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AIR EMISSIONS AT A MUNICIPAL SOLID WASTE LANDFILL

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ABSTRACT

The on-site and off-site ambient air concentrations of non-methane organic compounds (NMOC) and hydrogen sulfide were evaluated at a regional municipal solid waste (MSW) landfill. A target list was developed to reflect those compounds typically found at MSW landfills that have potential health effects or odors. The on-site effects on ambient air were estimated conservatively by collecting air samples 10 to 13 cm above the landfill surface. The off-site impacts were predicted using air dispersion modeling that considered both fugitive and point source emissions and were based on landfill gas sampled from an active well collection system. The on-site and off-site ambient air concentrations were compared to levels set by regulatory requirements (Connecticut's Hazard Limiting Values or HLVs) and odor threshold levels. No compound exceeded the HLVs either on- or off-site. No compounds detected on-site exceeded their odor thresholds. Several compounds evaluated at one-half their detection limit did exceed the odor threshold on-site. Only hydrogen sulfide exceeded its odor threshold off-site but remained below Connecticut's Odor Limit Value.

BACKGROUND

The municipal solid waste landfill described in this study is approximately 280,000 m^2 located in an urban Connecticut setting and has been in continuous use for over fifty years. The landfill accepted unprocessed municipal solid waste until the late 1980's. Since then, the landfill has accepted only bulky waste, ash residue, and process residue resulting from the processing and burning of MSW. At the time of testing, the majority of landfill side slopes were under final cover. Intermediate cover was being placed on approximately 81,000 m^2. The working faces received daily cover. An active gas extraction system and enclosed flare have been in use for two years. The landfill operator commissioned a study to characterize the air emissions and to evaluate the potential health impact for on-site workers and off-site sensitive receptors (nearby residents and businesses).

In addition, odors had been occasionally detected off-property. The installation of the gas collection system and enclosed flare 2 years ago greatly decreased the incidence of off-site odors but did not totally eliminate them. This study included an evaluation of off-property ambient air concentrations of odorous compounds, and the potential frequency and duration of detectable odors.

SELECTION OF COMPOUNDS FOR STUDY

Landfill gas, composed mainly of methane and carbon dioxide, has trace (up to 1% total) amounts of potentially hundreds of compounds. The trace organic compounds are collectively referred to as non-methane organic compounds or NMOC. In addition, inorganic compounds such as hydrogen sulfide are present. Quantitative testing for all potential components is not feasible, practical or even desirable in terms of turn-around time or economics for an evaluation study. However, for estimating health and odor impacts, identification of the likely significant individual contributors is necessary.

The target compounds were selected based on the reported frequency of a compound's detection at other landfills weighted by its potential health or odor impacts.