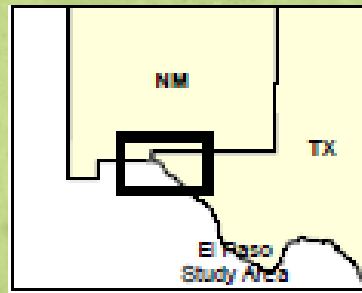


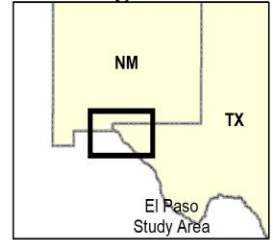
Review of El Paso Area Ozone and Precursor Air Monitoring Data



Presented at May 23, 2019 JAC Meeting in El Paso, Texas

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El Paso Area Ozone and Ozone Precursor Monitoring Network



Legend

2016-2018 8-hr Ozone Design Value

- 0.055 - 0.067 ppm
- 0.068 - 0.070 ppm
- 0.071 - 0.085 ppm

Major VOC Stationary Emission Source (t/yr)

- 100 - 950

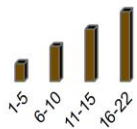
Major NOx Stationary Emission Source (t/yr)

- 100 - 950
- 951 - 1800

Graduated triangle symbols represent individual Stationary Emission Sources that have NOx and VOC emissions

- ▲ 100 - 950

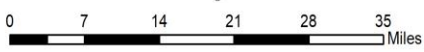
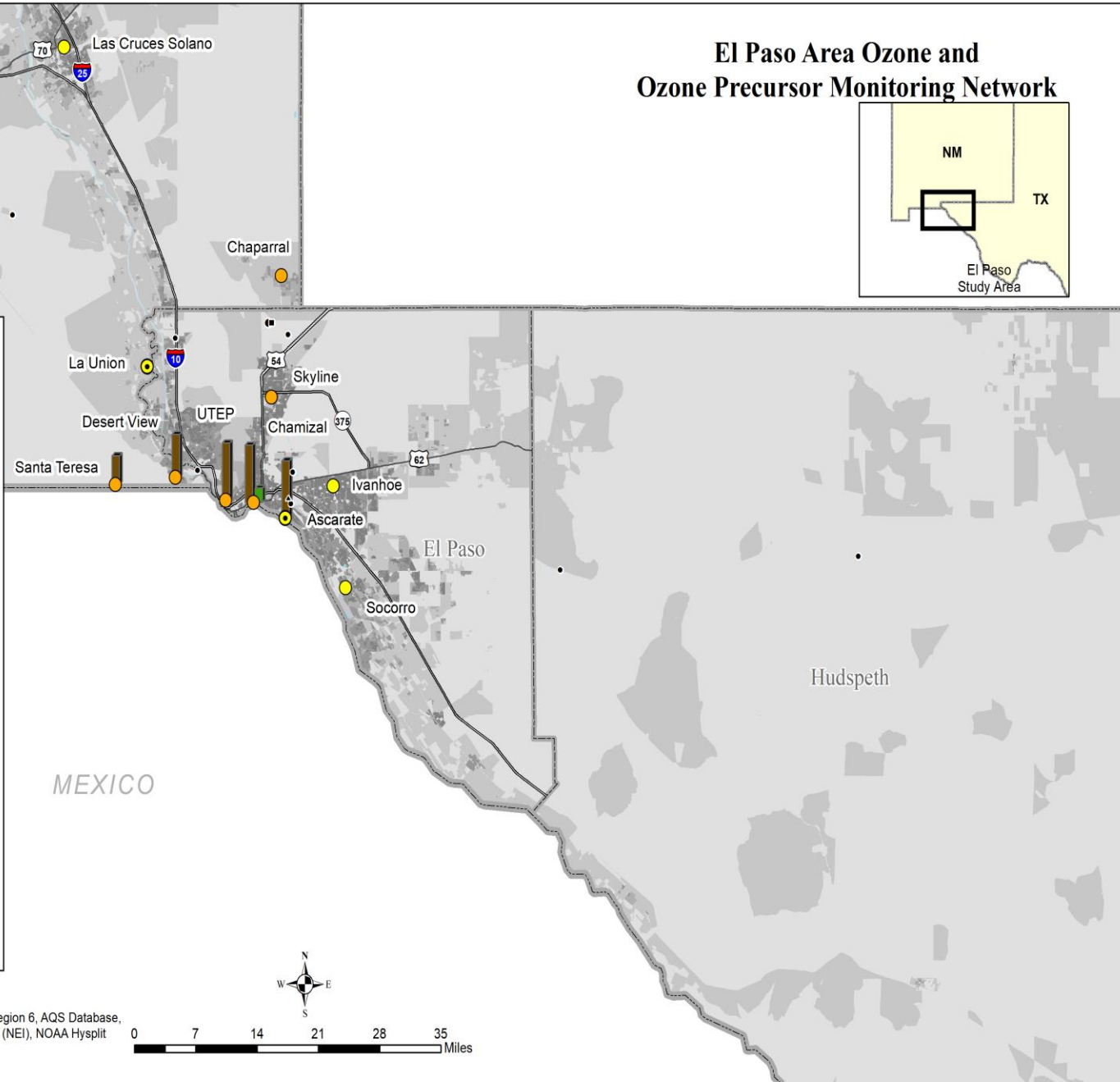
2016-2018 June-August 6-9 AM Weekday NOx Concentration (ppb)



Population Density (per square mile)

- 0
- 1 - 500
- 501 - 1000
- 1001 - 5000

2016-2018 June-August 6-9 AM Weekday VOC (tnmoc) Concentration (ppbC)

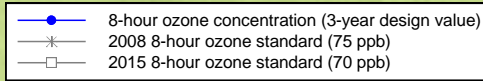
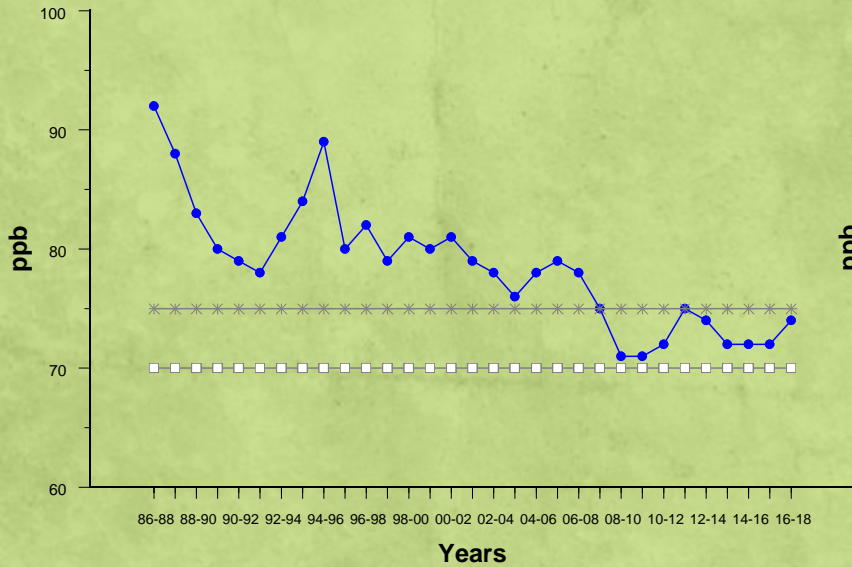


Why has the El Paso area not been able to get down to 70 ppb or lower in the past 8 years for the 8-hour ozone standard?

- NO_x concentrations have declined over the long-term but total VOC concentrations have remained level over the past 8 years in an area where some sites are now VOC limited.
- For VOC concentration trends, alkenes (and reactivity) have been decreasing but alkanes have been increasing, with increasing alkane contributions from US side (including Refinery) and Juarez, Mexico over the past 8 years.
- Overall meteorological conditions in El Paso area have been more conducive to ozone formation over the past 8 years (warmer + more solar radiation).
- International transport of ambient ozone concentrations from neighboring Juarez, Mexico.

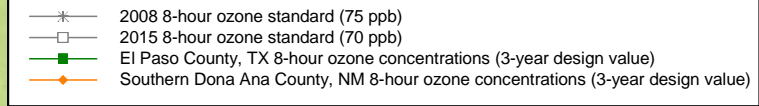
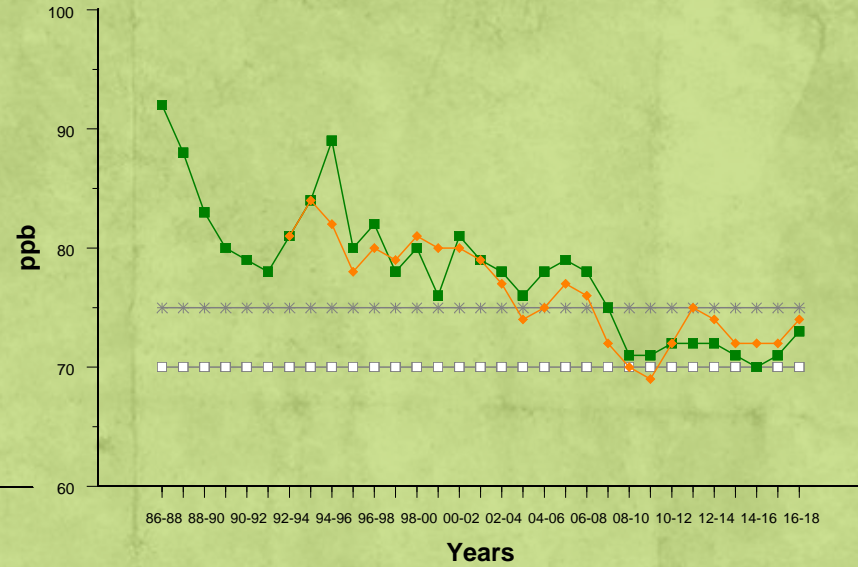
Ozone Trends

El Paso Area (Combined Airshed)



Ozone Trends

El Paso County, Texas and Southern Dona Ana County, NM



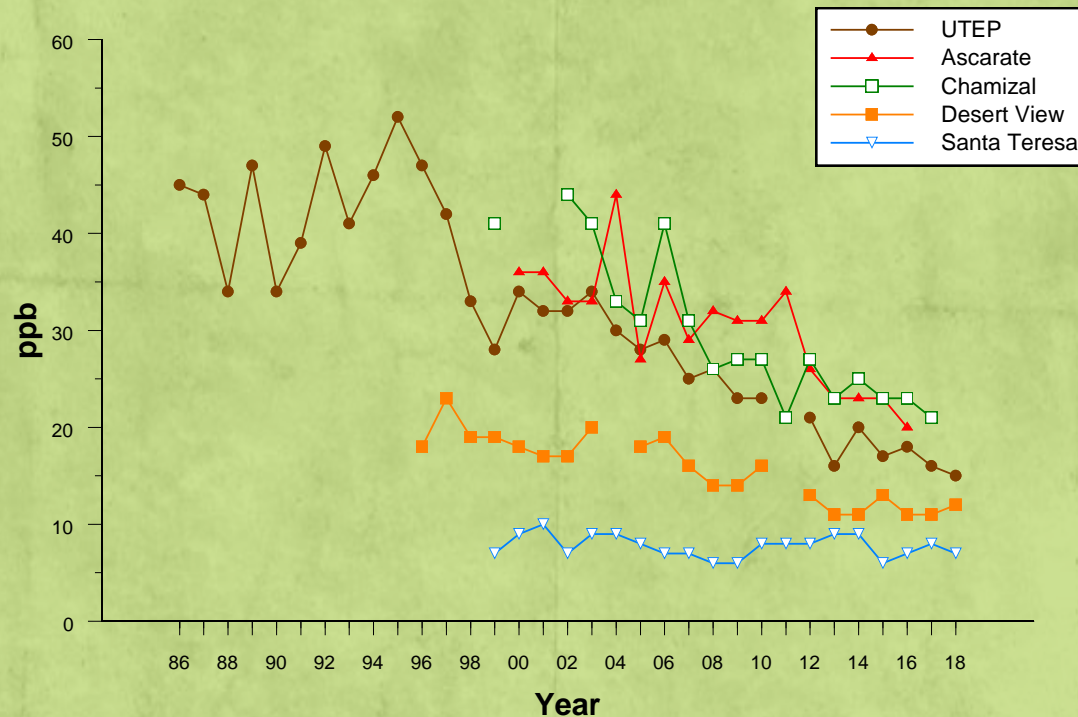
Good News: El Paso area 8-hour ozone design value decreased 21 ppb from 92 ppb in 1986-1988 to 71 ppb in 2008-2010.
Current Question: Why has the area not been able to get down to 70 ppb or lower in the past 8 years?

El Paso Long-term NO_x Concentration Trends

June-August Weekday; 5-8 AM LST (Local Standard Time)

Mean Morning NO_x Concentrations

June-August; 5-8 AM LST Weekday (74% min. data capture)



Not enough data for Desert View site in 2004 (9% data capture) and in 2011 (39% data capture)

Not enough data for UTEP site in 2011 (63% data capture)

Not enough data for Ascarate site in 2017 (59% data capture) and in 2018 (35% data capture)

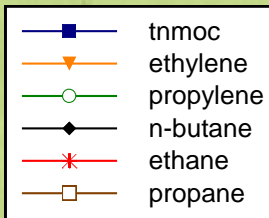
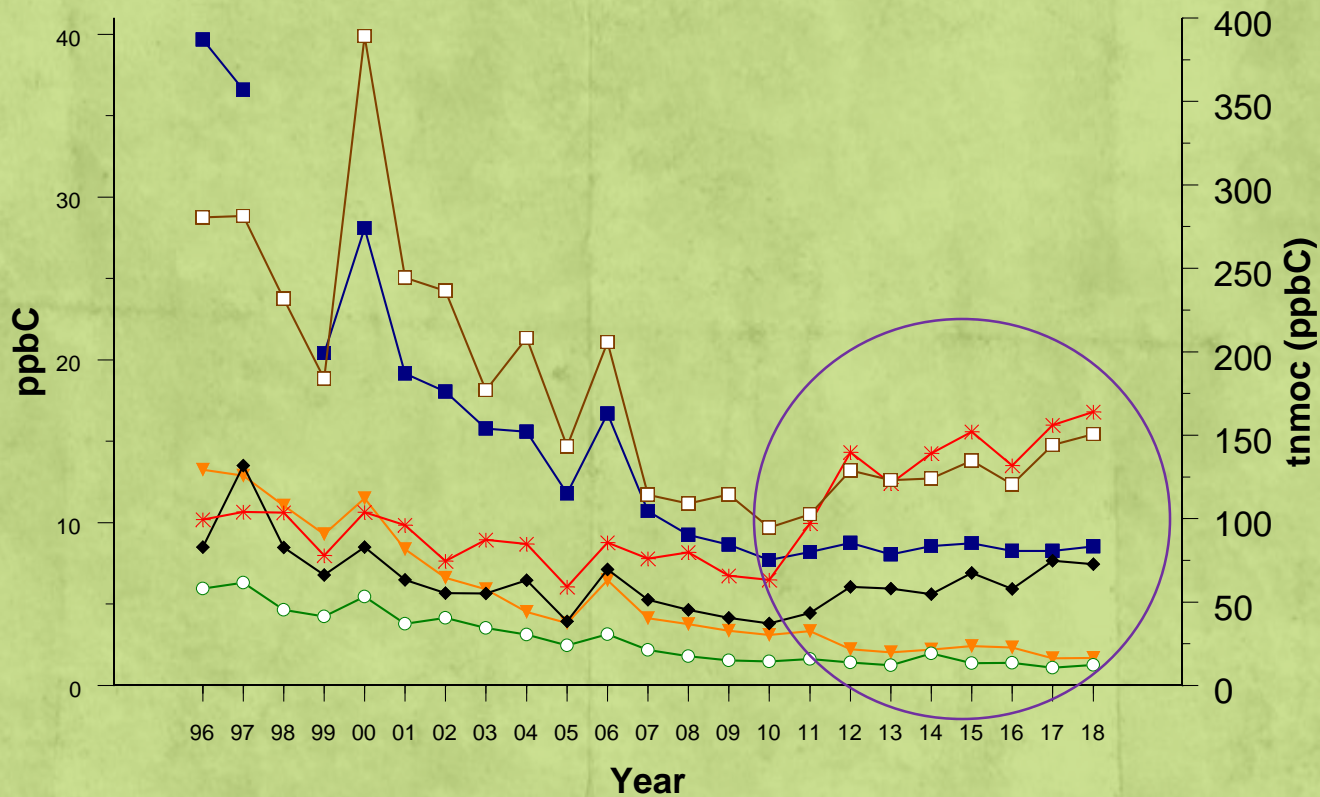
Not enough data for Chamizal site in 2000 (68% data capture) and in 2001 (65% data capture) and in 2018 (45% data capture)

Good news: NO_x concentrations have consistently declined over the long-term at many area sites

El Paso Long-term VOC Concentration Trends

June-August Weekday; 5-8 AM LST (Local Standard Time)

El Paso Chamizal Mean Morning VOC Concentrations

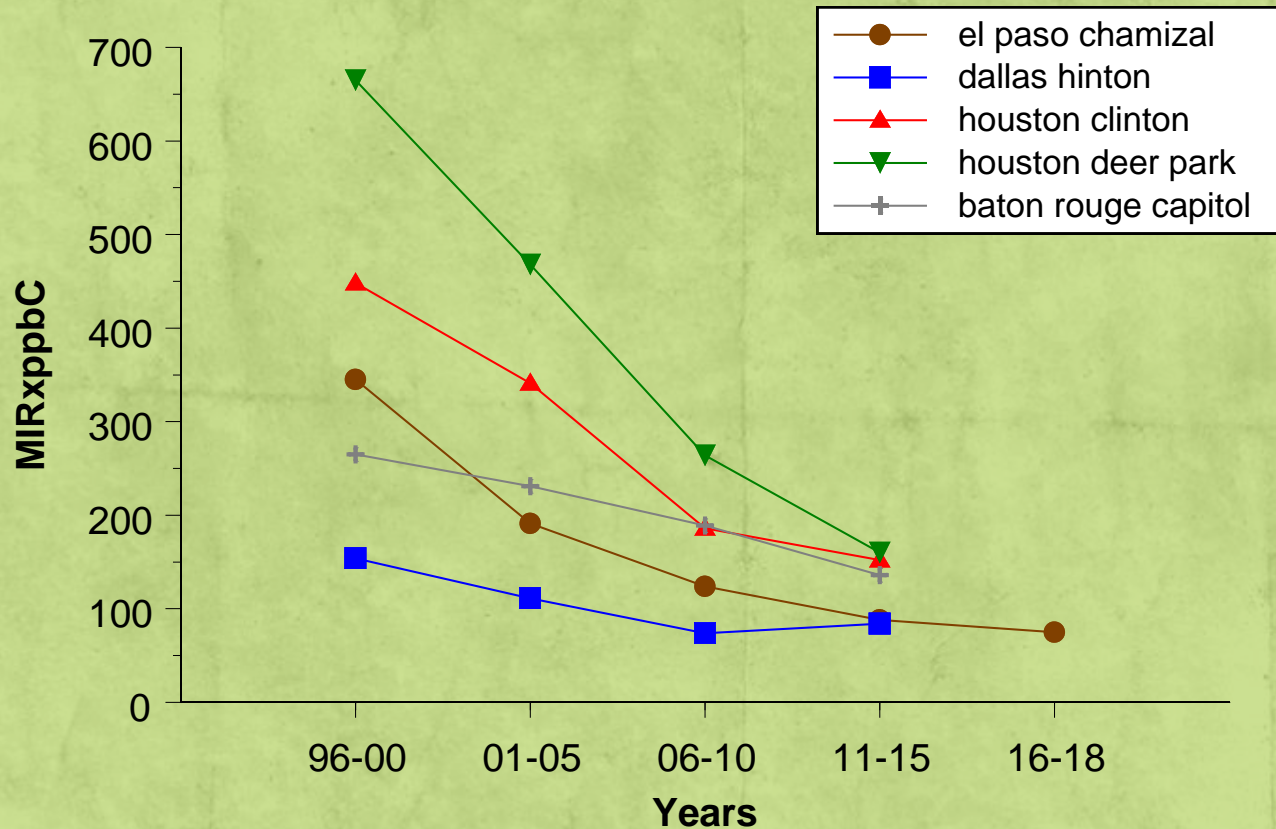


not enough data in 1998 for tnmoc - 56% data capture and missing August
 2008 - 67% data capture; 2016 - 62% data capture

Total VOC concentration trends similar to ozone trends.
 Decreasing to 2010 and then generally staying flat through 2018.
 Alkenes decreasing and alkanes increasing from 2010-2018.

VOC Reactivity

Sum of Mean MIRxppbC for 9 species: ethene, propene, m/p xylene, trans-2-butene, cis-2-butene, 1-butene, ethane, propane, n-butane

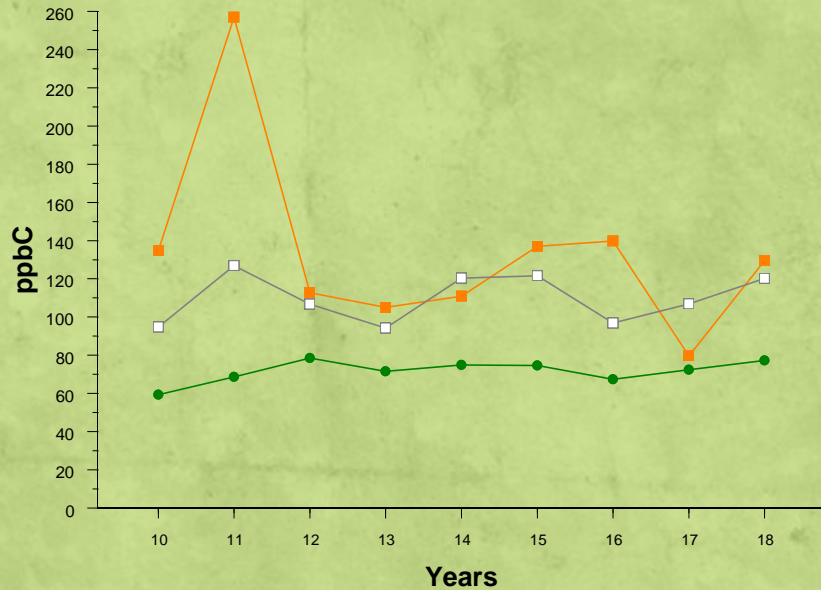


Good News: Reactivity continues to decline at El Paso Chamizal site.

**MIR = Maximum Incremental Reactivity
June-August weekday 5-8 AM LST**

TNMOC Trends

El Paso Chamizal site; summer weekday morning with resultant wind speeds > 2 mph



Data distribution:

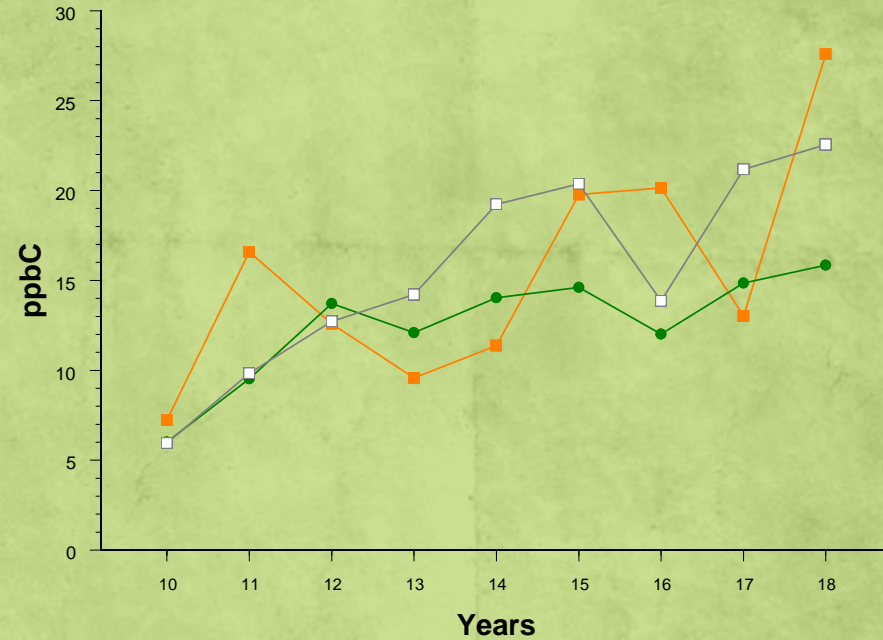
89%-98% from US side (3%-17% from refinery direction)

2%-11% from Juarez side



Ethane Trends

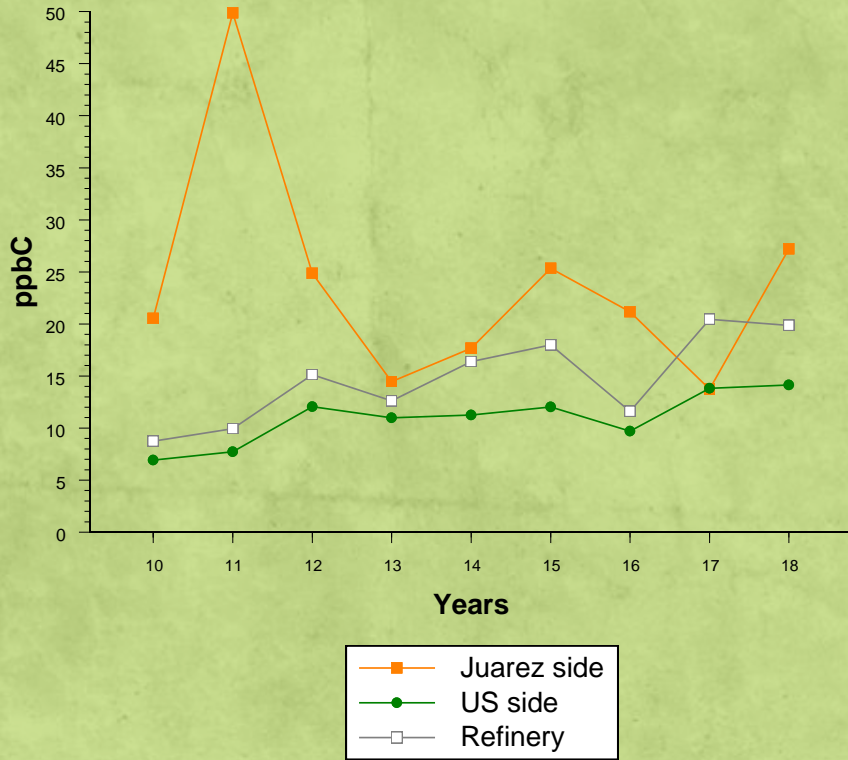
El Paso Chamizal site; summer weekday morning with resultant wind speeds > 2 mph



Total VOC mean concentrations have generally remained flat since 2010. Alkenes (i.e. HRVOC) have decreased in concentration but alkanes have increased in concentration. Ethane has increased from both the US side, including Refinery, and the Juarez, Mexico side.

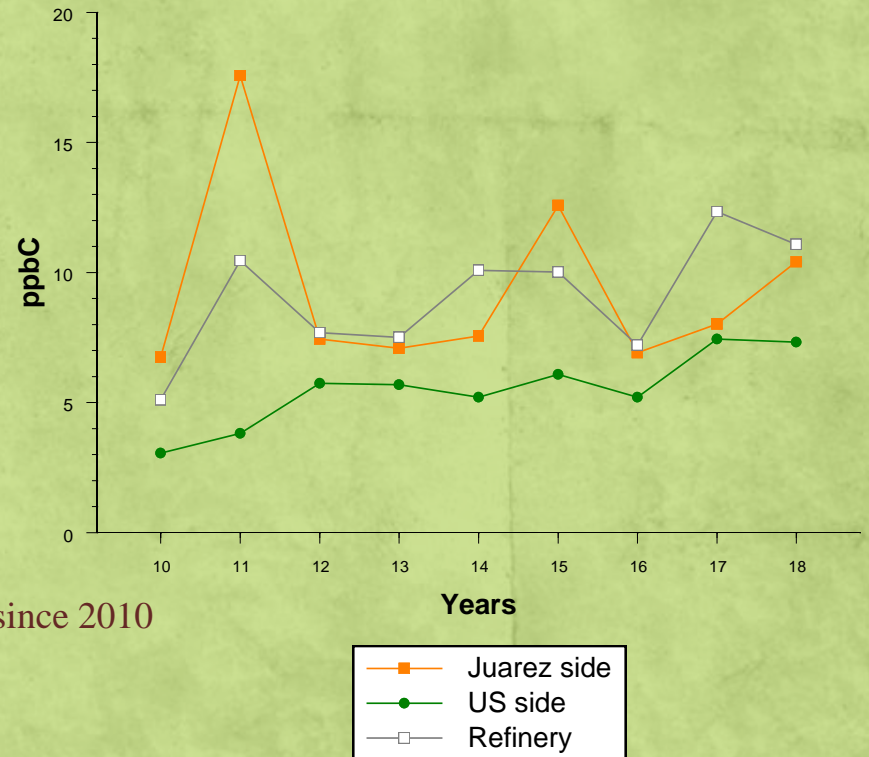
Propane Trends

El Paso Chamizal site; summer weekday morning with resultant wind speeds > 2 mph



N-Butane Trends

El Paso Chamizal site; summer weekday morning with resultant wind speeds > 2 mph

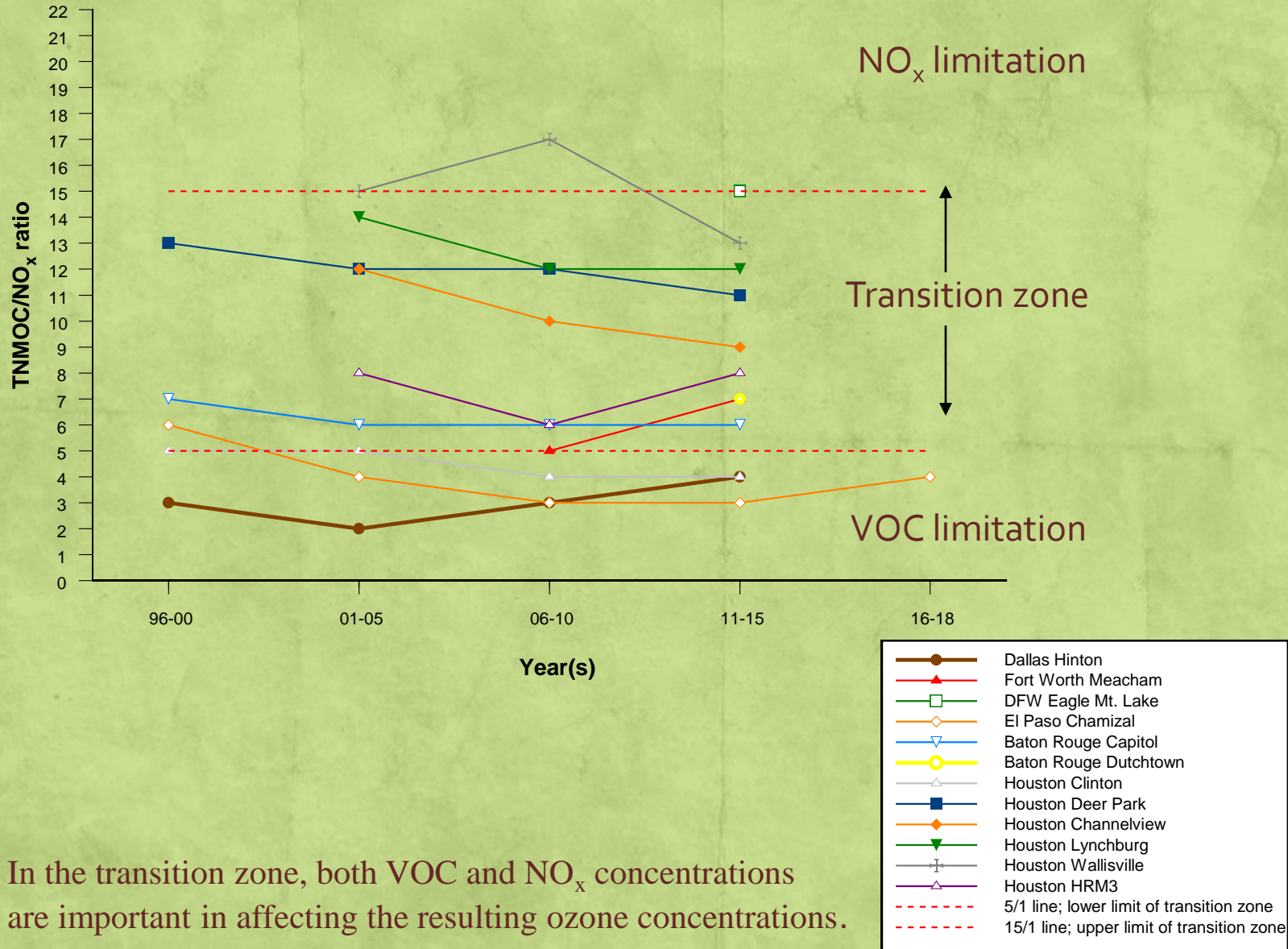


Propane and n-butane mean concentrations have increased since 2010 from the US side, including Refinery, and remained similar from the Juarez, Mexico side

VOC/NO_x Ratios at El Paso Chamizal

- Have gone from VOC/NO_x transition zone (5-15) to more VOC limited conditions (0-4) for ozone formation.
- 98-00= **6.0**
- 01-05= **4.2**
- 06-10 and 11-15= **3.4**
- 16-18 = **3.7**

VOC/NO_x Ratio Trends in Region 6 PAMS Areas June-August Weekday; 5-8 AM LST

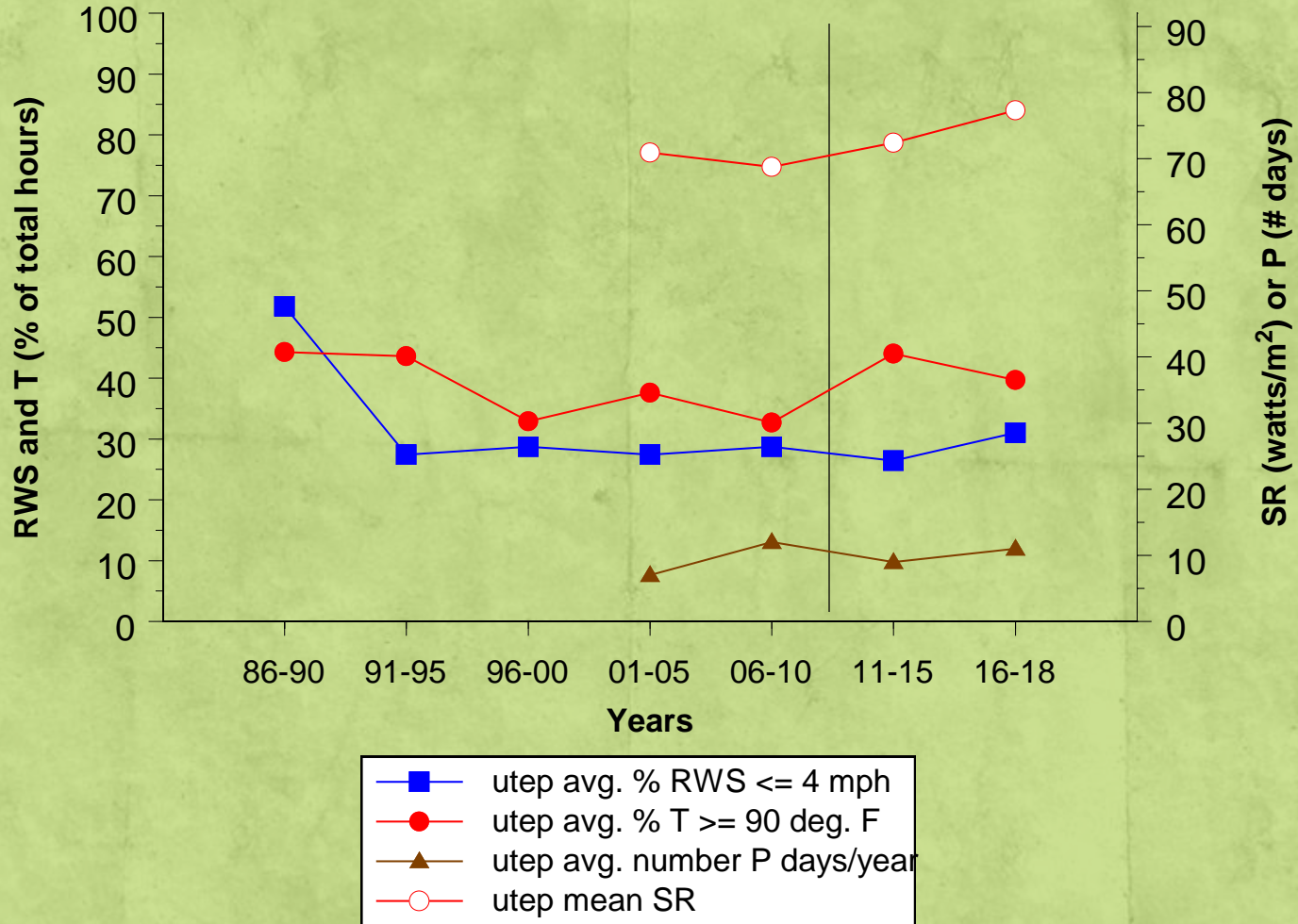


In the transition zone, both VOC and NO_x concentrations are important in affecting the resulting ozone concentrations.

High Temperature/Solar Radiation/Stagnation/Precipitation Trends

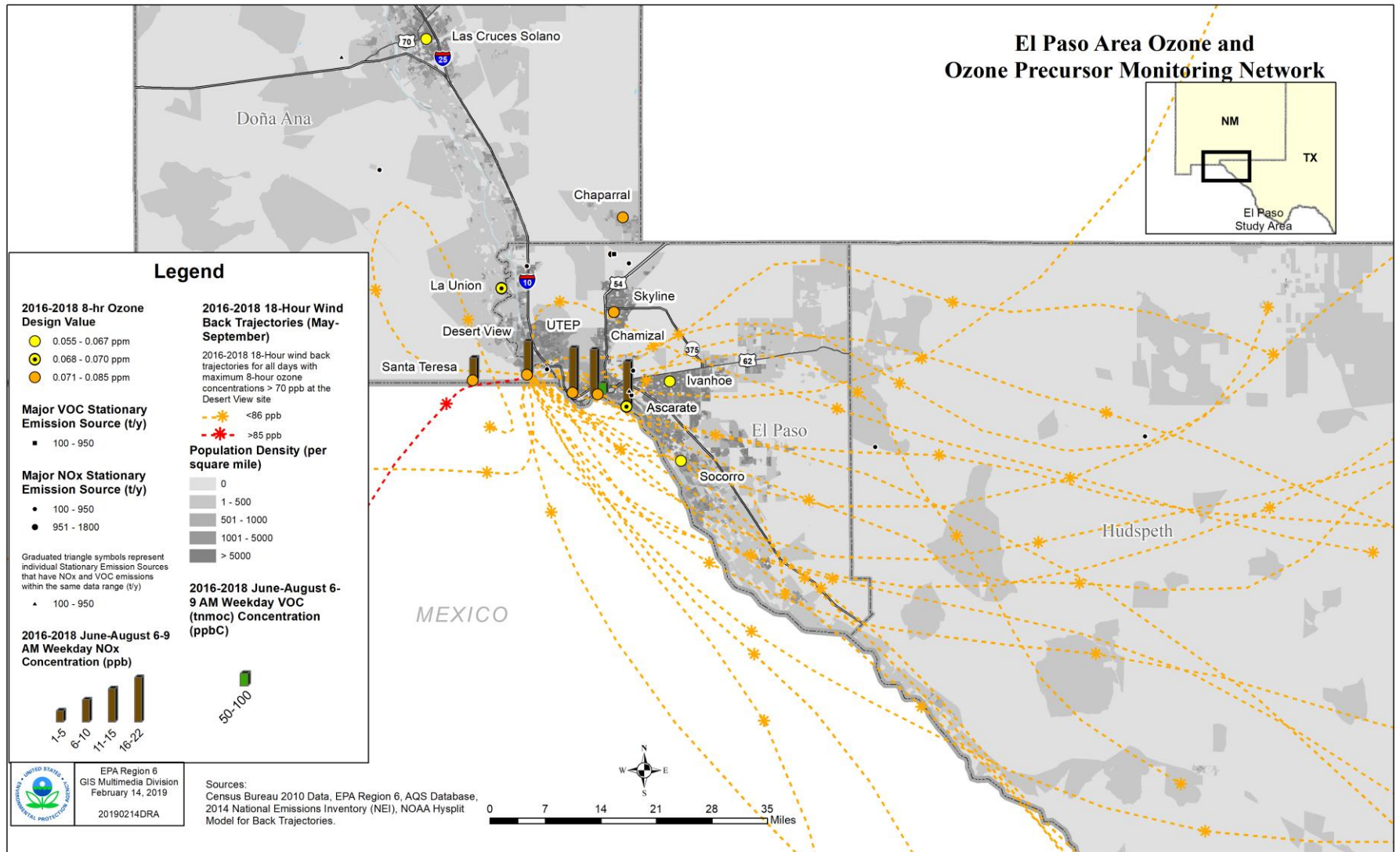
June-August; 0500-1900 LST (0800-1600 LST for solar radiation); SR measurements x 10

T=temperature, SR=solar radiation, RWS=resultant wind speed, P=precipitation



Overall meteorological conditions more conducive to ozone formation 2011-2018 in El Paso area compared to 2006-2010.

El Paso Area Ozone and Ozone Precursor Monitoring Network



25 exceedance days (> 70 ppb) at the Desert View site in Southern Dona Ana County, NM from 2016-2018 [2 exceedance days in 2016, 6 in 2017, and 17 in 2018]

32% of those exceedance days (8/25) had wind trajectories going back through El Paso County

68% of those exceedance days (17/25) had wind trajectories going back through Juarez, Mexico, including both exceedance days in 2016, the top 4 exceedance days in 2018, and the 2nd, 4th, and 6th highest exceedance days in 2017