

REPORT ON THE PROPOSED G. M. COLLINS  
WELL SITE NEAR GLENDON, WYOMING

Introduction

The proposed irrigation well site is located in the SE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$  of sec. 29, T. 30 N., R. 68 W., about three miles north of Glendon, Wyoming. The geology of the area was investigated by the writer and Mr. Acus Edwards, in company with Mr. Harold Bindschadler of the Soil Conservation Service, on January 30, 1940. At the time of investigation much of the area was covered by snow, and parts of the area were inaccessible. Exposures were satisfactory, however, for obtaining a general knowledge of the geology of the region.

Relief

The region is a small basin with a drainage area of about 2,000 acres. It is bounded on the north by a prominent escarpment, and on the west and south by more gentle slopes. The basin opens to the east. The proposed well location is near the lower end of the basin.

Drainage

There are no intermittent or perennial streams in the basin. All streams are ephemeral, and flow only in direct response to precipitation. The drainage system consists of one principal ephemeral stream, and several minor ephemeral tributaries.

Stratigraphy

Rocks exposed in the area consist of the Casper sandstone (Pennsylvanian), the Embar formation (Permian), the Chugwater formation (Permo-Triassic), and the Arikaree formation (Miocene).



## Structure

The area is a small structural basin modified by erosion. It is bounded on the north and west by an asymmetrical anticline. The red Chugwater shales and, to a lesser degree, the Casper sandstone and the Embar formation are exposed in the anticline which bounds the basin on the north. To the west this anticline is largely covered by the nearly-horizontal overlapping Arikaree sediments. The south side of the basin is bounded by a smaller anticline. Here the Chugwater is covered in many places by remnants of Arikaree sandstone. The basin floor is covered by Arikaree. At one locality on the basin floor in the  $SE\frac{1}{4}NW\frac{1}{4}SE\frac{1}{4}$  of sec. 30, T. 30 N., R. 68 W., the Embar formation is exposed in a gully cut through the overlying Arikaree. At this exposure the strike of the Embar beds is N.  $40^{\circ}$  E., and the beds dip  $15^{\circ}$  NW.

Erosion occurred prior to deposition of the Arikaree. At most places the Arikaree overlies the Chugwater formation. At some places it overlies the Casper sandstone, and at other places the Embar formation. Pre-Arikaree erosion makes it impossible to predict accurately the thickness of the Arikaree or the thickness of the remaining portions of the underlying formations at any one locality.

## Present Well Development

At the present time there are records of six wells drilled in areas adjacent to that of the proposed irrigation well site. One well is in sec. 30 and five are in sec. 29. The well in the  $NW\frac{1}{4}SE\frac{1}{4}NE\frac{1}{4}$  of sec. 30 is 197 feet deep. This well pumps dry. A well in the  $SE\frac{1}{4}NE\frac{1}{4}NW\frac{1}{4}$  of sec. 29 is 129 feet deep, and the water table is 40 feet below the surface. The well in the  $S\frac{1}{2}NE\frac{1}{4}NW\frac{1}{4}$  of sec. 29 is 139 feet deep, and the water level is 58 feet below the surface. This well is at a higher elevation than the preceding



one, which probably accounts for the difference in the position of the water table. In the NE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$  of sec. 29 there is a well 100 feet deep. The water level in this well is about 40 feet below the surface. Water from the well is used for domestic purposes. A well not in use at the present time is located in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$  of sec. 29. This well was drilled to a depth of 420 feet; the water level is about 40 feet below the surface. An irrigation well has been drilled in the SW $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$  of sec. 29 to a depth of 107 feet. The water table here is also about 40 feet beneath the surface. The well is 10 inches in diameter. A Deming eight-inch rotary pump attached to 87 feet of pipe is used at this well. The pump delivers about 150 to 200 gallons of water per minute without appreciable draw-down. When the pump is operated at full capacity of 1,000 gallons per minute the water level is lowered from 40 feet to 87 feet in about 40 seconds. This well produces from the Arikaree formation.

#### Source and Quantity of Ground Water Available

The sole source of ground water in the Arikaree in the area is precipitation. The catchment area is estimated by the Soil Conservation Service as 2,000 acres, and the valley floor is about one-half mile wide at the proposed well site. The underground water moves eastward from the interior of the basin in much the same direction as surface water.

An estimate of the possible recharge of ground water in the Arikaree formation lying within the basin is as follows. It is understood that any estimates of this nature are only rough approximations.

Estimated amount of precipitation entering the Arikaree formation annually . . . . .	5%
Average annual precipitation . . . . .	14 inches
Total area in drainage basin . . . . .	2,000 acres



On the basis of the above figures the total average annual recharge from precipitation is

5% of  $2,000 \times 1 \frac{1}{6} = 116$  acre feet.

According to the above estimate, if all ground water now in storage in the Arikaree formation within the catchment basin were removed there would be 116 acre feet of ground water from precipitation per average year. What portion of this water could be removed by a well or wells is not known. It is believed that much of it would leave the area by underground drainage.

#### Artesian Possibilities

The drainage basin, and the area surrounding the drainage basin, are largely covered by Tertiary sediments. Because of this cover, artesian conditions are not known.

#### Conclusions

It is improbable that wells drilled in the Arikaree at the proposed site will have a larger yield than those producing from the formation in adjacent areas. The success of deep wells drilled at the proposed site to the Casper sandstone for artesian water cannot be predicted.

Signed.....  
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Approved.....  
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