Change to Air Sampling Method Improves Sample Accuracy

In 2016, Hill AFB implemented a number of changes to its indoor air sampling program in an effort to improve accuracy and reduce the need for future sampling. The change most noticeable to residents was the method used to obtain the sample. This fact sheet describes the changes made to the sampling method, the rationale for the changes and the effects the changes will have on decisions as the program moves forward.

Device change

The most obvious change is to how the samples are collected. Gone is the large silver Summa canister, which was used to collect a 24-hour sample. It is replaced with a small passive sampling device about the size of a pencil, designed to collect a sample over a 14 to 26-day period. When analyzed, the devices accurately measure an average concentration of chemicals in the air over the entire sampling period.

Recent advances in the science of vapor intrusion have shown that 24-hour samples, such as those collected by the Summa canisters, are not the most effective way to determine whether or not vapor intrusion is occurring in a particular home. Research has shown that the concentrations in a home can vary from day-to-day. This variability is due to changes in weather, outside temperature, furnace use, opening of windows and doors and several other factors, and can affect if contaminant vapors are entering the home.

If a canister were placed in a home during a period of favorable vapor intrusion conditions, then it's likely the chemicals would be detected. However, if a canister were placed in a home when vapor intrusion conditions were unfavorable, then it's unlikely contaminant vapors would be detected.

Passive diffusion samplers, shown here, replaced Summa canisters. These devices are designed to collect a sample over a period of 14 to 26 days. Research has shown that a long-duration sample is more effective at determining if vapor intrusion is occurring in a home than a 24-hour sample.

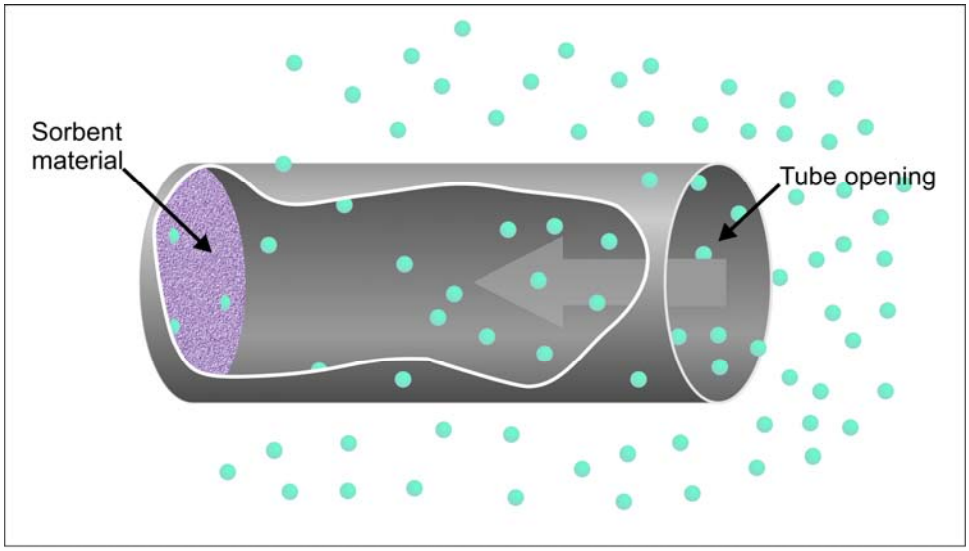
The variability in detecting chemical vapors is the primary disadvantage using the 24-hour canister method. The passive samplers, technically known as axial type passive samplers, are basically a tube filled with a special material designed to capture specific chemical vapors. When placed in the home, the tubes are opened to allow air to flow into them. At the conclusion of the sampling timeframe, the tubes are sealed and sent to a laboratory for analysis. The laboratory will report an average concentration of chemicals in the air during the sampling time period.

The Air Force now uses an approximate sampling time period of 26 days. By sampling up to 26 days, the Air Force hopes to be able to determine whether or not vapor intrusion is occurring in the home with a reasonable degree of certainty without requiring sampling the same home multiple times over a period of several years.

What these changes mean to residents

Those homes with limited sampling using the 24-hour Summa canister in the past will be invited to participate every year until a 26-day sample has been collected.

The sampling team will contact the resident to schedule the drop-off of the sampling tube and will tentatively schedule the pickup. Placing the tube takes about 45 minutes.



This simplified diagram shows how a passive sorbent tube works. Air, including contaminant vapors, naturally flows into the tube. Contaminant vapors are captured by the sorbent material at the end of the tube. To calculate the concentration, the laboratory analyzes the sorbent material and considers other factors, such as tube length, size of the tube opening, the surface area of the sorbent material and the time exposed. From that, the laboratory can calculate an average concentration of contaminant vapors in the home during the sampling period.

The tube will be placed in the lowest livable space in the home, at about three to five feet off the ground. It will most likely be hung from the ceiling in a location that will receive minimal disruption. As before, residents will be asked to refrain from activities that use substances that may contain chemicals of concern, such as glues, gun cleaners and solvents. Due to the length of the sample, some restrictions required for the 24-hour sample have been lifted, such as doing laundry and burning candles. The team will provide residents a detailed list of requirements prior to sampling the home.

As before, the sampling team will conduct a home chemical inventory with the resident prior to placing the sampling tube. This will ensure all chemicals inside the home that could interfere with the sample are removed. If a detection above the mitigation action level (MAL) is found, the team will return to the home with an instrument designed to locate specific sources of a particular chemical. If no inside source of chemical vapors is found, it's likely that vapor intrusion is occurring at the home and action will be taken to prevent further vapor intrusion. If an inside source is found, the source will be removed and the home resampled.

Identifying inside sources is important to ensuring vapor removal systems are installed where vapor intrusion is actually occurring. Vapor removal systems are only effective at preventing vapors from entering the home. They have no effect on vapors that originate from inside the home.

The sampling season runs from October through March. Research has shown that the winter months provide the best conditions for detecting vapor intrusion, if it is occurring.