NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

RICE WATER CONTROL

(No. and Acre)
CODE 746 CA INTERIM

DEFINITION

A planned system of level or graded basins or checks for the efficient distribution of rice irrigation water and containment of agrichemicals.

PURPOSES

This practice may be applied as part of a conservation management system to support the following purposes:

1. Reduce pollution of surface waters
2. Distribute irrigation water efficiently
3. Control the movement of irrigation and drainage water containing agrichemicals.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to cropland including the planning and design of irrigation systems for the flooded culture of rice. It applies to recirculating (tailwater recovery), static water, and multiple-user type systems. Topography must be flat to slightly sloping so that level or nearly level basins can be constructed. Soils should be fine textured with very low intake rates. Areas with impermeable substratum are preferred. Water volume and flow rate must be adequate to meet flooding, consumptive use and seepage loss requirements.

CRITERIA

Holding requirement

All rice water management systems shall be designed as closed systems so pesticide treated water can be contained within the system for the maximum required holding period as defined in local regulations. All drainage structures that can discharge waters shall be designed in a manner that they can be closed during the holding period.

Land Grading

Precision grading is necessary for crop stand uniformity and water control. Field slope shall be adequate for surface drainage requirements for rice and the other crops in the crop rotation. In rice-only cropping systems, the land shall be graded from zero slope to 0.05 feet per 100 feet. For rice-row crop rotations, a slope of 0.05 to 0.2 foot per 100 feet shall be required.

Basin Size

The difference in surface elevation within a basin shall not exceed 0.4 feet. The effects of wind related wave action on dikes shall be considered when determining the size and orientation of rice basins. Where wind is a factor, levees shall be oriented, if possible, at 90 degrees to the prevailing wind direction and maximum basin size limited to 20 acres.

Dikes

Dikes or levees between basins shall be constructed of mineral soil. Where the maximum elevation difference between basins is less than 0.5 feet, the minimum top width shall be 2 feet as measured at the specified height. The minimum settled height shall be the depth of ponding plus 0.5 feet and side slopes shall be no steeper than 1.5 horizontal to 1 vertical.

For dikes separating basins from supply ditches, drainage ways and natural channels and for dikes separating basins where the elevation difference between them is from 0.5 and 4.0 feet, the minimum top width shall be 4 feet, with a minimum settled height of 1.0 foot plus depth of ponding, and side slopes shall be no steeper than 2 horizontal to 1 vertical.

Access roads/dikes shall be constructed as needed for access to fields or structures. They shall have a minimum top width of 13 feet, a minimum settled height equal to the ponding depth plus 1.25 feet, and side slopes 2 horizontal to 1 vertical.

Water Delivery/Distribution System

The delivery system shall have the capacity to:

1. Apply a minimum of 10 inches of water to all basins within a field in a maximum of 6 days.

2. Meet consumptive use and seepage loss on all basins.

3. Drain the field in less than 10 days (if also used for drainage).

The hydraulic grade line of the pipeline or ditch shall be adequate to deliver the required flow at a point at least 6 inches above the highest field elevation within each basin.

Irrigation field ditches shall be designed in accordance with Practice Standard 388-Irrigation Field Ditch. Pipelines shall be designed following Practice Standard 430-Irrigation Water Conveyance.

Surface Drainage

Features and/or structures shall be provide for drainage of basins when required holding periods are not in effect. Drainage points within each basin shall not be placed more than 660 feet apart and shall be capable of draining basins in less than 10 days.

Recirculating Type Systems

Recirculating, flow-through systems shall apply water to an upper (higher elevation) basin and allow water to flow over a weir through a series of lower basins to a collection point where it will be pumped back to one of the upper basins.

Basin water depth shall be controlled by rice boxes (weirs) placed in the levees or dikes between basins. At the collection point, a storage sump or other suitable storage method shall be used to provide a buffer for variations in evapotranspiration and for adjustments in basin water depth.

A pump with pipeline or return ditch shall be used to convey the tailwater back to an upper basin. The minimum sump storage requirement shall be the volume of runoff generated by the normal flow off the bottom weir for 12 hours or 20 percent of the irrigation inflow for 12 hours, whichever is greater. The recirculating pump shall have a capacity equal to or greater than the mean inflow rate.

Head on the weirs shall not exceed 0.5 feet for irrigation or drainage flows. Return pipeline and pumping plant design shall follow Practice Standards 430-Irrigation Water Conveyance and 533-Pumping Plant For Water Control, respectively.

Static Type Systems

Static water systems shall apply only the amount of water needed to replace evapotranspiration and other losses in each basin.

Static water level systems shall deliver water to individual basins or checks in one of two ways: 1) From a source ditch controlled by flashboard weirs and flap-gated inlet pipes into each basin, or 2) from a pipeline or ditch with adjustable float control valves on each basin inlet.

The supply source shall be isolated and protected from contamination by means of flap gates or other such anti-back flow devices.

Flashboard riser structures shall be used to maintain the water level for each basin in an open ditch system. Head loss through the structure shall not exceed the difference in elevation between basins. The weir length shall be sized so that the head on the weir shall not exceed 0.5 feet. The minimum weir length shall be structure outlet pipe diameter plus 6 inches.

To the greatest extent possible, the supply system shall be self regulating either by means of float level control valves or gates or by spillage of excess flow from the terminal weir structure into a suitable drain. If the supply system can not be made fully self regulating, a terminal basin can be used to capture and hold excess flow. The size of this basin shall not exceed 10% of the area served by the system and precise flow adjustments to the system must be practical.

Cross connections shall not be permitted between systems except where it can be demonstrated that the connection will not interfere with the regulation of the system.

Multiple User Type Systems

Multiple user systems shall provide for runoff from one or more farms to be collected for use in other rice growing areas. These systems shall require formal agreements between land owners or land owners and irrigation district, drainage district or other group legally empowered and willing to accept the responsibility for the containment of the pesticide

treated water. Drainageways and downstream delivery facilities shall be separated or isolated from drainage ditches that discharge into natural streams or lakes.

On-farm facilities shall include structures, pipelines, siphons and flumes for bypassing the existing drainageways and ditches to convey runoff the delivery system for use by other rice growers. District or group facilities shall include all needed storage reservoirs, canals, pumps and water control structures.

Water Control Structures

Flashboard weirs, irrigation weir boxes, and float control valves shall be designed so that the basin water level can be adjusted to meet cultural requirements. The capacity of the structure shall be adequate to pass the design flow, while maintaining the required water surface elevation. Water control structures shall be designed following Practice Standard 587-Structure for Water Control.

CONSIDERATIONS

The depth of ponded water in basins is dependent on the variety of rice being grown, establishment method used, weed problems, and pesticide treatment. Water depth may also need to be lowered on windy days to reduce wave action and minimize levee and dike erosion.

Water holding periods are dependent on the pesticides being used. These pesticides dissipate over time depending on microbial activity, temperature, and other processes. Minimum holding periods are specified by state and county agencies and may change from year to year.

The potential for establishing a wetland in the lowest basin should be considered.

Water Quantity

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

2. Potential for a change in plant growth and transpiration because of changes in the volume of soil water.

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

4. Effects on the volume of downstream flow that could cause undesirable environmental, social, or economic effects.

5. The effect on the water table of the field in providing a suitable rooting depth for anticipated land uses.

6. Potential use of irrigation water management.

Water Quality

1. Effects on erosion and the movement of sediment and soluble and sediment-attached substances carried by runoff.

2. Effects of nutrients and pesticides on surface and ground water quality.

3. Effects on the movement of dissolved substances below the root zone or to ground water.

4. Effects of water levels on soil nutrient processes such as plant nitrogen use or denitrification.

5. Effects of water control on the salinity of soils, soil water, or downstream water.

6. Short-term and construction-related effects on the quality of downstream water courses.

7. Effects on the temperatures of water resources that could cause undesirable effects on aquatic and wildlife communities.

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

9. Effects on the visual quality of water resources.

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of

habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user 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 landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

PLANS AND SPECIFICATIONS

Plans and specifications for rice water management systems shall be in keeping with this standard and standards for individual system components.

OPERATION AND MAINTENANCE

The owner or operator shall be responsible for operating and maintaining the system to meet all state and local requirements. An operation and maintenance plan shall be prepared for this use. The plan should include specific instructions for operating and maintaining the system to ensure that it achieves its intended purpose.