MR-195-14

By BD Stewart Jr.
2/14/31.

MR Misc
Railroad

MEMORANDUM ON ALLOTMENT OF FUNDS AND NATURE OF WORK TO BE PERFORMED IN FURTHER INVESTIGATION OF MINERAL RESOURCES OF ALASKA TO ASCERTAIN THE POTENTIAL RESOURCES AVAILABLE WHICH WILL AFFECT ALASKA RAILROAD TONNAGE

The potential mineral resources in regions tributary to the Alaska Railroad, named in the order of their relative importance as sources of railroad tonnage so far as present development has revealed them, embrace (1) fuels, (2) metallic ores, and (3) non-metallic mineral substances.

1. Fuels.

The fuels include various types of coal ranging in grade from anthracite to lignite, and peat, the importance of which as a fuel is doubtful, but which may be found to have other important uses that will permit its treatment and shipment to the States. The possibility has also been indicated that petroleum may be found in the Susitna River basin.

(a) Anthracite coal (known deposits): The investigation of known deposits of anthracite coal has already been determined upon and the allotment of funds for that purpose has been fixed.

(b) Anthracite coal (unknown deposits): Several years ago samples of very pure anthracite coal were submitted to this office for analysis by representatives of the federal bureau of education, Interior Department, that were said to have been brought in by Indians from the general region lying north of the Yukon River and within the

1931

drainage system of the Chandalar River or neighboring streams. It was stated that the Indians declined to furnish more definite information as to the exact locality from which the samples were secured. Further investigation of this occurrence might be warranted.

(c) Semi-bituminous coal (known deposits): The known deposits of semi-bituminous coal occur in the Chickaloon-Coal Creek section of the Matanuska field. Much information on these deposits is already available in reports rendered on operations and investigations made by the Navy Alaskan Coal Commission that are on file in the leasing division, Geological Survey. Further data regarding subsequent investigations on the availability of the Chickaloon-type semi-bituminous coals for commercial exploitation are contained in a memorandum for the Secretary on "Coal Production Problems" by H. Foster Bain (June 14, 1922), and in a "Preliminary Report of the Investigation of Government-Owned Coal Mines in the Matanuska District, Alaska" rendered by Messrs. Hornberger, Slater and Christianer in connection with the agreement between the Department of the Interior and the Lake and Export Coal Corporation, dated April, 1922. These reports discuss briefly the possible availability of the Chickaloon-type semi-bituminous coal for use as blacksmith coal and as commercial bunker-coal for vessels crossing the Pacific as well as for coke-making. The advisability suggests itself of further investigating the possible markets for this

type of coal for these purposes. In that connection determinative tests should be conducted to fully appraise the suitability for use as blacksmith coal of the Chickaloon and Coal Creek coals, or combinations of these coals with other types found in the Matanuska field.

Concurrently with the investigation of possible markets and suitability of the coals for the purposes named, further investigation should be made as to tonnages probably available. The reports of the Navy Alaskan Coal Commission indicate the probable tonnages developed by the mine workings and diamond drill holes at Coal Creek and by the mine workings at Chickaloon. The geologic work done by the Commission indicates, however, that the mine development accomplished at Chickaloon and Kings River was confined to sections of the Chickaloon coal series that lie in the upturned edges of a synclinal basin that have been excessively affected by intricate faulting and by the injection of igneous sills. The report of the Commission also indicates the probability that the exploration of the interior or trough section of this syncline by means of diamond drill holes would develop the coal seams of the series under conditions of much less disturbance and in form such that mining costs would be much less than those that obtained at Chickaloon and that the coal would there be found cleaner, less friable, and otherwise more marketable. At the time the Navy ceased its operations in the Chickaloon section there was in progress the sinking of a diamond drill hole as a start in the exploration of this synclinal basin. This hole, which is designated by the Commission as their diamond drill hole No. 9, had been carried to a depth of 1,345 feet when opera-

tions were discontinued. As recommended by the Commission, this hole which is cased and capped, should be continued to a depth of 2,100 feet in order to determine the presence and condition of the coal seams at that locality. If conditions revealed by this hole are found favorable, two other drill holes should be sunk as recommended by the Commission placed as indicated on Plate No. 15, accompanying "Enclosure B" of the final report of the Navy Alaskan Coal Commission. This plate shows drill hole No. 9 and its proposed extension in relation to the synclinal structure and other geologic features at that locality.

(d) Bituminous coal (known deposits):

Matanuska Field.

The coal referred to herein as bituminous includes the types mined at Eska, Jonesville and Moose Creek, in the Matanuska field, that may be more strictly classified as high-rank sub-bituminous coal. The distribution and qualities of the deposits of this type in the Matanuska field have been fairly well indicated by the mining operations conducted at the localities mentioned, which are on the outskirts of the Wishbone Hill syncline. Wishbone Hill has been determined to be a down-thrown synclinal fault block within which the coal-bearing series is overlain for the most part by a thick bed of conglomerate designated the Eska conglomerate. All mining and exploratory operations that have been heretofore conducted in this vicinity have been near

the periphery of this main synclinal block and therefore in areas highly affected by fault movements that accompanied the settling of the block. None of the private coal operators has ventured to attempt the exploration of the coal series underneath the Eska conglomerate on account of the uncertainty that exists as to the depth of the series beneath the present surface. Geologists of the Geological Survey have expressed the opinion, however, that this depth is not excessive, and probably not more than a few hundred feet.

Whereas the coal seams of this section have been shown to stand at high angles to the horizontal (varying from 30° to vertical) in such mine openings as have been made so far, and the coal thus far mined is of such friable nature that its availability for export in competition with "outside" coals is questioned on that account, such conditions are undoubtedly due to the faulting that characterizes the peripheral sections of the Wishbone Hill block where the existing mines are located. It is highly probable that in the central portions of the Wishbone Hill syncline, underneath the Eska conglomerate, the coal beds lie at much gentler angles and that there the coal will be found to be much less fractured and more amenable to extraction in lump form. The attitude of the Eska conglomerate and underlying formations as visualized by G. C. Martin of the U. S. Geological Survey following extensive field examinations is clearly shown in Section

D-D, Plate XV, U. S. Geol. Sur. Bull. 500. A well planned diamond-drilling program conducted by the Alaska Railroad for the purpose of revealing the depth and attitude of the coal beds and the character and quality of the coal underneath the Eska conglomerate of Wishbone Hill is undoubtedly justified and should probably be made a major feature of the proposed investigation of resources. A favorable location for the initial hole would be on the SW. $\frac{1}{4}$, Sec. 27, T. 19 N., R. 2 E., S. M., which is adjacent to the Moose Creek branch of the Alaska Railroad. The rock strata on this quarter section are exposed by the gorge of Moose Creek and are shown to be members of the coal series lying almost horizontal over a considerable area. The locations of subsequent holes should be determined by additional field examinations.

Riley Creek Field.

A limited amount of exploratory work has been conducted on seams of bituminous coal that occur in the vicinity of Mile 341 on the Alaska Railroad. These coal seams have been determined to be older in geologic age than any others within the region tributary to the Railroad. The coal yielded by them is of the true bituminous type and has excellent physical qualities that make it a very favorable type for export. The calorific value is also high. Unfortunately, the only seam which has been opened for development is accompanied by an igneous sill which has coked the coal in places. It is also accompanied by a clay bed, clay from which has penetrated fine fractures

in the coal. The presence of this clay causes serious clinkering upon ignition of the coal. These features have condemned it for locomotive use. Further investigation is justified of the coal series in this locality to determine if possible the location of cleaner beds.

Lower Yukon River.

Deposits of bituminous coal have been found and some have been developed to a limited extent adjacent to the lower reaches of the Yukon River between Kulato and Anvik. Further investigation is suggested of these deposits as a possible source of coal for the Seward Peninsula market and the development of traffic for the Yukon River steamers of the Alaska Railroad.

(e) Sub-bituminous coal (known deposits):

Nenana Field.

The productive capacity of the mine of the Healy River Coal Corporation in the Nenana field is not only ample to supply such markets as have been developed for the type of coal available in that field, which is sub-bituminous coal of high moisture content, but is easily capable of expansion to supply the demands of a largely increased market. It would be a policy of doubtful merit, therefore, for the Alaska Railroad to encourage the expansion of development of coal tonnage in the Healy River section unless additional markets for the product are first assured. The coals of the Healy River section are rich in volatile combustible matter and on distillation

furnish a quite high yield of oil. Within recent years methods have been developed and are being commercially applied on a large scale in Germany whereby coals of the type found in the Nenana field are treated so as to convert them into fuel of much higher rank and also to secure from the process valuable by-products. The advisability is suggested of having an exhaustive study made of the Nenana coals as a means of determining their amenability to treatment by such processes and the feasibility of the commercial application of such processes in the reasonably near future if not at the present time. This study should be made by the U. S. Bureau of Mines in cooperation with the Alaska Railroad.

Broad Pass Field.

Costello Creek.

There has been discovered on Costello Creek, a tributary of the west fork of Chulitna River, at a point approximately 10 miles north of Broad Pass station on the Alaska Railroad, a seam of sub-bituminous coal the exposed section of which is about 25 feet in thickness. The hanging-wall section is covered and the full width is not known. Samples taken by a representative of this office showed on analysis that this coal has a calorific value of 10,620 B.t.u.'s as received, and an ash content of 3.34 per cent. The topography is such that a railroad spur could be constructed to the coal outcrop

with comparative ease. The strategic location of this seam near the railroad summit at Broad Pass, from which there is a down-hill haul to both termini of the road, lends significance to the occurrence. Further investigation of this deposit is warranted.

Investigation of improved marketing methods in the coal industry.

Serious obstacles to the successful introduction of Alaska coal, particularly the bituminous coal of the Matanuska field, into markets offered by the coastal towns of southern and southeastern Alaska where competition with foreign coal is met, have been the poor preparation of the Alaskan coals for marketing and the absence of storage bunkers and ship loading facilities at the Seward terminus of the Railroad. It is suggested that arrangements be made for an investigation to be conducted by the U. S. Bureau of Mines in cooperation with the Alaska Railroad and coal operators, having for its purpose improvements in the methods employed in preparing for market the coals mined in the Matanuska field as a means of expanding the markets for the coal and thereby increasing the tonnage available for railroad haul. A study should also be made of the advisability of providing storage bunkers and ship-loading facilities at Seward.

(f) Peat: The occurrence of a deposit of peat on lands segregated for the use of the College at Fairbanks and data relative to its potential value as a source of back-haul tonnage for the

Railroad are discussed in correspondence furnished by President Bunnell of the College. The existence is known of other deposits of peat along the line of the Alaska Railroad, specifically in the vicinity of Hurricane Gulch, and it is very probable investigation would reveal extensive deposits in many localities now unknown. A thorough survey should be made of peat resources in the railroad belt and investigations conducted as to their probable commercial value.

2. Metallic Ores (known deposits).

For the most part possessory title to known deposits of metallic ores in the regions tributary to the Railroad that are potential sources of tonnage is held by private individuals and in many cases such deposits are privately owned in fee simple owing to the issuance of patents. The extent to which investigations of such deposits may properly be carried by Government agencies is therefore limited. It is certainly feasible, however, for a thorough survey to be conducted by the Interior Department in cooperation with private owners of deposits of metallic ores both lode and placer with the purpose in view of appraising the potential importance and life of individual known deposits as sources of tonnage for the Railroad. Comprehensive authentic information of this type is lacking, and provision for such a survey should be made. Furthermore, this survey should be of a continuing nature in order that the Railroad

and the public may be kept informed as to the progress of the current developments of ore deposits and their significance.

The type of survey recommended should include not only such field investigations as have been made heretofore by the geologists of the Geological Survey, but also examinations of individual deposits by competent mining engineers. In the case of lode deposits, examinations by these engineers should include sampling, such estimation of probable tonnages as ore exposures permit, and the gathering of such other information as may be essential in appraising the importance of the deposit as a source of ore capable of commercial exploitation and of supplying tonnage to the Railroad.

In the case of placers, examinations should be conducted with a similar object in view and with such variations in methods employed as the nature of the deposits require.

A survey of the type indicated was commenced in 1922 and many examinations were made of mining properties, both lode and placer, in regions tributary to the Alaska Railroad by mining engineers associated with the office of Supervising Mining Engineer prior to the transfer of that office to the Geological Survey in 1925. Following that transfer, however, the staff of three engineers that were engaged in this work were removed from service and the policy of continuing such examinations in the Territory was rejected by the Geological Survey. This organization should be restored and its

services made available to the Alaska Railroad as well as to other sections of the Territory. As a means of encouraging systematic and economic development of meritorious deposits, the services of this staff of engineers should also be available in supplying technical assistance to prospectors and small operators who cannot afford to employ the services of private engineers.

Metallic Ores (unknown deposits): In considering the investigation of deposits of metallic ores now unknown the importance of providing for examinations and engineering services of a continuing nature should be emphasized. Any attempt to reveal the potential metallic mineral resources of the Railroad belt by investigations of an intensive nature that are limited to a single season is foredoomed to failure. The regions which may reasonably be expected to supply tonnage to the Railroad by production from metallic ore deposits now unknown embrace enormous areas not only adjacent to the railway line itself, but throughout the great drainage systems of the Yukon, Susitna and Kuskokwim Rivers. They include the mountain systems of the Brooks Range, the Alaska Range, the Kaiyuh Mountains, the Talkeetna and Chugach Ranges and other minor ranges too numerous to mention. Much of these regions is of a rugged mountainous nature difficult of access even under seasonable weather conditions and other vast areas of less rugged mountainous territory are mantled by heavy growths of

moss and tundra underneath which the bedrock is hidden. The task of revealing the mineral resources of such regions is one that may be accomplished only by exploratory and prospecting operations conducted over a long period of years. It is understood the proposed fund of $150,000 to be used for the survey of the potential mineral resources of these great regions will be available for use only within the fiscal year beginning July 1, 1931 and ending June 30, 1932. In many of the areas that merit close examination by field parties weather conditions prevent the continuing of such work after the first week in September or its commencement earlier than June first. It is therefore evident that no matter how intensively the task is undertaken, the accomplishment of but little toward such a vast survey may reasonably be expected within so brief a period. To attempt to base a judgment of the extent and value of the undiscovered mineral resources of the regions tributary to the Railroad on such a survey would be a profound injustice to the Railroad project itself and to the Territory as a whole.

3. Non-metallic Mineral Substances.

While there are at present no known deposits of non-metallic mineral substances of economic importance, other than fuels, within regions tributary to the Railroad, several deposits of clay, limestone, marl, etc. are known that will undoubtedly be developed for commercial use as the population and industries of the Railroad belt increase. Surveys of such resources should be made in order that information concerning them may be available when their exploitation becomes feasible.

B. D. STEWART,
Supervising Mining Engineer.