US Environmental Protection Agency (EPA) "State of VI Science" Workshop Session

Reducing Vapor Intrusion Uncertainties by More Frequent Simple Measurements and Community Involvement

AEHS Spring Conference, March 22, 2021, Virtual/Online[1]

Monday, March 22, 2021 – 11:30–3:30 ET (240 min)

This workshop will describe the vapor intrusion (VI) state-of-the-science, including recent data analysis and testing of Indicator, Tracer, and Surrogate (ITS) concepts and ongoing research by EPA Office of Research and Development (ORD) and other practitioners. The workshop will be online as part of the AEHS Spring Virtual Conference[1] and will be accessible to local, state, and federal regulatory personnel.

11:30 01_Welcome and Overview – Sponsors, IAVI website, key definitions - *Henry Schuver, EPA Office of Resource Conservation and Recovery (ORCR; schuver.henry@epa.gov)*

11:38 02_State the Problem – Review/update on current state and EPA guidance on sampling timing & temporal variability - *Laurent Levy, Jacobs*

11:45 03_Review of sampling confidence analyses based on two to four 24-hour samples in residential monitoring - results from Holton (2013), Lutes (2017), and Weinberg (2014) - *Chase Holton, Geosyntec*

11:55 04_New results from Navy/EPA study of an Industrial building with 18 months of high resolution indoor and subslab temporal variability data in multiple zones – *Chris Lutes, Jacobs*

12:10 05_Review of ITS concepts, fact sheets, and results regarding ITS prediction strength presented in previous workshops (including the 3 ways ITS can be used) – *Robert Truesdale, RTI*

12:25 06_Presentation of results of new sampling confidence analyses for multiple sites – comparing newly calculated performance metrics for seasonal versus ITS-guided sample times – *AJ Kondash, RTI; Chris Lutes, Jacobs; Chase Holton, Geosyntec*

1:20 – BREAK – 5 min

1:25 – QUESTIONS/DISCUSSION – 5 min

1:30 07_EPA perspectives on Environmental Justice & Citizen Science, with ITS for temporal variability, *Henry Schuver, EPA ORCR*

1:40 08_Panel Part 1: User perspectives on ITS and VI needs - invited discussants include *communities, academics, State regulators, EPA regulators, consultants, and PRPs*.

2:00 – QUESTIONS/DISCUSSION – 5 min

2:05 09_Vapor intrusion assessment challenges and Environmental Justice. - *Theresa Gabris, Geosyntec*

[1] https://www.aehsfoundation.org/West-Coast-Conference.aspx

2:15 10_EPA Perspectives on Environmental Justice & Citizen Science, with ITS for spatial variability (& an alternative 'Soil Gas Safe' approach) – *Henry Schuver, ORCR*

2:25 11_Panel Part 2: Bridges to practical implementation: community communication/Citizen Science/Environmental Justice – *Same Discussants from Part 1*

2:45 – QUESTIONS/DISCUSSION – 5 min

2:50 12_Review of available results from other EPA ORD CEMM studies

2:50 12a_Large Buildings (VA site): Subslab sampling methods comparison, high volume sampling, etc. – *John H. Zimmerman, EPA ORD CEMM; Theresa Gabris, Geosyntec*

3:00 12b_Large Buildings (AK site): Temporal variability in industrial and residential style buildings in a far northern climate (study design/preview, limited results) – *Brian Schumacher, EPA ORD CEMM; Chris Lutes, Jacobs*

3:05 12c_Other ORD VI Research Efforts

- SVE for VI mitigation – published results, forthcoming economics analysis - *John Zimmerman, EPA ORD CEMM*
- PFAS vapor intrusion potential – development and testing of soil gas sampling methods (research plans, early stage) - *Brian Schumacher, EPA ORD CEMM*
- Preferential Pathways Study - *Matt Plate, EPA R9*

3:20 Audience questions/discussion – Moderated and Recorded – Henry, Robert, AJ

3:30 1 min END – Henry et al.

(Questions also may be covered during the presentations through chat function.)

References

Holton, C., H. Luo, P. Dahlen, K. Gorder, E. Dettenmaier, and P.C. Johnson. 2013. Temporal variability of indoor air concentrations under natural conditions in a house overlying a dilute chlorinated solvent groundwater plume. *Environ. Sci. Technol.* 47(23):13347-13354. https://pubs.acs.org/doi/10.1021/es4024767.

Lutes, C., N. Weinberg, R. Truesdale, B. Schumacher, J.H. Zimmerman, and R. Norberg. 2017. Evaluation of indoor air concentrations and exposures and implications for indoor air sampling approaches. Platform presentation at *Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies*, Miami, May 2017.

Weinberg, N., C. Lutes, M. Bartee, R. Norberg, R. Truesdale, and B. Schumacher. 2014. A risk assessment comparison: evaluation of relevant indoor air exposure concentrations and periods and implications for developing indoor air sampling plans. Paper presented at *AWMA Vapor Intrusion, Remediation, and Site Closure Conference,* September 10-11, Cherry Hill, NJ. http://portal.awma.org/store/detail.aspx?id=13COMBCP207.

Abstract

Reducing Vapor Intrusion Uncertainties by More Frequent Simple Measurements and Community Involvement

All conventional methods for assessing and managing vapor intrusion (VI) rely on assumptions about temporal and spatial variability because VOC measurement data are generally sparse. Building-specific measurements such temperatures, pressures, and indoor radon levels, when properly implemented, can be relatively easily and cost-effectively applied to better understand these uncertainties, improving both initial and long-term VI assessments and management, and enabling more reliable, quantifiably confident, defensible, and protective VI decisions. This workshop session will expand the critical evaluation of existing data-rich studies of indicators, tracers, and surrogates (ITS), including temperatures, pressures and radon, as an alternative technology to improve current VI sampling practice. Previous workshops, and papers have defined ITS concepts and described our current understanding of on how VI 'drivers' such as temperatures and pressures affect chlorinated volatile organic compound (CVOC) VI and its assessment. In this workshop the emphasis shifts to indoor radon levels and how they can relate to indoor CVOC concentrations from VI. To do so we investigated how both CVOCs and radon are affected by temperature differentials, pressure differentials, and changes in barometric pressure, and how indoor (and differential) radon levels can help us estimate CVOC concentrations in indoor air from VI. This review has shown that the relationships between these variables and CVOC VI are building specific, generally nonlinear, and sometimes monotonic. Summary presentations will include false-negative and false-positive rates for conventional 'random', as well as seasonal, sampling events versus ITS-guided sampling results. This workshop session will also discuss how 'at risk' communities could voluntarily apply these simple ITS measurements (for example, through citizen science programs) to help ensure that Environmental Justice and other community concerns are being adequately addressed. The workshop will also provide updates on EPA-ORD research including soil vapor extraction (SVE) and VI, VI in large buildings, and potential VI for some PFAS (per- and polyfluoroalkyl substances).