

GSI W-9 Webinar Entitled:

“Behavior and Analysis of Twenty Solid Waste Landfill Failures”

Webinar Overview

In comparison to the number of worldwide solid waste landfills that exist, the incidence of landfill failures is extremely small. Nevertheless, when they do fail the mass of waste involved has been enormous. Six of the twenty failures described in this webinar involved over 1,000,000 m³ of waste and three involved deaths. The analysis of each failure using the computer program ReSSA (3.0) identified the most sensitive unknown variable, while individual project reports identified the “triggering mechanism” which brought the already low FS-value into a failure state. Some of the salient findings are as follows:

1. 7 of 11 unlined cases were rotational failures
2. 8 of 9 lined cases were translational failures
3. Service lifetimes were from 1 week to decades
4. Duration of failures was from 1 min. to a few hours
5. Average height of waste mass was 26 m
6. Height-to-length of failed waste was approximately 0.42
7. Average density of waste was 12.1 kN/m³
8. Average waste shear strength was 26° and 13 kPa
9. Geomembrane shear strength varied from 5.1 to 16.2° (none were textured)
10. Waste and/or liner shear strength was generally the greatest uncertainty
11. Liquids were involved in all 20 cases; i.e., in the waste, liner system or foundation soil and it was invariably the “trigger” causing failure

This webinar should convince all involved and interested in landfill technology of the serious implications of failure and of the necessity for proper design, construction, waste filling, cover and maintenance practices. It is important to note that the unlined landfill failures were in the 1973 to 2008 time frame, whereas the lined failures were in the 1987-2002 time frame. The few recent failures in both categories are not included due to insurance and/or litigation concerns.

Learning Objectives

Participants will become familiar with the methods and idiosyncrasies of solid waste landfill failures. Different trajectories of failures (rotational or translational) will be identified and described where they occurred. The computer analyses will clearly show the importance of having accurate shear strengths; both of the solid waste and liner system. The negative implications of liquids in the waste, liner, or foundation will be highlighted. This is the case with most geotechnical and geoenvironmental problems and is clearly substantiated herein.

Webinar Benefits

1. Understand the idiosyncrasies of solid waste failures
2. Learn about the circumstances leading to the failures
3. Learn the significance of representative shear strengths to the FS-values
4. Learn about the negative impacts of liquids to the FS-values
5. Understand the negative implications that such failures have on the credibility of landfilling practice and everyone involved in it

Intended Audiences

Public and private owners/operators of landfills, heap leach mining operations, combustion coal residuals and related solid waste facilities; consultants and designers in the private sector; regulators and agency personnel at the federal, state and local levels; geosynthetic manufacturers and their representatives; geotechnical and geosynthetic testing organization personnel; contractors and installers of liner and cover systems; academic and research groups; and others desiring technically related information on this important aspect of our constructed infrastructure.

Specific Topics Covered

- 1.0 Background of Webinar
- 2.0 Overview of Analysis Method
- 3.0 Unlined (or Soil Lined) Cases
- 4.0 Geosynthetic Lined Cases
- 5.0 Summary and Conclusions
- 6.0 Recommendations

Webinar Instructor

Dr. George R. Koerner is the current director of the Geosynthetic Institute, a position that he has held since 2014. George's interest in geosynthetics spans his entire professional life from undergraduate work in the 1980's to the present. He holds his PH.D. in Civil, Architectural and Environmental Engineering from Drexel University in Philadelphia. George's master thesis was on direct shear testing of geosynthetic interfaces and his doctoral dissertation was on landfill leachate clogging of soil and geosynthetic filters. Both are regularly cited to this day.

Dr. George Koerner is a Professional Engineer in both Pennsylvania and New Jersey, and is an ASQC Quality Auditor. During his 30-years of geosynthetic activities, Dr. Koerner's output has been tremendous and he has to his credit the following publications:

- Books Edited or Co-Edited – 15
- Journal Papers – 18
- Symposium and Conference Publications – 40
- Book Chapters and Published Reports – 4
- Miscellaneous Articles – 30

The Geosynthetic Institute is a nonprofit research and development organization dedicated to the proper use of geosynthetics in its myriad applications. As director of the Geosynthetic Institute, Dr. George Koerner is also in charge of the laboratory accreditation and inspection certification programs.