
Procedural and Technical Considerations for the Unstable Areas Location Restriction Demonstration

THIS POLICY DOES NOT HAVE THE FORCE OF LAW

APPLICABLE RULES

MSW: OAC 3745-27-20(C)(5)
OAC 3745-27-06(C)(6)

ISW: NA

RSW: NA

Tires: NA

Cross References:

DSIWM Guidance 0138, Location Restriction Demonstrations - Implementation Instructions
Ohio EPA's policy #0660 "Geotechnical and Stability Analyses for Ohio Waste Containment Facilities"

PURPOSE

This document outlines technical and procedural considerations for the unstable area location restriction demonstration (LRD) required by Ohio Administrative Code (OAC) 3745-27-20(C)(5) and 3745-27-06(C)(6) [see also OAC 3745-27-20(A)(3)(e), 3745-27-06(C)(1), and 3745-27-20(B)(1)(c)].

APPLICABILITY

This guidance document applies to applicants proposing a new municipal solid waste (MSW) unit after June 1, 1994.

LRDs for any existing units and new units in authorized fill areas designated as of June 1, 1994, should have already been completed and placed in the operating record.

BACKGROUND

OAC 3745-27-20(C)(5) states, "The sanitary landfill facility is not located in an unstable area

as that term is defined in rule 3745-27-01 of the Administrative Code, unless the owner or operator demonstrates that engineering measures have been incorporated into the design of the sanitary landfill facility to ensure that the integrity of the structural components will not be disrupted; except, that for an area of potential subsidence resulting from underground mining, the demonstration must show that the voids are filled or removed if the sanitary landfill facility is located above an underground mine or within the angle of draw of an underground mine. The following factors shall be considered when determining whether an area is unstable:

- (a) On-site or local soil type and hydraulic conditions;
- (b) On-site or local geologic or geomorphologic features;
- (c) On-site or local human-made features (both surface and subsurface); and
- (d) On-site or local events (both surface and subsurface)."

OAC 3745-27-01(U)(2) states "'Unstable area' means a location that is susceptible to natural or human induced events or forces capable of impairing the integrity of some or all of the structural components of a landfill that are responsible for preventing releases from the landfill and can include areas where on-site or local soil conditions result in significant differential settling; areas where the downslope movement of soil or rock due to gravitational influence occurs; or areas where the lowering or collapse of the land surface occurs either locally or over broad regional areas."

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Examples of unstable areas are foundation materials susceptible to settlement or liquefaction, areas susceptible to mass movements such as landslides, subsurface voids due to mining or karst features, and stream banks and coastal areas susceptible to erosion.

A “structural component” is an engineered component (listed in OAC 3745-27-08(B)) of a structural nature. The engineered components which are not considered structural components are survey marks and access roads.

PROCEDURE

LRDs for existing units and new units in authorized areas should have already been completed, therefore this document will address how to proceed with the unstable area LRD as part of a permit-to-install application for a new unit proposed after June 1, 1994. DSIWM recommends using the following procedure to satisfy the LRD rule requirements. The procedure is presented in two parts. In the first part of the LRD, the applicant determines whether or not an area is unstable. If unstable conditions exist, then the applicant performs the second part of the LRD. The second part identifies and justifies the engineering measures incorporated into the design of the MSW landfill to ensure the integrity of the structural components of the proposed new unit(s).

Part 1: Determining Existence of Unstable Areas

The site investigation required by OAC 3745-27-06(C)(3) and the stability analysis required by OAC 3745-27-06(C)(4) are likely to provide most, if not all, of the information necessary to determine whether or not an area is unstable. Rather than repeating the site investigation results and stability analyses, the unstable area LRD required by OAC 3745-27-06(C)(6) can summarize the necessary information, and reference the appropriate parts of the permit-to-install application for more detail. The LRD must represent the conditions at the time the permit-to-install application is submitted for review. DSIWM recommends that the first part of the

LRD address the following:

Foundations and Slopes:

- a. Assess the susceptibility of the foundation and slopes. See Ohio EPA’s policy “Geotechnical and Stability Analyses for Ohio Waste Containment Facilities” for recommendations on how to assess the site for the following:
 - S liquefaction
 - S excessive or differential settlement
 - S slope failure
- b. Identify any slopes susceptible to mass movement of earth material (e.g. landslides, debris slides and flows, block sliding, and rock falls) at or beneath or adjacent to the unit.
- c. Assess the impact of natural and human induced activities (cutting and filling, draw down of ground water, weathering, heavy rain, seismic activity, blasting etc.).

Karst Terrain:

- a. Identify the bedrock formation and its depth. Near surface Silurian carbonates, such as the Columbus Limestone, Delaware Limestone, Peebles Dolomite, and Brassfield, are susceptible to the formation of karst features.
- b. Review surface maps, such as USGS topographic maps, for karst features. Be aware that mapping of karst features on USGS topographic maps is not complete. For example, approximately 10% of the sinkholes are mapped and some of these depressions may be kettles. Ohio Department of Natural Resources (ODNR), Division of Natural Areas and Preserves should also be contacted for information about caves.
- c. If karst features (e.g. sinkholes, solution cavities, sinking streams, caves, large springs, and blind valleys) are suspected or are known to be present, then an in-depth,

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site investigation is recommended. The subsurface can be characterized by using one or more geophysical techniques (such as electromagnetic conductivity, seismic refraction, ground penetrating radar, and electrical resistivity), and corroborated, if appropriate, by subsurface drilling.

Underground Mining:

- a. Review mining maps or additional information from the ODNR, Division of Mineral Resources Management, or other appropriate agencies.
- b. The letter from ODNR verifying type, mining method, location, depth and status, required by OAC 3745-27-06(C)(3)(c)(i) can be referenced.
- c. If maps or other information indicate that underground mines are located in proximity to the limits of solid waste placement, then an in-depth, site investigation is recommended. Drilling in search of voids should not be conducted on a grid system as pillars remaining after mining operations may be encountered each time instead of the mine void.

Coastal and River Erosion:

The owner or operator must investigate the following for areas within 1000 feet of the limits of solid waste placement:

- a. Review coastal erosion maps available through ODNR, Ohio Office of Coastal Management. Some coastal areas along Lake Erie have erosion rates of up to ten feet per year.

- b. Identify streams and rivers that exhibit erosion of their banks toward the unit(s).

Part 2: Engineering Measures

If it has been determined that a proposed new unit exists in an unstable area, the applicant must demonstrate in the second part of the LRD that engineering measures are incorporated into the unit's design or construction that ensure the integrity of the structural components [3745-27-20(C)(5)]. Examples of engineering measures are surface water control structures, grouting of voids, building retaining walls, adding reinforcement (geogrids) or selecting an engineered component material with protective or reinforcing attributes. The owner or operator is obligated to enact the engineering measures (see also DSIWM Guidance #0138, Location Restriction Demonstrations - Implementation Instructions).

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