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

Locate facilities to promote even grazing distribution and reduce grazing pressure on sensitive areas.

Design the watering facility to provide adequate access to the animals planned to use the facility. Incorporate escape features into the watering facility design unless local knowledge and experience indicate that wildlife will not be at risk of drowning.

Provide pre-manufactured, “on demand”, livestock waterer’s of the size and in sufficient numbers to meet the needs according to the manufacturer’s recommendations.

Include design elements to meet the specific needs of the animals that are planned to 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 NRCS 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.

Construct watering facilities from durable materials that have a life expectancy that meets or exceeds the planned useful life of the installation.

Materials. All materials shall have a life expectancy that meets or exceeds the planned useful life of the installation. Common construction materials are reinforced concrete, steel, fiberglass, used heavy equipment tires and plastic. All designs shall meet the industry standards for the material being used. Follow appropriate NRCS design procedures for the material being used or industry standards

where NRCS standards do not exist.

A reinforced concrete trough or tank shall be constructed of good quality concrete using sound, clean aggregates. The concrete mix shall be such that it will produce a compressive strength of3,000 psi at 28 days. A concrete cast trough or tank shall be reinforced with steel as required by the Natural Resources Conservation Service (NRCS), National Engineering Manual (NEH) Part 636, "Structural Engineering" and American Concrete Institute (ACI) – 318 (Latest Edition).

Galvanized steel tanks shall have a minimum thickness of 20 gauge bottom with a minimum wall thickness of 21 or 22 gauge.

Plastic, rubber and fiberglass structures shall be made of ultraviolet resistant materials or shall have a durable coating to protect the structure from deterioration due to sunlight. Plastic/rubber tank/trough shall conform to ASTM D1998, having a minimum wall thickness of 0.125" (1/8") for containers less than 200 gallons and 0.1875" (3/16") for containers 200 gallons or greater.

Watering Facility Components. Water level control and/or overflow facilities shall be provided as appropriate. Water level control and /or overflow facilities will be set to provide a minimum of 1 inch of freeboard below the top of the trough or tank. Valves and pipes shall be protected by shields or covers to prevent damage by livestock and/or wildlife. Full flow automatic water level valves shall be provided if being used with a portable trough or tank. All automatic water control devices shall have an inline shut off valve located at or near the watering facility. All valves and water control devices shall allow the minimum inflow rate. If an overflow pipe is used it shall be piped to a stable or suitable point of release. All pipe and fittings shall be new galvanized steel, copper, bronze, or plastic in accordance with NRCS Conservation Practice Standard "Pipeline" Code 516, and shall be connected in a manner to prevent leakage. Include backflow prevention devices on facilities connected to wells, domestic or municipal water systems. The trough, pipes, and water control valves shall be protected from freezing and ice damage. Freeze-proof troughs or electric heaters may be used.

When a roof is placed over the watering facility to provide shade, the roof shall be designed for appropriate loads and shall be durable to withstand anticipated livestock and wildlife activities.

All watering facilities shall be installed in a manner which will secure the trough or tank in place and prevent the facility from being overturned.

All exposed pipes, fittings, and appurtenances shall be protected from rust or ultraviolet as appropriate.

Location. The watering facility shall not be located adjacent to any well head. A separation distance of at least 50 feet is needed for wellhead protection ("Water Well Rules, Regulations, and Standards", State of Louisiana, November 1985). If possible locate the watering facility down gradient from the well head. The location shall have easy access by the livestock and/or wildlife.

Troughs or tanks should be located so that loafing, by livestock, is not encouraged. Troughs or tanks placed under trees encourage loafing and creates maintenance problems from falling leaves. If water temperature is a concern, the watering facility can be partially buried or a roof built to provide shade.

For livestock, locate watering facilities to fully utilize grazing lands. To get maximum use of available forage, water must be within a quarter mile (1,320 feet) of the forage-producing site on level and undulating topography. Where land slopes exceed 25 percent, this distance should be reduced to 600 feet (NRCS, "National Range and Pasture Handbook" (NRPH), September 1997). Lactating dairy cattle watering facilities should be located within 300 feet of where grazing occurs ("Prescribed Grazing and Feeding Management for Lactating Dairy Cows", New York State Grazing Lands Conservation Initiative and USDA NRCS, January 2000).

Additional Criteria Applicable to Livestock

Water Supply and Capacity. Troughs or tanks shall provide sufficient capacity for the two day water requirement of the livestock through storage and an alternate water source (i.e. storage tank, pond) and provide access to the entire herd within a reasonable period of time, usually 1-3 hours. Water systems that have a weather dependant supply source, such as a solar or wind powered system will have

three day storage. Where livestock are checked a minimum of once daily (i.e. dairy, feedlot) and water supplies are dependable (i.e. pto or self-supporting generator connected to a pump is available to produce water from a well, spring, pond, or municipal water supply), troughs or tanks with 1 day water storage capacity may be used.

A watering facility will be in demand approximately two hours in the morning and two hours in the afternoon by grazing livestock. One half of the total daily water requirement will need to be supplied during the morning and one half during the afternoon peak usage periods.

The watering facility must be connected to an adequate and dependable water supply. Table 1 shall be used in determining the minimum daily water requirements and depth of permanent watering facilities.

Watering system storage capacity is critical to animal health. System storage capacity shall be determined based on the reliability of the water source and the availability of alternate water sources (such as a pond, lake, stream, etc.) to livestock on the land unit.

The minimum watering system storage capacity may be provided in a combination of watering facilities in adjoining pastures.

The required capacity of the watering facility shall be the greater of

1. the Minimum Capacity value from Table 1, for the appropriate livestock, or
2. the value calculated from the following formula.

Capacity, in gallons = (no. of head) x (daily water requirement from Table 1) x (no. of required days storage) x 0.5

Table 1 – Minimum Requirements of Permanent Watering Facilities

Kind of Livestock	Daily Requirement[1/] gal per head per day –	Depth inches	Minimum Capacity gal
Beef cattle	12	24	50
Horse	12	24	50
Dairy Cattle (drinking only)			
Lactating	25	24	100
Non-lactating	15	24	50
Swine	4	6	15
Sheep and Goats	2	6	15

[1/] These requirements vary with climatic conditions, kinds of feed, size of animals, and other factors and may be increased as necessary.

The trough or tank may be increased in size from the minimum stated in Table 1 or computed from the equation above in order to provide access to the entire herd within 1 – 3 hours. For cattle or horses, provide room for at least 1 animal in 20 to drink from a watering facility at a time. For lactating dairy cattle provide room for at least 1 animal in 15. For access, provide 20 inches of perimeter for circular tanks and 30 inches of length for rectangular or square tanks for each animal drinking.

For toughs or tanks where a pond supplies the water to the trough or tank, the pond must have sufficient capacity to store the livestock water requirements for 30 days and provide a minimum elevation head of 4 feet (anticipated water surface elevation during late summer/early fall of the pond surface).

Portable Trough or Tank. A portable trough or tank is one that is moved periodically to facilitate a rotational grazing system or moved to reduce the impact of livestock to the area around a watering point. The minimum volume for a portable trough or tank, as part of a portable watering system, shall be 25 gallons. The minimum water supply rate to the watering facility shall be 5 gallons per minute. Full flow automatic water level valves shall be used. This system will supply water for a maximum of 80 beef cattle or equivalent, based on the water requirements.

Site Protection. The site shall be well drained. If the site is not well drained, drainage measures shall be provided when installing watering facilities on soils rated with wetness limitations. The area beneath the watering facility, and an area of at least 10 feet outside of the trough or tank's perimeter, shall be graveled, paved, or otherwise treated to provide a firm foundation and reduce erosion, in accordance with NRCS Conservation Practice Standard "Heavy Use Area Protection" Code 561. All treated surface areas shall slope away from the watering facility to prevent ponding of water. A portable trough or tank used in livestock rotational grazing systems is not required to have heavy use area protection if the trough or tank is moved often enough to prevent bogging.

CONSIDERATIONS

This practice may adversely affect cultural resources and must comply with NRCS General Manual 420, Part 401.

Topography should be evaluated to minimize trail erosion and flooding erosion from trough or tank overflow.

The size of animals (domestic and wildlife) using the facility should be considered. Watering facilities should be designed so small animals (e.g. calves, goats, deer, etc.) can access the water.

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.

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

An O&M plan specific to the type of installed watering facility shall be provided to the landowner. The plan shall include, but not be limited to, the following provisions:

- check for debris, algae, sludge or other materials in the trough which may restrict the inflow or outflow system;
- check for leaks and repair immediately if any leaks are found;
- check the automatic water level device to ensure proper operation;
- check to ensure that adjacent areas are well protected against erosion;
- check to ensure the outlet pipe is freely operating and not causing erosion problems; and
- prepare guidance for winter weather, such as adding material in the storage area to allow for ice expansion without damage.

Algae and iron sludge accumulation should be addressed in areas that are known to cause this water quality problem. Chemicals such as copper sulfate and chlorine can be recommended as needed, as long as local rules and regulations are followed.

REFERENCES

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, NV, USDI Bureau of Land Management.

Yoakum, J. and W.P. Dasmann. 1971. Habitat manipulation practices. Ch. 14 in Wildlife Management Techniques, Third Edition. Ed.

Robert H. Giles, Jr. Pub. The Wildlife Society. 633 pp.

National Engineering Handbook, Part 650 Engineering Field Handbook, Chapters 5, 11 & 12, USDA Natural Resources Conservation Service.

Timber, National Design Specification for Wood, American Forest and Paper Association

Steel, Manual of Steel Construction, American Institute of Steel Construction

Masonry, Building Code Requirement for Masonry Structures, ACI 530, American Concrete Institute

NRCS General Manual 420, Part 401

NRCS National Engineering Manual, Parts 541 and 542

Prescribed Grazing and Feeding Management for Lactating Dairy Cows, New York State Grazing Lands Conservation Initiative and USDA NRCS, January 2000

National Range and Pasture Handbook, Chapter 6, Page 6-12, Table 6-7 & 6-8, USDA- Natural Resources Conservation Service.

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

ASTM D1998