THE UNIVERSITY OF TEXAS AT AUSTIN
Bureau of Economic Geology
February, 1942
Typeset from original stencil, December 1979

MINERAL RESOURCE SURVEY
Circular No. 41

The information contained in this circular was gathered by a unit of the WPA State-wide Mineralogical Survey of Texas, a project sponsored by The University of Texas Bureau of Economic Geology. The purpose of this survey is to assemble information concerning mineral resources and to gather other geological data and make them available to the public. With this information in the hands of the public, it is reasonable to suppose that industries of value to the State may be developed. The following report is based on work done in Polk and adjoining counties by Work Projects No. 17060 and No. 18507, from September 1, 1941, to November 22, 1941.

RICE SANDS IN POLK AND ADJOINING COUNTIES, WITH NOTES ON VOLCANIC ASH AND BENTONITIC CLAYS*

by George H. Shafer, Supervisor

INTRODUCTION

The purpose of this report is to give results of investigations made in Polk and adjoining counties. Rice sand located on property owned by the Eden-Birch Lumber Company, approximately 1.5 miles west of Carmona, northern Polk County, and other deposits in Polk, Trinity, Tyler, and Walker Counties were examined. Volcanic ash, bentonitic clays, and artesian water were encountered while mapping the Eden-Birch locality, and a brief discussion of each of these is also included in the report.

GEOLOGY OF THE AREA

Rocks exposed over the area belong to upper Jackson, lower Catahoula and Willis formations. Sediments of the Jackson and Catahoula formations consist of indurated and friable silts and clays, volcanic ash, tuff, bentonitic clay, and lesser amounts of conglomerate. Thin beds of impure lignite were encountered in test holes in the Jackson formation. The Willis formation (Pliocene) is composed of loose sands and miner amounts of sandstone, clay, conglomerate, and residual pebbles and boulders.

The contact between the Jackson (Eocene) and Catahoula (Oligocene) is marked by the occurrence of very coarse-grained sands, "rice sands," overlying sandstones, volcanic ash, and thinly bedded sediments. Numerous auger holes were put down along the contact between these formations in the area worked.

TOPOGRAPHY OF THE EDEN-BIRCH LOCALITY

The Eden-Birth locality, near Carmona, is a basin surrounded by a sandstone ridge which is breached by small streams. Springs and seeps from the sandstone form an intermittent stream known as Bull Creek. This stream flows north into Piney Creek, a tributary of Neches River. Immediately south of the southernmost springs is the crest of a sandstone ridge, a surface water divide; tributaries of Trinity River drain the area south of this divide.

From the central low-lying area, the slopes approaching the higher levels vary from gradual to very abrupt. Toward higher ground on the east, after leaving the creek, is a flat, almost featureless plain, broken only by a number of small pimple-like mounds, all of which are similar in size and shape. The crests of these rounded mounds average about 3 feet above normal ground level. Assuming that a point near the juncture of the two main forks of the creek is 0'.0", the highest point in the area is 97 feet, located along the crest of a ridge to the south.

RICE SANDS

The term "rice sands" is applied to coarse-grained siliceous sands occurring at various horizons throughout the Gulf Coast Tertiary belt. On the weathered outcrop the large light-colored sand grains resemble grains of rice. In East Texas numerous lenticular deposits of rice sand occur at the base of the Catahoula formation; reworked deposits are found in varying amounts in the Willis formation. Frequently these sands occur as indurated sandstones. These sands are composed almost entirely of quartz, with small amounts of chert, chalcedony, and opal.

The high percentage of quartz renders rice sand especially well suited for use as a moulding sand. The material is used as a water filtrant by many of the larger cities of Texas. The Texas Silica Sand Company, of Houston, has supplied the City of Dallas with more than 400 tons of rice sands taken from a deposit 5 miles east of Corrigan, northern Polk County. It is also used as a blast sand. The sand, washed, dried, and screened, brings from $7.50 to $12.50 per cubic yard.

Rice sands on the Eden-Birch property near Carmona (fig. 1) occupy an area of approximately 60 acres along Bull Creek. Figures 2, 3, 4, and 5 show the position of the beds and thickness of the sands. Bull Creek would furnish a convenient source of water supply for washing the sand as would also artesian water encountered in several auger holes drilled to obtain subsurface data (figs. 3 and 4). The abundant water supply, conveniently located, is an important factor in processing sand from this locality. Over much of the area the sand is interbedded with volcanic ash. The sand that has been reworked and deposited in the Willis formation is intermixed with a considerable amount of clay. Sand containing volcanic ash is more easily washed clean than sand mixed with clay.

*Assistance in the preparation of these materials was furnished by the personnel of Work Projects Administration Official Projects No. 665-66-3-233 and No. 165-1-66-695.

Samples of rice sand were taken from other localities while general reconnaissance work was being done in the area. These are briefly described.

Chita deposit. — This deposit, located at Chita, a small community in Trinity County, 12 miles south of Groveton, occupies an area about one-half to three-quarters of a mile square, and dug wells in the area encountered rice sands averaging 20 feet in thickness. A small amount of sand has been taken from this locality to supply local needs.

Chester deposit. — This deposit, located on the W. A. Barnes farm, 10 miles north of Chester, in northern Tyler County, covers an area approximately 1,600 feet long by 600 feet wide. The average thickness is about 15 feet. No sand has been produced from this deposit.

Harmon Creek deposit. — This deposit is located 2 miles southwest of Riverside, Walker County, a few hundred feet south of the old Riverside-Huntsville highway. Small quantities have been taken from this deposit to supply local needs, but its extent is unknown.

Texas Silica Sand Company deposit. — This deposit, located 5 miles east of Corrigan, in northern Polk County, has been worked commercially for several years by the Texas Silica Sand Company.

The chart below gives the results of screen analyses of samples taken from deposits mentioned in this report.

Screen Analyses of Rice Sands

Mesh	**Eden-Birch Lumber Co. deposit, near Carmona, Polk County** (Washed sample) Per cent	**Texas Silica Sand Co. deposit, 5 miles east of Corrigan, Polk County** (Unwashed sample) Per cent	**Chester deposit, Tyler County** (Washed sample) Per cent	**Chita deposit, Trinity County** (Unwashed sample) Per cent
10	2.89	0.52	0.44	1.85
16	24.4	5.88	3.87	10.66
20	27.0	18.21	12.28	21.92
40	27.2	49.8	70.38	41.22
60	11.72	8.27	10.79	13.69
80	3.79	3.97	1.13	4.43
100	0.69	0.81	0.21	0.71
Pan	2.31	12.54	0.88	5.52
	100.00	100.00	100.00	100.00

VOLCANIC ASH

A bed of relatively pure volcanic ash underlies the rice sands at the Eden-Birch locality near Carmona. The position of the bed is shown in figures 2, 3, 4, and 5. This ash is exposed in the bed of Bull Creek for a distance of approximately 1400 feet. Volcanic ash was encountered in auger holes as far distant as 1000 feet eastward from the creek (fig 3). The purest ash is mainly in the lower portion of the bed, which part has a light blue-gray color on fresh exposure and white on weathered surfaces. Over a large part of the area, the exposure and white on weathered surfaces. Over a large part of the area, the upper part of the ash is ferruginous, yellowish, and in places partially altered to bentonite. The average thickness of this lenticular deposit is about 15 feet.

The material is very light in weight and pulverizes into a fine powder. Near the surface contact with overlying rice sands, some cross-bedding and interbedding of ash and coarse-grained sands were observed. The ash exposed in the bed of the creek is quite resistant to stream erosion and has developed falls in a few places. Just south of the juncture of the two main forks of Bull Creek, at the site of test hole No. 18, is a prominent bank of volcanic ash which stands 6 feet above the creek bed. This bank is known locally as "Chalk Bluff."

A bed of very impure dark greenish-brown, lignitic, pyritic ash and silt immediately underlies the ash at this locality. Thin discontinuous seams of lignite from 1 to 3 feet thick are present in this bed, but the lignite is of no economic importance. This fine-grained material makes an excellent confining bed for artesian water which is present in a sand layer immediately below.

BENTONITIC CLAY

Sixty-two feet of sky-blue bentonitic clay was cored in test No. 60 before it became necessary to abandon the hole because of the interference of pyritic nodules in the clay. These nodules, some of which were as large as hen eggs, did great damage to the auger bits and made hand drilling very difficult.

Several auger holes, spaced about 200 feet apart, were drilled along the creek bed north of hole No. 60. The clay was present in all of the holes. North from hole No. 61 the clay immediately underlies sandy alluvium in the creek. The upper portion of the clay contains ferruginous stains, but these stains lessen with depth.

In places this clay is quite bentonitic, while in others it appears to be free from bentonite. It is very plastic and would probably be a suitable ceramic clay.

ARTESIAN WELLS

Flowing wells resulted from the digging of test holes No. 7, 18, 19, 20, and 63; see figures 1, 2, 3, 4, and 5. The strongest flow was from hole No. 18, which encountered the "salt and pepper" water sand at 35 feet. The well flowed with much vigor at an estimated rate of about 200 gallons per minute. No appreciable change or decrease in flow was noted after three weeks. Artesian flow almost as strong as that of No. 18 was encountered at a depth of 33 feet in test No. 19, also located in the creek bed. This well also was still flowing vigorously at the end of four weeks from the time it was dug. The next flow encountered was from test hole No. 20, situated in the bed

of the creek, and approximately 400 feet south of hole No. 19. In hole No. 20 the sand was encountered at a depth of only 22 feet, which indicated that the water-bearing bed was becoming shallower to the south along the creek. The flow from this hole was less vigorous but yielded approximately 100 gallons of water per minute. Test hole No. 7, dug in the creek bed approximately 700 feet north of hole No. 18, was the weakest flowing well of the group. This well, being still farther down the gradient, would normally be expected to have the strongest flow. The fact, however, that the reverse is true may be due to a lensing out of the water sand to the north. Test hole No. 63, dug in the bed of the west fork of Bull Creek, was the last flowing well that was found. The aquifer was encountered at a depth of 43 feet in this well, but the flow was again very weak. Test hole No. 64, dug 200 feet west of No. 63, did not reveal the presence of the water sand; instead, a sky-blue clay was encountered at 30 feet.

All the flowing wells were dug in the bed of the creek. The owner of the property requested that the wells be left open to supplement the water supply normally afforded by the stream, which in dry weather either becomes completely dry or offers only a meager supply to live stock in the vicinity. This additional water supply also would be advantageous in affording the necessary water for washing rice sands during dry periods, if the deposit is developed in the future. The following table gives the results of a chemical analysis of sample of water from test hole No. 18. The analysis was made by W. W. Hastings.

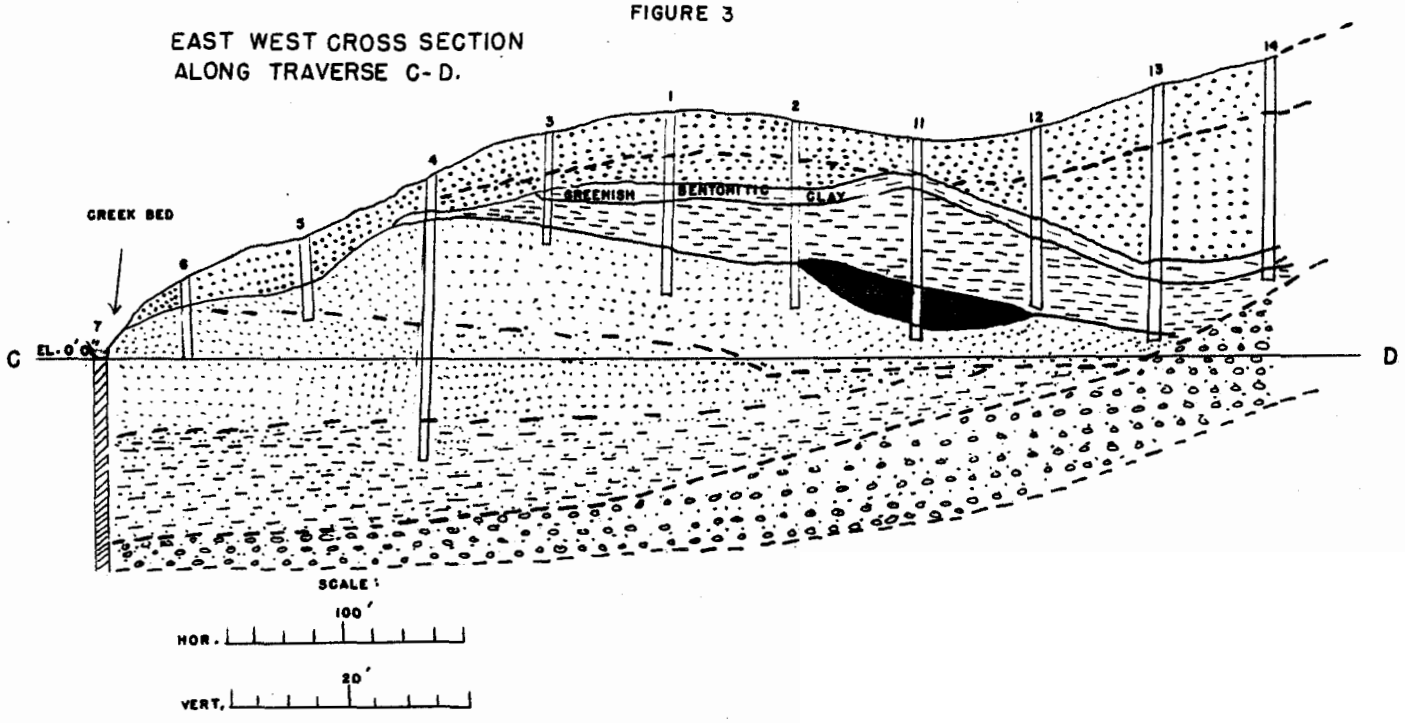
Analysis of water sample from test hole No. 18

Owner of test hole No. 18: Eden-Birch Lumber Company
Depth of well: 35 feet
Date of collection of sample: October, 1941

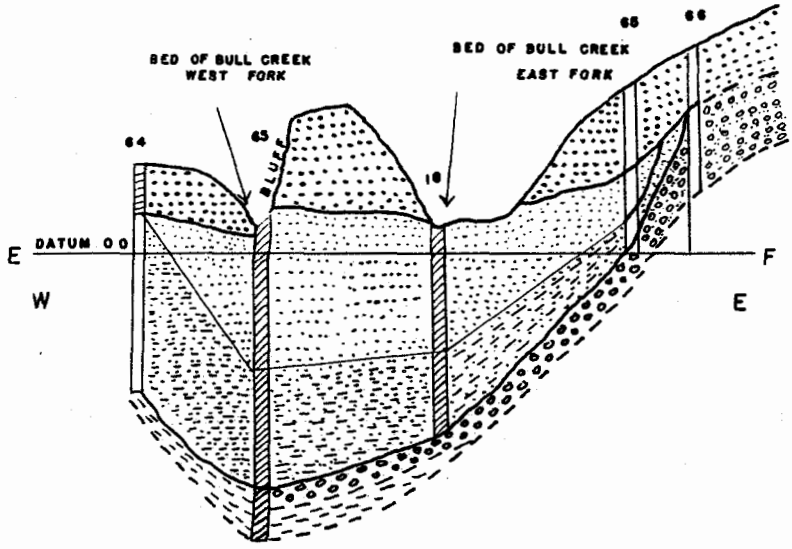
	Parts per million	
Total dissolved solids	306	
Calcium (CA)	7.8	
Mg	2.1	
Na	65	(calc.)
NCO	45	
NO	48	
Chloride (Cl)	55	
Hardness	23	(calc.)

FIGURE 3

EAST WEST CROSS SECTION
ALONG TRAVERSE C-D.



EAST WEST CROSS SECTION
ALONG TRAVERSE E-F.



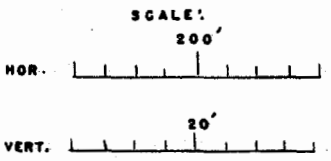


FIGURE 4

LEGEND:

- RICE SANDS
- BENTONITIC CLAY
- IMPURE ASH LIGNITIC
- VOLCANIC ASH
- ARTESIAN WATER SAND
- IMPURE LIGNITE
- TEST HOLE
- TEST HOLE TAPPING ARTESIAN WATER

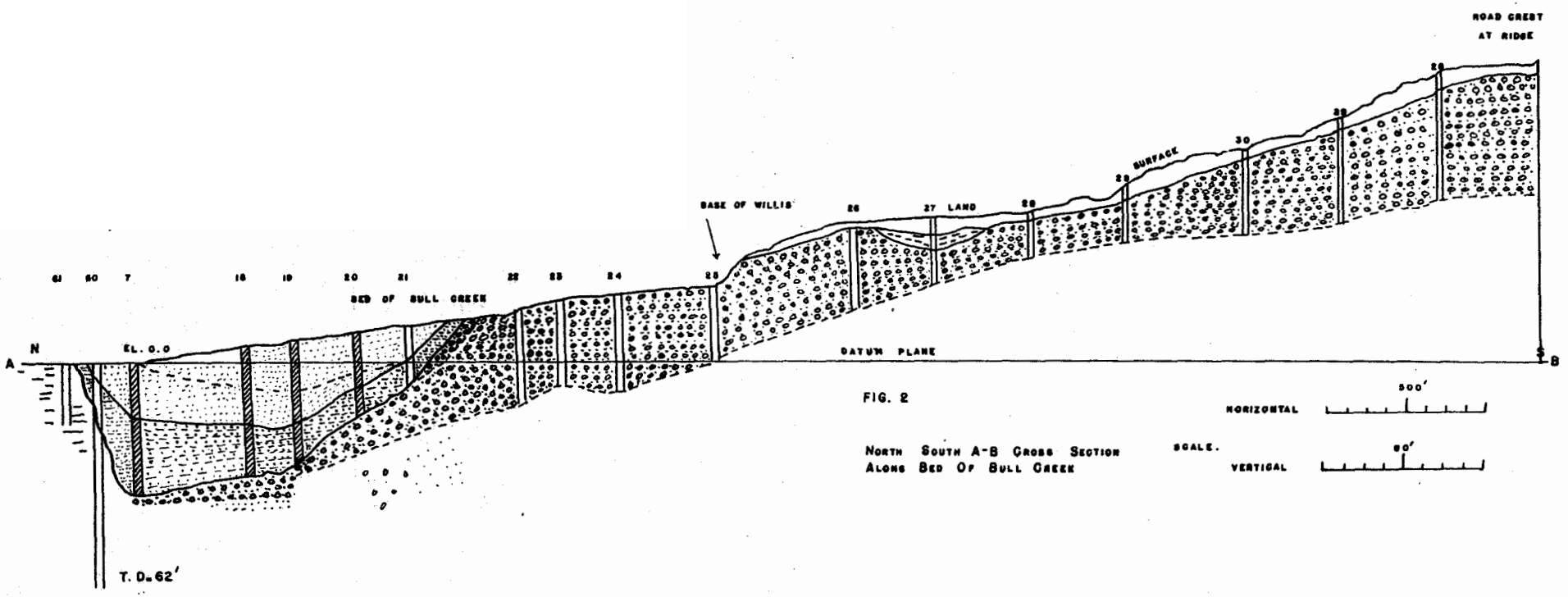


FIG. 2

North South A-B Cross Section
Along Bed Of Bull Creek

SCALE.

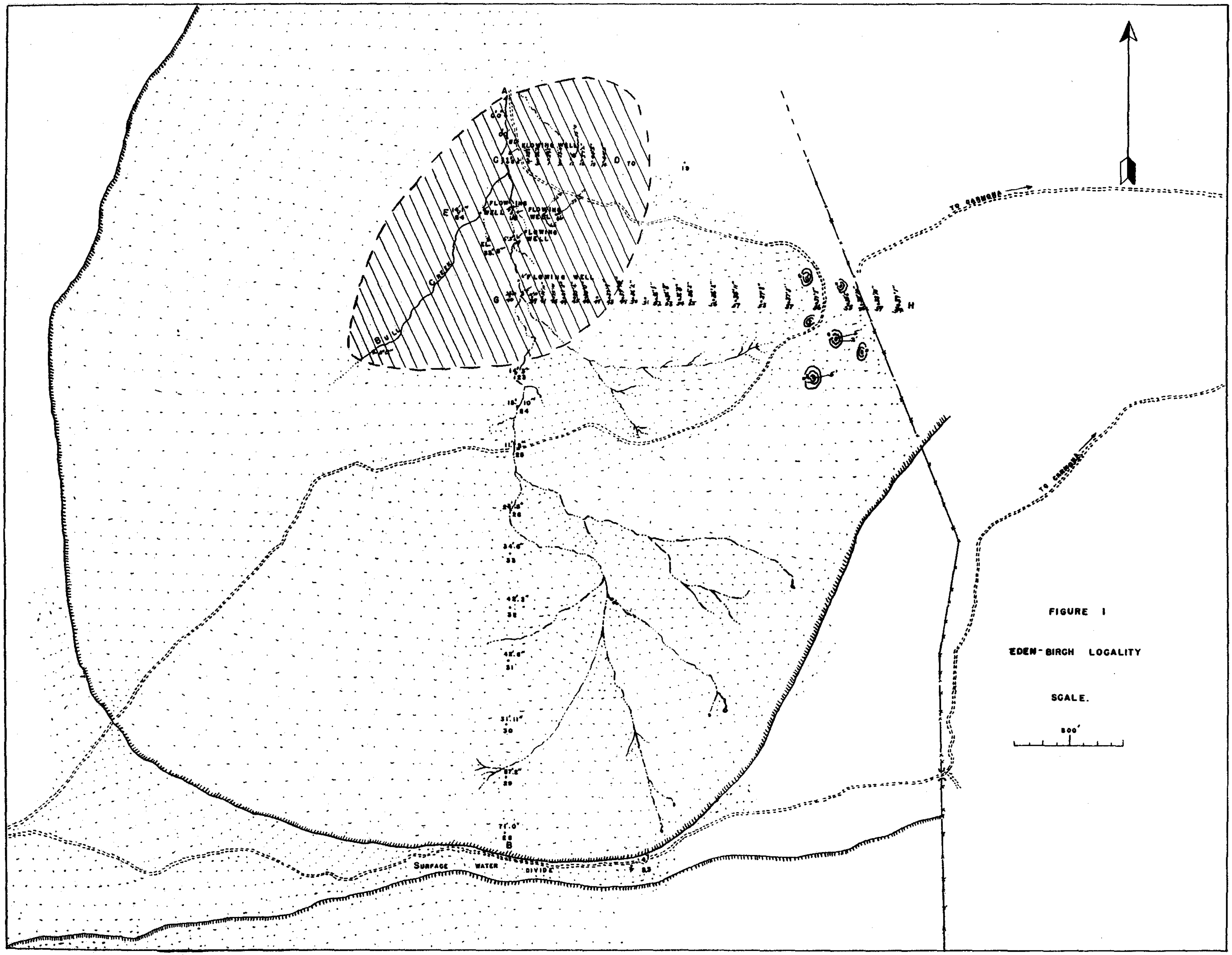


FIGURE 1

EDEN-BIRCH LOCALITY

SCALE.

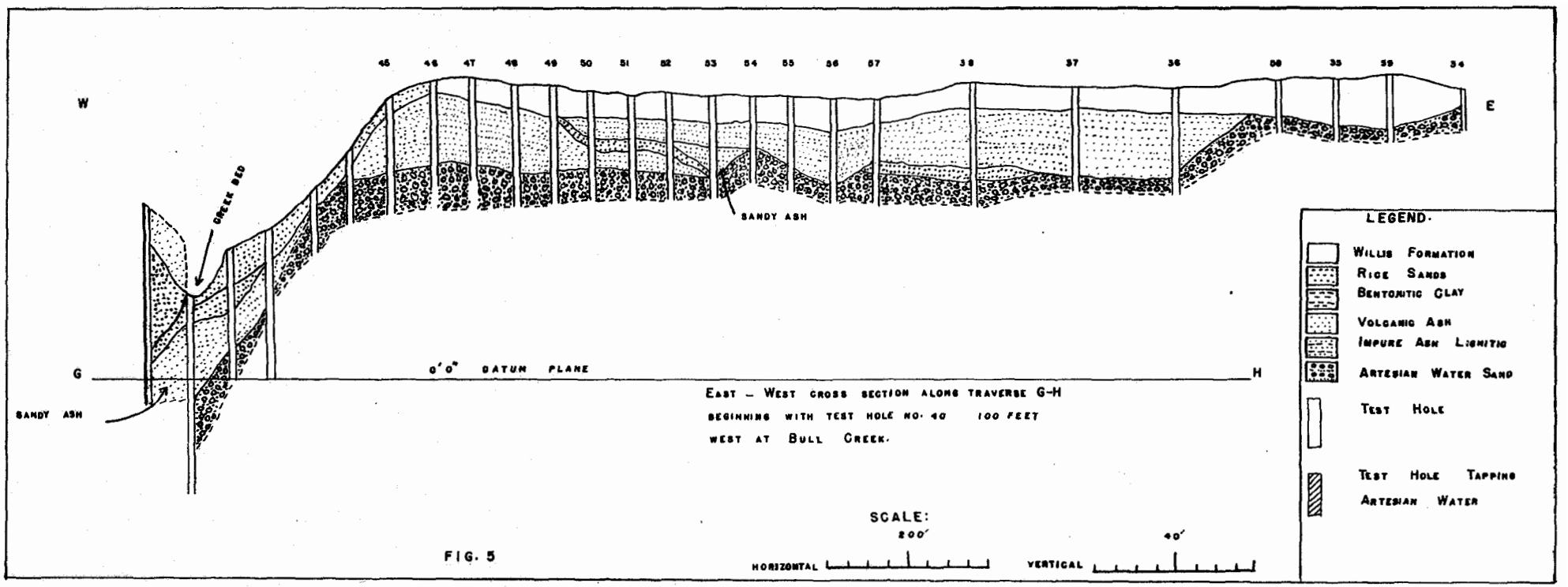


FIG. 5