

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

SALINITY AND SODIC SOIL MANAGEMENT
 (Ac.)

CODE 610

DEFINITION

Management of land, water, and plants to control and minimize accumulations of salts and/or sodium on the soil surface and in the crop rooting zone.

PURPOSE

- To reduce and control harmful salt concentrations in the root zone.
- To reduce problems of crusting, permeability, or soil structure on sodium affected soils.
- To promote desired plant growth and to utilize excess water in the root zone in non-irrigated saline seep areas and their recharge areas.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where the concentration or toxicity of salt limits the growth of desirable plants or where excess sodium causes crusting and permeability problems. This practice also applies to non-irrigated land where a combination of factors such as topography, soils, geology, precipitation, vegetation, land use, and cultural/structural practices can increase the extent and concentration of salts in saline seep areas.

CRITERIA

General Criteria Applicable to All Purposes

All work, including associated practices for management of drainage and runoff, shall comply with Federal, State, and local laws and

regulations.

Type and rate of application of soil amendments shall be based on the chemistry of both the soil water and irrigation water (where applicable) regarding concentrations and types of salts and/or sodium, sodium adsorption ratio (SAR or RNa), exchangeable sodium percentage (ESP), concentration and types of salts, and pH.

Improve surface and subsurface drainage as needed to reduce localized ponding and or high water tables.

Additional Criteria to Reduce Salt Concentrations in the Root Zone

On irrigated lands, leaching requirements shall be determined as presented in National Engineering Handbook Part 623, Chapter 2.

On non-irrigated land, reclamation shall utilize vegetative methods, soil amendments, and/or enhanced drainage to effect a reduction in soil salinity.

Additional Criteria to Reduce Problems of Crusting, Permeability, or Soil Structure on Sodium-affected Soils.

Apply soil amendments containing soluble calcium, or that cause calcium in the soil to become available.

Additional Criteria Specific to Saline Seeps and Their Recharge Areas

Plant and/or maintain adapted high water use vegetation in recharge areas to utilize soil water.

CONSIDERATIONS

Soil salinity levels can be monitored to minimize the effects of salinity on crops and to evaluate management practices.

Tools such as electromagnetic induction (EMI) and salinity probes are appropriate for evaluating and for monitoring soil salinity levels.

The drainage water from this practice may have high levels of salts. Select an outlet or disposal area that will minimize the effects of this saline water.

Removal of salts from the root zone by leaching operations may increase contamination of water tables. Avoid excessive leaching and schedule leaching operations during seasons when potential contaminants in the soil profile, such as nitrogen, are low.

For irrigated conditions, an irrigation water management plan should minimize non-point pollution of surface and groundwater resources.

Chiseling and subsoiling can improve permeability, root penetration, and aeration where water movement is restricted by layered soils. Avoid inversion tillage that can bring salinity to the surface and interrupt the leaching process.

Green manure crops or applications of organic matter can improve soil structure and permeability.

Polyacrylamides may improve effectiveness of leaching and reclamation of some soils.

Applications of gypsum, sulfur, or calcium will help in displacing sodium from the root zone.

Water of slight to moderate salinity not dominated by sodium can enhance leaching of salts.

Residue management can improve the organic matter content of the soil, improve infiltration, and minimize surface evaporation and capillary rise of salts to the soil surface.

Consider selecting crops with tolerance to salinity/ sodium levels in the soil.

Consider using bedding and planting methods designed to reduce salinity near plant root zone, especially for germinating seeds.

Cultural Resources

NRCS policy is to avoid any effect to cultural resources and protect them in their original location. Determine if installation of this practice or associated practices in the plan could have an effect on cultural resources. The National Historic Preservation Act may require consultation with the California State Historic Preservation Officer.

<http://www.nrcs.usda.gov/technical/cultural.html> is the primary website for cultural resources information. The California Environmental Handbook and the California Environmental Assessment Worksheet also provide guidance on how the NRCS must account for cultural resources. The e-Field Office Technical Guide, Section II contains general information, with Web sites for additional information.

Document any specific considerations for cultural resources in the design docket and the Practice Requirements worksheet.

Endangered Species

If during the Environmental Assessment NRCS determines that installation of this practice, along with any others proposed, will have an effect on any federal or state listed Rare, Threatened or Endangered species or their habitat, NRCS will advise the client of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the client selects one of the alternative conservation treatments for installation; or with concurrence of the client, NRCS initiates consultations concerning the listed species with the U.S. Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit according to the Criteria,

NRCS, CA

August 2006

Considerations, and Operation and Maintenance described in this standard. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

No operation and maintenance requirements, national in scope, have been identified for this practice.

REFERENCES

Ayers, R.S., and D.W. Westcot, 1994. FAO Irrigation and Drainage Paper 29 Rev. 1, Water Quality For Agriculture.
<http://www.fao.org/DOCREP/003/T0234E/T0234E00.HTM>

ASCE, 1990. Agricultural Salinity Assessment and Management, ASCE Manuals and Reports on Engineering Practice No. 71, New York, NY.

California Fertilizer Association. 1998. Water and plant growth. p. 21-66. *In* Western Fertilizer Handbook. Interstate Publishers, Inc., Danville, Illinois.

Rhoades, J.D., and J. Loveday. 1990. Salinity in Irrigated Agriculture. p. 1089-1142. *In* B.A. Stewart and D.R. Nielsen (ed.) Irrigation of Agricultural Crops. Agron. Monogr. 30. ASA, CSSA and SSSA, Madison, WI.

USDA, Soil Conservation Service. 1993. National Engineering Handbook (NEH), Part 623, Chapter 2- Irrigation Water Requirements. Washington, D.C.
<http://www.info.usda.gov/CED/ftp/CED/neh15-02.pdf#search=%22NEH%20part%20623%2C%20chapter2%22>

USDA. 1954. Diagnosis and Improvement of Saline and Alkali Soils. Agriculture Handbook No. 60. Washington, DC.
http://www.ars.usda.gov/SP2UserFiles/Place/53102000/hb60_pdf/hb60intro.pdf#search=%22Diagnosis%20and%20Improvement%20of%20Saline%20and%20Alkali%20Soils.%20%20Agriculture%20Handbook%20No.%2060.%20%20%22

610 - 4

NRCS, CA
August 2006