NATURAL RESOURCES CONSERVATION SERVICE
MONTANA CONSERVATION PRACTICE STANDARD

WATERING FACILITY (NUMBER)

CODE 614

DEFINITION

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

PURPOSE

To provide access to drinking water for livestock and 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 wildlife.

CRITERIA

General Criteria Applicable To All Purposes

Design watering facilities with adequate capacity to meet the daily water requirements of the livestock and 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.

Storage. Minimum water consumption rates shall be based on the values shown in Table 1. Under grazing conditions, water storage capacity within each pasture, in combination with other water sources shall meet the following requirements:

One day water use minus six hours of inflow, but not less than half day storage for the stock tank(s) when water and power are dependable, and daily inspections occur.

Three days water use where water supply or power is not dependable or inspected daily.

When wind or solar-powered pumps are used, and other water sources are not available, a minimum of three days storage per pasture is required. If the site is remote and inspected infrequently, the storage should be increased to a minimum of seven days.

For winter feeding areas, calving areas, or feedlots, stock tanks or fountains with minimal storage may be used. Watering facilities shall provide the daily water requirement to the maximum confined animal numbers within an eight-hour period.

TABLE 1.

Conventional Grazing Drinking Water Requirements		Maximum Water Spacing (Miles)	
Animal	**Gal/ Day (Min.)**	**Rough Relief**	**Gentle Relief**
Cow and Small Calf	**20**	**0.5**	**1**
Range Cow	**15**	**0.5**	**1**
Horses and Mules	**15**	**0.5**	**1**
Sheep and Goats	**2**	**0.5**	**1**
Dairy Cow	**25**	**--**	**--**
Hog	**2**	**--**	**--**
Daily water consumption for feeder cattle may be calculated at one gallon per day per 100 lbs.			
For summer conditions, a minimum of two gallons per day per 100 lbs. of body weight is recommended for range cattle.			

NRCS, MT
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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.

NOTE: This type of font **(AaBbCcDdEe 123..)** indicates NRCS National Standards.
This type of font (AaBbCcDdEe 123..) indicates Montana Supplement.

Design the watering facility to provide adequate access to the animals**, including wildlife** planned to use the facility. **Escape ramps for small animals and birds shall be installed in all stock tanks. Exceptions are frost-free tanks and fountains located in feedlots.**

Criteria to Protect Wildlife

See specification for Watering Facility - Wildlife (Code 614) for design criteria for various wildlife watering facilities.

The approval of the appropriate NRCS Area Biologist is required where guzzlers and other wildlife watering facilities are planned in areas currently without a water source (exception: wildlife escape ramps in stock tanks.)

Wildlife escape ramps in open livestock water troughs will be designed to contact the sides of the tank so that animals swimming around the tank perimeter are forced to make contact with the escape ramp; i.e., they cannot swim underneath the ramp. Escape ramps will have no greater than 1:1 slope.

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, Heavy Use Area Protection **(Code** 561**)**, to design the protection.

Overflows shall be installed on all stock tanks. Exceptions are winter watering facilities in an enclosed area where animals are being fed and checked daily. The overflow pipe shall have a minimum diameter of two inches, or at least one size greater than the inlet pipe, and located 3 inches below the top of the tank.

Provisions shall be made to prevent erosion at the overflow outlet. Outlets shall also be protected from damage with rock, steel pipe, or concrete, and shall be located a minimum of 40 feet from the tank.

Install permanent watering facilities on a firm, level foundation that will not settle differentially. Examples of suitable foundation materials are bedrock, **six inches of** compacted **sand**, **fine** gravel, or stable, well compacted, **or undisturbed** soils **that will not settle differentially**.

When the area next to the stock tank contains a high silt or clay content, a minimum of six inches of crushed rock, sand and gravel, scoria, concrete, soil-cement paving, or other durable material shall extend a minimum of six feet beyond the tank.

Design and install watering facilities to prevent overturning **or movement** by wind and animals. **Stock tanks subject to movement shall be secured with posts, cross bracing, or other methods to provide a permanent installation.**

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

Include backflow prevention devices **such as double check valves or anti-siphon devices on** facilities connected to wells serving domestic or municipal water systems.

Use the criteria in NRCS Conservation Practice Standard, Pipeline **(Code** 516**),** to design piping associated with the watering facility. **The Montana Stockwater Pipeline Manual may also be used as a guide for planning, design, and management of stockwater pipelines.**

MATERIALS (GENERAL)

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.

Refer to the State Conservation Engineer's Approved Storage and Stock Tank list for tanks currently approved for use.

Concrete Stock Tanks. Concrete tanks shall be constructed from a concrete mix producing a minimum compressive strength of 4,000 psi at 28 days. Minimum thickness and steel for walls and floors shall be as specified in Construction Specification, Watering Facility (Code 614). Wall and floor thickness, and steel configuration for tank components not meeting these minimums will require appropriate structural analysis.

Interior walls subject to freezing shall have a minimum taper of one inch horizontal to 12 inches vertical.

Steel Stock Tanks. All steel tank material shall be galvanized, stainless steel, or factory-coated with plastic or epoxy. The minimum gauge and edge reinforcement shall be as specified in Construction Specification, Watering Facility (Code 614). Steel tanks shall be installed on a concrete or gravel base.

Fiberglass Stock Tanks. Fiberglass shall have a nominal minimum thickness of 3/16-inch and shall be made of ultraviolet-resistant materials or shall have a durable coating to protect the tank from deterioration due to sunlight. Minimum thickness, resin content, and reinforcement shall be as specified in Construction Specification, Watering Facility (Code 614).

Plastic Stock Tanks. Exposed plastic tanks shall have ultraviolet resistance. Prior to use, each make, model, and size of stock tanks manufactured from polyethylene plastic or other plastic compounds must be approved by the Senior Engineer. Approval will be based on operational field experience with specific materials and supplier-provided information concerning configurations, laboratory tests, and other evidence supporting reasonable service life under field conditions.

Rubber Tire Stock Tanks. Large-diameter, heavy equipment, rubber tires may be used for stock tanks. Top rims may be left in place for winter tanks. When the top rim is cut off, the steel belts shall be trimmed off flush. The tires shall be set on a firm, level, foundation such as bedrock, compacted gravel, or stable undisturbed soils that will not settle differentially. Concrete bases shall be a minimum of six inches. Fiberglass or steel plate bases shall be sealed and fastened to the tire bead. Bentonite bases should not be used in tanks subject to long dry periods.

Above-Ground Storage Tanks. Common construction materials include, fiberglass, steel, and plastic. Adequate coatings or ultraviolet-resistant materials shall be used to meet the practice life. Tanks shall be founded on concrete or gravel, and shall be adequately tied down to prevent lateral movement by wind or cattle in the empty condition. Installation shall be in accordance with the manufacture's recommendations. Approval of above-ground storage tanks shall be based on the manufacturer's written guarantee for the tank. A minimum two-year guarantee is required. The producer shall be responsible for maintaining the tank for the practice life. If the tank cracks or deteriorates within that time, it must be replaced at the owner's expense.

Buried Storage Tanks. Approval of buried storage tanks shall be based on an engineering analysis, or ASTM performance testing. If installation requirements are an integral part of the design, it shall be specified by the manufacturer.

Used Storage Tanks. Approval of used steel storage tanks is defined in the National Engineering Manual, Part 543.

Interior and exterior surfaces of buried steel tanks shall be protected against corrosion. Interior surfaces shall be galvanized or coated with an epoxy suitable for livestock use. Exterior surfaces shall be coated in accordance with Construction Specification, MT-113, Paint System F, galvanized, or an approved equal. Exceptions are heavy (7/16-inch) walled used rail cars.

CONSIDERATIONS

Additional drinking water considerations are as follows:

During cold weather, a continuous flow of one gpm or more may be required to keep the tank from freezing.

For feedlots without storage, consider a flow rate of two gpm per drinking space, (20 perimeter inches per animal).

Where conditions allow, overflows that outlet 50 feet from summer use tanks, and 100' for winter use tanks will minimize wet areas.

For bottomless stock tanks with corrugated steel sides, consider polymer, bituminous, or aluminized coating for added life.

For winter feeding areas, calving areas, or feedlots, where stock tanks or fountains with minimal storage are used, consider a documented contingency plan in case of system failure. Without a contingency plan, the one-day storage minus the six-hour inflow should be used.

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, **wire** fencing material should not extend across the water surface. If fencing across the water is necessary, it should be **accomplished with highly visible materials such as wood planks**.

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.

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 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.

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.

REFERENCES

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