

# HRVOC Monitoring at CAMS 19 During August-September, 2008

Presentation to the NETAC  
Technical Committee

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# Background

- Purpose of this HRVOC monitoring effort:
  - Understand causes of high ozone at CAMS 19
  - Improve conceptual model of ozone formation in Northeast Texas
- Ozone is formed from VOCs and NO<sub>x</sub> together
- Highly reactive VOCs (HRVOCs) form ozone rapidly and efficiently

## Previous HRVOC Monitoring at Longview

- Baylor aircraft measured HRVOCs in Longview area, plumes from Eastman Complex
  - Eastman: olefin production and specialty chemicals
  - Flint Hills: polypropylene production
  - Westlake: polyethylene production
- VOC monitoring at CAMS 19 in 2006 showed intermittent presence of anthropogenic HRVOCs
  - Canister measurements cannot provide a continuous record of HRVOC impacts
  - Problems with these measurements-no ethylene detected

# Rapid Alkene Detector Instrument

The RAD detects alkenes by chemiluminescent reaction with ozone. Reaction produces electronically excited formaldehyde and glyoxal.



Measure light with a photomultiplier tube. Light intensity proportional to alkene concentration.

Instrument response is calibrated to a particular alkene. Daily calibrations with isoprene.

## Relative Response

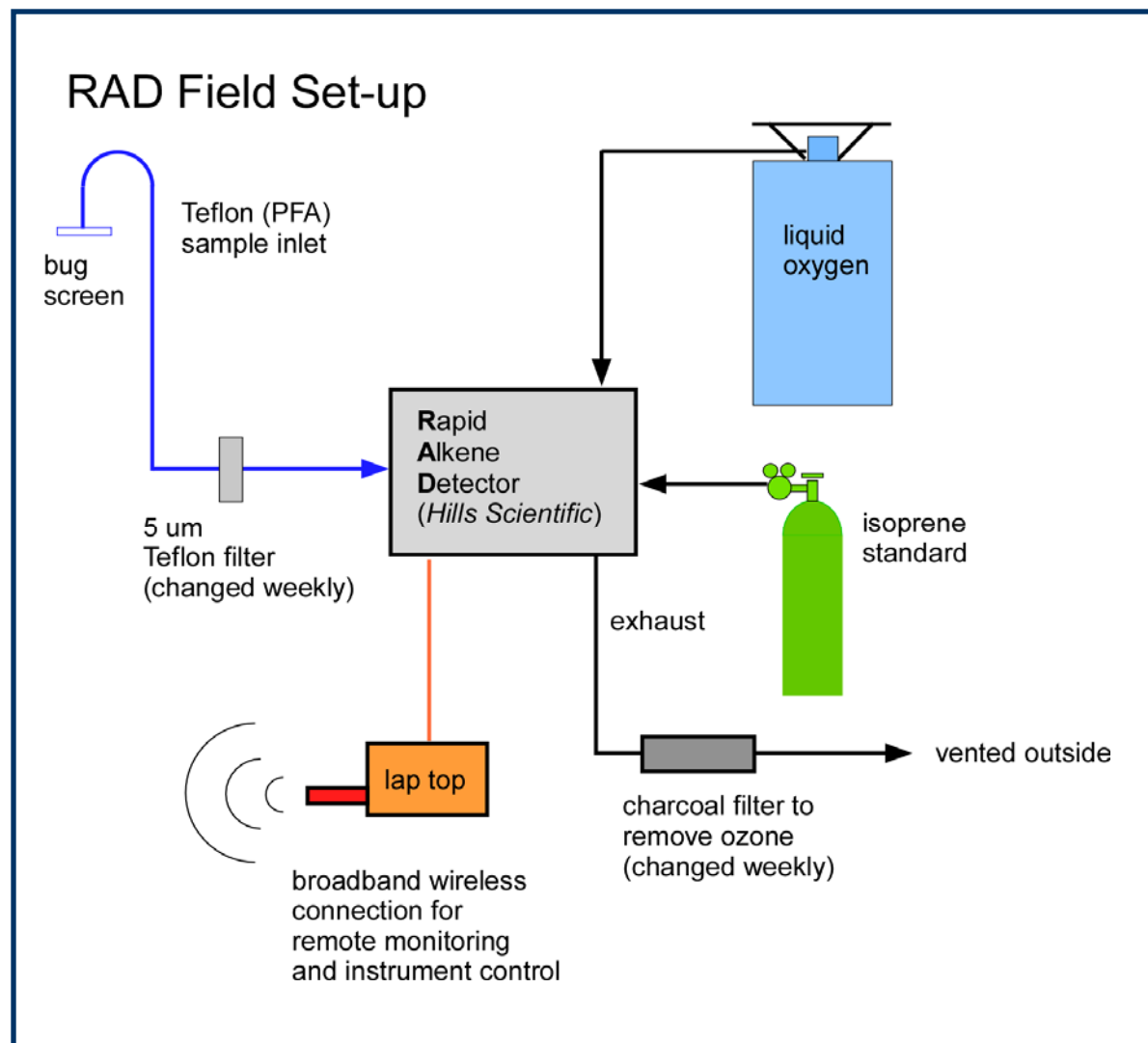
Isoprene = 1  
Ethene = 0.17  
Propene = 0.58

Response  
Time  
0.4 s

Dynamic Range  
0-100 ppbv  
isoprene

Detection Limit  
0.14 ppbv  
isoprene

# RAD Experimental Setup



Data collected at 1 Hz.

Automated zero and span done 3 times per day.

RAD response calibrated for isoprene.

Multipoint calibrations for isoprene, ethene, and propene performed 3 times during deployment (beginning, middle, and end).

Final data = 1 minute averages.

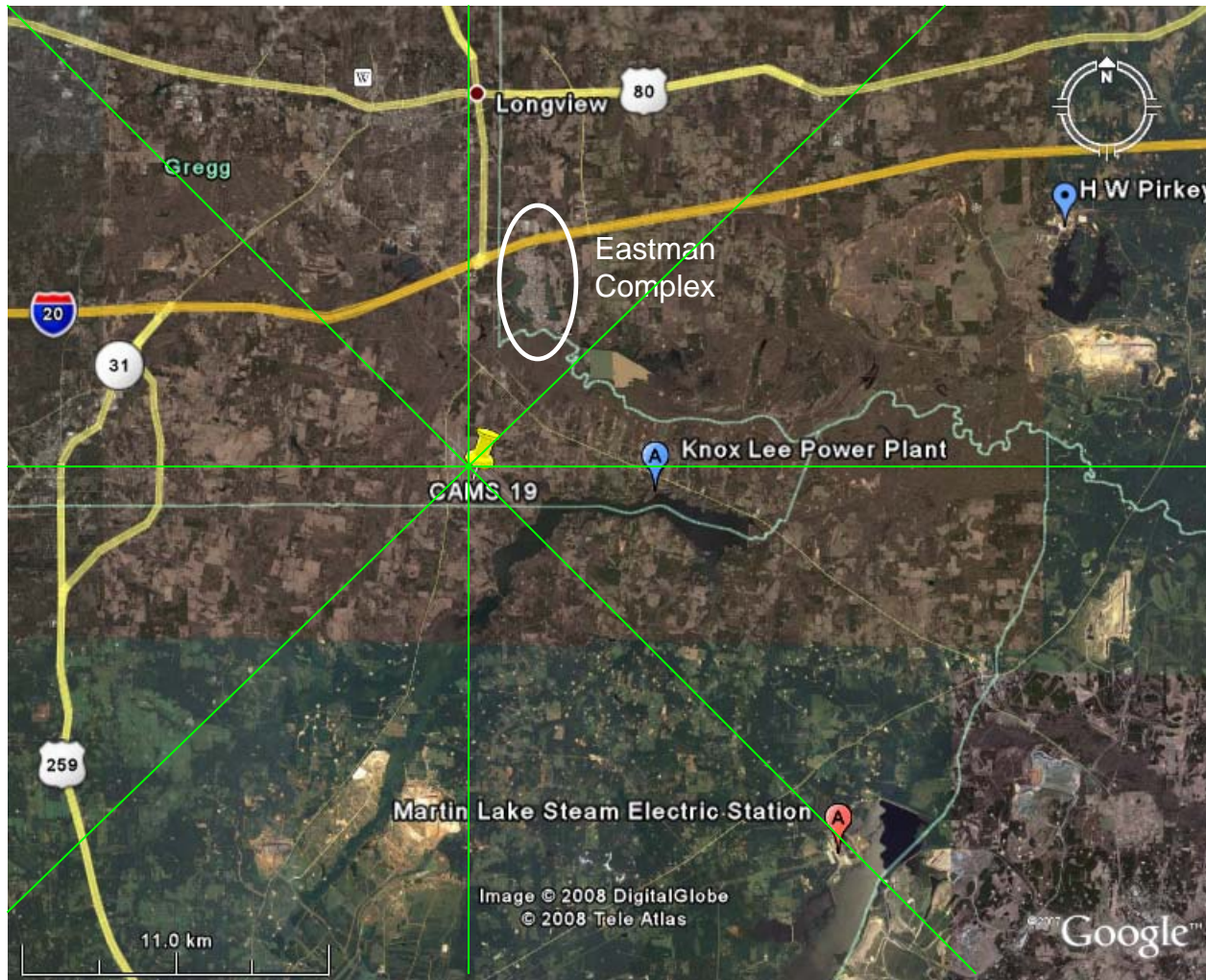
# RAD Experimental Setup at CAMS 19



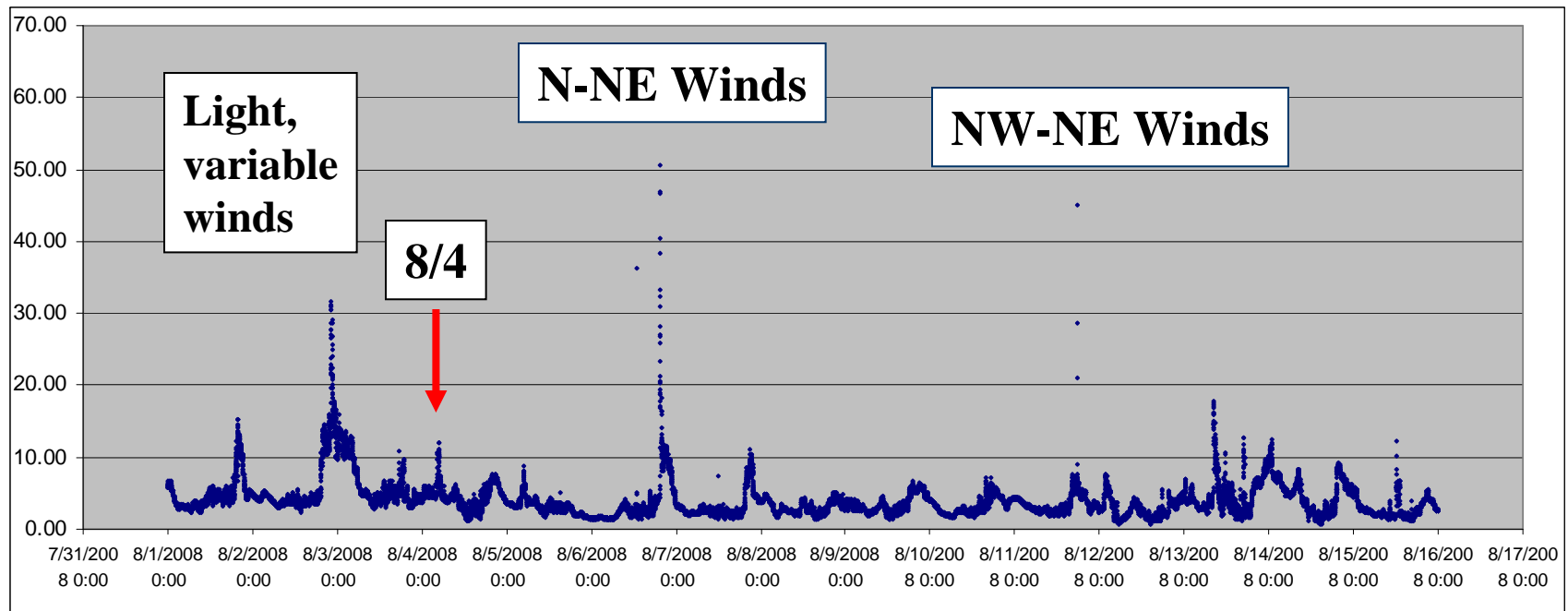
## RAD Data

- RAD instrument was deployed from August 1 through October 6, 2008
- Data shown today are preliminary and are undergoing QA
- Final data expected November, 2008

# Emissions Sources Near CAMS 19

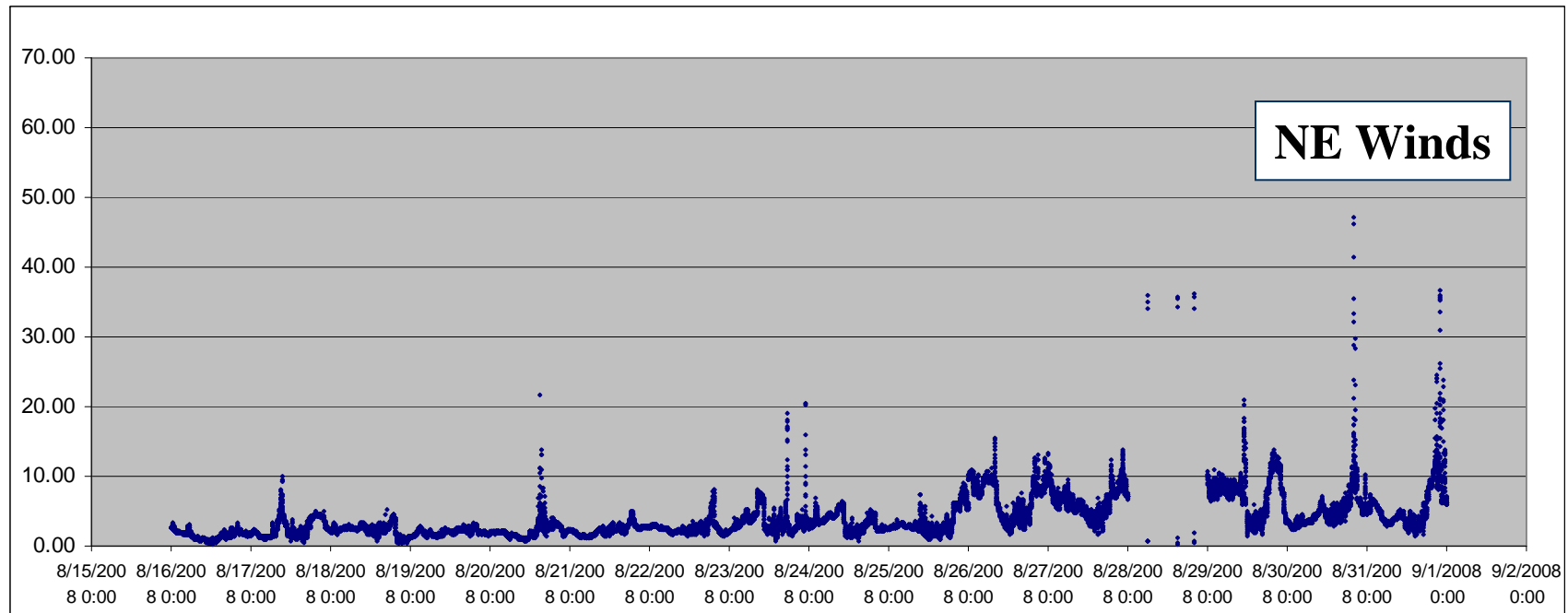


# RAD Data July 31-August 17



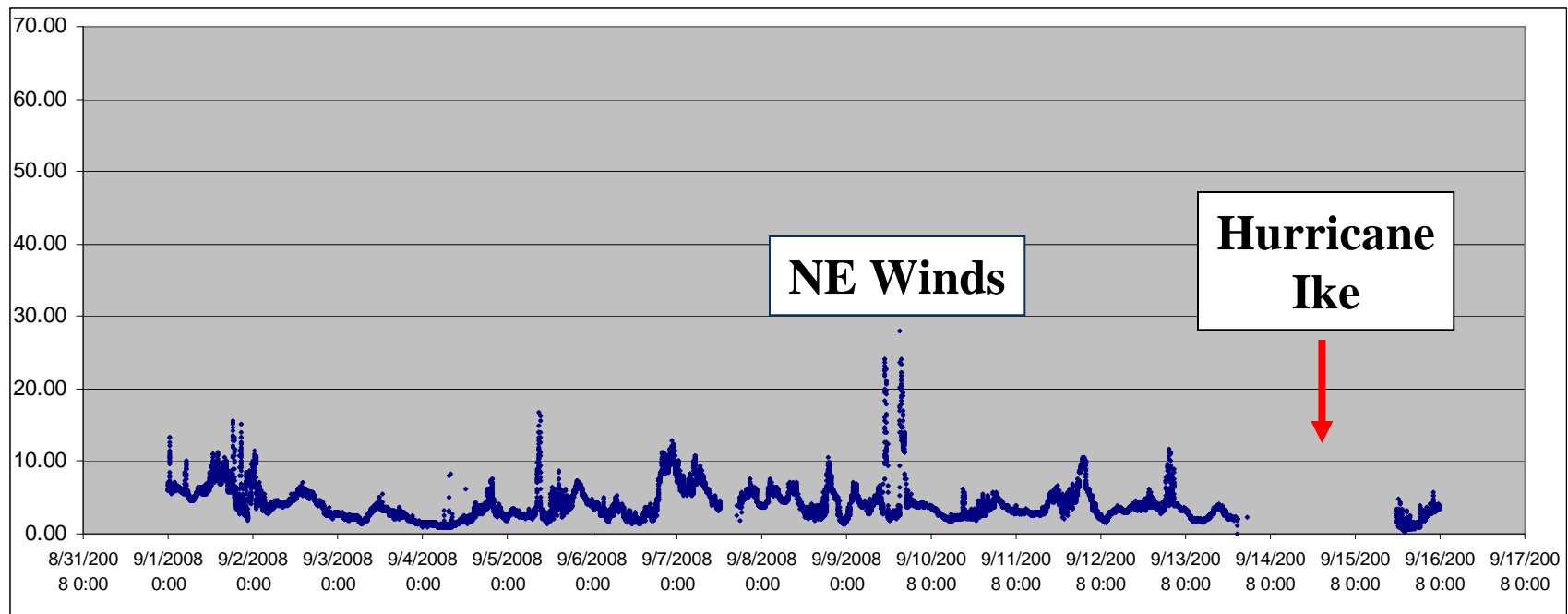
- No strong HRVOC peak on August 4, when high ozone was measured at Longview and Tyler
- Wind direction was E-SE at CAMS 19
- All three strong RAD peaks occurred after 5 pm

# RAD Data August 15-September 2



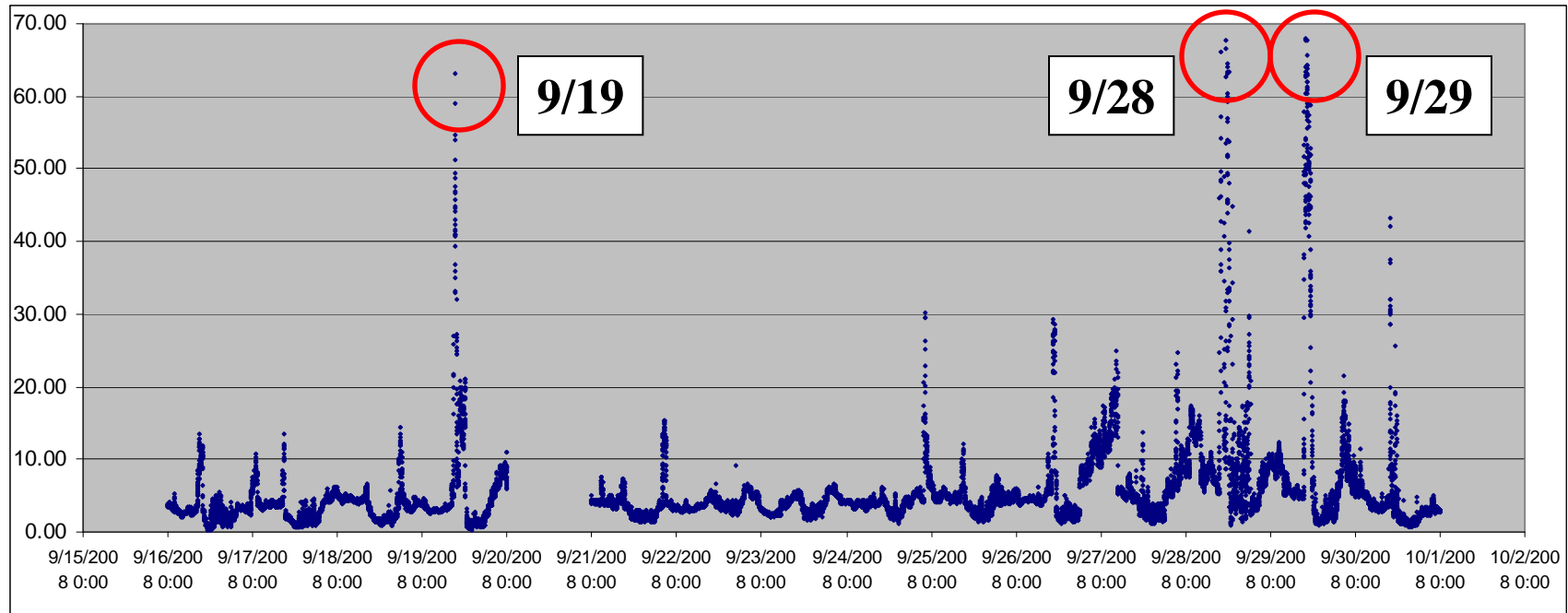
- Problem with data capture on 8/28-8/29. Final data set will have data for these days
- Peaks on 8/30 and 8/31 occurred in the evening

# RAD Data August 31-September 17



- September 1, 2, 4, 5, and 6, 7, 12 had periods of N-NE winds
- No very large spikes during this time

# RAD Data September 15-October 2



- High 1-hr ozone at CAMS 19 on 9/19 (93 ppb) and 9/28 (104 ppb), but not as high on 9/29 (81 ppb)
- Wind direction northerly on 9/19 and 9/28, 9/29

## Summary (1)

- HRVOCs were detected at CAMS 19
- High resolution RAD data confirmed the intermittent character of anthropogenic HRVOC impacts suggested by 2006 VOC monitoring data from CAMS 19
- 10 of 64 days showed strong RAD signals above 30 ppb

## Summary (2)

- Many RAD spikes were not associated with high ozone at CAMS 19; most of these occurred at night
- Some days may not have been conducive to ozone formation (lower temperatures, clouds)
- High 1-hour ozone coincided with HRVOC spikes and northerly winds on 3 days in September, suggesting Eastman Complex impacts

# Recommendations

- Further analysis of the HRVOC data from August-September, 2008
  - Data used in analysis of 2008 high ozone days
  - What magnitude of emissions is required to explain the HRVOC spikes?
  - Determine biogenic contribution from periods between spikes and use to evaluate CAMx modeling
- No plans at this time for more HRVOC monitoring at CAMS 19
  - Consider within overall goals for future monitoring activities

End

