SOIL CONSERVATION SERVICE

WEST VIRGINIA

ENGINEERING STANDARD

POND SEALING OR LINING (No.)
Bentonite

Definition

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

Scope

This standard applies to the sealing of ponds with bentonite or similar high swell clay materials.

Purpose

To reduce seepage losses in ponds to an acceptable level and preserve or improve water quality.

Conditions Where Practice Applies

This practice applies where water loss from a pond through leakage is, or will be, of such proportion as to prevent the pond from fulfilling its planned purpose. This practice also applies where leakage will damage land and crops, cause waste of water, or cause environmental problems.

Design Criteria

The design shall be based on adequate investigation and documentation of leaking soil materials.

Ponds to be sealed shall be constructed to meet SCS standards for irrigation pits or regulating reservoirs (552), irrigation storage reservoirs (436), ponds (378), waste treatment lagoons (359), waste storage ponds (425), or wildlife watering facilities (648), as appropriate.

Soil Properties

Sealing with bentonite or similar materials is more applicable on coarse- grained soils where more than half of the soil particles are larger than the No.200 sieve size.

Rate of Application

The rate of application shall be based on laboratory tests unless sufficient data are available on the field performance of previously tested soils that are similar, texturally and chemically, to the soils to be sealed.

In the absence of laboratory tests or field performance data on the soils to be sealed, the minimum application shall be:

Pervious Soil	Application Method	Application Rate
Clay	Mixed layer	1.0- 1.5 lb/sq.ft
Sandy silt	Mixed layer	1.0- 1.5 lb/sq.ft
Silty sand	Mixed layer	1.5- 2.0 lb/sq.ft
Clean sand	Mixed layer	2.0- 2.5 lb/sq.ft
Open rock or gravel	Clay or sand mixed layer	2.5 -3.0 lb/sq.ft [1/]

[1/] There shall be a minimum of 2 feet of fine-grained soil compacted over cavernous limestone. The top 6 inches of the 2 feet shall be treated with bentonite.

Thickness of Treated Blanket

The minimum thickness of the finished treated blanket shall be 6 inches for water depths up to 8 feet. Additional thickness shall be provided for greater water depths, for pond areas exposed to drying, and for areas subject to wave action.

Plans and Specifications

Plans and specifications for sealing ponds with bentonite shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Operation and Maintenance

An operation and maintenance plan shall be prepared which includes as a minimum, the following items.

1. Treated areas shall be protected from puncture by animal trampling.

2. Areas near normal waterline and at points of concentrated surface inflow shall be protected against erosion.

3. Any area of the blanket found to be eroding or damaged shall be immediately repaired.

4. The pond shall be used in such a way that prevents removal or penetration of the sealing layer.

5. Plant growth which would penetrate the sealing layer shall be controlled.

6. Consistent with the purpose, the pond should be maintained at full pool after treatment to prevent weed growth, surface drying, and weathering damage to the treated layer.

CONSTRUCTION SPECIFICATIONS

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The area to be treated shall be drained and dried.

All vegetation, trash, stones, and other objects large enough to interfere with disking or compacting the area shall be removed.

Cavernous or jointed limestone shall have plugs of adequate strength to bridge openings wider than 3 inches. Cavernous openings shall be plugged by a minimum of 2 feet of compacted fined-grained soil. Open gravel shall be blanketed by a mixture of bentonite and sand or clay compacted to a depth of 1 foot. Holes and rills shall be filled and smoothed to provide a uniform application surface.

Powdered bentonite shall be uniformly spread over the surface at the specified rate. The bentonite shall be incorporated to a depth of 6 inches for each specified layer. The mixing equipment shall be a disk, rototiller, or similarly effective tool.

Livestock trampling shall not be an acceptable method of mixing the bentonite with the soil.

Mixed layers shall not exceed 6 inches, in depth before compaction. Each layer shall be compacted to a minimum dry density of 90 percent of maximum standard Proctor density with soil at or above optimum moisture content.

Construction of the bentonite seal shall be done in such a manner that erosion and air and water pollution are minimized. The completed job shall present a workmanlike finish.

Approved By_____ **Date**_____	**U.S. Dept. of Agriculture** **Soil Conservation Service** **Assisting**_____ **Soil Conservation District**	**Cooperator**_____ **Sheet**_____**of**_____

Pond Sealing or Lining (no.)
Bentonite Sealant **521-C**

Planning considerations for water quantity and quality.

Quantity

1. Effects upon components of the water budget, especially effects on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.

2. Variability of the practice's effects caused by seasonal or climatic changes.

3. Effects on downstream flows or aquifers that would affect other water uses or users.

4. Effects on the volume of downstream flow to prohibit undesirable environmental, social or economic effects.

5. Potential use for water management to conserve water.

Quality

I. Effects on the movement of sediment, pathogens, and soluble substances carried by seepage toward the groundwater.

2. Effects on the visual quality of the downstream water resources.

3. Short-term and construction-related effects of this practice on quality of the local and downstream water resources.

4. Effects on the movement of dissolved substances below the pool area and toward ground water.

5. Effects on wetlands or water-related wildlife habitats.