Modifying an Existing Sub-Slab Methane Mitigation System at Redeveloped Landfill Site after Years of Settlement

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Background/Objectives. The Westport Office Park, located in Redwood City, California was built on top of the 45-acre unlined Westport Landfill in the late 1990s to early 2000s. All 20 office buildings were equipped with passive landfill gas venting systems at the time of construction. During the next 20 years, the site experienced 3 to 5 feet of settlement due to the degradation of the refuse and the original landfill gas venting systems were rendered inoperable. In 2016, Langan repaired the existing landfill gas venting systems at all 20 on-site office buildings and engineered fill was installed beneath multiple buildings in order to fill some of the settlement gaps beneath building slabs and restore lateral structural support. Shortly thereafter, two of the buildings began experiencing methane alarms within the utility trenches. Langan was asked to investigate and design a solution.

Approach/Activities. Langan conducted design parameter tests at two of the office buildings. These tests consisted of temporarily modifying the existing passive exhaust risers so that a portable blower could be attached and various flow and vacuum conditions could be applied to the sub-slab space. Tests were performed in order to determine 1) sub-slab methane concentrations, 2) reaction of methane concentrations and vacuum beneath the slab to various applied flow rates, and 3) pneumatic connectivity of the sub-slab sections. The collected flow, vacuum, and methane data were analyzed and used to design contingency active sub-slab ventilation systems that will be activated by elevated methane concentrations.

Results/Lessons Learned. The initial design parameter test at the first building showed decisively that all sub-slab areas were pneumatically connected based on high induced vacuums at nearly all monitoring locations. Semi-log plots of flow versus induced vacuum at multiple monitoring locations were generated. The data were fit to exponential equations on a semi-log plot with a very high goodness of fit, and the results were used to design an active sub-slab ventilation system for the first building, with a focus on sub-slab depressurization.

Testing at the second building showed very low to no induced vacuums compared to testing at the first building, but a greater decrease in sub-slab methane concentration was observed during testing. Initial data collected at the second building were considered inconclusive, and additional investigations and testing were conducted. Because of the lack of induced vacuum, a sub-slab depressurization approach was not applied at the second building and design focused on extraction and dilution.

This presentation will provide an overview of the design testing performed, how the test data guided final system design, and how the resulting design differed between the two buildings. The presentation will also give an update on the implementation of the active sub-slab ventilation systems at both buildings.