Comments of
Peter C. Babich, Jr., Sc.D.
Supervising Environmental Analyst
Connecticut Department of Environmental Protection

on the
United States Environmental Protection Agency's
Review of EPA's Photochemical Assessment Monitoring Stations (PAMS) Program

Before the
Clean Air Scientific Advisory Committee (CASAC)
Air Monitoring and Methods Subcommittee (AMMS)

Members of the Air Monitoring and Methods Subcommittee of the Clean Air Scientific Advisory Committee, I am Peter Babich, a Supervising Environmental Analyst with the Connecticut Department of Environmental Protection. My comments specifically address our interest and efforts in meeting our PAMS monitoring requirements and doing so with an approach that produces high quality data with methods that are less-resource intensive than current PAMS systems currently operated by most states.

The Air Monitoring Group of the CTDEP was interested in investigating alternative instruments and methodologies for PAMS sampling, particularly as our existing Perkin-Elmer gas chromatography (GC) instrumentation was aging and service and support was continually declining. CTDEP became aware of Synspec GC systems from conversations with other States. The Synspec BTEX instrument has been successfully deployed and operated by a large number of agencies worldwide.

In 2009, CTDEP purchased two Synspec GC955 POCP systems as potential replacements for existing Perkin-Elmer systems. There are a number of functional differences between the two instruments.

Below are some specifics of both the Perkin-Elmer and Synspec systems, but generally speaking, we committed to the Synspec primarily because this is a platform/instrument that was made specifically for field operation and not a laboratory GC, like the Perkin-Elmer which was altered/modified in an attempt to use in a field application. Per the picture below, the Synspec POCP system which measures all 56 target PAMS compounds is rack mountable with minimal on-site service that needs to be performed. Working with Synspec in terms of data output, the system creates a file compatible with VOCDat which is a common software tool used for PAMS data validation and submittal to the EPA AQS database. Again, working with Synspec, software has been recently developed to allow for the reprocessing of previous runs to address shifts in retention times to allow for new files for VOCDat to be processed.

The other key element in exploring this new technology as an alternative to the Perkin-Elmer systems we have historically operated, is the service and support available. The Perkin-Elmer GCs are the only instruments we operate in our entire ambient air monitoring network which we need to have the vendors come physically on site to troubleshoot/maintain the instrumentation. There can be significant delays in this service and support as all states each year are putting GCs online in preparation for ozone/PAMS season. It is not uncommon to lose weeks and even over a month at a time waiting for the appropriate level of service and support. With the Synspec units, the majority of the troubleshooting can

and is done remotely. This is imperative for both us as operators of the instrumentation and the vendors to be able to provide the appropriate level of support.

Another feature that makes this technology attractive is the flexibility of the method and the potential to be able to look at toxics specifically or biogenics or other target compound lists.

These are some of the current configurations that are offered found at:
http://www.synspec.nl/dl_applications.html
BTEX GC955-600_BTX.pdf
Benzene/Butadiene GC955-600_Bu_Be.pdf
Methane/TNMHC in ambient air alpha-115MTNMHC.pdf
Ozone precursors GC955-600-800_POCP.pdf
Mercaptans and sulfides in ambient air GC955-800_mercaptans.pdf
Toxic hydrocarbons in ambient air GC955_backgr_toxic.pdf GC955-800_C2-C5.pdf GC955-600_C6-C10.pdf
BTEX and M/TNMHC GC955-600_BTEX_AND_ALPHA-115_MTNMHC.pdf
Paraxylene GC955-600_Paraxylene.pdf

Additional information specific to the Synspec GC configured for PAMS is at:
http://www.synspec.nl/pdf/GC955-600-800_POCP.pdf

We are still evaluating this technology and are operating colocated Perkin-Elmer and Synspec GCs at two locations (East Hartford and New Haven) this 2011 PAMS season. Some preliminary colocated data from the 2010 PAMS season shows good correlation/agreement between the two systems.

Below is some basic information of both the Perkin-Elmer and Synspec systems:

The Perkin-Elmer employs:

Single Sample Stream with two column analysis
Sample continuously collected over 40 min/hour
Two flame ionization detectors (FID) with linear response over entire range, and components (mostly)
Single response factor for all components on each detector
Helium carrier gas with hydrogen FID fuel
Software (data review and manipulation) available on remote PC. Data may be collected and reported real time, or reviewed and reprocessed later.
Software mature – with some limitations

The Synspec employs:

Two separate sample streams, each with single column analysis
Sample collected at selected intervals over 40 min/hour – actual sample time is about 10 minutes out of the hour
Three detectors – One FID for alkanes; two photoionization detectors (PID) for aromatics, alkenes.
Individual response factors for every component with response linearized by software
Nitrogen carrier gas/ hydrogen FID fuel
Software (data review and manipulation) available only on GC itself. Data may be collected and reported real time or reviewed and reprocessed later.

THE SYNSPEC GC955 POCP SYSTEM

The upper box houses the PC which controls the operational and data processing features. The siloxane column & PID analysis components are also present. The lower box houses the Al2O3 column & PID/FID detectors

The hardware seems quite robust. CTDEP experienced an early problem with a PID lamp window crack which entailed a relatively straight forward repair. Otherwise, there have been no major instrumental problems in well over a year of operation. Hydrogen and zero air generator s (from LNI) were purchased to supply operational gases, and have been found to work well with the Synspec unit. Retention time stability seems good with the Al2O3 column showing some drift, not atypical for this is type of column.

The instrument generates usable data files real time. If calibration or identification corrections need to be made, the data must be reprocessed. Post analysis review and reprocessing of data is just becoming available and is currently being tested.

In closing, our experience with the Synspec PAMS unit us leads us to believe that it is a viable and sustainable technology and platform for enabling us to provide quality ozone-precursor data in meeting our PAMS requirements and obligations. Moving forward in a continually budget-constrained and resource-limited climate, continuing to operate traditional PAMS GCs that are manually intensive methods that lack vendor service and support, is not an option. There is more work to be done and refinements to be made with the Synspec method, but progress is continually being made as we gain expertise with the instrumentation and the vendor understands our needs and the requirements of the PAMS program as whole. Additionally, this platform has the flexibility to be adjusted accordingly if the PAMS target list is modified and/or other specific compound lists are targeted. Some type of EPA involvement, i.e. methods development/testing/certification, related to PAMS is long overdue, and it would having EPA push a proven technology to be utilized in the PAMS arena would benefit the PAMS program at the federal and state levels immensely.