EXAMINATION OF COAL DEPOSITS, SITKINAK ISLAND, ALASKA

By Robert S. Warfield

* open-file report

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ABSTRACT

From August 18-21, 1962, a reconnaissance was made of coalbeds on Sitkinak Island, Alaska. The examination was made at the request of one of the lessees who furnished information as to the area of the best coal outcrops. A number of thin-bedded coal outcrops were observed. Some of the coal outcrops were examined in detail and their locations recorded; others were given only the cursory examination necessary to determine their total coal thickness. One of the better outcrops, having a total coal thickness of 1.9 feet, was sampled for analyses.

LOCATION AND ACCESSIBILITY

Sitkinak Island is off the southern tip of Kodiak Island at about 56°35' N latitude 154°10' W longitude. The U.S. Coast Guard presently (1962) maintains a Loran Station with a compliment of approximately 30 men on the island. This station is supplied, except for fuel, by air transport using a 6,400-foot gravel airstrip. Kodiak Airways maintains a three-times-weekly schedule for mail and passengers. Deep-draft ships

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or boats can approach close to Sitkinak Island, but there are no protected anchorages; a large shallow-draft barge could probably be towed into Sitkinak Lagoon at high tide and be allowed to go dry during a loading or unloading operation.

PHYSICAL FEATURES AND CLIMATE

Sitkinak Island is characterized generally by fairly low but rugged relief; Sitkinak Dome, the highest hill on the island, is 1,470 feet elevation. The hills and ridges are all smoothly rounded as a result of glaciation that probably covered the entire island. In the area inspected postglacial erosion has formed numerous gulches or ravines that cut across the strike of bedding; outward from the mouth of each gulch, an alluvial fan has developed. Sitkinak is devoid of any tree growth except an occasional low poplar or willow bush; the reason for the lack of tree growth is probably not climatic, but rather a lack of post-glacial reseeding. The island supports a lush growth of grasses and berry bushes and has one cattle ranch (1962).

The climate is typically coastal with cool wet summers and generally mild winters. The average total precipitation at Kodiak, where records have been kept for a number of years, is 60 inches; total precipitation in 1961, however, was only 43.58 inches. Incomplete records kept by the Coast Guard station during 1961 indicate Sitkinak received a few inches less total precipitation than Kodiak. Winter temperatures very seldom drop below 0° F and summer temperatures seldom exceed 75° F.

HISTORY AND OWNERSHIP

The published history of coal deposits on Sitkinak Island is very limited. Geological Survey Bulletins 259 and 379 mention the reported occurrence of coal deposits but the Survey geologists did not actually visit the island. Geological Survey Bulletin 880c has the island mapped as "Mainly Tertiary Sandstone and Shale," but again, the author did not visit the island.

During December 1958, M. W. Jasper, mining engineer and Wiley D. Robinson, coal mine inspector of the Territorial Department of Mines in the company of two of the present lessees made a preliminary investigation[2/] of the coal deposits, but because of bad weather their examination was limited to a 100-foot-wide, thin-bedded, coaly zone along the south shoreline.

2/ Jasper, M. W. and Wiley D. Robinson. Preliminary Investigation of Coal Occurrences on Sitkinak Island, Trinity Island Quadrangle, Kodiak Precinct, Alaska. Territory of Alaska, Department of Mines, Anchorage, Alaska, 1959.

Coal prospecting permits covering most of the island were issued to a group of Kodiak men in 1959; George Cornelius, a Kodiak real estate broker, is the spokesman for this group.

GENERAL GEOLOGY

Coast Guard personnel from the Loran Station stated that the Geological Survey had geologically mapped the island during the summer of 1962. The result of this mapping is not available at this writing, and the author has no knowledge of any other geological mapping.

During this brief reconnaissance, no detailed geologic mapping was attempted; however, a few general geologic observations were made of a relatively small area in the southern part of the island. The predominant rock formation is a fairly well cemented pebble to cobble conglomerate with subordinate thicknesses of sandstone, claystone, and thin-bedded coal seams. These sediments are believed to be of Tertiary age.

Folding was apparently intense resulting in steeply dipping beds (30^{o} to 50^{o}) and locally, very complex structure. The strike of the beds, in general, is about northeast-southwest. Although no faults were recognized during this brief reconnaissance, detailed mapping or study of aerial photographs undoubtably would reveal many faults, probably some of major magnitude.

WORK BY THE BUREAU OF MINES

From August 18 through August 21, a reconnaissance was made of coalbeds on Sitkinak Island. The examination was made at the request of George Cornelius, spokesman and partner of a Kodiak group that holds coal prospecting permits covering most of Sitkinak Island. As a part of the examination, the author stopped in Kodiak enroute to Sitkinak to confer with Mr. Cornelius as to the location of the best outcrops. The best exposures were described as occurring in a series of eastward trending gulches in the south-central part of the island (fig. 1).

Part of the examination consisted of traversing from the mouth of one gulch to its head, then crossing over to the head of another gulch and traversing down it. This process was repeated until most of the gulches in the reportedly favorable area had been traversed. The gulches cut the general strike of bedding at a fairly large angle, and the

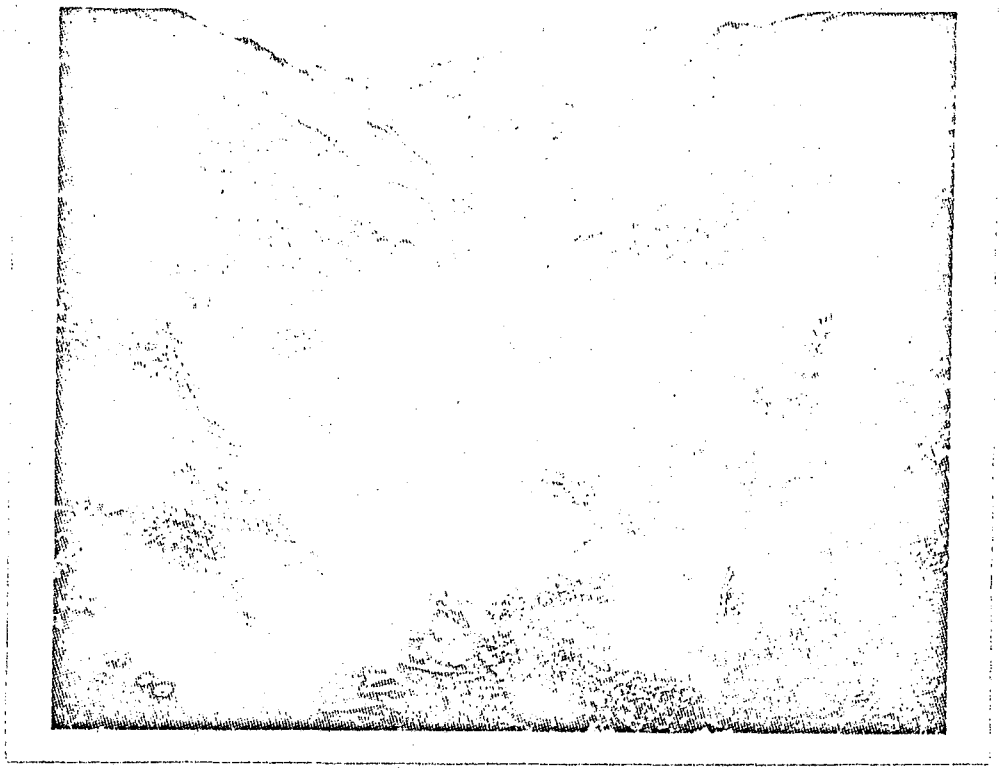


FIGURE 1. - Typical Gulch, Sitkinak Island

bedding dips steeply to the northwest, so wherever bedrock is exposed, a considerable thickness of formation can be observed. Undoubtably some observations were of the same coalbed from one gulch to the next, but because bedrock was not exposed everywhere in each gulch, it was necessary to examine almost every gulch in order to reduce to a minimum the possibility of missing a coal occurrence.

All of the seams examined are thin bedded; none of the individual coal bands exceeds 1.0-foot thickness, and the total coal thickness of a given series of coalbands does not exceed 2.5 feet. No

attempt was made to trace a seam along strike from gulch to gulch; however, it is believed that strike continuity is probable for several thousands of feet.

The locations of several outcrops were plotted on the Geological Survey quadrangle map, Trinity Island (C-1), Alaska; these locations are identified on the accompanying C-1 map by a circle and number. Outcrops 1 and 7 were logged in detail and number 1 was sampled for analyses. Several other outcrops were logged but not in detail. Logs and analyses are shown on the legend sheet attached to the accompanying map. The upper best section of outcrop 7 is shown in the photograph (fig. 2).

FIGURE 2. - Outcrop 7, Upper Section

Outcrop 7 is exposed along the dip for a distance of about 150 feet. In this distance, the individual coalbeds and clayey beds thin and thicken considerably, but nowhere did the coalbeds attain a greater thickness than logged; this probably indicates lenticular deposition rather than differential compaction due to folding.

In addition to outcrops examined in the south-central part of the island, Coast Guard personnel guided the author to an outcrop in a low bluff on the west shore of a tidal flat of Sitkinak Lagoon (location 6). Here, two thin-bedded coal seams occur in a tight anticlinal fold that has a near cross section exposure in the face of the bluff; although the upper part of the anticline is missing, the two exposed legs of the fold appear to be on about a 100-foot radius. Considerable contortion of beds in addition to the anticlinal fold was also apparent. Each coalbed has a total thickness of about 2 feet, and one bed contains a coalband that measures .9 foot in one location. Both the coal and coaly interbands thicken and thin within very short lateral distances, but nowhere on either leg of the anticline or in either coalbed did the total coal thickness exceed 1.3 feet.

A traverse made primarily to obtain samples of beach sands from the southwest beach of the island afforded an opportunity to observe additional coal occurrences. The traverse followed a route about as shown on the accompanying map. From location 8, several coalbeds were observed outcropping in the conglomerate hills and ravines to the east. No closeup inspection was made of these beds, but they appeared to be similar to the thin-bedded occurrences previously examined. These beds dip steeply to the east, thus making probable a synclinal structure.

within the area encircled by the traverse. During the part of the traverse along the conglomerate sea cliffs from locations 9 to 5, several thin-bedded coal seams were observed closeup. These outcrops were probably on the same seams observed distantly from location 8.

LEGEND

- - - - Route of traverse.

Locations:

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

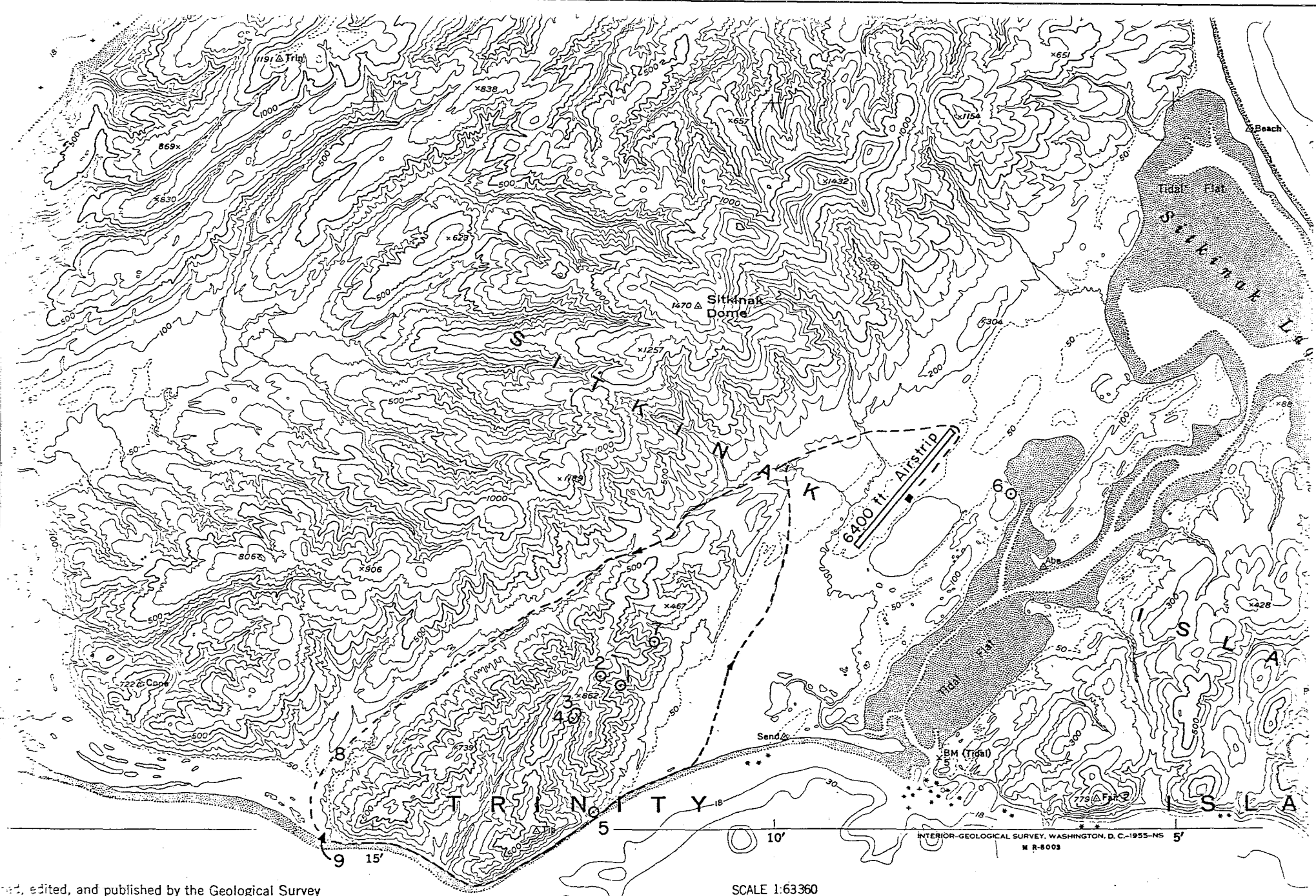
Coke button - NAa (noncoherent residue)

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 .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.



...ed, edited, and published by the Geological Survey

...by USC&GS and USCE

...raphy compiled from USC&GS chart 8537
...529 scale)

...raphy from aerial photographs by photogrammetric
...d 1954. Aerial photographs taken 1952

...al Transverse Mercator projection, zone 5
...North American datum

SCALE 1:63360

4 MILES

21000 FEET

5 KILOMETERS

NTOUR INTERVAL 100 FEET

...E NORTH
22°
...TIC NORTH

ALASKA

ALL WE
Hard-surfa
Other

LEGEND continued

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.

7. Log of well 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.