

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

POND SEALING OR LINING - SOIL DISPERSANT

(No.)
CODE 521-B

DEFINITION

Installing fixed lining of impervious material or treating the soil in a pond mechanically or chemically to impede or prevent excessive water loss.

PURPOSE

To reduce seepage losses in ponds or earthen waste impoundments to an acceptable level.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- (1) seepage losses from a pond or waste impoundment would prevent it from fulfilling its intended purpose.
- (2) seepage from a waste impoundment would contaminate ground or surface water, and/or
- (3) soils are suitable for treatment with chemical dispersants.

CRITERIA

Impoundment structures to be sealed shall be constructed to meet all applicable NRCS Conservation Practice Standards, and may include any of the following as appropriate:

- Irrigation Storage Reservoir (Code 436)
- Pond (Code 378)
- Waste Storage Facility (Code 313)
- Waste Treatment Lagoon (Code 359)

The treated soil liner shall be designed in accordance with National Engineering Handbook Series, Part 651, Agricultural Waste Management Field Handbook, Chapter 10, Appendix 10D.

All work shall be in compliance with federal, state, and local laws and regulations.

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

1. At least 50 percent finer than 0.074 mm diameter (#200 Sieve)
2. At least 15 percent finer than 0.002 mm diameter
3. Less than 0.50 percent soluble salts (based on dry soil weight)

Soils suitable for treating with dispersants are generally clay soils having high calcium contents. These soils are usually in Group III as defined in Appendix 10D.

Dispersants. Tetrasodium polyphosphate (TSPP) and sodium tetraphosphate (STPP) should be used in preference to other polyphosphate salts. Commercial phosphatic fertilizer is not acceptable. Soda ash, tech grade, 99-100 percent sodium carbonate may be used.

These dispersants should be finely granular with 95 percent passing a number 30 sieve and less than 5 percent passing a number 100 sieve.

Standard commercial sodium chloride is satisfactory in the granulated form normally available.

Other dispersants may be used in the form found by local experience to be satisfactory.

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

Rate of Application. For treating waste impoundments, the rate of application and kind of dispersant used shall be based on laboratory tests.

For ponds, the rate of application and the kind of dispersant to use shall be based on laboratory tests unless sufficient data are available on the field performance of previously tested soils and their similarity texturally and chemically to the soil to be sealed.

For ponds, in the absence of laboratory tests on the soils to be sealed, the minimum application rate for each treated layer shall be:

Sodium Polyphosphate5 to 10 lbs/100 sq. ft.

Sodium Chloride..... 20 to 33 lbs./100 sq. ft.

Soda Ash 10 to 20 lbs./100 sq. ft.

Otheras found by local experience to be adequate.

Thickness of treated blanket. The finished treated liner shall be at least 6 inches thick for water depths up to 8 feet. For greater depths of water, the blanket thickness shall be twelve inches or greater as determined by procedures in Appendix 10D. The liner material shall be installed in multiple lifts of 6 inches compacted thickness. A minimum thickness of 12 inches is recommended for all areas in the vertical range of water surface fluctuation.

There shall be at least 2 feet of fine-grained soil over fractured rock outcrops or other highly permeable material in addition to the treated blanket.

A protective layer of untreated soil shall be placed over the treated liner in waste impoundments. The minimum thickness of the protective layer shall be 6 inches.

CONSIDERATIONS

Compaction of thin layers on steep slopes is difficult to accomplish without leaving discontinuities in the liner. To preserve the integrity of the liner, consideration should be given to flattening the slopes of waste impoundments or excavated ponds. As an alternative, liners on steep slopes may be

constructed using the stair step method as described in Appendix 10D. NRCS experience has shown that usually about twice as much soda ash is required to treat a given clay than the polyphosphates. However, because soda ash may be less than half as expensive, it may be the most economical choice of materials in many cases.

Consideration should be given to providing a protective layer of soil over the dispersant treated liner in ponds where fluctuating water levels may contribute to erosion of slopes. The untreated soil cover will provide a sacrificial zone that can withstand some erosion while protecting the underlying treated liner.

Consideration should be given to fencing the structure for the safety of humans, livestock, wildlife, and pets and to protect the liner from damage

PLANS AND SPECIFICATIONS

Plans and specifications are to be prepared for each specific site based on this standard. They shall include such drawings, specifications, material requirements, quantities, construction requirements, equipment requirements, and other documents as are necessary to describe the work to be done.

OPERATION AND MAINTENANCE

Maintenance activities required for this practice consists of those operations necessary to prevent breaching of the treated soil layer. This includes excluding cattle and equipment from the treated area, protection of the layer during initial filling, agitation, or pumping operations, and repair of disturbed or eroded areas.

REFERENCES

National Engineering Handbook Series, Agricultural Waste Management Field Handbook, Chapter 10, Part 651, Appendix D

Kentucky NRCS Conservation Practice Standards:

Code 436 - Irrigation Storage Reservoir
Code 378 - Pond
Code 359 - Waste Treatment Lagoon
Code 313 - Waste Storage Facility

CONSTRUCTION SPECIFICATIONS**POND SEALING OR LINING (Soil Dispersant)****CODE 521B**Scope

This specification consists of the material requirements and construction procedures necessary for construction of a soil dispersant treated clay liner for sealing of ponds, including waste impoundments. Construction operations shall be carried out in such a manner that erosion, water, air, and noise pollution will be minimized and held within legal limits as established by state regulations.

Materials

Dispersants shall be soda ash (Na_2CO_3), TSPP (tetrasodium pyrophosphate), STPP (sodium tetraphosphate), or common salt (NaCl). The specific chemical to be used and the application rate will be specified for each job.

Subgrade Preparation

The area to be treated should be drained and cleared of all vegetation, trash, and all stones or other objects of a size which would interfere with the operation of mixing and compaction equipment.

If the treated liner is to be constructed in more than one layer, then adequate material shall be excavated and stockpiled for construction of the additional layers, unless other borrow material is to be obtained from outside the pond.

Placing and Mixing Chemical Dispersant

Sealing chemicals shall be distributed evenly over the surface to be treated with a drop type spreader, by hand broadcasting, or by other methods which provide uniform distribution of the chemicals. If broadcast by hand, the area should be staked or otherwise marked in grids of 100 square feet. The specified amount of chemical should then be spread evenly within each grid area.

The chemicals should be thoroughly mixed into each layer of soil being treated. Mixing should be with disk, rototiller, pulverizer, or similar equipment. At least two passes of the mixing equipment are required for thorough mixing.

The second and subsequent passes should be in a direction perpendicular to the previous pass. The mixing equipment shall not be allowed to penetrate below the planned bottom of the layer being placed. As a guide, a 9 inch thick loose layer should compact to a thickness of about 6 inches.

Water should be added by sprinkling during the mixing operation if moisture is not adequate for maximum compaction. If the moisture content is too high, the soil should be dried by disking or some other effective process.

Compaction

When a minimum dry density is specified, each treated layer of soil shall be compacted to the specified dry density with the soil at the specified moisture content. When a minimum dry density is not specified, each treated layer of soil shall be compacted by completely traversing the layer with not less than four passes of the compaction equipment. Each layer shall be mixed and compacted to the specified density before subsequent layers are placed.

The preferred equipment for compacting clays treated with dispersants is a tamping type roller. Sheepsfoot rollers which have long penetrating feet should be avoided. Care shall be exercised during compaction operations to avoid tearing or displacing the layer being compacted or previously compacted underlying layers. A direction of travel up and down slopes rather than along the slope may be required to avoid displacement of the treated layer.

Where the treated liner is to be covered with a layer of untreated soil, the untreated soil shall be spread in loose layers of approximately 9 inches thickness. Each loose layer is to be compacted by at least 2 passes of the spreading equipment over the entire surface.