

# Supplement to the BLM Fencing Handbook 1741-1

## Installation of Electric Fences

**Purpose:** The purpose of this guidance is to augment Section 1741-1, J.2. of the Bureau Fencing Handbook pertaining to electric fences for use as permanent allotment boundary and/or interior pasture fences with particular emphasis on addressing concerns for both wildlife movement and public lands access regarding human health and safety. This guidance is not intended to address design standards for electric fences needed temporarily or short-term for special management protection from grazing. Electric fences needed for special management such as those to promote recovery following a prescribed burn or to promote aspen regeneration, etc. will be considered on their individual merit in a National Environmental Policy Act (NEPA) document appropriate for the purpose intended.

**Background:** Historically western ranges have been fenced with multi-strand barbed wire and/or a combination of barbed wire and net wire to control livestock. Today the use of electric fence is becoming a very popular alternative. Electrical fences provide an effective low-cost and easy to install and maintain management tool for control of livestock. Properly installed and maintained, electric fence systems can be used for rotational grazing management systems, riparian enclosures, etc. However the use of electric fence on public lands has raised two primary issues.

1. The effect on wildlife movement to and from traditional seasonal ranges.
2. Public land access regarding human health and safety.

Guidance currently found in the Fencing Handbook 1741-1 lacks the detail necessary to effectively plan for installation and use of electric fences.

In May 2002 the University of Wyoming's Cooperative Fish and Wildlife Research Unit published a final report prepared by Rory Karhu and Stanley Anderson entitled Evaluation of High Tensile Electric Fence Designs on Big Game Movements and Livestock Containment. This policy relies heavily on the findings and recommendations in this report.

**Policy:** It is the policy of the Bureau of Land Management (BLM) in Wyoming that before approving any electric fences, either permanent or temporary, affecting public land administered by the BLM, all requests or applications for the installation will be thoroughly assessed and evaluated using existing NEPA guidelines and policy. These applications will be considered in a multiple use context consistent with the current Resource Management Plan decisions for the public lands involved. Particular emphasis will be placed on the affects to wildlife migration and/or movement and the concerns for human health and safety regarding access to and across public lands.

Before any BLM funds (e.g., Rangeland Management Program 1020 and/or Range Improvement funds 8100/8200) are used to construct an electric fence for the purpose herein, there must be an expressed benefit to the public lands. These benefits can be expressed in an approved Allotment Management Plan, other activity plan intended to serve as the functional equivalent of an allotment management plan (i.e., Habitat Management Plan, Coordinated Resource Management Plan, etc.), or management agreement with all interested parties for maintaining and/or improving land health.

**Fence Design:** The purpose of any fence is reasonable control of livestock (cattle, bison, sheep, etc.) movement by either containing or excluding the animals regardless of design. Although there are many effective designs, the goal is to find the optimum design for the job to be done while still providing for wildlife movement and other public land uses. This policy is intended to outline a consistent approach to

do that. The publication entitled Fences prepared in cooperation with the Bureau of Land Management, USDA Forest Service, Technology and Development Program, and the Society for Range Management, pages 87–134 is a handy reference for electric fence specifications. Also refer to the attached illustrations for design specifications specific to guidance herein. (See pages 24 and 25 of the University of Wyoming evaluation report for design illustrations)

Information gained from the field evaluation conducted by the University of Wyoming referenced above, indicates that a 3-wire electric fence is the optimal design to meet the goals of both the livestock producer running cattle and/or bison, and the wildlife manager with a concern as to the affects on wildlife movement. The height of this fence is 42” with the bottom wire 22” above the ground with 10” spacing between wires. If circumstances warrant, this standard may be modified to 40” inches high 12” between top and middle wire, 10” between middle and bottom wire, with the bottom wire 18” above ground. The electric fence designs friendliest to wildlife are ineffective in controlling sheep because the bottom wire must be lower than 16”. Therefore, electric allotment boundary and/or pasture fences for controlling sheep will not be allowed on public lands in Wyoming.

Two-wire designed electric fences pose little or no problem to elk or mule deer movement, but are confusing to pronghorn and result in high aversion rates. If pronghorn are present a 3-wire fence is the preferred design. Two-wire fences effectively control cattle in most all situations, but should not be used as a weaning fence. The height of this fence is 30” (Hot) with the bottom wire 20” (ground) above the ground with 10” spacing between the wires. This fence design is not recommended for bison containment.

There is really no need for a 4-wire electric fence, even to contain bison. The above-mentioned study shows that the 3-wire electric fence performed satisfactorily with both classes of livestock. However, if circumstances dictate the absolute need, such a fence will conform to the standard 4-wire fence design with bottom wire 16” and cold or not charged. This design keeps the height of the fence to no more than 42” compared to 52” for the 4-wire electric fence often used for bison operations.

Any electric fence being proposed for the intended purpose of this policy having 5 wires or more and/or greater than 42” in height will not be allowed on BLM administered lands in Wyoming.

A ¾ to 1” diameter fiberglass fence post is recommended. However, pointed wooden posts have been successful. Steel posts are not recommended. Insulators are also necessary when using steel posts.

The recommended wire type is a smooth high tensile 12.5-gauge either 170,000 or 200,000 psi. 170,000 psi is preferred because it is the easiest to handle and to tighten. It is recommended that wires be tightened to 150 lbs tension. 14-gauge high tensile wire is too thin and difficult to see resulting in an unacceptable increase hazard to wildlife and to human safety. Components or material used in lieu of high tensile wire such tape, twine, wire nylon, etc. are not recommended. These materials will not withstand the weather in the long term. For temporary or short term (e.g. 6 months or less) these work reasonably well. To use them otherwise will increase material replacement cost and repair time.

Energizers must be Underwriters Laboratory (U.L.) approved in accordance with U.L. Standard 69. This means it has been approved safe for human use. Energizers vary in joules or capacity. How much capacity depends on the miles of fence to be energized and the number of wires. Regardless of energizer capacity, the limits are: (1) energy 5 to 8 joules, and (2) peak current no greater than 10 amperes.

The use of wire stays is optional. However, the preference is **not** to use them because of higher maintenance costs associated with the fence grounding out when the stays are hit by wildlife or livestock causing the wires to twist together. Twisting also presents a higher risk for the animal to become

entangled. However, with smooth wire and the 10" to 12" spacing the risk of entanglement is minimal. Stays also tend to make the fence a little less friendly for wildlife that traverse between wires by reducing the flexibility between wires due to recommended spacing requirements. Therefore, the recommended fence post spacing is 50' if stays are not used. If posts are greater than 50' apart and stays are determined to be needed, a rule-of thumb calls for a distance of 30' between stays; with no more than two stays between fence posts (e.g., 60' between posts with 1 stay and 90' maximum line post spacing with 2 stays). This could vary depending on the post spacing and on the type of terrain where the fence is located.

Maintaining fence flexibility and a maximum top and minimum bottom wire height is the key to providing a fence that will contain cattle or bison and still allow wildlife to traverse. If the 3-wire fence design as recommended is modified by using steel posts, different types of wire, different spacing between wires, increased tension of wire etc., the integrity of the fence as well as considerations for wildlife movement and public health and safety may be compromised affecting the goals we are trying to accomplish. With electric fence, design and proper construction techniques are critical. In other words, if shortcuts in materials and/or construction are taken, you are asking for a maintenance nightmare and the fence will likely not function as intended. For advise on construction and fence components, consultation with the manufacture's representative for the fence selected is always a good idea and highly recommended.

**Safety Requirements:** Electric fences on public land raise concerns of safety, particularly for those who may have heart pace makers. In addition, the potential of receiving a shock is a concern of most people. Therefore, they become reluctant to cross the fence and then the issue becomes one of access to and over public lands.

To help alleviate these concerns, the measures listed below will be required for all electric fences allowed on public lands in Wyoming.

- During periods of inactivity (e.g., when no livestock are in the pasture controlled by the fence) the power will be shut off. If possible, turning them off during peak recreation use times such as hunting season may be desirable.
- Gates will not be electrified. Stiles or pedestrian walk through as shown in Illustration 3 of the Fencing Handbook 1741-1 will be installed to provide passage relatively safe from shock. These fence crossings will be provided as determined by the BLM and the cooperator and identified as a special condition in Sec. 14 of Form 4120-6, Cooperative Range Improvement Agreement dated June 2002.
- Signs warning of the electric fence will be placed at common crossing points and at intervals along the fence. Signs provided by the fence manufacturer tend to blow off. Therefore, they need to be attached to assure they will remain.
- A safety brochure detailing information on electric fences and illustrating ways of safely traversing a fence will be developed no later than **December 31, 2003**.

**Public involvement:** Concerns over the effects of electric fences on public land access, human health and safety, and wildlife movement are cause to provide for, and ensure that, there is an open process during the evaluation and/or assessment of any electric fence proposal. The Field Manager needs to ultimately determine how public involvement will evolve. But not having some level of public involvement is not an option.

The NEPA process will provide the avenue for the public to become aware of the project and become involved. The magnitude of the project will be a major factor as to how much outreach and public involvement will be required. For example, a mile or two, something portable, around an enclosure for riparian protection etc., may not require extensive or even demand a lot of public involvement outside of local government agencies and those that have expressly indicated an interest in the allotment or area in which you are working. Whereas a proposal to replace and/or construct numerous miles of electric fence affecting wildlife seasonal range migration routes or in proximity to or encompassing areas frequented by the recreating or casual user of the public lands may require a series of public meetings to scope the issue before completing the assessment.

**Other Considerations:** The following are other consideration important to effective electric fence planning and management:

- Electric Fences are very effective for enclosing and managing riparian areas because the site is wetter.
- Visibility – The use of flagging and/or signs to highlight the fence is beneficial to help animals to see the fence. This is particularly helpful in keeping birds from flying into them and in wooded areas where lighting is poor. Pay attention to fence location in relation to bird concentration areas such as sage grouse leks. No electric fence should be constructed within 1 mile of a sage grouse lek because there exists an increased probability that birds will collide with the wires as they fly to the lek during the early morning hours when there is poor visibility.
- Fence in disrepair lying on the ground is an entanglement danger to both livestock and wildlife. It is extremely important that maintenance responsibilities are clear and enforced. This is to be clearly stipulated on the Cooperative Range Improvement Agreement, Form 4120-6.