The Best Method to Assess Whether a Vapor Intrusion Risk is Present and Requires Mitigation: The Preference for Passive Samplers

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Background/Objectives. Indoor air samples historically have been collected in the United States over an 8- or 24-hour period because of the successful promotion of evacuated canister sampling by Method TO-15. However, research completed over the past decade at universities, as well as data collected on commercial projects, has clearly demonstrated that the temporal variability of indoor air concentrations can vary by orders of magnitude in both long and short time periods. Therefore, there is a growing trend by regulators to require data be collected over an extended time period (e.g., 10 to 14 days). The collection of daily 24-hour samples over these extended time periods is cost prohibitive; therefore, the use of passive samplers to collect long-duration, time-integrated samples is being advanced and adopted as a best practice to reliably determine average concentrations of VOCs in air and confidently determine whether mitigation is required.

Approach/Activities. The use of sorbent samplers to passively sample air over days or weeks provides long-duration average concentrations to assess health risks, which overcomes the challenges from temporal variability and episodic occurrences of vapor intrusion. Passive samplers are low-profile and are more readily adopted by building occupants and easier to manage by field technicians than evacuated canisters. An ongoing community sampling program involves the collection of indoor air samples at hundreds of homes annually by use of passive samplers, with uptake rates that were verified to be linear out to 26 days by a robust study completed by an independent third party. The passive samplers provide a 26-day, time-weighted average concentration that represents with one sample more than 25% of the entire winter season. Whereas, the prior sampling program that used inert stainless steel evacuated canisters to collect discrete, 24-hour point-in-time samples, was found to not represent the actual exposure risks of the building occupants and homes even with non-detects were not removed from the monitoring program. By collecting long-duration samples with parts per trillion by volume (pptv) reporting limits following a US EPA analytical method, greater confidence was achieved that the health risks were properly assessed and ongoing monitoring and mitigation strategies could be determined.

Results/Lessons Learned. The use of passive samples to collect samples over 26-day periods has produced data that are of higher confidence for determining health risks than when 24-hour samples were collected and regulators are now more confident in determining which homes require no further sampling and which require mitigation. Passive samplers additionally have gained acceptance because they are light weight, easy to transport, and are a more green and sustainable technology then the use of bulky, evacuated stainless steel canisters. The simplicity of use of these devices results in less errors in the field and an easier to clean sampler that can eliminate cross contamination issues that are known to be common for canister samplers. In addition, in the most recent round of sampling at the ongoing community sampling program, the simplicity-of-use of these devices allowed residents the option of hanging the samplers in their own homes to minimize the contact with others when virus transmission concerns were present. The ability to have residents receive samplers at their doors and hang them in their homes following documented procedures and conditions will increase the number of homes that are able to be sampled in both ongoing and future sampling programs by overcoming the stigma of having someone enter ones home.