Natural Resources and Sustainable Agricultural Systems Research

in the

Agricultural Research Service

Climate Change, Soils, and Emissions

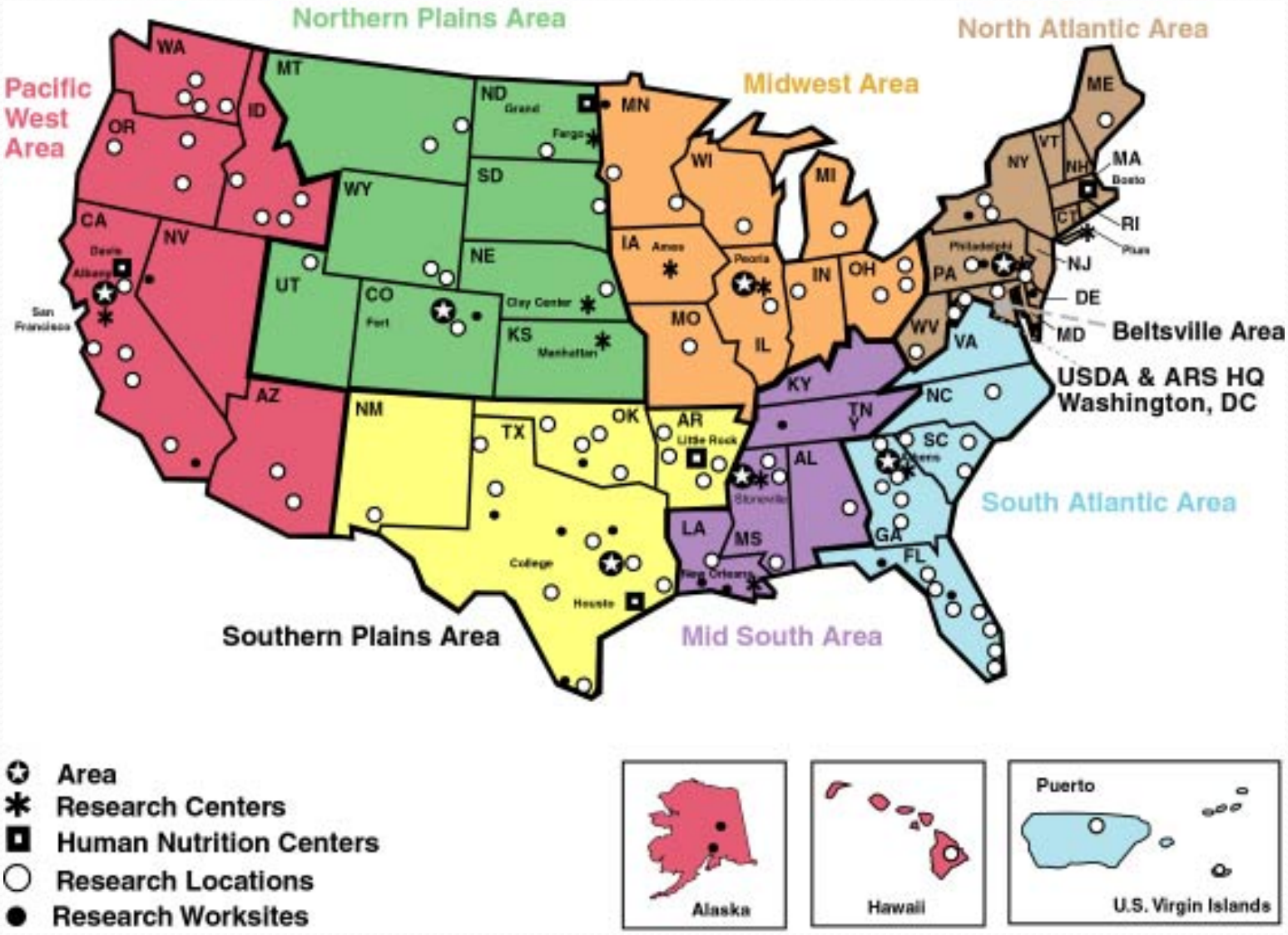
Greg Holt for Charlie Walthall

Natural Resources & Sustainable Agricultural Systems

USDA

ARS

ARS Locations



ARS National Programs

Program Planning and Evaluation

Chavonda Jacobs-Young

Associate Administrator

Natural Resources & Sustain. Agric. Sys. (~20%)

Currently Vacant

- Water Availability and Watershed Management
- Global Change, Soil and Emissions
- Bioenergy and Bioproducts
- Agricultural Waste and Byproduct Utilization
- Pasture, Forage and Range Land Systems
- Agricultural System Competitiveness and Sustainability

Crop Production & Protection (~35%)

Kay Simmons

- Plant, Microbial & Insect Germplasm Conservation & Development
- Plant Biological & Molecular Processes
- Plant Diseases
- Crop Protection & Quarantine
- Crop Production
- Methyl Bromide Alternatives

Animal Production & Protection (~15%)

Steven Kappes

- Food Animal Production
- Animal Health
- Arthropod Pests of Animals and Humans
- Aquaculture

Nutrition, Food Safety & Quality (~30%)

Currently Vacant

- Human Nutrition
- Food Safety
- New Uses, Quality & Marketability of Plant & Animal Products

ARS Research Program Management

- Role of the Office of National Programs
  - Research relevance
  - Program coordination
  - Program impact
- Role of the Area Offices
  - Prospective quality assurance
  - Project and resource management

Benefits of National Programs

- Coordination
- Communication
- Efficient use of resources
- Results

Climate Change, Soils, and Emissions

Total Projects: 35
Total Locations: 29
Total Scientists: 98

- **Enable Improvements of Air Quality via Management and Mitigation of Emissions from Agricultural Operations**
- **Develop Knowledge and Technologies for Reducing Atmospheric Greenhouse Gas Concentrations Through Management of Agricultural Emissions and Carbon Sequestration**
- **Enable Agriculture to Adapt to Climate Change**
- **Maintain and Enhance Soil Resources**

Air Quality







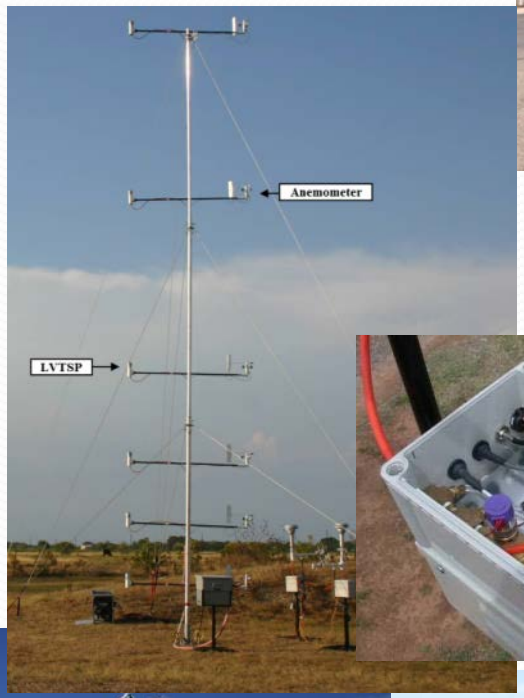

Cotton Gin Sampling Project Objectives

- Develop $PM_{2.5}$ emission factors and verify current PM_{10} & TSP emission factors for cotton gins.
- Development of PM data sets that can be used in the design, development, and evaluation of current and future air quality dispersion models.
- Characterize the PM emitted from cotton gins across the cotton belt in terms of particle size distribution, particle density, and particle shape.
- Collect field data for comparison of PM_{10} and $PM_{2.5}$ EPA federal reference method data from stack and ambient sampling versus particle size distribution analyses.

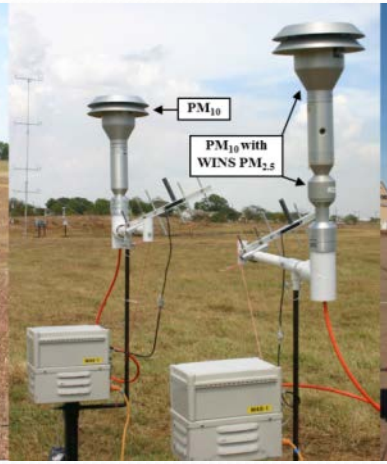
National Collaborators

- Gin Labs
  - Derek Whitelock – Mesilla Park
  - Clif Boykin – Stoneville
  - Greg Holt – Lubbock
- Oklahoma State University
  - Michael Buser
- Texas A&M University
- Texas, California, Southern, Southeastern, and National Ginners Associations
- Cotton Incorporated
- Cotton Foundation
- Primary and alternate gins selected for the study
- California Air Resources Board
- San Joaquin Valley Air Pollution Control District
- Texas Commission on Environmental Quality
- Missouri Department of Environmental Quality
- North Carolina Department of Environmental Quality
- NRCS Air Quality and Climate Change Unit in Portland, OR
- USDA-ARS Aerial Application Unit in College Station, TX
- EPA (National, Region 9, and Region 4)

Resources

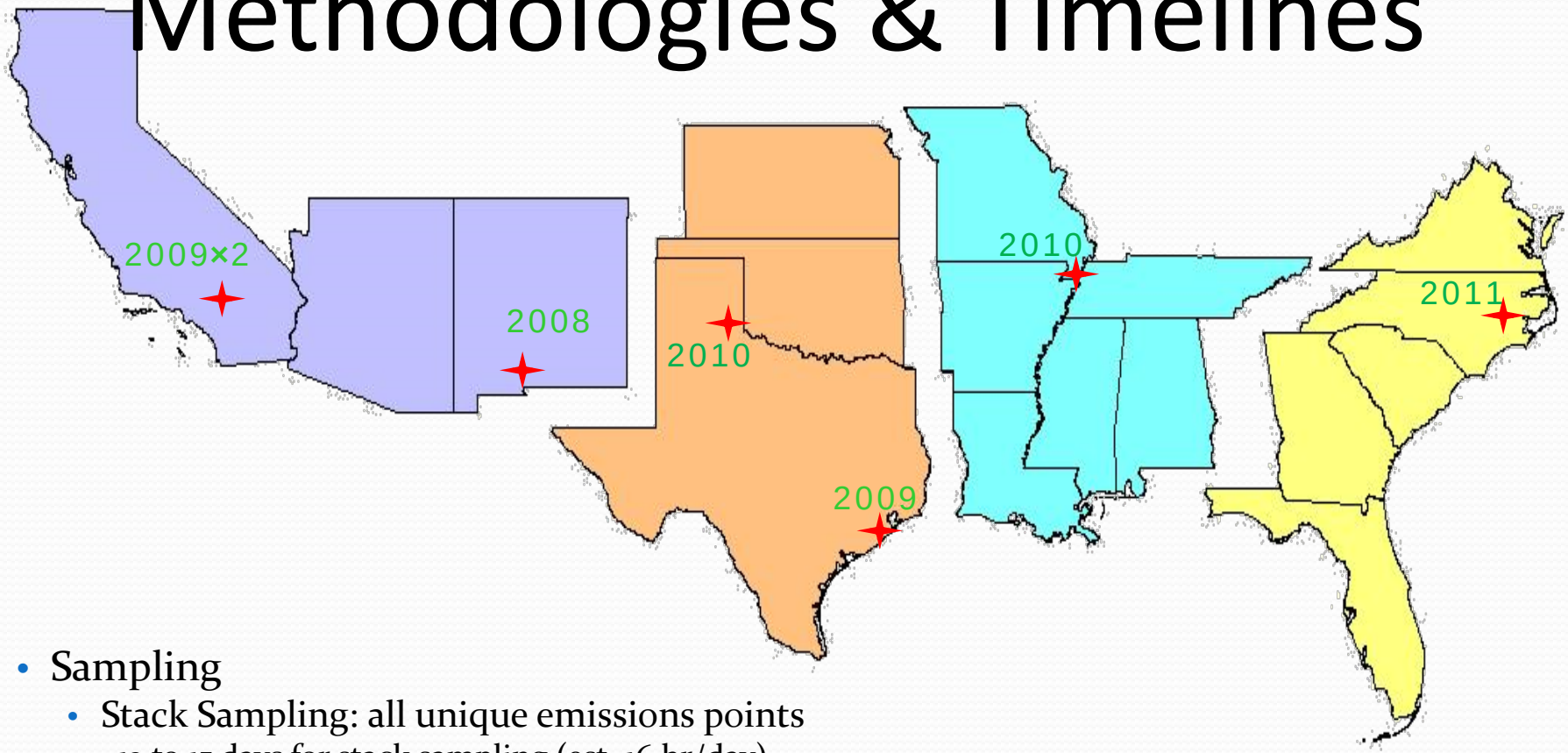

Anemometer
LVTSP


LVTSP


PM10
PM10 with WINS PM2.5

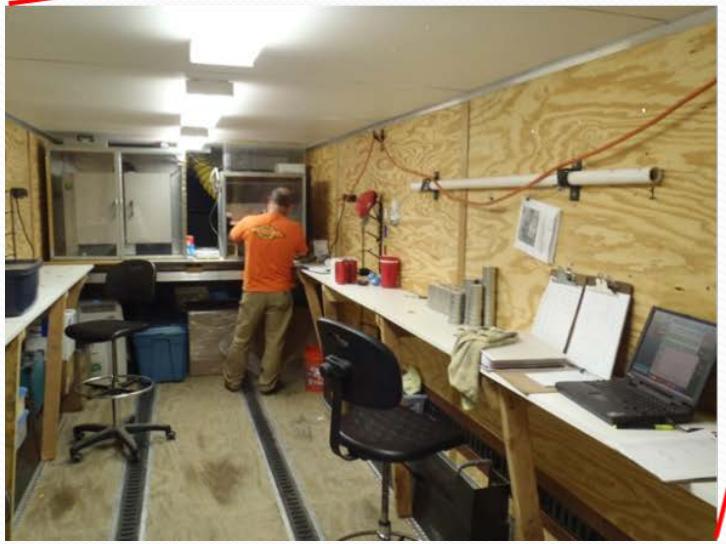

PM10 with VSCC PM2.5

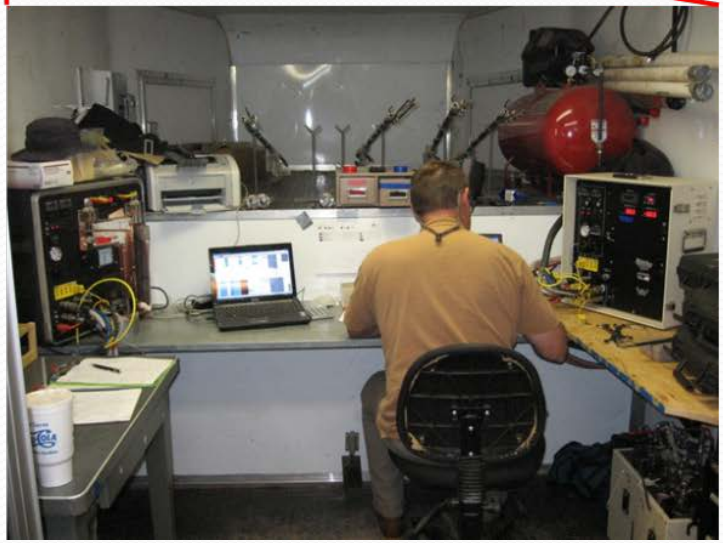
Methodologies & Timelines



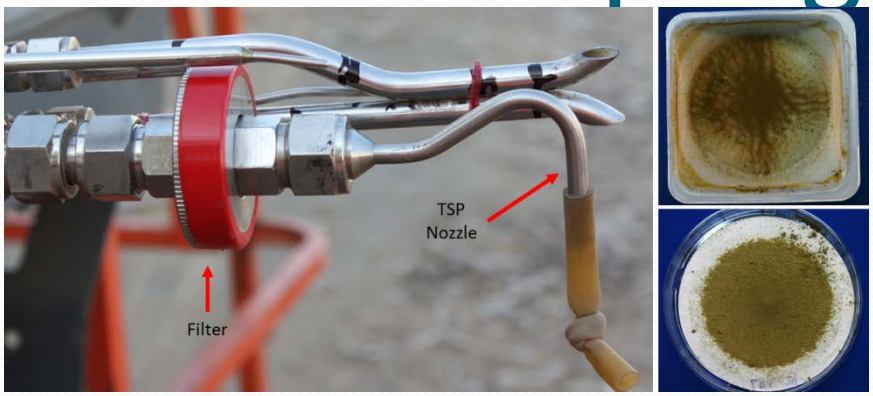
- Sampling
  - Stack Sampling: all unique emissions points
    12 to 15 days for stack sampling (est. 16 hr/day)
  - Ambient Sampling: 125 sampling point array
    - 10 to 15 days (~24 hr/day)
  - Ambient and stack sampling will overlap

Stack Sampling

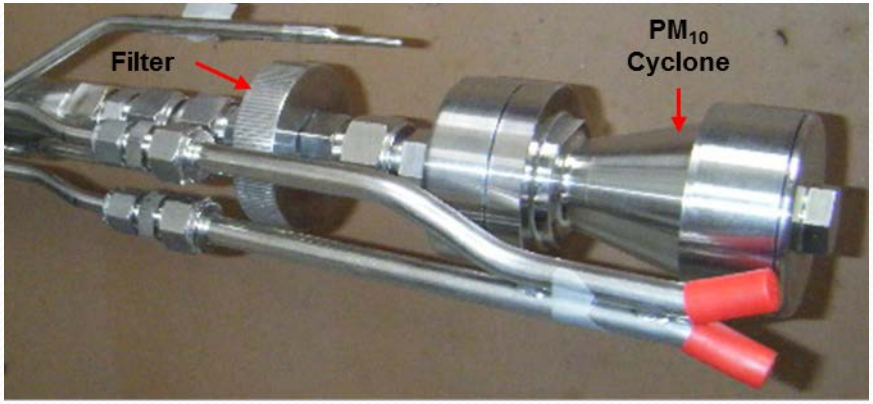


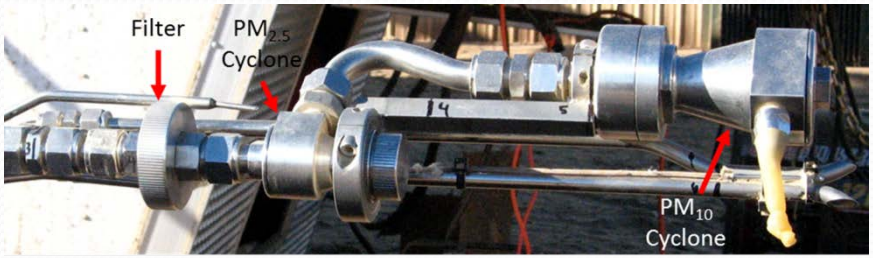


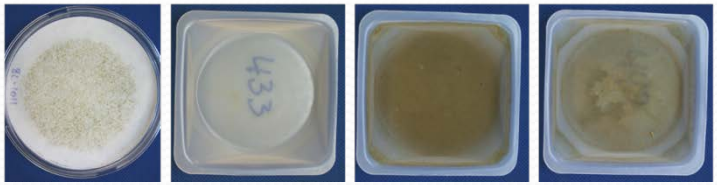
Stack Sampling



Total Particulate - Method 17





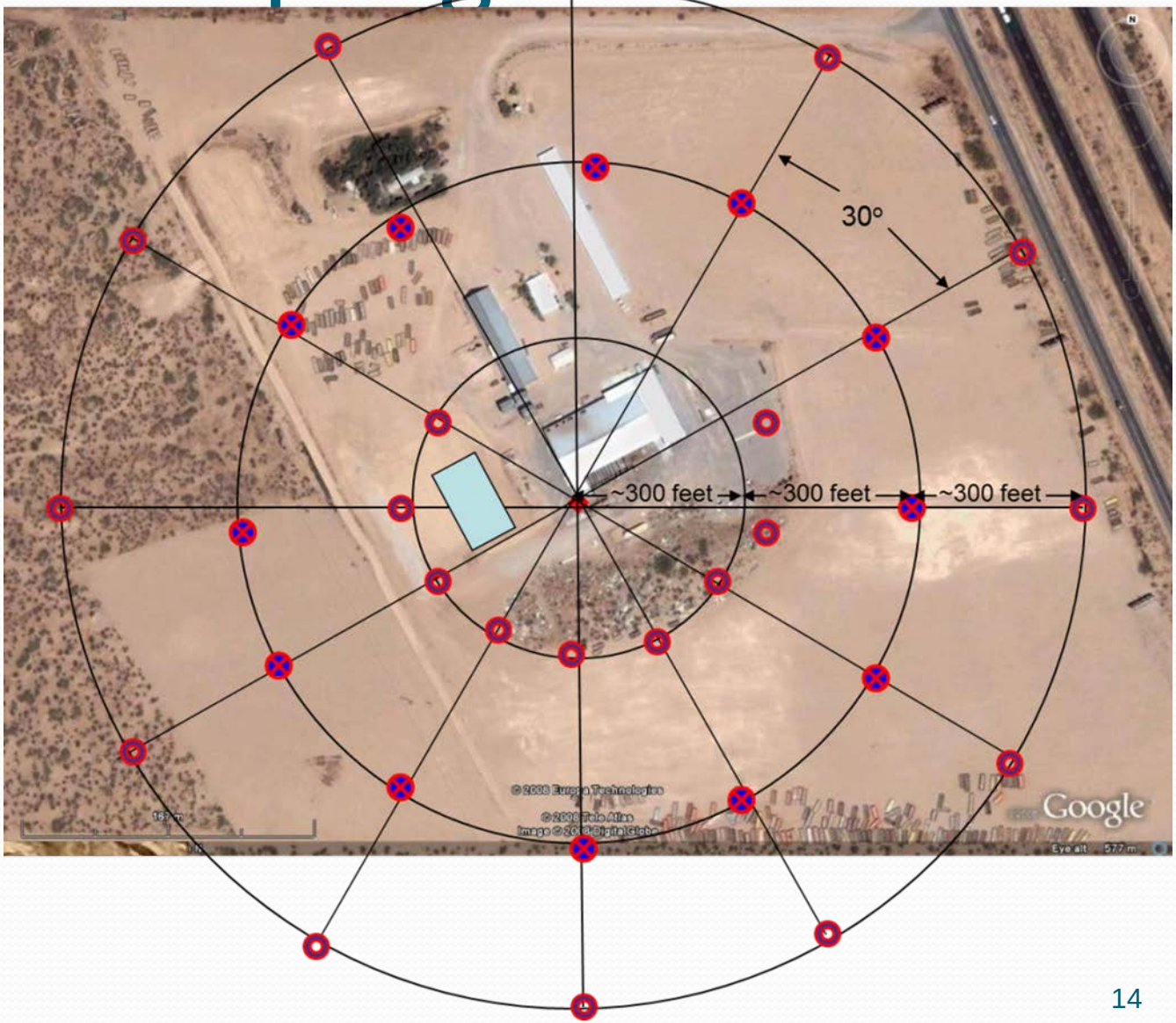


$PM_{2.5}$ – OTM 27

PM_{10} – Method 201A

Ambient Sampling

- **Tower Sampler**
- **Stand Alone Sampler**



2 Tower Sites:

1 – TEOM

2 – PM10 Samplers

2 – PM2.5 Samplers

1 - Tower

2 Tower Sites:

1 – TEOM

1 – PM10 Sampler

1 – PM2.5 Sampler

1 - Tower

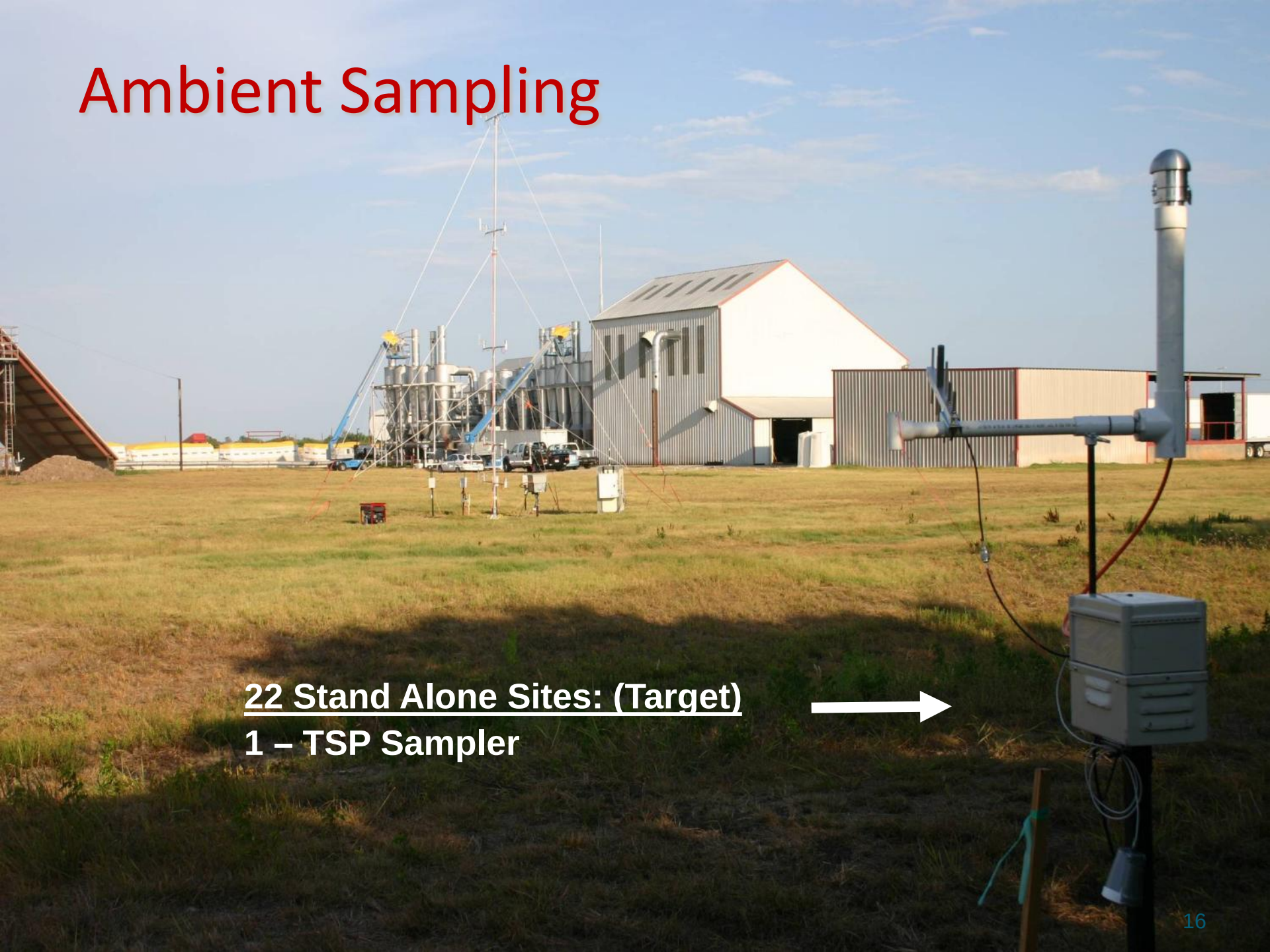
8 Tower Sites:

1 – PM10 Sampler

1 – PM2.5 Sampler

1 - Tower

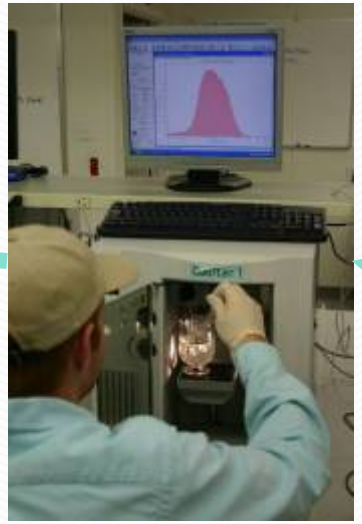
Ambient Sampling

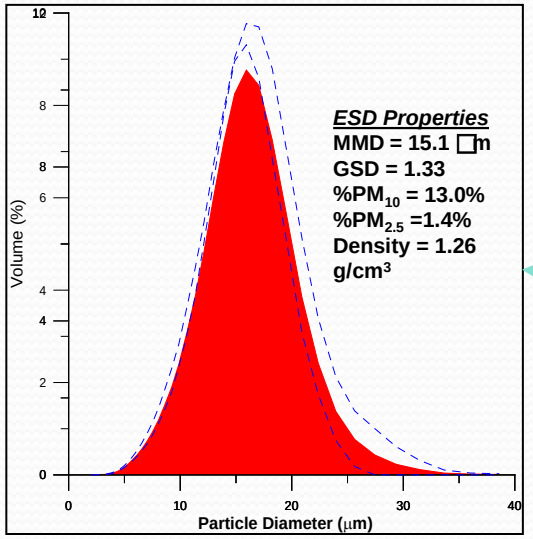


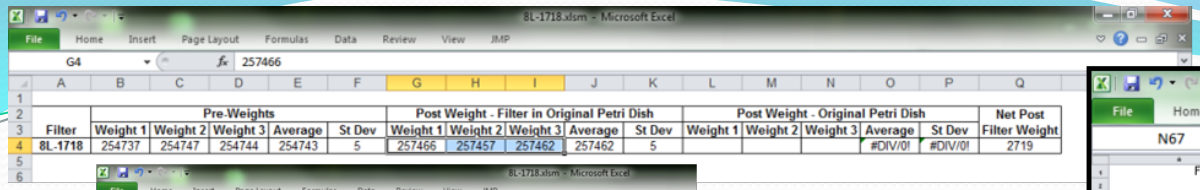
<u>22 Stand Alone Sites: (Target)</u>

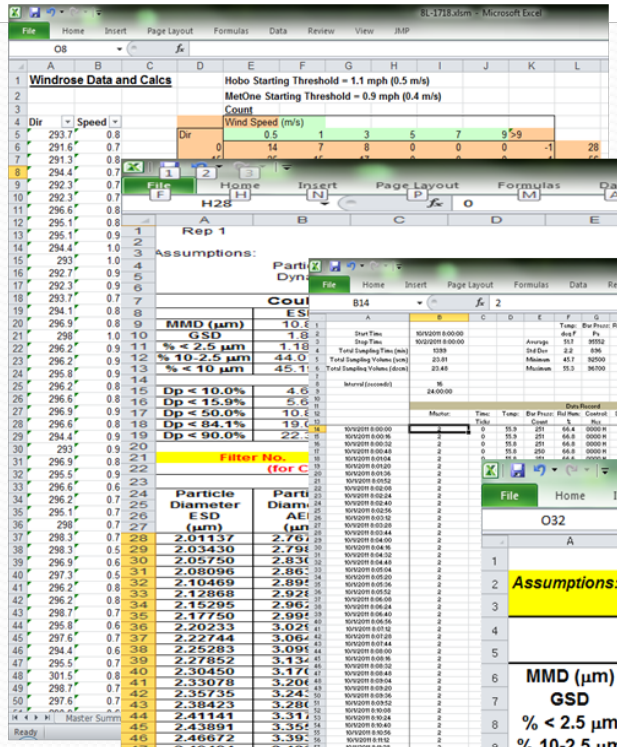
1 – TSP Sampler

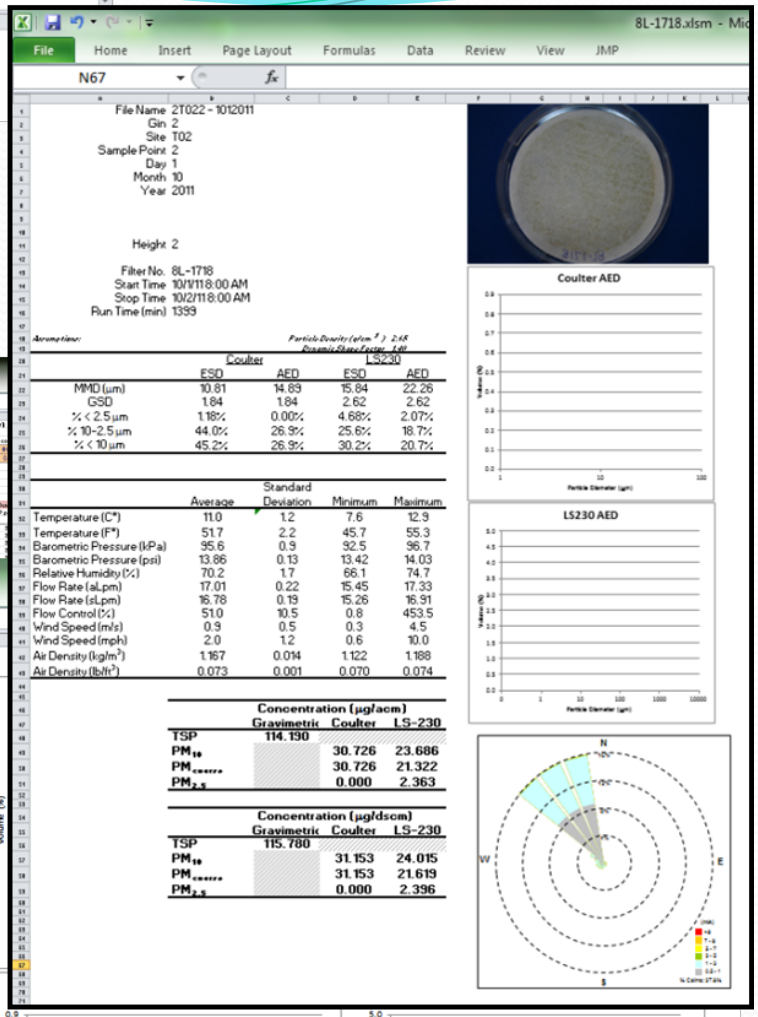
Laboratory Analyses

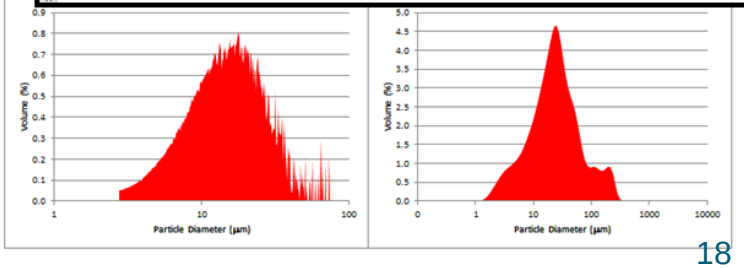












Ambient Data ~8000 Total

Emission Factors (lb/bale)

Total

	Gin
Test	1.743
AP42	2.4
Difference	
Test-AP42	-27%

PM_{10}

	Gin
PSD	0.660
Test	0.987
AP42	0.82
Difference	
Test-AP42	20%
PSD-Test	-33%
PSD-AP42	-20%

$PM_{2.5}$

	Gin
PSD	0.044
Test	0.148
CA Estimate 36% of Total	0.861
Difference	
Test-CA	-83%
PSD-Test	-70%
PSD-CA	-95%

Output and Results (stack & ambient)

- 17 pubs – JCS special edition (PM 2.5) – Anytime
- 17 pubs – PM10 – should be accepted this month
- 17 pubs – TSP – out for review
- 17 pubs – PSD's, submitted by end of Jan.
- Comparison Data pubs upcoming
- Finish ambient data checks (met data, sampler flow, processing rate of gin, PSD and gravemetric)
- Comparison – models vs. measured (in discussion)
- Texas made changes in air permits based on PSD data
- SJV – recommended no additional action for cotton gins (PM2.5)

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