

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

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 and/or **WVEng WS 614A, or agricultural extension information**. 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.

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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.

The minimum trough(s) or tank(s) capacity will be 100 gallons and or three days storage volume accumulation, unless a permanent water source is documented as available year round.

Automatic livestock watering devices may be used where appropriate, if the following conditions are met

- ***freeze protection.***
- ***electrical requirements.***
- ***necessary water pressure; provide water through the pipeline at a rate of not less than 2 GPM times the number of animals that can drink. For example, a two-hole watering facility needs at least 4 GPM.***
- ***installed according to the manufacturer specifications.***
- ***backup water source (location and volume) for times of maintenance or failure.***
- ***minimum number of opening and flow capacities as outlined in Table 1.***

Protect areas around watering facilities where animal concentrations or overflow from the

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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. **Gravel pads (6" thick or greater) or other suitable foundation underlain with geotextile shall extend a minimum of 6' from the tank, or length of animal which ever is greater (reference CP HUAP (561)). Automatic watering facilities shall be protected by a 4" thick concrete pad, 4 ft. x 6 ft, (reference CP HUAP (561) or according to manufacture.**

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

Troughs or tanks will be located to provide easy access for livestock, where concentrated animal traffic will not cause excessive erosion, and where they will best help to distribute grazing within the fields. Where possible troughs or tanks will be located in fence lines in order to provide water to more than one field.

In intensive grazing systems, the trough or tank may be portable in order to permit movement from one subdivision to another or within the subdivisions (see portable troughs or tanks later in this standard).

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

Automatic water level control and/or overflow facilities shall be provided on all troughs or tanks. Provisions for draining the tank or trough shall be provided for each installation. Overflow pipes may be used as the trough drain when installed such that removal of the overflow standpipe will allow complete drainage of the trough or tank. Valves or pipes shall be protected to prevent damage by livestock by:

1. **Using steel standpipes,**

2. **Installing valves and/or standpipes near center of the trough out of reach of livestock, or**
3. **Installing a metal, wood, concrete, fiberglass or other equally durable plate across the top of the tank, in a manner that will prevent livestock from coming into contact with the valve or standpipe.**
4. **Overflow shall be piped to a stable or suitable point of release, but at least 6 ft. from the outside edge of the trough or tank stabilized area. The trough and outlet pipes shall be protected from freezing and ice damage.**
5. **Freeze-proof troughs or electric heaters may be used.**

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.

Automatic waterers and lightweight plastic or steel troughs or tanks will be anchored or otherwise protected to prevent livestock from moving or damaging the watering facility by pushing on the sides. This can be accomplished by anchoring the facility to a concrete pad, minimum of 4 inches thick, and/or placing a solid wood, steel or other rigid fence around the facility.

Used heavy equipment tires may be used as troughs or tanks. The landowner is responsible for determining that the used tire has never been filled with any fluids that may be toxic to animals or that it has been flushed so there are no residues of toxic material in the tire. Tire troughs will be installed as detailed on standard drawing WV-ENG-64.

Pipes in and through the walls or bottom of troughs will be sturdy and durable. The minimum diameter will be 1 1/4 inches for gravity flow systems and 3/4 inches for pumped pressure systems. However, the

diameter will be no smaller than the pipeline feeding the trough or tank.

Collars will be installed where pipes pass through the wall or bottom of the trough or tank.

Openings cast in precast concrete troughs or tanks, for installation of plumbing, will be filled with a non-shrink hydraulic cement or epoxy after installation of the plumbing. Any of the pipes listed in WV Conservation Practice Standard 516, Pipeline, are acceptable outside of the trough, except that polyethylene pipe will not be used where it will be exposed to sunlight. Pipe through the walls or bottom and inside the trough or tank will be polyvinyl chloride (PVC), galvanized steel, or copper meeting one of the following specifications:

| TYPE PIPE | APPLICABLE SPECIFICATION |
|---------------------|--|
| PVC | ASTM D-1785, ASTM D-2241 (SDR 26 or less), ASTM D-2665 |
| Steel | ASTM A-120, ASTM A-53, AWWA C-202 |
| Copper Alloy | ASTM B-42, ASTM B-43, ASTM B-88, ASTM B-302, ASTM B-306, ASTM B-585, ASTM B-586, ASTM B-641, ASTM B-642 |

Concrete troughs or tanks will have a minimum wall and bottom thickness of 4 inches, except that precast troughs or tanks containing 1.5 lbs. of fiberglass reinforcing fibers per cubic yard of concrete, and cast from concrete having a 28 day compressive strength of 4000 psi or greater, may have a 3" minimum wall thickness. The inside face of the walls of concrete troughs or tanks will have a 2" batter from top to bottom. The minimum steel reinforcement shall be 6 x 6 - 8 ga. x 8 ga. (W2.1 x W2.1) wire reinforcement.

Construction joints in concrete troughs or tanks shall have waterstops installed to insure watertight joints.

Galvanized (2 oz. per sq. ft. zinc coating) steel tanks shall have a minimum thickness of 20 gauge. Coal-tar enamel coated steel tanks will be 16 gauge minimum.

Portable Troughs or Tanks

Portable troughs or tanks will only be used as part of an intensive grazing system, where it is necessary and advantageous to move the watering facility from subdivision to subdivision. They will not be used where water is needed during freezing weather.

These troughs will normally be lightweight plastic or metal troughs. They may be installed on permanent concrete or gravel pads (minimum 4 inch thickness) or installed on a treated wood or metal skid.

Troughs on skids will be moved to the desired location, leveled with blocking, and anchored to prevent movement.

All portable inlet and outlet pipelines will be protected from livestock damage by burial, installation of shields or covers such as steel casing, or by installing the pipe overhead or along fence lines. Steel pipe will not require special protection. Provisions will be made to drain all above ground inlet and outlet pipes during freezing weather.

Shields or covers installed to protect pipes shall be staked or otherwise fastened to prevent livestock from moving the shield or cover and causing damage to the pipe or connections.

Pipes installed overhead or along fence lines will be attached to a continuous treated wood or steel support that will prevent sagging in the pipe or damage by livestock.

The tank should be located so the trough can be utilized in two or more subdivisions, reducing the need to move the trough as frequently. The pads will incorporate

anchor bolts, fence posts or other measures that will prevent movement of the trough by livestock. The pipeline will be installed so it is protected from damage, while the site is being used and when the trough is at another location.

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

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.

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 control 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 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.

Adequate protection for livestock during the winter should be considered. Inlet pipes should be installed with a capped cleanout pipe extending under and beyond the edge of the trough or tank, particularly where silt or sediment may enter the system.

Overflow pipes should be protected with leaf guards when troughs or tanks are installed in or near wooded areas.

PLANS AND SPECIFICATIONS

Plans and specifications for watering facilities shall provide the information necessary to install the facility. **If the trough or tank is a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will also be conveyed on the plans.**

Development of plans and specifications will be in accordance with the

- **National Engineering Handbook (NEH) Part 650**
- **WV5-Engineering Field Handbook, Appendix A- Quick Reference Design and Construction Support Data for Conservation Practices**
- **Engineering Field Handbook, Chapter 5,**
- **National Engineering Manual (NEM), Parts 541 and 542.**

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 O&M 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.
- **Include “Maintenance Tips Brochures for Spring Developments or Ponds” as appropriate.**

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.

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.

NRCS National and State Utility Safety Policy (NEM Part 503-Safety, Subpart A - Engineering Activities Affecting Utilities 503.00 through 503.06)

<http://policy.nrcs.usda.gov/> ***Handbooks: Title 210 – Engineering; NRCS National Engineering Handbook; Part 650 Engineering Field Handbook***

Title 190- Ecological Sciences; Part 601- National Cultural Resources Procedures Handbook

Selection of Alternative Livestock Watering Systems (UTextension PB 1641)

Solar-Powered Livestock Watering Systems (U TExtension PB 1640)

North Carolina State Cooperative Extension Publication Number: EBAE 161-92

http://www.bae.ncsu.edu/programs/extension/publicat/wqwm/ebae161_92.html

NRCS-Tennessee Watering Facility Fact Sheet (March 2003)

WV e-FOTG Section IV- Practice Standards and Specifications

<http://www.nrcs.usda.gov/technical/efotg/> ***(click on WV from the US map)***

WV5-Engineering Field Handbook, Appendix A- Quick Reference Design and Construction Support Data for Conservation Practices

CONSTRUCTION SPECIFICATION WEST VIRGINIA

WATERING FACILITY, TROUGH OR TANK

The tank, trough or site pads will be installed at the locations shown on the drawings.

The foundation area shall be cleared of all vegetation, topsoil, wet soils and any other material not suitable for the subgrade.

The foundation and the area immediately surrounding shall be graded and smoothed to permit free drainage of surface water.

The tank or trough shall be placed on original ground when possible in a well drained location. If low areas are encountered, the area around the tank will be shaped to drain away from the tank, eliminating low areas. The area around the tank, where animals have access will be protected by gravel or other suitable stable material.

Install trough or tank inlet and outlet pipes in trenches as shown on the drawings. The pipes will be placed carefully in the trench to prevent damage and the trenches will be backfilled. The trench bottom and backfill material shall be free of rocks or other sharp-edged material that could damage the pipe. Backfill will be placed such that deformation or displacement of the pipes does not occur. The backfill material will be compacted to a density equivalent to the surrounding ground.

Precast concrete, steel, plastic, fiberglass or other approved pre-manufactured Tanks will be placed on the site in the manner detailed on the drawings. Embedment, anchor pads, fence or other protection will be installed as shown.

troughs or tanks will be placed on the site in the manner detailed on the drawings. Embedment, anchor pads, fence or other protection will be installed Concrete for site cast troughs or tanks shall be ready-mixed concrete (minimum 28 day compressive strength of 3000 psi), pre-bagged commercially available concrete mix, or site mixed concrete. Concrete and reinforcing steel will meet the requirements of Specifications 732, Concrete and 734, Steel Reinforcement.

All tanks shall have surface protection in the form of gravel, pavement or other protective material installed around the trough or tank, unless documented otherwise.

All materials used in installation of the trough or tank will be in good condition and meet the applicable ASTM or commercial specifications shown on the drawings.

Upon completion of construction, all disturbed areas will be graded smooth and blend with the surrounding ground.

Vegetation will be established by applying seeding and mulching materials as described on the drawings according to CP Critical Area Planting (342).

Construction operations will be carried out in such a manner that erosion and air and water pollution will be minimized and held within legal limits.

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Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service [State Office](#) or visit the [electronic Field Office Technical Guide \(e-FOTG\)](#) located on our web site. *Note: Bold italics is information added or changes made to the National Conservation Standard by WV.*

| TABLE 1 | | |
|---|--|--|
| AUTOMATIC WATERING DEVICES | | |
| ANIMALS PER NUMBER OF OPENINGS AND FLOW CAPACITIES | | |
| SHALL BE AS FOLLOWS | | |
| <i>Type Animal</i> | <i>Max. No. of Animals Per Watering Facility Opening</i> | <i>Min. Capacity Per Watering Facility Opening (GPM)</i> |
| <i>Dairy Cattle</i> | <i>8</i> | <i>3/4</i> |
| <i>Beef Cattle</i> | <i>40</i> | <i>3/4</i> |
| <i>Swine</i> | <i>25</i> | <i>1/4</i> |
| <i>Horses</i> | <i>10</i> | <i>3/4</i> |
| <i>Sheep or Goats</i> | <i>40</i> | <i>1/4</i> |
| <i>Poultry</i> | | |
| <i>Laying Hens</i> | <i>200</i> | <i>1/8</i> |
| <i>Broilers</i> | <i>100</i> | <i>1/8</i> |
| <i>Turkeys</i> | <i>50</i> | <i>3/16</i> |
| | | |