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REPORT RELEASED ON COAL OCCURRENCE ON THE BELUGA RIVER, ALASKA

Release of a Geological Survey report based on a brief examination of a thick coal bed in a little known area on the Beluga River, 50 miles west of Anchorage, Alaska, was announced today by Acting Secretary of the Interior Clarence Davis.

Exposed along the eastern canyon wall of the Beluga River for more than half a mile the coal bed has a generally northeasterly dip of 8 to 12 degrees at the northern part of the outcrop. In the southern portion of the outcrop area the structure becomes somewhat more complex. The thickness of the coal in all exposures examined is at least 20 feet, and in some it was estimated to be nearly 30 feet. A second coal bed with a thickness estimated at from 15 to 20 feet is exposed at river level directly below the south end of the upper coal bed.

The occurrence is noteworthy in that the bed is exceptionally free from impurities. An analysis of a representative sample showed the coal to be lignite in rank, with less than seven percent ash and a heating value of 7,600 B.t.u. as received. As the minimum depth of overburden is 150 feet, it seems probable that the bed could be mined most economically by underground methods. Located about 20 river miles from the coast the locality is accessible by small boats during periods of high water.

The report, entitled "Notes on a coal deposit on the Beluga River, Alaska", by F. F. Barnes, has been placed on open file at the following Geological Survey offices: Room 1033, General Services Administration Building, Washington, D. C.; Brooks Memorial Mines Bldg., College, Alaska; Room 117, Federal Building, Juneau, Alaska; 4 Homewood Place, Menlo Park, Calif.; South 157 Howard St., Spokane, Wash.; 468 New Customhouse, Denver, Colo.; 807 Post Office and Courthouse, Los Angeles, Calif.; 724 Appraisers Bldg., San Francisco, Calif.; 210 E. F. Glover Bldg., Anchorage, Alaska and the Territorial Department of Mines, Territorial Bldg., Juneau, Alaska. Copies from which reproductions of text and illustrations can be made at private expense are available at 4 Homewood Place, Menlo Park, Calif.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
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NOTES ON A COAL DEPOSIT ON THE BELUGA RIVER, ALASKA

By

F. F. Barnes

1955

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NOTES ON A COAL DEPOSIT ON THE BELUGA RIVER, ALASKA

By F. F. Barnes

INTRODUCTION

This report is based on a brief examination of a locality on the Beluga River, about 50 miles west of Anchorage, Alaska (fig. 1), that had been reported to contain a coal bed of exceptional thickness and quality, possibly suitable for large-scale strip mining. I visited the locality on August 21-22, 1954, accompanied by Mike Goggans, of Anchorage, who volunteered to guide me to the locality, and by Joe Schneller, of the Two Joe Fish Co. on the Beluga River, who furnished a boat and outboard motors and served as boatman. I wish to acknowledge the invaluable assistance of both men in making the trip possible and in assisting in the field work.

GENERAL SETTING

The Beluga River heads in Beluga Lake, one of the largest lakes in the Cook Inlet-Susitna lowland. The lake in turn is fed by Triumvirate and Capps Glaciers, which head in large ice fields on the east slope of the Alaska Range between Mount Spurr and the headwaters of the Skwentna River. From the lake the Beluga River flows about 18 miles southeastward across a rolling piedmont surface, into which it has carved a canyon several hundred feet deep, and then turns eastward to flow through winding channels for about

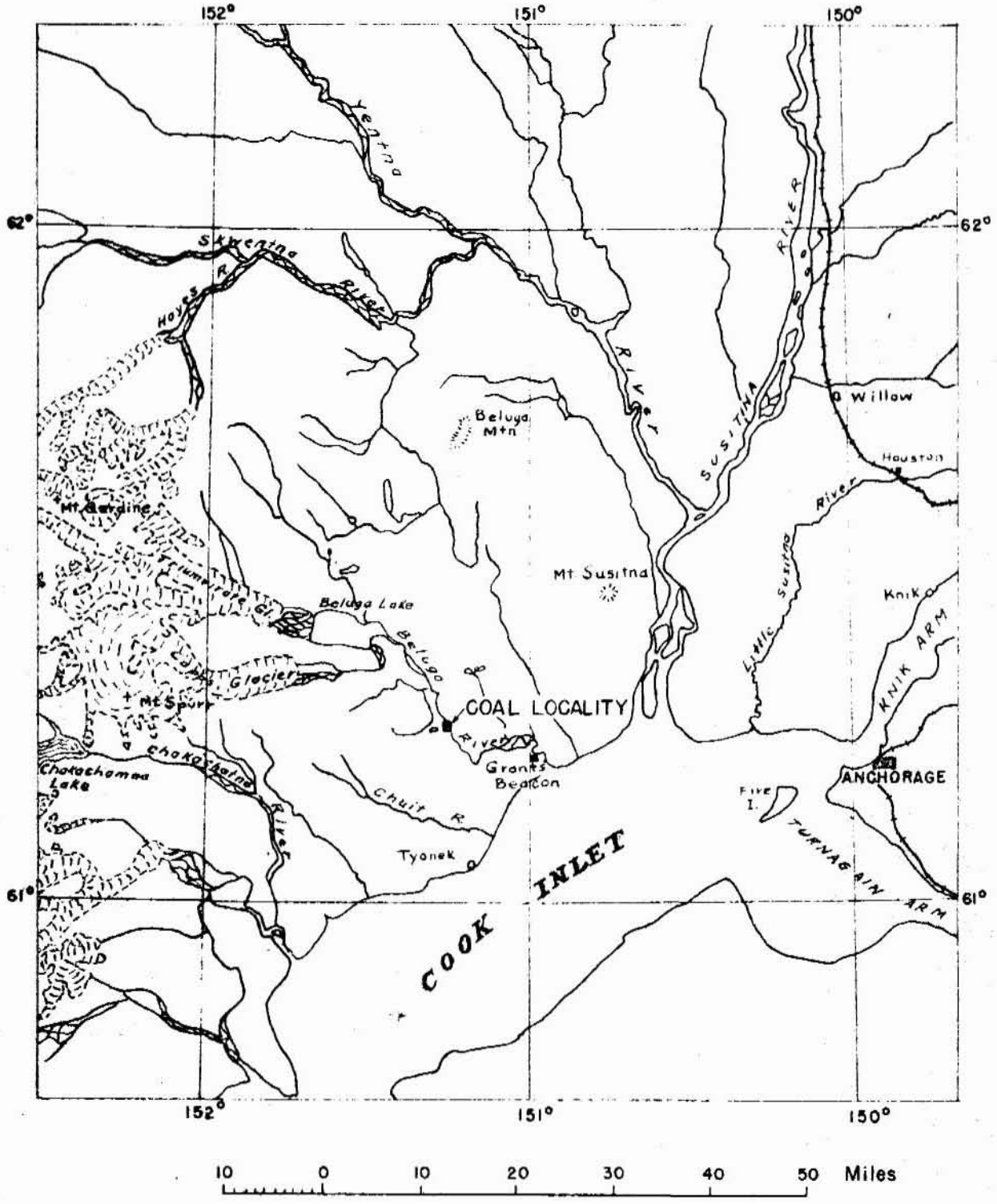

Figure 1. Index map showing location of Beluga River coal locality, Alaska.

This report is preliminary and has not been edited or reviewed for conformity with U. S. Geological Survey standards and nomenclature.

10 miles across a low flat coastal belt to the head of Cook Inlet. The entire area between the mountains and the coast is characterized by irregular topography and immature drainage, marked by many lakes and swampy areas. Glacial deposits, 100 feet or more in thickness, are exposed in the canyon walls, where they overlie dominantly sandy beds of the coal-bearing formation of Tertiary age that have been moderately to strongly folded and locally faulted.

The locality described in this report is about 20 river miles from the coast and 8 miles below the outlet of Beluga Lake. It is accessible by small boats, but only during high-water periods, as the river has a steep gradient, marked by many rapids, and the channel contains many large glacial boulders and blocks of coal, which make navigation difficult and hazardous at times of low water. At the time of my visit the river was unusually high, so that we were able to get all the way to the coal locality from the coast in a 22-foot dory powered by two 25-horsepower outboard motors. The locality lies within the northern boundary of the Cook Inlet Bombing and Gunnery Range.

FIELD WORK

About 1½ days were spent in examining and tracing coal outcrops and in collecting a coal sample for analysis. As the area has not been mapped topographically, field observations were plotted on vertical aerial photographs, from which the accompanying sketch

map (fig. 2) was prepared at a scale of approximately 1:12,000. Two cross sections (fig. 3) were prepared at the same scale as the map, using approximate altitudes determined stereometrically from aerial photographs.

COAL DEPOSITS

A coal bed between 20 and 30 feet thick is exposed in the east wall of the canyon at the locality examined (fig. 2). The outcrop was followed for a distance of 2,200 feet and projected by eye to a total length of about 3,700 feet to the point upstream where it passed below river level. It is about 150 feet below the canyon rim at its southern end and probably 500 feet below the rim at its northern end. The bed appears to have a general northeasterly dip of 8° to 12° in the northern part of the outcrop, but near the southern end the few measured dips indicate a gently eastward-plunging anticlinal fold, south of which the bed turns up rather sharply to dip 31° N. and is apparently cut off at the base of a thick mantle of gravel exposed in the bluffs below the canyon rim to the east (fig. 3, section B-B').

The thickness of the coal in all exposures examined is at least 20 feet, and in some it was estimated to be nearly 30 feet. The top of the bed is generally concealed by hillside creep, but at one place near the south end of the outcrop the bed is fully exposed, and a thickness of 28 feet was measured. The following

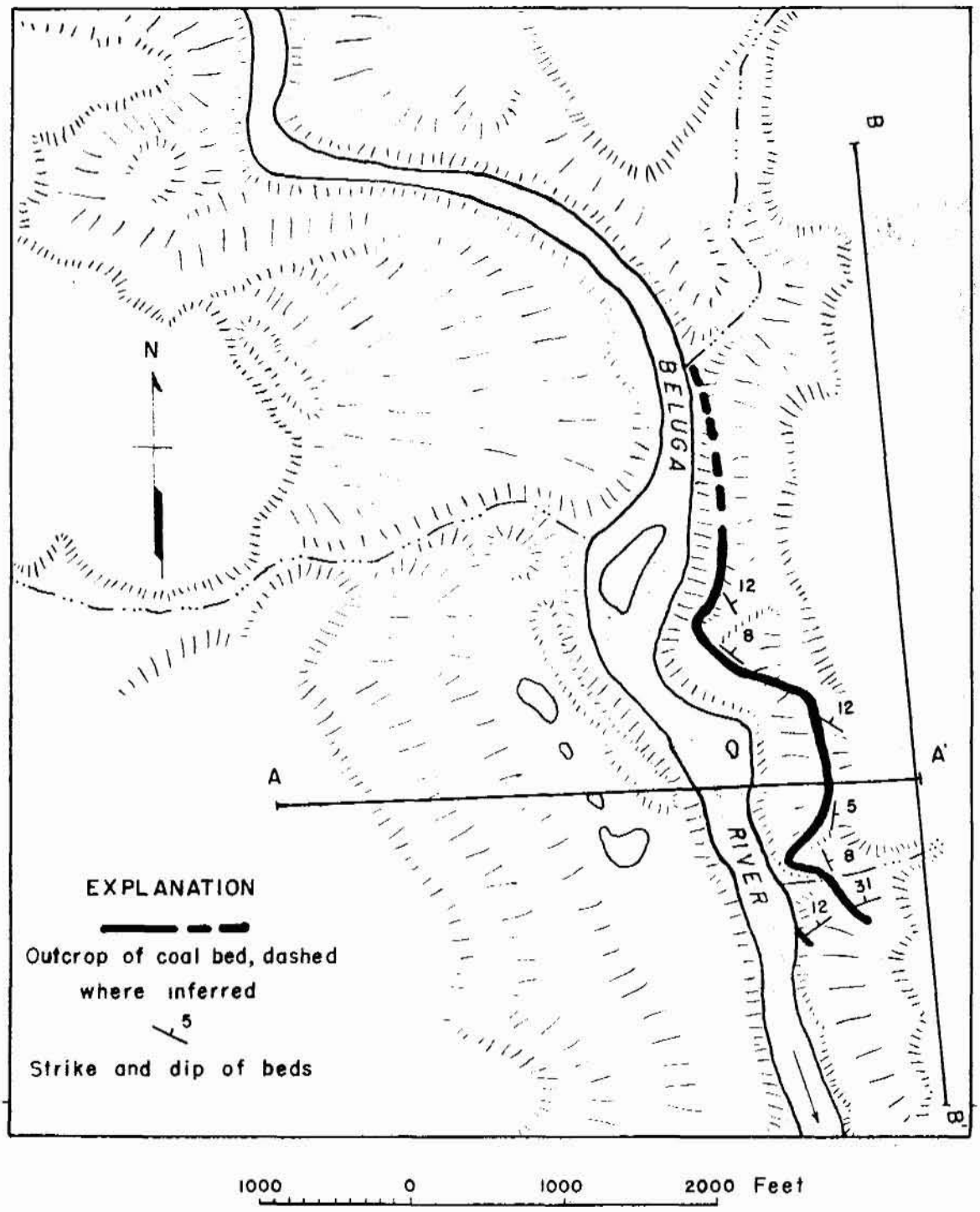

Figure 2. Sketch map of Beluga River coal locality, Alaska

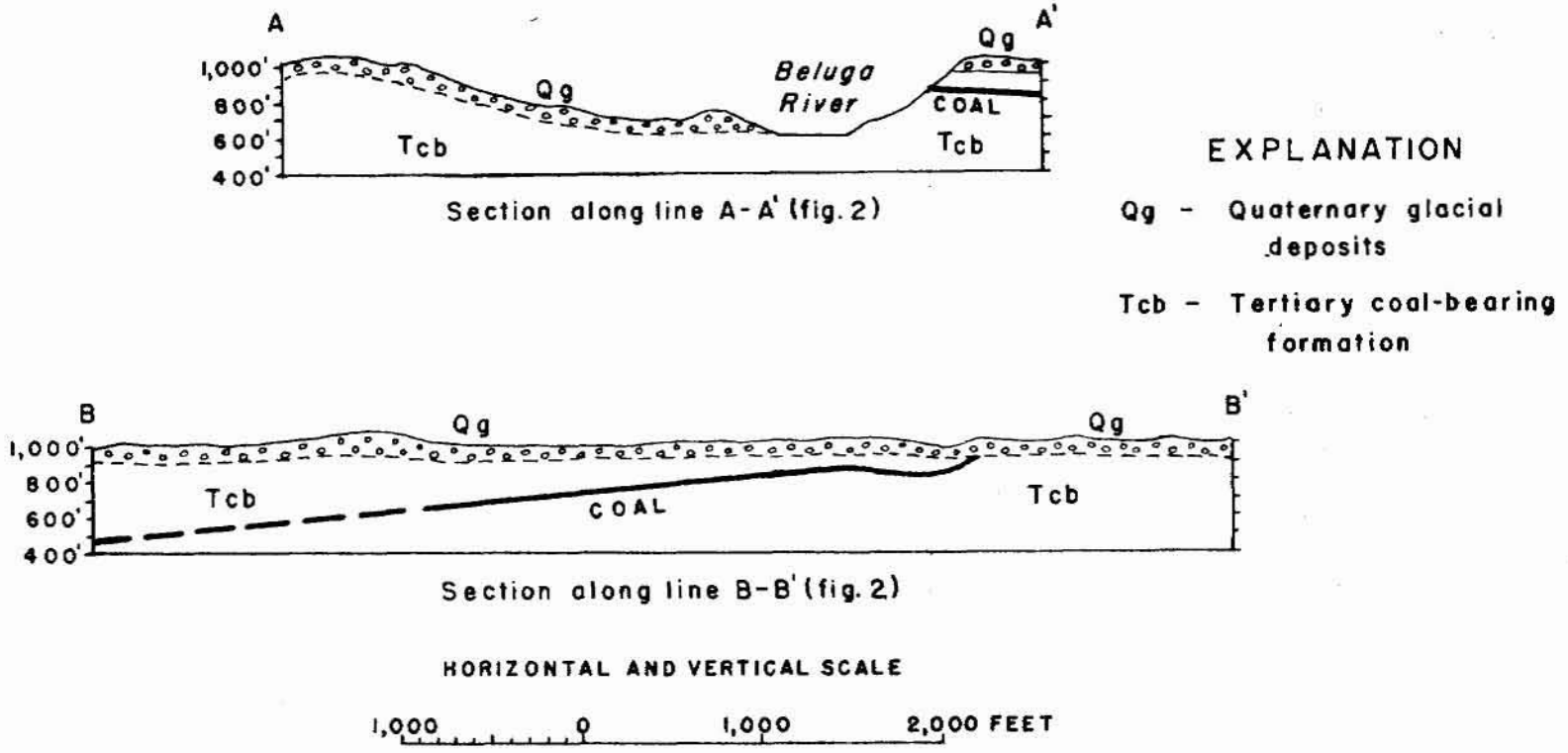

Figure 3.- Diagrammatic cross sections of Beluga River coal locality, Alaska

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detailed section of part of the bed was measured near the line of section A-A':

Section of coal bed measured at a point 200 feet south of Section A-A'

	Feet
Coal and coaly claystone, highly weathered (roof not exposed)	3.3+
Coal, dull to waxy, friable	14.0
Claystone, coaly, brown	.5
Coal, dull, massive	.7
Coal and coaly claystone, thin-bedded	1.8
Coal, soft, platy	2.0
Claystone, coaly (floor)	

Strike, N. 10° E.; dip, 5° SE.

At a point on the line of section A-A' the following section was measured and a coal sample was taken for analysis:

Section of coal bed measured at a point on section A-A'

		Feet
	Coaly claystone and coal, weathered (roof not exposed)	2.0+
	(Coal, dull, platy	1.7
	(Claystone, brownish gray	.2
Anal. A-1	(Coal, dull, massive	5.5
	(Coal and coaly claystone, thin-bedded	.7
	(Claystone, coaly	.1
	(Coal, dull, massive; few bright lenses near base	4.0
	Claystone, carbonaceous	.3
	Coal, dull, platy	.7
	Coal and coaly claystone, thin-bedded	1.9
	Coal, dull, platy; few claystone lenses	1.7
	Claystone (floor)	

The coal sample (lab. no. A-1) was analyzed by C. R. Cupp, of the U. S. Bureau of Mines at Anchorage, with the following results:

Proximate analysis of coal from the Beluga River coal locality

	As received	Moisture free
Moisture.....percent.....	30.1	--
Volatile matter.....do.....	37.7	53.9
Fixed carbon.....do.....	25.5	36.5
Ash.....do.....	6.7	9.6
Sulfur.....do.....	.1	.1
Heating value.....Btu.....	7,611	10,888

According to the Standard Classification of the American Society for Testing Materials (1951) this coal is ranked as lignite.

A second coal bed is exposed at river level directly below the south end of the bed just described (fig. 2). Time did not permit detailed examination or tracing of this bed, but it was estimated to be between 15 and 20 feet in total thickness, with no thick partings, and to dip about 12° NW. It appears to lie about 200 feet stratigraphically below the upper coal bed.

RESERVES

An estimate of reserves in the principal coal bed at the Beluga River locality was made by assuming that the bed extends back from the outcrop for a distance equal to half the length of the outcrop. Reserves were thus computed for a block 3,700 feet long and 1,850 feet wide. As the bed was estimated to be well over 20 feet in total thickness at all points examined and appeared to contain no thick or

persistent rock partings, it was assumed to contain an average thickness of 20 feet of minable coal. Using a weight factor of 1,750 tons per acre-foot, an average figure for lignitic coal, the indicated reserves in the above-defined block were calculated to be approximately 5½ million tons. As it is reasonable to assume that a coal bed of this thickness would extend both northward and eastward well beyond the assumed limits, much larger reserves can be inferred.

ECONOMIC CONSIDERATIONS

Although interest in the coal at this locality has been based largely on the assumption that it could be mined economically by stripping, the results of this brief examination seem to indicate that conditions are not particularly favorable for strip mining. Except in the relatively narrow belt between the outcrop and the rim of the canyon, the depth of overburden is at least 150 feet near the south end of the main outcrop and increases both northward and eastward down the dip of the bed. In addition to the thick overburden, a second factor unfavorable to stripping is the attitude of the coal, which, with a dip away from the river, would present a drainage problem as stripping progressed, particularly if hydraulic stripping methods were used. It seems probable that most, if not all, of the coal at this locality could be most economically mined by underground methods.

As there are no roads in the area, and the Beluga River is not a navigable stream, one of the first problems in developing the Beluga River coal deposits would be to provide some means of transportation between the deposits and tidewater on Cook Inlet. The coal locality is about 10 miles by the most direct route from the closest point on Cook Inlet, about 4 miles south of the mouth of the Beluga River. This route would involve crossing the river, which would be a major engineering problem because of the size and torrential character of the river and the depth of its canyon. A route to the coast north of the river would avoid the crossing but would terminate on broad tidal flats that skirt the head of Cook Inlet from Knik Arm to the Chuit River (fig. 1). South of the mouth of the Chuit the 3-fathom line lies within half a mile of shore, so that some type of permanent docking facilities might possibly be constructed in that vicinity.

REFERENCE CITED

American Society for Testing Materials, 1951, Standard specifications for classification of coals by rank: (A.S.T.M. Designation: D388-38): Book of A.S.T.M. Standards, p. 74-79.