Landfill Gas Transport in Karst

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Abstract

The solid waste disposal practices of many localities over the past 40 years have resulted in a proliferation of old, closed landfills located in karst areas. Recent investigations indicate that landfill gas, created by the decomposition of waste, can potentially seep into voids within karst and migrate considerable distances off site. Adjacent property owner concerns have typically excluded off site investigations into the extent of landfill gas impacts. New, innovative gas monitoring techniques have enabled investigators to actively map and track the distribution and migration of landfill gas off site via temporary and non-invasive methods that respect adjacent property owner concerns. Characterizing the extent of off-site impact in karst has enabled investigators to identify primary gas transport mechanisms and flow paths existing within voids in the bedrock. Several case studies of investigations at closed landfill sites situated in karst areas of the Valley and Ridge geologic province of Tennessee and Virginia are presented to illustrate the potential for previously unseen off-site impacts resulting from the transport of landfill gas via the void network. At each case study site, investigators have been successful at remediating off-site gas impacts by accessing the bedrock voids and redirecting the flow to the surface with passive vents installed at the property line. The temporary off site gas monitoring networks installed at each case study site initially enabled investigators to track the gas migration to the bedrock voids. The temporary off-site gas monitoring networks presently provide the data necessary to demonstrate the effectiveness of the passive bedrock-void gas vents.