

AGRARIAN RESERVOIR SITE, BIG HORN COUNTY

Location (damsite): $W\frac{1}{2}$ sec. 12, T. 52 N., R. 95 W.

Date Examined: December 13, 1960

Storage Data: Compacted earth-fill dam, 53 feet high, 8 foot freeboard, and crest length of 1,140 feet.
Reservoir capacity is 4,106.21 acre-feet with a maximum depth of 43 feet.

Geology

The damsite is located along Dry Creek which flows approximately east-southeast to due east. Dry Creek has eroded a relatively large channel approximately 1,560 feet wide (at the damsite) in the Tertiary Willwood formation and overlying alluvial terrace deposits. Both abutments adjoin the Willwood formation which has an approximate north-northwest strike and dip of several degrees to the south-southwest. Since the sandstones of the Willwood formation are cross-bedded and occupy scoured and filled channels, random attitudes of the beds occur. This is not deleterious to the abutments, however.

Outcrops at the south abutment expose about 30 feet of yellowish gray medium-grained cross-bedded alternating hard (relatively) and soft beds of calcareous sandstone. These beds are somewhat cavernous as exposed on the outcrop, but this condition is believed caused by surficial weathering and should not be expected to be present within the rock itself. As evidenced by exposures at the north abutment, it is presumed that shale underlies the sandstone beds, but these beds are not exposed.

The upper part of the rock section at the north abutment is composed of approximately 20 feet of alternating hard and soft sandstones similar to those on the south abutment. These rest on a 30-foot exposure of light

olive-gray thin-bedded impermeable shale.

Although not directly observed by the writer, it is believed that shale underlies the alluvial deposits of Dry Creek. This is substantiated by the report of Baldwin (oral communication) that shale occurs about 15 inches below the surface level (Dec. 13, 1960) of Dry Creek. If this is true, then the thickness of alluvial fill in Dry Creek valley is probably not more than 10 to 15 feet.

Unconformably overlying the Willwood formation in the vicinity of the damsite is an irregular thickness, varying from 8 to 20 feet, of Quaternary terrace gravels, sand, and clay. As exposed in a narrow 27-foot gully about one-fourth mile south-southwest of the damsite, these deposits are about 9 feet thick and unconformably overlie a sequence of tan somewhat loosely consolidated siltstones and shaly sandstones. A short distance northwest of this location, however, a drill hole reportedly penetrated 20 feet of these terrace gravels. A north-south-trending wasteway, 50 feet wide and 53 feet deep, will be entrenched in these deposits. No leakage difficulties should be encountered here since the maximum depth of water will only be 4 feet when flowing at a rate of 1,200 cubic feet per second.

As proposed by Baldwin, the materials excavated from the wasteway are suitable for use in the construction of the dam.

Conclusion and Recommendations

The construction of the dam and reservoir in this area is feasible from

a geological standpoint. In view of this, however, it is recommended that the following suggestions be carried out:

1. Several holes should be drilled along the axis of the dam to determine the thickness of alluvial deposits along Dry Creek. It is necessary that the foundation of the dam be consolidated rock (shale in this case) to minimize leakage.
2. Several holes should be drilled along the course of the wasteway to determine the thickness of the terrace alluvial deposits. This will aid in computing the amount of different types of materials available, as well as in determining the suitability of such materials for construction purposes.
3. Tight contact between the embankment and dam should be maintained, and proper control of potential zones of seepage along the plane of contact should be ensured.
4. Although not absolutely necessary, it is recommended that the area of rock rip-rap be extended 100 to 200 feet upstream from the dam on both abutments. This is desirable, since the west-east direction of the prevailing winds might cause eddying and undesirable erosion at the abutments. A layer of bentonite between rip-rap and embankment could also be employed here to minimize leakage, especially when the reservoir is full.

Signed

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Dated: January 12, 1961

Reference: Baldwin, Thane H., "Preliminary Report on Agrarian Reservoir", unpublished report, December, 1960.