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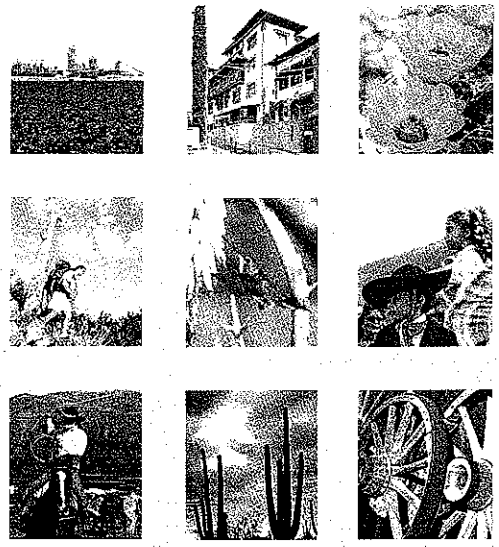

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An Approach for Estimating Benzene Air Concentrations at Former MGP Sites

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During the early 1900s, manufactured gas production (MGP) facilities supplied energy in the U.S. Because waste streams and equipment were often buried during the use or dismantling of these facilities, surface and/or subsurface soils at some former MGP sites have remained contaminated for many years. However, few published data sets exist on measured airborne concentrations of volatile compounds, such as benzene, during contact with or the disturbance of soils at these sites. We therefore provide an approach for estimating benzene in ambient air at former MGP sites based on emission (vapor and particulate) and air dispersion modeling techniques. Specifically, we characterize benzene air concentrations under several scenarios, including during the outdoor excavation of soil and in indoor environments. For these hypothetical scenarios, a soil column from 0 to 15 feet with maximum soil concentrations of benzene that ranged from 10 to 1,000 mg/kg for the 12 to 15 feet depth interval are used. Vapor emissions from subsurface soil are calculated using the USEPA's EMSOFT model and the ASTM RBCA model for outdoor and indoor scenarios, respectively. Particulate emissions from the handling or disturbance of surface soils are calculated using the USEPA AP-42 model. Additional near field and air dispersion models are then used to calculate airborne concentrations of benzene in the breathing zone. We find that predicted benzene air concentrations for most scenarios range from approximately 0.001 ppm to 1 ppm, which is consistent with the limited published air sampling data collected at various MGP sites during excavation and other activities. Benzene exposures from incidental soil ingestion or dermal contact during these activities are estimated to be negligible. The modeling approach presented here should be useful for predicting benzene air concentrations at a number of sites where surface or subsurface soils may contain benzene.