

MINING DEVELOPMENTS IN THE MATANUSKA COAL FIELDS.

By THEODORE CHAPIN.

INTRODUCTION.

The only coal-mining activity in the Matanuska Valley in 1919 was the working of the Government-operated mines at Eska and Chickaloon by the Alaska Engineering Commission in charge of Sumner S. Smith, resident engineer. This paper is intended as a brief statement of the operations of the year, to supplement a more extended report on the geology and developments recently published.¹

ESKA MINE.

The principal operations were at Eska, where an average of 85 men were employed throughout the year and approximately 40,377 tons of coal was mined. This coal was taken from all six of the productive beds, the Martin, Shaw, Eska, Maitland, David, and Emery, but the greater part came from the first four named.

The coal deposits at Eska lie in an open syncline that trends approximately east, about perpendicular to the creek, which has cut across the beds and has exposed a natural section. The mining by the Alaska Engineering Commission has been done only on the north limb of the syncline, above water level. During 1919 the Emery east and David east gangways were extended 353 and 448 feet, respectively, this work being largely in the nature of development. On the west side of Eska Creek the Eska, Shaw, and Martin tunnels were extended 275, 407, and 86 feet, respectively. The Shaw is now used as the main haulage way, and the 20-pound rails formerly used have been replaced by 60-pound rails and the track gage widened from 24 to 36 inches.

About 1,660 feet from the portal of the tunnel the Martin, Shaw, and Eska beds are cut off by a fault, whose position was known approximately from the surface outcrops. During the open season of 1919 a careful study was made of the structure of the beds as shown on the surface above and just beyond the present face of the Shaw west tunnel. The beds were opened by pits and at critical localities

¹ Chapin, Theodore, Mining developments in the Matanuska coal field: U. S. Geol. Survey Bull. 712, pp. 131-167, 1920.

by stripping, which showed the conditions illustrated in figure 2. The Eska, Shaw, Martin, and Emery beds were identified, and one or another was traced for nearly 1,000 feet. Between the position of these beds and the position of the present workings, however, there is a downthrown fault block from 100 to 300 feet wide in which the coal beds are either absent or badly broken. The beds west of this fault block appear to be but little disturbed with reference to the position of the beds in the present workings. From the strike and dip of the outcrops the approximate position of these beds on the level of the

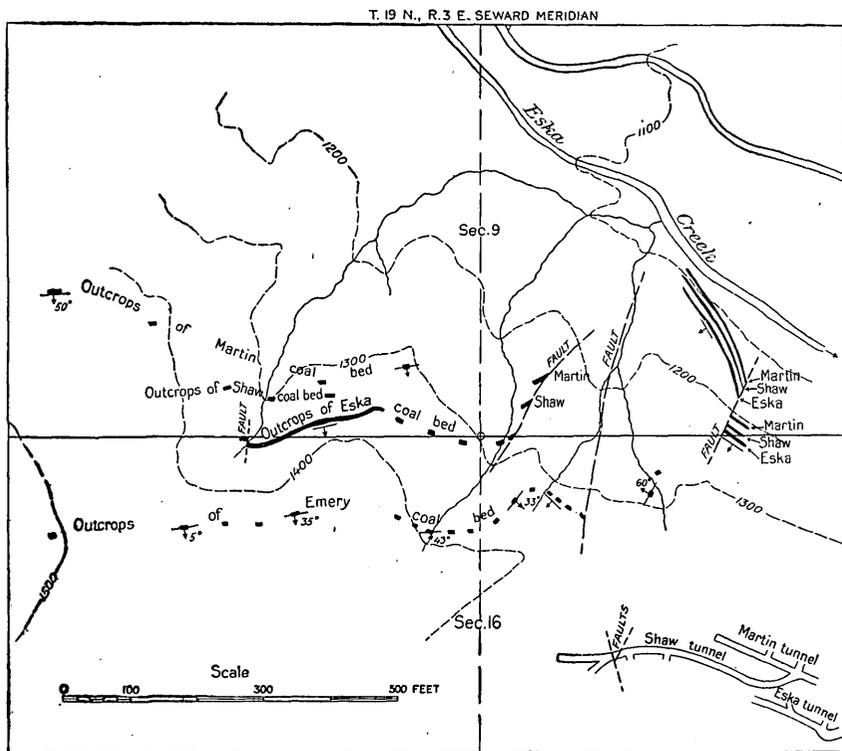


FIGURE 2.—Sketch map of part of Eska mine, Matanuska Valley, showing position of face of Shaw, Eska, and Martin workings, outcrops of coal beds, and structural relations.

present workings has been calculated, and work is now in progress to drive the Shaw west tunnel through the fault block to connect with the beds west of the faulted ground.

Where the Shaw tunnel enters the fault block it cuts a massive sandstone which occurs just above the Eska coal bed and which has been carried downward by the movement along the fault. Excavation through this hard rock will necessarily be slow.

On the south edge of the syncline open cuts and churn-drill holes show the presence of all six beds and indicate a considerable area of

minable coal from which a large tonnage can be mined with probably no greater difficulties than were encountered in the present workings. So far all the mining has been done from water-level tunnels, from which rooms are opened.

The cleaning plant has been in operation throughout the year, and plans are under way for the erection of a washery.

CHICKALOON MINE.

At Chickaloon an average of 35 men were employed in 1919 and approximately 4,176 tons of coal was mined incidentally to development operations. On account of the difficulty of using the old slope as a working shaft a new slope was extended along bed 8 at an angle of 32° to 46° for 238 feet, to the second level, at an elevation 312 feet below that of the portal, and a station was cut, from which drifts were extended east and west 206 and 434 feet respectively.

The new slope from the first to the second level passed from bed 8 through a faulted zone containing considerable crushed coal into bed 5, which is exposed in the station. In extending the slope it was not evident to the operators whether a fault or a squeeze in the bed was being encountered, but when the second level was reached bed 5 was identified. It is thus evident that the fault is not marked by a definite plane but by a crushed zone containing drag blocks of coal, and its direction is known only by the relative position of beds 5 and 8.

On the west drift from the station the workings pass from bed 5 to bed $5\frac{1}{2}$ along the crushed zone of a low-angle fault of slight displacement similar to the one in the slope that has cut off bed 8.



LODE DEVELOPMENTS IN THE WILLOW CREEK DISTRICT.

By THEODORE CHAPIN.

MINING IN 1919.

Mining operations in the Willow Creek district in 1919 were carried on at five mines, the same number as in 1918. The Gold Cord mine, which was operated in 1918, was idle, but the War Baby made its first production in 1919 and was operated throughout the open season. Considerable prospecting was done, and some bona fide sales were made. The value of the gold and silver produced in 1919 was \$159,458.

The Willow Creek district is being developed mainly for its gold-bearing lodes, which occur as well-defined fissure veins in quartz diorite. Two copper-bearing lodes, however, one on the eastern and one on the northern edge of the district, have been located recently, and enough annual assessment work has been done to hold the claims. The presence of telluride ores in the gold-quartz veins has been reported from time to time. Since 1913 the Survey has tested these so-called tellurides with negative results. In 1919 it was again reported locally that telluride ores occur at a number of properties in the Willow Creek district. Tests for tellurium on samples submitted were made in the Geological Survey office at Anchorage, with negative results, and these tests were corroborated by assays made on the same ore by the Survey chemists in Washington. It is not intended to say that tellurides do not occur in the Willow Creek district, nor that they will not be found. It is not likely, however, that rich deposits of telluride ores occur here, for the geologic association of the Willow Creek lodes does not favor their occurrence. The known rich deposits of telluride ores of gold and silver occur mostly in comparatively shallow veins in Tertiary lavas. The Willow Creek lodes are not associated with effusive volcanic rocks and are believed to be of much greater depth and persistence than the type of veins in which rich deposits of tellurides are usually found.

The mines and prospects on which development work is being continued are shown on the accompanying map (Pl. VI). The following descriptions of operations deal only with recent developments.

MINES AND PROSPECTS.

WILLOW CREEK AND TRIBUTARIES.

The Gold Bullion mine on Craigie Creek, operated by the Willow Creek Mines, continued to be the most constant producer in the district. The mine and mill were operated throughout the open season, from May 26 to October 16, employing from 60 to 70 men. The ore was supplied principally from tunnels Nos. 3, 4, and 5. Plans were recently made to erect a plant for the treatment of the slimes, which have been ponded since milling operations were begun. Some development work was done on the Lucky Shot and Panhandle groups of claims, on which options were taken last fall by the Willow Creek Mines. The Lucky Shot vein was traced across five claims by open pits and a short tunnel that was started to open the vein. It strikes N. 60° E. and dips 45° NW. The Panhandle group consists of four claims, which cover a vein of quartz from 6 to 8 feet across, with horses of country rock. This vein strikes N. 85° W. and dips 38° N. But little work has been done on it.

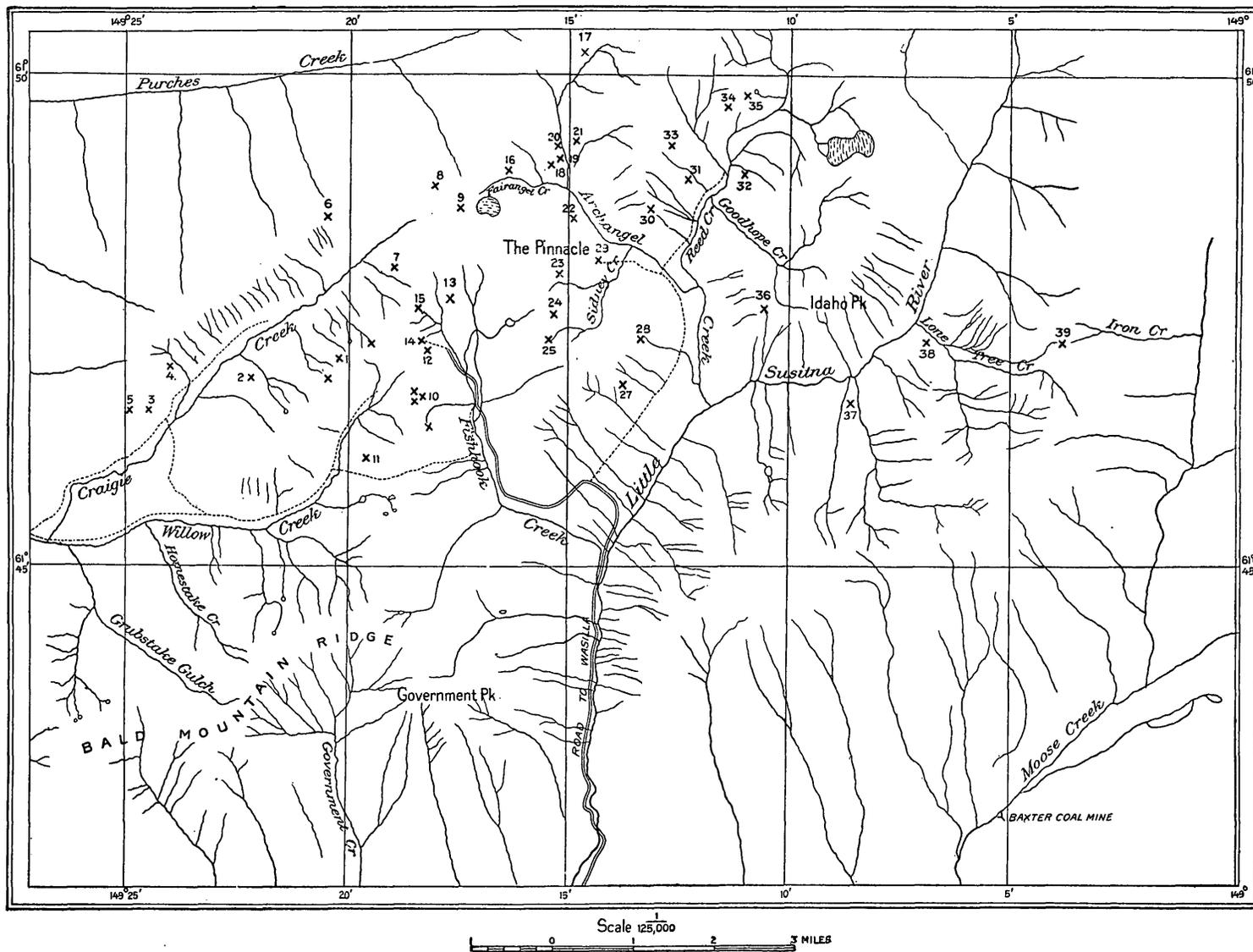
The owners of the War Baby mine, on lower Craigie Creek, which made its first production in 1919, completed the erection of a Straub mill and operated the mine throughout the season. The workings consist of two short openings on the vein and a third that is being driven to tap the vein at a lower level. Underground development work was carried on during the winter.

Some development work was done on the Golden Light claims, on the southeast side of Craigie Creek, and a mill was erected, but no production was made.

The Leona and Gold King claims, near the head of Craigie Creek, are being developed by the Brassel Bros. A large fissure vein, which is said to have been traced for six claim lengths, is 19 feet across. The walls are well defined, with 6 inches of gouge on the footwall and 18 inches on the hanging wall. The vein is composed of altered quartz diorite with stringers of quartz. It strikes N. 70° E. and dips 42° NE. About 100 feet below it is a parallel quartz-feldspar dike with some vein quartz which carries a little gold. On the Gold King No. 3 and Leona claims a number of surface workings show several small veins of rich quartz, and a tunnel is now being driven to open these veins.

Development work was also continued on the Newman and Miller claims, on upper Craigie Creek.

A copper prospect near the head of Purches Creek is covered by the Dixie group of claims. The ore deposit consists of a pegmatitic vein 8½ feet wide which strikes N. 55° E. and dips 55° SE. At each border of the vein is a coarse pegmatite composed of quartz and orthoclase



SKETCH MAP OF WILLOW CREEK DISTRICT, SHOWING LOCATION OF MINES AND PROSPECTS

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|---|-----------------------------------|--------------------------------|----------------------------------|
| 1. Gold Bullion mine. | 11. Mammoth prospect. | 21. Little Gem Gold Mining Co. | 31. Idamar prospect. |
| 2. Golden Light prospect. | 12. Alaska Free Gold mine. | 22. Webfoot prospect. | 32. Mary Ann prospect. |
| 3. War Baby mine. | 13. Gold Cord mine. | 23. Mohawk prospect. | 33. Snow King prospect. |
| 4. Panhandle prospect. | 14. Independence Gold Mines Co. | 24. Keystone prospect. | 34. Willow Creek Development Co. |
| 5. Lucky Shot prospect. | 15. Kelly-Willow Creek Mining Co. | 25. Smith-Sargent prospect. | 35. _____ prospect (idle). |
| 6. Gold King prospect. | 16. Talkeetna mine. | 27. Shough prospect. | 36. Le Roi Mines Co. |
| 7. Newman & Miller prospect. | 17. Anchorage Gold Mines Co. | 28. Mabel mine. | 37. Gold Mint prospect. |
| 8. Dixie prospect. | 18. Rutland prospect. | 29. Arch prospect. | 38. Maverick prospect. |
| 9. Little Willie prospect. | 19. Fern & Goodell prospect. | 30. Opal prospect. | 39. Moose Creek copper claims. |
| 10. Brooklyn-Willow Creek Gold Mining Co. | 20. Giant Gold Mining Co. | | |

with large foils of muscovite and particles of chalcopyrite. The central part of the vein is milky-white quartz cut by irregular stringers of chalcopyrite with a little bornite. The deposit is opened at one place by an open cut across the vein which shows the following section:

Section in open cut on Dixie claims.

	Ft.	in.
Pegmatite.....	1	0
White glassy quartz with stringers of chalcopyrite and bornite.....	5	0
Lens of chalcopyrite.....		5
Pegmatite.....	2	0

The sulphides are essentially pure chalcopyrite and bornite, which occur as irregular masses in the quartz.

The Little Willie claims were recently staked by Long & Holland on the divide between the heads of Craigie, Purches, and Fairangel creeks. The principal vein crops out on Craigie Creek above Craigie Glacier and has been traced across the ridge into the head of Fairangel Creek. This vein strikes N. 77° W. and dips 26° NE. It is composed of quartz stringers from an inch to 6 inches wide which closely follow a green igneous dike made up entirely of secondary minerals, essentially sericite, quartz, and calcite. Originally this altered rock was probably granite or monzonite, composed of quartz and feldspar with some hornblende or mica. The quartz vein is evidently of later date than the dike but follows it closely along one wall or the other and in places occurs as several parallel veins within the igneous rock. The vein is small but is very persistent and from the amount of free gold in the outcrop is apparently very rich.

A copper-bearing vein from 1 inch to 18 inches thick occurs on Fairangel Creek on the ridge above the glacier: This vein is composed of quartz and carries gold, specks of chalcopyrite, and tiny veinlets of molybdenite.

The claims of the Blue Quartz Mining Co. are near the head of the north fork of Peterson Creek, a northern tributary of Willow Creek. Three parallel granitic dikes, composed of quartz and orthoclase, with clusters of tourmaline, strike N. 63° E. and cut the quartz diorite country rock. One of these dikes, 8 feet wide, gradually passes along its strike into a quartz vein that carries some gold and visible particles of chalcopyrite and tetrahedrite. Intersecting this main quartz vein are several short gash veins of quartz with considerable pyrite. These veins pinch out a short distance from the main fissure. Open cuts have been made on both the gash veins and the main vein, and a tunnel has been started to cut the main vein. The persistence of this fissure vein is not known. In one direction it apparently merges into a granite dike, and in the other it is covered with débris and has not been traced.

On Willow Creek some development work was carried on by Milo Kelly on the claims of the Brooklyn-Willow Creek Gold Mining Co.

FISHHOOK CREEK.

The Alaska Free Gold mine, mill, and cyanide plant were operated throughout the season, working from 20 to 30 men. Mining operations were continued in the old workings, and a little work was done on the Eldorado claim.

The Gold Cord mine, on upper Fishhook Creek, which yielded a production in 1917 and 1918, was not in operation.

ARCHANGEL CREEK.

Control of the Talkeetna mine, near the head of Fairangel Creek, was acquired in the fall of 1918 by W. F. Rock, who operated it throughout the open season of 1919 and continued development work. Mining operations are now confined to one tunnel extended about 300 feet along the vein, which strikes N. 45°-60° E. and dips 40°-60° NW. For the first 200 feet from the portal of the tunnel the vein is from 5 to 18 inches wide, but it widens abruptly and for the next 100 feet to the face of the tunnel is from 5 to 8 feet wide and in places contains 5 feet of solid quartz. Above this tunnel are other veins which are not being developed at present. The ore is banded rusty white and gray quartz, with considerable gouge. The quartz contains some visible gold, and in spots the ore is very rich, but the workable rock is confined to definite pay shoots within the vein.

The Little Gem Gold Mining Co. bonded the Webfoot claims and other property on Archangel Creek and continued development work during the winter of 1919-20.

The recently formed Giant Gold Mining Co. is developing the Marmot group of claims, on Archangel Creek. Supplies and equipment were sledged in to the property in the fall, and work was continued during the winter.

Tunnel driving was continued by Fern & Goodell during the spring of 1919 on their property on Archangel Creek.

The Mabel mine was operated for 160 days, from May 25 to November 1, by a small crew of men, and tests and mill runs were made on the ore. The work of the year was mostly intended to develop the mine. A crosscut tunnel was driven for 150 feet, and drifts were extended for 340 feet. The opening of two new ore bodies is reported. The Loveland-Alaska Mining Co., of Loveland, Colo., has taken a lease and bond on the mine and will continue active development under the management of H. J. Phillips.

REED CREEK.

Development work was continued on the property of the Le Roi Mining Co., on Good Hope Creek, a tributary of Reed Creek. The claims are on the high divide between Reed and Good Hope creeks, about $1\frac{1}{2}$ miles east of the Loveland-Alaska mine and may be reached from the Reed Creek road. Since this property was located in 1917 development work has been carried on preparatory to active mining.

The Skarstad claims, known as the Opal group, were staked in 1919 on the west side of Reed Creek about a mile from its mouth. Two parallel veins have been traced by surface pits for two claim lengths. The veins strike N. 50° E. and dip 50° NW. The outcrop of the upper vein is from 3 to 4 feet wide and consists of quartz and gouge along each wall inclosing considerable altered diorite, all of which carries gold. The hanging wall is mineralized diorite with stringers of quartz and also contains gold. The lower vein is from 3 to 5 feet wide. It is made up of stringers of quartz and gouge in altered diorite and carries much pyrite from which gold may be panned after roasting. A tunnel was started in the fall, and work was continued during a part of the winter.

The Idamar claims, adjoining the Skarstad property on the northeast, were staked by J. B. Larsen in 1919, and a little surface stripping was done.

J. F. Burr is developing the Mary Ann group of claims, on the east side of Reed Creek, half a mile above the mouth of Good Hope Creek. A tunnel is being driven to intersect a vein that has been traced along the surface. It strikes northwest and dips northeast.

The Snow King claim, on the ridge west of Reed Creek, is being developed by J. F. Austin, to open a vein of quartz that is said to have been stripped for 4,000 feet.

LITTLE SUSITNA RIVER.

The Gold Mint group of seven claims was recently located by J. B. Hatcher on Little Susitna River about 2 miles above the mouth of Archangel Creek. The country rock is gneissoid quartz diorite. Several veins intersect the property. The upper vein strikes N. 50° W. and dips 42° SW. It is composed of 10 to 17 inches of bluish-white quartz, with considerable pyrite and chalcopyrite and some visible gold. The vein has been traced for some distance on the surface and appears to be persistent. The lower vein strikes N. 30° W. and dips 62° SW. Where exposed by several surface cuts the vein consists of milky-white quartz with rusty streaks and blotches from the oxidization of pyrite. Between these two veins are two or three others that strike about north. These are apparently barren where

exposed. The developments consist of a short tunnel that is being driven on the upper vein and surface pits to prospect the veins.

The Maverick claims were located by J. B. Wilson on Lone Tree Creek on a quartz vein reported to be 2 feet thick and similar in appearance to the upper Gold Mint vein.

The Moose Creek copper claims, on the ridge between tributaries of Little Susitna River and Moose Creek, have not been visited by members of the Survey, and the following information is abstracted from a report by Mr. F. L. Thurmond, of Anchorage. The claims are on the eastern border of the Willow Creek district, on the divide between Little Susitna River and Moose Creek, at elevations ranging from 2,300 to 4,800 feet. The property is reached from Moose Creek. A wagon road follows the creek for 5 miles to the Baxter mine, from which a trail extends to the property on Iron Creek, a distance of about 12 miles. The property consists of two groups of claims, one of four claims and an adjoining group of seven claims. These claims were located in 1914 and 1915 by J. H. McCallie and associates, of Anchorage. The ore deposit is from 30 to 100 feet in width, strikes about N. 75° E., and dips about 80° SE. It does not appear to have a well-defined wall, however, and merges gradually into the quartz diorite country rock. At one place an open cut has been made 25 feet diagonally across the deposit, which at this locality consists of pyrite, pyrrhotite, chalcopyrite, and sphalerite carrying gold and silver. It is said to have been traced for 7,000 feet along the surface but has not been explored in depth. The copper, gold, and silver contents are said to be low, but the apparent size of the ore body and its proximity to the railroad and to the coal deposits recommend it for careful examination.