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Reducing Potential Impacts of a Large-Scale Subslab Depressurization System through the Use of Remote, Long-Term Monitoring

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Background/Objectives. Subslab soil gas investigations identified areas with elevated VOC concentrations in soil gas beneath three buildings comprising a former maintenance facility located in a remote area. A subslab depressurization (SSD) system was designed and constructed to include the use of open-source software and hardware for remote, long-term monitoring. Alternative strategies for long-term monitoring and maintenance of the SSD system operation are considered and include the use of traditional site visits. This paper summarizes a screening level life cycle assessment of the monitoring and maintenance options for the SSD system using SiteWise™, a tool developed for green and sustainable remediation. The evaluated scenarios also considered the long-term human health risks to building occupants.

Approach/Activities. Two system monitoring and maintenance options were evaluated: (1) the traditional approach of quarterly monitoring and maintenance as needed during monitoring visits, and (2) the use of a remote, long-term monitoring system with alerts indicating the need for maintenance. The operational phase assumed a 30-year system life span for both options. The impacts of the two options were assessed for four categories: global warming potential, energy footprint, electricity consumption, and accident risk and injury. The Hazard Index and potential cancer risks to building occupants were evaluated considering potential system downtime.

Results/Lessons Learned. Comparison of the two options illustrates that energy footprint and global warming potential impacts were similar for the two options. The potential cancer risks and non-cancer health impacts to onsite workers is noticeably reduced by the ability to be responsive to maintenance needs on demand instead of on a pre-determined schedule. This evaluation shows that within the current regulatory landscape, which includes an increasing emphasis on long-term stewardship of vapor intrusion mitigation systems, a remote monitoring approach can significantly reduce potential health impacts over the operational life of the system without increasing life cycle impacts.