NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

POND SEALING OR LINING
BENTONITE SEALANT

(No.)

CODE 521C

DEFINITION

A liner for a pond or waste impoundment consisting of a compacted soil-bentonite 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 bentonite.
- Ponds or waste 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

Bentonite treated soil liners will comply with all Federal, State, and local laws, rules, and regulations.

Lined structures will meet all applicable NRCS standards.

Bentonite treated soil liners will be filter compatible with the natural foundation materials on which they are compacted according to Chapter 26, Part 633, of the National Engineering Handbook, Gradation Design of Sand and Gravel Filters.

The minimum thickness of the finished compacted liner will be 6 inches.

The bentonite will be a sodium bentonite with a free swell of at least 22 milliliters as measured by ASTM Standard Test Method D5890, unless laboratory tests using other bentonite types are used for design.

When laboratory permeability tests are required to determine application rates, the

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 electronic Field Office Technical Guide.

tests will be performed using bentonite of the same quality and fineness as that proposed for use.

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

Criteria Applicable to Waste Impoundments

Design. Design of the bentonite treated soil liners for waste impoundments will be in accordance with National Engineering Handbook, Part 651; Agricultural Waste Management Field Handbook, Chapter 10, Appendix 10D; and/or State regulatory requirements.

Liner Protection. The liner will be protected against desiccation cracking, the effects of water surface fluctuations, wave action, surface erosion, erosion from pipe inlets, agitation equipment, animals, or items installed through the liner. Protective measures will be designed into the system to protect the liner for these cases. At least 6 inches of compacted soil cover will be placed over the soil-bentonite liner.

Criteria Applicable to Ponds

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 finely ground bentonite per 1-inch thickness of constructed liner will be:

Pervious Soil Description	Application Rate (lb./ft.^{2})
Silts (ML, CL-ML)	0.375
Silty Sands (SM, SC-SM, SP-SM)	0.5
Clean Sands (SP, SW)	0.625

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

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

CONSIDERATIONS

Flattening the slopes of ponds or waste impoundments to facilitate compactive efforts during construction should be considered. The stair-step method of construction as outlined in Appendix 10D may be considered in lieu of slope flattening.

A protective compacted soil cover should be considered for protecting the soil-bentonite liner for ponds.

Consider using a flexible membrane liner for sites that have water depths greater than 24 feet.

PLANS AND SPECIFICATIONS

Plans and specifications for bentonite treated soil liners for ponds and waste impoundments will be in keeping with this standard and will describe the requirements for applying the practice to achieve its

intended purpose. Plans and specifications will 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 consist of those operations necessary to prevent damaging the treated soil liner. This includes, but is not limited to, excluding animals and equipment from the treated area, protection of the liner during initial filling, agitation or pumping operations, and repair of disturbed or eroded areas.

REFERENCES

ASTM Standard Test Method D5890

NRCS. National Engineering Handbook, Part 633, Chapter 26.

NRCS. National Engineering Handbook, Part 651, AWMFH, Chapter 10, Appendix 10D