



# IOWA DEPARTMENT OF NATURAL RESOURCES

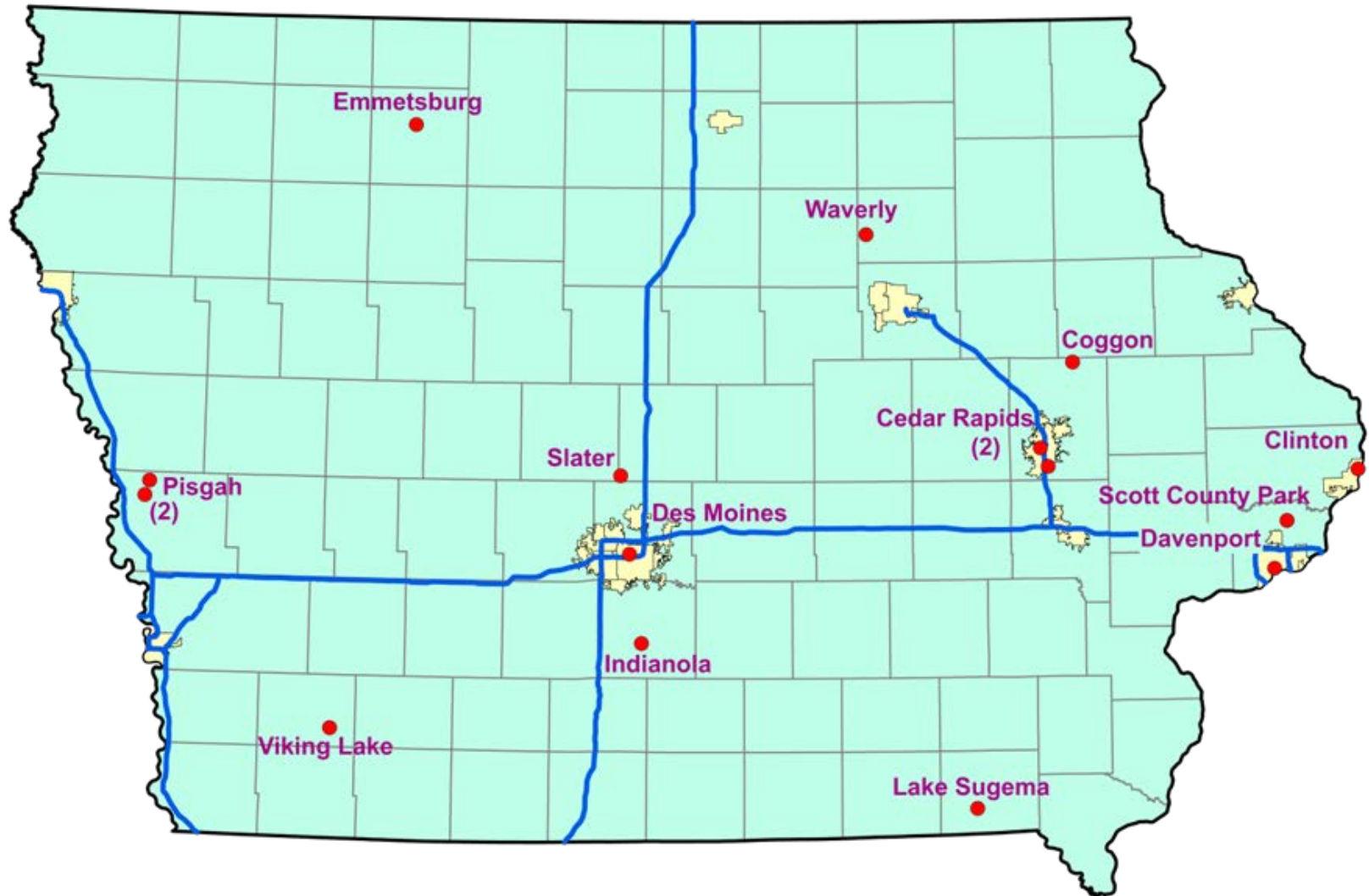
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LEADING IOWANS IN CARING FOR OUR NATURAL RESOURCES

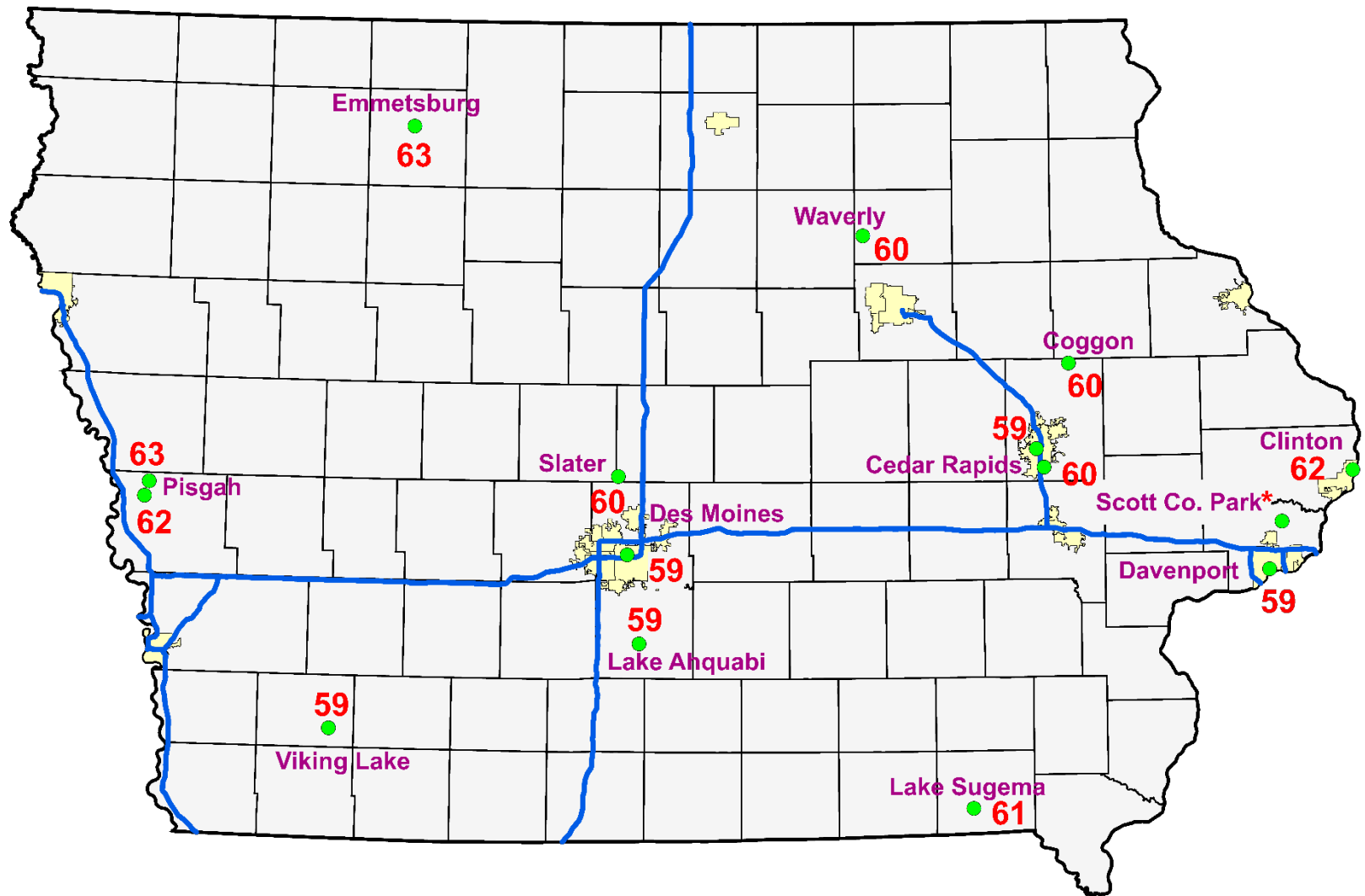
# Iowa Ozone Site Layout

- All sites have collocated ozone monitors and at least one transfer standard present for nightly zero, precision and span checks.
- Thermo 49i is used at all locations except for Cedar Rapids and Coggon sites.
  - Cedar Rapids and Coggon use API 400A & 400E monitors.
- Each monitor has its own sampling line in a climate-controlled environment.
- Special procedures are followed to minimize interference.
  - Insulated sampling lines.
  - Methods of mixing air output from air conditioners and heaters.
  - Proper wiring and grounding.

# Iowa Ozone Sites Map



# Iowa Ozone Design Values for 2015



## Iowa Ozone 4<sup>th</sup> Max Concentrations: 2013-2015

Site	2013	2014	2015
Waverly, Airport	60	61	59
Clinton, Rainbow Park	62	65	61
Pisgah, Forestry Office	65	63	61
Pisgah, Highway Shed	65	62	61
Cedar Rapids, Kirkwood College	60	59	63
Coggon, School	60	61	60
Cedar Rapids, Public Health	59	59	60
Viking Lake State Park	60	59	60
Emmetsburg, Iowa Lakes CC	64	63	64
Des Moines, Health Dept.	58	61	60
Scott County Park	59	64	63
Davenport, Jefferson School	60	59	59
Slater City Hall	61	62	59
Lake Sugema	63	63	57
Lake Ahquabi	59	60	59

# Experimental CMAQ Verification for Ozone

- August 29, 2016 through September 5, 2016.
  - 6Z and 12Z runs.
- Day 1 forecasts
- Experimental CMAQ data is compared to preliminary\* data recorded by ambient ozone monitors in Iowa.
- Analysis is also considered preliminary.
- Maximum daily 8-hour average ozone concentrations and hourly concentrations are compared.
  - No consideration is given for weather conditions such as cloud cover or precipitation in this analysis.
- At conclusion of ozone season (October 31, 2016) and final quality control checks are completed, values will be pulled from AQS for final comparison/analysis.

\* Data for 2016 will not be certified until May 2017.

# Average Experimental CMAQ Day 1 Differences

Site Name	Site ID	Average Difference in ppb (CMAQ - Observed)
Cedar Rapids, Kirkwood College	CDKC	3.5
Cedar Rapids, Public Health	CDPH	3.1
Clinton, Rainbow Park	CLRP	3.6
Coggon, School	COGG	4.8
Des Moines, Health Dept.	DMHD	9.1
Davenport, Jefferson School	DVJS	4.5
Emmetsburg, Iowa Lakes CC	EMMT	8.0
Lake Ahquabi	INDI	11.8
Lake Sugema	LKSU	10.8
Pisgah, Forestry Office	PIFO	9.8
Pisgah, Highway Shed	PIHM	7.4
Scott County park	SCPK	5.0
Slater, City Hall	SLAT	9.8
Viking Lake State Park	VLSP	9.2
Waverly, Airport	WAVR	9.2
Average Difference (All Sites)		7.1

# Average Experimental 6Z CMAQ Day 1 Differences

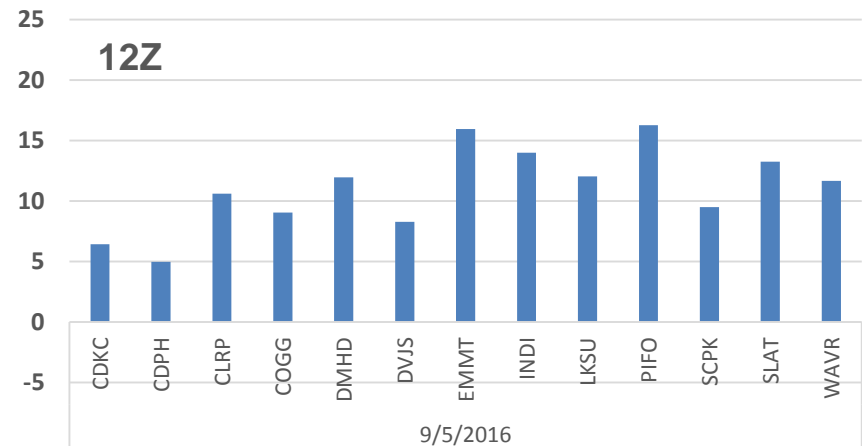
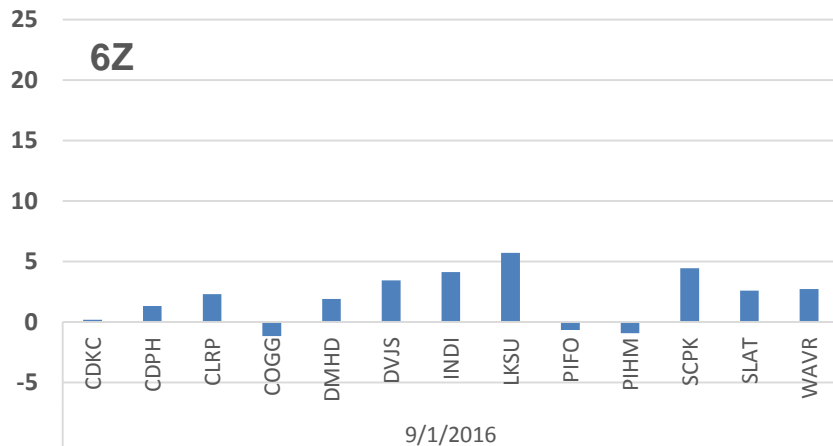
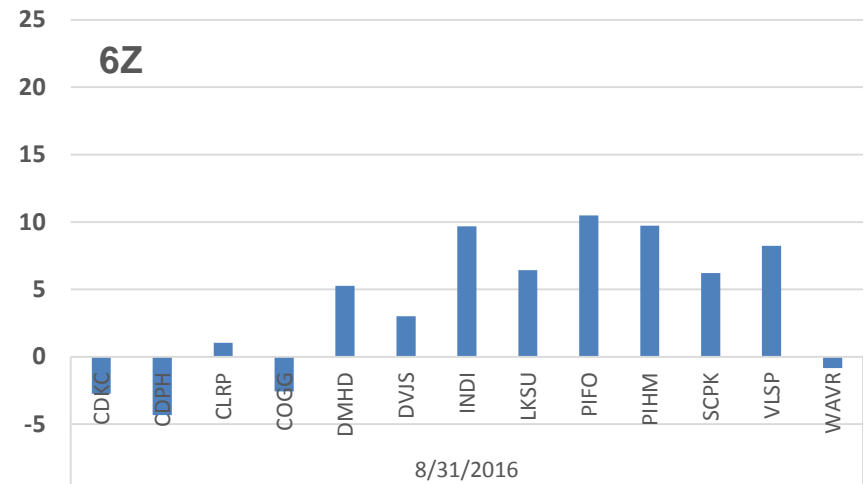
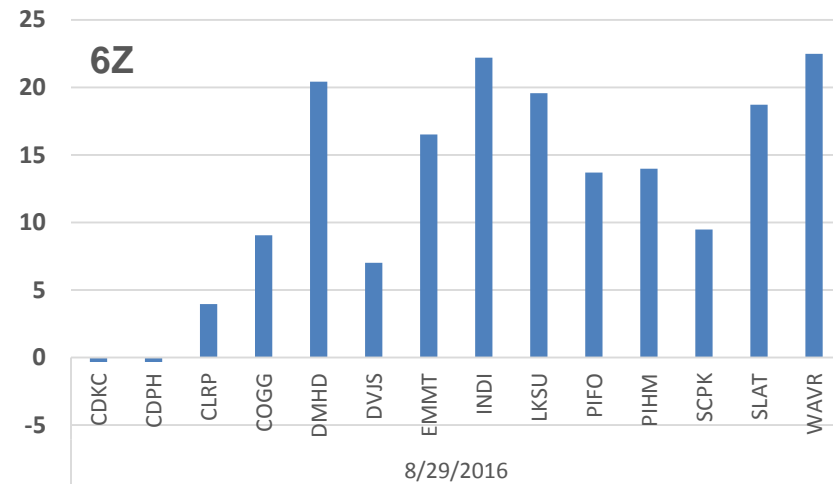
Site Name	Site ID	Average Difference in ppb (CMAQ - Observed)
Cedar Rapids, Kirkwood College	CDKC	2.8
Cedar Rapids, Public Health	CDPH	2.3
Clinton, Rainbow Park	CLRP	2.6
Coggon, School	COGG	4.7
Des Moines, Health Dept.	DMHD	8.9
Davenport, Jefferson School	DVJS	3.6
Emmetsburg, Iowa Lakes CC	EMMT	8.4
Lake Ahquabi	INDI	11.5
Lake Sugema	LKSU	10.4
Pisgah, Forestry Office	PIFO	9.5
Pisgah, Highway Shed	PIHM	7.1
Scott County park	SCPK	4.2
Slater, City Hall	SLAT	9.5
Viking Lake State Park	VLSP	8.2
Waverly, Airport	WAVR	8.9
Average Difference (All Sites)		6.7



# Average Experimental 12Z CMAQ Day 1 Differences

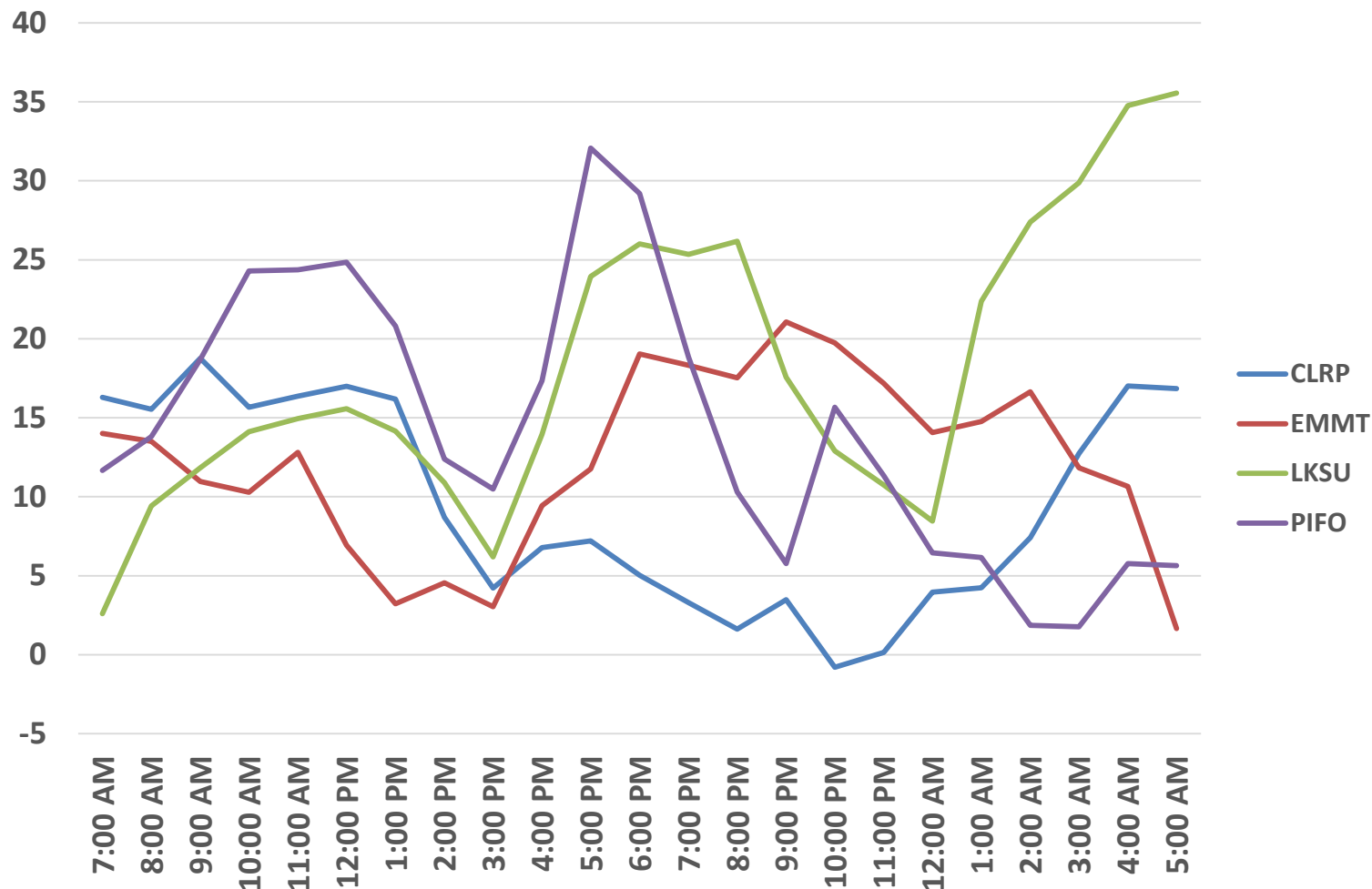
Site Name	Site ID	Average Difference in ppb (CMAQ - Observed)
Cedar Rapids, Kirkwood College	CDKC	4.2
Cedar Rapids, Public Health	CDPH	4.0
Clinton, Rainbow Park	CLRP	4.5
Coggon, School	COGG	5.0
Des Moines, Health Dept.	DMHD	9.3
Davenport, Jefferson School	DVJS	5.3
Emmetsburg, Iowa Lakes CC	EMMT	7.7
Lake Ahquabi	INDI	12.0
Lake Sugema	LKSU	11.1
Pisgah, Forestry Office	PIFO	10.1
Pisgah, Highway Shed	PIHM	7.7
Scott County park	SCPK	5.8
Slater, City Hall	SLAT	10.0
Viking Lake State Park	VLSP	10.2
Waverly, Airport	WAVR	9.6
Average Difference (All Sites)		7.6

# Day 1 Maximum 8-hour Average Ozone Differences

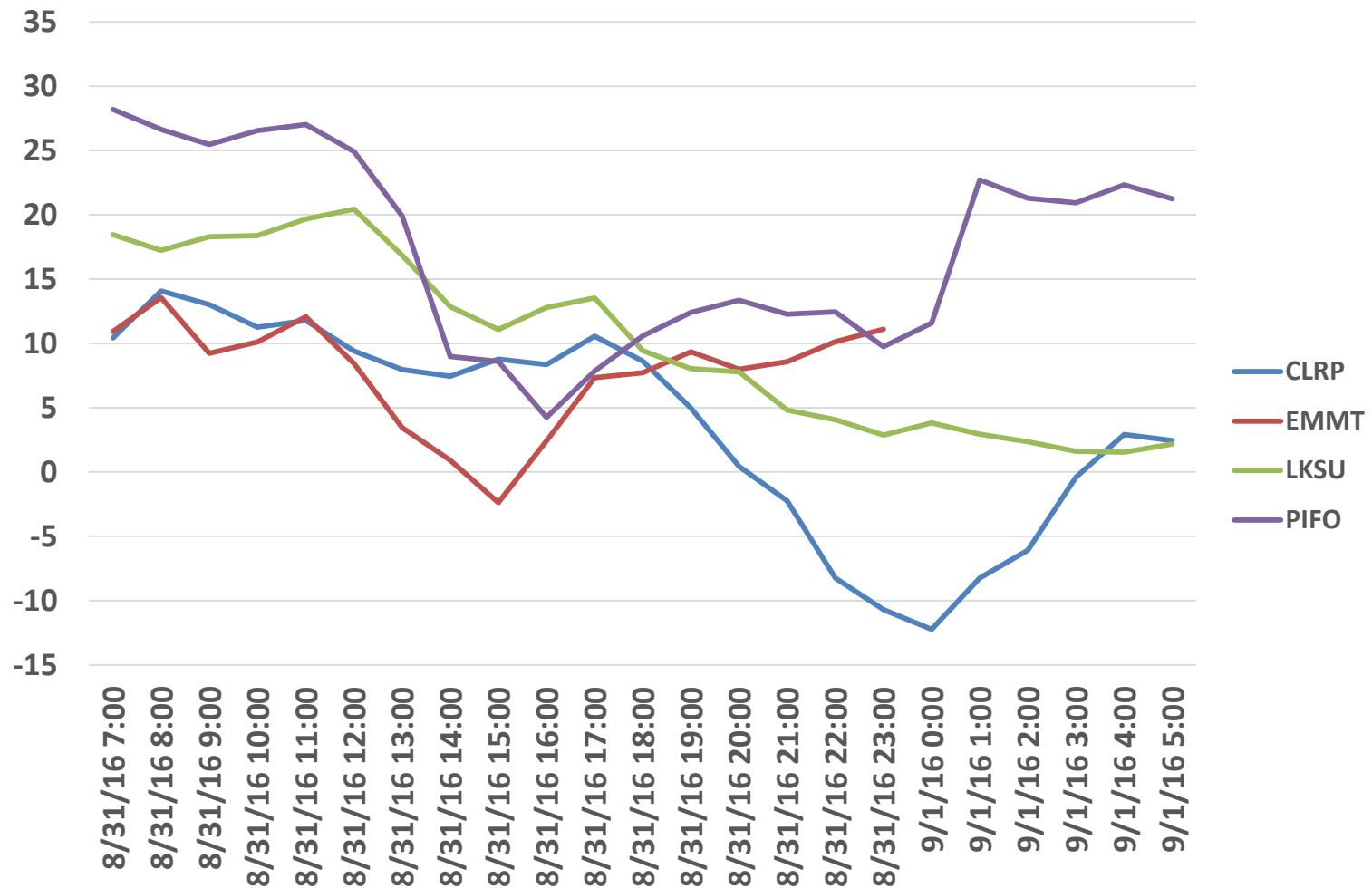


Concentration Differences are in ppb.

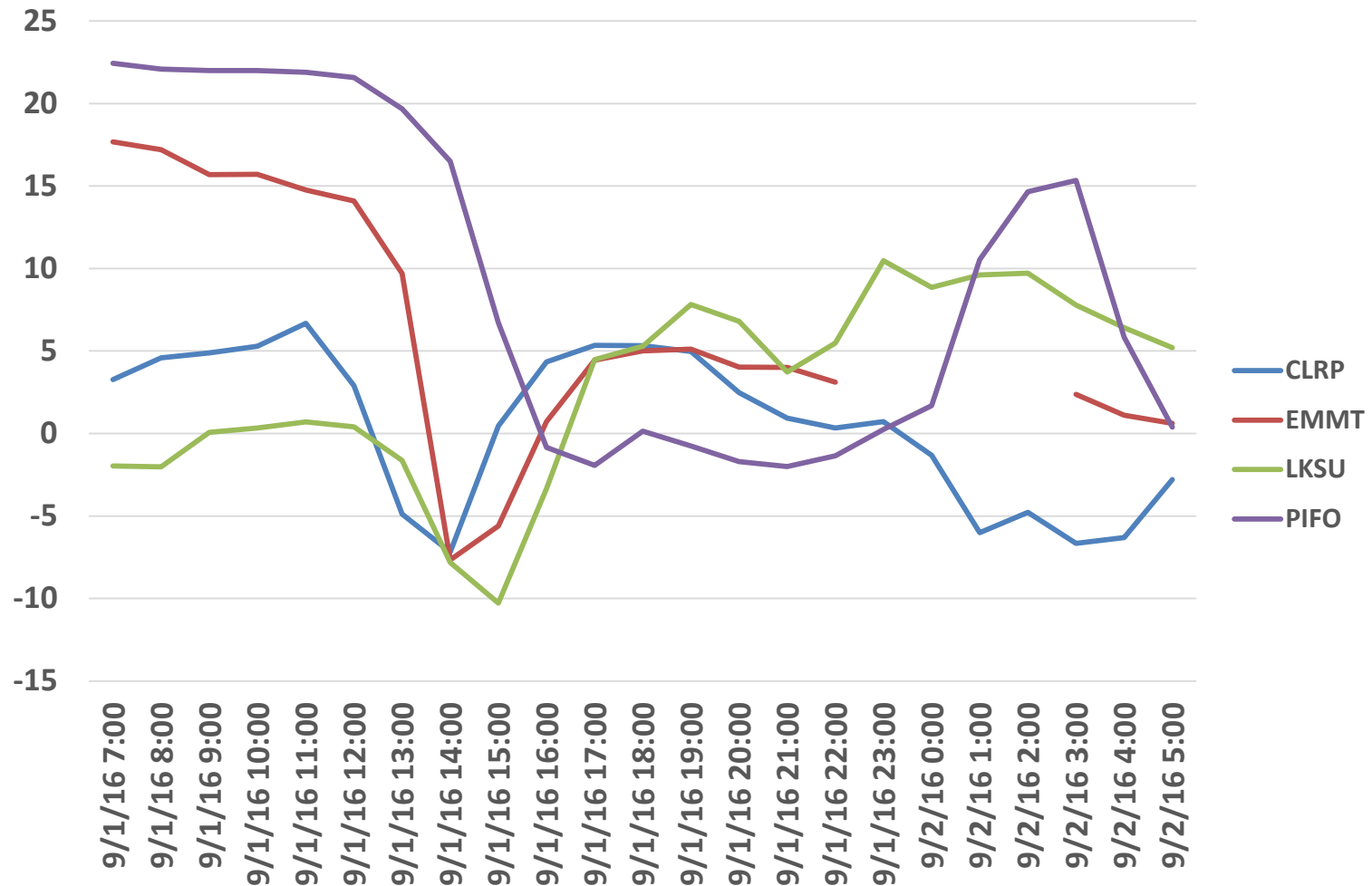
# Select Sites Hourly (UTC) Differences (ppb): 8/29/2016



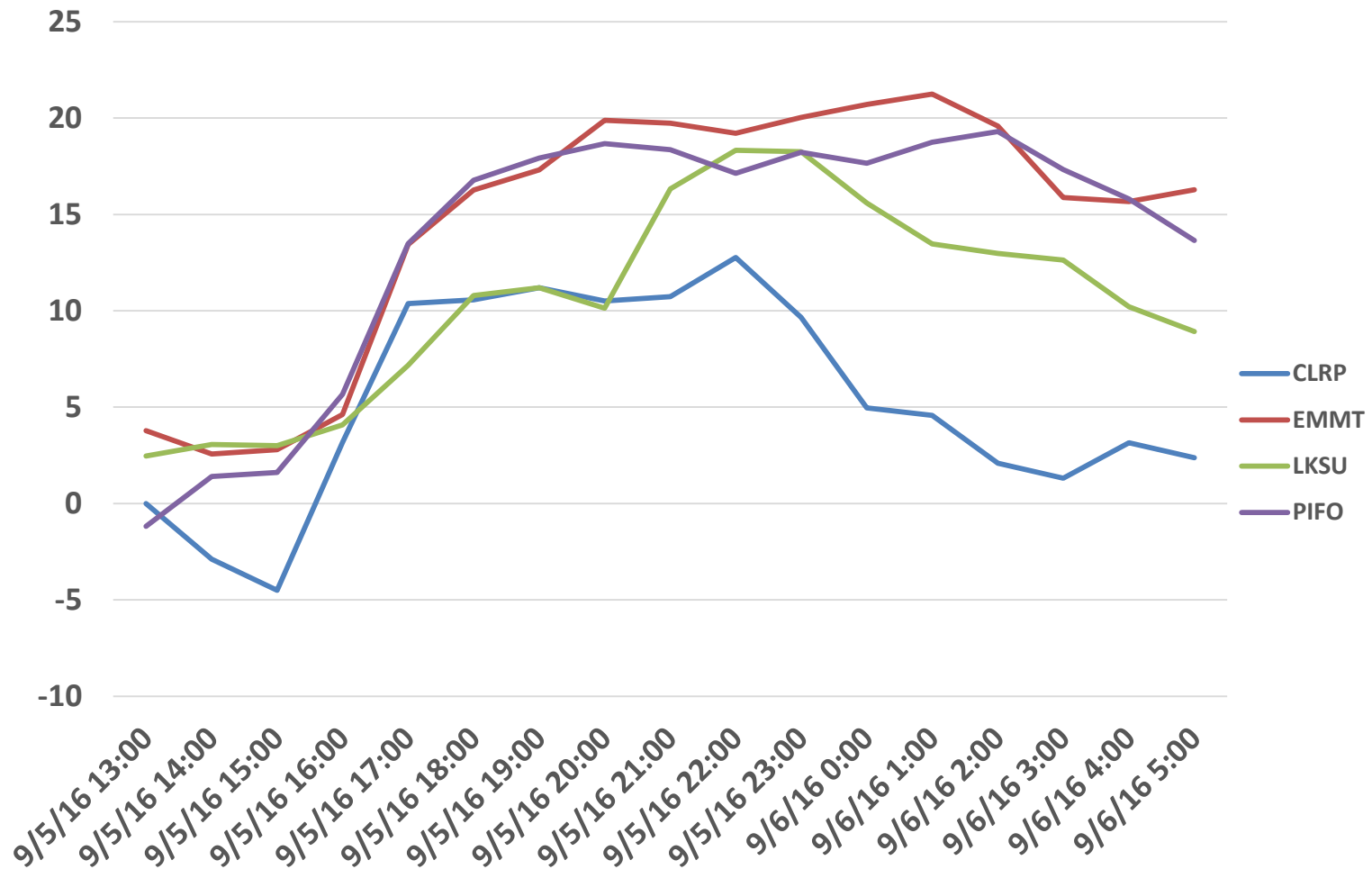
# Select Sites Hourly (UTC) Differences (ppb)



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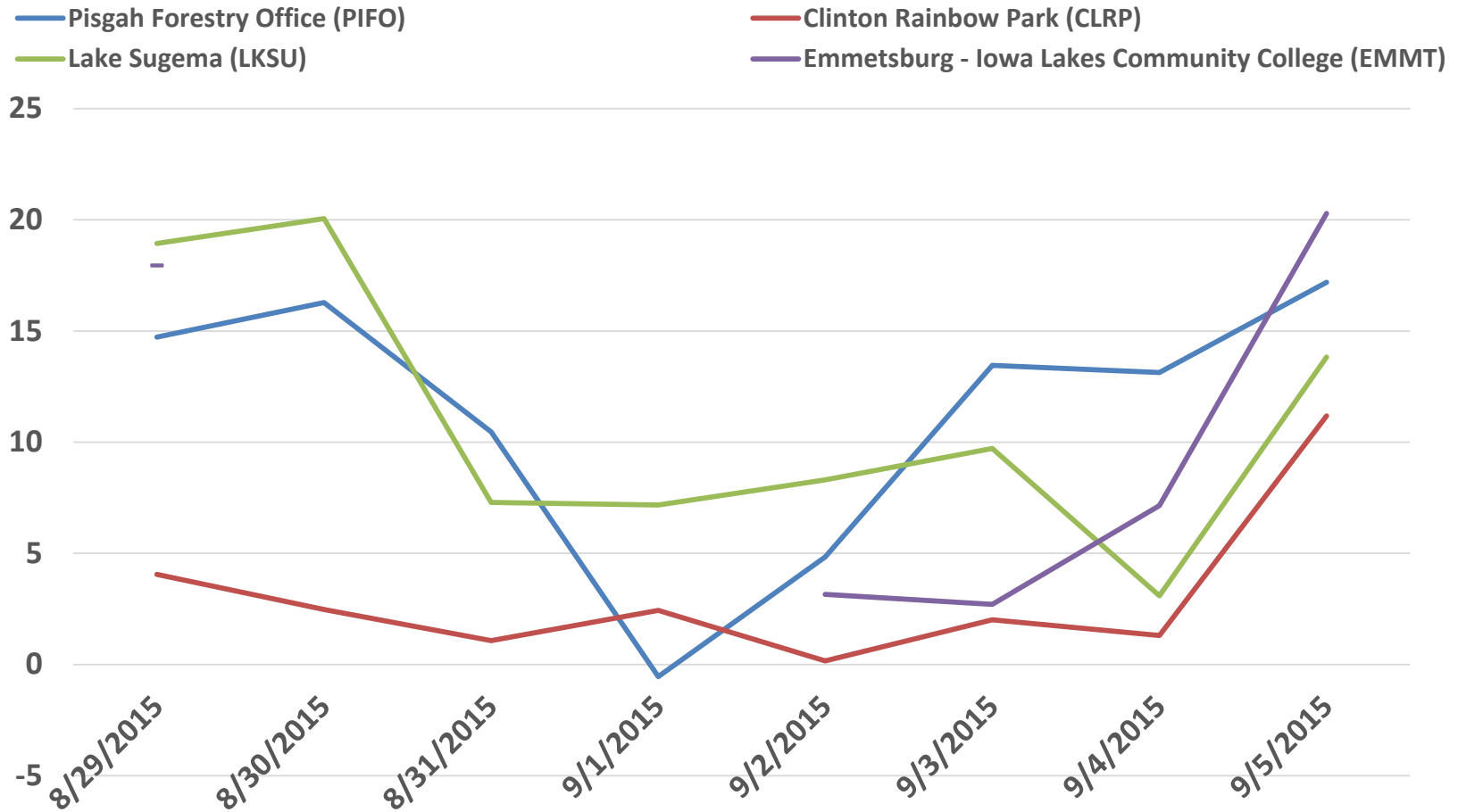


# Select Sites Hourly (UTC) Differences (ppb)



# Current Operational CMAQ (06Z) Differences (ppb)

Maximum Daily 8-hour Average (CMAQ – Observed)



# Preliminary Musings

- The sample size is limited so few, if any conclusions can be drawn at this point.
- More analysis needs to be done to evaluate the performance of the new CMAQ model.