Sizing Plastic Pipelines for Water on the Range

Guide B-810

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Cooperative Extension Service • College of Agricultural, Consumer and Environmental Sciences

This publication is scheduled to be updated and reissued 5/15.

In recent years, the advent of plastic pipe has given ranchers the opportunity to extend their livestock watering facilities cheaply and easily.

Plastic pipe has a low-friction factor at the low flows associated with livestock watering. It is also very inexpensive compared with other pipeline materials, and it is easy to install.

To select the proper size of pipe to fulfill your needs, all you need to know is the flow rate needed to keep the tank full enough to water the stock and the relative difference in elevation (on a "downhill" basis) between the source and the stock tank. The chart on the back of this sheet does the rest.

On this chart, the horizontal scale represents the amount of slope you must have to overcome pipe friction and produce flow between the two points. It is expressed in feet of fall per 1,000 feet of distance. The vertical scale represents flow rate. Use the diagonal lines to determine the rate of flow of a given size of pipe, as shown in the following examples:

Example A: If a rancher has a fall of 10 feet per 1,000 feet between two locations and chooses to use 3/4-inch pipe to convey the water, such a pipe as shown by the bold line "A" on the graph would produce a flow rate of about 1.8 gallons per minute.

Example B: If a rancher wants a flow rate of 6 gallons per minute on a pipeline that has an average slope of 3 feet per 1,000 feet, he or she would need to select 1 1/2-inch pipe to do the job.

This chart neglects the minor losses associated with fittings, elbows, etc., and considers only friction losses in the pipe, which are essentially overcome by the elevation differences.

When great differences in elevation exist between two locations, as in mountainous terrain, it is entirely possible that the elevation difference could create enough pressure to cause the plastic pipe to burst. Plastic pipe is generally constructed to withstand a pressure of 80 pounds per square inch. The relationship between pressure and elevation is expressed in the equality of 1 psi = 2.31 feet of elevation difference.

Therefore, on a pipeline where 80 psi pipe is used, elevation differences exceeding 180 to 190 feet (80 x 2.31 = 184.8 feet) should be broken up by an intermediate tub, which could also serve as a drinking location, but whose main purpose is a pressure reliever. Such a device is shown in Figure 1.

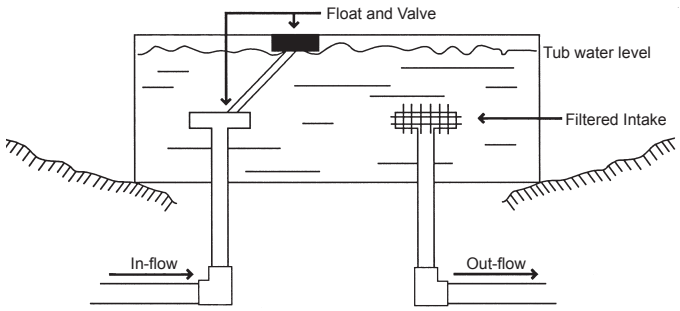

Figure 1. **Tub installation, breaking line pressure.**

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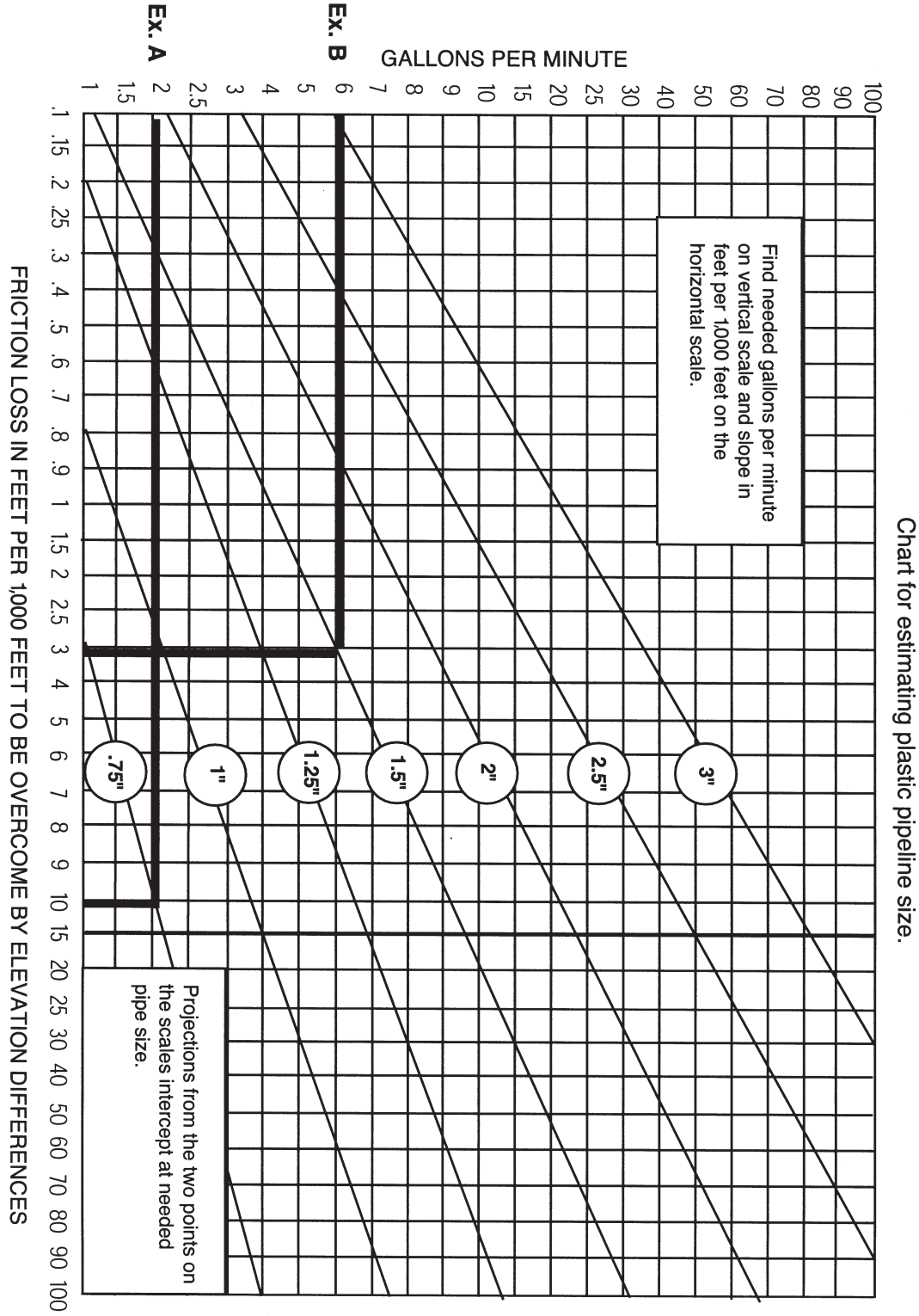

Revised May 2010 **Las Cruces, NM**