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Department of Environmental Quality

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Monitoring for Sulfur Dioxide Using Sensor Technology

- Why did we do it?
- Design thoughts
- A few pictures
- Some data
- Conclusions

That was then....

- Data Requirements Rule, May 13, 2014 proposal
- As many as 10 facilities
- Modeling ok in certain situations
- How many monitors? Really???
- Adding SO₂ sites expensive, and poses logistical challenges to meet requirements
- TAD?
- Prior experience with SO₂

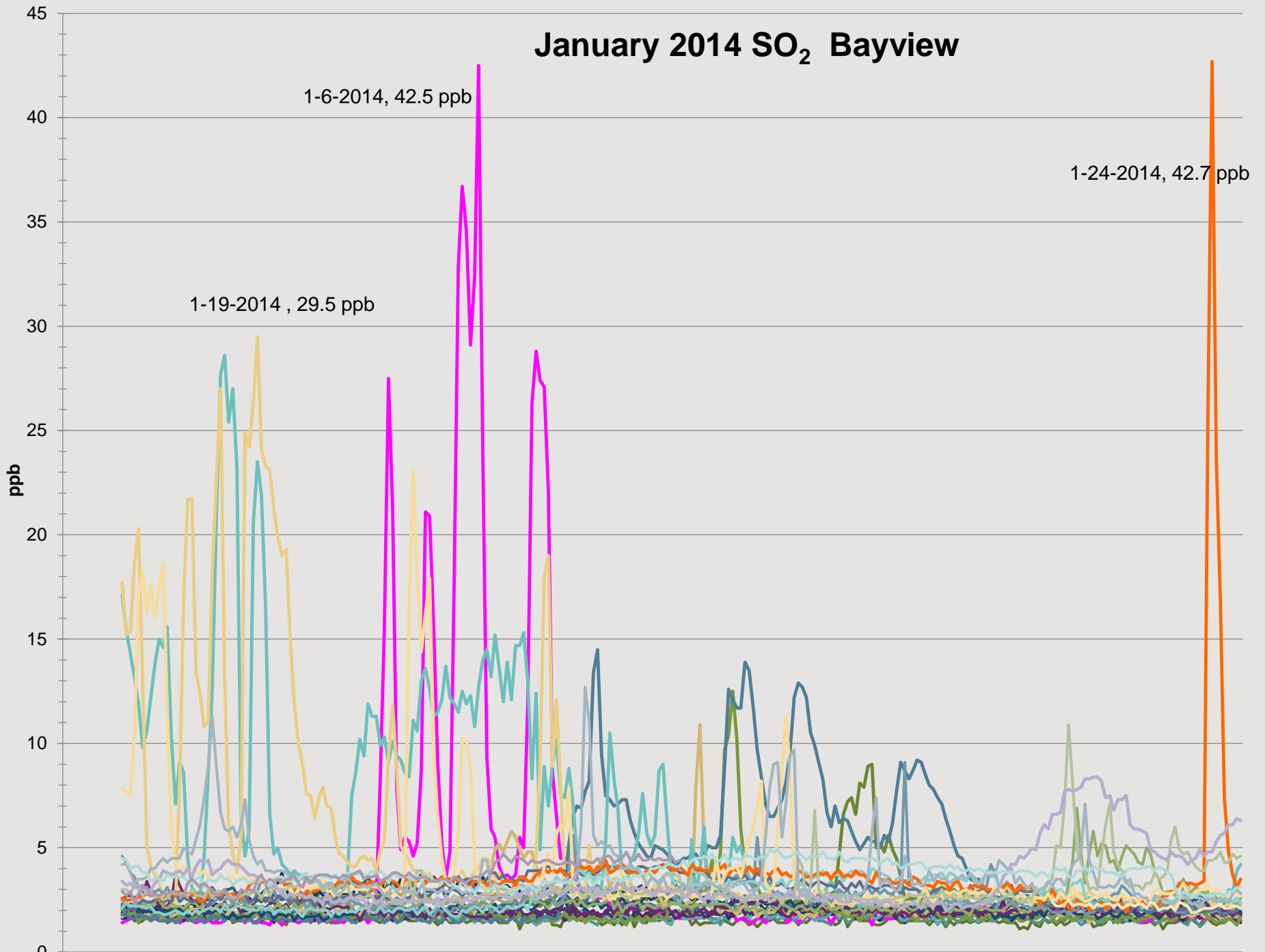


New Generation Air Monitors

- Most promising options measure air quality using emerging sensor technology
- Sensors can be easily deployed in multiple locations around sources increasing spatial and temporal resolution
- Wireless transmission makes data readily available
- Most sensors available at a lower cost compared to reference monitors
- But what about:
 - Equipment and data reliability?
 - Equipment and data rigor?
 - Relatable to air quality standards?



January 2014 SO₂ Bayview



*The Basic Experimental Idea –
Can these sensors be used as indicators?*

- Assess the viability of paired sensors to [robustly] monitor SO₂
 - In a side-by-side comparison, do the pods read the “same value” ? (+/- 15% or other value)
 - Does a pod, one or the other, read the “same value” as the SO₂ Monitor? (+/- 15% or other value)
 - Or alternatively, is there a quantifiable, consistent deviation between the pod values and the monitor values?
- Run sensors simultaneously with the SO₂ reference monitor at established source-oriented sites
- Evaluate data

Equipment Selected

▶ AQMesh



Pod also equipped with sensors for CO, O₃, NO, NO₂, temp, RH, atmospheric pressure

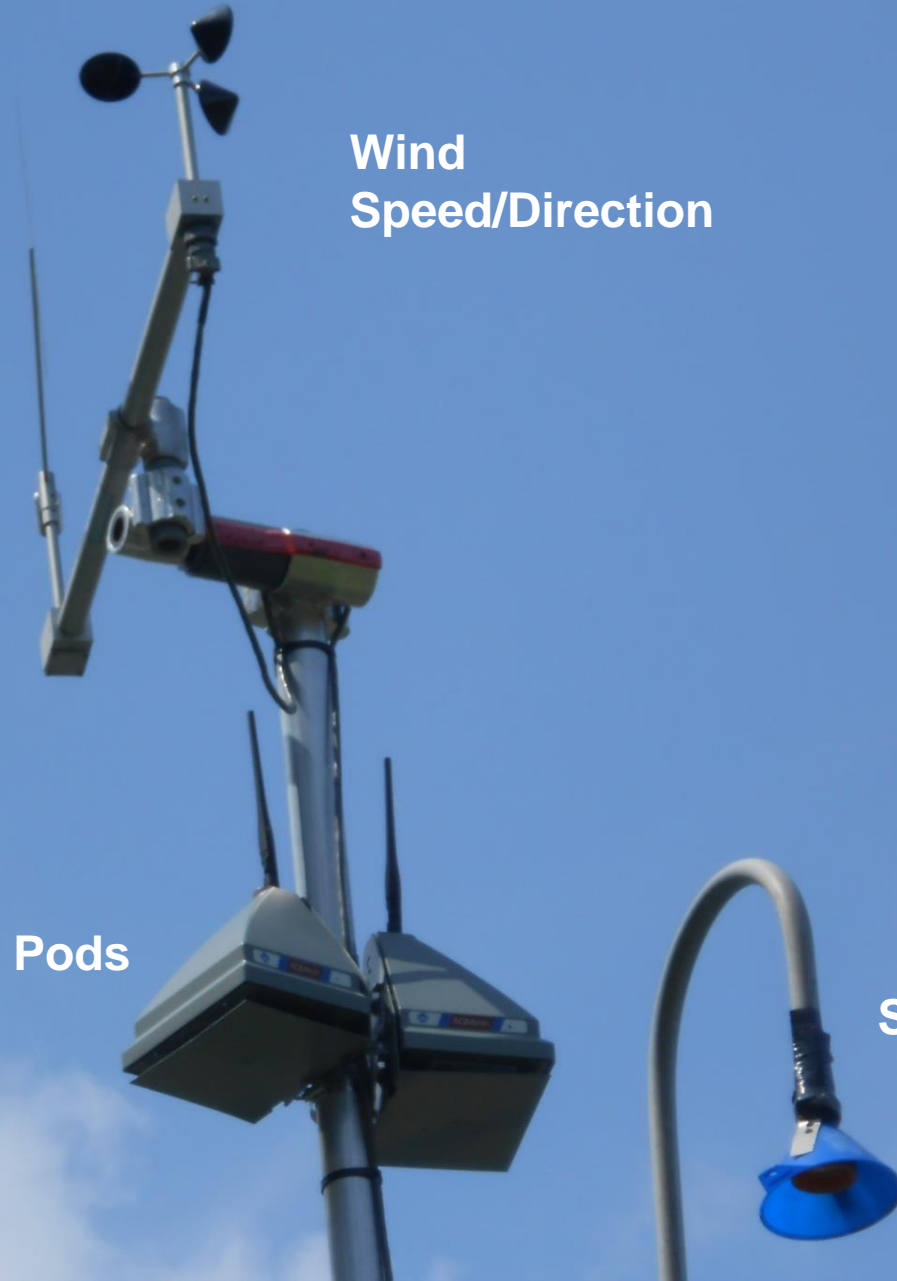


Set-up

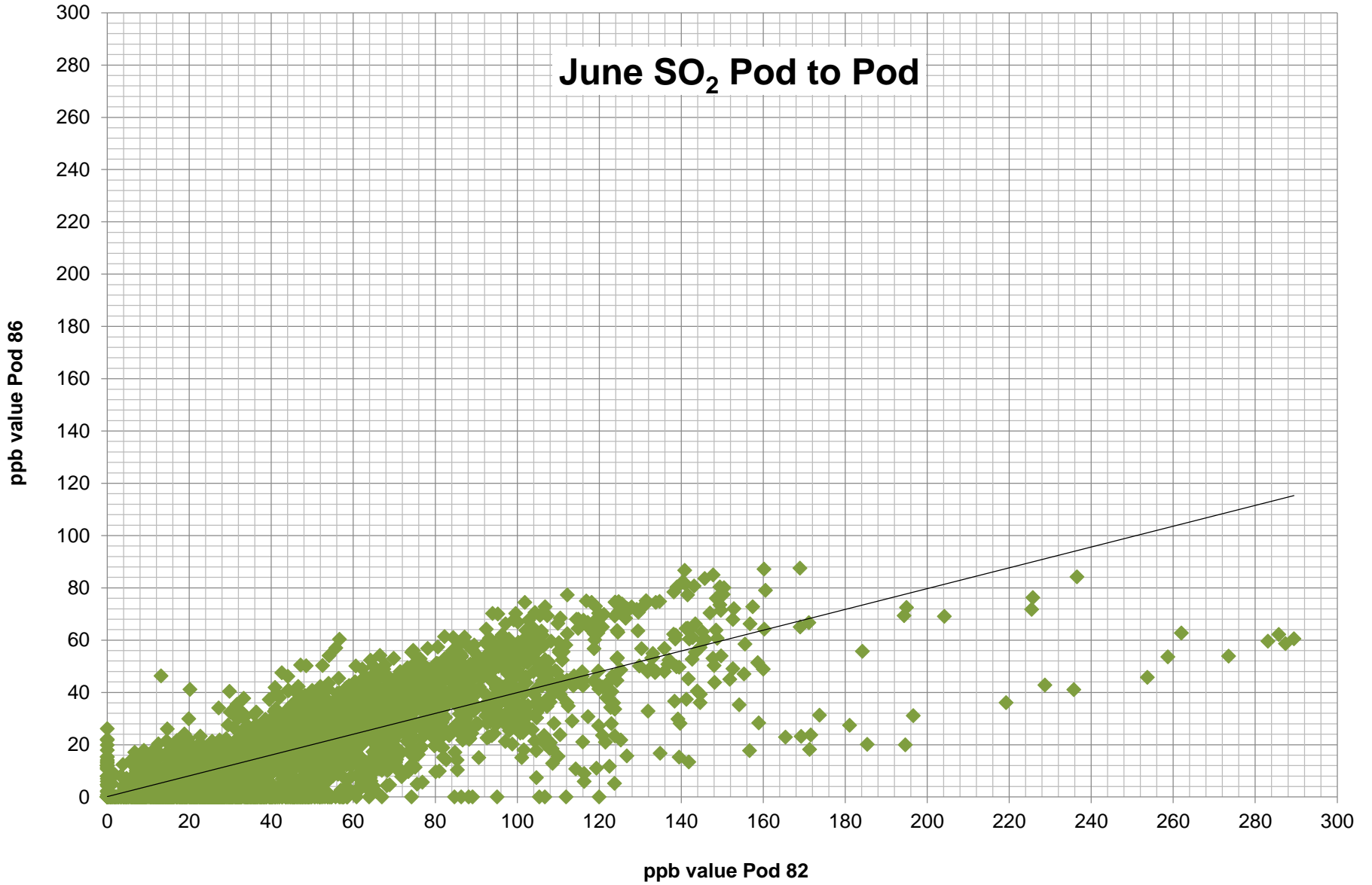
Wind
Speed/Direction

Sensor Pods

SO₂ Inlet

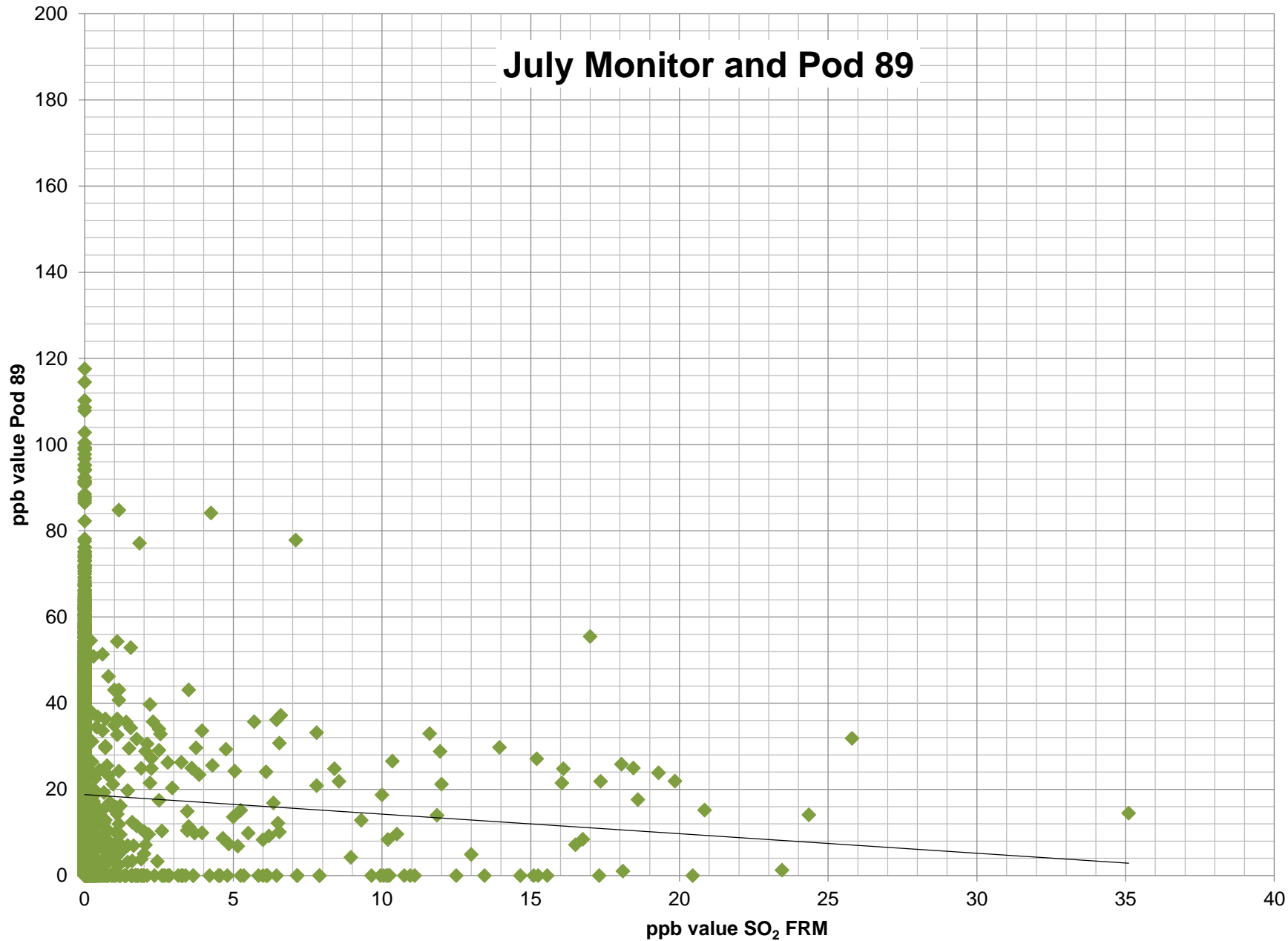


June SO₂ Pod to Pod



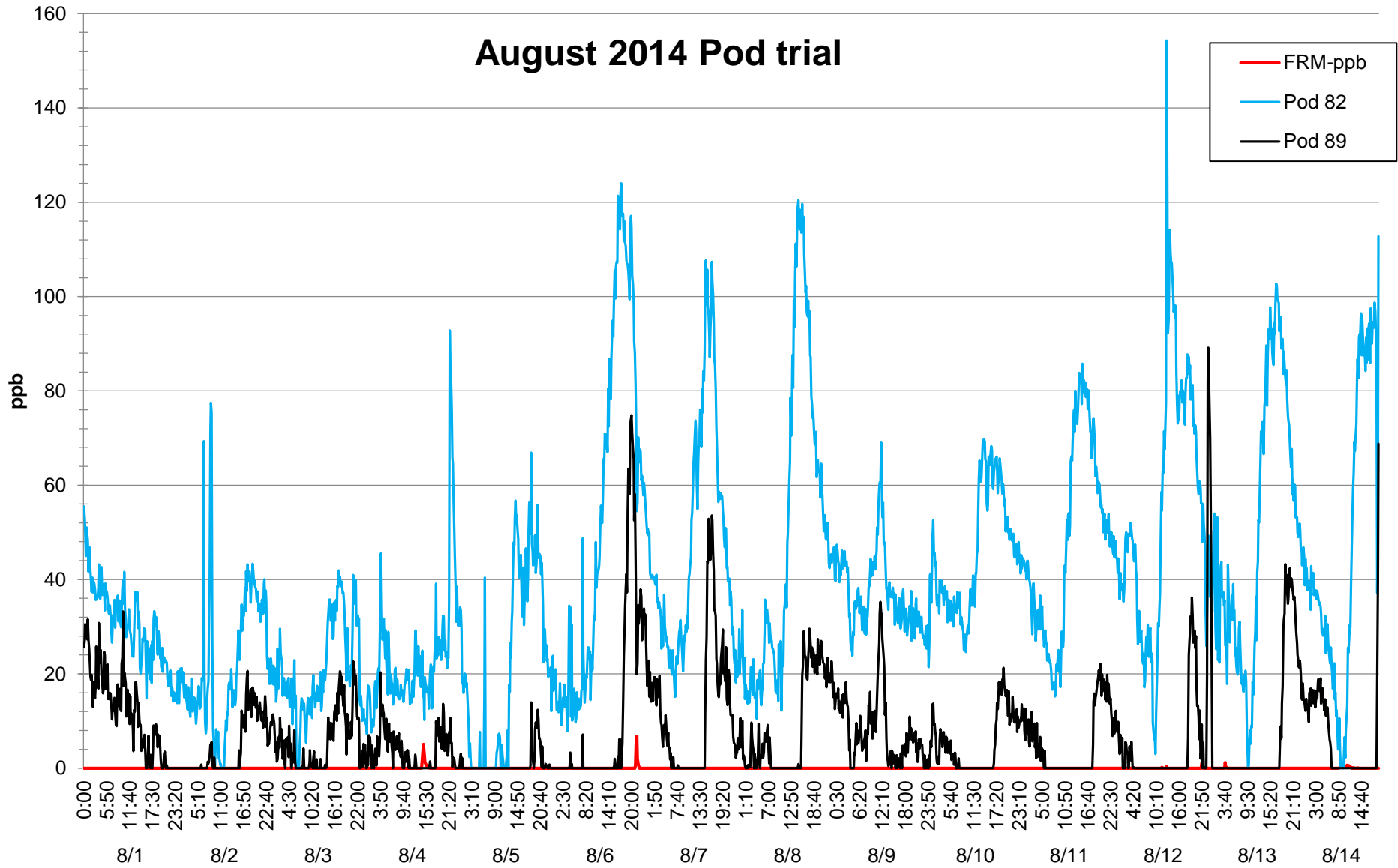
$r^2 = .78$

July Monitor and Pod 89

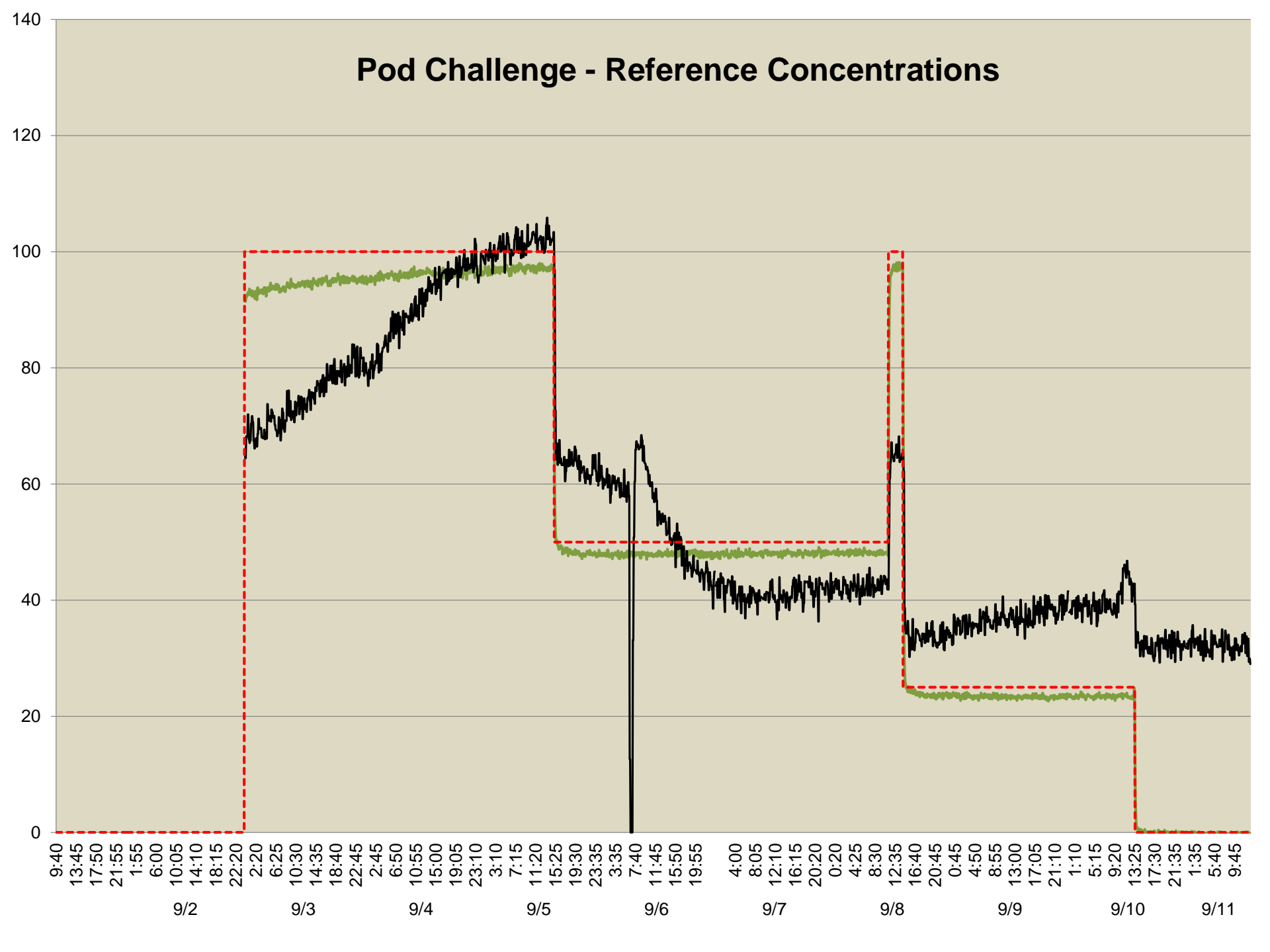


$r^2 = -.05$

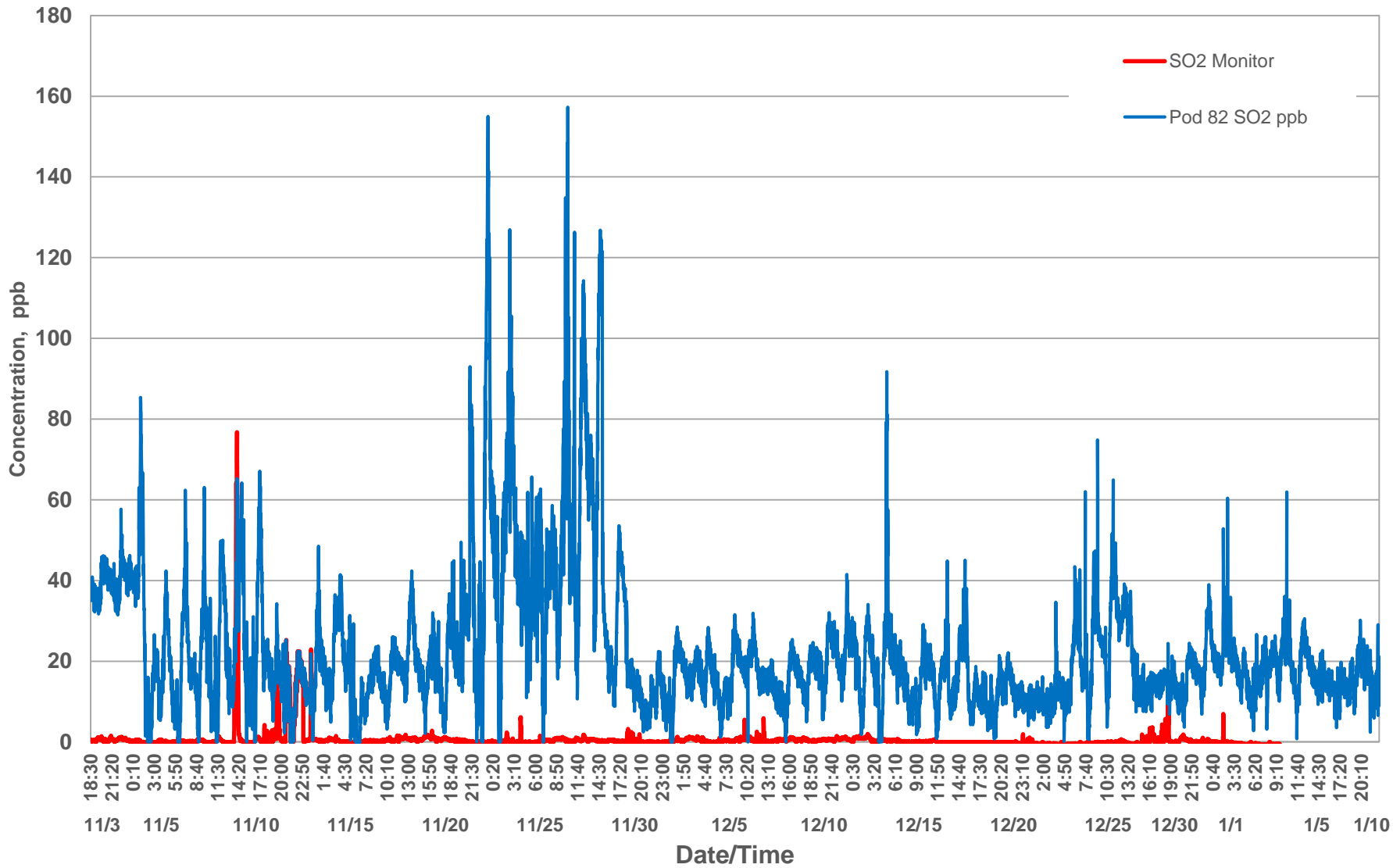
August 2014 Pod trial



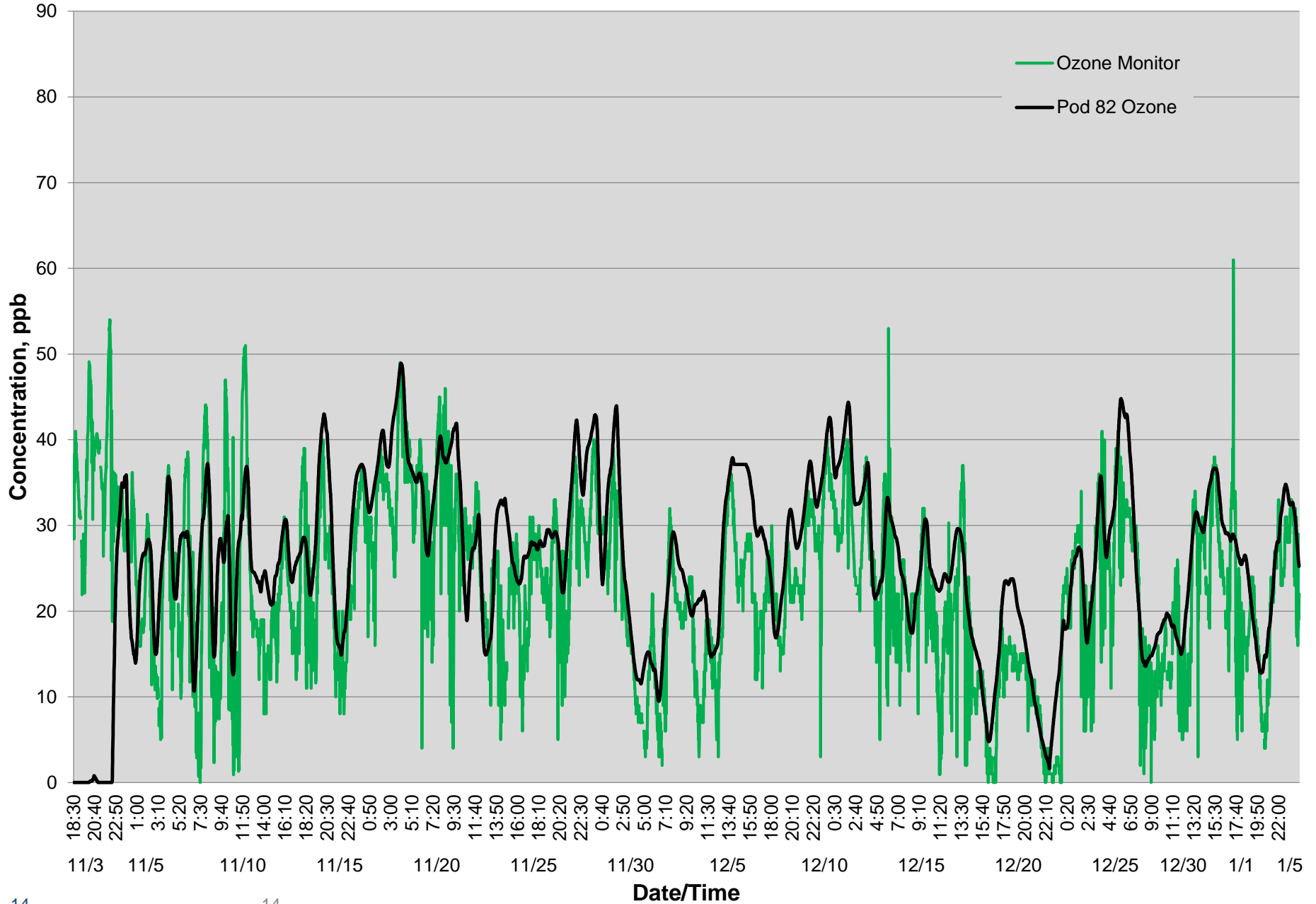
Pod Challenge - Reference Concentrations



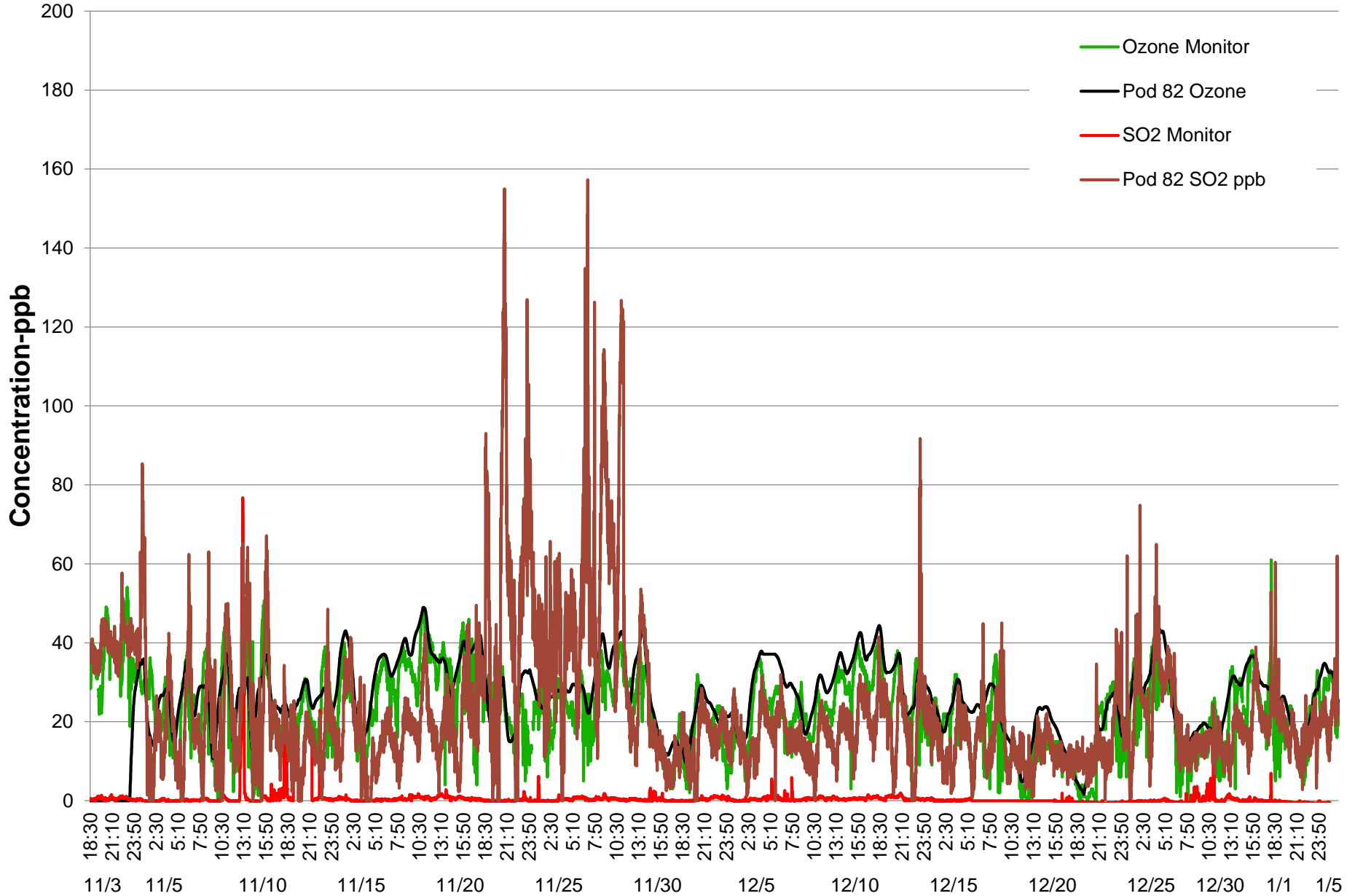
Time Series for SO2 Pod 82 and Monitor 11/3/2014 through 1/10/2015



Time Series Ozone Monitor-Pod 82 11/3/2014 - 1/5/2015



Time Series for Ozone & SO2 Monitor-to-Pod 11/3/2014-1/5/2015



This is now...

- Pursuing traditional monitoring at five facilities
 - One monitor only
- Another manufacturer interested in co-locating their equipment with one of these sites

