



## DEPARTMENT OF THE INTERIOR

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#### PART OF HERENDEN BAY COAL FIELD, ALASKA

A preliminary report on part of the Herenden Bay coal field, Alaska, has been prepared by the Geological Survey, Department of the Interior, it was announced today by Director William E. Wrather. The Herenden Bay coal field on the Bering Sea side of the Alaska Peninsula was briefly examined in October, 1943, by George O. Gates of the Geological Survey, with a representative of the Army and one from the Bureau of Mines.

Coal is known at several localities in the vicinity of Herenden Bay. At some, the coal is lignite, at others it is bituminous. The latter, low in ash and containing 11,000 to 13,000 British thermal units per pound is a good quality shipping coal. A few unsuccessful attempts were made before 1900 to develop the bituminous coal along Mine Creek, where the coal measures are in a broken and faulted syncline that approximately coincides with the valley of Mine Creek.

A limited number of mimeographed copies of the report are available to those directly interested and may be obtained upon application to the Director, Geological Survey, Washington 25, D. C.

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PART OF THE HERENDEN BAY COAL FIELD, ALASKA

By George O. Gates

Introduction

The Herenden Bay coal field has long been known and was briefly studied by Paige <sup>1/</sup> in 1905. His report contains considerable detail on the development work, all of which was done before 1900. Atwood <sup>2/</sup> made a more detailed study in 1908 as part of a regional study of the Alaska Peninsula in the vicinity of Herenden Bay.

The following report summarizes some of the main findings of the earlier studies and is based in part on a 3-1/2-day examination in October, 1943, in the company of Lt. Col. C. W. Jeffers, Quartermaster Corps, U. S. Army, and Robert S. Sanford, District Engineer for Alaska, U. S. Dept. of the Interior, Bureau of Mines. Transportation from Anchorage to Herenden Bay and return was furnished by courtesy of the U. S. Army.

The coal deposits in the vicinity of Herenden Bay, lying about 1600 miles northwest of Seattle, are favorably situated with respect to north Pacific navigation routes to Russia and to the Bering Sea. Herenden Bay is the west arm of Port Moller on the Bering Sea side of the Alaska Peninsula and about 120 miles from the tip of the peninsula. The coal deposits considered in this report are about 1 mile

<sup>1/</sup> Paige, Sidney, The Herenden Bay coal field: U. S. Geol. Survey Bull. 284, pp. 101-108, 1906.

<sup>2/</sup> Atwood, W. W., Geology and mineral resources of parts of the Alaska Peninsula: U. S. Geol. Survey Bull. 467, 1911.

to about 2 miles east of Mine Harbor, a small reentrant on the east side of Herendeen Bay.

### Character of the Coal

Coal is known at several localities in the vicinity of Herendeen Bay. At some, the coal is lignite, at others it is bituminous. Bituminous coal crops out in the valley of Mine Creek, at Coal Bluff, in Coal Valley, and east of the head of Coal Valley. The coal of bituminous rank is a good quality shipping coal and according to Atwood does not slack readily. Proximate analyses of two samples taken by Atwood in mine workings are given below:

Lab. No.	Loss on air drying	Total moisture	Volatile combustible	Fixed carbon	Ash	B.T.U.
6957	4.6	7.48	32.13	48.77	11.62	11,261
6951	5.3	8.01	33.53	51.35	7.11	11,785

Below are analyses of samples taken by Lt. Col. Jeffers and Mr. Sanford on outcrops of two of the coal beds exposed above the Johnson tunnel about two miles up Mine Creek. Samples were analyzed by Maurice L. Sharp, Chief Coal Sampler and Analyst, Alaska Railroad.

Sample No.	Air dried		As received		Moisture free		Moisture & Ash free	
	10171	10172	10171	10172	10171	10172	10171	10172
Moisture	5.8	4.7	6.7	5.3				
Volatile matter	36.3	36.9	35.9	36.6	38.4	38.6	41.4	41.2
Fixed carbon	51.3	52.5	50.9	52.2	54.6	55.2	58.6	58.8
Ash	6.6	5.9	6.5	5.9	7.0	6.2		
B.T.U.	11665	12045	11550	11970	12380	12640	13305	13480
Sulphur	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6

### Geology

All development work has been done on the coal exposed along Mine Creek, a small stream about 2 miles long that flows west in a V-shaped

valley to Mine Harbor. The coal is in the Chignik formation of Upper Cretaceous age which consists of sandstone, shale, conglomerate and coal. The coal measures form the central part of the formation and are about 300 feet thick. Though the coal beds range from a few inches to 5 feet thick, most of them are less than 2 feet.

The Chignik formation and underlying sedimentary rocks are folded into a syncline that approximately coincides with the valley of Mine Creek and plunges gently westward. The axis of the syncline is approximately parallel with the creek and a little north of it. <sup>3/</sup> The dip of most of the exposed coal beds ranges from 20 to 35 degrees.

Most of the exposures of coal are on the edge of the south limb of the syncline. This limb has been largely removed by erosion. At no place on the south limb does the coal appear to extend more than 300 feet up the dip of the beds from Mine Creek, before being cut out by the present land surface. On the north limb of the syncline, however, the eroded edge of the Chignik formation crops out several thousand feet up the dip from Mine Creek. Information on the extent of the coal beds in the north limb is incomplete. The only exposures of coal on this limb are to the east near the nose of the syncline. Farther west a part of the Chignik formation has been faulted down against older rocks and any coal that may be present is not exposed.

The south limb of the syncline is broken into blocks by at least three major faults which strike a few degrees east of north and are a thousand or more feet apart. On two of the faults it can be seen that the east block has moved a few hundred feet north relative to the west block. Minor faults that displace the coal beds a few inches to a few feet are numerous. These have about the same attitude as the larger faults. To the east near the nose of the syncline the beds are especially badly broken and also distorted by small folds.

#### Development

As a result of the approximate coincidence of Mine Creek and the axis of the syncline, the coal is favorably situated for mining. However, several factors should be considered before starting development work to mine a large tonnage.

Present data do not permit calculation of reserve figures that are more than indicative of the order of magnitude of the tonnages of coal of minable thickness. No more than 500,000 tons of such coal is inferred in the south limb of the syncline above Mine Creek. If the

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<sup>3/</sup> Atwood, W. W., op. cit., pl. VIII.

coal exposed on the south limb is also present throughout the north limb, and no evidence to the contrary is known, 5,000,000 tons to 10,000,000 tons of coal of minable thickness can be inferred. The presence and nature of coal in the north limb should be tested by drilling.

Detailed geologic mapping is needed to outline more completely the individual fault blocks, the structure within each block, and the relations between the blocks. Both surface exposures and difficulties encountered in early attempts at development between 1890 and 1898 strongly indicate that the coal in the south limb of the syncline is too faulted and distorted to be mined. Paige <sup>4/</sup> mentions six tunnels ranging up to 205 feet long which had been driven on coal beds at different places along Mine Creek. All these tunnels were caved at the time of his examination in 1905, but in several of them the coal was reported to Paige to have been lost, presumably in most, or all, cases, by faulting. Atwood <sup>5/</sup> who later was able to enter two of the tunnels, reports that in one, the Johnson tunnel, the coal disappears through faulting and that in the other, minor faulting was seen at various places.

Two routes of access to the coal in the valley of Mine Creek are possible. The route involving the shortest land haul is from Mine Harbor, which is a good anchorage and can accommodate ocean-going freighters. Although most of Herendeen Bay is shallow from Pt. Divide to Marble Pt. a narrow channel near the east side is deep enough to be navigable by ocean-going freighters <sup>6/</sup>. Coal could not be shipped from Mine Harbor the year round as Herendeen Bay is commonly frozen from December to April or May.

The deposits could be reached the year round from Balboa Bay on the Pacific side of the Alaska Peninsula but a road about 13 miles long would be necessary. The most likely route from Balboa Bay is up a small valley, through a low pass less than 600 feet in altitude, down Portage Valley and across Grass and Lawrence Valleys near their mouths.

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<sup>4/</sup> Paige, Sidney, op. cit., p. 106.

<sup>5/</sup> Atwood, W. W., op. cit., p. 102.

<sup>6/</sup> U. S. Coast and Geodetic Survey Chart 8833.  
U. S. Coast Pilot, Alaska, pp. 388, 389.

### Conclusions

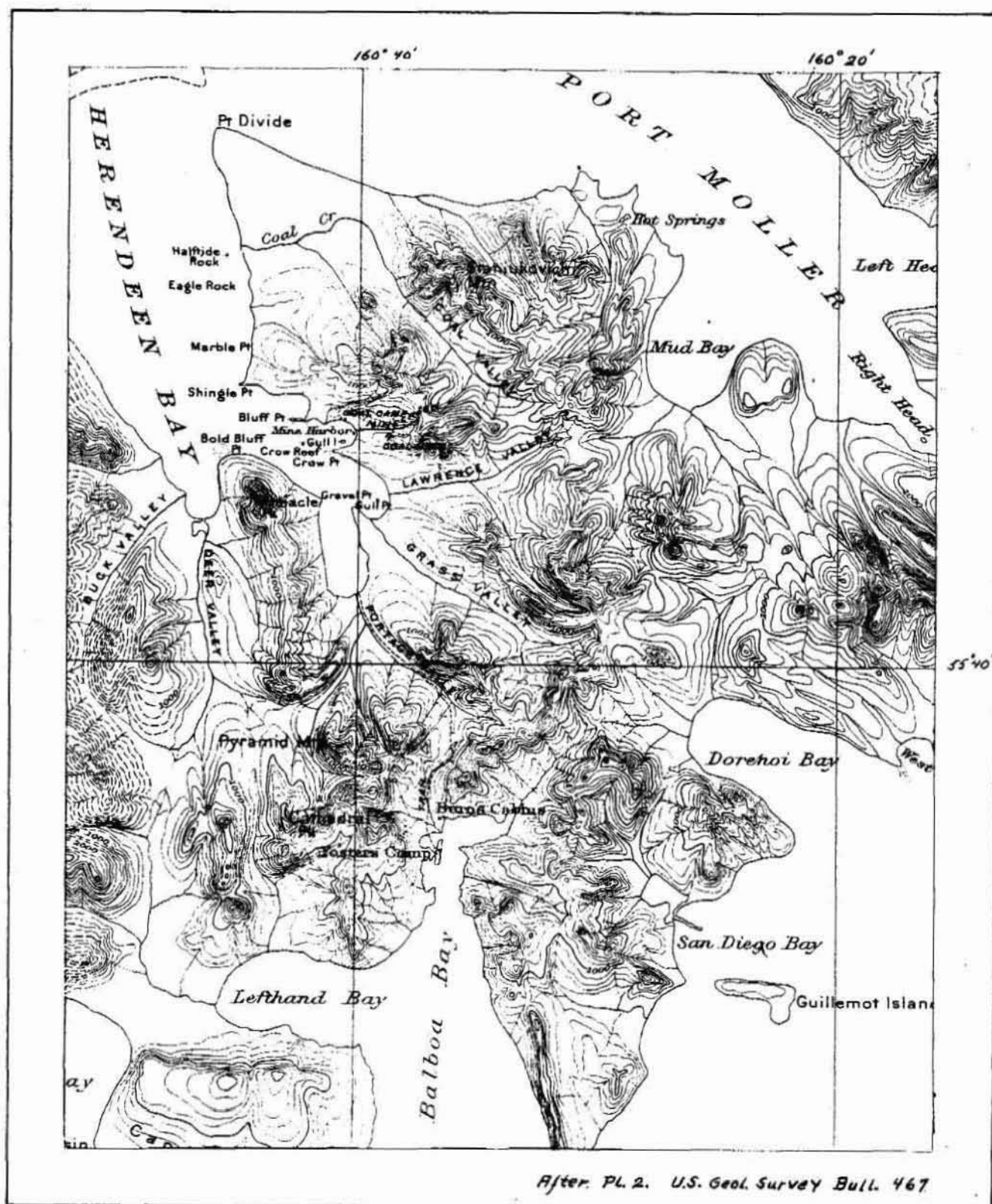
1. The high quality of the coal, the possibility of a large tonnage, and the location of these deposits with respect to navigation routes warrant further investigation of the deposits.

2. Detailed geologic investigation is needed to obtain more adequate information as to the structure of the deposits for use in planning possible mining operations, and is needed also as a basis for estimating tonnage of minable coal.

3. Some drilling for subsurface information would be necessary in order to make an adequate geologic study.

January, 1944.





Map showing Herendeen Bay and vicinity, Alaska

0 5 10 miles

Contour interval 200 feet  
Datum is mean sea level

34530