

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**

This practice must conform to all federal, state, and local laws and regulations.

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 for guidance on livestock water quantity and quality requirements. For wildlife, base water quantity and quality requirements on targeted species needs.

**Access.** Design the watering facility to provide adequate access to the animals planned to 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 are planned to use the watering facility, both livestock and wildlife.

**Drainage and Overflow.** Protect areas around watering facilities where animal concentrations or overflow from the watering facility will cause resource concerns. Use criteria in the Natural Resources Conservation Service (NRCS) Conservation Practice Standard (CPS) Heavy Use Area Protection (561) to design the protection.

The site shall be well drained. Drainage measures shall be provided as needed. Areas adjacent to the watering facility that will be trampled by livestock and other large animals must provide firm footing and provide adequate drainage. An apron area around the tank perimeter must be concrete or must receive regular maintenance using compacted earth, pit run sand/gravel/rock, or other appropriate nonpolluting, durable materials.

Automatic water level control and/or overflow facilities shall be provided as appropriate to remove overflow water, avoid boggy conditions or foundation failure at the site. Overflow pipes must carry overflow to a stable outlet and must be two-inch nominal diameter or larger. Provisions to cleanout or drain the facility such as siphon pipes, drain pipes, or manual drainage, shall be provided. All plumbing including valves, pipes, and appurtenances, shall be protected from damage by freezing, ice, large animals, and other hazards.

**Durability.** 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 of at least 10 years and meet or exceed 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.

**Concrete.** Type II cement and 3,500 pounds per square inch (PSI) concrete minimum compressive strength shall be specified for concrete structures containing more than 20 cubic yards of concrete.

All reinforced concrete floors for steel rim tanks shall extend a minimum of two feet beyond the periphery of the tank and shall be set on a gravel base at least two inches thick.

**Metal.** Metal tanks shall be constructed of galvanized corrugated metal with reinforced rims. Metal rims set in concrete must be coated with plastic or asphalt based sealant to protect the metal at all concrete/metal contact points. Metal rims used with synthetic liners shall be sealed with bentonite or another approved method at the contact areas around the perimeter.

Tanks with the largest dimension less than 10 feet must be constructed from 20-gauge or heavier metal. Larger tanks must be 18-gauge or heavier. Tanks with metal bottoms shall be set on a well-drained gravel base. Gravel base shall be at least two inches thick.

**Fiberglass.** Fiberglass tanks shall have a minimum thickness of 3/16 inch. Fiberglass tanks shall be made of ultraviolet resistant materials or shall have a durable coating to protect the structure from deterioration due to sunlight. Fiberglass tanks shall be set on a gravel base at least two inches thick.

**Polyethylene.** Polyethylene tanks must be manufactured from high density polyethylene. Tanks must be manufactured with ultraviolet

resistant materials and have a reinforced rim. They are to be used as part of an above ground pipeline system.

**Other Materials.** Other materials may be used where long service life will be provided. Use of manufactured materials must follow the manufacturer's recommendations or a design prepared by an engineer.

**Shade.** When a roof or shade is placed over the watering facility, the structure must be designed for appropriate wind and snow loads and shall be durable and able to withstand anticipated livestock and wildlife activities.

**Connection to Pipeline.** Appurtenances to join sections to pipe or provide tank hook-ups must provide leak free seals and be structurally equivalent to the pipe used.

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

**Water Collection Areas.** Water collection areas shall be designed according to CPS Water Harvesting Catchment (636) and based upon procedures outlined in the NRCS Engineering Field Handbook, Chapter 2,- Hydrology. Storage volume and collection area size shall be based upon a monthly water budget for the target time period.

#### **Criteria Applicable To Providing Livestock Drinking Water**

**Storage.** Watering facilities must provide the daily water requirement of the livestock and provide access to the entire herd (including young animals) within a reasonable period of time.

The daily water requirement must be provided through a combination of watering facility storage and water source flow rate unless the flow rate is adequate to meet the demand.

The water supply system must provide at least the amount shown in Table 1.

Required water facility size is dependent upon water supply flow rate, travel distance, and access space requirements for the number of animals expected to use the facility at any

given time. The watering facility shall be designed according to South Dakota (SD) Design Technical Note No. 2006-1, Watering Facility Design Criteria for Cattle, and the following criteria:

No minimum amount of storage is required for the watering facility and the facility shall be designed according to access space for five percent of the herd if all of the following conditions are met:

1. A very reliable water supply source such as a rural water system or well with conventional power supply is used;
2. The water supply can deliver a minimum of two gallons per minute (gpm) for each drinking space available;
3. The distance from the edge of the pasture to the watering facility is no greater than 1,980 feet.

For reliable water supply sources not meeting the conditions above, size will be based upon a combination of flow rate, physical storage, and access space. The combination of tank storage and available flow rate must be able to deliver the daily water requirements of the animals in 12 hours. Water storage is limited to a maximum of two days. Access space is required for summer grazing at 5 percent to 10 percent of the herd depending on maximum travel distance to water. Refer to SD Design Technical Note No. 2006-1, Watering Facility Design Criteria for Cattle.

For water sources not inspected daily, or sources with high maintenance requirements, or which have power requirements which are not dependable (solar, wind, etc.), a minimum of three and a maximum of seven days of storage is required.

**Winter Watering Facilities.** Winter watering facilities shall be part of a prescribed grazing plan. Winter watering facilities must be freeze-proof. Geothermal heat, insulation, flowing water, covered openings, or other methods may be used. Commercial automatic waterers shall be installed according to manufacturer's recommendations. Winter watering facilities may be designed without regard to travel

distance, and may be designed without regard to storage if the water source can provide a minimum of two gpm per drinking space. Commercial waterers have a recommended number of head that the waterer will serve. For fabricated tanks, provide no less than one drinking space per 100 animals. Systems without the necessary flow rate to provide two gpm per drinking space may be designed using a combination of storage and pipeline flow. The daily water requirement for winter grazing cattle may be considered as 10 gallons per day.

**Livestock Water Distribution.** Stock watering facilities should be located so travel distance between forage and dependable water is no more than three quarters of a mile. Location of the facilities shall be planned in conjunction with the prescribed grazing plan.

#### **Criteria Applicable To Providing Wildlife Drinking Water**

**Storage.** The wildlife watering facility shall be sized to accommodate the expected consumptive rates of all the target and non-target species as indicated in Table 2. The minimum storage shall be 200 gallons.

**Location.** The recommended distribution and spacing of wildlife watering facilities shall be based upon Table 3.

### **CONSIDERATIONS**

Design fences associated with the watering facilities 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.

It is recommended that watering facilities be designed to prevent entry of livestock and other large animals.

When livestock are moved to another area, consider leaving the water in the watering facility to provide water for wildlife.

Watering facilities that rely on water harvesting should be covered to prevent evaporation.

<b>Table 1. Minimum Water Supply Per Animal</b>	
<b>Animal</b>	<b>Water, Gal./Day</b>
<b>Beef Cattle:</b>	
Cows lactating with Calves	18
Bred, Dry Cows and Heifers	15
400 lb. Growing Cattle	10
600 lb. Growing Cattle	13
800 lb. Growing Cattle	15
Bulls	19
600 lb. Finishing Cattle	15
800 lb. Finishing Cattle	18
1,000 lb. Finishing Cattle	21
1,200 lb. Finishing Cattle	23
<b>Dairy Cattle:</b>	
1,400 lb. Dry Cow	16
1,700 lb. Dry Cow	17
Lactating, 20 lb. Milk	18
Lactating, 60 lb. Milk	25
Lactating, 80 lb. Milk	28
Lactating, 100 lb. Milk	33
200 lb. Heifer	3
400 lb. Heifer	6
800 lb. Heifer	11
1,200 lb. Heifer	15
<b>Swine:</b>	
Boars & Gestating Sows	3
Lactating Sows	5
15 – 50 lb. Feeder	0.75
50 – 120 lb. Feeder	1
120 lb. to Market	2
<b>Horses:</b>	
Mature	18
Weanling	8
<b>Sheep &amp; Goats:</b>	
Rams & Dry Ewes	2
Ewes with Lambs	3
Feeder Lambs	1.5
Suckling Lambs	0.3
<b>Birds:</b>	
100 Chickens	9
100 Turkeys	15

<b>Table 2. Minimum Wildlife Water Supply</b>	
<b>Animal</b>	<b>Water, Gal./Day</b>
<b>Larger Mammals:</b>	
*Elk	5 - 8 per animal
*Deer	1 - 2 per animal
*Antelope	1 - 2 per animal
<b>Birds:</b>	
Sharp Tail Grouse	2 - 5 per facility
Prairie Chicken	2 - 5 per facility
*Ring-necked Pheasant	2 - 5 per facility
*Mourning Dove	2 - 5 per facility
Bobwhite Quail	2 - 5 per facility
Gray (Hungarian) Partridge	2 - 5 per facility
*Turkey	6 - 9 per facility
*Songbirds	1 - 2 per facility
Waterfowl and Shorebirds	NA

\*Species that are known to benefit from water developments provided cover is adequate and water is scarce or unavailable.

<b>Table 3. Suggested Optimum Spacing of Watering Facilities</b>	
<b>Animal</b>	<b>Miles</b>
<b>Larger Mammals:</b>	
Elk	1.0
Deer	0.5
Antelope	1.0
<b>Birds:</b>	
Sharp Tail Grouse	1.0
Prairie Chicken	1.0
Ring-necked Pheasant	0.5
Mourning Dove	0.5
Bobwhite Quail	0.25
Gray (Hungarian) Partridge	0.25
Turkey	0.5
Songbirds	0.25
Waterfowl and Shorebirds	NA

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 over use 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.

### **OPERATION AND MAINTENANCE**

Provide an Operation and Maintenance Plan specific to the type of watering facility to 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 insure 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.

### **REFERENCES**

Brigham, William and Stevenson, Craig, 1997, Wildlife Water Catchment Construction in Nevada, Technical Note No. 397.

Tsukamoto, George and Stiver, San Juan, 1990, Wildlife water Development, Proceedings of the Wildlife Water Development Symposium, Las Vegas, NV, USDI Bureau of Land Management.

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National Engineering Handbook, Part 650, Engineering Field Handbook, Chapters 5, 11, and 12, USDA/NRCS

National Range and Pasture Handbook, Chapter 6, Page 6-12, Table 6-7 and 6-8, USDA/NRCS.

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

SD Engineering Standard Drawings  
<http://www.sd.nrcs.usda.gov>.