Actionable Science for Communities

Mitigation and Effectiveness of a Vapor Intrusion Mitigation System - SHC 3.61.4

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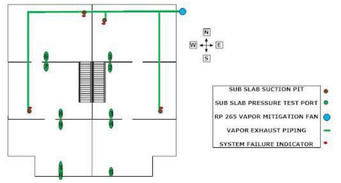
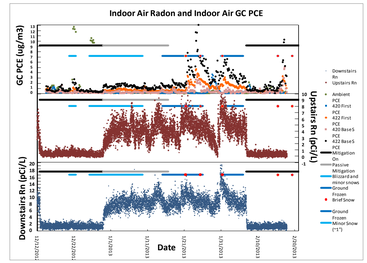
Purpose/Utility of Research

Vapor intrusion (VI) is the migration of subsurface vapors, including radon and volatile organic compounds (VOCs), in soil gas from the subsurface to indoor air. Subslab depressurization (SSD) is the predominant technology used for mitigating vapor intrusion. Design practices for SSD systems have been adapted essentially verbatim from radon mitigation experience. This research project investigated distributional changes in VOC and radon concentrations in the indoor air, subslab, and subsurface soil gas from an underground source (groundwater source and/or vadose zone source) adjacent to a residence and to monitor the effects on the concentrations when a subslab depressurization mitigation system was installed and operated.

Highlights



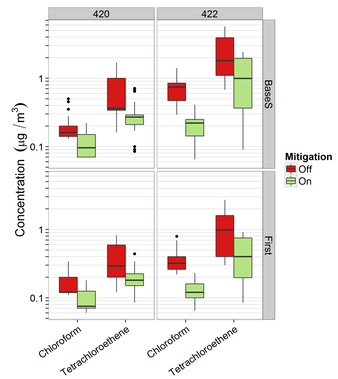
- The mitigation system met or exceeded the performance tests for radon with reductions greater than 90% and radioactivity measured being below regulatory limits.
- The effect of the mitigation system was seen almost instantly when the system was turned on or off with sharp increases or decrease in radon concentrations.
- In contrast, the mitigation system resulted in an average reduction of 68% in chloroform and 61% in PCE in indoor air.
- Concentrations of VOCs in some subslab and soil gas ports rose after mitigation began.
- This suggests that VOCs are being redistributed by the mitigation system and that concentrations close to the building may be enhanced by drawing higher concentrations of VOCs from greater depths.



Application & Translation

The results have provided the Program Offices and Regions with vital information that has been directly incorporated into the latest vapor intrusion guidance document released in mid-2015 entitled, “OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air.”

Further research into testing of vapor intrusion mitigation systems and their effectiveness is ongoing in the vapor Intrusion scientific community.



Intended End Users

The intended end users for this research project include: Office of Land and Emergency Management (OLEM), Regions, vapor intrusion researchers, regulators, universities, and the private sector who deal with vapor intrusion issues and mitigation. This research was identified and requested by OLEM during their annual research needs identification process. OLEM vapor intrusion personnel were intimately involved in this research effort through their review of products at all stages from initiation through completion.

Lessons Learned

- The results of our mitigation system testing suggest that the assumption that systems protective for radon will always be equally protective for VOCs could be incorrect depending on home construction and local geology.
- This report helps fill in knowledge gaps identified by the Program Offices (e.g., Office of Land and Emergency Response) and the Regions in providing vapor intrusion guidance.
- Clients will use results to provide new and updated VI guidance related to the determination of the potential for vapor intrusion into the home and other buildings and on how to mitigate the vapor intrusion problem.

U.S. Environmental Protection Agency. (2016) Assessment of Mitigation Systems on Vapor Intrusion: Temporal Trends, Attenuation Factors, and Contaminant Migration Routes under Mitigated and Non-mitigated Conditions. EPA/600/R-13/241.