MULTI - SECTOR AIR POLLUTANTS REGULATION (MSAPR)

USING CONTINUOUS EMISSION MONITORS (CEMS) FOR REPORTING

Presented by:

Kirk Easto –
Principal, RWDI

Emissions Monitoring With Low Cost Sensors

Presented by:
Sean Miner -
President, Pacwill Environmental

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Redefining possible.

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Regulation Basics

Multi-Sector Air Pollutants Regulations

Federal Regulation with the purpose of setting consistent emission standards for Nitrogen Oxides (NO_X) across several industrial sectors.

Main focus:

a) Boilers and heaters firing natural gas (Part 1)

b) Spark ignition engines firing natural gas (Part 2)

c) Emissions(NO_x & SO_2) from Cement Industry (Part 3)

Goal:

Reduce emissions that negatively effect human health.

PART 1 – Boiler and Heaters

Basics Steps - Part 1

a) **Determine your boiler classification**

b) **Determine NO_X intensity via**

- Stack Tests; or
- CEMs

c) **Report emissions**

d) **Plan for reduction if required**

PART 2 – Stationary Spark-Ignition Engines

Basics Steps - Part 2

a) **Determine your engine group**

b) **Determine NO_X intensity**

- Stack Tests

c) **Report emission**

d) **Plan for reduction if required**

CEMs are not expected to be applicable to this part of the MSAPR

PART 3 – Cement Industry

Basics Steps - Part 3

a) **Determine if the Regulation applies to you**

b) **Determine Emission Limit**

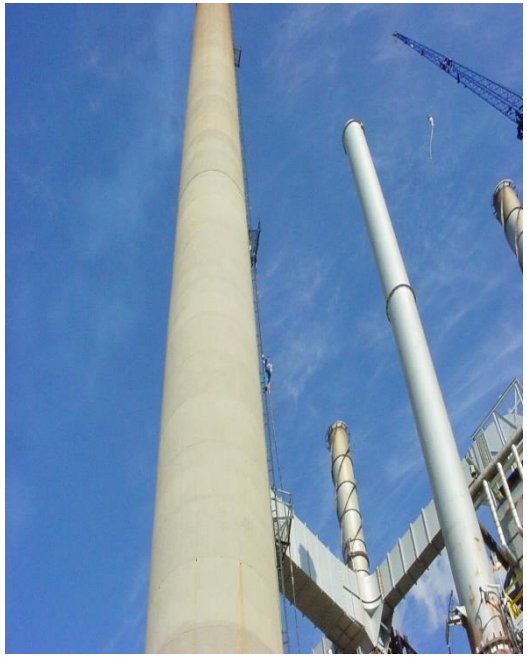
- Based on clinker production

c) **Determine Actual Emissions**

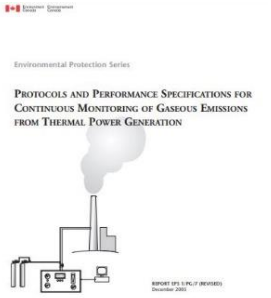
- Using CEMs is only option

d) **Submit Compliance Report**

e) **Plan for reduction if required**



CEM Operation



CEM Operation

The MSAPR lists only two CEM codes your facility must follow in order to use the data for reporting

1) EC CEMS code, titled Protocols and Performance Specification for Continuous Monitoring of Gaseous Emissions from Thermal Power Generation (EPS/ 1/PG/7), December 2005

2) AB CEMS Code titled: Alberta Continuous Emission Monitoring Systems Code

   (Pub No.: Ref. 107), May 1998.

CEM Operation

Both Codes are relatively the same and offer the following guidance:

- Design Specifications
- Installation Specifications
- Certification and Performance Test Procedures
- On-going Quality Assurance which include
  - Daily;
  - Quarterly;
  - Annually
- Relative Accuracy Test Audits
- Detailed QA/QC Manuals
- Annual Independent Inspections

CEM Operation

Installation and Operation of a CEM system is expensive and time consuming.

It requires a large initial investment, continuous man hours and outside consultant fees

Not recommended unless already in place and operating

If a facility is following one of the two Codes the data will be very reliable and accurate.

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MSAPR and CEM

MSAPR and CEM

Part 1 – Boilers and Heaters

Allows the use of CEM data for reporting the average NO_X intensity for the required period.

Or

Conduct a series of stack tests

MSAPR and CEM

Part 3 – Cement Manufacturing

CEM are required to be installed and operating under the listed CEM Codes for emission monitoring and reporting.

MSAPR and CEM

Part 4 — General

Part 4 sets out general rules related to:

(a) the CEMS Reference Method that governs the use of a Continuous Emissions Monitoring System;

(b) alternative rules to those set out in documents incorporated by reference into these Regulations; and

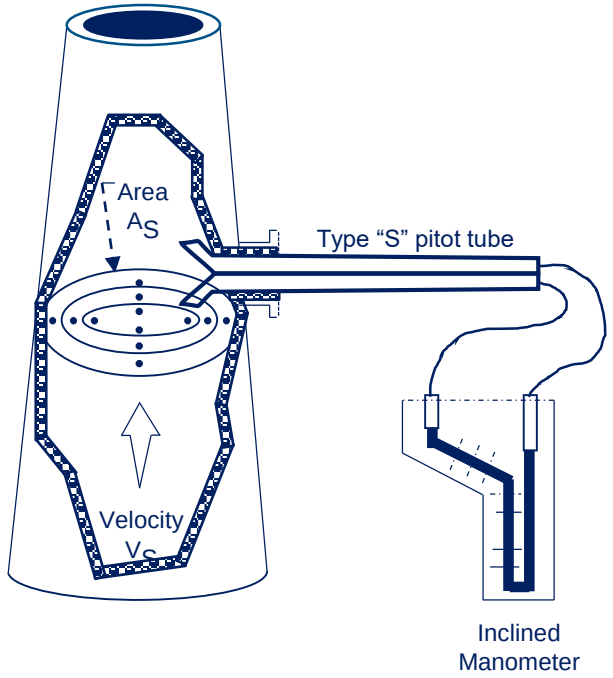
(c) the reporting, recording and retention of information.

MSAPR and CEM

Part 4 — Summary

Highlights the key components of each method namely;

- Design Requirements;
- Installation Requirements;
- Performance Requirements;
- QA/QC manual details; and
- Annual Audit.



MSAPR and CEM

Part 4 — Summary

Annual Audit

PG/7 has a “Independent Inspection”

AB CEMS Code has an “Annual Evaluation”

MSAPR it is referred to as a “Annual Audit”

Provides more detail on what exactly is required, and highlights the RATA and Bias tests, as well as the implementation of a QA/QC manual.

Lists a 30 day delivery date on the Auditor Report and lists the information required.

Qualifications for the Auditors are provided

MSAPR Modifications to CEM Codes

EC CEM Code Modifications

- Removes the term “appropriate regulatory authority”
- Fixes typo in equations A-1 and A-7
- Removes the option of Energy Balance Method
- Limits the Reference Method options for the RATA to only US EPA Method 7E for NO_X, and US EPA Method 3A for O_2.
- Similarly limits the flow and density methods to US EPA Method 1,2,4 or EC Methods A,B and D.

AB CEM Code Modifications

- Removes the terms related to "Director"
- Removes terms related to opacity monitors
- Removes the ability to use the Alberta Stack Sampling Code for Method 1&2, must follow US EPA Method 1&2 or EC Method A&B
- Changes the term "owner or operator" to responsible person"
- Removes the ability to use systems that do not have calibration gases
- Limits the Reference Method options for the RATA to only US EPA Method 7E for NO_X, and US EPA Method 3A for O_2.
- Similarly limits the flow and density methods to US EPA Method 1,2,4 or EC Methods A,B and D.

Summary

Summary

Part 1 of the MSAPR does allow the use of CEMs for reporting NO_X intensities

Part 3 of the MSAPR (Cement) must use CEMs for reporting of quantity of NO_X and SO_2.

The CEMs must follow either the Alberta CEM code or the EC CEMs code (PG/7)

Summary

Notable modifications to the AB CEM's Code and EC CEM's code;

Annual Audit report may require more details than currently being provided.

Reference Methods for the RATA are limited to:

US EPA Method 7E

US EPA Method 6C

US EPA Method 3A

US EPA Method 1,2,4, or

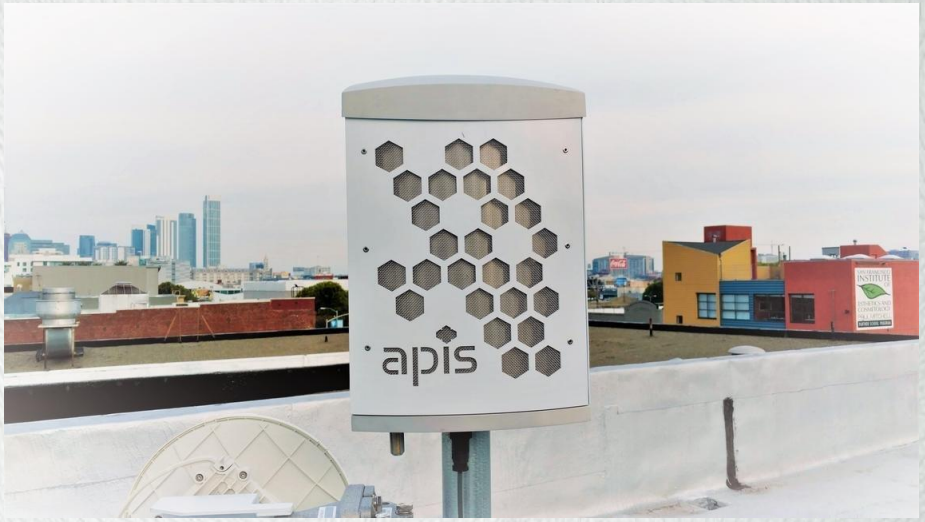
EC Methods A,B, D.

Pacwill Environmental

Emissions Monitoring With Low Cost Sensors

Presented by:
Sean Miner - President, Pacwill Environmental

1. Near Source Air Monitoring



Near Source Air Monitoring

Continuous real time measurement data is a valuable tool

- Prompt notification of an emission event allows the emitting facility to be proactive in addressing process issues.
- Responding to emission events quickly reduces complaints from nearby residents and businesses.
- Monitoring data can be used to determine the location of an emission source. This includes emissions from another facility.

Near Source Air Monitoring

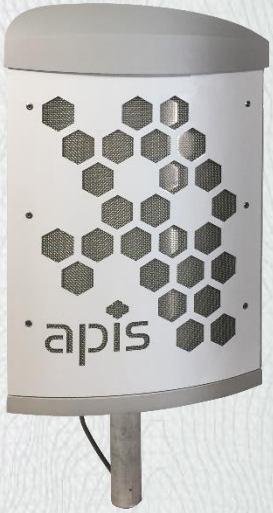
Barriers to Continuous Measurements

- Monitoring systems are expensive to buy and maintain.
- An appropriate site including services is required for installation.
- Specialists needed to maintain system and interpret the data.

As a result, monitoring is typically done short term or only when absolutely necessary.

Near Source Air Monitoring

Recent developments in sensor technologies have reduced barriers (for some applications)



2. Improvements in Sensor Technologies

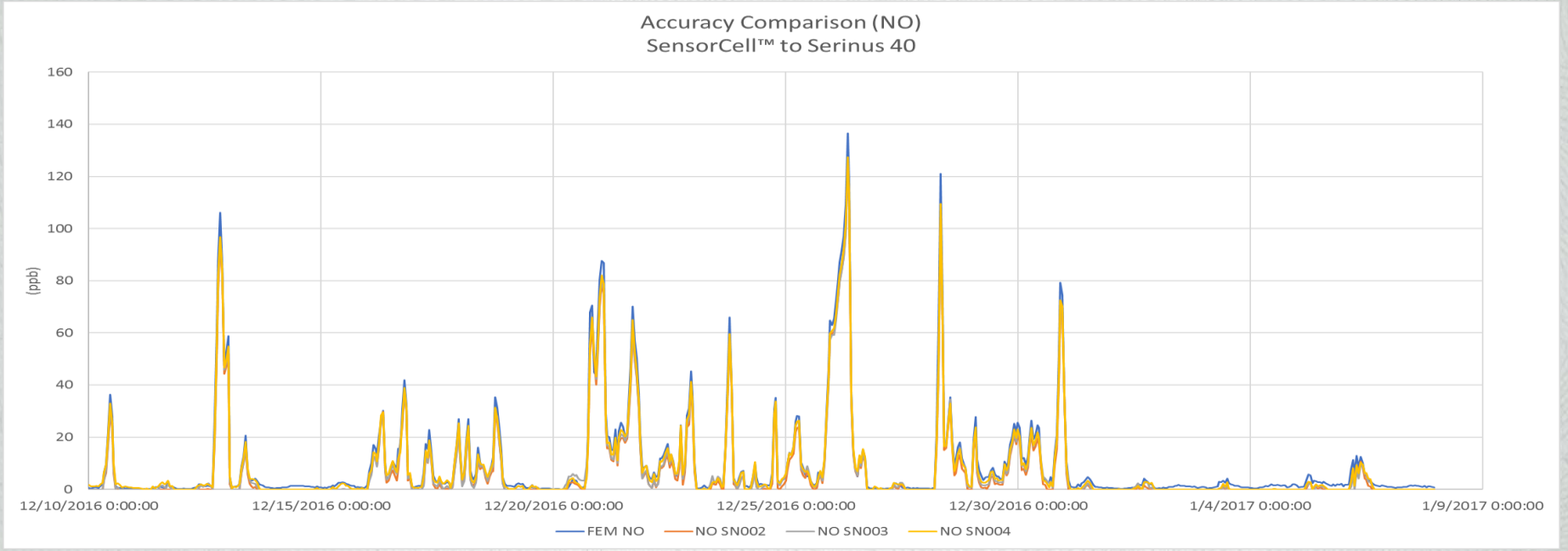
Improvements in Sensor Technologies

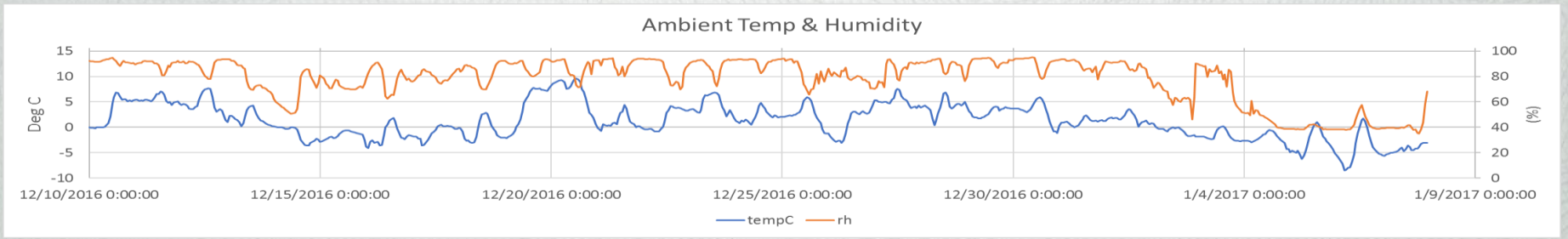
Developments	Result
• Improved measurement sensitivity and stability for electrochemical cells, PID detectors and optical particle counters. • Proliferation of low cost high quality sensors.	• Lower cost systems with reasonably high measurement quality. • Smaller footprint systems with lower power consumption.

Improvements in Sensor Technologies

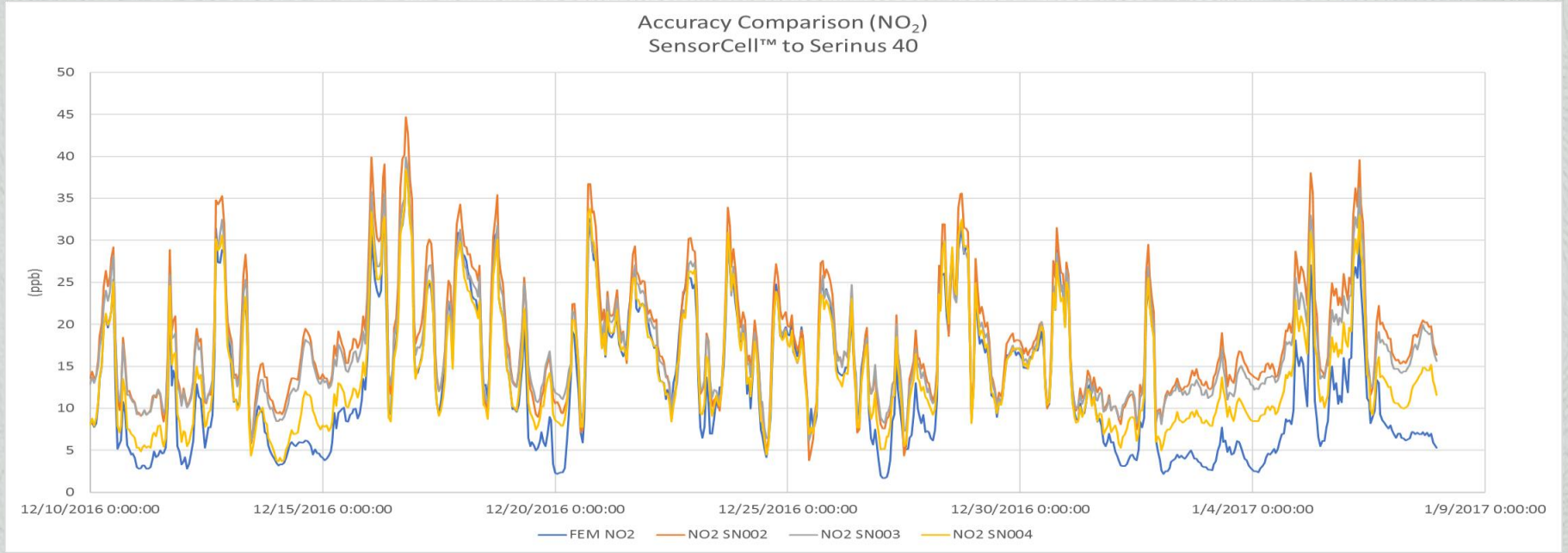
Developments	Result
• Integrated cell modems and GPS chips. • Cloud based data storage and notification services. • Data as a service (DAAS) business models.	• Quick and easy installation. • Easier data analysis. • Reduced maintenance and capital cost.

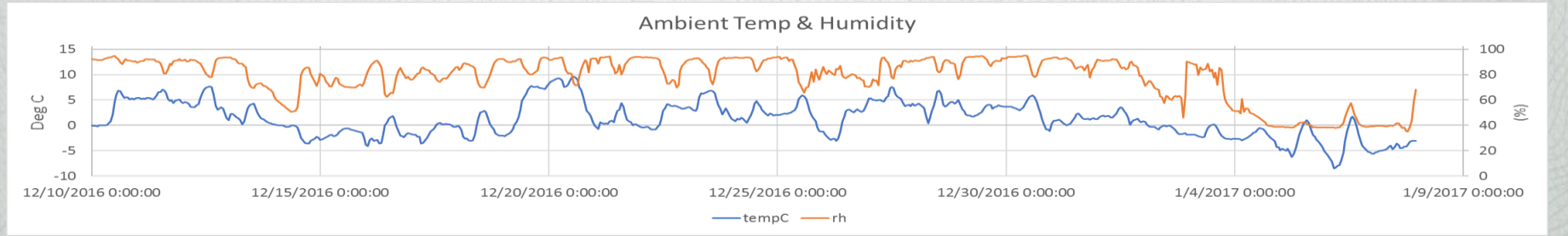
Improvements in Sensor Technologies; NO



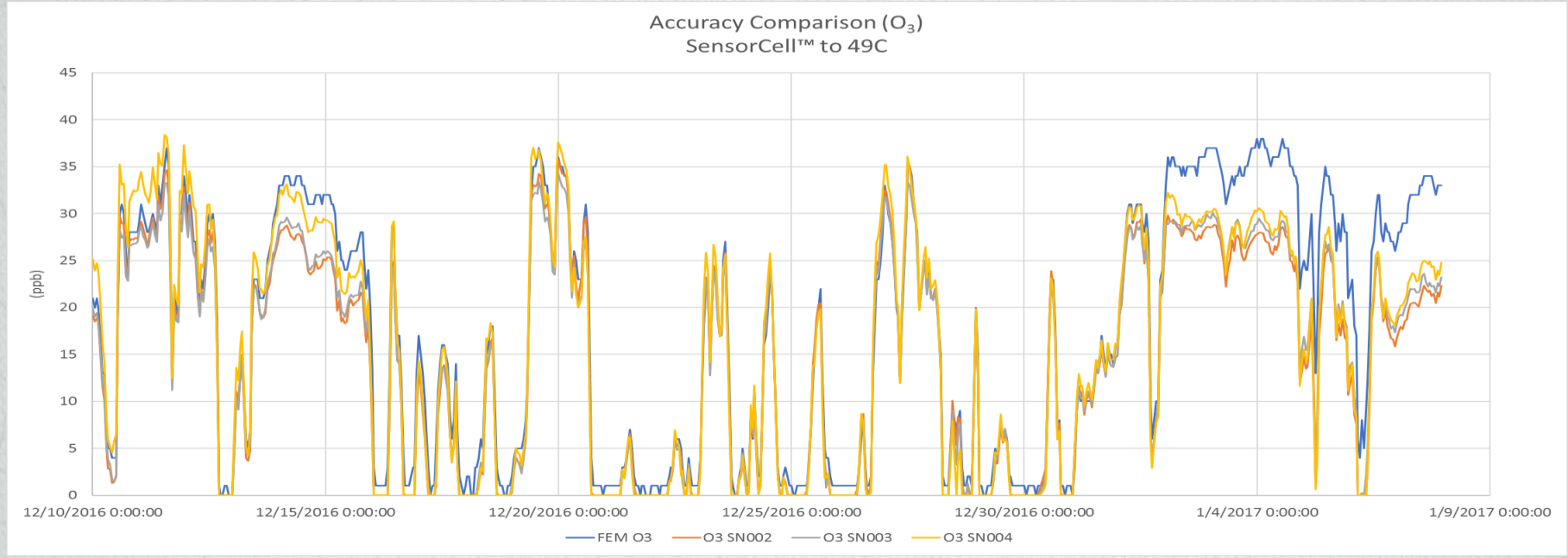


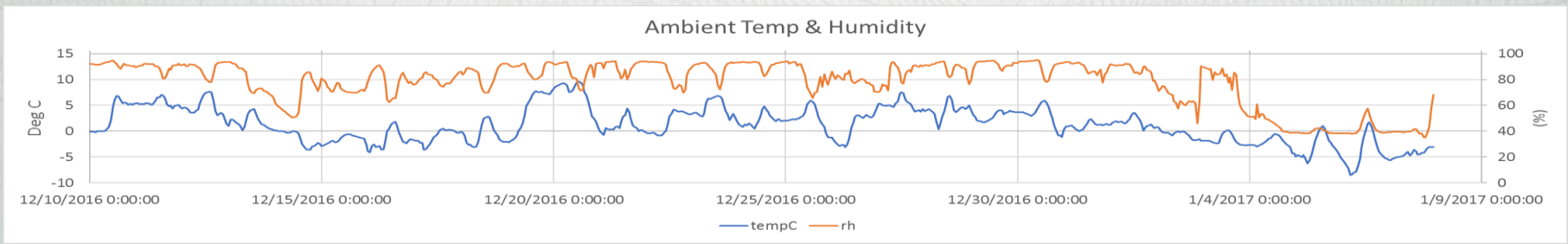
Improvements in Sensor Technologies; NO_2





Improvements in Sensor Technologies; NO_3





Improvements in Sensor Technologies

Summary:

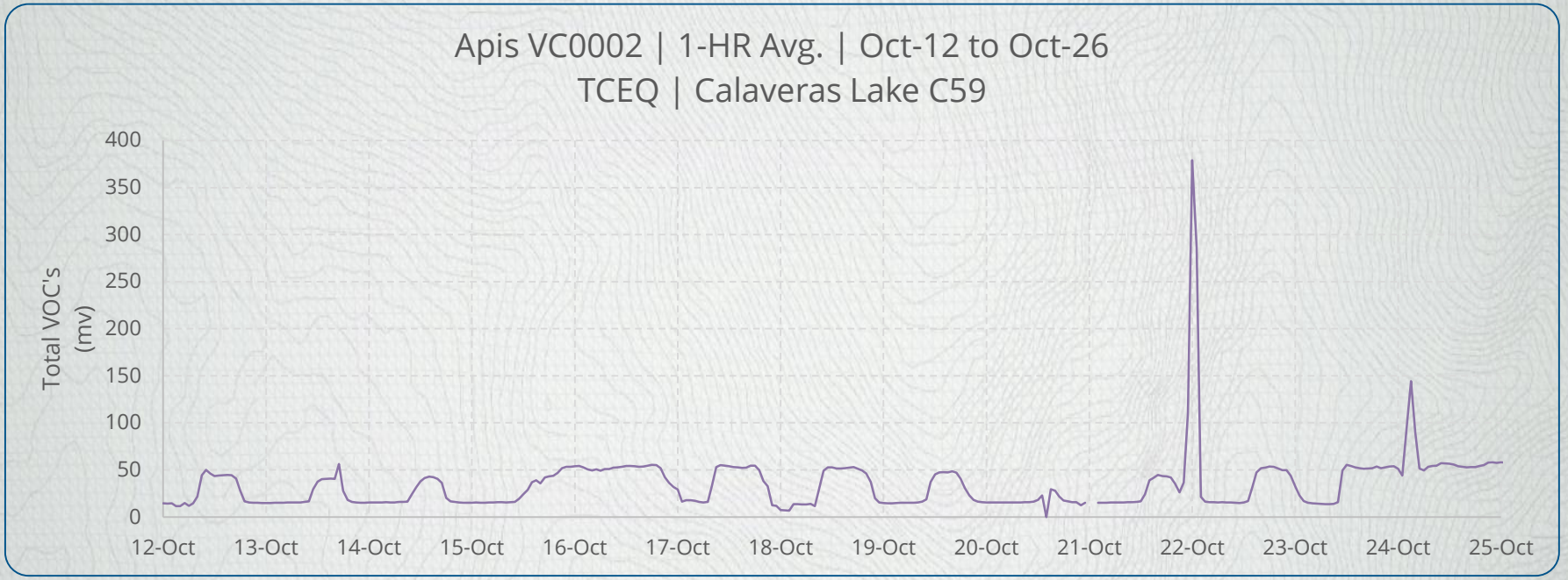
- Sensor based monitoring technologies are capable of providing meaningful continuous data at a much lower cost than reference systems.
- Although sensor measurements have improved, they still aren't as accurate as reference measurement technologies.
- Sensor data is accurate enough to be useful for non compliance applications.

3. Source Identification

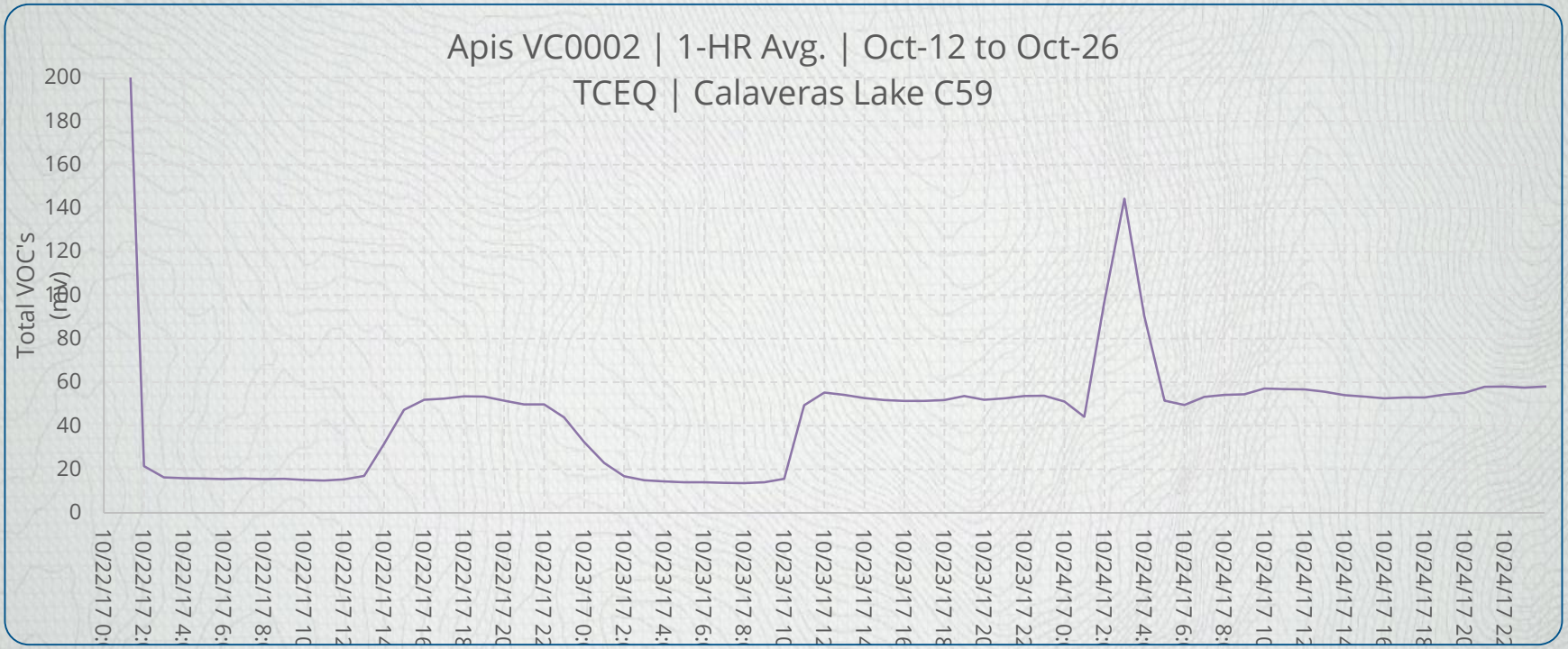
Source Identification

- **APIS sensor system located near Calaveras Lake Power Station.**
- **Measurements for: total VOC's, NO, NO2 and O3.**
- **Wind data obtained from nearby station**
- **Monitoring took place Oct 12, 2017 through May 12, 2018.**

Source Identification



Source Identification



Source Identification

- Wind direction from the North during peak VOC concentration
- Power plant coal pile is the likely VOC source

Source Identification

Summary:

- Based on monitoring data, the coal pile at Calaveras Lake Power Station was identified as the likely VOC source.
- System has recorded 14 hits since start of project indicating that this wasn't an isolated incident
- Data was useful to power plant in identifying the issue and developing mitigation strategies.

Thank You!