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DIVISION OF MINES AND GEOLOGY

PROPERTY EXAMINATION

#135-2

SITKINAK ISLAND COAL

TRINITY ISLANDS C-1 QUADRANGLE

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A B S T R A C T

There have been several preceding reports of coal occurrences on Sitkinak Island, one of which mentions a possible 25-foot coal seam. The authors of that report were unable to reach the area southeast of Sitkinak Dome where this 25-foot coal seam was reported to be because of adverse weather. The latest reconnaissance of the Island was made from August 14 to August 18, 1968 of all the areas where continental sediments are reported to examine coal seams for possible economic value. The Sitkinak Dome area was also investigated, but no coal was found. The sedimentary rocks there are marine, as reported by Moore (1967). The author found no coal seams on Sitkinak Island thick enough to warrant development for mining.

I N T R O D U C T I O N

The purpose of this report is twofold. First, to report on the coal seams which were observed on the reconnaissance in August 1968 and their economic potential. Second, to compile into one report the several previous maps and reports on Sitkinak Island.

LOCATION AND ACCESSIBILITY

Sitkinak Island -- 56°35' N. Latitude 154°10' W. Longitude -- is a member of the Trinity Island group (Trinity Islands C-1 Quadrangle) 10 miles south of the southernmost tip of Kodiak Island. Kodiak Airways schedules a three-times-weekly flight for passengers and mail to Sitkinak, landing on the U.S. Coast Guard's 6400-foot asphalt runway or the large freshwater lake nearby. By writing to the Coast Guard in Juneau it was possible to make arrangements for staying with the 30 men in the Loran Station on the Island. There are no protected anchorages on the Island for deep-draft ships, but fishing boats can pass into Sitkinak Lagoon at high tide and anchor there.

PHYSICAL FEATURES AND CLIMATE

Sitkinak Island is low but rugged in relief. The elevation of the highest hill on the Island, Sitkinak Dome, is given as 1470 feet on the U.S. Geological Survey Quadrangle maps and as 1640 feet on the U.S. Coastal and Geodetic Survey charts. The 1640-foot elevation was established by the U.S. Army Corps of Engineers in 1955. The latest information states:

> "The Corps of Engineers has provided more recent data giving an elevation of 1599 feet for Sitkinak Dome. This latter value has been forwarded to our chart division headquarters as a correction to the charts." (Haraden 1968)

Recent glaciation has smoothly rounded the ridges, but post-glacial erosion has cut numerous steep ravines. Sitkinak supports no tree growth, but the Island is lush with grasses and berry bushes. A cattle ranch is located west of Sitkinak Lagoon.

The climate is moderate with cool wet summers and mild winters. Average monthly temperatures for the Island in 1967 ranged from 29.5° F in January to 56.2° F in July. Total rainfall in 1967 was 47.23 inches. The Island is frequently shrouded in fog. Extremely high winds are common on the Island's higher hills.

HISTORY

Coal reconnaissance on Sitkinak has been limited, and differ with respect to the quality and quantity of coal present.* In December 1958, M.W. Jasper, mining engineer, and Wiley D. Robinson, coal mine inspector of the Territorial Department of Mines, made a preliminary investigation of the coal at the request of several men who held prospecting permits on the Island. Jasper and Robinson were handicapped by bad weather and were able to traverse only part of the southern side of the Island in their five-hour visit. They reported a wide thin-bedded coal formation west of the tidal flats striking northeasterly. They also projected a 25-foot coal bed southeast of Sitkinak Dome, as reported by the permittees, but were unable to visit the location. (Jasper and Robinson, 1959)

In August 1962 Robert S. Warfield of the Bureau of Mines did more reconnaissance on Sitkinak Island. Warfield traversed from the Coast Guard barracks in a southwesterly direction to the beach and along the beach on the west side of the tidal flats. He confirmed the presence of thin-bedded coal near the tidal flats but did not examine or report any coal near Sitkinak Dome. (Warfield, 1962)

The U.S.G.S. publication "Preliminary Geologic Map of Kodiak Island and Vicinity, Alaska" shows the Sitkinak Dome area to be marine sedimentary rocks (Moore, 1967). The scale of the map is 1:250,000.

G E N E R A L G E O L O G Y

For this investigation, Moore's Sitkinak Island geology was enlarged and placed on the U.S.G.S. topographic Trinity Islands (C-1) Quadrangle at 1" = 1 mile.

Coal occurrences are limited to continental sedimentary rocks. Reconnaissance was limited to these areas with the exception of Sitkinak Dome and around the southwest side of Sitkinak Lagoon on East Sitkinak Island. The continental sediments are of middle Tertiary age, consisting of thick beds of conglomerates and poorly-sorted subgraywackes with thinner sections of claystone, shale, and coal. The coal occurrences, where observed, were interbedded with the claystone and shale, and these sequences were found only in the conglomerates. For the most part the graywacke is friable and more easily eroded than the conglomerates. Cursory examination of the marine sediments showed thick beds of medium gray mudstone which contains abundant concretions of apparently similar material, thinner beds of brown sandstone, and thick sequences of thin-bedded dark gray shale.

C O A L O C C U R R E N C E S

Sampling and examination of the coal beds in the south-central part of the Island were done by Warfield (1962). The locations are shown on the accompanying map by circled numbers, and the logs of coal bed outcrops from his report are included. (table 1)

Warfield inspected most of the gulches in the south-central part of the Island which were reported to him to be the most favorable locations for mineable coal deposits. He reported that the seams he examined in the area:

> "....are thin-bedded; none of the individual coal bands exceeds 1.0-foot thickness, and the total coal thickness of a given series of coal bands does not exceed 2.5 feet." (Warfield, 1962, p 7)

*Sitkinak Island coal deposits are mentioned in U.S. Geological Survey Bulletins 259 and 378 and in the Geological Survey Annual Report for 1896, but none of the authors had visited the Island.

He also examined coal outcrops on the tidal flat at location 5 (fig 1) where the beds observed are thin; the thickest being 1.3 feet. The coal beds are in a tight anticline.

The remainder of Warfield's examinations were southwest along the northwest shore of the tidal flat and along the ocean shore for about two miles. Since his observations were very brief and no samples were taken, I examined this area in a little more detail. Because all of the beds are thin and of no apparent economic value, the time required for logging was not warranted. Samples taken were from each coal seam in sequence at the exposure (table II).

Interbedded coal occurrences were observed at locations A, B, and C (fig 1). At each place the coal seams are from a few inches up to a foot thick and interbedded with claystone and carbonaceous claystone. Strikes of the beds generally indicate that the anticlinal structure shown on the map broadens to the southwest and that the coal sequences increase in age from A to C. The rocks in this area are too highly altered to obtain accurate strikes and dips so that the above observation is quantitative only.

The coal beds observed at Sand Point, location C (fig 1), are also thin and interbedded with claystone and carbonaceous claystone. The thickest coal seam is about 1.5 feet thick.

Because the coal occurrences are thin, steeply dipping beds, limited to the tidal flat area, there are insufficient coal reserves to mine on a scale other than for local use. Furthermore, spectrographic analyses of the ashes showed no unusually high concentrations of any elements. Concentration of silver was less than 0.5 PPM, and gold was not detected (written communication, Rao, 1968).

No coal was observed on East Sitkinak Island, either in place or as float.

TABLE I
COAL SAMPLES AND ANALYSES BY WARFIELD
(1962, p 11-12)

Map Location

1. Log of coalbed outcropping in bottom of gulch.

	Material	Thickness, feet	
Roof	Coaly claystone	Unknown but overlain in short distance by pebble conglomerate.	
	Coal	0.7	Included in sample.
	Coaly claystone	.1	
	Coal	.3	Included in sample.
	Coaly claystone	.6	
	Coal	.9	Includes a .05-foot band of bone that was excluded from sample.
Floor	Coaly claystone	Unknown	

Strike N 45° E, dip 45° to 50° NW.

	Analyses of sample		
	As received	Dry	Moisture and ash free
Moisture	10.8	-	-
Volatiles	33.3	37.3	47.6
Fixed carbon	36.6	41.1	52.4
Ash	19.3	21.6	-
Sulfur	.1	.1	.2
Btu	9,040	10,140	12,930

Coke button - NAa (noncoherent residue)

2. Thin coalbed .8 to 1.0 foot thick.

3. 5-foot interbedded thin coal seams and coaly claystone. Upper coal band is 1-foot thick. Upper coal band is overlain by 0.8-foot coaly claystone which in turn is overlain by an unknown thickness of pebble to cobble conglomerate.

4. 4.5-foot interbedded thin coal seams and coaly claystone. Stratigraphically underlies location 3 about 30 feet. Individual coal seams to .6-foot thickness. One-third total thickness estimated to be coal.

5. 2-foot interbedded coal and coaly claystone. Coal bands to .4-foot thick. Strike N 40° E, dip 30° NW.

6. Two 2-foot thin banded coal and coaly claystone seams. One coal band .9-foot thick in one coal seam. Total coal thickness in either seam does not exceed 1.3 feet.

Strike S 15° W, dip 50° W, where measured on northwest limb.

Dip 35° SE where measured on southeast limb.

TABLE I (continued)
COAL SAMPLES AND ANALYSES BY WARFIELD
(1962, p 11-12)

Map Location

7. Log of wall exposed interbedded coal and coaly claystone bed.

	Material	Thickness, feet
Roof	Coaly claystone with very thin bands of coal, overlain by pebble to cobble conglomerate	8 to 10
	Coal	.6
	Coaly claystone	.6
	Coal	.7
	Coaly claystone	.1
	Bony coal	.3
	Coaly claystone with thin bands of coal	3.4
	Coal	.2
	Coaly claystone	4.0
	Bony coal	.65
	Coaly claystone	1.0
	Pebble to cobble conglomerate	Unknown

Strike S 40° W, dip 47° NW.

8. Observation point in creek bottom from which thin-bedded coal seams were observed in hills and gulches to the east. Beds dip steeply east.

9. Beginning of traverse along conglomerate sea cliffs.

TABLE II

COAL SAMPLES AND ANALYSES -- 1968

Sitkinak Island	Basis*	Moisture	Vol. Matter	Fixed Carbon	Ash	Sulfer	Heating Value Btu	Rank
Map Location A	1	7.9	29.7	59.4	3.0	0.3	11,724	
	2	12.7	28.2	56.3	2.8	0.3	11,113	
	3	-	33.3	66.7	-	-	-	
	4	-	-	-	-	-	11,433	Subbituminous A
Map Location B	1	8.2	30.9	57.7	3.2	0.3	11,633	
	2	12.9	29.3	54.8	3.0	-	11,037	
	3	-	34.9	65.1	-	-	-	
	4	-	-	-	-	-	11,378	Subbituminous A
Map Location C	1	5.6	38.7	47.2	8.5	0.5	11,446	
	2	9.6	37.1	45.2	8.1	0.5	10,961	
	3	-	45.1	54.9	-	-	-	
	4	-	-	-	-	-	11,928	Subbituminous A
Map Location D	1	3.4	26.8	28.5	41.3	-	-	
	3	-	48.5	51.5	-	-	-	

*Basis - (1) As received
(2) Equilibrated moisture basis
(3) Moisture ash free basis
(4) Moisture ash free basis

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