

# Field Operations (and anything else in Monitoring) Issues and Tricks of the Trade

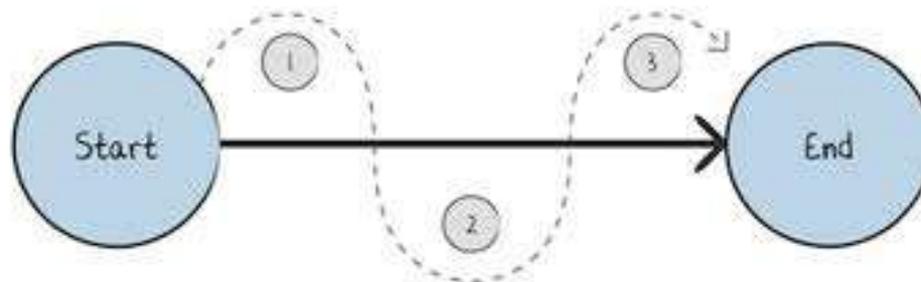
Thursday August 14<sup>th</sup>, 2014  
National Ambient Air Monitoring  
Conference  
Atlanta 2014





# Goals for this Session

- ✓ Identify issues and solutions in Ambient Air Monitoring.
- ✓ Hear from Monitoring Agencies; Instrument Manufacturers and other companies; and any other monitoring stakeholder that has ideas to share.
- ✓ Share those solutions here and document for use later by monitoring agencies.



# Genesis

- This session intended to build off the highly successful related session at recent Region 4 monitoring workshops.
- Also, recognition that many issues in ambient air monitoring have already been addressed by other agencies and it would be great to share those successes





## How this will work?

- Need Audience Participation.
- Please come to a microphone and provide your:
  - Name
  - Agency/organization
  - What you or your agency is doing
- We have documented several tips and tricks and will cover those.



## Some Themes of what we have heard so far:

- Site and Station Organization
- Automation and Planning
- Data Review and assessments
- Gravimetric Laboratories
- Cylinders
- Equipment and Maintenance
- Sensors
- Communications
- Training

## Using Mailboxes at Sampling Sites

- Used in West Virginia
- Allows storage of log books (and other items) next to sampler





Have all overnight gas analyzer checks already summarized and ready for review first thing in the AM

- Reported by Connecticut
- A staff person that comes in early prepares reports and has them ready for review as other staff arrives in the AM
- Allows quick decision on prioritizing sites to travel to that day.

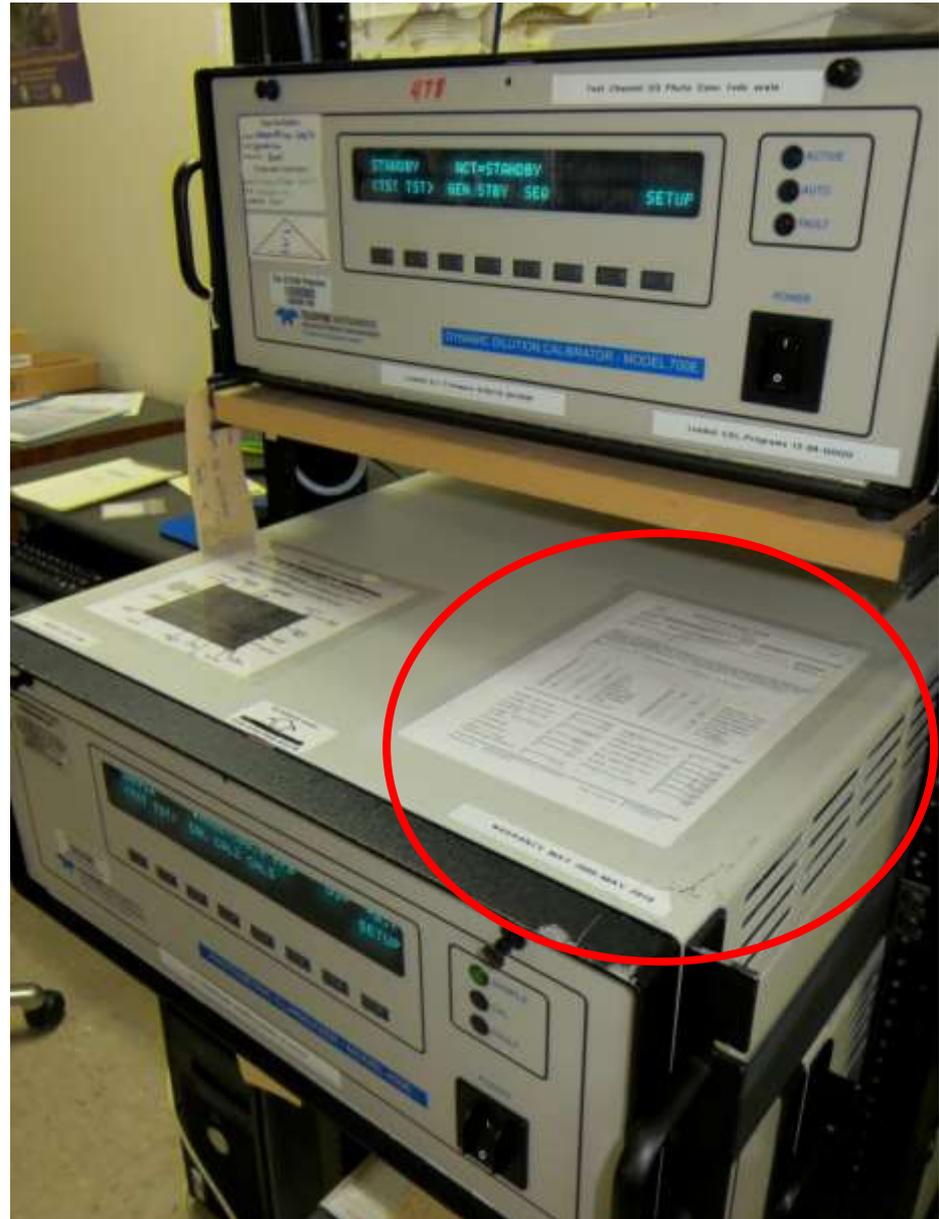


Attach the Equipment Repair Form to the inside of the cabinet door of PM samplers



Or, attach the Equipment Repair Form to the top of the analyzer or calibrator.

This will allow field and QA staff to see the results of the last diagnostic checks & when parts & pieces were last cleaned, checked, & replaced.



# Materials Knowledge in Sample Stations

- Reported by CAS
- Keep organization to your sample lines
- Thermally isolate sample lines
- No bends in sample lines
  - Straight runs are better
- Ensure can handle a TTP audit



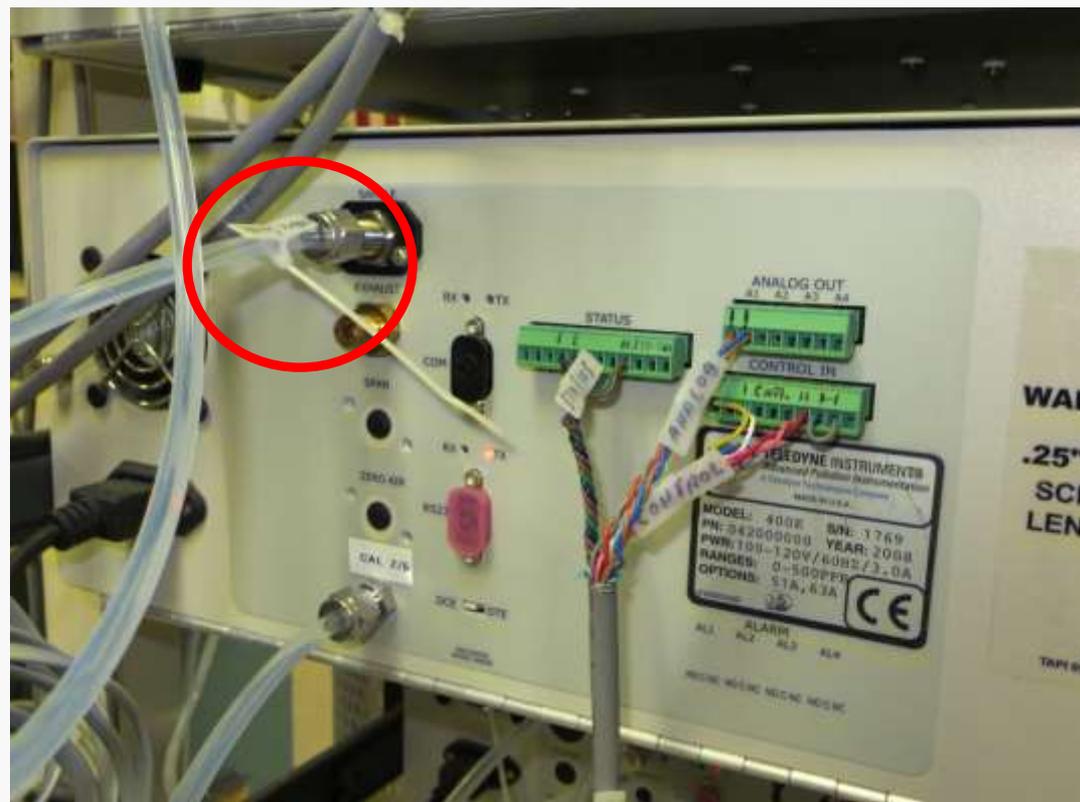


## Use low pressure air to clean out down tube and monitors

- Reported by GRIMM
- Use a can of “dust off” air or similar made for use with computers.
- Use to clean down tube and even into monitor to blow out dust
- Lower pressure of these cans are better than a high pressure air tank.
- High pressure tank can cause damage to equipment
  - e.g., naphion

# Label Everything!

- From Phoenix, AZ
- Buy zip-ties with labels
- Write monikers on zip-tie labels, to help identify parts and sample lines





## Reminder Cards

- From Lew Weinstock, OAQPS
- Put a sign inside your shelter door that reminds you to enable your datalogger channels before leaving the site!
- Same for reassembling equipment -- be sure to plug your blower motor back in after you are done with an audit





## Automated precision and zero checks so that they can be run remotely

- Done in Maryland
- Use all electronic forms for P & Z and then email.
- Also, have standardized procedures such that all sites are done in the same month
  - e.g., Zero check on BAMs



# Electronic Logbooks

- Reported by BAAQMD
- Allows easy input
- Information is available across widely distributed network stations to those who need it.



# Migration from manual to automated systems

- Reported by Sutron
- Automation of routine precision and zero checks
- Visualization of that information
- Migration of telemetry from land line telephones to internet
- Migration of connectivity on the instruments from RS232 to Ethernet
- Allows addressing most important issues at sites



## Two stage review of Data

- Reported by BAAQMD
  1. First review is by staff who know the monitoring method
  2. Second review is by Air Quality Meteorologists on staff who know the network
- Work to get data reviews done within two weeks of data collection as it allows remembering weather. If it were done two to three months later you wont remember that kind of information without looking it up

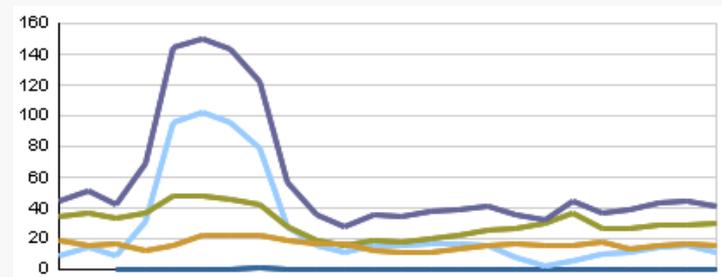
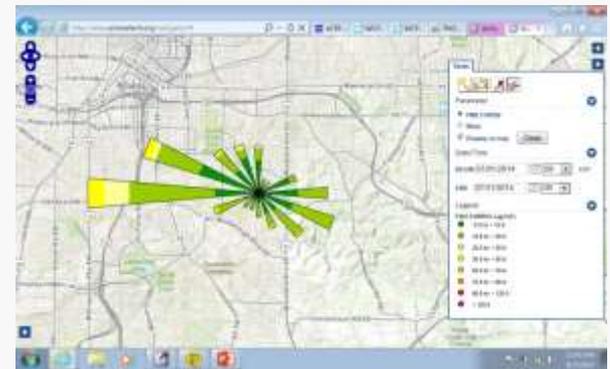


## Compare Data - Monitor to Datalogger

- Reported by Ecotech
- Develop an Excel File template
- Have one sheet hold the data downloaded from the monitor
- Have another sheet hold a data dump from the data logger
- Have a third to provide the comparison
- May be most important at sites using analog

# Explore your data beyond just looking at it for QA

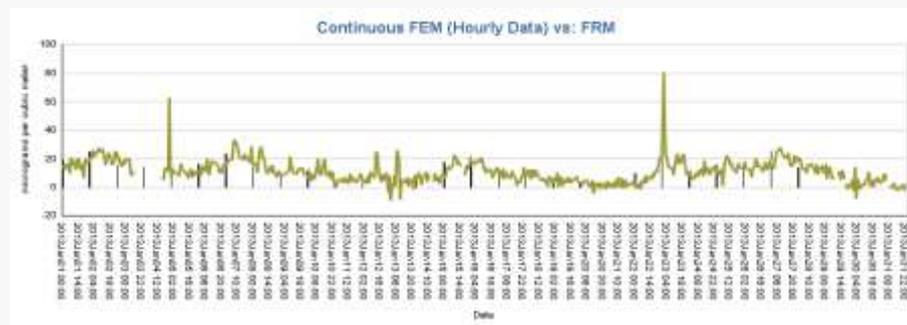
- Reported by STI
- Try to analyze your data in ways that are more than just a QA look
  - Transport
  - If an ozone site is being titrated
  - Look at wind roses
- Take advantage of the power of the commercial data systems. Most of the major data logger companies have significant capabilities.
- Get training; other agencies may be able to help



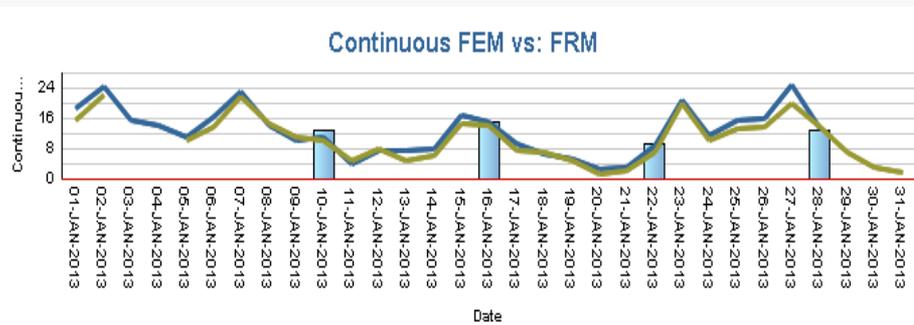
# Visualize Your Data

- Stated by Cassie McMahon, MN

Hourly



24-Hour





# Colorado Efficiencies

- One-minute data
  - Use on daily basis to get a good idea of equipment performance before sending staff out to do maintenance; allows for better prioritization
  - Used by forecasters to get a much better idea of air quality conditions versus the one-hour data, which provides for more accurate forecasts and issuance of advisories to the public
- Digital Communications
  - Can get much more analyzer performance specs that with analog, so easier to see which equipment needs maintenance before sending staff out



## Visitors to Weigh room?

- Reported by BAAQMD
- Maximum number of visitors to weigh room is 3.
- Plan to have a down day after a tour so that the room has time to completely stabilize
- No one but the lab analyst in the weigh room during the weigh session.





## PM<sub>2.5</sub> Weigh Labs – Discharging Static

- From FL Department of Environmental Protection
- Equip the microbalance with an “U-electrode”
  - Eliminates the need to track and replace Polonium strips every 6 months
- Upfront cost for anti-static kit is expensive, but quickly recouped



## Cylinder Testing

- From Arizona
- Run nightly span gases for NO and SO<sub>2</sub> at all sites, which will help gauge cylinder performance
- Once per month, zero/span check analyzer bypassing multi-gas calibrator – feed full concentration of gas cylinder to instrument and observe results





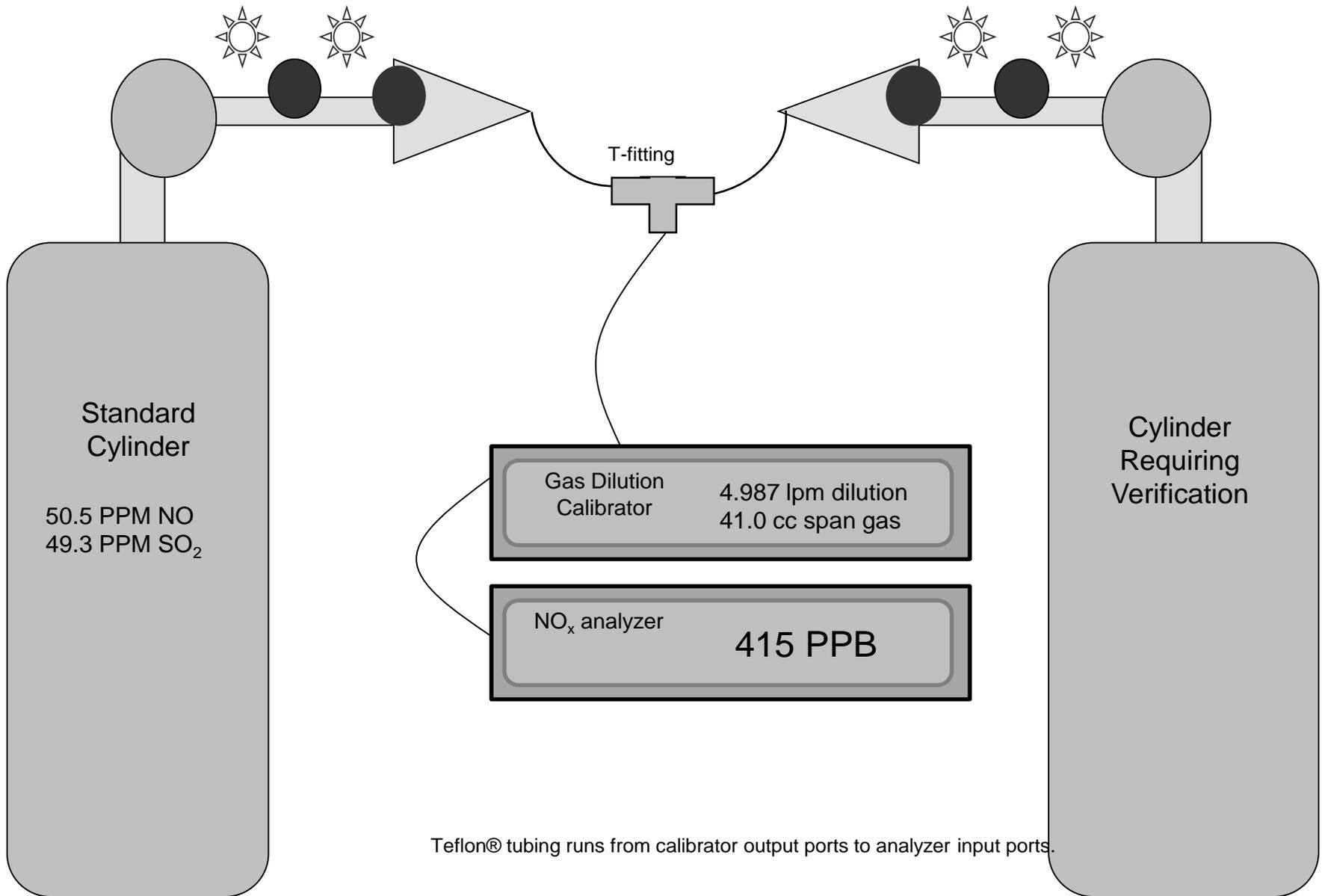
## More Cylinder Tips

- From Allegheny County Health Department
- As a way of testing cylinders without completing a lengthy certification procedure, have separate tanks for overnight spans with separate calibrators
- For biweekly checks, use a different operator with a different calibrator

**Issue: Low Nightly  
Spans**

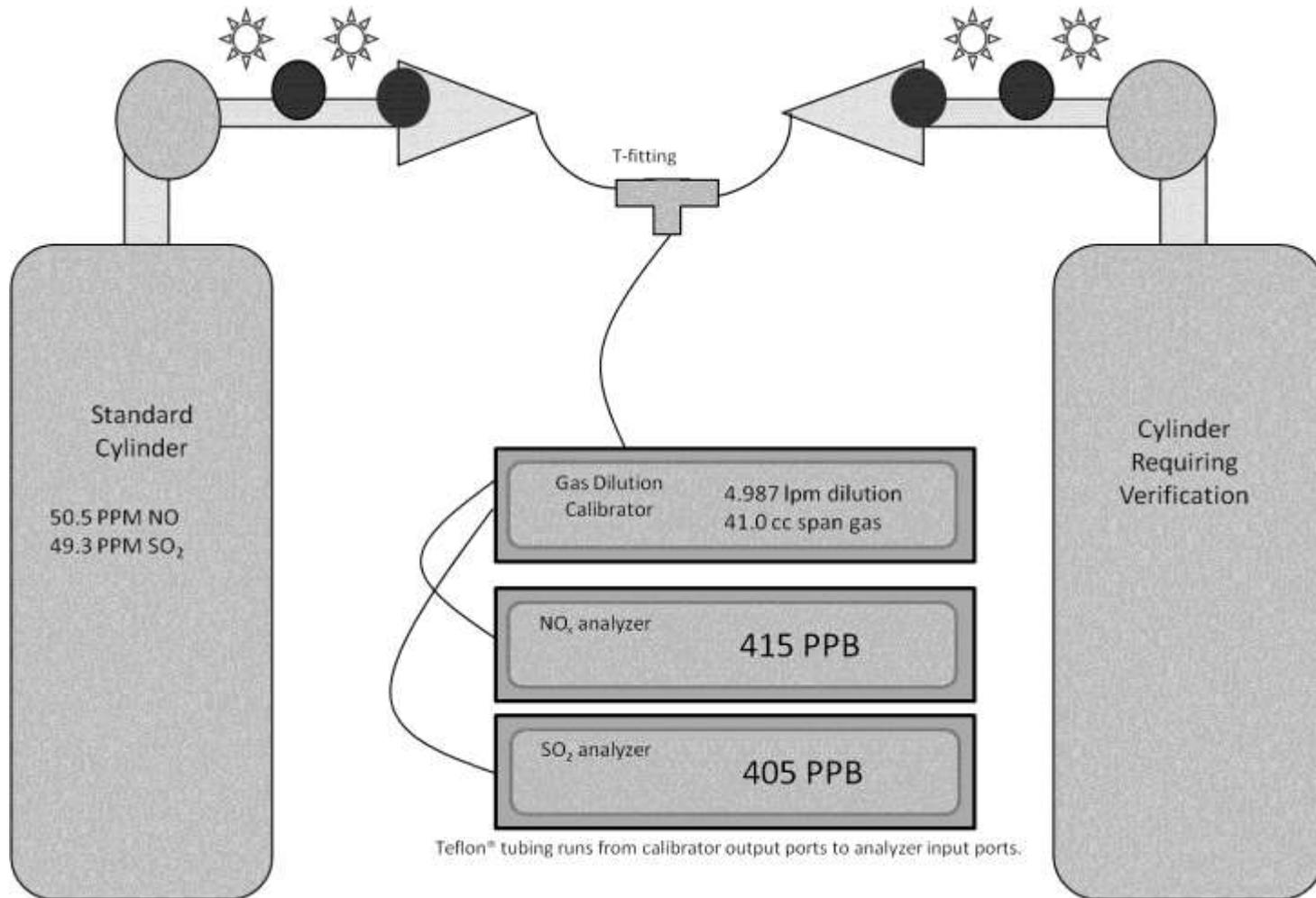
**Troubleshooting  
Suggestion:  
Certify your gas  
cylinder!**





Teflon® tubing runs from calibrator output ports to analyzer input ports.

This procedure can be completed for 2 gases at the same time...





# Issue: Low Sample Flow



**If the black o-ring is not properly seated within the holder assembly, there could be a leak.**

**Make sure the white ring is positioned with the notches facing up!**

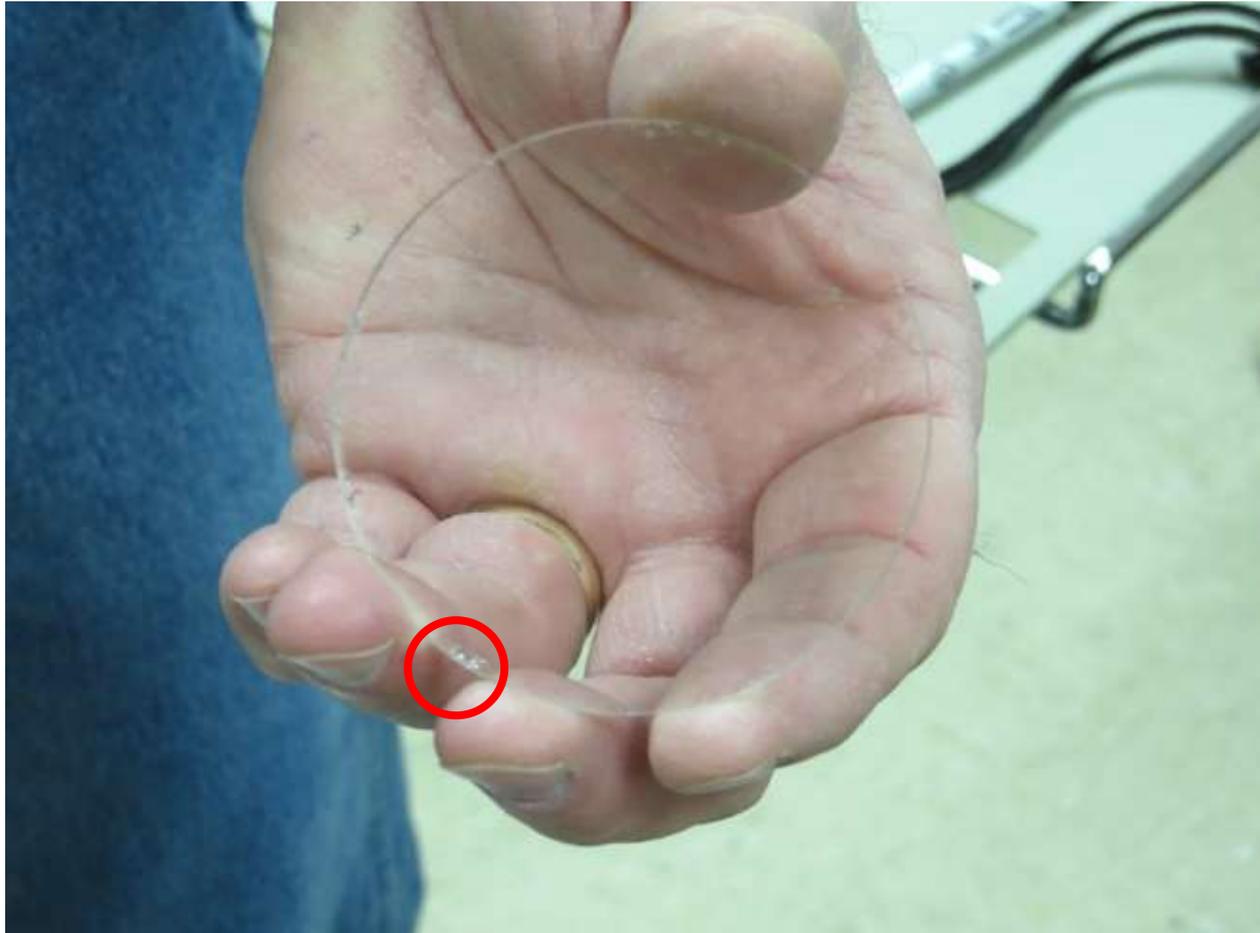
**Particulates will gather on the black o-ring.**



**Particulates will gather within the grooves of the holder assembly.**



**Field staff should inspect the o-rings and filter holder assembly each time the mace filter is replaced.**



## **Filter Holder Assembly**

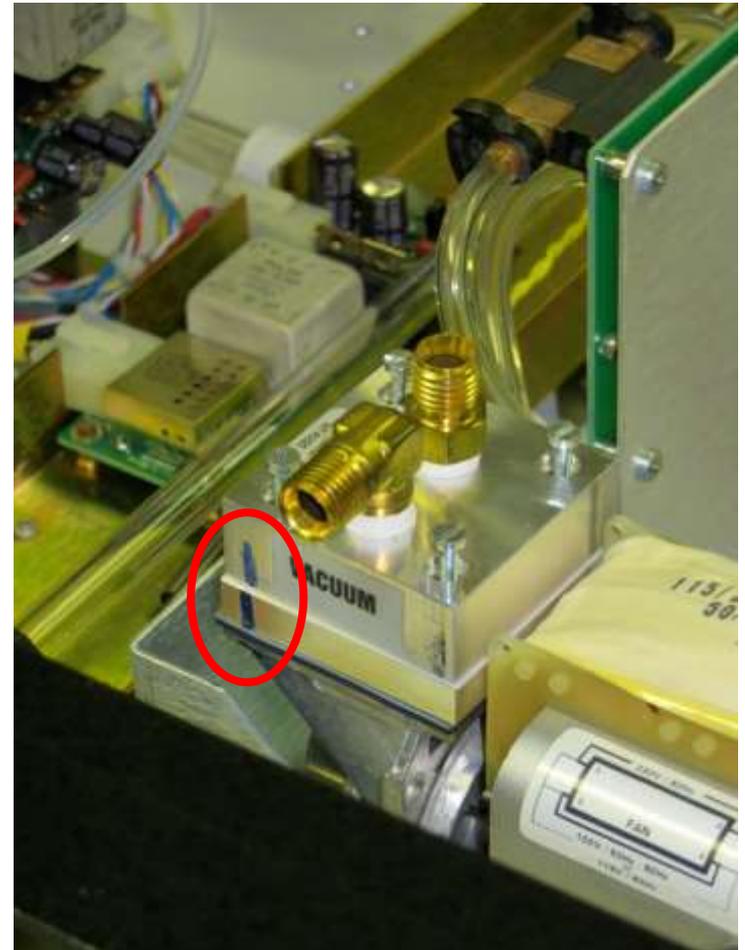
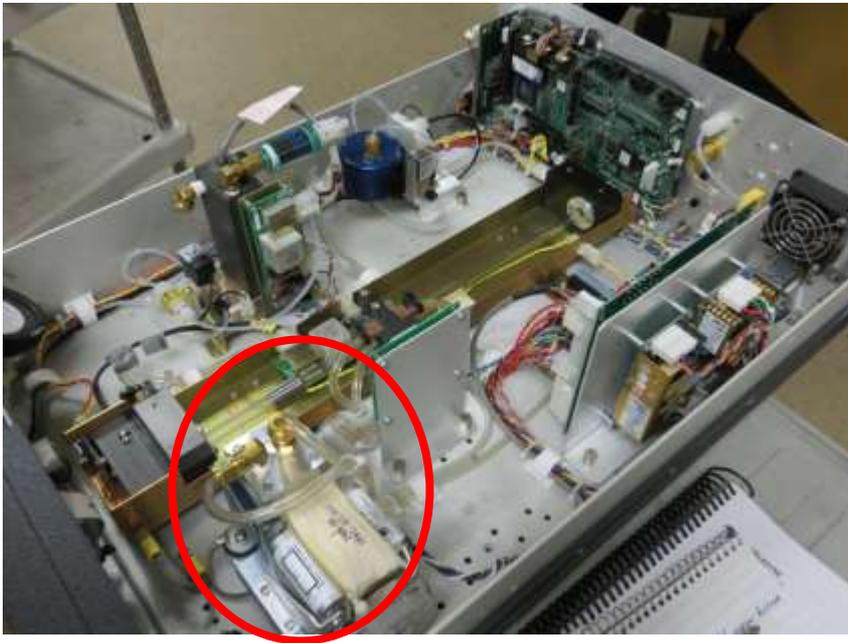
If the glass assembly has chips, leaks can be present.

Also, chips will eventually lead to the glass cracking, so always be careful when handling the glass and inspect it routinely.

# Troubleshooting Low Sample Flow

Before you disassemble the unit, mark it with a Sharpie to indicate where pieces are to line up. This will help with reassembly.

Disassemble the unit in order to inspect the pump diaphragm.



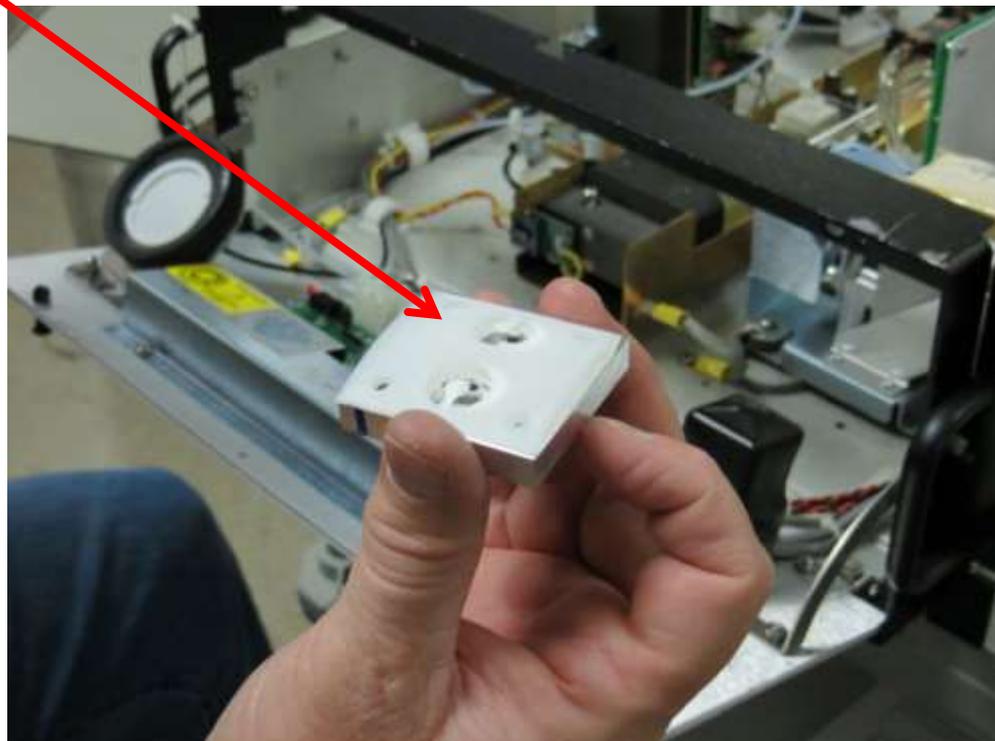
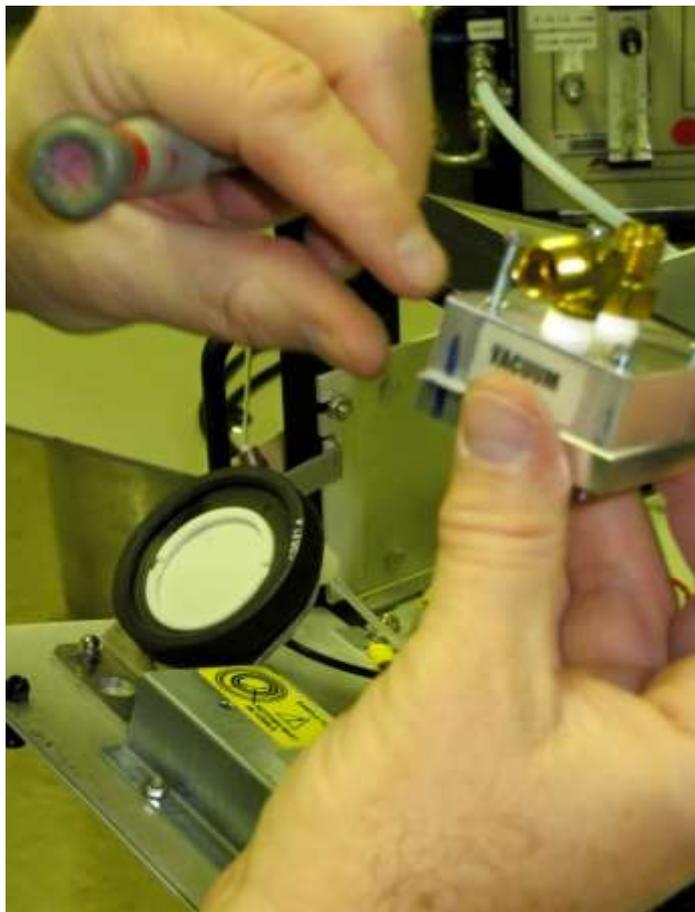


## **Pump Diaphragm**

**Wipe it clean, if visibly dirty.  
Replace when cracked.**

## Replace the Flapper Valve

It may become warped from heat!





# Maintenance Schedules and other ideas

- Reported by Wilbur
- Plan your maintenance early in the week in case things go wrong.
  - Don't find yourself working late on a Friday with no one to call for help.
- Use a wireless modem at the site so that remote access is available.
- Use web cameras with data trigger to take photo of location around site if something measures high.



## BAM 1020 and sample time

- Reported by Met One
- BAM 1020 default reporting is end hour, while ambient air data is reported as start hour.
- Ensure data are logged back to the start hour in your data system.
- A one hour offset in the time over a 24-hour period will result in reduced performance relative to a collocated FRM



## Optimizing Collocation Performance on PM

- Reported by Met One
- For collocation testing of the FRM with the FEM monitors, flow, temperature, and pressure calibrations and verifications should be performed with the same certified calibrations device.
- This is especially important in programs where different field staff support the FRM and the FEM.



## Leak Checks

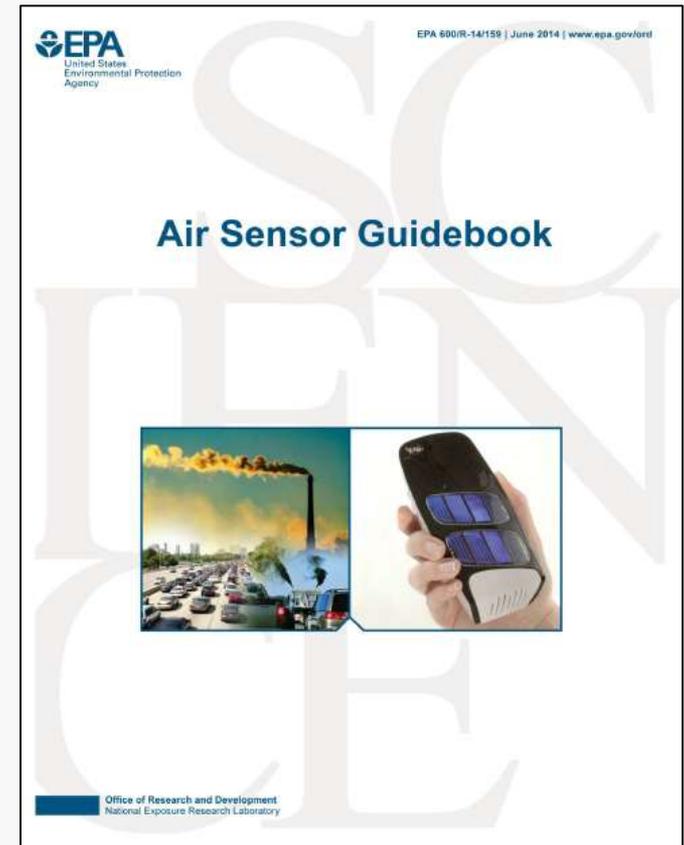
- From Arizona
- Be sure to get the paper off the back of the particulate (mace) filter!
- Do leak checks before and after changing the filter (i.e., cap inlet port)
- Condition the new filter with span gas post-change





# Sensors

- Reported by STI
- Be aware of the state of the science on sensors so you can handle questions from the public
- If your curious about sensors, pick up and read the guidebook
- **EPA/600/R-14/159 June 2014**  
**[www.epa.gov/ord](http://www.epa.gov/ord)**





## Utilize Digital Communications



- From San Luis Obispo County, CA
- Configure equipment so that you receive text alerts or emails from instruments when they need attention
- Also, graphing digital outputs will illustrate how an instrument is operating, which may help you determine if a site visit is warranted



## Utilize Advanced Technologies

- From Maine
- Utilize webcams to monitor events around a site
  - May help identify sources of high readings and/or exceptional events
- Use FaceTime for technical support



- From Great Basin UAPCD
- Instead of carrying a laptop computer to a monitoring site, use a Tablet instead





## Put Hands on into your training

- Reported by Merrifield and associates
- Hands on training is much better than a ppt alone.
- Use analogies in training to help explain your subject.
- Teach at a level that can be understood by the audience



## Take Advantage of Training Opportunities

- Reported by Ecotech
- Take advantage of training options
- Ensure staff know how to touch instruments so there is not fear in the case when something must be adjusted.
- Try to have at least one staff person be the expert on a method, but also have backups.



# Utilize On-line Resources

- Reported by DR DAS
- Have on site PC with library of support documents
- Ensure remote access so that support staff can call into the site
- Have your systems capable of downloading a diagnostics report so that it can be emailed. This is critical in off site support helping from remote locations.
- Track monitoring inventory electronically so that you have details on history of maintenance and repairs



## Training on Methods

- Reported by Alaric
- Training matters
- Keep good people as it can take years to get staff up to speed on all the ins and outs of methods and monitoring
- Proactively send staff to training; don't just wait for training to be available locally.



## Training Tips

- From Albuquerque, NM: Host frequent mini-training sessions, with staff teaching each other tricks of the trade
  - Calibrator training is imperative for a successful monitoring program
- From Wisconsin: Host monthly meetings with candid discussions
  - Share mistakes & the learning experiences garnered from them (corrective actions)



# Training

- From Forsyth County, NC
- Choose a month and have a rotation with the secondary operator completing all procedures
- Repeat this process at routine intervals
- This cross training technique will keep the secondary operator's skills sharp





- From South Coast AQMD: For training sessions, reach out to neighboring districts & vendors to augment learning opportunities
- From Arizona: Every 6 months, get air agencies together as a group (locals, tribes) to share information
  - During training, explain *why* procedures are important
  - Avoid giving operators manuals and SOPs and just having them read



# Training

- From the TAMS Center
- Pick one aspect of an operator's daily work and demonstrate how to do it with them
- Work with them slowly over a month, incorporating new procedures
- Do not overload operators with training all at once
- The internet is a great training tool



## Training

- From Tennessee Department of Environment and Conservation
- Get EPA Regional Office technical staff to provide air monitoring & quality assurance training to S/L/T personnel
- This has worked very well in Region 4.



## Videos & Webinars

- From North Carolina: Demonstrate SOPs live & create YouTube videos
  - Computer applications are also available for download that will capture computer screen shots & movements, to help visually train on software
- From Southwest Ohio Air Quality Agency: Encourage vendor training via webinar

Ideas + Implementation = Efficiency  
More?

