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Verifying Zero Air Sources in an Ambient Air Gaseous Monitoring Network

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Protecting the air we share

Air Quality

CLARK COUNTY • DEPARTMENT OF AIR QUALITY

Introduction

Quality Data: proper instrument operation:

Calibration

- Good quality zero air is important
- Lower level measurements and upscale regression

Clean/reliable zero air is a must

- How do we verify zero air sources?

Zero Air Systems

Two Primary Options:
Cylinders and Zero Air Generators (**ZAG**)

Cylinders

- Vendor Certification Available (NIST Traceable)
- Independent and Alternate Source
- Finite Amount
- Moisture Issues
- Purity Levels

Zero Air Generators (ZAG)

Continuous Supply (and flowrate)

Clean and Reliable

Not Always Certified from Vendor (NIST)

Other ZAG Considerations

Break Through

- High Pollutant Level Inputs – Scrubbing Efficiency
- Effected (not clean) Output
- Teledyne API Paper

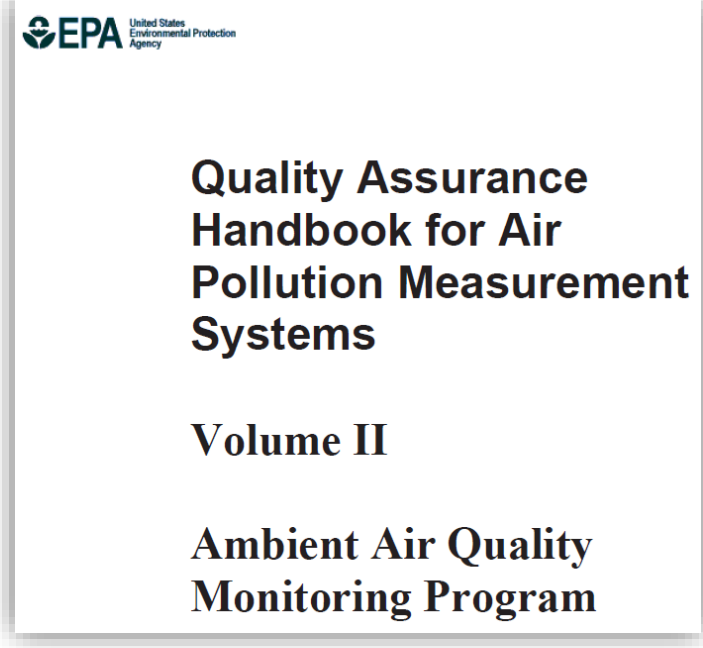
EPA Efforts

EPA Requirements

Rules and guidance are sparse

State and local initiatives

QA Workgroup is developing guidance



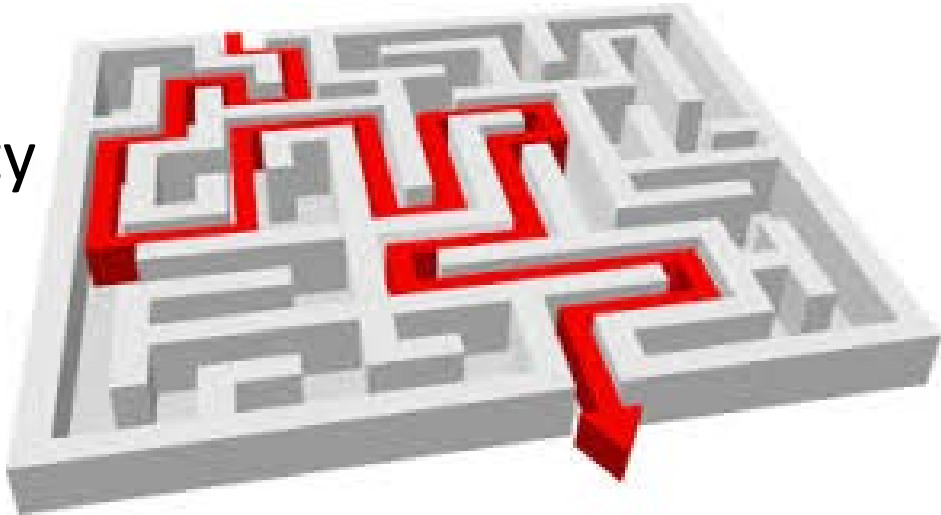
Developing a Local Procedure

Technical Challenges

Iterative Process

Some Issues (along the way):

- Measuring below Lower Detectable Limit (**LDL**)
- Response time / stability
- Flow rate and pressure
- Reliability and repeatability



Procedural Approach

First Iteration

NIST traceable zero air cylinder

- Sequenced with a series of scrubbers (for cleaning and drying)
- System was a standard

Procedural Approach (contd.)

Standard response compared against field ZAG

Note: Instrument's front panel used for readout

- Obtain Difference: Diff = Std_Z – ZAG_Z
- Within tolerances? Yes, then good.

Instrument	Units	Allowable Tolerance
Ozone	ppb	± 1
Carbon Monoxide	ppm	± 0.1
Nitric Oxides	ppb	± 1
Sulfur Dioxide	ppb	± 1

Procedural Approach (updated)

Difficulties with existing procedure

- Time for an update

Certified ZAG

Solved problems:

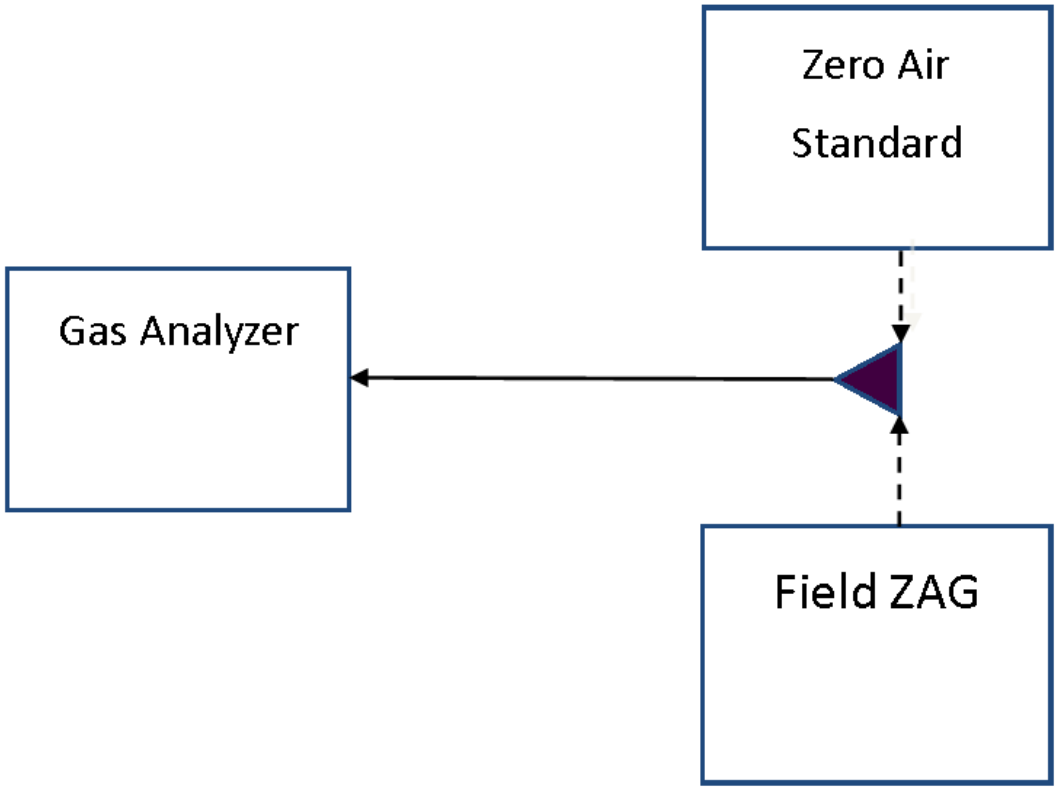
- Instrument stability, moisture, pressure, and flow issues.

Methods (Zero Air Verification)

1. Zero air from standard to measurement instrument
2. Analyzer zero coefficient is adjusted
3. Zero air from field ZAG to measurement instrument. Test reading is taken
4. If within tolerance, then test passes

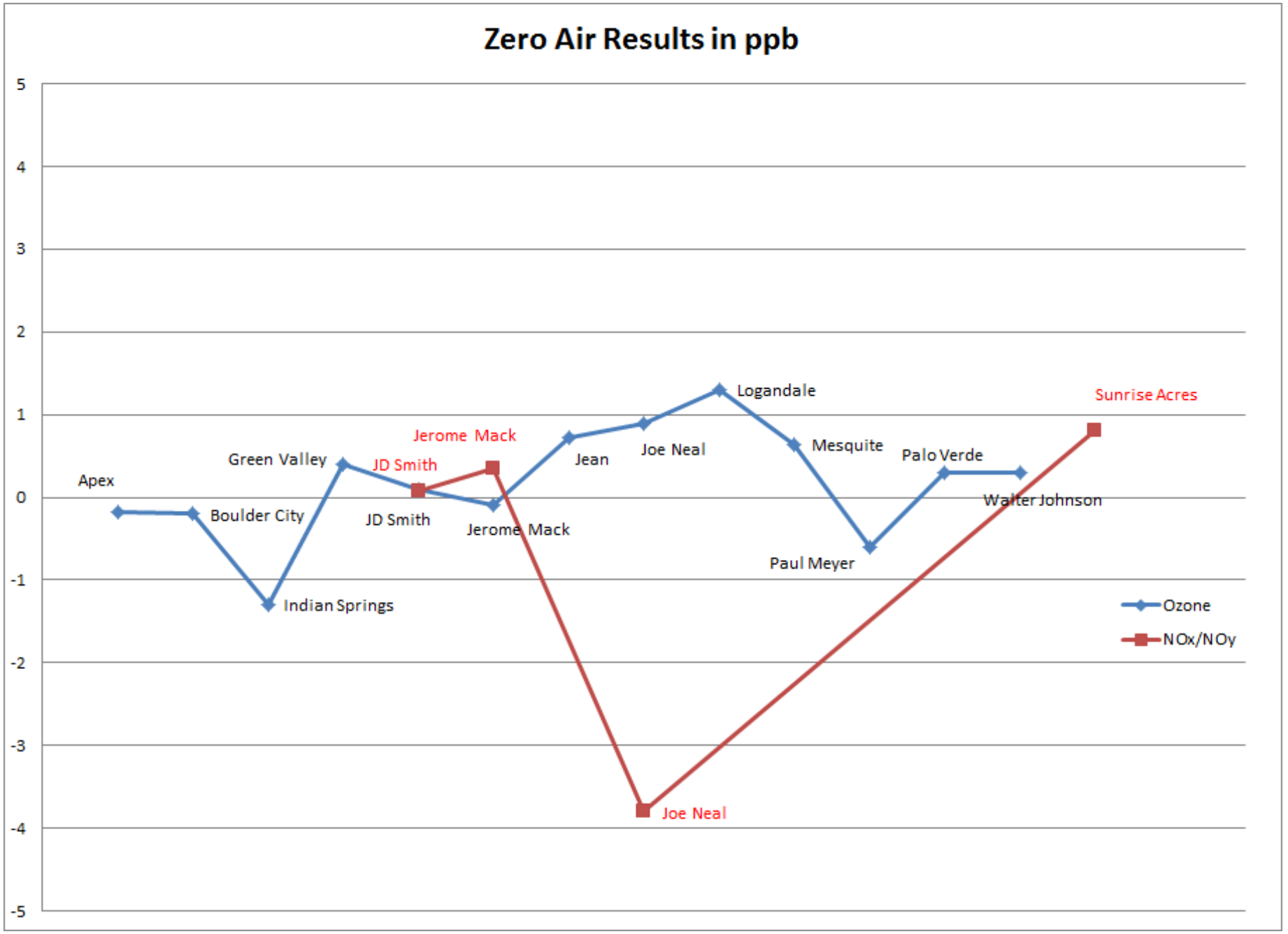
- *Note: Difference measurement between the standard and field ZAG is not needed*

Diagram



Information About Data

- **Annual testing of all the field ZAGs**
  - **More often in some cases**
- **Test for each parameter being measured**
- **2015 testing – Sampling of data (next slide)**


Zero Air Results in ppb
5
4
3
2
1
0
-1
-2
-3
-4
-5
Apex
Boulder City
Green Valley
Indian Springs
JD Smith
Jerome Mack
Jean
Joe Neal
Logandale
Mesquite
Paul Meyer
Palo Verde
Walter Johnson
Sunrise Acres
Ozone
NOx/NOy

Results

Improvements

- Results have improved over the years
- Improvements in procedure are notable
- Testing is now more stable
- Instrument response time has decreased
- Greater control: moisture, pressure, flow

Summary

Revised and improved testing design

- Better testing results
- Data quality

Agency (State, Local, EPA) Efforts

- Standardization and more consistent results
- National scale
- Data comparability

Quality Management

- Continuous improvement – more work?

Acknowledgements

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References

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Any Questions?

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