

GEOLOGIC NOTES ON THE OGDEN CANYON DAMSITES, BEARLODGE MOUNTAINS, CROOK COUNTY

General Statement

On November 3, 1961, the writer, upon the request of Mr. E. J. Van Camp, Chief of Water Development, Wyoming Natural Resource Board, made a brief geological examination of two proposed damsites in Ogden Canyon. A third site, located in the W $\frac{1}{2}$, sec. 25, T.52 N., R.63 W., was not examined. The writer was accompanied by Mr. John Goodier, Assistant Chief of Water Development, Natural Resource Board, and Mr. Myron Goodson, a rancher and member of the Natural Resource Board.

Geology

Location: - Approximate center sec. 26, T.52 N., R.63 W.

The proposed damsite is located in a local widening of the "V"-shaped canyon of Ogden Creek. Here the stream disappears underground and reportedly does not reach the surface again (except during periods of spring runoff) for a mile or two down the canyon in an easterly direction.

Both abutments are composed of a medium-gray somewhat brecciated limestone of the Mississippian Pahasapa (Madison) formation. This formation strikes north-south (across the creek) and dips 30° east (downstream). A prominent joint set strikes east-west and dips 85° south. Alluvial fill (depth to bedrock) along the creek is estimated to be about 20 feet.

There are several factors that probably contribute to the disappearance of water in the creek here. First, the bedding planes of the limestone dip downstream, and a steeply dipping joint zone parallels the course of the creek. Both of these provide a passage for the escape of water. Further, it is reasonable to assume that the Pahasapa (Madison) limestone is cavernous (all of the large caverns in the Black Hills area are in this formation) on the basis of available geologic information. Thus the water probably flows down the bedding planes and joint zones into a subsurface cavern (or caverns).

Because of the leakage of water, a dam is not recommended at this location. The seepage zones could be grouted, provided that no caverns were encountered; however, it would be exceedingly difficult and expensive to effectively seal off interconnected subsurface caverns should they be present.

Location: - Approximate NE $\frac{1}{4}$ sec. 27, T.52 N., R.63 W.

The second damsite examined was at the contact of Tertiary intrusive igneous rocks and the Cambrian Deadwood formation. A small earth-fill dam has been constructed here which forms a small reservoir.

The north abutment is composed of light brownish gray altered and highly fractured syenite porphyry. About 30 to 35 feet above the creek level, the syenite porphyry is unconformably overlain by light brown ferruginous sandstones and quartzite of the Deadwood formation. This formation strikes north-south and dips from 25° to 30° east (downstream).

A limited exposure of dark greenish gray phonolite (?) occurs on the south abutment. This igneous body may possibly be a dike, and if this is the case, then it is probable that the lower part of the bedrock here would be similar to the north abutment. The above outcrop is somewhat sheeted (fractured) along rudely horizontal to gently undulating planes. Since these planes are tight, the permeability is probably negligible. Two major joint zones are present. One strikes N. 48° W. and dips from 70° NE. to vertical, and the other strikes east-west and dips 75° south. The water seepage through the south side of the small earth-filled dam may be controlled, or caused by, the joint zone striking N. 48° W.

Conclusion and Recommendations

- (1) The Construction of a dam in the center of section 26 is not recommended because of the geological factors described earlier in this report.
- (2) A single dam, 80 to 90 feet high, is not recommended in either section 26 or 27, because of the high probability of excessive leakage.
- (3) Two small dams, each about 40 feet high are geologically feasible in section 27. One of these could be located in the NE $\frac{1}{4}$ of the section. The geology of this site was discussed earlier in this report. In this case, it would be desirable to expose fresh bedrock on both abutments. If fractured zones persist, a layer of impermeable clay or bentonite would be desirable to inhibit leakage. If the fractures are large, they should be grouted.
- (4) Assuming that a second dam is built in section 27, then the recommendations mentioned in (3) above should be employed if the geologic conditions are similar.

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Dated: