**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
RESEARCH TRIANGLE PARK, NC 27711

**OFFICE OF**
**AIR QUALITY PLANNING**
**AND STANDARDS**

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**MEMORANDUM**

**SUBJECT:** Use of Stand-Alone Timers for Volatile Organic Compound (VOC) Sample Collection in Canisters

**FROM:** Greg Noah, QA Team Lead
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**TO:** EPA Regional Air Monitoring Contacts

EPA has received reports of issues with the use of stand-alone timers used for VOC sub-ambient sample collection. The issues involve potential leaks in the timer and/or sample flow controller that allow the sample canisters to drop to ambient pressure (0"Hg) during sampling and results in the invalidation of the sample. The invalidation requirement is consistent with direction in the National Air Toxics Trends Station Technical Assistance Document, Revision 3, Section 4.2.3.2.2 located here: https://www3.epa.gov/ttn/amtic/files/ambient/airtox/NATTS%20TAD%20Revision%203_FINAL%20October%202016.pdf.

The most common sampling method for VOCs is to collect ambient air in canisters for subsequent analysis using EPA method TO-15/TO-15A. Two types of automated "all-in-one" sampling methods exist for VOC sampling. The first method is pressurized sampling where a mechanism pumps ambient air into the canister and automatically stops sampling at a user-defined time. The second method is sub-ambient sampling where the canister begins sampling under a vacuum and air is metered into a canister using a sampling device, again, stopping at a user specified time. Both sampler types are expensive, robust, electrically powered and must be operated within a shelter that is protected from the weather. The stand-alone timer is a cheaper option that is sometimes used in instances where the more robust samplers are cost prohibitive or other resources are not available. These timers are more affordable, battery powered, weatherproof and are easy to program. To set up a sample, a flow controller device is fitted to the top of the timer, and this assembly is then attached to the top of the sample canister. The apparatus is then placed on a stand outdoors where the timer is programmed to open and close at a user designed interval.

Historically, these timers have presented issues when used in VOC studies. In the School Air Toxics Monitoring Initiative conducted in 2009, the timers developed leaks within the timer unit itself and sampled air from within the timer enclosure. This resulted in qualification or

invalidation of some samples. Recently, ethylene oxide sampling studies involving timers have yielded similar issues resulting in the invalidation of data where final canister pressures fell to ambient pressure. In addition, temperature extremes experienced during these studies are suspected of impacting the functionality of the system.

There are several reasons why the stand-alone timer used with a flow control device may leak.

- Adding a timer creates more connections that can become loose and leak,
    - Timer to canister
    - Timer to flow controller
- Fittings in the flow controller assembly can become loose and leak,
- Leaks can occur within the timer unit itself,
- Contraction and expansion around the seals within the timer may create leaks in temperature extremes,
- Functionality of the timers degrade with low battery life.

If resources dictate that using stand-alone timers are the best option, EPA recommends the monitoring organization use experienced staff to conduct the sampling activities and exercise extreme caution and oversight. Due to the potential issues noted above, the following guidance should be considered prior to and during the study.

- Follow all directions in the vendor operating manual.
- Upon each sampling event, ensure all fittings (canister to timer, timer to flow controller, and flow controller fittings, particulate filter) are tight. Some fittings require an extra quarter turn after the fitting is finger tight. Consult tightening guidance of the fitting vendor.
- Leak test the sampling apparatus (canister, timer, and flow controller) every sampling run (procedure can be found in TO-15A).
- Leak check timer every 10 runs.
- Replace the batteries frequently.
- Conduct a flow check on the flow controller to ensure that vacuum (4 to 11 inches of Hg) will remain in the can following the sampling duration.
- Immediately report samples that end the sampling run at ambient pressure (0 inches of Hg) to the QA staff for corrective action.
- Train the operator to conduct the sampling and retrieval procedure properly and to be cognizant of issues, and potential issues, in the sampling system.

Following the above recommendations will not guarantee a successful sampling event, but it will greatly improve the success of collecting a valid sample. For questions, please contact me at noah.greg@epa.gov.

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