

# Liners for Domestic and Industrial Wastewater Impoundments (Ponds)—Frequently-Asked Questions (FAQs)

This document provides information for certifying the liners for municipal and industrial wastewater holding ponds. The liner requirements for Concentrated Animal Feeding Operations (CAFOs) are contained in 30 TAC 321, Subchapter B and are not discussed in these FAQs.

## NEW POND CONSTRUCTION

### **1) What TCEQ rules or guidelines apply to my wastewater pond?**

- a) For municipal or domestic wastewater ponds (e.g., ponds that hold wastewater produced by cities and other residentially developed areas): Applicable rules include Title 30 of Texas Administrative Code (30 TAC), Chapters 217.203 Design Criteria for Natural Treatment Facilities, 309.13(d) Unsuitable Site Characteristics and 210.23 Storage Requirements for Reclaimed Water (reclaimed water only).
- b) For industrial wastewater ponds: There are no specific TCEQ rules for industrial wastewater ponds except for those activities covered by 30 TAC Chapter 321 (also known as Permit by Rule). However, requirements for new ponds are developed using rules specified in 30 TAC 217.203 and 309.13(d) as regulatory guidance. Also, information provided under Item 3 (Titled “Impoundments”) of Technical Report 1.0 from the form “Completing the Industrial Wastewater Permit Application” (Form TCEQ-10411/10055-Instructions) may be used as guidance. Additionally, rules and guidance provided in other program areas may be considered, such as 30 TAC Chapter 218—Brine Evaporation Pits and Solid Waste Technical Guidance Document #4 for Non-Hazardous Industrial Solid Waste Surface Impoundments.<sup>1</sup>

As specified in 30 TAC 217.203(c)(3), a variance may be granted to the liner requirements prior to pond construction. If a variance is proposed, sufficient information must be provided to demonstrate that the alternate liner will adequately protect waters in the state (including groundwater). Considering the diversity of wastewaters generated from industrial operations, rules and guidelines provided in other program areas of the TCEQ and standard industry practices may be considered for evaluation of alternate liners. All liner systems must be certified by a Texas licensed professional engineer (P.E.) who supervised construction, after completion of their construction. Should you need to seek a variance, contact the Water Quality Division (512) 239-4671 for more information.

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<sup>1</sup> [http://www.tceq.state.tx.us/permitting/waste\\_permits/ihw\\_permits/tech\\_guidance\\_index.html](http://www.tceq.state.tx.us/permitting/waste_permits/ihw_permits/tech_guidance_index.html)

For ponds that contain reclaimed water, rules under 30 TAC 210.23 apply. A facility must have a 210 authorization from TCEQ to qualify under these rules.

- c) **For storm water ponds:** There are no regulations specific to storm water ponds (except for those regulated over the Edwards Aquifer). Regulated storm water discharges are typically permitted under the Texas Pollutant Discharge Elimination System (TPDES) program. TCEQ does not generally require that storm water ponds have a liner, because the potential discharge of storm water to groundwater is not regulated under the TPDES program. However, in certain cases, an individual TPDES permit may be required for storm water to ensure that the storm water does not cause or contribute to contamination of groundwater. If a liner is required in these cases, it would be addressed using the procedures above described for industrial wastewater ponds.

Stormwater ponds located on the Edwards Aquifer regulatory zones have requirements contained in 30 TAC Chapter 213 and TCEQ regulatory guidance RG 348 “Complying with the Edwards Aquifer Rules—Technical Guidance on Best Management Practices” (see especially Chapter 3)<sup>2</sup>. For more information on Edwards Aquifer requirements, call the TCEQ Austin Region at (512) 339-3939 or the San Antonio Region at (210) 490-3096.

- d) **For all wastewater ponds:** the Texas licensed P.E. certifying the liner must use standard professional engineering practices to ensure that the ponds are constructed in a manner that is protective of human health, groundwater and the environment.

**2) How many core samples are required to demonstrate a pond liner meets the permeability, percent passing the 200 mesh sieve, plasticity index and liquid limit requirements?**

- a) For ponds using unmodified in-situ soils or placed liners, 30 TAC 217.203(d)(1)(A) requires a minimum of one core sample for every 0.25 acres of bottom area for each pond. Additionally, the Texas licensed P.E. should obtain one core sample per each 0.25-acre sidewall area, in order to demonstrate the sidewall also meets TCEQ permeability requirements. The certifying Texas licensed P.E. may need to take more samples if there are different soil types present. The certifying Texas licensed P.E. should collect as many samples as necessary to ensure that the pond is representatively sampled, which includes representative samples of each lift.
- b) For ponds using amended in-situ soils, 30 TAC 217.203(d)(3)(C) requires a minimum of three representative samples from each 6,700 cubic feet of amended soil. Each of these samples must be analyzed for the percent passing a 200 mesh sieve, the liquid limit and the plasticity index prior to placing the soils in lifts to

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<sup>2</sup> [http://www.tceq.state.tx.us/comm\\_exec/forms\\_pubs/pubs/rg/rg-348/rg-348.html](http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/rg/rg-348/rg-348.html)

ensure a good blend is achieved and the soils will be appropriate for use as a soil liner. After placement and compaction, each 0.25-bottom acre of the liner must have one field permeability test and one core sample collected for a laboratory permeability test. Additionally, the Texas licensed P.E. should obtain one core sample per each 0.25-acre of sidewall area for a laboratory permeability test. Each permeability test must verify that the coefficient of permeability is equal to or less than  $1 \times 10^{-7}$  centimeter (cm)/ second (s) as specified in the rules. The certifying Texas licensed P.E. should collect as many samples as necessary to ensure that the pond is representatively sampled, which includes representative samples of each lift.

- c) The executive director may grant a variance to the liner requirements of 30 TAC Chapter 217 in accordance with 217.203(c)(3). All variances must be requested in writing prior to pond construction, and must include an assessment of how the variance will be equivalently protective of public health, groundwater quality and other waters in the state. Should you need to seek a variance, contact the Water Quality Division (512) 239-4671 for more information.

**3) Can I take a core sample and remold it to run the permeability test?**

- a) No. Use a sampling method (such as ASTM D 1587) to obtain an undisturbed core sample for permeability tests. An undisturbed sample is more representative of the permeability of the pond liner.

**4) Can I run several independent core sample analyses and take an average of the results to get an average permeability, percent passing the 200 mesh sieve, plasticity index and liquid limit for the pond?**

- a) No. Each core sample must be analyzed separately for the coefficient of permeability, percent passing the 200 mesh sieve, plasticity index and liquid limit, and the results must be reported separately for each core.

**5) Can more than one sample for geotechnical testing be combined into a single sample (as opposed to being analyzed as independent samples)? For example, can I take four samples and mix them together to get one composite sample for the pond?**

- a) No. Each core sample must be analyzed separately for the coefficient of permeability, percent passing the 200 mesh sieve, plasticity index and liquid limit. The results must be reported separately for each core.

**6) Is it necessary to meet the TCEQ permeability requirements for each discrete sample collected?**

- a) Yes. Per 30 TAC 217.203(c)(1), the permeability requirement is a minimum standard and all samples must meet the minimum requirement of equal to or less than  $1 \times 10^{-7}$  cm/s.

**7) Do all of my samples have to meet the TCEQ requirements for percent passing a 200 mesh sieve, the liquid limit and plasticity index value for the soil that will serve as the liner?**

- a) Yes. These requirements are intended to give a starting point to identify soil material that can be compacted to achieve the required minimum coefficient of permeability of  $1 \times 10^{-7}$  cm/s. If the soils do not meet the TCEQ requirements for percent passing a 200 mesh sieve, the liquid limit and plasticity index, but you have determined that the soils will meet the thickness and permeability requirements of the rules, then you can submit a variance prior to pond construction. The variance request for these requirements and the supporting information should be submitted to the Water Quality Division for consideration in accordance with 30 TAC 217.203(c)(3).

**8) How do I backfill where I took my core samples?**

- a) The Texas licensed P.E. must:
  - i) Ensure that the integrity of the liner is restored to the original or to an improved condition using material that meets the liner requirements (i.e., the permeability, percent passing a 200 mesh sieve, plasticity index and liquid limit); and
  - ii) Ensure that plugging does not cause preferential vertical migration pathways such as cracks.
- b) The Texas licensed P.E. may refer to the following guidance document: EPA Technical Guidance Document EPA 600/R-93/182--Quality Assurance and Quality Control for Waste Containment Facilities (In particular, see section 2.8.5- Repair of Holes from Sampling and Testing-on page 85).

**9) Are there any requirements for a synthetic membrane liner?**

- a) Yes. Title 30 TAC 217.203(d)(4) requires a minimum liner thickness of 40 mils and the installation of an underdrain with a leachate detection and collection system. Also, the liner must be able to withstand constant sunlight without degradation. The manufacturer of the membrane liner will recommend specific procedures for the pre-installation work, installation process and testing methods that should be followed.

**10) What documentation do I need to provide for a synthetic membrane liner?**

- a) The liner system must be certified by a Texas licensed P.E. who supervised the construction and must include a statement that the pond liner meets the engineering design and TCEQ requirements. Additionally, please submit, at a minimum, the following information: the type and thickness of liner material used; manufacturer's specifications of the ability of the material to withstand UV degradation; how the subgrade was prepared prior to installation of the liner; a description of the leachate detection and collection system; engineering drawings of the pond showing the leachate detection and collection system, bottom, sidewalls and subgrade; the date(s) the certifying engineer did a site visit of the installation; and a brief discussion of how the manufacturer's recommendations for installation and field testing of the seams were followed.

**11) What documentation do I need to provide for an in-situ liner?**

- a) The liner system must be certified by a Texas licensed P.E. who supervised the construction and must include a statement that the pond liner meets the engineering design and TCEQ requirements. Additionally, please submit, at a minimum, the following information: engineering drawings of the pond showing the bottom and sidewalls with the location of the soil borings and core samples collected; the date(s) the certifying engineer conducted a site visit of the installation; the total surface area of the bottom and each sidewall slope of the liner; liner thickness; the soil classification(s) of the in-situ material; methods to disrupt any pre-existing preferential flow paths in the soils (e.g., roots, burrows, cracks, etc); and laboratory tests showing the percent passing a 200 mesh sieve, the liquid limit, plasticity index, and hydraulic conductivity of the core samples. If the soils have a perched or apparent shallow water table reported by the Natural Resources Conservation Service (NRCS) soil survey, or site specific observations suggest a shallow groundwater table may be present you will need to provide additional information. You can either provide site specific information demonstrating the water table does not exist, or describe installed engineering controls that will protect the liner from hydrostatic uplift and prevent co-mingling of the wastewater and fresh water.

**12) What documentation do I need to provide for a placed clay liner?**

- a) The liner system must be certified by a Texas licensed P.E. and must include a statement that the pond liner meets the engineering design and TCEQ requirements. Additionally, please submit, at a minimum, the following information: engineering drawings of the pond showing the bottom and sidewalls with the location of the soil borings and core samples collected; the date(s) the certifying engineer conducted a site visit of the installation; the total surface area

of the bottom and each sidewall slope of the liner; how the subgrade was prepared prior to liner installation; liner thickness; laboratory tests showing the percent passing a 200 mesh sieve, the liquid limit, plasticity index; field tests of the lifts showing that the compaction was achieved; and laboratory tests of hydraulic conductivity of the core samples from each lift taken post construction. If the adjacent soils have a perched or apparent shallow water table reported by the NRCS, or site specific observations suggest a shallow groundwater table may be present, you will need to provide additional information. You can either provide site specific information demonstrating the water table does not exist, or describe installed engineering controls that will protect the liner from hydrostatic uplift and prevent co-mingling of the wastewater and fresh water.

**13) What do I do if my pond liner does not meet the TCEQ requirements?**

- a) One option is to remove the pond from service, perform corrective action and have a Texas licensed P.E. re-certify the pond liner. Possible corrective actions should be evaluated with a Texas licensed P.E. and include, but are not limited to, the following:
  - i) Place and compact additional thickness of liner material sufficient to meet liner requirements - 30 TAC 217.203(d)(2);
  - ii) Use a soil amendment to reduce soil permeability - 30 TAC 217.203(d)(3);
  - iii) Install a synthetic membrane liner with underdrain and leachate detection and collection system - 30 TAC 217.203(d)(4);
  - iv) Remove and replace unacceptable soils and recompact the material;
  - v) Adjust water content and recompact the existing soils; or
  - vi) The executive director may consider other corrective action on a case-by-case basis.
  
- b) Another option is to cease use of the pond and close it in accordance with TCEQ requirements. Additional permits and/or authorizations may be required to construct replacement facilities. You may contact the Water Quality Division at (512) 239-4671 for information on municipal pond closure requirements, or the Remediation Division at (512) 239-2200 for industrial pond closure requirements.

You may call the Water Quality Division at (512) 239-4671 to discuss the options further.

**14) What if my pond is located over the Edwards Aquifer?**

- a) Ponds located on the Edwards Aquifer are subject to 30 TAC Chapter 213 in addition to the requirements of the specific wastewater program area. For more information on these requirements, please contact the Edwards Aquifer Protection Program either at the Austin Region (512) 339-3939 or the San Antonio Region at (210) 490-3096.

## **EXISTING PONDS (PERMIT RE-ISSUANCE OR AMENDMENT)**

### **1) What information do I need to provide with my certification?**

- a) You need to submit a certification page by a Texas licensed P.E. along with any supporting data, such as soil test results, permeability results, thickness of the liner, or as-built engineering plans for the pond. See the answers to questions 10, 11 and 12 above.

### **2) What can I do if I cannot find a certification for my pond?**

There are several options, including but not limited to the following:

- a) If the pond is located over thick, clay-rich soils, you may advance geotechnical borings adjacent to the pond down to 3 feet below the pond bottom to see if in-situ soils meet TCEQ requirements for permeability, percent passing a 200 mesh sieve, plasticity index and liquid limit;
- b) You may collect core samples from the sidewall of the pond liner above the maximum water line to verify if placed liners meet TCEQ requirements for thickness, permeability, percent passing a 200 mesh sieve, plasticity index and liquid limit;
- c) If the pond has elevated berms around it and is located over thick clay soils, you may propose to regularly survey the perimeter of the berms for evidence of seepage and report the results of the survey to the TCEQ;
- d) You may propose to conduct groundwater monitoring, if site characteristics (e.g. site specific borings, depth to water table, access to install monitoring wells, etc.) are favorable to monitor groundwater and you can install appropriate monitoring wells;
- e) If you have several wastewater ponds, you may be able to take a pond out of service to sample the liner to demonstrate it meets TCEQ requirements. If a pond does not meet requirements, you must repair the pond as necessary to meet the liner requirements and recertify the pond liner as described in answer 13 above in order to continue use of the pond. You may rotate this technique to additional ponds onsite as needed;
- f) If you received funding from the Texas Water Development Board (TWDB) for the construction of the wastewater ponds, they may have records of the liner construction. You can contact their Clean Water State Revolving Fund (CWSRF) Program at (512) 463-8510. To facilitate them in locating your records, please have your loan number handy. If you do not have that number, they may be able to locate the loan by the entity name; or

- g) You can call the TCEQ Water Quality Division at (512) 239-4671 to discuss these or additional options further.

**3) In cases where I find information indicating the pond met liner requirements when constructed, do I need to demonstrate that the pond liner meets the current TCEQ rules?**

- a) There may be some exceptions, but you do not generally need to update the pond to current TCEQ rules if the pond is properly maintained and is in good working condition. You need to meet the regulations in place during the time of construction. If the pond liner is not functioning properly, then a Texas licensed P.E. should evaluate the pond liner to develop a plan to bring it up to current TCEQ regulations.
- b) An owner that materially alters or expands an existing domestic wastewater pond must submit plans and specifications that demonstrate the pond will comply with 30 TAC 217. The plans and specs must demonstrate that the modified pond will comply with 217.203 for liner requirements.

**4) My permit authorizing the use of a pond has expired; or I am applying for a new permit with an existing pond and I cannot document that my existing pond meets the current permeability requirements of 2 or 3 feet of  $1 \times 10^{-7}$  cm/s material. I want to be able to use the pond. What options do I have?**

- a) Remove the pond from service, perform corrective action and have a Texas licensed P.E. recertify the pond liner. Possible corrective actions include but are not limited to the following:
  - i) Place and compact additional thickness of liner material sufficient to meet liner requirements - 30 TAC 217.203(d)(2);
  - ii) Use a soil amendment to reduce soil permeability - 30 TAC 217.203(d)(3);
  - iii) Install a synthetic membrane liner with underdrain and leachate detection and collection system - 30 TAC 217.203(d)(4);
  - iv) Remove and replace unacceptable soils and recompact the material;
  - v) Adjust water content and recompact the existing soils; or
- b) The executive director may consider other corrective action on a case-by-case basis.

You may call the Water Quality Division at (512) 239-4671 to discuss the options further.



## **RECERTIFICATION OF LINER AFTER MAJOR REPAIR, MODIFICATION, OR SLUDGE REMOVAL**

- 1) What information do I need to submit to demonstrate that the pond meets regulatory requirements?**
  - a) The Texas licensed P.E. that supervised the repairs should provide a certification that the repaired pond liner meets the TCEQ requirements, including thickness, permeability, percent passing a 200 mesh sieve, plasticity index and liquid limit in the area of the repair or modification. Additionally, the P.E. should discuss how the repair maintained the integrity of the liner.