GEOLOGICAL SURVEY CIRCULAR 154

COAL PROSPECTS AND COAL EXPLORATION AND DEVELOPMENT IN THE LOWER MATANUSKA VALLEY ALASKA, IN 1950

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UNITED STATES DEPARTMENT OF THE INTERIOR
Oscar L. Chapman, Secretary

GEOLOGICAL SURVEY
W. E. Wrather, Director

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Washington, D. C., 1952

Free on application to the Geological Survey, Washington 25, D. C.

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INTRODUCTION

The following report is based on incidental field examinations made during the summer of 1950, while the writers were engaged primarily in collecting supplemental field data in the Wishbone Hill coal district and furnishing geological assistance to a diamond-drilling project of the U. S. Bureau of Mines. Sites examined included all the operating coal mines in the lower Matanuska Valley and several isolated and little-known coal prospects on which additional information was desired. Also included in the report is a description of one coal prospect examined in 1951--the Barnett prospect on the Little Susitna River. The locations of all known coal mines and prospects in the lower Matanuska Valley are shown on the accompanying sketch map (fig. 1).

GEOLOGIC SETTING

The bedrock of the lower Matanuska Valley, so far as known, consists of moderately deformed sedimentary rocks of Late Cretaceous and Tertiary age that have been depressed between the older and more highly deformed metamorphic and intrusive rocks of the Talkeetna and Chugach Mountains, to the north and south respectively. Rocks of Late Cretaceous age, consisting of marine shale and sandstone, are confined largely to the area east of the latitude of Eska Creek, although there are scattered exposures in the bluffs of the Matanuska River to a point opposite Palmer. Rocks of Tertiary age, consisting principally of the coal-bearing Chickaloon formation, are exposed in several large areas east of Moose Creek, but farther west they are known only at a few small exposures scattered along the north side of the valley. Elsewhere the valley floor is covered by a thick mantle of outwash gravels and morainic deposits of Quaternary age that conceal the underlying bedrock. In the Wishbone Hill district the Chickaloon formation is partly overlain by the Eska conglomerate, also of Tertiary age but not coal-bearing.

The coal-bearing Chickaloon formation is best exposed and has been studied most fully in the Wishbone Hill district, from which the greatest part of the total coal production of the Matanuska field has come. Detailed studies in the district have shown that the principal coal beds, contained in the upper 1,000 ft of the Chickaloon formation, fall into three fairly well defined groups of three or more coal beds separated by thick sections of relatively barren strata. These groups include, in descending order: the Jonesville coal group, first developed in the now-abandoned workings on the south-limb of the syncline at the Evan Jones mine; the Premier coal group, mined in the Premier, Buffalo, and other mines on Moose Creek and in the north-limb workings of the Evan Jones mine; and the Eska coal group, mined on both limbs of the syncline at the Eska mine.

The structure of the Wishbone Hill district is dominated by a northeast-trending syncline, with dips on the limbs generally ranging from 15° to 40°, that is cut by several major transverse faults. The fault in the Eska mine and the Jonesville fault in the Evan Jones mine have greatly affected the direction and extent of mining operations in the eastern part of the district. Other major faults in the western part of the district, together with

complex folding on the northwest limb of the major syncline, have complicated if not prevented the successful operation of several mines along Moose Creek.

The character and structure of the Chickaloon formation are less well known west of the Wishbone Hill district, because of the scarcity of exposures. The nearly flat lying and apparently little faulted beds exposed in the strip coal mine at Houston suggest that the structure becomes less complex westward from Wishbone Hill. There is a possibly related decrease in rank of the coal, which is bituminous at all mines in the Wishbone Hill district and subbituminous at Houston.

ESKA CREEK

Properties visited on Eska Creek include the Evan Jones mine, which continues to be the only large-scale producer of bituminous coal in the Territory; the Eska mine of the Alaska Railroad, which has been closed since 1946; and the Knob Creek mine, a new venture that has not yet reached the producing stage and has been inactive since early in 1950.

Evan Jones mine.--This mine was active throughout the year, except for a short period in midsummer when mining was suspended to facilitate the installation of a new heavy-medium coal cleaning plant. All production was from bed 3. In addition to the numerous faults that complicate mining operations in this mine, a 20-foot basic dike that crops out on the north slope of Wishbone Hill (Barnes and Byers, 1945, p. 19) was encountered about 4,000 ft west of the main crosscut tunnel. Aside from causing difficulty in driving gangway and crosscuts through this extremely hard rock, and causing the displacement of a certain amount of coal, the dike has had little effect on mining operations or on the condition of the coal. The metamorphic effect of the intrusion--hardening and incipient coking of the coal--does not extend more than a few inches from the dike walls.

At the time of examination the gangway on bed 3 was stopped at a fault at Chute 90 until one or more diamond-drill holes could be bored into the face to locate the coal beyond the fault. For this purpose a small air-driven drill, taking a 7/8-inch core, was to be used.

After drilling by the Bureau of Mines had proved the presence of coal on the south limb of the Wishbone Hill syncline west of the Jonesville fault, the Evan Jones Coal Co. in 1949 attempted to develop a new mine opening about a mile west of Jonesville, with the object not only of developing additional reserves but of eliminating the disadvantage of having all mining operations dependent on a single opening. The first attempt consisted of sinking a slope at moderate inclination across the dip of a coal bed encountered in a nearby drill hole. The slope was driven 77 ft, after which work was suspended because abrupt steepening of the dip threw the coal bed out of the projected line of the slope. A tunnel was then started across the strike of the northwest-dipping beds and continued for 189 ft. From the tunnel face a horizontal diamond drilling carried exploration an additional 373 ft before being stopped by caving and before penetrating the Jonesville coal group, the objective of the work. However, fragments of coal in the caved material washed from the drill hole suggest that the drill may have reached the base of the coal group.

The Bureau of Mines drilled two holes on the Evan Jones lease in 1950. Hole 10 was churn-drilled to a depth of 1,150 ft through the Eska conglomerate and then core-drilled to a total depth of 2,110 ft, passing through a series of coal beds and coaly zones that probably represent the Jonesville and Premier coal groups. Hole 9 was churn-drilled to a depth of 1,200 ft in the Eska conglomerate and then recessed until the 1951 field season, when it will be completed with a core drill.

Eska mine.--The Eska mine, a government property under the jurisdiction of the Alaska Railroad, remained closed throughout 1950, and no plans for reopening it are known.

Knob Creek mine.--A small "truck" mine was opened by C. D. and J. A. Carrol in 1949 on Knob Creek, about 1 mile northeast of Eska, with which it is connected by a dirt road. An apparently promising coal bed was opened on the outcrop but was followed for only a short distance before being cut off by a fault. Attempts were made to follow the coal both by driving through the fault and by sinking a slope down the dip outside the fault. The coal was not located beyond the fault, and at the time of examination the slope had not been advanced far enough to determine whether a minable block of coal could be developed. This mine has been inactive since early in 1950.

MOOSE CREEK

Mining or development work was done at two mines on Moose Creek in 1950.

Buffalo mine.--Development work and some incidental coal production were resumed at the Buffalo mine in 1950, after an inactive period dating from 1944. Development work involved preparations for sinking a low-angle slope across the dip on bed 1, the lowest in the series of coal beds encountered in the Buffalo mine, to replace the original slope that was driven directly down the dip on bed 2 at a maximum inclination of nearly 60°. From the foot of the new slope it was planned to drive a crosscut in the direction of dip through the Premier coal group, which will then be mined in descending stratigraphic order. Current plans included the construction of a new tipple and washery opposite the collar of the new slope, which will be about 400 ft northeast of the old slope. Production was being augmented temporarily during the development period by mining on bed 5 above tunnel level.

Premier mine.--Work at the Premier mine in 1950 included the mining of a small tonnage from pillars in the old underground workings, and the cutting of several trenches in an effort to develop stripping coal in beds exposed in the bluffs on the southeast side of Moose Creek between the Premier and Baxter mines. At the time of examination three trenches had been cut to bedrock and offered poor

exposures of several coal beds, probably representing the Eska coal group, with steep to vertical dips on the limbs of a series of tightly compressed northeast-trending folds. Only one bed of the series appeared to be of minable thickness, about 5 ft, and this includes large masses of iron-carbonate near its center.

Inactive mines on Moose Creek.--Other mines on Moose Creek that have operated in the past are the Pioneer (Doherty) mine on lower Moose Creek, the Baxter mine a short distance above the Premier mine, and the New Black Diamond, Wishbone Hill, Matanuska Center and mines above Buffalo. All these mines are now virtually abandoned--the Pioneer because of the poor quality of the coal, and the others because of complex structure, financial difficulties, and other factors that prevented the attainment or continuation of a profitable mining operation (Apell, 1944, pp. 34-35; Payne and Hopkins, 1945, p. 20, table 3).

LITTLE SUSITNA RIVER

Coal is known at three localities on the Little Susitna River, at points 5, 13, and 25 miles west of the southwest end of the Wishbone Hill coal district. As the intervening areas are completely covered with unconsolidated deposits, largely glacial in origin, it is entirely possible that the coal-bearing formation underlies, more or less continuously, large areas of the lower Matanuska Valley, particularly along its northern margin.

Some information on this possibility might be obtained from detailed surface examination and shallow trenching, but the presence of minable coal deposits in these areas could be determined only by deep trenching or drilling. The depth of the unconsolidated deposits, as indicated by well records, ranges from a few feet to 200 ft or more.

Houston strip mine (Duck Flat Coal Co.).--The presence of coal in the Houston area has been known since 1917, when it was discovered in a railroad cut by a grading crew, and numerous attempts have been made to develop a mine. Several short tunnels were opened near track level of the Alaska Railroad in the low bluffs between Houston station and the Little Susitna River. In 1937 a longer tunnel was opened by Evan Jones about half a mile northwest of the section house, and a small amount of coal was mined. In 1948 the Houston Coal Co. began the development of a strip mine on two thin, flat-lying coal beds that are reported to have been traced, by test pits and hand-drill borings, under relatively shallow cover for a considerable distance. The following sections were measured in 1950:

Section in Houston strip mine near old Evan Jones tunnel

	Feet	inches
Claystone, gray, slightly silty	3+	
Coaly shale, grading downward into bone		2½
Coal		1½
Coaly shale		1
Coal		10
Bone		7
Coal, bright clean	1	1½
Bony coal		3½
Coaly shale		2
Claystone, brownish-gray thin coal stringers		8
Claystone, gray	2	
Bony coal (top of lower coal, not fully exposed)		8+

Section in Houston strip mine, 1,200 ft northeast of old Evan Jones tunnel

	Feet	inches
Shale, gray, coaly at base	10+	
Coal, dull glossy[1]		9
Bone, with bright coal streaks		7
Coal, bright [1]	1	½
Coaly shale	1	4
Coaly shale and bone	2	4
Coal [2]	1	
Coaly shale [2]		4
Coal, with clay slips [2]		6
Bone		2
Coaly shale		

[1] Included in analysis D-51894.
[2] Included in analysis D-51895.

The following analyses are of samples collected Sept. 26, 1950, by R. R. May and F. F. Barnes:

Analyses of coal from the Houston strip mine

Condition of sample: A, as received; B, air-dried; C, moisture free; D, moisture and ash free

[Analyzed by H. M. Cooper, U. S. Bureau of Mines]

Lab. no.	Air-drying loss	Condition	Moisture	Volatile matter	Fixed carbon	Ash	Sulfur	Heating valve Btu
D-51894	7.6	A	20.3	31.6	38.9	9.2	0.4	9,210
		B	13.7	34.2	42.1	10.0	.5	9,970
		C	--	39.6	48.9	11.5	.5	11,550
		D	--	44.8	55.2	--	.6	13,060
D-51895	6.7	A	17.4	32.5	36.6	13.5	.4	9,160
		B	11.5	34.8	39.3	14.4	.5	9,820
		C	--	39.3	44.4	16.3	.5	11,090
		D	--	47.0	53.0	--	.6	13,250

Mining methods in 1950 involved the stripping of 10 to 15 ft of overburden, consisting mainly of poorly consolidated silty claystone and a thin veneer of glacial gravels, breaking the coal by blasting in shallow holes on about 10-foot centers, and loading the coal into dump trucks with a power shovel. The coal was then hauled about a mile to the tipple and washing plant, where it was crushed, cleaned, and loaded into railroad cars.

A small tonnage of coal was produced in 1949, and the company has a contract to furnish 8,000 tons of stoker coal to the Army at Fort Richardson in the fiscal year 1951. Plans were being made in 1950 for expanding and improving the plant. In 1951 the company was reorganized and its name changed to the Duck Flat Coal Co.

Bartholf prospects.--In 1917 John Bartholf reported the presence of a bed of lignite on the Little Susitna River, in sec. 16, T. 18 N., R. 1 W., from which he had obtained some coal for use at gold mines in the Willow Creek district (Christensen, 1917, p. 11). About 1944 a prospecting permit covering secs. 8, 9, 16, and 17, T. 18 N., R. 1 W., was issued to Grohnert, Dodson, and Brown, three mining men with interests in the Willow Creek district, who expressed the intention of constructing a power plant to serve mines in the district. Short prospect tunnels were opened on two coal beds at two localities, one near the mouth of a small northern tributary of the Little Susitna River and the other 3,000 ft up the tributary. Both localities were visited in 1950 by the writers, who found the prospect openings badly caved. The following section was measured in the side of a short tunnel near the mouth of the creek.

	Ft.
Coal, thin-bedded, and coaly claystone	1.8
Bone and coal, interbedded	.7
Shale, carbonaceous, and iron-carbonate	.1-.2
Coal, in part bony, including numerous large masses of coaly ironstone	4.6
Coal, somewhat blocky, with lenses of bone and coaly claystone (base not exposed)	2.3+

The following section was measured at an outcrop (strike, N. 40° W.; dip, 10° SW) in the stream bank 25 ft from the tunnel, and at least in part duplicates the beds in the above section:

	Feet
Silty claystone	0.6+
Coal, thin platy, but apparently clean	.9
Bony coal	.7
Coal, clean blocky	.5
Thin-bedded coal, bone, and coaly claystone	1.0
Coal, hard bony, including 1" ironstone nodule	1.9
Coal, in part shaly, in part blocky	.5
Shale, coaly	.5
Coal, largely bony (base not exposed)	1.5+

The tunnel at the locality 3,000 ft north of the Little Susitna River was completely caved at the time of examination, and the only coal exposure was in the bed of the creek, where a 3-foot section consisted of platy coal, apparently clean and of good quality, divided by an 8-inch bed of coaly claystone. Neither the top nor the base of the coal was exposed. The strike at this point was due east and the dip 23° S., indicating that the coal lies close to the surface of the north wall of the stream valley at this point.

The following section was measured in 1944 at the upper locality by Col. C. W. Jeffers, head of the Alaska Coal Procurement Commission, Ft. Richardson, who described it as an average section of the lower bed:

	Feet	inches
Coal	1	9
Dirt band		6
Coal		2
Dirt band		6
Coal	3	
Dirt band	2	6
Coal	3	4

Partial records of six analyses of coal samples taken at both localities by Col. Jeffers and members of his staff show the coal to have a high ash content, ranging from 19 to 36 percent.

No work was done on these prospects for several years, and the permit issued in 1944 lapsed. In 1951 James Harris and Emil Stalder applied for a prospecting permit on the same area and started a new prospect tunnel at the upper locality.

Barnett prospect.--Coal-bearing rocks are exposed on the west side of the Little Susitna River about half a mile northwest of the junction of the roads from Palmer and Wasilla to Fishhook Canyon. An application for a prospecting permit on unsurveyed land including this prospect was filed in 1951 by Barnett, Lohnes, Thorpe, and Pomeroy.

The following section was measured at the prospect locality (strike of outcrop, N. 16° E.; dip, 18° NW) in the west bank of the Little Susitna River:

	Feet
Siltstone, gray	8
Sandstone, fine silty iron-stained	2.8
Bone	.3
Coal, thin-bedded in part bony	1.7
Coal, bony	.5
Coal, bright	.6
Clay, brown, containing coal and claystone fragments	.5
Claystone with some iron-carbonate nodules	1.0

WILLOW CREEK

Sparling prospect.--The only known coal occurrence in the Willow Creek area lies about 2 miles north of Willow Creek at a point about 18 miles

east of Willow station on the Alaska Railroad. The coal is exposed in a steep-sided gully cut in the southwest slope of the extreme western end of the ridge between Willow and Purches Creeks. At the time of the writers' examination bedrock was almost completely concealed by slump from the steep gully sides, so that sections of the coal beds could not be measured. Bedrock was exposed sufficiently by digging several shallow pits to determine that the general strike is about N. 45° W. and the dip 45° NE.

According to an unpublished memorandum by Major D. L. Sibray of the Alaska Coal Procurement Commission, who examined the prospect in 1943 when the beds were well exposed by recent trenching, the section included four coal beds ranging from 2 to 9 ft in thickness. The 9-foot bed includes an 18-inch soft clay parting. Major Sibray's memorandum also included the following analysis, representing the middle 6 ft of one of the beds:

Analysis of coal from the Sparling prospect

Condition of sample: A, as received; B, air-dried; C, moisture free; D, moisture and ash free.

[Analyzed by M. L. Sharp, Alaska Railroad]

Lab. no.	Condition	Moisture	Volatile matter	Fixed carbon	Ash	Sulfur	Heating valve Btu
1021	A	19.7	34.9	35.5	9.9	0.2	8,855
	B	7.3	40.3	41.0	11.4	.2	-----
	C	---	43.5	44.2	12.3	.3	11,025
	D	---	49.6	50.4	--	.3	12,600

AREA EAST OF GRANITE CREEK

Rinehart prospect.--Coal was discovered in 1917 on the north side of the Matanuska River about 2 miles east of Granite Creek, in sec. 18, T. 19 N., R. 4 E., by William Rinehart and associates (Christensen, 1917, pp. 10-11).

"They found what they supposed was a five foot bed of coal. They ran a cross-cut tunnel some 200 feet, but when they struck the bed it was found that there was only about 18 inches of coal, and that of a poor quality. They shipped two carloads of it to Anchorage, but it contained so much bone and other impurities that they finally abandoned their venture."

A sketch of this prospect from the files of the Alaska Railroad, prepared by M. L. Sharp in 1925, shows that a tunnel was driven about 140 ft to intersect a 4-foot coal bed dipping about 45° N. A fault cut the coal at tunnel level, leaving only 18 in. of coal in the face. A single chute was driven up the dip of the coal to the surface, a distance of about 140 ft, and widened by mining to a maximum width of 60 ft. When the locality was visited by the senior writer in 1945 both the tunnel and airway were caved and inaccessible. Outcrops and test pits on the steep slope above the tunnel show the bedrock formation to contain much sandstone and some claystone, with a strike N. 40°-70° E. and a dip 35°-50° NW. About 100 ft above the tunnel level the slope is broken by a flat bench, which is covered with a thick mantle of glacial gravel and boulders, as shown by numerous test pits and trenches dug by the original prospectors. The extent and coal content of the Chickaloon formation at this locality are therefore unknown. The nearest known coal-bearing rocks along the projected general strike of these beds are on Young Creek, about 4 miles to the northeast (Martin and Katz, 1912, p. 82).

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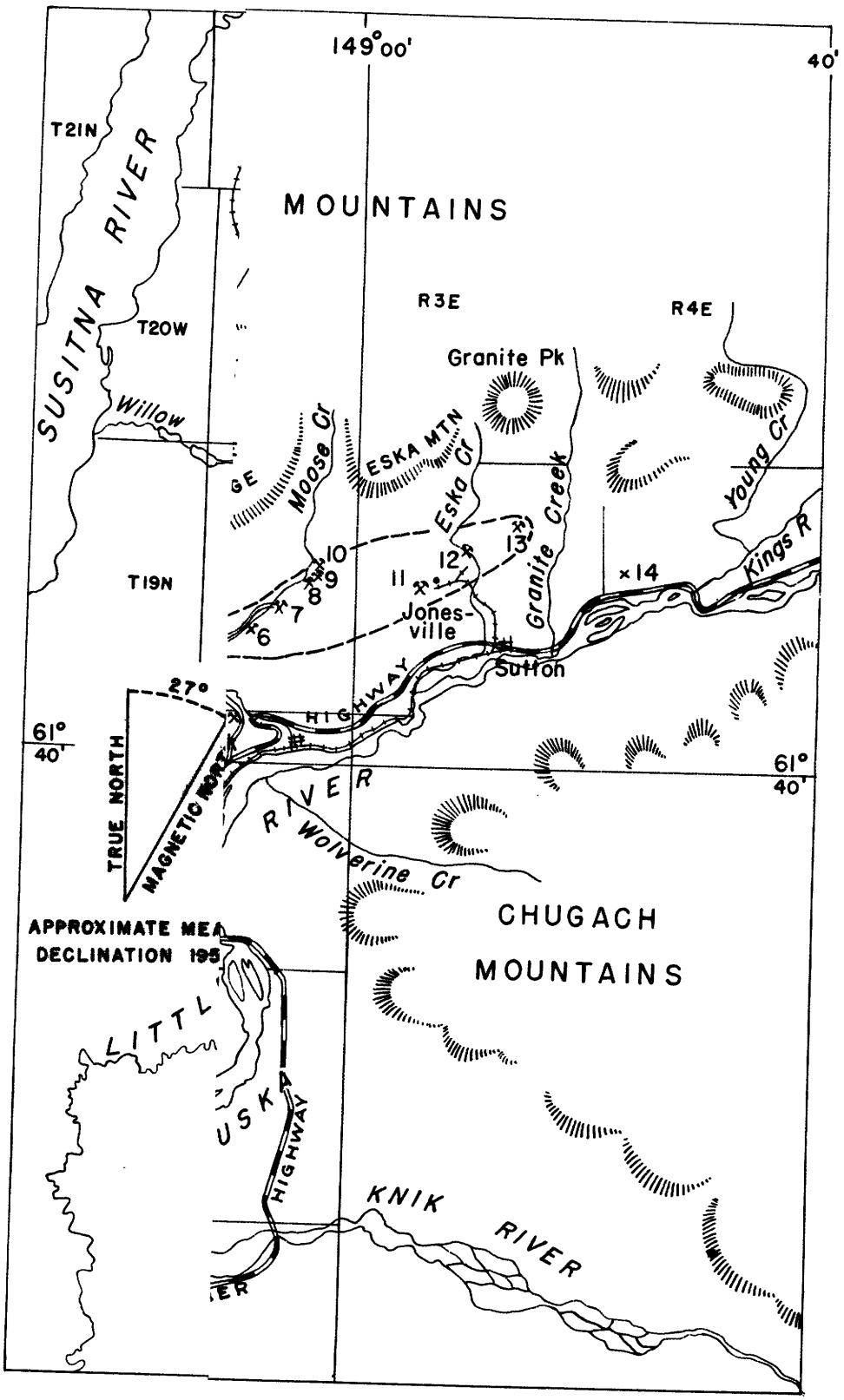

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