

SAVERY DAMSITE, CARBON COUNTY

Location: Sec. 2, T. 14 N., R. 89 W.

Date Examined: May 28, 1957

Storage: A 60 foot dam will impound approximately 8,000 acre-feet of water (J. Banner, oral communication).

Geology

The damsite is located along Savery Creek, which flows between the toe of a large landslide on the left and a steep cliff of Steele shale and Mesaverde formation on the right (looking downstream). Both formations, which are Upper Cretaceous in age, strike northwest and dip about three degrees southwest. These are unconformably overlain by the Browns Park formation of Miocene age.

The right (west) abutment adjoins the Steele shale which consists of a buff to dark gray shale with thin seams of sandstone. This is overlain by a tan, massive, somewhat cavernous sandstone of the Mesaverde formation. Two joints sets observed here have the following attitude: East-West, vertical; and N. 20° W., and vertical; strike and dip respectively. The dam will tie into the Steele shale which is considered relatively impermeable and geologically stable.

The left (east) abutment will adjoin the toe of a large landslide mass approximately one and one-half miles long (east-west direction) and one mile (north-south). The landslide is characterized by hummocky topography and is evidently fairly old geologically since it is covered by a thin soil mantle with grass and sagebrush growing on it. The mass appeared well saturated with water at the time of examination since a number of sag ponds containing soil and organic debris were observed just east of the toe.

Surficial exposures show a number of large blocks of conglomerate which are presumed to have slid from the Browns Park formation cropping out on the hill to the east. The character of the underlying rocks in the slide mass can only be determined by drilling. Murdock (1945), however, reports that five drill holes examined by the Bureau of Reclamation show an upper alluvial unit consisting of clay, silt, sand, gravel, angular blocks up to 10 feet in diameter, and a dark clay; all relatively impermeable. This overlies dark colored clay and shale fragments which are believed to be tight and fairly well compacted. Murdock, however, believes that the stability of this material is poor, since it possesses a low angle of internal friction. One hole reportedly encountered gravels at 67 feet which probably marked the former position of Savery Creek. The landslide mass as a whole overlies the Steele shale (see geological cross section).

The average slope of the landslide near the abutment is about 7 or 8 degrees. The flatter slopes of the mass are east of the abutments. Just east of the toe, however, are a number of raised rims of debris. Actually the landslide is probably better classified as a modified earth-rock flow.

It is puzzling how such a slide could take place with only a dip of three degrees on the sliding surface (dip of the Steele shale). Evidently the slide moved fairly slowly and occurred when the ground water table dropped. At this time, since much of the material is too fine grained to permit free drainage, the weight of the debris is further increased by the weight of the water trapped in the voids. With subsequent loss in shear strength and associated excess hydrostatic pressure, the mass either slid as a whole or more probably as a group of small slides.

No evidence of recent sliding was observed, and it would appear that the slide is fairly well stabilized.

Conclusion

No undue seepage losses are to be expected in the reservoir basin which is in the impervious Steele shale. This holds true for the right abutment, except that some sloughing off due to wave action may occur.

The left abutment, however, presents problems that are not easily reconciled if a dam were built on it. Favorable factors indicate a present stability and relative impermeability. Further, the slide is relatively confined and does not have much room for further movement. However, a laboratory test of materials should be undertaken, and also pressure testing of drill holes to determine what may be expected in the way of leakage.

The writer cannot definitely determine whether the left abutment will be stable when the reservoir is full. Present geological factors would seem to indicate that it would. It is probably best to inform the designer, and others concerned with the dam, of the geology and possible hazards of the site and recommend that the lowest possible dam be constructed with the axis as far as possible upstream if the project is to proceed.

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Reference

Murdock, J. Neil, "Preliminary Geology of the Savery Creek Damsite - Little Snake River Project, Wyoming", unpublished report by U. S. Bureau of Reclamation, Dec. 1945.