

BRENNAN RANCH

COPY

WALLOA
Water report
Brennan Ranch
area - Wallowa
County by N. S. Wagner

June 29, 1951

Mr. M. J. Brennan
Lightening Creek Ranch
Joseph, Oregon

Dear Mr. Brennan:

The following paragraphs represent a brief summary of my conclusions relative to the ground-water situation in the general area of your Lightening Creek holdings.

It is readily apparent that there are several places on your holdings where additional water supply can be developed in amounts adequate for stock purposes. The question of developing volumes of water sufficient for irrigation purposes is, however, another matter. Generally speaking, the prospects appear poor. This is most certainly so in terms of any large volume well under artesian head and centrally located with reference to the particular table land tract which you wish to irrigate.

Briefly, ground-water exists in two major states of occurrence, namely as (1) free water, and as (2) confined water. Free water represents normal precipitation water which soaks into the ground and accumulates above the first impervious strata encountered. It is thus often referred to as surface water. Confined water, on the other hand, represents water which has succeeded in penetrating below this level to a reservoir strata in which it becomes imprisoned both above and below by an overlying and underlying blanket of impervious strata. Such water is more or less analogous to water in a pipe system, and roughly speaking it is governed by the same fundamental laws of hydraulics. Conversely free ground-water follows a behavior pattern more nearly comparable to surface water in ditches.

Artesian water always originates from confined sources, and the head, or intake area must be higher than the well collar in order to provide the pressure necessary to cause natural flow. In this connection I might state that a well doesn't necessarily have to have a natural flow to be classed as artesian. One in which the water rises to some point near the surface after being penetrated by the well at depth, is also considered from an engineering standpoint as being under artesian pressure.

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Free or unconfined ground water can, and often does, occur in enormous quantities. This is especially so in large valleys filled with thick accumulations of unconsolidated sands and gravels. It may also occur high on hilltops, however, when precipitation water is available, when the surface soil is of a type that will permit ready ingress, and when the prerequisite impervious stratā exists to arrest the downward subsurface migration of the water. Such localized water bodies are known as "perched" water bodies after the peculiar circumstances of their occurrence. They may be large, but are often small. Because they tend to be characterized by a belt or zone of seepages in the area occupied by the exposed margin of the impervious formation upon which they rest, and because they are dependent for replenishment upon the capture of precipitation water within the bounds of a strictly localized surface area, occurrences of this type are highly sensitive to yearly variations in precipitation.

Turning to the more immediate aspects of the subject, your property is underlain by the Columbia River lava formation. This formation is comprised of a series of lava flows and interbedded sediments. It is widespread in its occurrence, and in your portion of Wallowa County it is thick to the extent that the underlying formations are exposed only in a few places in the Snake and Imaha River canyons. Fundamentally speaking, this lava-sediment series rates as a potentially good host for underground waters. Many notable wells have been developed in it in Idaho, Oregon and Washington. There are, however, certain unfavorable conditions in the area immediately surrounding that in which you wish to drill. The most important of these are the canyons. Were it not for these, successful drilling results in the form of high yield wells could be generally anticipated. As is these deep canyons serve to restrict the bounds of the watershed from which underground replenishment can be had in your area. They also provide natural leakage for such local waters as may be taken in. The chances are therefore that only relatively low yield wells can be developed by any well penetrating the formation to depths less than that of the deepest local canyon.

There is evidence that sedimentary interbeds may be fairly abundant in the portion of the lava series occurring under the land surface in the general area of your property. There are also scattered indications which serve to suggest that these sedimentary interbeds may contain clayey layers. Because of this it appears that your present springs and seepages represent the natural leakage of the free or surface water from the perched type of ground-water accumulation. At one time during the course of my examination I entertained the notion that you might be able to secure irrigation water by opening and reservoiring a series of your better seepages as a substitute for one central well.

Subsequent examination along this line showed that most of the more promising seepages were unfavorably situated with reference to the various parcels of land to be irrigated to the extent of making adverse pumping conditions for localized irrigation by even overhead sprinkling. At best this might be possible on only certain of your lower elevation plots of grassland; certainly not on the higher elevation tracts.

We discussed this at some length during the course of our inspection of the property, but I wish to caution you again against over-development of your seepages even for stock purposes. You can develop several more water holes than you now have, but it would seem like the better part of wisdom to keep them small in surface area so as to hold evaporation to a minimum. The way it stands, your expressed idea of selective contour trenching and ditching for the purpose of trapping and distributing a larger increment of the annual snow melt and thereby enhancing the water situation on some plots of your pasture land, impresses me as being a constructive idea that might well be worth further consideration. Otherwise, your irrigation problem as I see it is reduced to the gamble of drilling a series of shallow wells with the hope that they might yield enough water for a short spot sprinkling of a small surrounding area.

Very truly yours,

N. S. Wagner
Geologist

NSW:mb

cc Mr. F. W. Libbey