

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

POND SEALING OR LINING – COMPACTED CLAY TREATMENT

(No.)
Code 521D



DEFINITION

A liner for a pond or waste storage impoundment constructed using compacted soil without soil amendments.

PURPOSE

To reduce seepage losses from ponds or waste storage impoundments constructed for water conservation and environmental protection.

CONDITION WHERE PRACTICE APPLIES

This practice applies where.

- Soils at the site exhibiting seepage rates in excess of acceptable limits or allowing an unacceptable migration of contaminants from the impoundment.
- An adequate quantity of soil suitable for constructing a clay liner without amendments is available at an economical haul distance.

CRITERIA

Use compacted clay treatment liners that comply with all Federal, state, and local laws, rules, and regulations.

Impact to cultural resources, wetlands and Federal and state protected species shall be

evaluated and avoided or minimized to the extent practicable during planning, design and implementation of this conservation practice in accordance with established National and Florida policy, General Manual (GM) Title 420-Part 401; Title 450-Part401, Title 190-Parts 410.22 and 410.26, National Planning Procedures Handbook (NPPH) Florida Supplements to Parts 600.1 and 600.6, National Cultural Resources Procedures Handbook (NCRPH), National Food Security Act Manual (NFSAM), and the National Environmental Compliance Handbook (NECH).

Design lined structures to meet all applicable NRCS standards.

Specify compacted clay treatment liners to be filter compatible with the sub-grade on which they are compacted to prevent loss of the liner soil into larger openings in the sub-grade material in accordance with the national Engineering Handbook (NEH), Part 633, Chapter 26 – Gradation Design of Sand and Gravel Filters.

Design compacted soil liners for ponds not storing animal waste to reduce seepage to rates that will allow the pond to function suitably as intended.

Design compacted soil liners for waste storage impoundments to reduce specific discharge (unit seepage) to rates suggested in the NEH Series, Part 651, Agricultural Waste Management Field Handbook (AWMFH), Chapter 10, Appendix 10D or rates mandated in state regulations if they are more restrictive. Use other, lower specific discharge rates for design at the discretion of the Designer.

The AWMFH, Chapter 10, Appendix 10D provides methods for computing unit seepage rates and includes recommended allowable rates of seepage. As necessary, use other

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

generally accepted methods for computing unit seepage rates.

Liner Thickness. Design the finished compacted liner minimum thickness based on the most stringent requirement listed below:

1. To achieve a specific discharge (unit seepage) design value selected by the designer
2. To meet state regulations, or
3. To meet requirement given in Table 1. The water depth to be used in the table is the normal full pool storage depth in the impoundment.

Table 1 – Minimum Liner Thickness

Water Depth (feet)	Liner Thickness (inches)
≤ 16	12
16.1 - 24	18
> 24	24

Liner Protection. Protect the soil liner against damage caused by the effects of water surface fluctuations, wave action, rainfall during periods when the liner is exposed, water falling onto the liner from pipe outlets, agitation equipment, solids and sludge removal activity, animal activity, and penetrations through the liner.

Include measures to protect against damage to the compacted liner if a seasonal high water table occurs at a level above that of the lowest potential level of liquid in the impoundment in the design. Use protective design measures such as by using perimeter drains to lower the water table, maintaining minimum liquid depth in the impoundment, and using liners thick enough to resist uplift water pressures are examples of protective design measures.

Protect the finished liner against the effects of desiccation during periods when the pond or impoundment is empty. Use a protective soil cover. For severe conditions, a protective soil cover may not adequately protect the liner from desiccation. Severe conditions include liners constructed with very high plasticity soils that are exposed to long periods of hot, low humidity conditions.

Side Slopes. Design the side slopes of ponds or waste storage impoundments to be 3H: 1V or

flatter to facilitate compaction of soil on the slopes if the bathtub method of construction as described in Appendix 10D, AWMFH, is used. Design slopes as steep as 2H: 1V if the stair-step method of construction as described in Appendix 10D to the AWMFH is used for constructing the liner.

CONSIDERATIONS

Consider using a flexible geomembrane or geosynthetic clay liner for sites that have water or waste storage depths greater than 30 feet.

Consider the stair-step method of construction as outlined in Appendix 10D in lieu of slope flattening.

Consider designs including a geomembrane in conjunction with a cover soil for severe conditions to protect the liner from desiccation adequately

Consider alternatives to compacted clay liners for poor foundation conditions such as karstic bedrock.

Consider maintenance requirements when selecting side slopes.

Consider filling the pond with water after construction to prevent desiccation.

PLANS AND SPECIFICATIONS

Describe the requirements for applying the practice to achieve its intended purpose in the plans and specifications for compacted soil liners for ponds and waste storage impoundments.

As a minimum, include the following in the plans and specifications:

- Plan view of system layout
- Foundation preparation
- Type of material to be used
- Method of installation
- Method to protect liner
- Structural details
- Quantity of material

OPERATION AND MAINTENANCE

Maintenance activities required for this practice consist of those operations necessary to prevent and/or repair damage to the compacted soil liner. Include, but is not limited to, exclusion of animals and equipment from the treated area, reparation of the damage to the liner occurring from erosion during initial filling; erosion resulting from wave action after the impoundment fills, and erosion caused by agitation, pumping operation, and activities involved in removal of solids and sludge. Prevent damage that might be caused by roots from trees and large shrubs by removing such vegetation. If the liner is damaged, repair any disturbed or eroded areas to restore the liner to its original thickness and condition.

REFERENCES

General Manual
Title 420-Part 401
Title 450-Part401
Title 190-Parts410.22 and 410.26
National Engineering Handbook
Part 633, Chapter 26
Part 650, AWMFH, Chapter 10, Appendix 10
National Cultural Resources Procedures Handbook
National Environmental Compliance Handbook
National Food Security Act Manual
National Planning Procedures Handbook
Florida Supplements to Parts 600.1 and 600.6