Dr Christina Baxter, of Emergencyresponsetips.com, offers helpful advice for first responders. This issue is sampling equipment.

CBRNeWORLD

Keeping you safe!

This column is intended to provide operational guidance to the hazmat/CBRNE community regarding the selection and performance of equipment and tactics. For this iteration we will focus on the appropriate use and application of sampling equipment.

One of the biggest operational limitations for the hazmat/CBRNE community today is developing and implementing a good sampling strategy. Remember, if you cannot get the sample to the detector, the detector will not be able to provide you with the information necessary to create your risk profile. The need for sample collection for risk mitigation or intelligence gathering must be balanced with the need for evidence preservation.

Trace liquids and solids

Going downrange for a recon mission is an excellent opportunity to collect opportunistic trace samples for further analysis. The following three are examples of methods for the efficient sampling of trace liquids and solids.

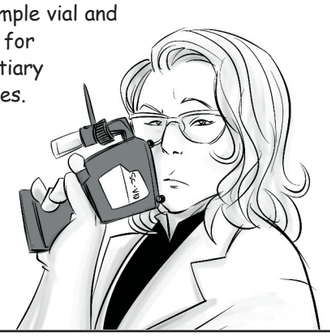
First, fingerprint lifting tape can be used to capture and focus particles into a specific area for further analysis. In this case, fingerprint lifting tape is used in preference to other types of tape as the adhesive tends not to interfere with further analysis.

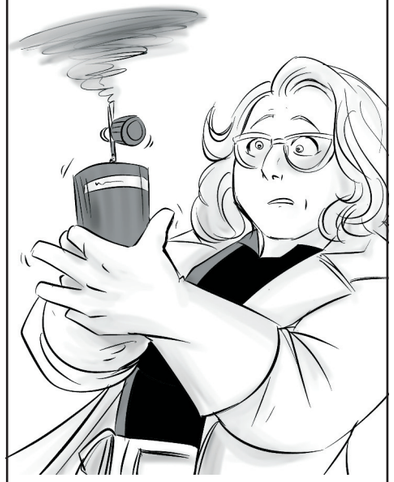
Next, standard cotton filter paper is an excellent material for capturing chemical residues from a surface. The collection efficiency can be increased by sampling from glass and metal surfaces rather than plastic ones. Filter paper sampling efficiency can be increased by five to 10 times by roughening the filter papers with a high grit sandpaper to break some of the fibres.

Finally, foam tip applicators and/or swabs, either dry or wetted, can be used on surfaces to capture chemical residues.

Bulk liquids and solids

If there is little concern about aerosolising the sample, the standard sampling techniques of using a scoopula or pipette to transfer samples into a vial for later analysis are acceptable. When dealing with drug labs, chemical warfare agents, or biological agents, however, the concern about aerosolisation is heightened. In these cases, a vacuum sampler like the Bulk Particle Collector from Seacoast Science Inc is necessary as the sample is vacuumed directly into the sample vial and sealed for evidentiary purposes.

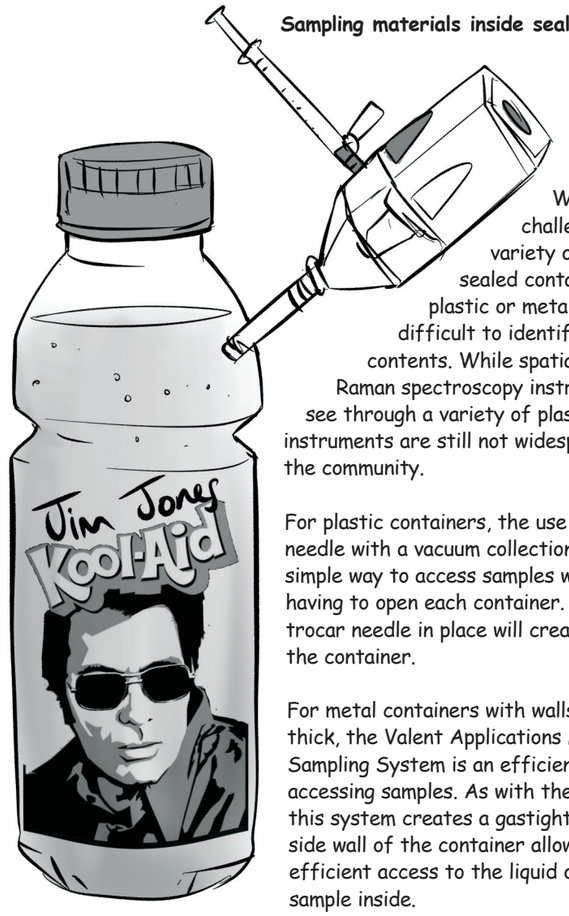




Air samples

Years ago, on scene air samples were relegated to large canisters and Tevlar bags. Today, vacuum-based air sampling canisters and bottles are available a variety of sizes for capturing quick grab (1-10 seconds) air samples. These vacuum containers come lined with fused silica or deactivated glass to allow for a broader range of volatile materials to be collected, stored and recovered for analysis.

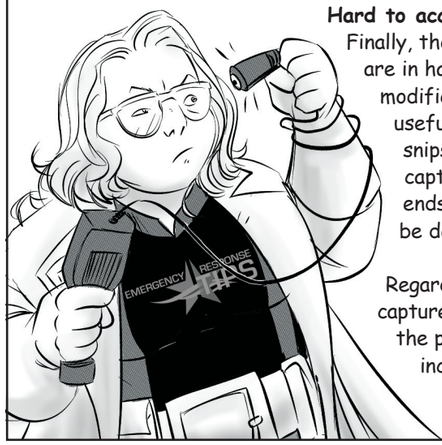
Sampling materials inside sealed containers



When you are challenged with a variety of samples in sealed containers, whether plastic or metal, it is often difficult to identify the contents. While spatially offset Raman spectroscopy instruments can see through a variety of plastics, these instruments are still not widespread in the community.

For plastic containers, the use of a trocar needle with a vacuum collection tube is a simple way to access samples without having to open each container. Leaving the trocar needle in place will create a seal in the container.

For metal containers with walls up to 8mm thick, the Valent Applications Midas Sampling System is an efficient means of accessing samples. As with the trocar needle, this system creates a gastight seal in the side wall of the container allowing for safe, efficient access to the liquid or gas sample inside.



Hard to access samples

Finally, there will be times when samples are in hard to reach areas. In this case, modified, hardened endoscopes are useful. Standard sample ends such as snips, cages and nets can be used to capture samples or modified sample ends such as sponge applicators can be developed.

Regardless of how the sample is captured, it is important to think through the process, develop a sampling plan including a sampling diagram, and determine the best collection medium for the sample.

Stay safe and happy sampling!

CBax away!

Images are courtesy of Phil Buckenham
https://philbuckenhamart.wixsite.com/philbuckenham