

Suggested Practice in USA for Geomembrane Wrinkles in Bottom Liners for Waste and Mine Stacks

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ABSTRACT: When observing bottom liner construction in waste or mine repositories, one question typically facing CQA personnel in the field is “How big, and how many, wrinkles in the geomembrane are allowable at the time of covering?” In the USA, and many other countries and locations around the world, the answer given in the specification is either not clear, or clearly not enforceable. Consider, for example, the following statements from the document: “Waste Containment Facilities Guidance for Construction, Quality Assurance and Quality Control of Liner and Cover Systems (Second Edition)” (2007) by Koerner and Daniel as published by the ASCE Press:

- Underlying geosynthetic materials should have all folds, wrinkles, and other undulations removed before placement of the overlying geomembrane.
- The geomembrane must be flat when it is backfilled.

By virtue of the state-of-the-practice in North America, and more of the rest of the world except perhaps for Germany, these statements are virtually ignored. When such statements are included in the specifications, they in fact disempower the role and authority of the CQA Organization because they are statements that are clearly not followed, which makes enforcing other provisions of the contract more difficult.

Perhaps other vague statements are used, such as “Avoid excessive wrinkles and compensate for stress bridging...Excessive wrinkles and stress bridging will be removed and repaired...” What does that mean?

For the past 15 years the author has been quantifying the “allowable wrinkle height” at which point covering operations over the geomembrane must be stopped. This height is in the range of 50-75 mm. Having a specific non-zero value in the specifications became a practical enforceable measure, and very commonly shut down covering operations between the hours of 9:30 a.m. and 6 p.m., depending on the actual weather conditions. In the end, controlling wrinkles in geomembranes is all about adjusting the work to suit the ambient temperatures for any given time of day.

The original basis of the 50-75 mm allowable wrinkle height was based on observation and judgement, but little else. Recent field and laboratory studies performed under the leadership of Dr. Kerry Rowe of Queen’s University in Canada have now corroborated the author’s initial judgment by providing quantifiable benefits for allowing the onset of a maximum wrinkle height of 50-75 mm at the time of covering. The studies cover two specific areas: maximum interconnected wrinkle length and GCL overlaps. The criteria addressed by these two issues is controlling advective leakage rates.