A 24-Day Study to Test Methods and Assess Variability of Indoor Air Trichloroethene Concentrations Arising from Vapor Intrusion

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Background/Objectives. This presentation will discuss the results of a 24-day study of indoor air sample collection and testing procedures completed in the Main Laboratory of the Cold Regions Research and Engineering Laboratory, Hanover New Hampshire. A variety of vapor sample collection and testing procedures were completed simultaneously to evaluate comparability of results between methods used to monitor indoor air concentrations of trichloroethene (TCE). Variability of TCE concentrations were also evaluated. Specific objectives included: evaluate comparability of results from 8-hour Summa/TO-15 Method and 8-hour Bottle-Vac™ (BV)/HAPSITE® field portable GC/MS Method; obtain a correction factor for BV/HAPSITE® results that can be used for decision making relative to results obtained from Summa/TO-15; evaluate comparability of results obtained from 8-hour Summa/TO-15 procedure and HAPSITE® grab (HPD) samples; evaluate comparability of the 5-day Radiello passive vapor sampler results with 8-hour Summa/TO-15 Method; evaluate temporal variability of TCE concentrations reported over the 24-day sampling period for TO-15 and HAPSITE® data.

Approach/Activities: Collocated samples were collected over 24 working days at a variety of locations that were known to regularly have measurable TCE vapors. Sample locations were pre-determined based on an evaluation of data collected prior to the study. A six-liter Summa canister equipped with an 8- hour flow controller, a one-liter BV equipped with an 8-hour flow controller, and a Radiello® passive sampler were deployed at each location. Radiello® samplers were deployed for 5-day exposure periods at the beginning of each week.

Results/Lessons Learned: Results from the 5-day sampling period were used to make the comparison of Summa/TO-15 and BV/ HAPSITE® method results. Comparison factors (CFs) were calculated for each sampling location. A CF of 1 indicates exact agreement, CFs greater than one indicate a high bias, and CFs less than 1 indicate a low bias compared to TO-15 results. The BV/ HAPSITE® TCE results are generally 2-times higher when compared to the Summa/TO-15 results. Radiello® results tracked more closely with TO-15 results and show a slight low bias. A multiplication factor of 0.5 was applied to the BV/ HAPSITE® results to normalize the values to results reported using the TO-15 Method.

The TO-15, BV/ HAPSITE®, and Radiello® samples were evaluated relative to a risk-based action level of 8.8 µg/m3. A wide spatial variability in the concentrations of TCE in indoor air was observed.