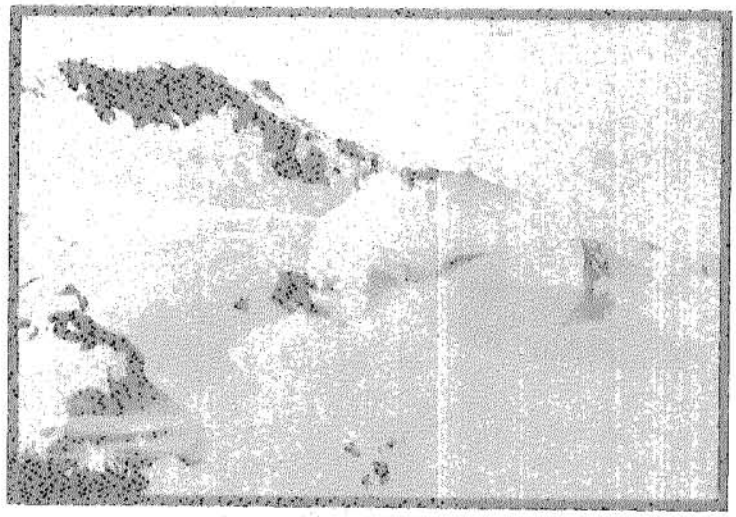
Mineralization Near Stepovak Bay Alaska Peninsula, Alaska



BY GILBERT R. EAKINS

SPECIAL REPORT NO. 4

DIVISION OF MINES AND GEOLOGY
DEPARTMENT OF NATURAL RESOURCES
STATE OF ALASKA

JULY 1970

STATE OF ALASKA

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DEPARTMENT OF NATURAL RESOURCES

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By

Gilbert R. Eakins

College, Alaska

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MINERALIZATION NEAR STEPOVAK BAY,

ALASKA PENINSULA, ALASKA

By

Gilbert R. Eakins

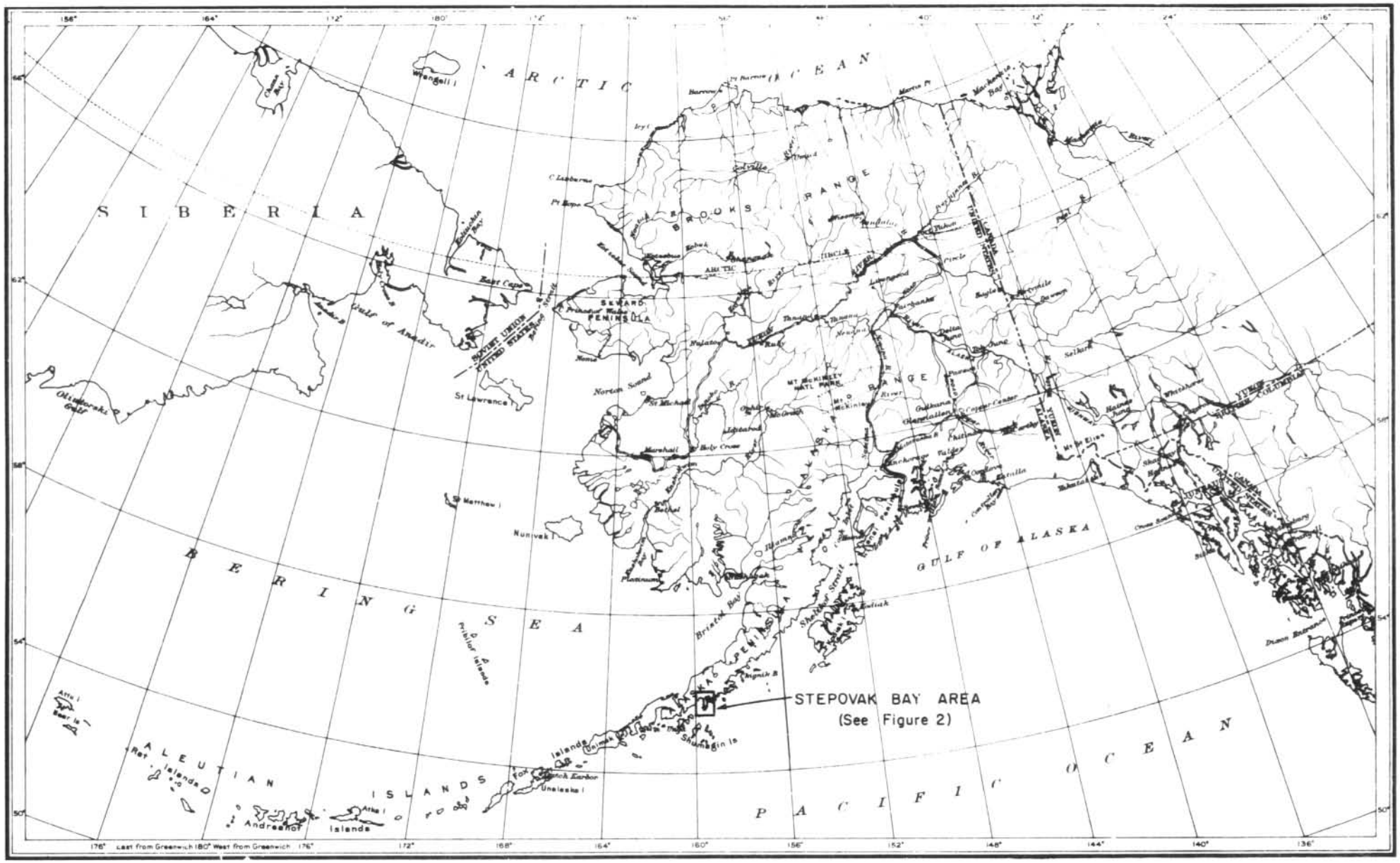
S U L F U R D E P O S I T N E A R S T E P O V A K B A Y

INTRODUCTION

A sulfur shortage during the years 1963 to 1968 created interest in sulfur deposits on the Aleutian Islands and the Alaska Peninsula. Three areas containing deposits of sufficient size to encourage exploration and some preliminary mining of early discoveries are: The Makushin Volcano on Unalaska Island, Akun Peak on Akun Island, and a deposit on Little Sitkin Island (Maddren, 1919). A fourth deposit described briefly by Maddren near Stepovak Bay has not been prospected because it is inaccessible. It is in the rugged mountains of the Aleutian Range on the Alaska Peninsula. No estimate of reserves has been made on this deposit, but local inhabitants report that several sulfur deposits are in the same general area. The writer, assisted by Robert Pelz, spent four days at Stepovak Bay during August 1969 to learn if any of the sulfur deposits were accessible and if so, to make an economic evaluation of them.

LOCATION AND ACCESS

Stepovak Bay is on the Pacific side of the Alaska Peninsula 525 miles southwest of Anchorage (*fig 1*). Light planes can land on the beach at Ramsey Bay, a cove at the northwest end of Stepovak Bay (*fig 2*). Fishing boats can approach within a short distance of shore. Bush-plane service is often available at Sand Point on Popof Island, 40 miles southwest of Stepovak Bay.


ARCTIC OCEAN
SIBERIA
BROOKS RANGE
SEWARD PENINSULA
Wrangell I
East Cape
Gulf of Anadir
St Lawrence I
Norton Sound
St Matthew I
Nunivak I
BERING SEA
Pribilof Islands
Attu I
Bering I
ALEUTIAN ISLANDS
Rat Islands
Andreanof Islands
Atka I
Fox Islands
Unalaska I
Shumagin Is
Bristol Bay
ALASKA PENINSULA
Shelikof Strait
Kodiak I
GULF OF ALASKA
MT McKINLEY NATL PARK
Mt McKinley
Cooper Center
Valdez
Cordova
Yakutat
Juneau
Ketchikan
Prince Rupert
Skeena R
Stikine R
Liard R
Yukon R
Mackenzie R
Mackenzie Bay
Coppermine R
Kuskokwim R
Nushagak R
Kobuk R
Noatak R
Colville R
Sagavanirktok R
Porcupine R
Tanana R
Koyukuk R
Innoko R
Yukon Flats
Tanana Flats
Kuskokwim Mts
Alaska Range
Wrangell Mts
Chugach Mts
Coast Mts
Selkirk Mts
Rocky Mts
Mackenzie Mts
Richardson Mts
Ogilvie Mts
Pelly Mts
Cassiar Mts
Omineca Mts
Cariboo Mts
Selkirk Mts
Purcell Mts
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Great Bear L
Great Slave L
Lake Athabasca
Lake Winnipeg
Lake Manitoba
Lake Nipigon
Lake Abitibi
Lake Mistassini
Lake Nipissing
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Lake Timiskaming
Lake Temagami
Lake Kenogamisis

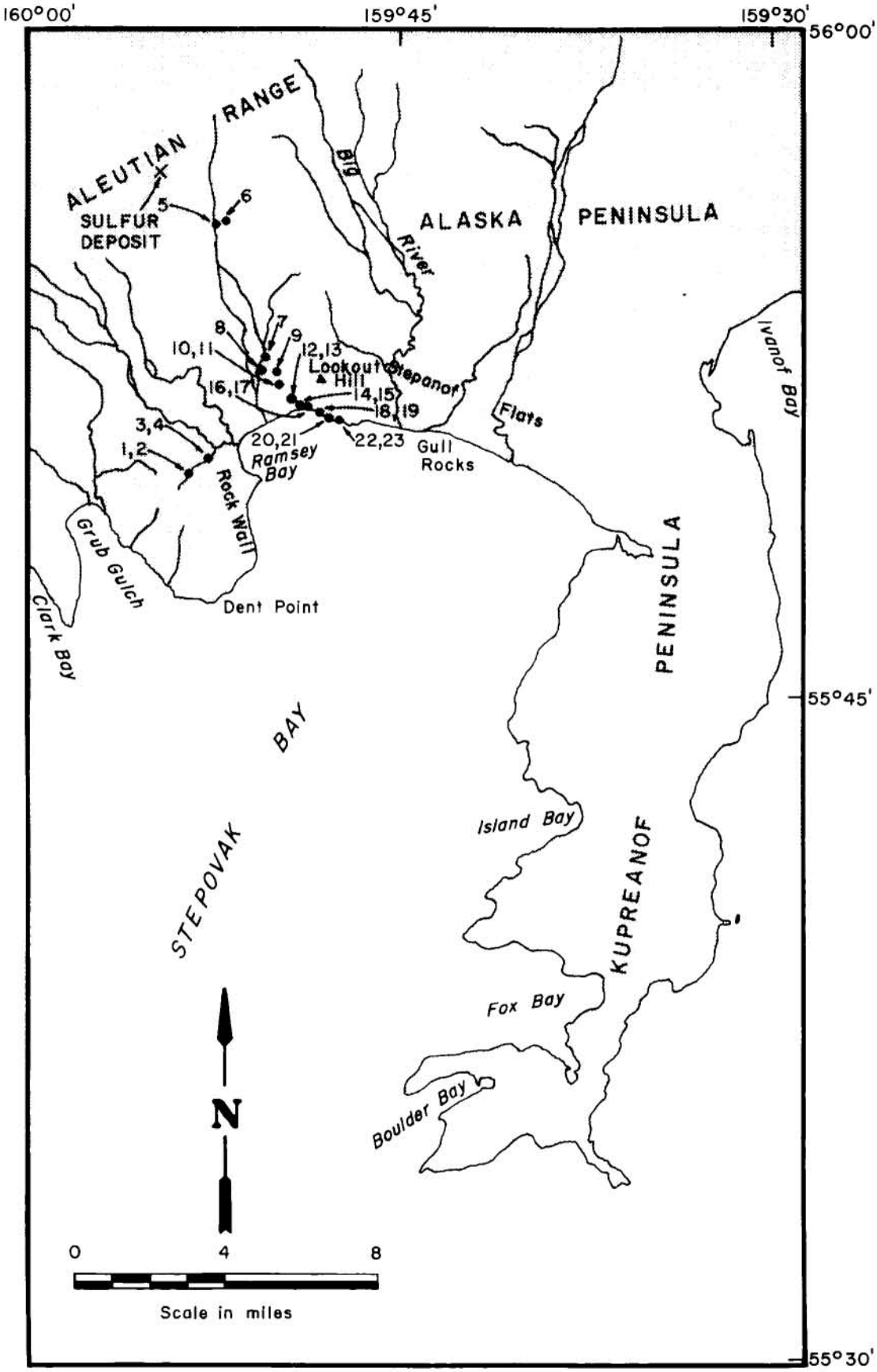


Figure 2

Location of Sulfur Deposit & Geochemical Sample Sites Stepovak Bay, Alaska

The sulfur deposit is 7½ miles from Ramsey Bay on a near-vertical slope at an elevation of slightly over 3000 feet. The summit of the mountain is 5109 feet.

A large unnamed river in a broad valley can be followed from Ramsey Bay due north six miles to the base of the mountain containing the sulfur. The river divides there, and the west fork drains from a canyon directly below the deposit (*fig 2*). The distance from Ramsey Bay to the base of the mountain can be covered on foot without difficulty, but crossing the river could be hazardous. The best means of viewing the sulfur at Stepovak Bay from the ground is by following the ridge along the west side of the river. Samples, however, can be collected by following the steep canyon that heads below the deposit.

The sulfur-bearing slope faces south, and the outcrop is visible from Ramsey Bay when clouds lift. The steep slope and the continual presence of crevassed ice and snow prevent access to the deposit. Technical climbing techniques are necessary to examine the sulfur in place.

The writer obtained a close view of the sulfur during a brief interval when the fog lifted sufficiently for flying (*fig 3*). Steaming fumeroles were visible at the west end of the deposit. On the north side of the mountain and near the summit, additional brightly colored material which may contain sulfur was seen, but clouds prevented good visibility.

From the air other active fumeroles were observed in the ice field near the summit of the range about five miles northeast of the known sulfur (*cover photo*). It was not determined if sulfur is present at this location. The writer also saw a large yellowish outcrop in the valley west of Stepovak Bay that may be sulfur. This outcrop is on the west side of the valley leading from Grub Gulch and is near the level of the valley floor.

GENERAL GEOLOGY

The core of the Aleutian Range at Stepovak Bay consists of Tertiary volcanics, including flows, breccias, dikes, and sills. Recent volcanic activity in this area is evident from the still-active fumeroles and associated sulfur deposits.

Paleocene-Oligocene sediments of the Tolstoi and Stepovak Formations of the Beaver Bay Group occupy the lower elevations on the Pacific side of the mountains. These include several thousand feet of dark, calcareous and fossiliferous sandstones, siltstones, and shales with some thin conglomerate beds. Sandstones and shales dip 3° to 20° away from the axis of an anticline that trends generally east-west. The axis of the structure is shown by Burk (1965) about two miles inland from Ramsey Bay. Dark flow rocks form bluffs at the shore on both sides of Ramsey Bay, and thick nearly flat-lying flows displaying columnar jointing can be seen capping the spurs on either side of the valley extending north from Ramsey Bay. The near-shore volcanics are porphyritic felsites and andesites or basalts. There is some alteration, and small outcrops of intrusive rocks have been mapped on the lower hills.

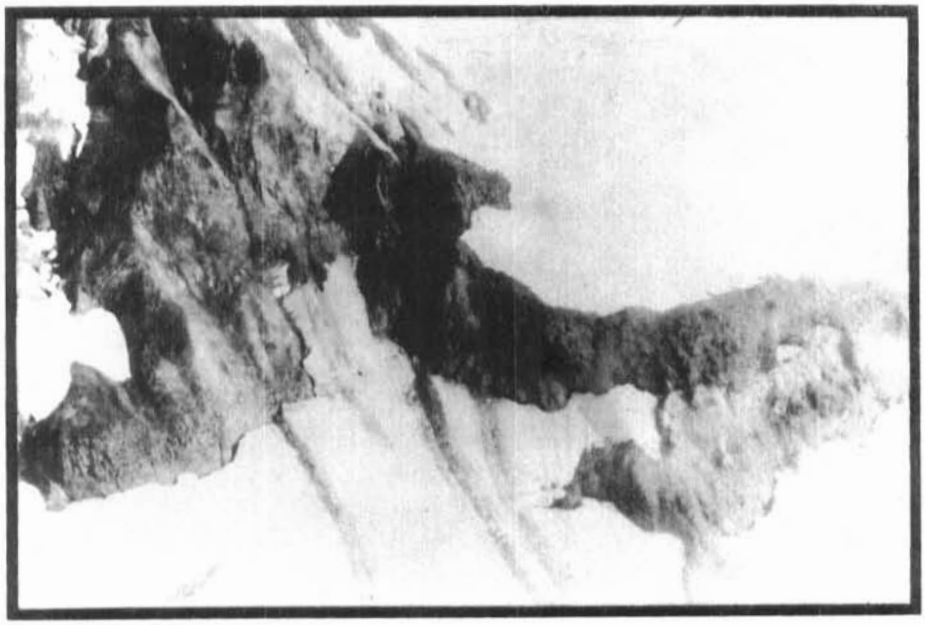


Figure 3. Aerial view looking north at sulfur-bearing breccia. Exposed on nearly vertical wall seven miles north of Stepovak Bay. Light areas are perennial ice and snow. Sulfur-bearing breccia approximately 100 feet thick is outlined in lower right.

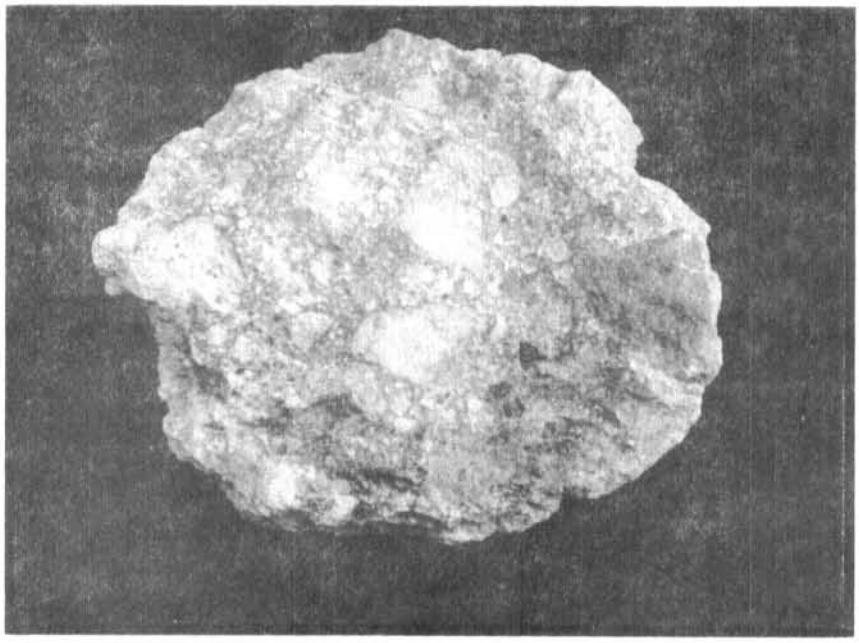
THE DEPOSIT

The only information available on the sulfur at Stepovak Bay is the description by Maddren (1919). At the time of that investigation, the deposit was seen on the wall of a cirque or volcanic crater from a distance of two miles. No photographs were published and the exact location was rather indefinite. The sulfur-bearing material was estimated to be 100 feet thick and to extend about one-half mile. The sulfur-bearing breccia found as float and moraine contained veinlets up to one-fourth inch wide and pockets up to one inch in diameter. Some of the breccia boulders were from 30 to 40 feet thick. Some specimens were estimated to consist of as much as 20 percent sulfur, but most of the material was thought to contain between 5 and 10 percent.

The length of the sulfur outcrop was judged by the present writer to be from one-fourth to one-third of a mile, but snow cover may have been more extensive than when Maddren visited the area. The samples found as float contained only scattered grains of sulfur, not over 10 percent by volume. The breccia containing the sulfur is soft, light gray to buff, porous and light weight. Angular fragments are bonded with a very fine soft gray material (*fig 4*). Finely disseminated pyrite is common in some specimens. One piece of float, about four inches in diameter, consists of about 50 percent fine-grained pyrite and 50 percent opal. The opal forms a two-inch pod and one-fourth inch veinlets. It is colorless to white and does not display the colors of gem quality opal.

CONCLUSION

Volcanic sulfur deposits generally cannot compete with salt dome sources because they are lower grade, have difficult access, and involve high mining and processing costs. Although the discovery of a number of closely-spaced deposits combined with another critical sulfur shortage could alter the outlook, it seems unlikely that the Stepovak Bay sulfur will be of economic interest in the immediate future.



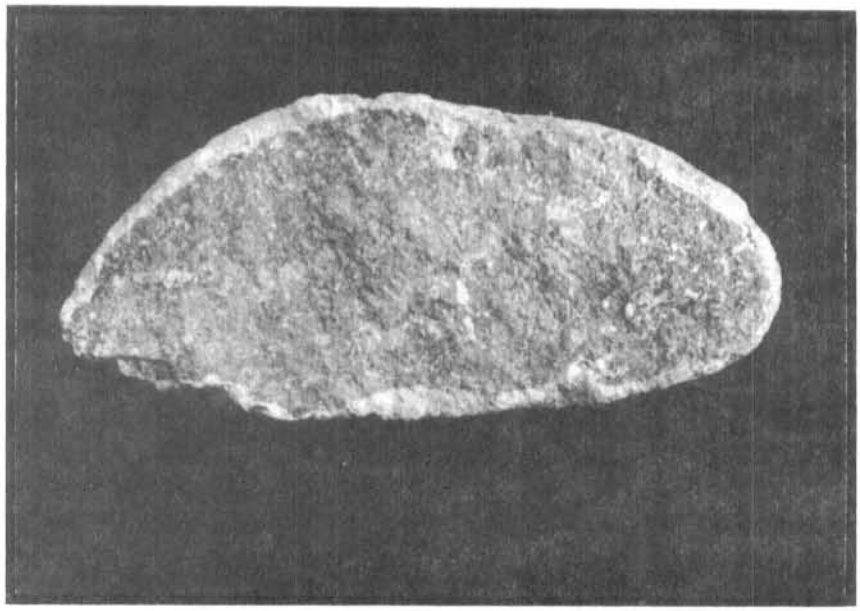


Figure 4. Sulfur-bearing volcanic breccia from the Stepovak Bay area. Specimens about six inches across.

LOCATION AND ANALYTICAL RESULTS

Twenty-three stream sediment samples were collected at localities shown on figure 2. They were analyzed for copper, lead, and zinc by atomic absorption in the Division's laboratory at College (*table 1*). Analyses by spectrograph for additional elements were made in the Mineral Industries Research Laboratory at the University of Alaska (*table 2*).

Samples 1, 2, 3, and 4 yielded abnormal copper values, ranging from 205 parts per million to 300 ppm. A histogram (*fig 5*) shows the norm for copper values by atomic absorption to be 25 ppm. Spectrographic analyses show anomalous copper and molybdenum in the same four samples. Samples three and four had nearly anomalous values for zinc, 95 and 110 ppm. The norm for zinc is 65 ppm. No lead anomalies were found.

The four samples containing anomalous copper and molybdenum were from a large stream two miles west of the shore of Ramsey Bay (*fig 2*). This stream forms a spectacular 300-foot waterfall that can be seen from Ramsey Bay. Abundant pyrite float has been found in this stream by a resident of Sand Point. Considerable pyrite in felsite float also was found during this investigation. The source of the pyrite was not reached, but it probably lies somewhere in the large basin above the waterfall. Burk (1965) shows a small intrusive in that area which could be a source of mineralized material.

CONCLUSION

Follow-up sampling and prospecting upstream from the anomalous sample locations appear justified. Considering the background values, the copper and molybdenum anomalies are quite definite. The large size of the stream and its rapid flow suggests that the samples represent a sizeable area. Copper mineralization is known to be present at several prospects on the Alaska Peninsula.

Table 1

GEOCHEMICAL DATA

Map No.	Field No.	Copper	Lead	Zinc	Stream Width - Ft.
1	9P 203	210	30	45	12
2	9P 204	205	25	45	12
3	9P 205	300	35	95	15
4	9P 206	240	35	110	15
5	9P 212	15	20	65	3
6	9P 213	30	20	65	3
7	9P 211	20	20	65	20
8	9P 210	20	20	55	2
9	9P 209	20	20	80	5
10	9P 207	15	15	35	2
11	9P 208	15	15	30	2
12	9P 194	25	20	60	1
13	9P 195	20	20	65	1
14	9P 190	25	25	80	1
15	9P 191	20	25	80	1
16	9P 192	20	15	65	2
17	9P 193	20	15	65	2
18	9P 196	25	20	65	2
19	9P 197	25	15	60	2
20	9P 198	25	20	55	1
21	9P 199	25	15	60	1
22	9P 200	30	15	55	1
23	9P 201	30	20	95	1

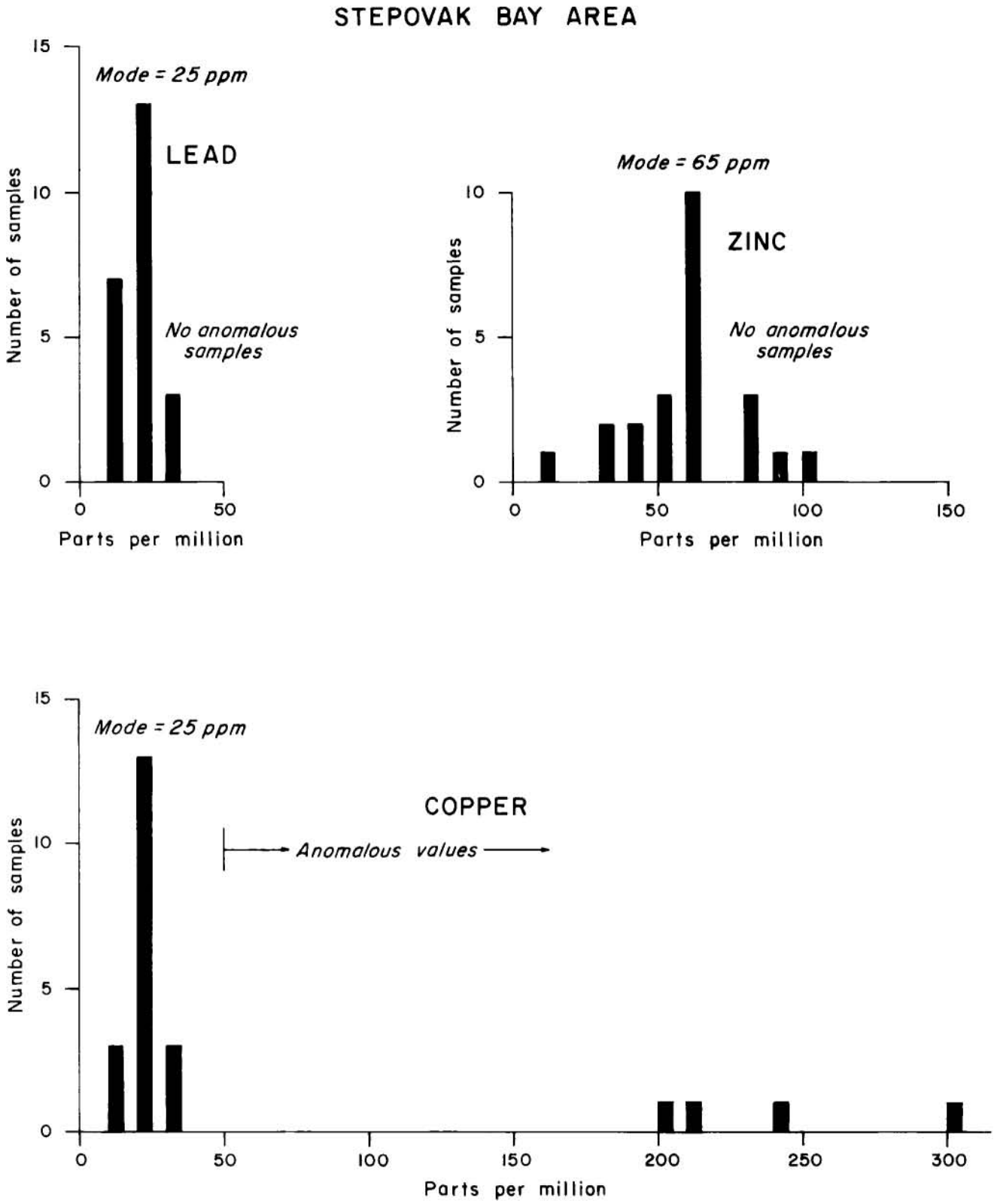
Copper, lead, and zinc analyses by atomic absorption
Concentrations in parts per million (ppm)
Anomalous values underlined

Table 2

GEOCHEMICAL SAMPLE ANALYSES FOR TRACE ELEMENTS BY SPECTROGRAPH

Map No.	Field No.	Cu	Pb	Zn	Mo	Co	Cr	Ni	Mn	Ti	Fe	Mg	Ca	Ba	Sr	B	Be	Zr	La	Nb	Sc	Y	V
1	69P203	200	10	100	20	10	50	10	500	5000	5	1	2	100	200	ND	ND	50	50	10	10	10	100
2	69P204	200	20	100	50	10	100	20	500	5000	10	1	2	200	200	ND	ND	100	20	20	10	20	100
4A	69P205	200	20	100	20	20	50	10	500	2000	5	1	2	200	100	ND	ND	50	50	20	10	20	100
4B	69P206	200	20	100	20	50	50	20	1000	5000	5	1	1	200	200	ND	ND	100	20	20	20	20	100
5	69P212	20	20	100	5	20	100	20	1000	5000	5	2	1	500	200	20	1	200	20	20	20	20	100
6	69P213	20	20	100	5	50	100	20	1000	5000	5	2	2	NA	200	10	1	100	20	20	20	20	100
7	69P211	20	20	100	5	20	100	20	500	5000	5	2	1	500	200	20	1	100	20	20	20	20	100
8	69P210	20	20	100	10	50	200	50	1000	5000	10	2	2	500	200	20	ND	100	20	20	50	20	100
9	69P209	20	20	100	5	20	100	20	1000	5000	5	1	0.5	200	100	50	ND	100	20	20	20	20	100
10	69P207	10	ND	100	ND	10	100	20	500	2000	2	0.2	2	100	200	ND	ND	50	50	10	10	10	100
11	69P208	10	ND	100	5	10	100	20	500	2000	2	0.5	2	100	200	ND	ND	100	50	10	10	10	100
12	69P194	20	20	100	5	50	100	20	1000	5000	5	1	0.2	500	100	20	ND	200	20	20	20	20	100
13	69P195	20	10	100	5	20	100	20	1000	5000	5	1	0.5	500	100	50	ND	100	20	20	20	20	100
14	69P190	20	20	100	5	50	100	20	1000	5000	5	2	1	200	100	50	ND	200	20	20	20	20	100
15	69P191	20	20	100	5	50	100	20	1000	5000	5	1	0.5	200	100	50	ND	100	20	20	20	20	100
17	69P193	20	20	100	5	50	200	20	1000	5000	5	2	0.5	NA	100	20	1	200	20	20	20	20	100
18	69P196	20	20	100	5	20	100	20	1000	5000	5	2	2	200	200	20	ND	100	20	20	20	20	200
19	69P197	10	10	100	ND	20	50	10	500	5000	2	1	1	NA	200	10	ND	100	20	10	20	10	100
20	69P198	20	20	100	ND	50	50	10	1000	5000	5	2	2	200	200	10	ND	100	ND	20	20	10	200
21	69P199	20	10	100	ND	20	50	10	1000	5000	5	1	2	NA	200	ND	ND	100	20	10	20	10	100
22	69P200	20	10	100	ND	20	20	10	1000	2000	2	2	2	100	200	ND	ND	50	20	10	20	10	100
23	69P201	20	20	100	5	50	50	10	1000	5000	10	2	2	100	200	ND	ND	100	ND	20	20	10	200

ND - Not detected
NA - Not analyzed



Histograms of Lead, Zinc and Copper Values in Stream Sediment Samples Atomic Absorption Analyses

Figure 5