

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
POND SEALING OR LINING
SOIL DISPERSANT TREATMENT

(No.)

CODE 521B

DEFINITION

A liner for a pond or waste storage impoundment consisting of a compacted soil-dispersant mixture.

PURPOSE

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

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Soils are suitable for treatment with dispersants.
- Ponds or waste storage impoundments require treatment to reduce seepage rates and to impede the migration of contaminants to within acceptable limits.

CRITERIA

General Criteria Applicable to All Purposes

Dispersant treated soil liners shall comply with all federal, state, tribal, and local laws, rules, and regulations.

Dispersant treated soil liners shall 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. The National Engineering Handbook, Part 633, Chapter 26-Gradation Design of Sand and Gravel Filters, provides criteria on filter compatibility.

Soil Properties. For chemical sealing, soils shall have properties approximating the following:

- At least 50 percent finer than 0.074 mm

diameter (No. 200 sieve);

- At least 15 percent finer than 0.002 mm diameter;
- Less than 0.50 percent soluble salts (based on dry soil weight).

Dispersants. The dispersant shall be tetrasodium pyrophosphate (TSPP), sodium tripolyphosphate (STPP), or soda ash unless laboratory tests using other dispersant types are used in the design. Commercial phosphatic fertilizer is not acceptable. Soda ash, technical grade, 99-100 percent sodium carbonate may be used.

These dispersants shall be finely granular; with 95 percent of the material passing a number 30 sieve and less than 5 percent passing a number 10 sieve.

Standard commercial sodium chloride is satisfactory in the granulated form.

When laboratory permeability tests are required to determine application rates, the tests shall be performed using dispersant of the same quality and fineness as that proposed for use.

For protection against dispersant dust, personnel on site during dispersant application and mixing shall wear mask and goggles.

Criteria Applicable to Ponds

Design. Dispersant treated soil liners for ponds not storing animal waste shall be designed to reduce seepage to rates that will allow the pond to function suitably as intended.

Application Rate. For ponds, in the absence of laboratory tests or field performance data on soils similar to those to be treated, the minimum application of

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#), or visit the [Field Office Technical Guide](#).

dispersant per 6-inch thickness of constructed liner shall be:

Dispersant Type	Application rate (lb./ 100 ft ²)
Polyphosphates	7.5
Soda Ash	15

Liner Thickness. In the absence of more detailed testing and analyses, liner thickness shall be according to the following table:

Water Depth (feet)	Liner Thickness (inches)
≤ 8	6
8.1 – 16	12
16.1 – 24	18
24.1 - 30	24

Criteria Applicable To Waste Impoundments

Design. Design of dispersant treated soil liners for waste storage impoundments shall be designed to reduce specific discharge (unit seepage) to rates recommended in the National Engineering Handbook Series, Part 651, Agricultural Waste Management Field Handbook (AWMFH), Chapter 10, Appendix 10D or rates mandated in state regulations if they are more restrictive. Lower specific discharge rates may be used at the discretion of the Designer.

Liner Thickness. The minimum thickness of the finished compacted liner shall be the greater of:

- that required to achieve a specific discharge (unit seepage) design value selected by the designer,
- that required by state regulations, or
- that given in the following table. The water depth to be used in the table is the normal full pool storage depth in the impoundment.

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

Other Criteria

Liner Construction. Use methods described in Appendix 10D to the AWMFH for liner construction.

Liner Protection. Dispersant treated soil liners shall be protected against damage caused by the effects of water surface fluctuations, desiccation and cracking, 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, penetrations through the liner, and any other activity capable of causing physical damage to the liner. A minimum thickness of 12 inches is recommended for all areas in the vertical range of water fluctuation. Provide a minimum 12-inch compacted layer of untreated soil over the treated liner where shoreline erosion or wetting and drying from fluctuating water levels exist.

Design should include measures to protect against damage to the dispersant treated soil liner due to uplift water pressures if a seasonal high water table occurs at a level above that of the lowest potential level of liquid in the impoundment. Examples of protective design measures are the use of perimeter drains to lower the water table, maintaining minimum liquid depth in the impoundment, and using liners thick enough to resist uplift water pressures.

Protection of the finished liner from the effects of desiccation during periods when the pond or impoundment is low or empty is advisable. A protective soil cover may be considered. The soil cover shall be of a soil type, thickness, and density that is resistant to erosion and desiccation. Place as a minimum, at least 6 inches of soil over the soil-dispersant liner.

Side Slopes. The side slopes of ponds or waste storage impoundments should be 3H:

1V or flatter to facilitate mixing of the dispersant when the bathtub method of construction as described in Appendix 10D, AWMFH, is used. Slopes as steep as 2H: 1V can be considered if the stair-step method of construction as described in Appendix 10D to the AWMFH is used. Maintenance requirements should also be considered when selecting a side slope.

CONSIDERATIONS

Consider using a flexible geomembrane or geosynthetic clay liner for sites that have water depths greater than 24 feet.

Alternatives to compacted soil dispersant treated liners should be considered for poor foundation conditions such as karstic bedrock, joints or other discontinuities of the underlying bedrock.

PLANS AND SPECIFICATIONS

Plans and specifications for dispersant treated soil liners for ponds and waste impoundments shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Plans and specifications shall include such drawings, specifications, material requirements, quantities, construction requirements, equipment requirements, and other documents as necessary to describe the work to be done.

Construction. Clear the area to be treated of all vegetation and trash and all stones or other objects large enough to interfere with operation of the compacting equipment.

The moisture content of the soil must be near optimum for compacting.

Distribute sealing chemicals evenly over the surface to be treated with a drill, seeder, or fertilizer spreader or by hand broadcasting. If

broadcast by hand, the area must be staked or otherwise marked in grids of 100 square feet.

Thoroughly mix the chemicals into the 6 to 8 inch thick layer of soil being treated. Mix chemicals into the soil with a disk, rototiller, pulverizer, or similar equipment. A second mixing shall be perpendicular to the first mixing.

If the moisture is inadequate for maximum compacting, add water by sprinkling during the mixing operation. If the soil moisture content is too high, dry by air and disking.

Protect treated areas from puncture by livestock trampling. Protect areas near the normal waterline and at points of concentrated surface flow into the pond against erosion.

Sediment coagulating chemicals, such as gypsum or iron sulfate, shall not be used to clear reservoir water after treatment.

OPERATION AND MAINTENANCE

Maintenance activities required for this practice consist of those operations necessary to prevent and/or repair damage to the dispersant treated soil liner. This includes, but is not limited to; excluding animals and equipment from the treated area; repairing 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 operations, as well as activities involved in removal of solids and sludge. Damage that might be caused by roots from trees and large shrubs should be prevented by removing such vegetation at first appearance. If the liner is damaged, any disturbed or eroded areas should be repaired to restore the liner to its original thickness and condition.

SUPPORTING DATA AND DOCUMENTATION

Field Data and Survey Notes

The following is a list of the minimum data needed:

1. System plan sketch;
2. Topographic survey of the site showing elevations and control features;
3. Soils investigation showing seasonal high water table, location of test holes, and gradation and classification of soils to be sealed.

Design Data

Record on appropriate engineering paper. For guidance on the preparation of engineering plans see Chapter 5 of the EFH, Part 650. The following is a list of the minimum required design data:

1. Statement concerning location and type of leaks or excessive permeability and description of foundation preparation to be made;
2. All required permits and documentation on file with the design information;
3. Plan view including, location map, all system components, material and construction specifications;
4. Rate of application and thickness of the treated blanket, method of mixing materials, method of compaction and protection, construction drawings, and component details;
5. Quantities estimate;
6. Job class on plan;
7. Details of foundation drainage, when required;

8. Planting plan. This must meet the criteria, specifications, and documentation requirements of the Maryland conservation practice standard for Critical Area Planting (Code 342).

Construction Check Data/As-built

Record on survey notepaper, SCS-ENG-28, or other appropriate engineering paper. Survey data will be plotted on plans in red. The following is a list of minimum data needed for As-builts:

1. Documentation of site visits on CPA-6. Include the date, who performed the inspection, specifics as to what was inspected, all alternatives discussed, and decisions made and by whom;
2. Actual dimensions of installed lining;
3. Verification of adequate foundation preparation;
4. Documentation of installation of foundation drainage;
5. Certification by the manufacturer that the material is suitable for the intended use, Certification statement from the contractor(s) that they have constructed the liner in accordance with the plans and specifications;
6. Statement on seeding and fencing;
7. Final quantities and documentation for quantity changes, and materials certification;
8. Sign and date checknotes and plans by a person with appropriate engineering approval authority. Include statement that practice meets or exceeds plans and NRCS practice standards.

REFERENCES

USDA, Natural Resources Conservation Service. *Engineering Field Manual, Chapter 4, "Elementary Soil Engineering" and Chapter 11, "Ponds and Reservoirs;"*

USDA, Natural Resources Conservation Service, *Maryland Field Office Technical Guide, Section IV, Standards and Specifications;*

USDA, Natural Resources Conservation Service. *National Engineering Handbook, Chapter 26, Part 633.*

USDA, Natural Resources Conservation Service. *National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook, Chapter 10, Appendix 10D.*