

Waste Management Conceptual Approach -- Revised Table

Task 6, Step 2. Risk Factors

Potential Factors of Interest:

1. Siting/Climate
2. Landfill design, construction, and maintenance
3. Operational practice
4. Potential for migration/distance to sensitive receptors
5. Compliance record for releases/system upsets

Siting/Climate Factors

Factor	Potential Impact Magnitude/Probability	Controls/Mitigations	Quantitative Parameter(s)	Primary Resource Potentially Impacted/ Problem(s)
Seismic Characteristics	<ul style="list-style-type: none"> • Location within Seismic Impact Zone with high horizontal acceleration potential (high) • Moderate horizontal acceleration potential (medium) • Low horizontal acceleration potential (low) 	<ul style="list-style-type: none"> • Engineering design 	<ul style="list-style-type: none"> • Ground acceleration, safety factors • Seismic Zone maps 	<ul style="list-style-type: none"> • Slope Failure • Leachate Seeps • Surface water/Ground-water impact • LFG migration • Cap failure – vector control and uncontrolled emissions
Rainfall/ Evaporation/ Transpiration	<ul style="list-style-type: none"> • Ratio of Rainfall to ET > 1.2 (high) • Ratio of Rainfall to ET between 1.2 and 1.0 (medium) • Ratio of Rainfall to ET < 1.0 (low) 	<ul style="list-style-type: none"> • Engineering design 	<ul style="list-style-type: none"> • Average annual rainfall • Rainfall intensity • Evaporation and Transpiration Potential 	<ul style="list-style-type: none"> • Slope Failure • Leachate Seeps • Surface water Impact • LFG migration

Factor	Potential Impact Magnitude/Probability	Controls/Mitigations	Quantitative Parameter(s)	Primary Resource Potentially Impacted/ Problem(s)
Floodplain	<ul style="list-style-type: none"> • Location Within 100 year floodplain (high) • Location medium within 500 feet of 100 year floodplain (medium) • Location medium Not Within 1,000 feet of 100 year floodplain (low) 	<ul style="list-style-type: none"> • Engineering design • Flood control measures 	<ul style="list-style-type: none"> • Floodplain maps 	<ul style="list-style-type: none"> • Groundwater • Surface water
Fire (intrusion from off site)	<ul style="list-style-type: none"> • Adjacent Land Area with high fire hazard potential –(high) • Adjacent Land Area with moderate fire hazard potential (medium) • Adjacent Land Area with low fire hazard (low) 	<ul style="list-style-type: none"> • addition of buffer area • Increased Fire Protection at Facility 	<ul style="list-style-type: none"> • Distance to wooded areas • Buffer property 	<ul style="list-style-type: none"> • Runoff • Groundwater • Surface water

Potential Factors - Landfill design, construction, and maintenance

Factor	Potential Impact Magnitude/Probability	Controls/Mitigations	Quantitative Parameter(s)	Primary Resource Potentially Impacted/ Problem(s)
Engineering Controls	<ul style="list-style-type: none"> • Non-Subtitle D Equivalent Design (high) • Combination of Subtitle D equivalent and non-Subtitle D equivalent design (medium) • Subtitle D equivalent design (low) 	<ul style="list-style-type: none"> • Construction QA/QC • 3rd party Design Review • 	<ul style="list-style-type: none"> • Type/design of cover and bottom liner • Type/design of LFG control system • Factor of safety 	<ul style="list-style-type: none"> • Groundwater • Surface water • LFG migration • Slope Stability
Amount of Waste in Place	<ul style="list-style-type: none"> • Waste Area > 500 acres (high) • Waste Area between 200 and 500 acres (medium) • Waste Area < 200 acres (low) 	<ul style="list-style-type: none"> • Engineering design 	<ul style="list-style-type: none"> • Waste volumes 	<ul style="list-style-type: none"> • Groundwater • Surface water • LFG migration • Slope Stability • Air quality
Type of Waste in Place	<ul style="list-style-type: none"> • Pre-Subtitle D, co-disposal waste (high) • MSW (medium) • Monofill, C&D (low) • 	<ul style="list-style-type: none"> • Engineering design • Waste Screening Procedures 	<ul style="list-style-type: none"> • Permitted types of waste • Operational Protocol and Records 	<ul style="list-style-type: none"> • Groundwater • Surface water • LFG migration

Waste Fill Methods	<ul style="list-style-type: none"> • Canyon/Pit/Quarry (high) • Combination of Area and Other (medium) • Area (low) 	<ul style="list-style-type: none"> • Engineering design • Buffer Property 	<ul style="list-style-type: none"> • Permitted Waste Area • Location 	<ul style="list-style-type: none"> • Groundwater • Surface water
Slope Stability	<ul style="list-style-type: none"> • Side Slopes 2:1 or greater (high) • Side Slopes between 2:1 and 3:1 (medium) • Side Slope < 3:1 (low) 	<ul style="list-style-type: none"> • Decrease slope • Improve drainage • Improve landscaping 	<ul style="list-style-type: none"> • History of Slope Failures • Existing and Planned Side Slope Angles 	<ul style="list-style-type: none"> • Groundwater • Surface water • LFG migration • Slope Failure

Operational Practice

Liquids management/ landfill bioreactor technology	<ul style="list-style-type: none"> • Disposal of bulk or non-containerized liquid in facility without bioreactor permit (high) • Permitted Leachate Recirculation (medium) • Bioreactor permitted (low) 	<ul style="list-style-type: none"> • Engineering Design 	<ul style="list-style-type: none"> • Efficiency of Leachate Collection System • Efficiency of LFG Collection • Leachate Quality Trends 	<ul style="list-style-type: none"> • Groundwater • Surface water • LFG migration
--	--	--	---	---

Potential for Migration/Distance to Sensitive Receptors

Factor	Potential Impact Magnitude/Probability	Controls/Mitigations	Quantitative Parameter(s)	Primary Resource Potentially Impacted/ Problem(s)
Hydrogeology	<ul style="list-style-type: none"> • Depth to Groundwater (>30 feet –low; < 30feet – high) • Permeability of Vadose Zone (silt/clay/low K – low; sand only/higher K – high) • Groundwater Flow Velocity (<150 ft/year – low; >150 ft/year – high) 	<ul style="list-style-type: none"> • Engineering design 	<ul style="list-style-type: none"> • Depth to groundwater of uppermost aquifer • Vadose Zone permeability values • Groundwater permeability values • Distance to Water Wells 	<ul style="list-style-type: none"> • Groundwater • Surface water
Proximity to Urban Areas	<ul style="list-style-type: none"> • No Buffer Property between Waste boundary and Urban Area (high) • At least 500 feet of Buffer Property (medium) • Greater Than 500 feet of Buffer Property (low) 	<ul style="list-style-type: none"> • Engineering design • Buffer Property • Land use consistent with facility care 	<ul style="list-style-type: none"> • Property Maps • Development Plans 	<ul style="list-style-type: none"> • Groundwater • Surface water • LFG migration • Landslides • Air quality • Odors
Proximity to Sensitive Habitat	<ul style="list-style-type: none"> • Unmanaged Habitat Within 500 feet of Waste Boundary (high) • Unmanaged Habitat Over 500 of Waste Boundary (medium) • Formally Managed Habitat (low) 	<ul style="list-style-type: none"> • Engineering design • Operations Management • Formally managed habitat 	<ul style="list-style-type: none"> • Management Practice of Habitat • Distance from LF 	<ul style="list-style-type: none"> • Biota

Compliance Record for Release/System Upsets

Factor	<ul style="list-style-type: none"> • Potential Impact Magnitude/Probability 	<ul style="list-style-type: none"> • Controls/Mitigations 	<ul style="list-style-type: none"> • Quantitative Parameter(s) 	<ul style="list-style-type: none"> • Primary Resource Potentially Impacted/ Problem(s)
Compliance Status	<ul style="list-style-type: none"> • Unpermitted release to surface water or groundwater (high) • Repeat Offenders of Environmental-Related Violations (medium) • Non-repeat Offenders of Environmental-Related Violations (low) 	<ul style="list-style-type: none"> • Engineering design • Operations Management 	<ul style="list-style-type: none"> • Correspondence from Regulatory Agency • Monitoring Data 	<ul style="list-style-type: none"> • Groundwater • Surface water • LFG migration • Slope Failure
Corrective Action Status	<p>Frequency/Severity</p> <ul style="list-style-type: none"> • Currently in active CA, cleanup or abatement orders (high) • CA complete other than confirmation monitoring or equivalent (medium) • CA complete including any confirmation monitoring associated with CA (low) 	<ul style="list-style-type: none"> • Engineering Design • Buffer Property 	<ul style="list-style-type: none"> • Correspondence from Regulatory Agency • Monitoring Data 	<ul style="list-style-type: none"> • Groundwater • Surface water • LFG migration