A review of approaches for the long-term management of municipal solid waste landfills.

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Abstract

After closure, municipal solid waste (MSW) landfills must be managed and controlled to avoid adverse effects on human health and the environment (HHE). Aftercare (or post-closure care) can be brought to an end when the authorities consider the landfill to no longer pose a threat to HHE. Different approaches have been suggested for long-term landfill management and evaluation of aftercare completion. In this paper, research on aftercare and its completion is analyzed and regulatory approaches for the completion of landfill aftercare are reviewed. Approaches to aftercare could be categorized as (i) target values, (ii) impact/risk assessment, and (iii) performance based. Comparison of these approaches illustrates that each has limitations and strengths. While target values are typically used as screening indicators to be complemented with site-specific assessments, impact/risk assessment approaches address the core issue about aftercare completion, but face large uncertainties and require a high level of expertise. A performance-based approach allows for the combination of target values and impact/risk assessments in a consistent evaluation framework with the aim of sequentially reducing aftercare intensity and, ultimately, leading to the completion of aftercare. At a regulatory level, simple qualitative criteria are typically used as the primary basis for defining completion of aftercare, most likely due to the complexity of developing rigorous evaluation methodologies. This paper argues that development of transparent and consistent regulatory procedures represents the basis for defining the desired state of a landfill at the end of aftercare and for reducing uncertainty about the intensity and duration of aftercare. In this context, recently presented technical guidelines and the ongoing debate with respect to their regulatory acceptance are a valuable step towards developing strategies for the cost-effective protection of HHE at closed MSW landfills. To assess the practicality of evaluation methodologies for aftercare, well-documented case studies including regulatory review and acceptance are needed.

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