NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
SOUTH DAKOTA SUPPLEMENTS ITALICIZED

SOIL SALINITY MANAGEMENT - NONIRRIGATED

(ac.)
CODE 571

DEFINITION

Management of land, water, and plants to control harmful accumulations of salts on the soil surface or in the root zone on nonirrigated areas.

PURPOSES

Treatment of saline or sodic-affected areas on nonirrigated land to permit desired plant growth and protect surface and ground water resources.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all nonirrigated land where (a) human-induced soil salinity or sodicity is at or approaching a level that adversely affects land use, or (b) combinations of factors - topography, soils, geology, precipitation, and land use - indicate the future probability of such adverse effects. *Areas where saline seeps are present or where there is the potential for saline seep development are the primary areas applicable. These areas include both the recharge as well as the discharge areas of the saline seep.*

CRITERIA

Correction of the salinity problem by applying this practice will be a component of a conservation management system.

Compliance with state law is required in the construction and decommissioning of monitoring wells.

Identification of Saline Seeps

Remedial treatment of saline seeps includes the identification discharge and recharge areas, as well as the implementation of management practices to correct and improve the soil conditions of the seep area.

Discharge Area

Detection of discharge areas may be accomplished by visual means or by electrical conductivity (EC) measurements. Visual symptoms may include: vigorous kochia or foxtail barley growth in small areas where soils would normally be too dry to support weed growth, salt crusting on the soil surface, prolonged soil surface wetness in small areas, poor seed germination or rank wheat or barley growth with accompanying localized lodging, stunted trees in a shelterbelt with leaf chlorosis, or a sloughed hillside in native vegetation adjacent to a cropped field.

Detection of a discharge area using soil (EC) can be used to identify and confirm the encroaching or developing saline seep. Soil (EC) at the discharge area may be high at the soil surface or may be low at the surface and increase considerably with soil depth.

Recharge Area

Several procedures for identifying the recharge area include: visual, soil probing, soil surveys, drilling soil resistivity and electromagnetic techniques. Even if the previously mentioned equipment is not available, a visual approximation of the recharge area can be made. Perennials such as alfalfa seeded into an approximation of the recharge area and can be used as an indicator to identify the recharge boundary. Vigorous growth of alfalfa in mid summer can be used to identify the boundaries of the recharge area. Facts to remember in a visual approximation of the recharge area are that it is at a higher elevation than the discharge area and is usually within 2,000 feet of the discharge area, many are within 100 to 600 feet.

Management Practices to Improve Saline Seeps.

Remedial treatment of saline seeps can be accomplished though proper soil moisture management, however, no permanent solution can be accomplished unless control measures are applied to the recharge area. Remediation can be accomplished through intensifying water use in the recharge area, proper snow management, and the establishment of salt tolerant species on the discharge area.

Recharge Area

On those cultivated lands where a perched water table has already developed and the depth to the bottom of the perched water table is greater than five feet, the establishment of deep-rooted perennial crops will be required to dry out the subsoil of the recharge area. Where the depth to the bottom of the perched water in the recharge area is less than five feet, the subsoil can often be dried out by eliminating fallow and by using a more intense continuous cropping system.

When a deep-rooted perennial crop is planted in the recharge area, it will remain established until the top of the water table in the discharge area has been lowered to four feet below the soil surface. At this time, the deep-rooted perennial crop in the recharge area can be replaced with continuous cropping using a more intense continuous cropping system.

Discharge Area

After the flow of water from the recharge area has been controlled reclamation of the discharge area can proceed. Plant salt tolerant grain crops such as barley, or moderately tolerant crops such as wheat, oats, sorghum, or safflower. In severe seep areas, plant salt tolerant grasses to initiate the reclamation process. (Refer to the standard Pasture and Hay Planting (512) Suitability Group J, or the Range Planting standard (550), range site Saline Lowland for seeding requirements).

CONSIDERATIONS

To the maximum extent practical, crops selected should utilize available soil water in the recharge areas.

When establishing a rotation on the recharge area the environmental conditions that must be considered are annual precipitation during the growing season, kinds of soils, adapted crops, and cooperator's needs and desires.

Determine the relationship of the ground surface topography and the water table contours in and adjacent to the problem area. One suggested method involves installing nine (three rows of three) auger hole observation wells for water table measurements. Additional wells may be needed to adequately define the recharge area.

The construction of monitoring wells in the recharge, drainage ways, and the discharge areas may be beneficial in monitoring progress in the reclamation of the saline seep.

Snow management is usually a necessary component in "soil moisture management." It increases the success of a more intense cropping system on the recharge area. Additional moisture from snow and more even distribution of the moisture are gained by leaving stubble stand over winter, no-till cropping systems, or by herbaceous barriers.

Conservation practices such as Windbreaks (380) or Herbaceous Wind Barriers (422A) can be used to limit snow accumulation on recharge areas.

On discharge areas, proper snow management can enhance the reclamation process. However, moving more precipitation through the soil profile in the discharge area will not be effective until hydrologic control of the recharge area has been achieved.

In addition to the loss of cropland, saline seeps may also have additional adverse environmental effects. In South Dakota, discharge waters from saline seeps have been identified to have toxic contaminants that may effect human or animal health. At this point, these contaminants include excessive levels of nitrates, sulfates, and selenium.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations, and Operation and Maintenance described in this standard.

Specifications shall be recorded using the narrative statement in the conservation plan or other acceptable documentation such as approved South Dakota specification sheets or job sheets.

OPERATION AND MAINTENANCE

Once proper management practices have been installed, research and farmer experience has

shown that yields will improve in three to five years. If visual symptoms of the discharge area appear or a rising water table persists through the summer months, cropping practices should be reevaluated and intensified to increase water use.

If observation wells are installed, monitoring should occur monthly, especially during and after snow melt and rainy seasons.

REFERENCES

Brown, P.L., A.D. Halverson, F.H. Siddoway, H.F. Mayalnd, and M.R. Miller. 1982. Saline-Seep Diagnosis, Control, and Reclamation. U.S. Department of Agriculture Conservation Research Report No. 30, 22p., illus.