Texas Commission on Environmental Quality
Municipal Solid Waste Facility
Geomembrane/Geosynthetic Liner
Evaluation Report

*****Read These Instructions Before Completing This Form******

This form is to be completed by a knowledgeable professional engineer experienced in geotechnical engineering and is experienced in geosynthetic clay liner testing, the interpretation of these test results, and the proper methods of constructing impermeable geomembrane/geosynthetic clay liners that meet the requirements of the Texas Commission on Environmental Quality (TCEQ) rules.

The certifying engineer or a member of his or her staff qualified by training and experience shall monitor liner construction, but the final evaluation must be made by the aforementioned engineer.

The purpose of the geomembrane/geosynthetic clay liner evaluation report is to assure that groundwater, as defined in the TCEQ rules, is protected from contamination resulting from the storage, processing, and disposal of municipal solid waste. This liner evaluation report is required to document that the liner was constructed as designed in accordance with the issued registration or permit and meets the TCEQ regulatory requirements prior to unit operation.

This report is to be supplemented with those quality-assurance/quality-control (QA/QC) tests as detailed in the liner quality control plan (LQCP) and shall be the basis of documentation of the quality control and acceptance of the constructed liner.

The term "GCL" as used in this report form refers to geosynthetic clay liner. The term "GCLER" refers to geosynthetic clay liner evaluation report and is synonymous with the term "SLER" as described in the TCEQ rules when GCL is used to replace or supplement a soil liner as part of an alternative liner design.

Attach additional sheets as needed, and on each sheet identify the appropriate Part and Paragraph number for each reference.

If the geosynthetic clay liner is to be covered by a geomembrane, complete Part F and G of this form with the geomembrane liner evaluation report.

Provide an interim status report within six (6) months completion of the protective cover as stated in Part E.3 and each 6 months thereafter until the entire liner system is covered by municipal solid waste. This report should be developed by a qualified independent consultant and submitted to the TCEQ. No formal report form exists for this purpose. The integrity and required thickness of the protective cover must be verified. If erosion of the protective cover has occurred, then it must be replaced and reported as such and verified by the consultant that it meets the thickness requirement. If repairs are necessary on the synthetic liner, then these repairs must be completed in accordance with the approved LQCP and reported to the TCEQ in a supplemental liner evaluation report.

Important: Three **signed, sealed, and dated copies** of this form which includes one original copy and all attachments (drawings, comments, etc.) must be provided to the TCEQ.

(Submit this Report to the TCEQ in Triplicate)

Texas Commission on Environmental Quality
Municipal Solid Waste Facility
Geomembrane/Geosynthetic Liner
Evaluation Report

Part A: Facility Identification

Permittee: _____

Permit No.: _____ Operational Classification Type: _____

County: _____

Part B: General Information

1. What type of liner system is required by the permit and is detailed in the site development plan (SDP)? _____
2. Is this the first liner element of a composite liner system? _____
3. Does the SDP require a leachate collection system (LCS) for this liner system? _____
4. Date of the current approved LQCP that was used to develop this GLER/GCLER? _____
   a. Was this plan followed? _____
   b. If not followed, why not? _____

Part C: Locations and/or Description of Areas Currently Being Evaluated

1. Attach to this report a copy of the latest approved sectorized fill layout plan showing the areas or sectors of the landfill or waste management unit currently under evaluation and noting areas previously filled. The required grid system must be shown on this drawing.
2. On a sketch(es) or drawing(s) of the area or areas under evaluation, indicate the following:
   a. Boundary lines distinguishing the bottom and sidewall areas of the trenches or fill areas being evaluated and SLER/GCLER/GLER boundary markers.
   b. Geomembrane/GCL panel layout with number designation and location of all repairs.
   c. As-built elevations of subgrade or liner.
3. Are boundary markers in place at the time of this submittal (see rules in title 30 Texas Administrative Code, Chapter 330, Section 330.143.)? _____
4. Present evaluation location and area of coverage:
   a. Trench, sector, or area identification or number (include SLER/GCLER/GLER boundary coordinates) of this evaluation: _____

b. Excavation depth _____ft.; Actual elevation of trench at: top _____ ft.; bottom _____ ft.; Width of excavation at: top _____ ft.; bottom _____ ft.; and ration of side slopes _____ H: _____V.

c. total square footage of liner construction for the floor _____ ft.^{2} and for each individual side slope: (1) _____ft.^{2}; (2) _____ ft.^{2}; (3) _____ ft.^{2}; (4) _____ ft.^{2} (if evaluated area has more than four sides, list all others)
_____

Part D: Liner Materials

1. Geomembrane Liner

   a. Indicate type of geomembrane used on floor and sidewalls _____

   b. Indicate geomembrane roll dimensions _____

   c. Does the geomembrane material meet the specifications and the requirements given in the SDP and the LQCP? _____. If not, please explain _____ Attach roll delivery documentation, manufacturer's certification, and conformance testing results. Provide information on a geosynthetics inventory table 6 if not provided elsewhere.

2. Geosynthetic Clay Liner

   a. Indicate type of GCL used on floor and sidewalls:

   _____Needle-punched geotextile-encased GCL placed with nonwoven side up and woven side down.

   _____Needle-punched geotextile-encased GCL placed with woven side up and non-woven side down.

   _____Needle-punched GCL with nonwoven geotextile on both sides.

   _____Adhesive-bonded GCL with woven geotextile on both sides.

   _____Stitch-bonded GCL with woven geotextile on both sides.

   _____Geomembrane-backed adhesive bonded GCL placed with geomembrane side down.

   _____Geomembrane-backed adhesive-bonded GCL placed with geomembrane side up.

   _____Other (describe) _____

   b. GCL roll dimensions _____

   c. Does the GCL material meet the specifications and the requirements given in the SDP and LQCP? _____. If not, please explain _____

   Attach roll delivery documentation and manufacturer's certification and test results. Provide information on geosynthetics inventory form (attached) if not provided elsewhere.

Part E: Installation of the Geomembrane/Geosynthetic Clay Liner

Describe concisely on attached sheets the field and laboratory activities performed by the certifying engineer and/or the engineer's staff to accomplish this evaluation. Please indicate the method used to determine testing locations, testing procedures, testing locations and repairs, and field and laboratory methods that were followed.

1. Dates geomembrane/geosynthetic clay liner was installed. _____
2. Dates the engineer visited the site. _____
3. Dates the protective cover was installed. _____
4. Name(s) of the engineer's technician and dates on site. _____

_____

5. Submit subgrade acceptance certificates.
6. Were all the QA/QC tests and the rate of testing preformed in conformance with the current LQCP? _____. If not, please explain. _____
7. Attach any independent laboratory conformance test results for geomembrane liner or GCL if performed. These data must include copies of all laboratory permeability test data sheets. Also, include any miscellaneous tests such as any required field density tests on subgrade.
8. Submit geomembrane/geosynthetic clay liner panel development summary and geomembrane seam summary.
9. Geomembrane installation.
    a. Types of field seaming used? _____
    b. Start-Up Testing

        Were peel and shear test seams made by each seamer each day at the start-up of each seaming period and after the mid-day break, for each seaming apparatus he or she used that day? _____. Did each seamer make at least one test seam each day he or she performed seaming? _____. Submit applicable geomembrane fusion trial seam summary and geomembrane extrusion trial seam summary tables.

    c. Non-Destructive Testing

        1. Was continuous, non-destructive testing performed on all seams? __
        2. Type of non-destructive testing: vacuum box _____, air pressure _____, other (please explain) _____
        3. Submit air pressure test summary table and other non-destructive test documentation on the applicable geomembrane seam summary and geomembrane repair summary table.

    d. Destructive Testing (if performed)

        1. Number of locations where destructive tests were performed. _____ Total length of seaming _____ feet. Attach destructive tests results.

2. Minimum number of peel tests required to be performed by quality control laboratory. _____. Number actually performed? _____ (Dual track welds must be tested independently).

3. Minimum number of shear tests required to be performed by quality control laboratory. _____. Number actually performed? _____

4. Where are samples from each destructive testing archived? _____

5. Submit destructive test summary table and laboratory destructive test data.

e. Repairs

Were all seams which failed destructive or non-destructive testing and other areas requiring repairs repaired in accordance with the LQCP? _____

Submit geomembrane repair summary table.

10. Geosynthetic Clay Liner Installation

a. How much overlap was provided at the edges of the GCL panels? _____. Was granular bentonite placed in the overlaps? _____ If so, please describe the placement procedure, the rate of bentonite placement, and the procedure used to verify the amount of bentonite placed. _____

b. Were the GCL panels placed by unrolling or by dragging the rolls across the subgrade? _____

c. Did any GCL hydrate prematurely prior to covering with geomembrane or protective cover? _____. If so, were the hydrated areas removed and replaced? _____. If not, please explain. _____

_____

d. How was the GCL tied into existing liner from any adjacent lined areas (attach sketch showing tie-in if necessary)? _____

_____

Part F: Leachate Collection System/Protective Cover

1. Gradient of bottom of evaluated area. _____.

2. Gradient of leachate collection lines. _____.

3. What method of placement was used for the LCS and/or protective cover over the geomembrane liner/GCL? _____

_____

_____

4. Was the liner system (including LCS/protective cover placement) completed prior to the engineer's final field visit? _____.

5. Do protective cover soil and leachate collection system materials (trench backfill; leachate collection layer soil; drainage, filter or cushion geosynthetics; collector pipes) meet the required specifications? _____.

6. Attach result of any required permeability, grain size, and calcium carbonate content tests on soil drainage and protective cover materials by suppliers and independent laboratory. For geosynthetic materials; attach roll delivery documentation, suppliers' certifications and test results, and results of any conformance tests required by the LQCP.

7. Attach survey documentation from a registered surveyor for thickness verification of LCS and protective cover. Also attach a sketch showing the liner/LCS/protective cover cross-section.

Part G: Ballast

Does this liner system require any ballast to overcome hydrostatic pressure? _____.

Include a demonstration of stability during construction (or post-construction BER if desired) with this GLER/GCLER. This documentation must include: (1) the seasonal high water table and how it was derived (a table showing the groundwater elevations from monitor wells or piezometers is sufficient); (2) the depth of the excavation (Part C.2.c above); and (3) a narrative explaining why ballasting is required with respect to the depth of excavation and the seasonal high water table elevation.

Part H: Signature of the Professional of Record

I certify that the liner has been constructed as designed in accordance with the issued permit and in general compliance with the regulations.

Affix Professional Engineer's Seal (Date & Sign)

[seal]

_____
(typed or printed name)

_____
(phone number)

_____
(date signed)

_____
(fax number)

_____
(company or business name)

_____
(address, city, zip code)

Note: A professional engineer must be registered in Texas.

Part I: Signature of Permittee

I have read and fully understand the findings of this GLER/GCLER submittal.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____
(signature)

_____
(typed or printed name)

_____
(title)

_____
(date signed)

_____
(phone number)

_____
(fax number

_____
(company or business name)

_____
(*address, city, state, zip code*)