



NO_y Monitoring – Moving Forward

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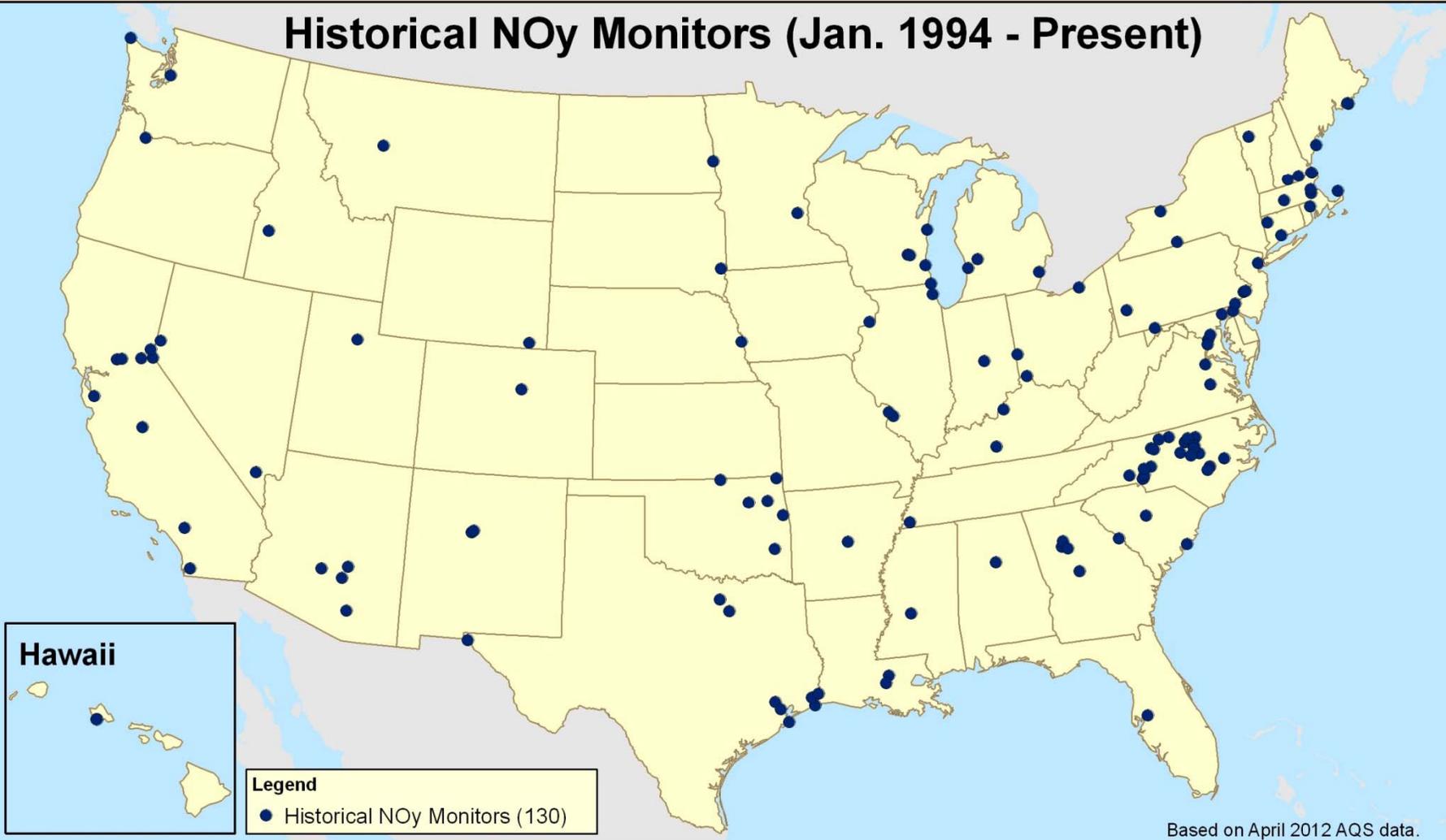
NAQC – May 2012 – Denver, CO



Objectives

- Review NO_y monitoring network
- Review chronology of EPA guidance on NO_y monitoring
- Discuss “current” guidance on operations and recommended QA/QC
- Future of NO_y monitoring
- NO_y operational issues discussion

Historical NO_y Monitors (Jan. 1994 - Present)



Hawaii

Legend

● Historical NO_y Monitors (130)

Based on April 2012 AQS data.

Active NOy Monitors & NCore Sites

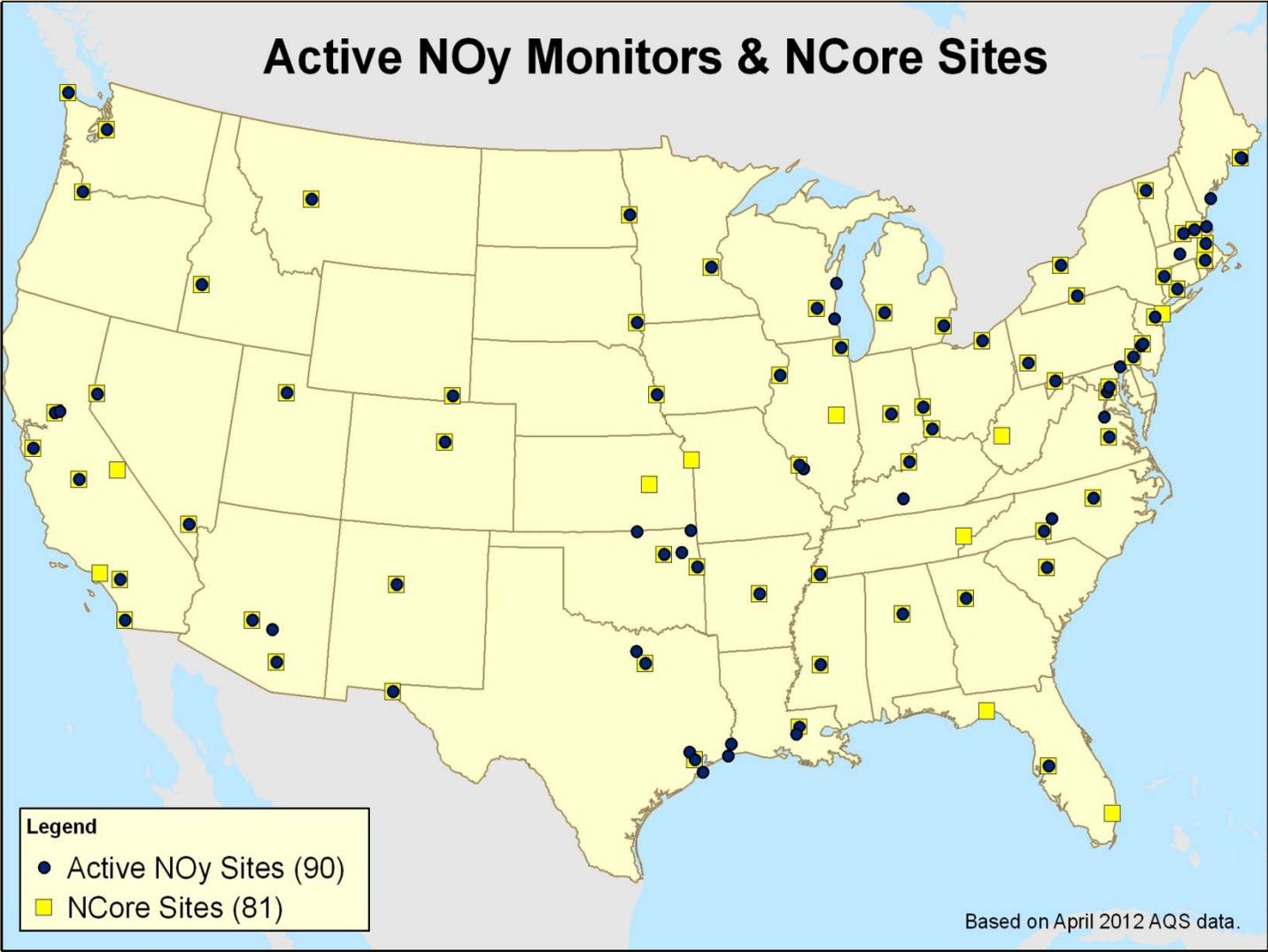
Alaska



Hawaii



Puerto Rico & VI



- Legend**
- Active NOy Sites (90)
 - NCore Sites (81)

Based on April 2012 AQS data.



EPA Guidance Chronology

1998

- First EPA guidance on NO_y monitoring was part of the “TAD for Sampling and Analysis of Ozone Precursors” issued September 1998 (<http://www.epa.gov/ttn/amtic/pams.html>)
 - NO_y was ‘strongly encouraged’ as part of an enhanced ozone monitoring program (~PAMS) and data was to be used to evaluate and improve photochemical models
 - Detailed instructions on converting a NO_x box to an NO_y box, where changes in the location of the **converter, particulate filter(s), flow control capillary, and the 3-way solenoid valve** make the difference
 - All QA checks including converter efficiency were using NO₂; converter efficiency check suggested to be >96%
 - NPN and nitric acid are mentioned as challenge agents, but not elaborated upon



EPA Guidance Chronology

- NCore TAD Recommendations
 - External converter to be at 10 meters (primarily to reduce potential for HNO_3 loss)
 - Inlet to be made of PFA Teflon
 - Inlet to use part of a Teflon filter holder as a bug screen
 - Only a heated Molybdenum converter be used (versus Au) at 350°C
 - Use opaque lines and reduce residence times

2005



EPA Guidance Chronology

2005

- NCore TAD Recommendations (continued)
 - Quarterly multipoint NO calibrations (zero, 3 span levels)
 - Quarterly multipoint NO₂ calibrations (zero, 3 span levels, close to those used for NO)
 - Two week precision checks; with NO, target 20 ppb
 - Daily (Level 1) zero/span check; span gas unspecified, but target level to be 70 to 90 percent of scale
 - Detailed MDL determination procedures
 - *Monthly* single-point converter efficiency tests --- TAD has two targets listed in different places: 95% and 96%
 - Converter efficiency test language suggests using NPN



EPA Guidance Chronology

2006 & 2007

- In the 2006 'Monitoring Rule', NCore sites were required, which included requirements for NO_y
- NO_y guidance resurfaced in 2007 as part of EPA – OAQPS' Precursor Gas Training workshops (<http://www.epa.gov/ttnamti1/precurtr.html>)
 - Reiterates external converter at 10 meters
 - Initial Calibration and zero/span recommended using NO and NO₂
 - Converter efficiency checks recommended to use NPN or IPN (targeting 96% efficiency)
 - Recognized loss of NO_z species within different inlet materials (SS, Teflon, silicon steel) – Teflon still preferred



EPA Guidance Chronology

2010

- EPA issued an AQS Technical Note (<http://www.epa.gov/ttn/amtic/files/NAAQSReportingUpdate11032010.pdf>)
- Noted creation of new parameter code for use with NO_y instruments: NO_y – NO
 - NO_y – NO has the parameter code 42612
 - Some submissions erroneously were labeling such data as NO₂
 - Document also listed method codes



EPA Guidance Chronology

2011

- EPA gives advice on NO_y operations issues and QA reporting in the December 2011 “QA Eye” - Issue 12 (<http://www.epa.gov/ttn/amtic/qanews.html>)
- For NO data from an NO_y analyzer:
 - Daily zero/span (Level 1 check)
 - 1 – point QC check (a.k.a precision check) for NO, at least every two weeks (higher frequency suggested)
- For NO_y:
 - 1 – point QC check (a.k.a precision check) every two weeks, using NPN or IPN (*do not report NO 1 – point check data for these data*)
 - Converter efficiency check: TAD suggested monthly check; however, MQO tables suggested every two weeks
 - Since we have a biweekly 1 – point QC check with NPN or IPN, converter efficiency check still recommended to be monthly



Summary & Discussion of **Current** NO_y Guidance

- Instrument Set-up & Operation
 - Use PFA Teflon materials, opaque lines, and strive to reduce residence times
 - Molybdenum converter at 350° C
 - Inlet at 10 meters; use Teflon bug screen



- Summary & Discussion of Quality Control Procedures

Data Channel	QC Function	Challenge Gas	Suggested Gas Level	Minimum Frequency	Is it Needed?
NO	Zero/Span	NO	0 & 70- 90% of scale	Daily	Yes
NO	1-pt QC check (precision)	NO	~20 ppb	Biweekly	Yes
NO _y	1-pt QC check (precision)	NPN or IPN	?	Biweekly	Yes
NO _y	Converter Efficiency	NPN or IPN	?	Monthly	Yes
NO	Multipoint Calibration	NO	Zero, 3 levels	Quarterly	Yes
NO _y	Multipoint Calibration	NPN or IPN or NO ₂ ?	Zero, 3 levels	Quarterly	?
NO _y	MDL determination	NPN or IPN?		Annually?	?



NO_y in the Secondary NO_x/SO_x Field Pilot

- The NFR for the Secondary NO_x/SO_x NAAQS introduced a Field Pilot Program (<http://www.gpo.gov/fdsys/pkg/FR-2012-04-03/pdf/2012-7679.pdf>)
- One of the objectives of the pilot is to “Evaluate measurement methods for the ambient air indicators of NO_y and SO_x and consider designation of such methods as Federal Reference Methods (FRMs)”
- The EPA anticipates using CASTNET sites (possibly select NCore too) as a primary element in the pilot, supplementing the existing filter-pack samplers with NO_y analyzers among other evaluative/complimentary methods



NO_y as an FRM

- EPA is pursuing the potential designation of NO_y analyzers as FRMs, pursuant to commitments made in the recent Secondary NO_x/SO_x NAAQS rulemaking
- February 2011, EPA submitted evaluation plans to CASAC AMMS for NO_y and other methods
 - CASAC AMMS responded supportively
- EPA – ORD is currently evaluating the commercially available NO_y analyzers

Approach

- Upon completion of the evaluation and compilation of the generated data and information on the NO_y measurement method, ORD will be able to describe the accuracy, precision, and reliability of the NO_y instruments and their applicability as FRM.
- ORD will provide a technical summary of the data and supporting information and develop the basis/rationale for adopting it as an FRM.
- ORD will prepare docket materials, proposal preambles, response to comments, and the FRM in regulatory text format.



NOy Operational Issues

- Think you're seeing interferences?
- Low confidence in your data?
- Too much 'down time'?
- Problems with calibrations/drift?

Let's talk about it...