



Area Designations for the 2012 Annual Fine Particulate Matter ($PM_{2.5}$) Standard

Texas Commission on Environmental Quality
Office of Air

Houston Area Public Information Meeting
July 22, 2013



Overview

- Revised PM_{2.5} National Ambient Air Quality Standard (NAAQS)
- 2010 through 2012 PM_{2.5} Design Values
- Exceptional Events
- Local PM Reduction Efforts
- Designations Process and Timeline
- TCEQ Commissioners' Agenda



Revised PM_{2.5} NAAQS

- Final rule promulgated on December 14, 2012
- Previous NAAQS
 - Primary and Secondary Annual: 15.0 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)
 - Primary and Secondary 24-Hour: 35 $\mu\text{g}/\text{m}^3$
- Revised NAAQS
 - **Primary Annual: 12.0 $\mu\text{g}/\text{m}^3$**
 - **Secondary Annual: 15.0 $\mu\text{g}/\text{m}^3$ (retain previous NAAQS)**
 - **Primary and Secondary 24-Hour: 35 $\mu\text{g}/\text{m}^3$ (retain previous NAAQS)**



Calculating PM_{2.5} Design Values

- Design values are calculated for each monitor in an area.
- The monitor with the highest design value will set the area design value.
- Annual PM_{2.5} NAAQS Design Value Calculation:
 1. Average the 24-hour PM_{2.5} values from each quarter within a year.
 2. Average the quarterly averages to obtain a yearly average.
 3. Average the yearly average from three consecutive years to obtain the design value.



Calculating PM_{2.5} Design Values

- 24-Hour PM_{2.5} NAAQS Design Value Calculation:
 1. Find the 98th percentile of 24-hour PM_{2.5} values from each year.
 2. Average the 98th percentile values from three consecutive years to obtain the design value.
- Data must meet the EPA's data completeness and certification requirements to represent a design value that is comparable to the NAAQS.
<http://www.gpo.gov/fdsys/pkg/FR-2013-01-15/pdf/2012-30946.pdf>



Calculating Annual PM_{2.5} Design Values: An Example

- All numbers in µg/m³:
 - A monitor has 30, 24-hour average, PM_{2.5} samples for each quarter of 2012, the average of quarter one would be:

$$\frac{(30 + 24 + 10 + 15 + 12 + 14 + 21 + \dots)}{30} = 12.96$$

- Take the average from each quarter and average those together to get the 2012 average:

$$\frac{(12.96 + 11.08 + 12.07 + 10.96)}{4} = 11.7675$$

- Take the yearly average from 2012, 2011, and 2010 to get the 2012 design value:

$$\frac{(12.0496 + 10.8945 + 11.7675)}{3} = 11.5706$$

- Round to one decimal place (0.05 rounds up and 0.049 rounds down)

2012 Annual PM_{2.5} Design Value = 11.6



Calculating 24-Hour PM_{2.5} Design Values: An Example

- All numbers in $\mu\text{g}/\text{m}^3$:
 - Rank all 24-hour PM_{2.5} averages for each year from highest to lowest:

2010 (100 Values)	2010 Rank	2011 (110 Values)	2011 Rank	2012 (104 Values)	2012 Rank
24	1	10	1	15	1
28	2	20	2	18	2
⋮	⋮	⋮	⋮	⋮	⋮
44	98	35	108	26	102
48	99	38	109	28	103
50	100	40	110	30	104

- Find the 98th percentile by multiplying the number of values from each year by 0.98 and adding 1 to the integer of the result.

$$\text{For 2012: } 104 \times 0.98 = 101.92$$
$$101 + 1 = 102$$



Calculating 24-Hour PM_{2.5} Design Values: An Example

- Find the value from each year that corresponds to each rank:

2010 Rank 99 = 48

2011 Rank 108 = 35

2012 Rank 102 = 26

- Average the three years together to get the design value:

$$\frac{(48 + 35 + 26)}{3} = 36.333$$

- Round to the nearest 1 (0.5 rounds up and 0.49 rounds down)

2012 24-Hour PM_{2.5} Design Value = 36



2012 PM_{2.5} Design Values (DV)

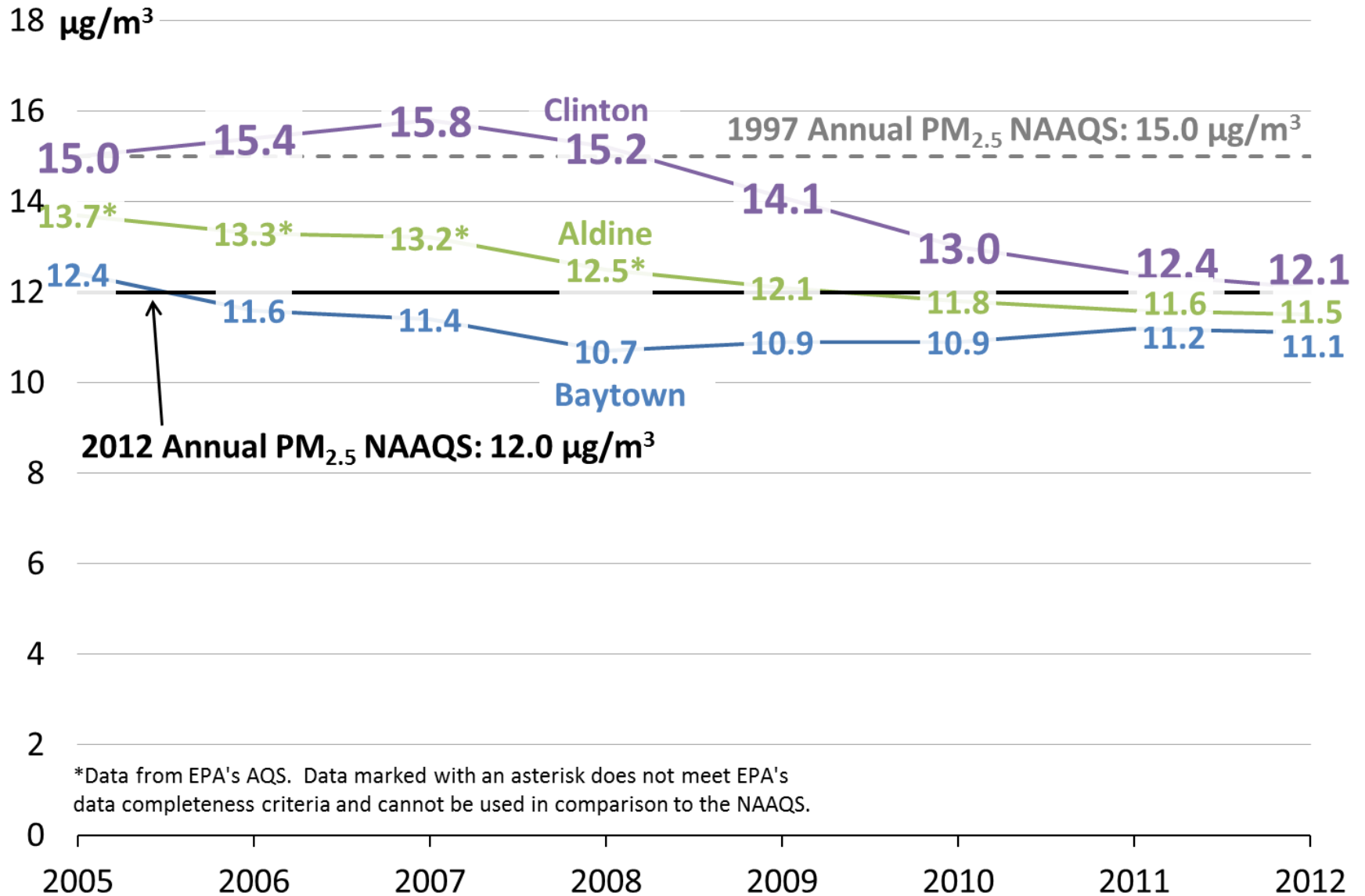
CBSA	County	Number of 2012 FRM* Monitors	Annual Design Value µg/m ³	24-Hour Design Value µg/m ³	Monitors with Annual Design Value Above 12.0 µg/m ³
			(Standard: 12.0 µg/m ³)	(Standard: 35 µg/m ³)	
Austin-Round Rock	Travis	2	10.2	21	0
Corpus Christi	Nueces	2	10.4	30	0
Dallas-Fort Worth-Arlington	Dallas	2	10.8	21	0
Dallas-Fort Worth-Arlington	Ellis	1	10.0	21	0
Dallas-Fort Worth-Arlington	Tarrant	2	10.7	22	0
El Paso	El Paso	2	10.8	30	0
Houston-The Woodlands- Sugar Land	Harris	3	12.1**	24	1**
McAllen-Edinburg-Mission	Hidalgo	1	10.3	23	0
San Antonio-New Braunfels	Bexar	2	9.0	23	0
Texarkana	Bowie	1	11.1	21	0
Marshall	Harrison	1	10.9	22	0

* FRM: Federal Reference Method

** Includes exceptional events such as Saharan dust events and smoke from Central American agricultural burning



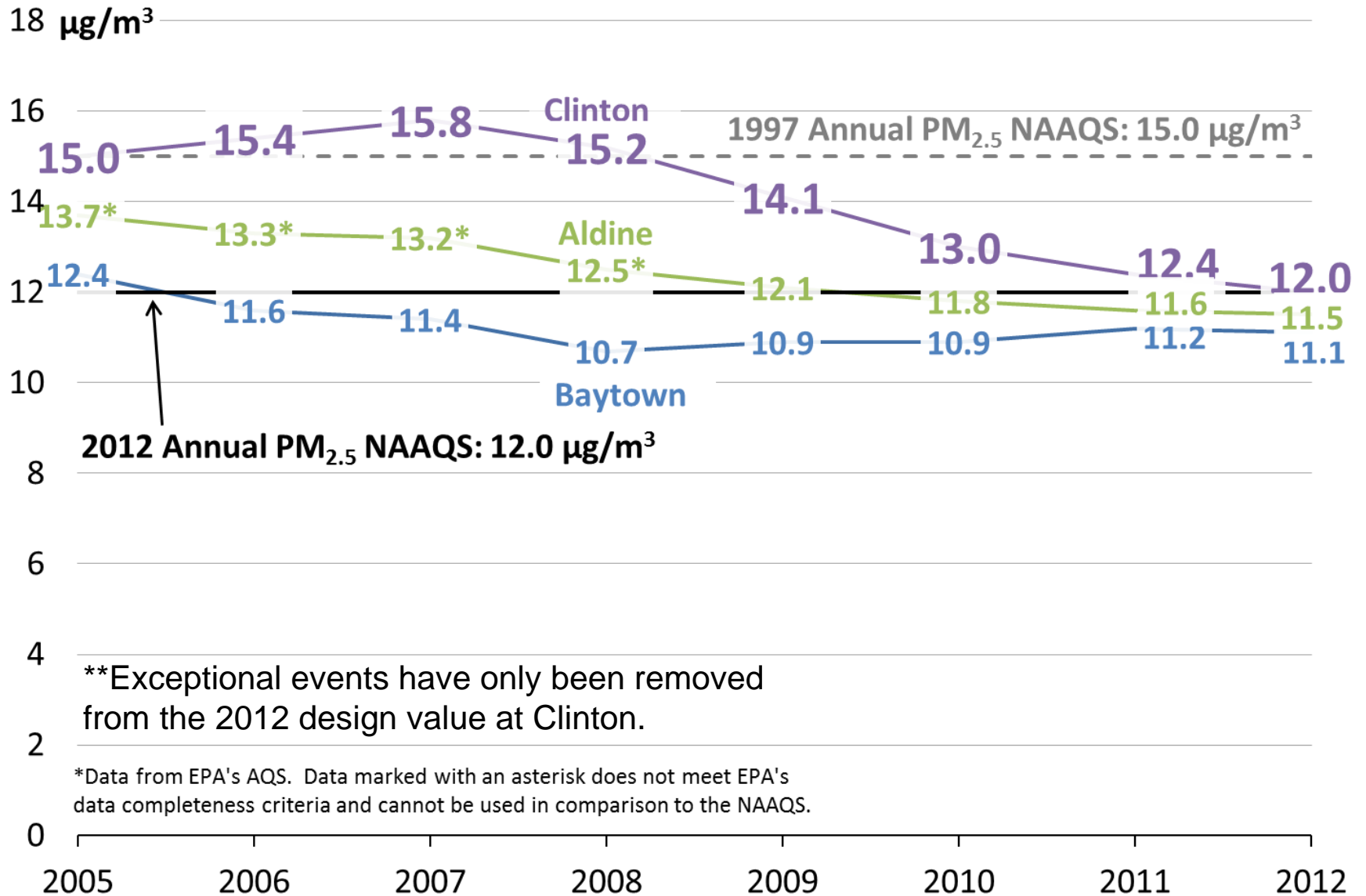
Annual PM_{2.5} Design Values in the HGB Area Including Exceptional Events



*Data from EPA's AQS. Data marked with an asterisk does not meet EPA's data completeness criteria and cannot be used in comparison to the NAAQS.



Annual PM_{2.5} Design Values in the HGB Area Excluding Exceptional Events

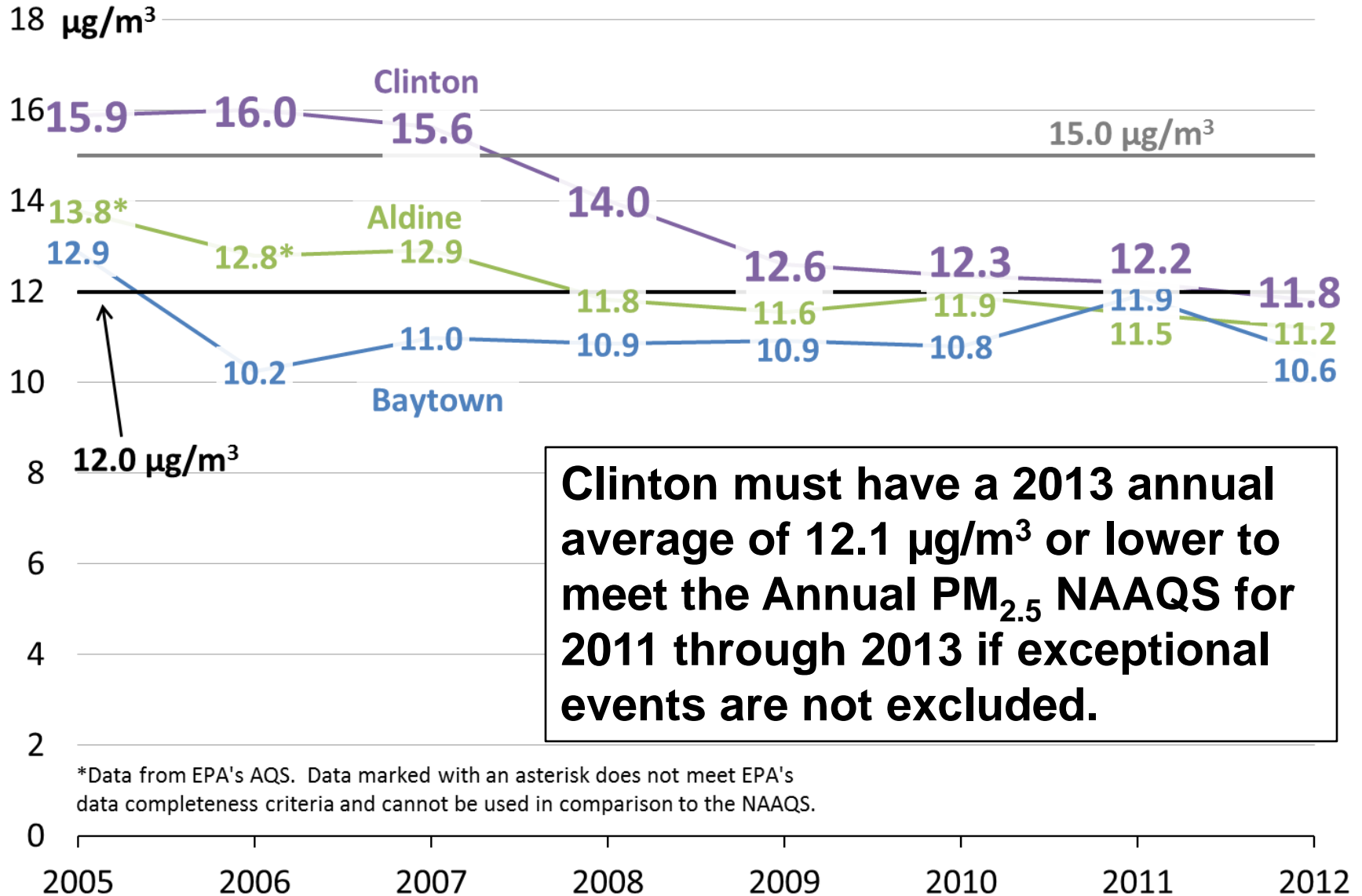


**Exceptional events have only been removed from the 2012 design value at Clinton.

*Data from EPA's AQS. Data marked with an asterisk does not meet EPA's data completeness criteria and cannot be used in comparison to the NAAQS.



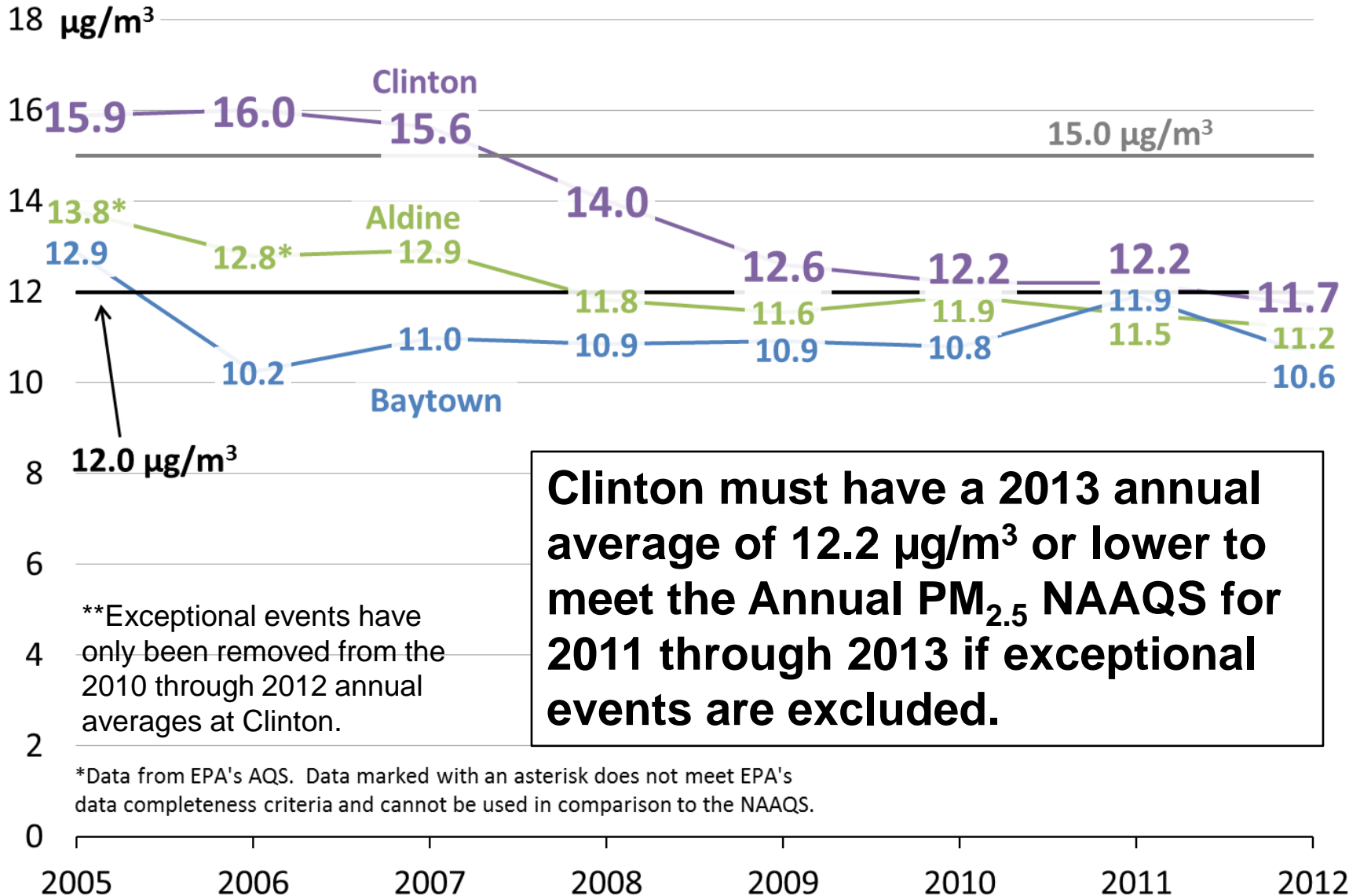
Annual Average PM_{2.5} in the HGB Area Including Exceptional Events



*Data from EPA's AQS. Data marked with an asterisk does not meet EPA's data completeness criteria and cannot be used in comparison to the NAAQS.



Annual Average PM_{2.5} in the HGB Area Excluding Exceptional Events



Clinton must have a 2013 annual average of 12.2 µg/m³ or lower to meet the Annual PM_{2.5} NAAQS for 2011 through 2013 if exceptional events are excluded.

**Exceptional events have only been removed from the 2010 through 2012 annual averages at Clinton.

*Data from EPA's AQS. Data marked with an asterisk does not meet EPA's data completeness criteria and cannot be used in comparison to the NAAQS.



Preliminary 2013 Annual PM_{2.5} Averages at Clinton Including Exceptional Events

	2010	2011	2012	2013*
Quarter 1 Average (µg/m ³)	11.9	12.1	10.7	10.1
Quarter 2 Average (µg/m ³)	12.5	13.8	12.7	
Quarter 3 Average (µg/m ³)	13.3	12.7	12.9	
Quarter 4 Average (µg/m ³)	11.4	10.2	11.0	
Annual Average (µg/m ³)	12.3	12.2	11.8	10.97

*2013 data is not validated and is subject to change.



Exceptional Events Rule

- Allows for data to be flagged and excluded from calculations in determining whether or not an area has attained the standard
- 40 Code of Federal Regulations §50.14 defines an Exceptional Event as an event that:
 - affects air quality
 - is not reasonably controllable or preventable
 - is caused by human activity that is unlikely to recur at a particular location or by a natural event
 - results in an exceedance of the standard that would not have otherwise occurred
- Requires concurrence from the United States Environmental Protection Agency (EPA)



Annual PM_{2.5} Design Values at Clinton with Exceptional Events Removed

	PM _{2.5} Annual Average (µg/m ³)			2012 Annual PM _{2.5} DV (µg/m ³)
	2010	2011	2012	
FRM Data	12.3	12.2	11.8	12.1
FRM Data with Exceptional Events Removed	12.2	12.2	11.7	12.0



Clinton Drive Exceptional Events

- Any of the following five combinations of exceptional event days demonstrate that the Clinton Drive data attains the NAAQS:
 - all 7 days accepted;
 - at least the 4 days from 2010 through 2011 accepted;
 - at least the 4 days from 2011 through 2012 accepted;
 - 4 highest days accepted; or
 - all 6 African dust events (from 2010 and 2012) accepted.

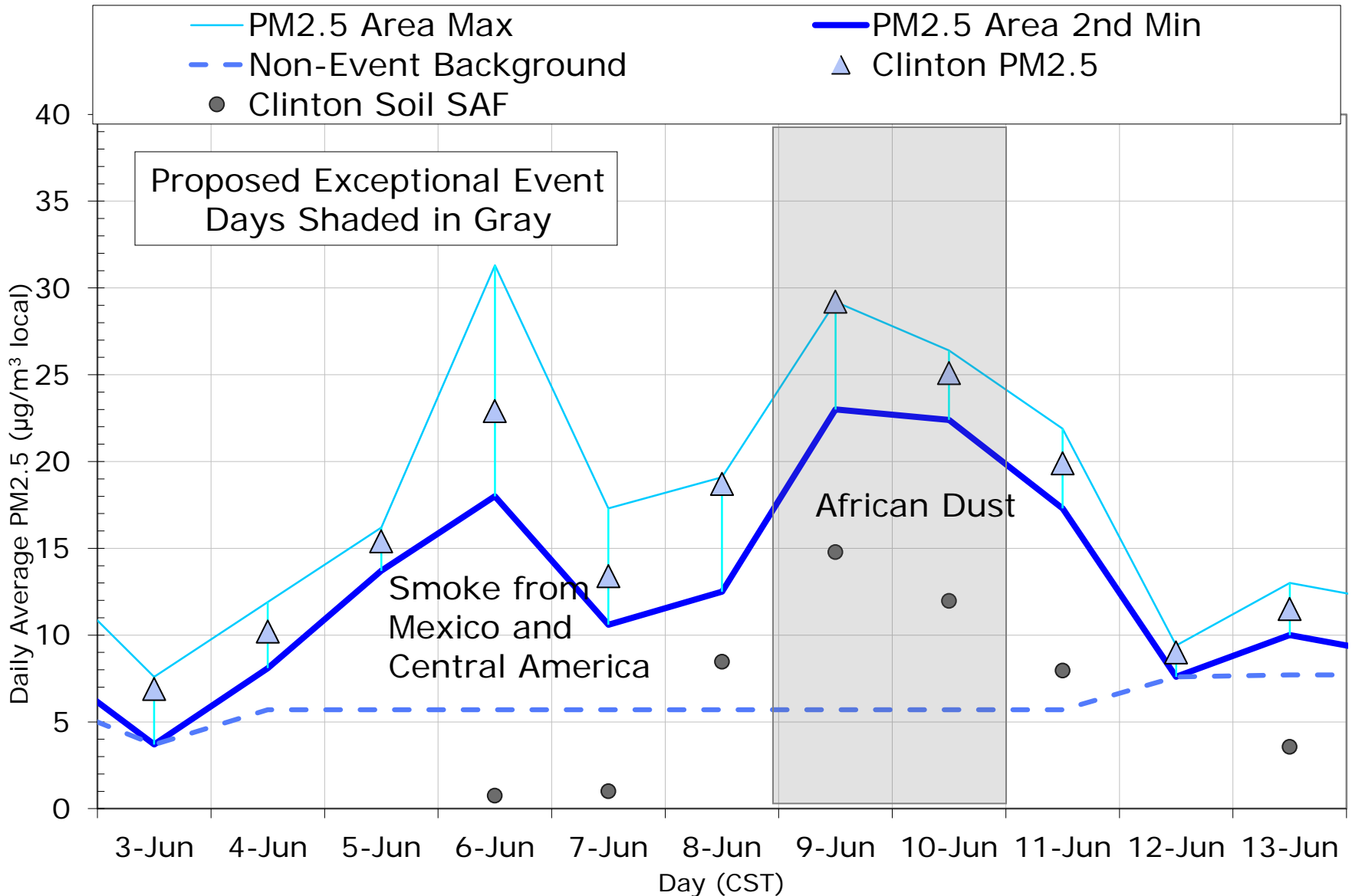


Example of an Exceptional Event Day at Clinton Drive

- A large African dust cloud moved through the Houston area with the highest PM_{2.5} concentrations on June 9 and 10, 2010.
- Impact of the African dust cloud primarily seen in greatly increased soil component of the speciated monitor data.
- Presence of strong markers for African dust including silicon, aluminum, and iron (SAF).

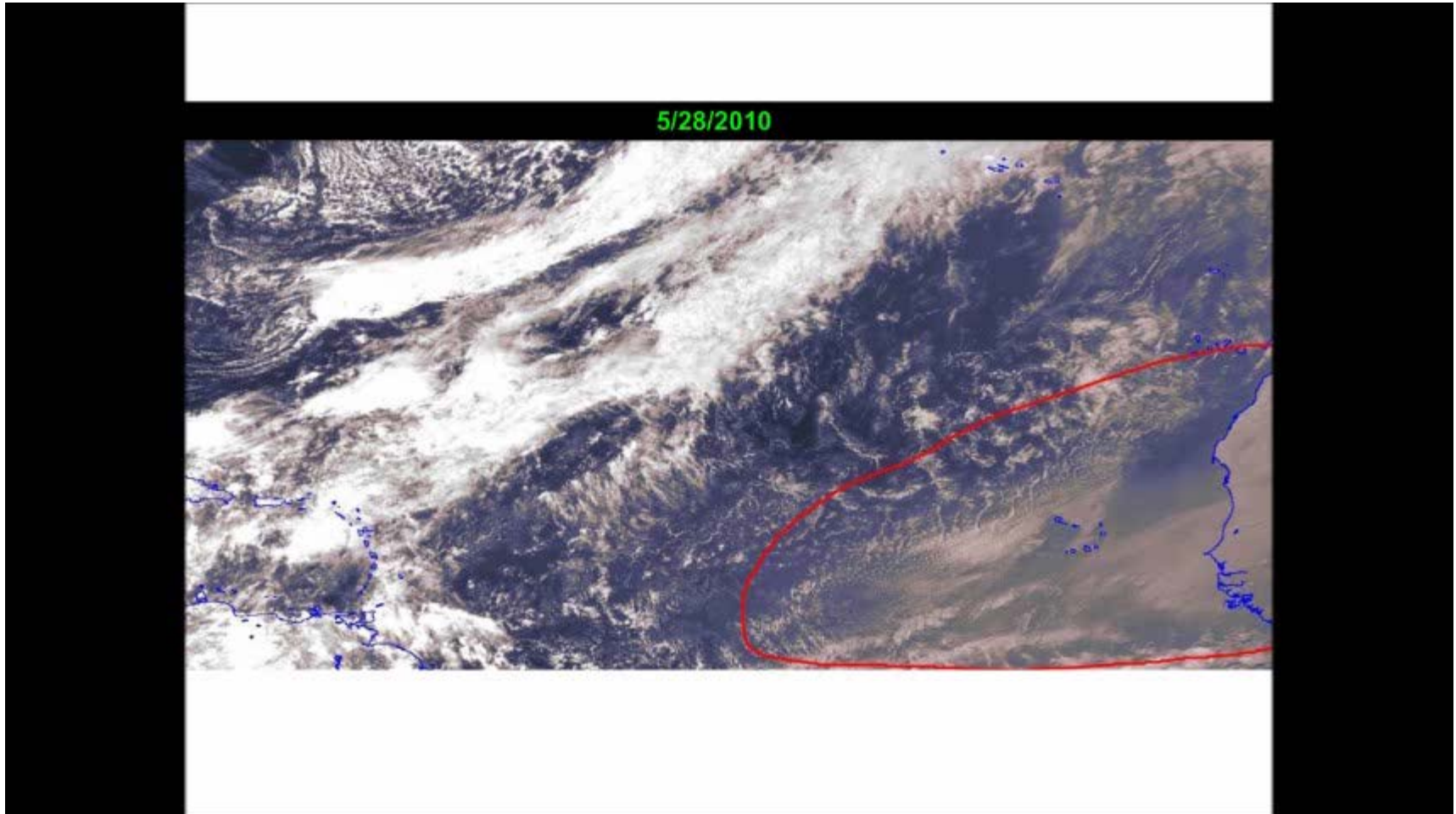


Houston and Clinton PM_{2.5} with Soil SAF for June 3 through June 13, 2010





Dust Cloud Moving Over the Atlantic Ocean, June 2010

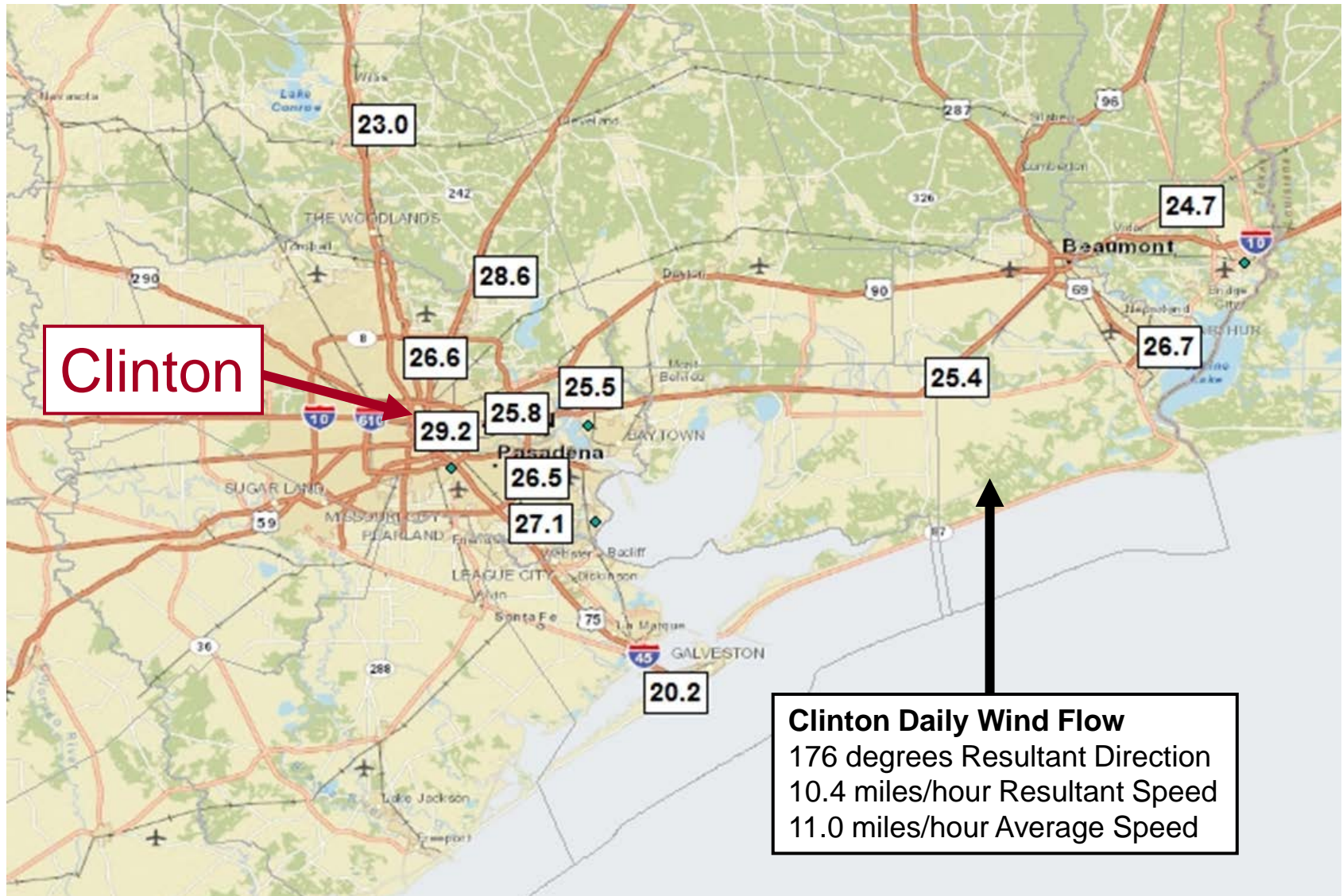


Click here to view animation:

<http://www.tceq.texas.gov/assets/public/implementation/air/sip/pm25/2012naaqs/ee-goes-june.wmv>



Average PM_{2.5} by Site: Exceptional Event Day of June 9, 2010



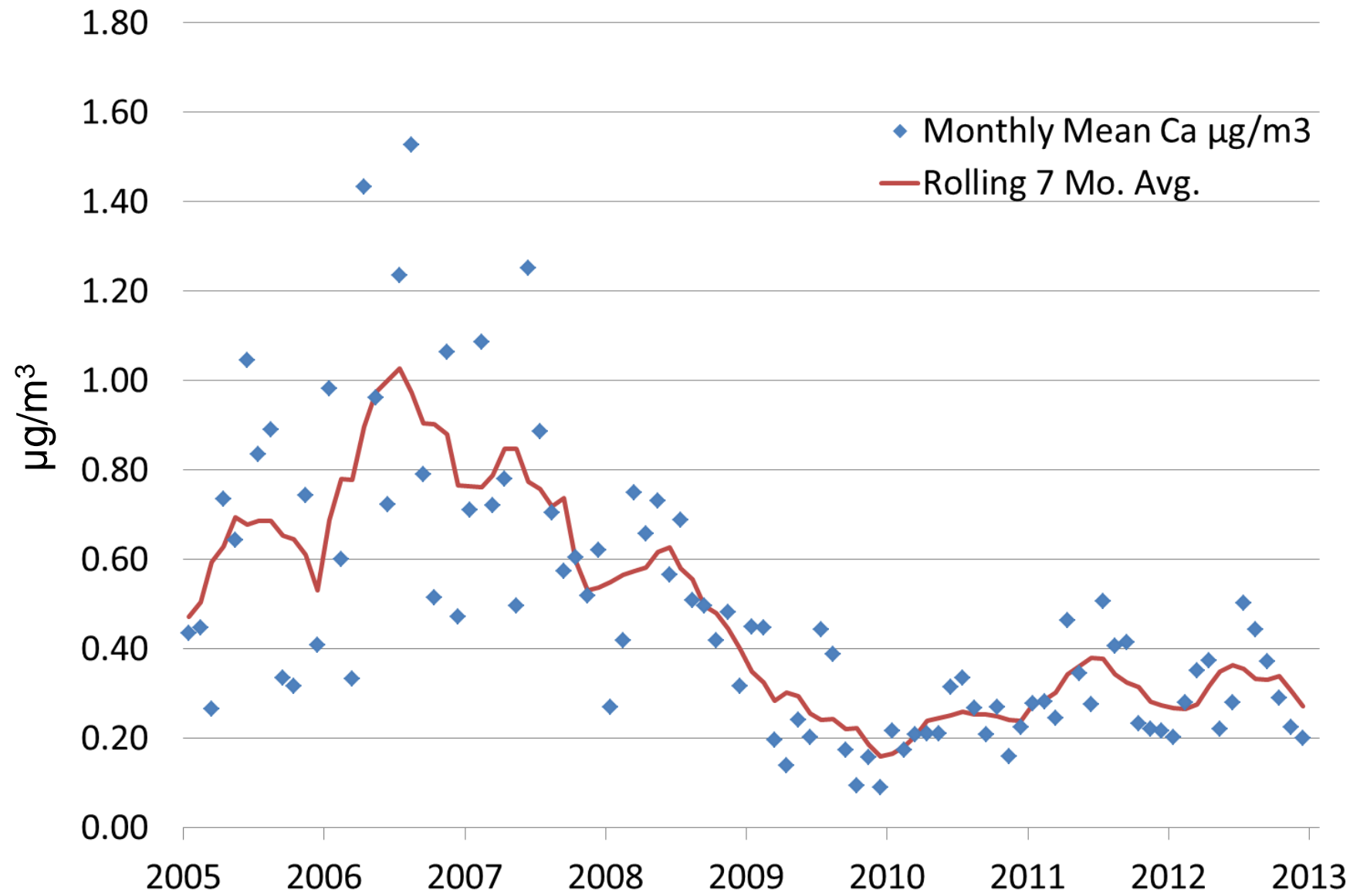


Local Actions to Reduce PM

- City of Houston
 - Installed and maintains barriers to keep trucks from driving onto the unpaved shoulders of Clinton Drive
 - Installed a traffic light at Clinton Drive and the Industrial Park East gate to control traffic at the intersection
 - Installed a landscaping project along Clinton Drive
 - Repaved Clinton Drive from two-lane street with shoulders to a four-lane street
- Port of Houston Authority
 - Reduced port related diesel emissions using funding received through an EPA National Clean Diesel Campaign (along with eight other industries in the Houston Ship Channel)
 - Enhanced dust suppression requirements for all its tenants including the use of emulsified asphalt on unpaved work areas
 - Eliminated soils that contain gypsum (CaSO_4) from the Port's work yards



Calcium (Ca) Impact Reduction Following the Port of Houston's Elimination of Soils Containing Gypsum (CaSO_4) from the Port's Work Yards





Local Actions Taken to Reduce PM

- Port Transit Rail Authority
 - Stopped steel loading on dirt areas near the Clinton Drive monitor
 - Operating newly refurbished switcher engines
- Other industries
 - Implemented dust control best management practices at bulk materials unloading and storage facilities
- TCEQ
 - Implemented a supplemental environmental project to pave the parking lot directly adjacent to the Clinton Drive monitor
 - Replacing older diesel engines with newer ones that have lower PM_{2.5} emissions through the Texas Emissions Reduction Plan Program



Other Measures to Reduce PM

- Federal Motor Vehicle Control Program (FMVCP)
- Implementation of refinery consent decrees continuing to reduce sulfur dioxide (SO₂) emissions from refineries and sulfuric acid plant
- Federal and international actions leading to reductions in marine vessel emissions of SO₂ and PM_{2.5}



Harris County Point Source Emissions Totals (Tons/Year)

Year of Emissions Inventory	SO₂	PM_{2.5}	PM₁₀
2005	25,500	5,500	8,900
2011	12,100	4,900	6,500
Change	- 53%	- 11%	- 27%

***Emissions are rounded to the nearest hundred and reported in tons/year**



Designation Recommendations

- Federal Clean Air Act requires state designation recommendations to the EPA within one year of NAAQS promulgation.
- States recommend designations of attainment, nonattainment, or unclassifiable based on ambient air quality monitoring data.
- State recommendations are expected to be primarily based on 2010 through 2012 monitored data.
- State recommendations may be updated when 2013 data is certified.



Final Designations

- The EPA will consider state recommendations in making final area designations.
- 120-Day Letter
 - The EPA will notify states concerning intended modifications to their recommendation.
 - States will have 60 days to respond and provide additional information.
- The EPA will consider all available data and is expected to make final designations based on 2011 through 2013 monitored data.



PM_{2.5} Designations Timeline

- **December 13, 2013:** State designation recommendations are due.
- **August 14, 2014:** EPA sends 120-day letters.
- **August 29, 2014:** EPA publishes public notice of state recommendations for 30-day comment period.
- **October 29, 2014:** States respond to 120-day letters.
- **December 12, 2014:** EPA promulgates final area designations.



TCEQ Commissioners' Agenda

- October 23, 2013
- Commissioners will consider designation recommendation for submittal to the governor.
- Documents available on the Commissioners' Agenda Web page and the SIP Hot Topics Web page October 4, 2013.



Additional Information

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Questions?



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