A Cautionary Example

Demonstrating the Importance of Quality Systems in NAAQS Decision Making

Background

This review details a series of quality system problems, occurring over multiple years at an anonymous, but actual, facility and ambient air monitoring program that has resulted in monitoring and modeling data being generated that is of *Unknown Quality*.

As a result, the veracity of the monitoring and modeling results to characterize the magnitude and extent of SO_2 NAAQS violations in this community have been diminished.

Presentation Purpose

The aim of the presentation is to illustrate

- The importance of quality systems for policy makers
- Expound on lessons learned

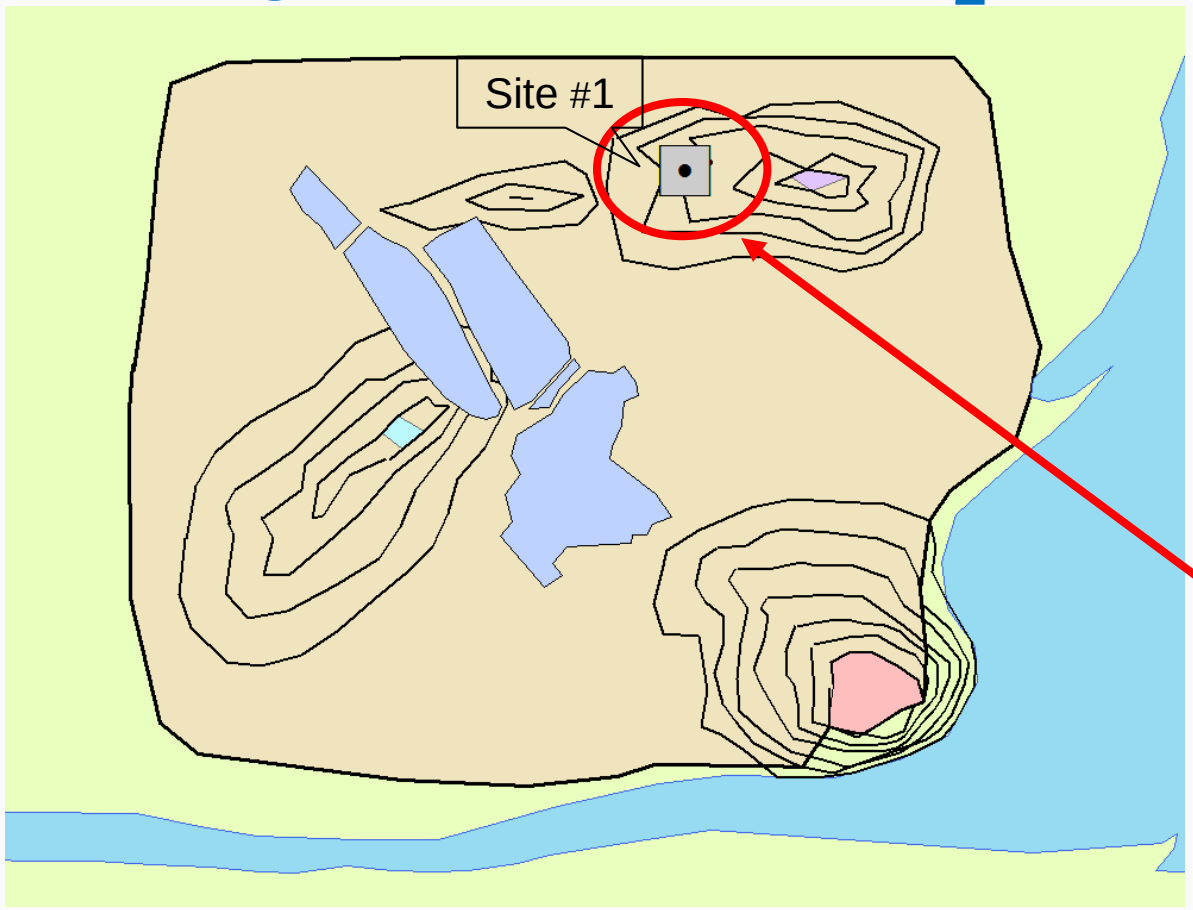
This presentation does not provide detail regarding:

- Modeling
- Emission Inventories
- NAAQS Designation Process
- Status of Pending Policy Decisions related to this event

Quality System Issues Leading to Event

- Old Region 4 Policy of “1 State = 1 PQAO”
  - Started to wind down in 2012 (completed 2015)
- Usability of Data in AQS
  - Old policy: (NAMS/SLAMS) & SPM /w App. A met
  - Current Policy: Everything, except NAAQS Excluded
- Industry Data uploaded as Monitoring Org’s PQAO
- Dated or Lacking QMP / QAPPs / SOPs
- Annual Network Plans & Data Certification

Leading to the New SO_2 NAAQS (up to 2010)

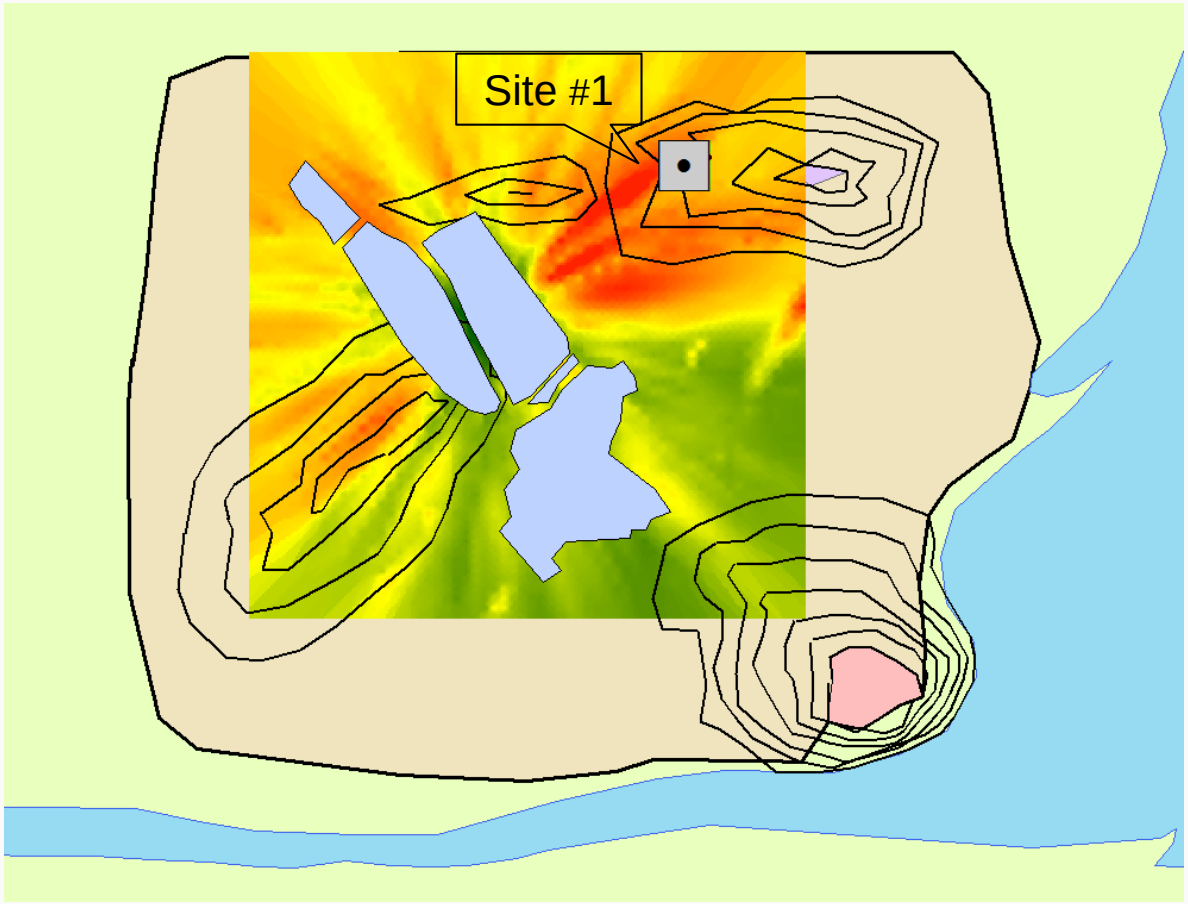


Year	Annual 1-Hr SO_2 99th Percentile
2005	187.8
2006	186.8
2007	137.3
2008	183.3
2009	158.5
2010	231.5

Fictitious Base Map.

But Actual Data for:
- Monitoring Sites
- Facility Location
- AERMOD Output
- Summary Stats from AQS

AERMOD Modeling of SO_2 Source



Note: “Green” represents modeled SO_2 concentrations between 29 to ~100 ppb.

Facility concerned that complex terrain may be causing model to over estimate ambient SO_2 concentrations.

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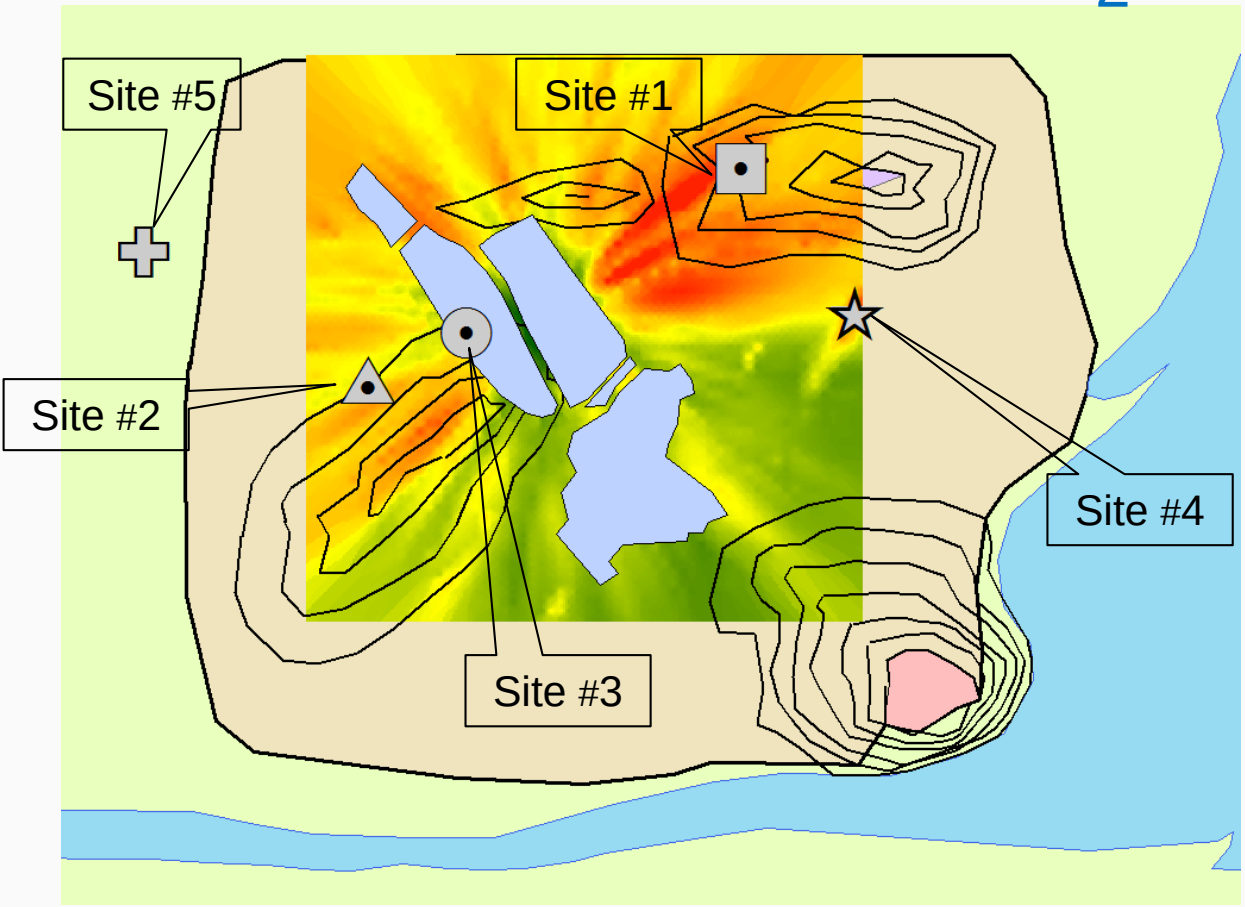
1-Year Study & Designation Data (2010-2012)

- Site #1 collecting data for pending designation
- AERMOD suspected by Industry to over predict SO_2
- 1 Year Special Study initiated by Industry
  - Verify if AERMOD over predicts SO_2 in complex terrain
  - Monitoring to assist development of new “Alternative Model”
- HOWEVER:
  - Site #1 is an Industrial monitor with unapproved Quality System
  - No QMP or QAPP for Special Study by Industry (Sites # 2-5)
  - No Approved SOPs

Short Term SO_2 Monitoring Study



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SO_2 Study Details:

- May 2012 to May 2013

- No QAPP or QMP
- SOPs not Approved
- Only Site #1 had an NPAP (*more on this audit later…)*
- Monitoring Data not Validated
- No TSA of Industry / Study

- Monitoring values "***Appear***" lower than Modeled Output

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Time-Line for 2013

- May 2013: Special Study by Industry Completed
  - Monitoring Data in hand for development of new "Alternative Model" ← *"More to be said about this later"*
- August 2013: FR issued for public comment
  - SO_2 Non-Attainment Decision → Site #1 (2010-2012)
  - Industry Operated Monitor with no Quality System
  - But! Certified to EPA by Air Program and listed as same PQAO
  - Site #1 listed in 2012 Annual Network Plan for satisfying PWEI monitoring requirement
- September 2013: Technical Systems Audit

Time-Line for 2013 (Continued)

- September 2013: Technical Systems Audit
  - Yes, there were Findings ← *"More to be said about this in a sec."*
- October 2013: FR finalizes Non-Attainment Decision
- November 2013: TSA Report Issued /w Findings:
  - Industrial Monitors not operating under Air Program's Quality System
    - Even though Certified and in ANP for the Air Program
  - Air Program not validating Industrial monitoring data
  - Prep. for TSA showed Precision and ***Bias Error*** for the Industrial Monitors
  - Report recommended "Industrial" monitors not be used be used for "*Regulatory*" in purposes. (i.e., NAAQS Excluded Monitors in AQS)

After 2013 TSA (2013-2015)

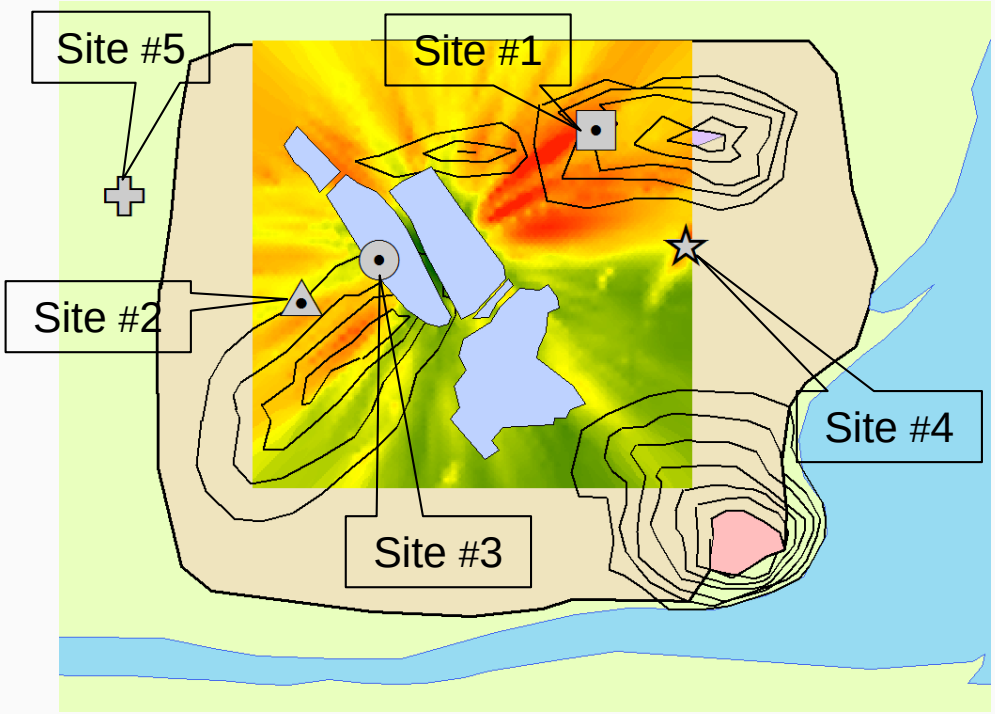
- Industrial Monitoring Data NAAQS Excluded as requested.
- Air Program began efforts to upgrade SO_2 Monitoring Network to meet regulatory quality system requirements.

- Region 4 Quality Assurance staff not aware of purpose of Industrial Monitors in SO_2 Special Study Network
  - *"Because there was no QAPP!"*

- Industry and other decision makers continue efforts to utilize special study SO_2 data for "*Alternative Model*" development
  - *"No QAPP → TSA findings not communicated to all decision makers"*

Alternative Model Development (2013-2015)

Monitoring Values "*Appear*" Lower than Modeled Output



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Annual Means of the Single Pt. Precision

Site	2012	2013
1	-2%	-4%
2	-14%	-13%
3	-39%	-73%
4	-23%	-22%
5	-39%	-37%

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Audits: NPAP(Site #1) and APEs (Sites 1-5)

AMP350 Raw Data Report (NPAP Example)

DAY \ HOUR	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500
	3.7	BF	1.0	1.0	1.2	1.4	1.5	1.7	1.6	1.7	5.9	1.7	1.3	1.2
	.9	BF	1.1	.9	.9	.9	.9	1.0	1.3	1.4	1.3	1.3	1.3	1.2
	.9	BF	1.1	.8	1.0	1.0	1.0	1.0	P90.1	55.1	14.3	4.8	4.7	3.8
	1.2	BF	1.4	1.4	1.5	1.5	7.1		19.4	39.6	6.7	2.9	3.6	28.1
	1.0	BF	1.1	.9	1.6	1.1	2.1	27.1				1.0	.8	.8
	.9	BF	1.1	1.1	1.1	1.1	1.1	1.1				1.7	9.8	14.6
	1.0	BF	1.1	1.2	1.3	1.1	1.2	2.1				5.6	2.2	2.5
	1.0	BF	1.1	.8	1.0	1.0	1.1	1.1				1.1	1.1	1.0
	.8	BF	.8	.8	.8	.8	1.1	1.1	2.7	52.3	25	16.8	16.2	17.7
20	1.1	BF	3.4	6.1	9.3	9.2	10.3	13.9	43.3	6.8	3.5	2.0	1.8	1.7
21	.9	BF	.8	.9	1.4	1.2	1.2	1.2	1.2	1.8	BC	BC	BC	1.5
22	.8	BF	1.1	.8	1.2	1.3	3.5	1.3	1.0	1.0	1.0	1.0	.9	1.1
23	.8	BF	1.0	.9	1.7	1.2	AZ	AZ	AZ	AZ	1.9	1.3	1.2	1.1
24	1.0	BF	1.6	1.1	1.3	1.1	1.1	1.0	1.0	1.0	1.2	1.2	1.4	1.4
25	1.0	BF	1.5	1.1	1.0	1.0	1.0	.9	1.0	1.0	1.0	.9	.9	1.0

Veracity of Audit Compromised by Cal. 2 days before Audit

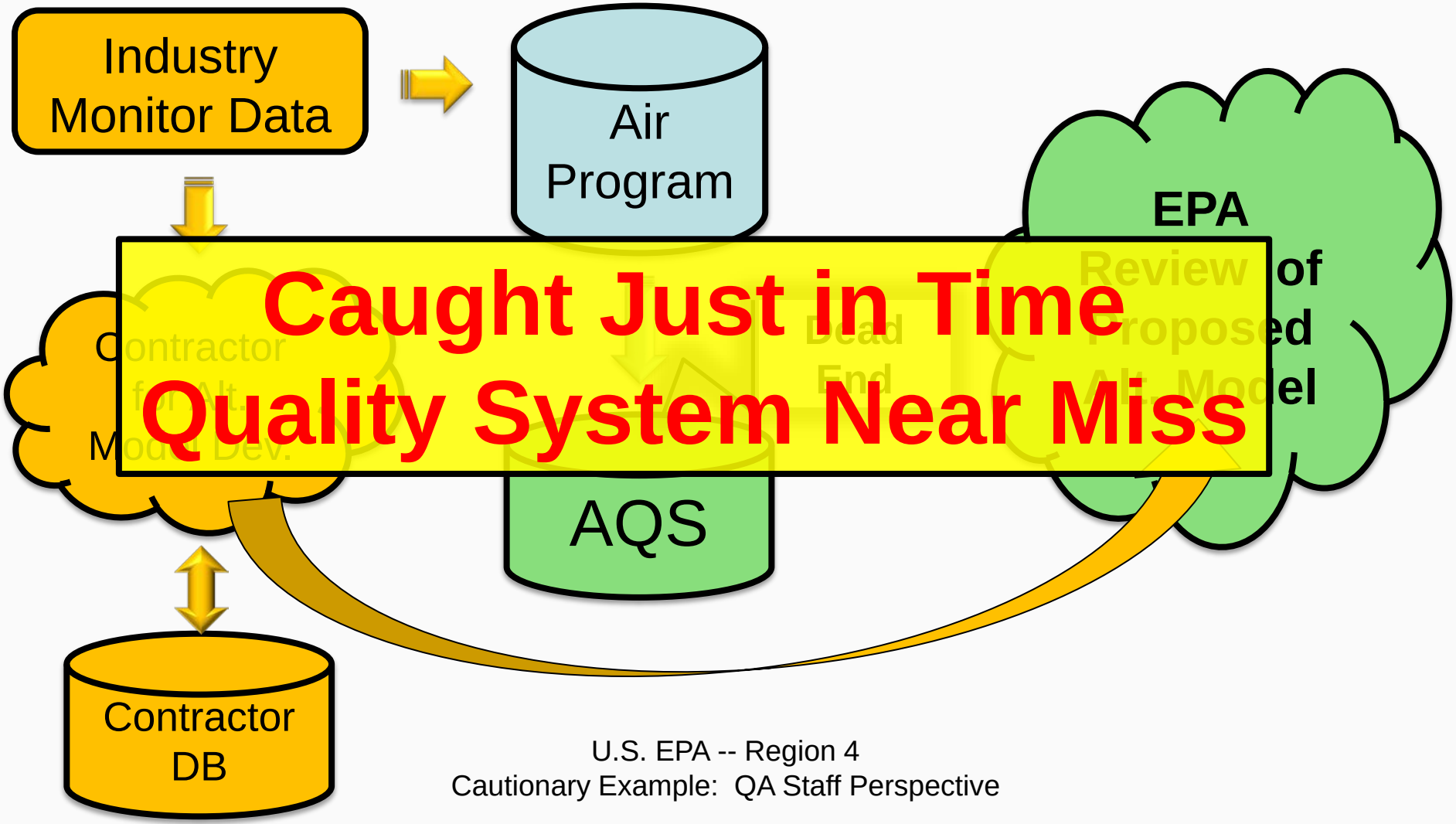
Calibration

NPAP Audit

Prep for 2016 TSA (Dec-2015)

- Notified Programmatic Staff of Precision and Large Bias errors with SO_2 measurements.
- Notified Programmatic Staff that 2016 TSA will likely recommend to invalidate this SO_2 data (May 2012 – May 2013)
- QA Staff wanted to be proactive and remove poor quality data from AQS before it was utilized for regulatory purposes.

Flow Path of Data Used in Alt. Model Dev.



Take Away Messages for Air Programs

- These things are not "*just paper work exercises*"
  - QMPs and QAPPs and SOPs
  - PQAO Codes
  - Annual Network Plans
  - Annual Data Certifications to EPA
- QAPPs are important for many reasons:
  - Top of list: Facilitates Communication between Decision Makers
- Unless NAAQS Excluded, Data in AQS can be used for Regulatory Decisions
- Validate your data before uploading to AQS
- Be mindful of these issues for the SO_2 DRR

Lessons I've Learned & *"Re-Learned"*

- Don't assume the QA / TSA Report is forwarded to everyone who needs to know.
- Auditors rarely know all of the uses and customers of the ambient air monitoring data they are auditing.
  - Little hope of auditing the data with the correct critical eye without a QAPP outlining the purpose of the measurements and the decisions that will be made from the data.
- QA/QC Assessments need to be performed routinely.
  - Not just prior to TSAs (once per 3yrs)
- Timely follow up to a TSA is a must

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