



Maryland Department of the Environment

Air Monitoring Program

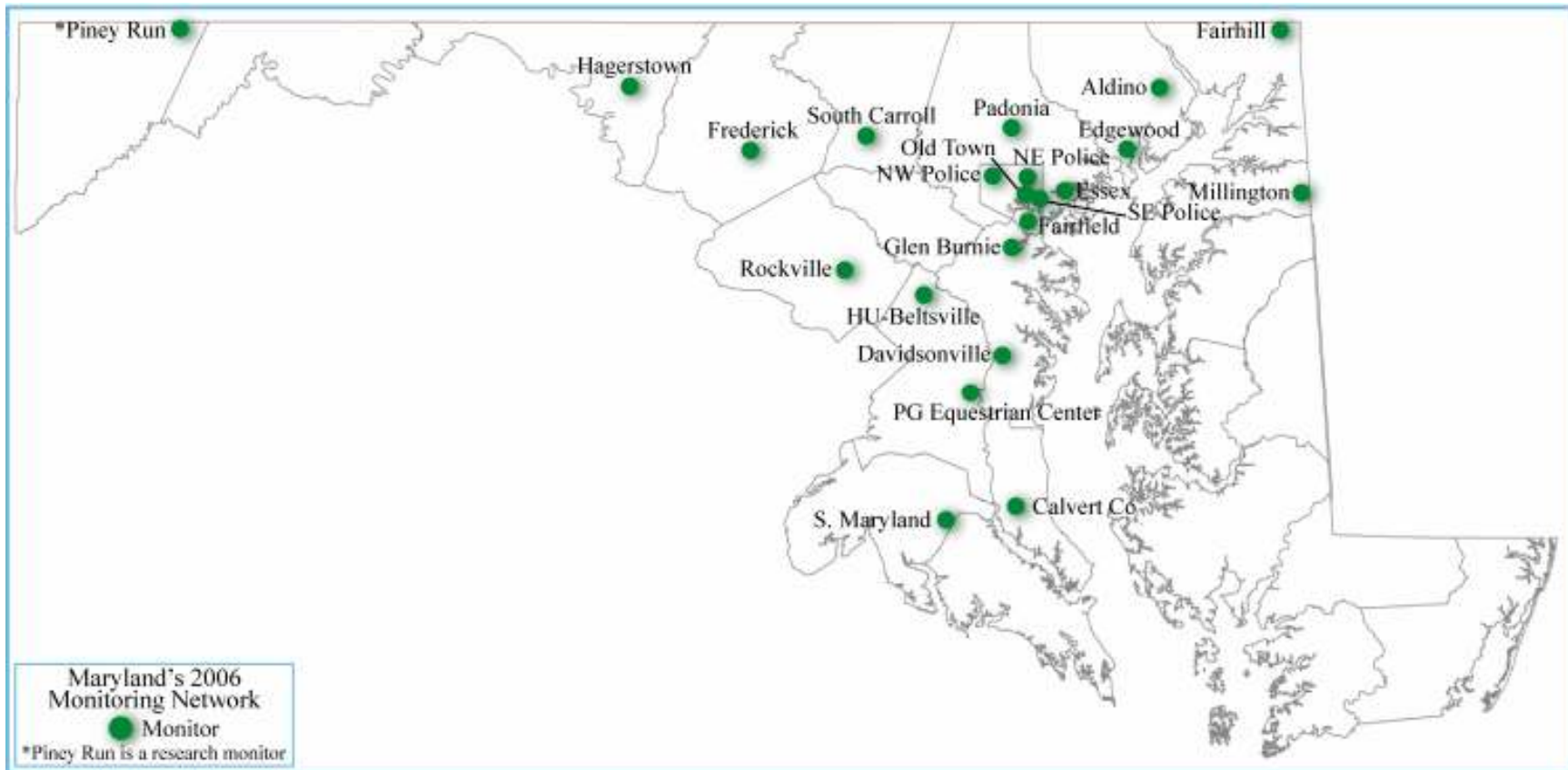
Trace Level Monitoring at Piney Run

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Department of the Environment







Piney Run Monitors

- TEI SO₄ particulate
- TEI SO₂T
- TEI NO_y
- TEI O₃
- TEI COT...coming soon
- Other instruments – Sunset OCEC, Met One BAM, Optec Nephelometer, IMPROVE sampler, Upper Air Profiler, several Meteorological parameters





Zero Air

- Initial zero air testing on the SO₂T.....
- Tested three methods...an SO₂ denuder (SO₄ particulate converter), an Ultra Pure Zero Air cylinder, and a TEI 111 zero air generator
- All three systems recorded consistently low zeros
- Operate the TEI 111, routinely challenge the zero air using the compressed zero air cylinder...to monitor for any degradation in the 111 (the oven catalyst, the purafil or the charcoal).





Compressed Gas Cylinders

- EPA Protocol Gases in Nitrogen
- SO₂T – 10ppm – short certification life
- NO_y - 20ppm
- COT – 200ppm





Datalogging

- ESC 8816 – analog mode
- Weekly downloads of digital data
 - temperatures, pressures, flows, internal zeros, voltages, zero and span coefficients, etc
- Purchasing Digital data logging system:
 - will allow us to view these instrument parameters much more frequently and thus help us to monitor the instruments, even particular components within the instruments (SO4 – quartz converter core, thermocouples, etc)





Trace Monitoring Issues

- Similarities to Standard Analyzers:
 - principal operations are very similar
 - also similar problems; pump failures, leaking solenoids, clogged glass capillaries, etc.
- Differences to Standard Analyzers:
 - more complex with the addition of external converters, and thus more consumable parts
 - less margin for error at lower concentrations, the need for tighter calibrations and more accurate zeros
 - the small problems (slight fluctuations in lamp voltages or flows) are magnified and more apparent at the trace level





Monitoring Conclusions

- With the increasing complexity of these instruments, field requirements may increase. However, with digital data logging capabilities, remote monitoring of these instruments is a growing possibility.
- Stress good Zero Air system and Cylinder Gases
 - continually checking the zero air system against other sources
 - maintain cylinder gas certifications





QA Slides – Trace SO₂ Quality Control Procedures

- Run nightly automated Zero/Span checks controlled by the Data Acquisition System
- Perform Quarterly 2 point Calibrations
- Perform bi-weekly precision checks
- Perform Quarterly 5 point Audits





SO₂ trace Data Validation

- We utilize the Mane-Vu Regional Aerosol Intensive Network (RAIN) Data Management SOP
- At this time we are validating the data to Level 1.
- The validation process is very similar to how we normally validate NAAQS pollutants





Data Validation Continued

- Zero adjust the data utilizing the zero readings generated during precision checks to obtain more accurate concentrations.
- Review the hourly data for abnormal values; high values, repeating values, negative or missing values.
- Review the nightly Zero/Span report and graph for percent error exceedances.
- Review the site log notes for precision checks, calibrations, audits, instrument malfunctions, etc.





Future Plans

- COT analyzer
- Adopt a 'thru the manifold' approach for the nightly zero/span checks
- Installation of a digital data logging system that would allow for much closer monitoring of the instruments performance
- Continued expansion of the Beltsville Site – our second NCORE site - adding to our SO₂T with a NO_y and COT





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<http://www.hazecam.net/frostburg/map.htm>

*Photo by Chris Smith, MDE

