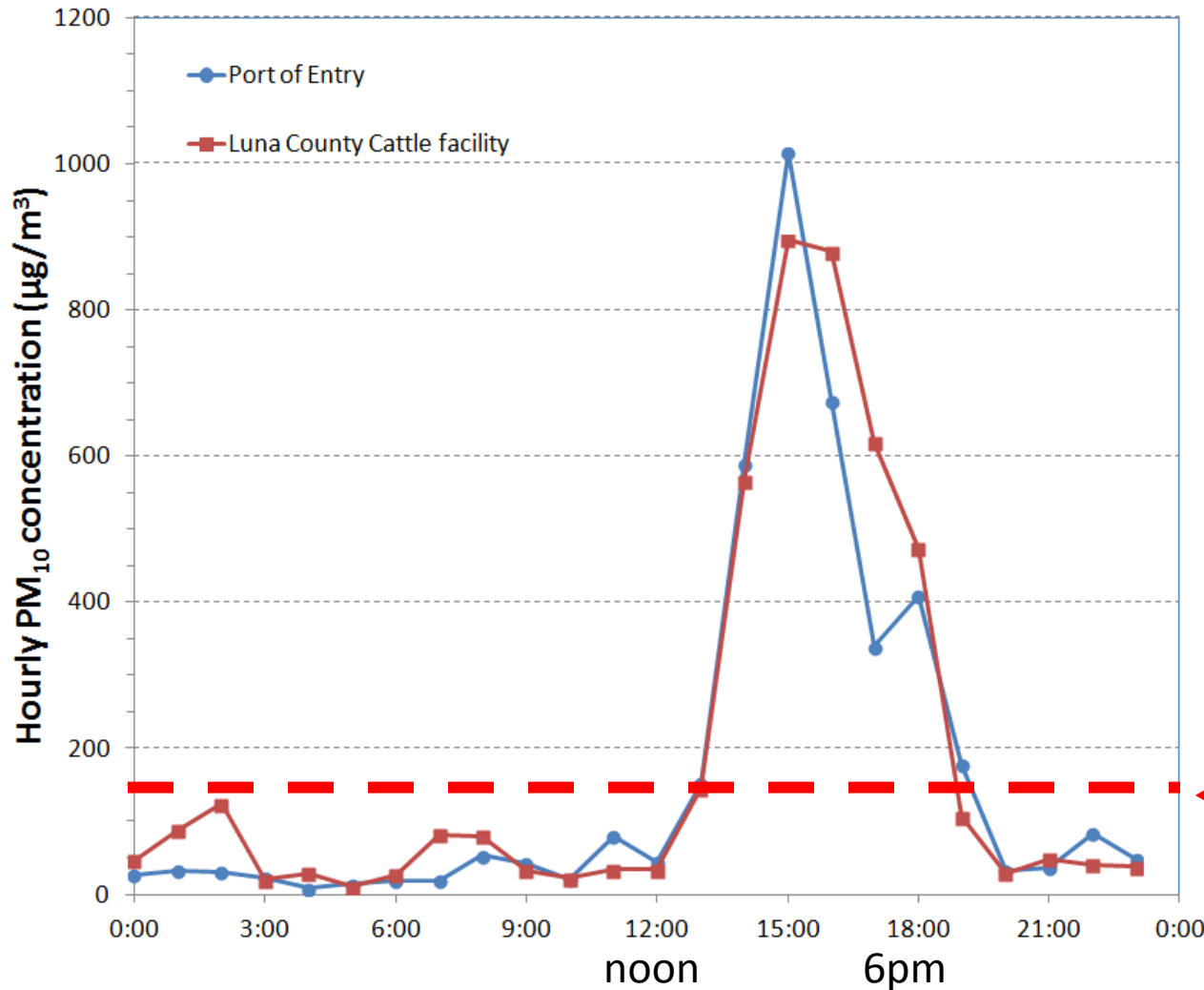
Satellite image of the afternoon of the 14th

Gray area is dust generated by the high winds

PM10 was 124% of standard at Luna County cattle yard

110% of standard at Columbus Port of Entry

April 26, 2012 Storm



PM10 measurements in Luna County

Red = County cattle yard (24-hr average 186 µg/m³)

Blue = US Port of Entry (165 µg/m³)

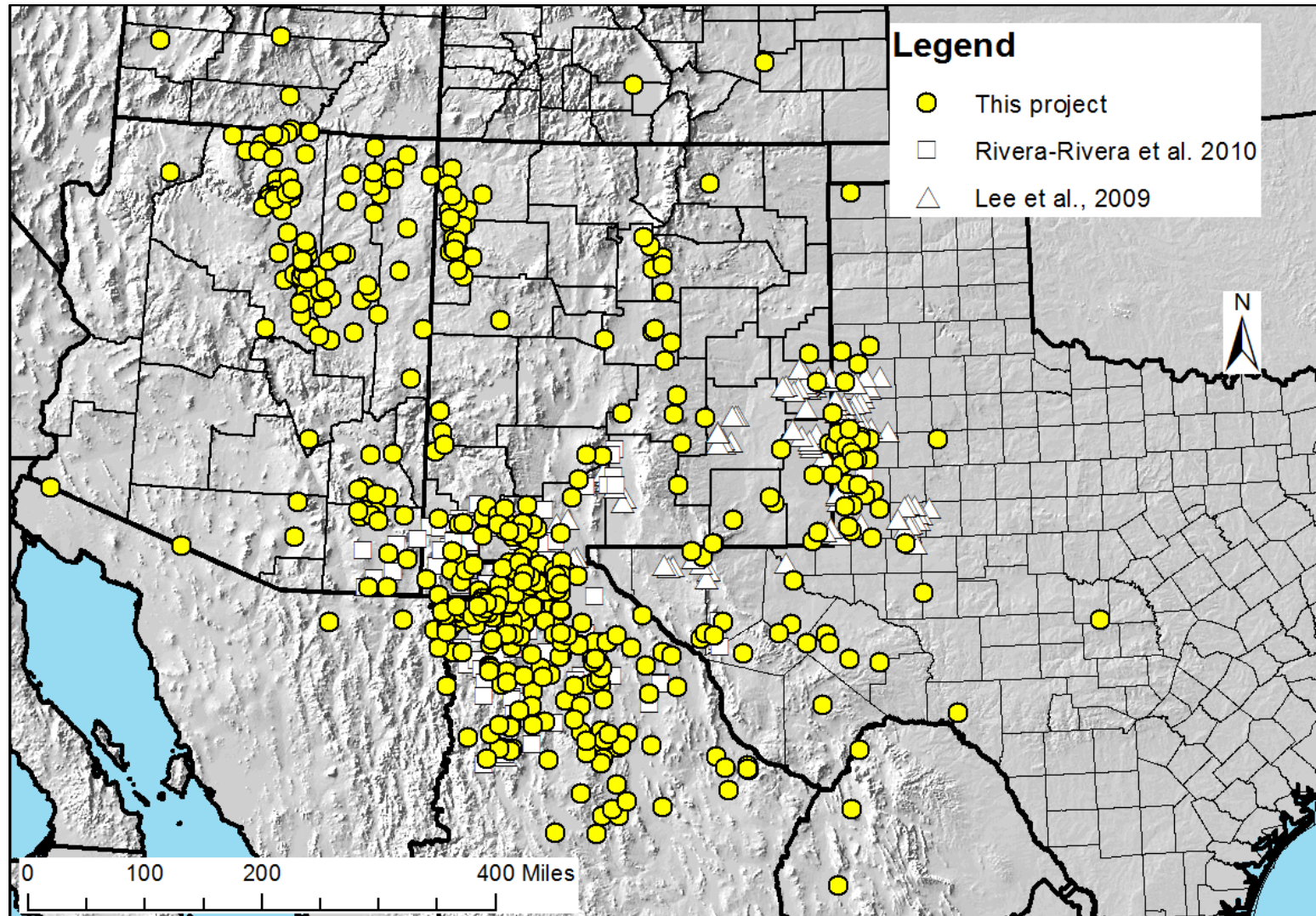
US EPA air quality standard



Next Steps

- Establish routine monitoring in Palomas
- Continue to map dust sources over Northwestern Chihuahua and Southwest New Mexico using satellite
- Evaluate and test dust mitigation options for the region
- Education

Mapping Wind Blown Dust Sources



Education blog: nmborderaq.blogspot.com

NM Border Air Quality Blog

Office of Border Health
HEALTH

SUNDAY, MAY 29, 2011

May 29

We saw high winds, windblown dust, and smoke plumes across the region today. Below was the RUC modeled southwesterly winds at 6 pm.

Southern New Mexico was covered with both dust and smoke plumes. At the end of the day the smoke plumes from the Horseshoe 2 Fire and fires in Chihuahua were blowing across the region.

Looking from space there was a lot of action today. First smoke plumes from the wildfires. Then there was the dust from the high winds. On top of that there was the smoke plume that was transported from

SPONSOR

This blog is part of an air quality study funded by the NM Dept. of Health, Office of Border Health. The mission of the Office of Border Health is the improvement of the health status and health services in the New Mexico/Mexico Border Region and other border-impact areas of the State.

PURPOSE

The blog documents air quality and meteorological conditions within the region. We try to document items of interest and summarize air quality levels on a daily basis.

One of the study's goals is to establish and operate an effective regional binational air quality monitoring network and develop a series of specific studies that will form the basis for the comprehensive Assessment of Land-based Sources of Air Quality Contaminants in the Binational Border Region of Southwestern New Mexico, Northwestern Chihuahua and West Texas. More information about the study can be found on our project management website.

I welcome your observations and comments.

BLOG ARCHIVE

- ▶ 2012 (20)
- ▼ 2011 (228)
 - ▶ December (22)
 - ▶ November (12)
 - ▶ October (17)

Recommendations

- Unpaved road mitigation
 - Pave main roads first
 - Prioritize based on traffic counts
 - Estimate cost & longevity of alternative controls
- Soil stabilization
 - Revisit previous land-use inventory
 - Address larger undeveloped lots first
- Wind Breaks
 - Around schools

Recommendations

- Continue monitoring in Columbus
- Expand weather and air quality network
 - Start with collecting weather data
 - Started with station in Columbus
 - Work on collecting weather data in Palomas
 - Opportunity to expand CoCoRaHS
 - Daily measurements of rain
 - 300+ observers across NM
 - Ready for volunteers in Mexico
 - Developing training materials in Spanish



What should you do?

- During dust storms
 - Limit time outside of house
 - Avoid strenuous work outside
 - Keep children inside
 - Keep windows closed
 - Remember pull aside and stay alive when driving
 - Minimize indoor pollutants during this time
- Plant native plants around where people live
- Avoid disturbing vegetation



Driving in a Dust Storm: What you should do to be safe!

Pull Aside and Stay Alive!

If you encounter extremely low visibility in a dust storm:

- 1. PULL OFF** the road as far as safely possible
- 2. LIGHTS OFF** (Turn OFF your headlights)
- 2. FOOT OFF** (Place the car in Park or engage the parking brake and take your foot **OFF** the brake pedal)

<http://www.pullasidestayalive.org/>



Image Source: KVOA News Channel 4

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<http://nmborderaq.blogspot.com>