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Coal Reserves Beluga and Chuitna Rivers and Capps Glacier Areas, Alaska

BY

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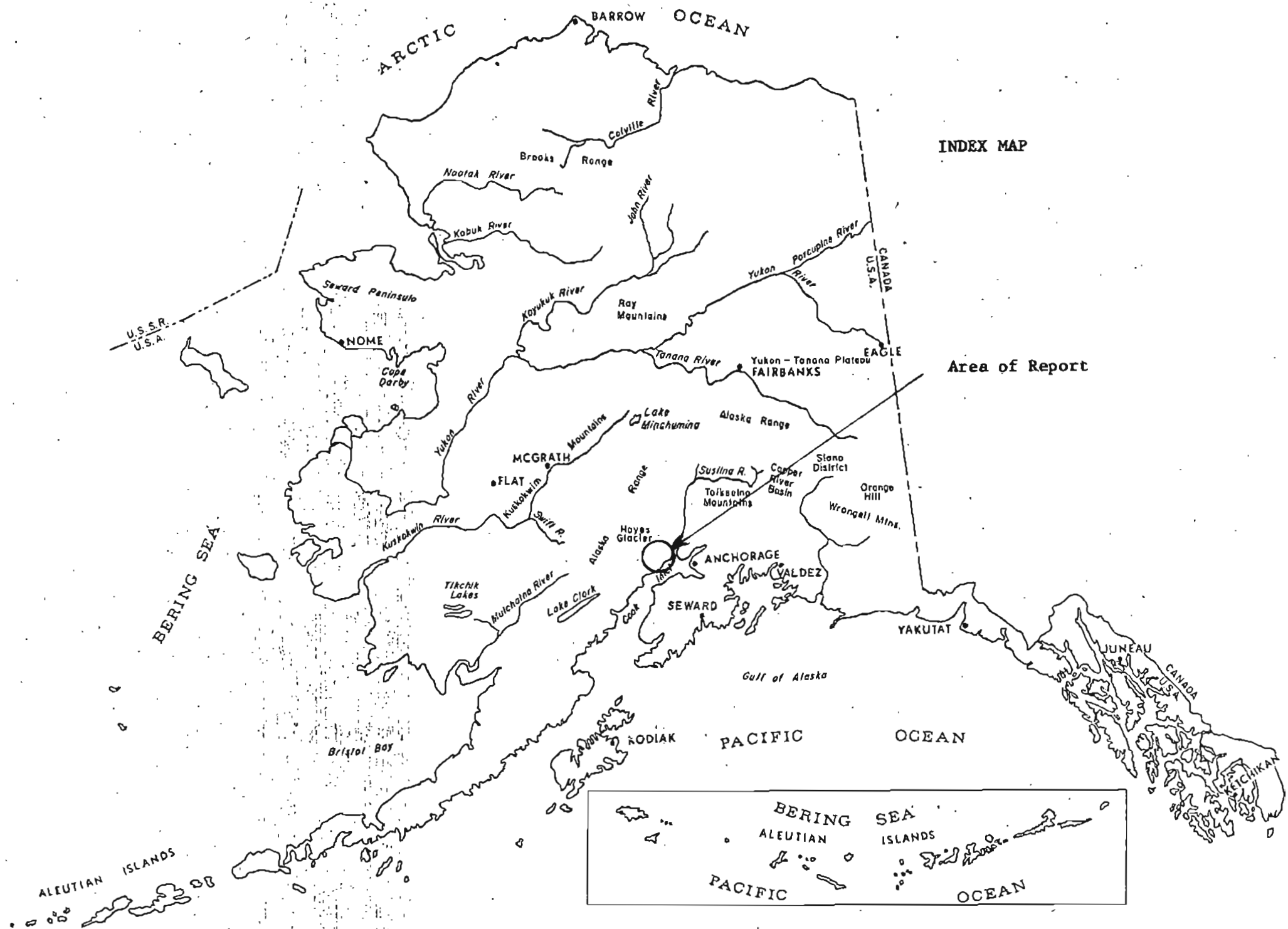
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COAL RESERVES, BELUGA AND CHUITNA RIVERS AND CAPPS GLACIER AREAS, ALASKA

INTRODUCTION

This report outlines the major known coal resources of the Beluga and Chuitna River drainages and the area south of Capps Glacier, Alaska. This area has previously been mapped (Barnes, 1966) as a part of the Beluga-Yentna region. The area covered by the present investigation is about 468 square miles in extent and is defined as the area between Beluga River and Nikolai Creek, bounded on the north by Beluga Lake and on the south by the northwest shoreline of Cook Inlet. The mouth of the Beluga River at the south end of the area under investigation is approximately 50 airmiles due west of Anchorage, Alaska.

This report was written to aid in the appraisal of the coal resources of this area. The size of the area under study was deliberately limited to include the largest reserves and those that could be most easily recovered and transported.

Previous investigations include Atwood (1909, p. 117-121) who in 1906 examined and measured sections of coal-bearing rocks on the beach near Tyonek and on the Beluga River. In 1927 Capps traversed from the coast south of Tyonek northwestward to Chakachamna Lake and mapped an area of Kenai formation on the headwaters of Straight Creek.

In 1959-1961 the U.S. Bureau of Mines examined a small area of T15N., R12W., using a diamond drill to determine the quality and extent of a coal bed more than 50 feet thick exposed on the west bank of Drill Creek (Warfield, 1963). Field investigations of coal deposits in the Beluga and Chuitna River basins were made by geologists of the U.S. Steel Corporation in 1961 and 1962. The Utah Construction and Mining Co. examined the same areas with the aid of a portable drill in 1962 and 1963.

The most comprehensive geologic study was completed by Barnes (1966) who did the field work during the summers of 1961 and 1962 preceded by reconaissance trips in 1949, 1953 and 1954. Barnes (1967) estimated that the reserves of the Susitna area approach 2.395 billion short tons of subbituminous and lignite coals mostly confined to a 400 square mile area in the Beluga-Chuitna River drainage areas.

GEOLOGY

GENERAL STRATIGRAPHY

Tertiary age rocks

The uppermost bedrock unit exposed in the Beluga-Chuitna area is a sequence of interbedded claystone, siltstone, sandstone and conglomerate that includes beds of subbituminous coal and lignite. This sequence is considered to be a continuation of the Tertiary Kenai formation exposed on the west side of the Kenai Peninsula. Barnes (1966) further separates the Kenai formation in the Beluga-Chuitna area into a lower and middle member. The lower member is a non-marine sequence of light gray to light yellow pebbly sandstones and conglomerates that contain little or no coal. The middle member overlies this member conformably as seen from exposures on several

of the east-flowing headwater tributaries of the Chuitna River. The Middle Kenai is a sequence of non-marine gray and light yellow claystone, siltstone, sandstone and conglomerate. Calcareous cemented beds of siltstone are locally common. The Middle Kenai member contains nearly all the coal reserves with numerous beds of subbituminous coal and lignite with several beds exceeding 50 feet in thickness. Barnes (1966) felt that the Kenai formation is widespread under the Quaternary cover because of the prevalence and continuity of outcrops. For this reason the coal beds probably continue laterally for greater distances than postulated in the reserve calculations and reserve figures are considered very conservative.

Direct correlations between the coal-bearing Middle Kenai formation in the Beluga-Chuitna area and the Kenai formation in drilled wells in the Cook Inlet have not been made. However, based on the occurrence of thick coals in the upper part of the Tyonek formation, a logical correlation would indicate that the Middle Kenai coal-bearing beds of the Beluga-Chuitna area are equivalent to the upper part of the Tyonek formation where thick coals are seen in drilled wells throughout the Cook Inlet Basin.

Quaternary rocks

Much of the surface cover in the Beluga-Chuitna-Capps Glacier areas is glacial deposits, both morainal and outwash. Other Quaternary deposits include talus and landslide masses. The maximum thickness of Quaternary deposits is about 300 feet along the Beluga and Chuitna Rivers. Recent deposits are limited to alluvial deposits along present stream systems.

Pyroclastic deposits

South of Capps Glacier an area of about 17 square miles is covered with volcanic breccia and tuff considered to be at least in part of Tertiary age (Barnes, 1966).

Intrusive rocks

The only known occurrence of an intrusive rock mass in the area under study is the Lone Ridge granite, probably of Middle Jurassic age (Grantz and others, 1963, p. 56-59).

STRUCTURE

Structural details are visible only in those areas along the Beluga and Chuitna Rivers, south and southeast of Capps Glacier, and along Drill Creek east of Beluga Lake. Most of the area studied is covered with thin Quaternary sediments.

Castle Mountain Fault

Evidence for the Castle Mountain fault is seen in the steep dips and sheared beds on the Chuitna and Beluga Rivers and further supported by the presence of Middle Kenai sediments against older Lower Kenai sediments. This fault zone is probably the southwest continuation of the Castle Mountain fault mapped by Barnes and Payne (1956) along the north side of the Matanuska Valley.

Section II', drawn at approximately right angles to the bed strike along the Beluga River demonstrates the Castle Mountain fault zone and field

mapped faults near the axial plane of the postulated anticline a[illegible]ear location 132 on the base geologic map. Steep dips are associated with both these faults. Minor faulting has also been mapped along the Chuitna drainage in section 23, T12N, R12E.

Folding

There is a simple anticlinal structure about 6 miles above the mouth of the Chuitna River. This structure has a gently dipping east limb and a moderately steep dipping west limb. The axial trend is about N15°E.

The Beluga River is crossed by an easterly plunging gentle syncline in sections 33 and 34, T14N, R11W. An anticlinal structure is suggested south of the syncline by sparse dips and structural cross-section 11' has been drawn to include this feature. Barnes (1966) has suggested that faulting may be responsible for this dip pattern. Folding and faulting may be related to splay patterns developed from the Castle Mountain fault.

Dips are generally very gentle other than when related to faulting. This is especially true along the Chuitna River drainage and this area is most favorable for commercial strip mining of the coal deposits.

SUMMARY AND CONCLUSIONS

Cross-sections were constructed in the Chuitna, Beluga and Capps Glacier areas to demonstrate the low structural relief. Measured coal sections were integrated into these cross-sections and the cumulative coal thicknesses were used in the reserve calculations.

Section II' along the Beluga River at right angles to the strike indicates that structural problems would be encountered along the Beluga River, but in general structural relief is low with most of the dips under 15 degrees. Maximum thickness of Quaternary overburden is about 300 feet and the ratio of overburden to coal thickness is favorable.

Evaluation of the reserves away from the outcrop areas will require additional core hole information.

ECONOMIC CONSIDERATIONS

Physical aspects of the coal

The coal is classified as subbituminous to lignite and is dull black, locally with a slight brownish tinge and includes a few thin layers and lenses of bright vitrain. The moisture content is high, 21-33 percent and ash content is generally high ranging from 2.1 to 22.2 percent. Sulfur content is low, generally .2-.3 percent and heating values average 10,500 BTU for a composite average of 47 samples (Barnes, 1966).

Reserve calculations and parameters

Reserve calculations have been made using the limiting parameters established by the U.S. Geological Survey as follow: "In computing the reserves the area underlain by a flat or gently dipping coal bed was determined by assuming that an outcrop establishes continuity for half a mile in all directions except where the bed is known to be terminated at a shorter distance by thinning, faulting or erosion."

The Chuitna, Beluga and Capps coal beds because of their thickness and outcrop continuity have more lateral continuity and it was assumed that each bed extends back from the outcrop for a distance equal to half the known outcrop length. Areas with structural complications and coal beds that project below the 1000 foot overburden limit were not included in the reserve calculations. Coal beds less than 1 foot thick were not included in the cumulative reserves.

Reserve calculations in this report are limited to three areas (Beluga River, Chuitna River, and Capps Glacier) where outcrop control is sufficient to indicate potentially commercial coal production. There is, in addition to the above areas, a small coal body along Drill Creek, section 10, 11, 14 and 15, T15N., R12W., which was diamond drilled by the U.S. Bureau of Mines in 1959-1961, blocking out approximately 20 million tons of coal reserves.

For comparative purposes one ton of coal is considered equivalent to 4 barrels of oil. This ratio is based on the type of coal, BTU content, and the amount of moisture and ash contained in the coal.

COAL RESERVES (in short tons)

Capps Glacier Area	550,000,000 short tons
Beluga River Area	150,000,000 short tons
Chuitna River Area	1,560,000,000 short tons
TOTAL	2.26 billion short tons

COAL RESERVES, BELUGA AND CHUITNA RIVERS AND CAPPS GLACIER AREAS, ALASKA

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