MUDDY GUARD RESERVOIR SITE, JOHNSON COUNTY

Location (damsite): NW¼ SW¼ sec. 6, T. 48 N., R. 84 W.

Date examined: September 5, 1961

Storage data: Earth-fill dam 56 feet high with a reservoir capacity of 922.25 acre-feet. A later proposal will raise the height of the dam 20 feet to increase the storage potential to approximately 2,280 acre-feet.

Geology

The damsite is located along Muddy Creek which flows approximately due east. Muddy Creek, and probably Pleistocene glaciation, has eroded a moderately broad and deep channel in Precambrian granite gneiss with lenses and layers of amphibolite and hornblende schist.

Three trenches (listed 1, 2, and 3, from north to south respectively) were cut in the alluvial deposits along the axis of the dam. Trench #1 (located about 18 feet south of the north abutment) penetrated, from top to bottom, approximately 4 feet of black dirt, clay, and angular fragments of Precambrian rock, and a 5-foot zone of bluish-gray very sandy clay containing small angular fragments of Precambrian rock. A zone of fractured Precambrian bedrock (?) was encountered at a depth of 9 feet -- the bottom of the trench.

Trench #2 (located south of, but adjacent to Muddy Creek) penetrated about 5 feet of dark, somewhat sandy and damp clay, and this was underlain by about 1½ feet of buff-colored wet sand. Underlying the sand, and extending to a depth of 14 feet (the bottom of the trench), is another zone of clay similar to the above, except that some fragments of Precambrian rocks are present. Data from a hole (drilled by the Soil Conservation Service) indicated that the above clay was saturated and

contained more sand between the 14 to 20-foot depth interval and that fractured bedrock (?) was encountered at a depth of 20 feet.

Trench #3 (located along the damsite axis but about 30 feet northwest of an outcrop of Precambrian bedrock) penetrated foundation conditions to those in Trench #1; however, a zone of wet decomposed granitic (?) sand was encountered at 10 feet. The trench was excavated to a depth of 11 feet and bottomed on fractured Precambrian bedrock (?).

Outcrops at the left (north) abutment expose about 100 feet of well-jointed gray, fine- to medium-grained granite gneiss with lenses of pink medium-grained granite. At the 7,700-foot contour level the gneissic layering (or banding) strikes N. 73° E. and dips 54° northwest and is crosscut by pink quartz-feldspar dikes up to 1 inch thick. Joint sets have the following attitude: east-west strike, 70° north dip; N. 47° W. strike, vertical dip; N. 53° E. strike, 23° SE. dip; and N. 88° E. strike, 12° south dip. Some of these are open joints; however, this is probably a surficial weathering condition that should not persist when the outcrops have been stripped to fresh rock.

The lower part of the right (south) abutment is a 30-foot rock exposure similar to that at the left abutment; however, the gneissic layering strikes parallel to the dam axis and is approximately vertical in dip. Joints here have the following attitudes: N. 26° W. strike, 76° SW. dip; N. 10° W. strike, 15° NE. dip; N. 7° E. strike, 60° NW. dip; N. 66° E. strike, 67° NW. dip. The upper part of the abutment is covered by slope wash of unknown thickness.

Conclusion and Recommendations

The construction of the 56-foot dam and reservoir is feasible from a

geological standpoint. It is recommended, however, that the following suggestions be carried out:

(1) Because several of the joint sets on both abutments are approximately parallel to paths of potential seepage, tight contact between embankment and dam should be maintained. A layer of bentonite or other impervious material could be utilized here to properly control zones of seepage along the plane of contact. If the joints are still open after the abutments have been cleaned off, it will be necessary to groat those that strike more or less at right angles to the axis of the dam.

(2) It is recommended that the foundation of the dam be solid bedrock (not highly fractured) to minimize shear and seepage. This is suggested providing that the depth to bedrock is not too great. If this is not done, then it is suggested that the alluvial deposits underlying the dam be subjected to standard penetration tests to determine compaction. Further, undisturbed samples should be taken from these deposits and tested for shear strength and permeability. These tests are particularly important if the height of the dam is raised an additional 20 feet.

/s/ William H. Wilson
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