NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WATERING FACILITY

(No.)

CODE 614

DEFINITION

A permanent or portable device to provide an adequate amount and quality of drinking water for livestock and/or wildlife.

PURPOSE

To provide access to drinking water for livestock and/or wildlife in order to:

- Meet daily water requirements
- Improve animal distribution

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where there is a need for new or improved watering facilities for livestock and/or wildlife.

CRITERIA

General Criteria Applicable To All Purposes

Design watering facilities with adequate capacity and supply to meet the daily water requirements of the livestock and/or wildlife planned to use the facility. Include the storage volume necessary to provide water between periods of replenishment. Refer to the National Range and Pasture Handbook (NRPH) for guidance on livestock water quantity and quality requirements. For wildlife, base water quantity and quality requirements on targeted species.

Design the watering facility to provide adequate access to the animals that will most likely use the facility. Incorporate escape features into the watering facility design where local knowledge and experience indicate that wildlife may be at risk of drowning.

Include design elements to meet the specific needs of the animals that that will most likely use the watering facility, both livestock and wildlife.

Protect areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns. Use criteria in Conservation Practice Standard 561, Heavy Use Area Protection, to design the protection.

Install permanent watering facilities on a firm, level foundation that will not settle differentially. Examples of suitable foundation materials are bedrock; compacted gravel; and stable, well-compacted soils.

Design and install watering facilities to prevent overturning by wind and animals.

Design watering facilities and all valves and controls to withstand or be protected from damage by livestock, wildlife, freezing, and ice damage.

Construct watering facilities from durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation. Follow appropriate NRCS design procedures for the material being used or industry standards where NRCS standards do not exist.

Use the criteria in Conservation Practice Standard 516, Pipeline, to design piping associated with the watering facility. Include backflow prevention devices on facilities connected to wells, domestic water systems, or municipal water systems.

Automatic water level control and/or overflow facilities shall be provided as appropriate. A cleanout drain shall be provided. Shields or covers shall be installed to protect valves or

pipes from damage by livestock or wildlife. Overflow shall be piped to a desirable point of release. The tank and outlet pipes will be protected from freezing and ice damage if this is a potential problem.

Additional Criteria for Livestock

For summer water needs, use the highest values for each type of animal in Table 6-7 in the NRPH. For livestock species not included in the NRPH, other references will be used--with the assistance of a range conservationist. A lesser volume is adequate when only winter watering is being provided.

Where wind, power, or pump failure may cause a loss of water supply, a 3-day water supply shall be provided. Compute the dimensions based on water depth accessible to the planned animals using the facility. Minimum capacity may be less than the 3-day livestock water requirement when an auxiliary power source is available, where a rural water district is the supply, where tanks are supplied by gravity flow from ponds, or where a spring development supplies water.

Where water supplies are dependable and livestock are checked daily or the water supply is provided for grazing distribution only, fountains with little or no water storage capacities may be used.

Locate facilities to promote even grazing distribution and reduce grazing pressure on sensitive areas. The spacing of the facilities and loading requirements will be determined by the range conservationist or other planner working with the cooperator prior to designing the watering facility. Section 600.0505(f), "Facilitating practice—Water development," in Chapter 5 of the NRPH provides additional guidance.

If the water source is a spring development, determine if a float valve is required at the inlet to the watering facility (tank) as follows:

- The tank should be removed away from the wetland seep to the maximum extent allowed by design criteria and landform. When the tank is installed a minimum distance of 100 feet from the edge of the wetland seep and 50 feet from the edge of wet contiguous areas downstream from the wetland seep, a float valve will not be required. Overflow discharge from the tank should be routed back to the original drainage flow-way.
- If the tank will be installed less than 100 feet from the wetland seep and less than 50 feet from the edge of wet contiguous areas downstream from the wetland seep, a float valve or livestock exclusion from the seep area will be required.
- For spring developments with very marginal water flow and where the technical person determines the wetland seep has sufficient water flow, a float valve will be required.
- If the producer uses the tank for over-winter water supply, the valve can be fixed open after first fall killing frost until frost-free date in spring.

The watering facility shall be constructed of materials including reinforced concrete, fiberglass, or other materials satisfying the conservation needs and life expectancy requirements such as a reinforced concrete floor with a steel-rimmed, fiberglass-rimmed, rubber-track-rimmed, or rubber-tire-rimmed tank.

Tanks constructed of corrugated steel sheets shall conform to the manufacturer's recommended design for wall thickness or gauge. If such recommendations are not available, then a minimum wall thickness of 16 gauge shall be indicated on the plans and specifications.

Concrete structures shall not be installed where experience has indicated the sulfate concentrations in the soil cause rapid concrete deterioration. For steel tanks, if a corrosion problem related to water quality is known or suspected, testing for water pH and electrical conductivity should be conducted. Based on the results of these tests, corrosion potential should be estimated. Protective coatings or non-corrosive tank materials shall be specified where necessary.

The concrete shall have a minimum design strength of 4000 pounds per square inch (psi) at 28 days for cast-in-place tanks (floor and wall[s]) and pre-cast concrete tanks.

Reinforcing steel, nylon fiber mesh additive, or wire fabric shall be used in the concrete as follows:

Reinforcing steel or wire fabric shall be

designed in accordance with appropriate engineering procedures and shall be shown on the drawings.

Concrete may be placed without reinforcing steel in the base of a steel-rimmed, fiberglass-rimmed, rubber-track-rimmed, or rubber-tire-rimmed tank if all of the following criteria and site conditions are met:

- The concrete has a minimum design strength of 3000 psi at 28 days.
- The tank base is located on soils that have low or moderate shrink-swell potential to a depth of 3 feet. The shrink-swell potential can be found by converting the linear extensibility using the table below. (Use the most restrictive layer [highest percent] within the desired soil depth.) Linear extensibility is the linear expression of the volume of difference of natural soil fabric at 1/3 bar or 1/10 bar water content and oven dryness and is reported as a percent change of the whole soil. Linear extensibility is obtained from the Soil Data Mart as follows:
  - Click "Select State" button and highlight "Kansas"
  - Click "Select Survey Area" button and highlight the county of interest
  - Click the "Generate Reports" button and highlight the map unit(s) of interest
  - Click on the drop-down menu by the "View Description" button and click "Physical Soil Properties"
  - Click "Generate Report" button

Shrink-Swell Potential Table

Linear Extensibility (percent)	Shrink-Swell Potential
<3.0	Low
3.0-6.0	Moderate
6.0-9.0	High
>9.0	Very High

- The tank is located to provide positive drainage away from the tank.
- Nylon fiber mesh shall be included in the concrete mix as an additive.

Additional Criteria for Wildlife

Wildlife water requirements. A greater prairie chicken will receive adequate water from natural dew and succulent foods during times of adequate precipitation. Prairie chickens will drink from open water during times of drought. Annual water requirements are estimated to be less than 5 gallons per year.

Ring-necked pheasant and bobwhite quail start using free water as soon as the succulent vegetation dries up in the warm weather of summer, and they continue to utilize it until green feed is available. Free water may be provided by morning dew, fog, springs, seeps, streams, guzzlers, or other watering devices.

When designing wildlife watering facilities, consider the species and the following water requirements:

Antelope	1-2 gallons/animal/day
Bison	8-12 gallons/animal/day
Deer	1-2 gallons/animal/day
Elk	5-8 gallons/animal/day
Mourning Dove	2-5 gallons continuously
Pheasant	2-5 gallons continuously
Quail	750 gallons/covey/year
Songbirds	1-2 gallons continuously
Wild Turkey	500 gallons continuously

Spacing between watering sites. Because of the expense of water development, it is advisable to determine the need for wildlife water at a site. Wildlife watering facilities may be provided if the following occurs:

- The range of the desired species of wildlife might be extended by providing additional water developments.
- The present population densities of the desired species can be increased by further water development.
- New habitat can be created.
- The landowner's objectives include attracting wildlife for aesthetic value.

There is no set rule for spacing of wildlife watering facilities. The distance the desired species will travel for water is the main criteria that should be used. The suggested spacing

pattern for ring-necked pheasant and bobwhite quail is at least one installation per 160 acres.

Water should be available at intervals in the landscape so that the ecological needs of the target species are met. Consider the distribution of food and cover, terrain, ecological barriers, disturbance, and any other factors that affect wildlife movement and survival. Follow-up monitoring of wildlife watering facilities can help identify problems so that adjustments can be made to meet the objectives.

The following is an estimate of the distance some wildlife species will travel to water:

Species	Optimum (miles)	Maximum (miles)
Antelope	2	3
Deer	1	3
Elk	1	3
Mourning Dove	3	5
Pheasant	0.5	1
Quail	0.5	1
Songbirds	0.25	0.5
Wild Turkey	1	2

Site location. For upland bird habitat, the site chosen for a wildlife watering facility can serve as a covey center. Escape cover should be provided adjacent to the water. A clump of American plum, currant, aromatic sumac, or other adapted shrub species furnishes favorable escape, foraging, and loafing cover near the installation. Brush piles can be used for temporary cover until vegetation can be established at the site. A site within 100 to 200 yards of a roost tree can be desirable for appropriate species.

The necessity for water in an area depends upon the availability of food, cover, and space requirements of the wildlife species that will benefit from the water development.

Size. The size of the runoff area and storage tank shall be based upon procedures for "Estimating Annual Yield of Runoff" that is outlined on pages KS-2-35 and KS-2-36 in the National Engineering Handbook Part 650 (NEH 650), *Engineering Field Handbook*. The appropriate runoff curve number for the collection area will be selected. The storage tank shall be sized to store the expected evaporation loss and the amount expected to be used by wildlife. Annual average values shall be used. The collection area will be sized such that the 50 percent chance runoff will fill the storage tank.

CONSIDERATIONS

Watering facilities for livestock should be designed and installed based on the recommendations in the Watering Facility Spreadsheet. Access the individual watering facility types (Form KS-ENG-25 attachments) in this spreadsheet that is found under Conservation Practice 614 - Job Sheet.

Fences associated with the watering facilities should be designed to allow safe access and exit for area wildlife species. To protect bats and other species that access water by skimming across the surface, fencing material should not extend across the water surface. If fencing across the water is necessary, it should be made highly visible by avoiding the use of single wire fences and using fencing materials such as woven wire or by adding streamers or coverings on the fence.

For watering facilities that will be accessible to wildlife, give consideration to the effects the location of the facility will have on target and non-target species. Also, consider the effect of introducing a new water source within the ecosystem in the vicinity of the facility. This should include things such as the concentration of grazing, predation, entrapment, drowning, disease transmission, hunting, and expansion of the wildlife populations beyond the carrying capacity of available habitat.

Freeze-proof tanks or electric heaters may be used at some sites. Roofs can be placed over the tank to provide shade and reduce loss of water by evaporation.

Consider the following guidelines for materials commonly used for watering facilities:

Concrete	3000 psi compressive strength
Galvanized Steel	20 gauge thickness
Plastic	Ultraviolet resistance
Fiberglass	Ultraviolet resistance

Where water is supplied continuously or under pressure to the watering facility, consider the use of automatic water level controls to regulate the flow of water to the facility and to prevent unnecessary overflows.

Watering facilities often collect debris and algae and should be cleaned on a regular basis. Consider increasing the pipe sizes for inlets and outlets to reduce the chances of clogging. Maintenance of a watering facility can be made easier by providing a method to completely drain the watering facility.

Steep slopes leading to watering facilities can cause erosion problems from overuse by animals as well as problems with piping and valves from excess pressure. Choose the location of watering facilities to minimize these problems from steep topography.

PLANS AND SPECIFICATIONS

Plans and specifications for watering facilities shall provide the information necessary to install the facility. As a minimum, this shall include the following:

- A map or aerial photograph showing the location of the facility
- Detail drawings showing the facility, necessary appurtenances (such as foundations, pipes. and valves) and stabilization of any areas disturbed by the installation of the facility
- Construction specifications describing the installation of the facility

When possible, specify the tank from the pre-qualified list. When the tank product is not on the pre-qualified list, it will have to be approved. The pre-qualified list of tanks is located in Section KS650.1780(b) in NEH 650, *Engineering Field Handbook*.

OPERATION AND MAINTENANCE

Provide an operation and maintenance (O&M) plan specific to the type of watering facility for the landowner. As a minimum, include the following items in the plan:

- A monitoring schedule to ensure maintenance of adequate inflow and outflow
- Checking for leaks and repair as necessary
- If present, the checking of the automatic water level device to ensure proper operation
- Checking to ensure that adjacent areas are protected against erosion
- If present, checking to ensure the outlet pipe is freely operating and not causing erosion problems
- A schedule for periodic cleaning of the facility

When a float valve is required, it may be left open during the non-growing season for winter use of the animals, if needed.

REFERENCES

General Manual Title 190, Section KS410.26F(1)(i), Protection of Wetlands, U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)

Brigham, William and Stevenson, Craig, 1997, Wildlife Water Catchment Construction in Nevada, Technical Note 397.

Tsukamoto, George and Stiver, San Juan, 1990, Wildlife Water Development, Proceedings of the Wildlife Water Development Symposium, Las Vegas, Nevada, U.S. Department of Interior Bureau of Land Management.

Yoakum, J. and W.P. Dasmann. 1971. Habitat Manipulation Practices. Chapter 14 in Wildlife Management Techniques, Third Edition. Ed. Robert H. Giles, Jr. Pub. The Wildlife Society. 633 pp.

NEH 650, Chapters 5, 11, and 12, USDA NRCS.

NRPH, Chapter 5, Section 2, Page 5-39, USDA NRCS.

NRPH, Chapter 6, Page 6-12, Tables 6-7 and 6-8, USDA NRCS.

National Research Council, 1996 Nutrient Requirements of Domestic Animals, National Academy Press.