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BUREAU OF MINES

Region I - Alaska

Open-File Report
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RECONNAISSANCE SAMPLING OF BEACH AND RIVER MOUTH DEPOSITS, NORTON BAY AND KOTZEBUE SOUND, SEWARD PENINSULA, ALASKA

by

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Alaska Office of Mineral Resources
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OPEN-FILE REPORT

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INTRODUCTION AND SUMMARY

Deposits along the shores of the Seward Peninsula, Alaska were sampled by the Federal Bureau of Mines during August 1959. The reconnaissance included sampling between: 1) Golovia and Koyuk on the south shore of the Seward Peninsula, and 2) between the Goodhope River and Alder Creek on the north shore of the peninsula. Bench deposits were sampled to indicate their heavy mineral content and to determine if detailed studies on individual deposits would be warranted. Stream and river deposits were sampled and analyzed for indications of lode deposits which may exist inland from the beach areas. The samples were shipped to the Bureau of Mines laboratory at Juneau for analysis. Of 61 samples analyzed petrographically, 10 were bedrock chip samples and 51 were pan concentrates of beach and river deposits. Only trace quantities of heavy minerals were recovered from all deposits by single pans. Traces of tin were detected in two samples from the shores of Norton Bay.

Travel within the areas examined was by small boat; bedrock formations cropping out along the shore were examined when time, weather, and beaching conditions permitted. No deposits of potential economic value were found.

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Work on manuscript completed in February 1962.

LOCATION AND ACCESSIBILITY

The deposits examined are along the shores of the Seward Peninsula. in northwestern Alaska (fig. 1). The areas investigated on the peninsula include: 1) Deposits between Golovin and Koyuk on Norton Bay (figs 2 and 3), and 2) deposits between Goodhope River and Alder Creek on Kotzebue Sound (fig. 4). The area on Norton Bay is shown on the Solomon and Norton Bay topographic map, 1:250,000 series, U. S. Geological Survey; the area on Kotzebue Sound is shown on the Kotzebue topographic map, 1:250,000 series, U. S. Geological Survey.

The Norton Bay area, in the southeastern part of the Seward Peninsula, is accessible from Nome (approximately 70 miles to the west) by air to small bus airports at Golovin, Elim, and Koyuk and to the Federal Aviation Agency airfield at Moses Point. Virtually all access is by small bush aircraft. The area has no roads or good harbors; most travel is by foot or small boat.

The Kotzebue Sound area is on the northern part of the Seward Peninsula. Access is by small aircraft to the bush airfield at Deering. Deering, at the mouth of the Inmichuk River, is the only permanent community in the area. A road from the village to the placer mines up the Inmachuk River is used by the miners in the summer months when hauling heavy supplies and equipment from Deering to the mines. Travel along the coast is by foot or small boat.

The prevailing northerly winds are often strong, and can cause a heavy surf. Special care should be taken when traveling the coast by boat.

HISTORY AND OWNERSHIP

Small-scale beach mining for placer gold near the mouth of Alder Creek on Kotzebue Sound in 1901 is the only report of beach mining in the area examined.

Most of the beaches smapled along the shores of Norton Sound are in the Norton Bay Native Reservation wherein no mining claims may be located. The reservation extends from approximately 4 miles northeast of Cape Darby to 1 mile east of Bald Head.

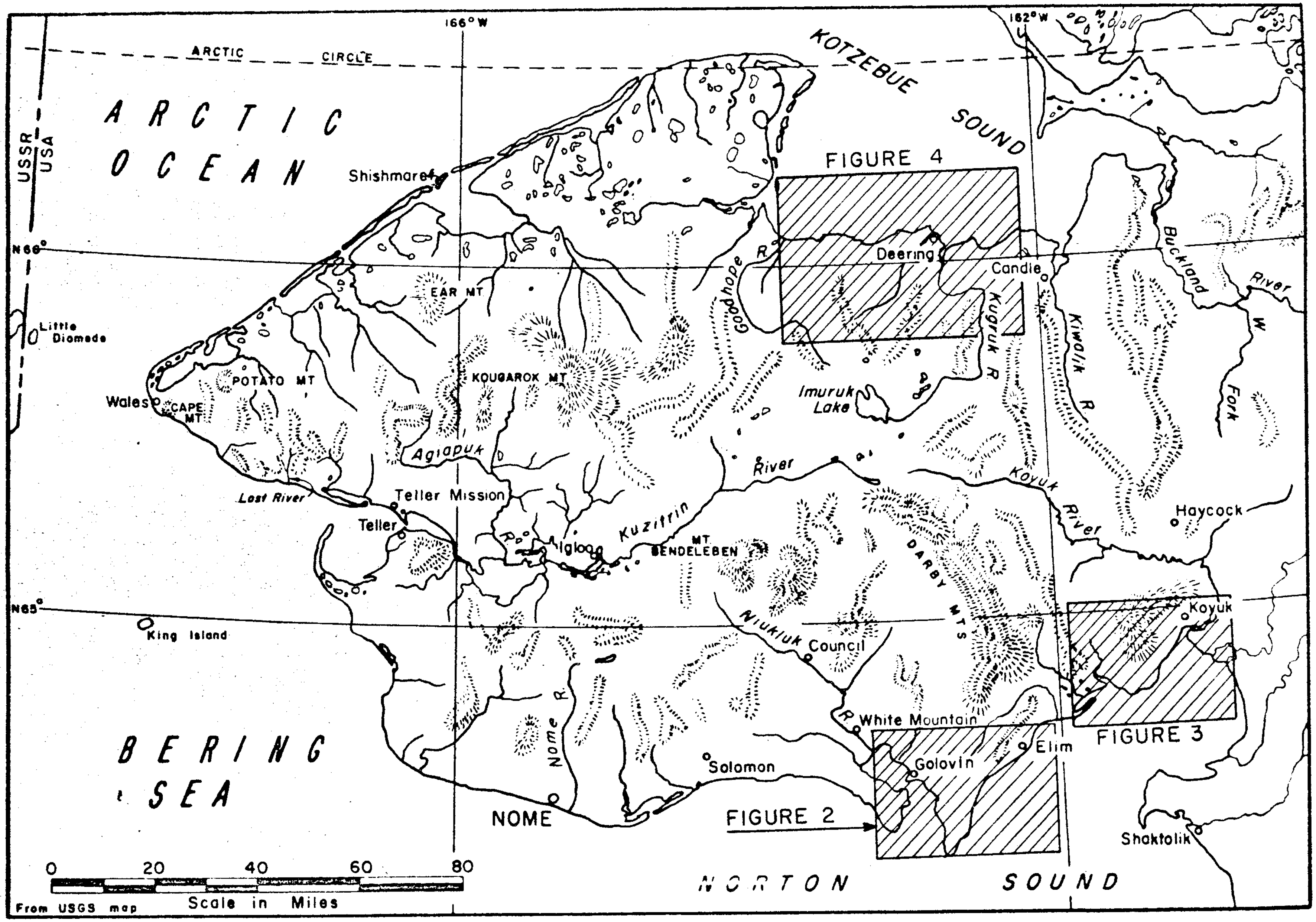

FIGURE I.-Seward Peninsula, Alaska.

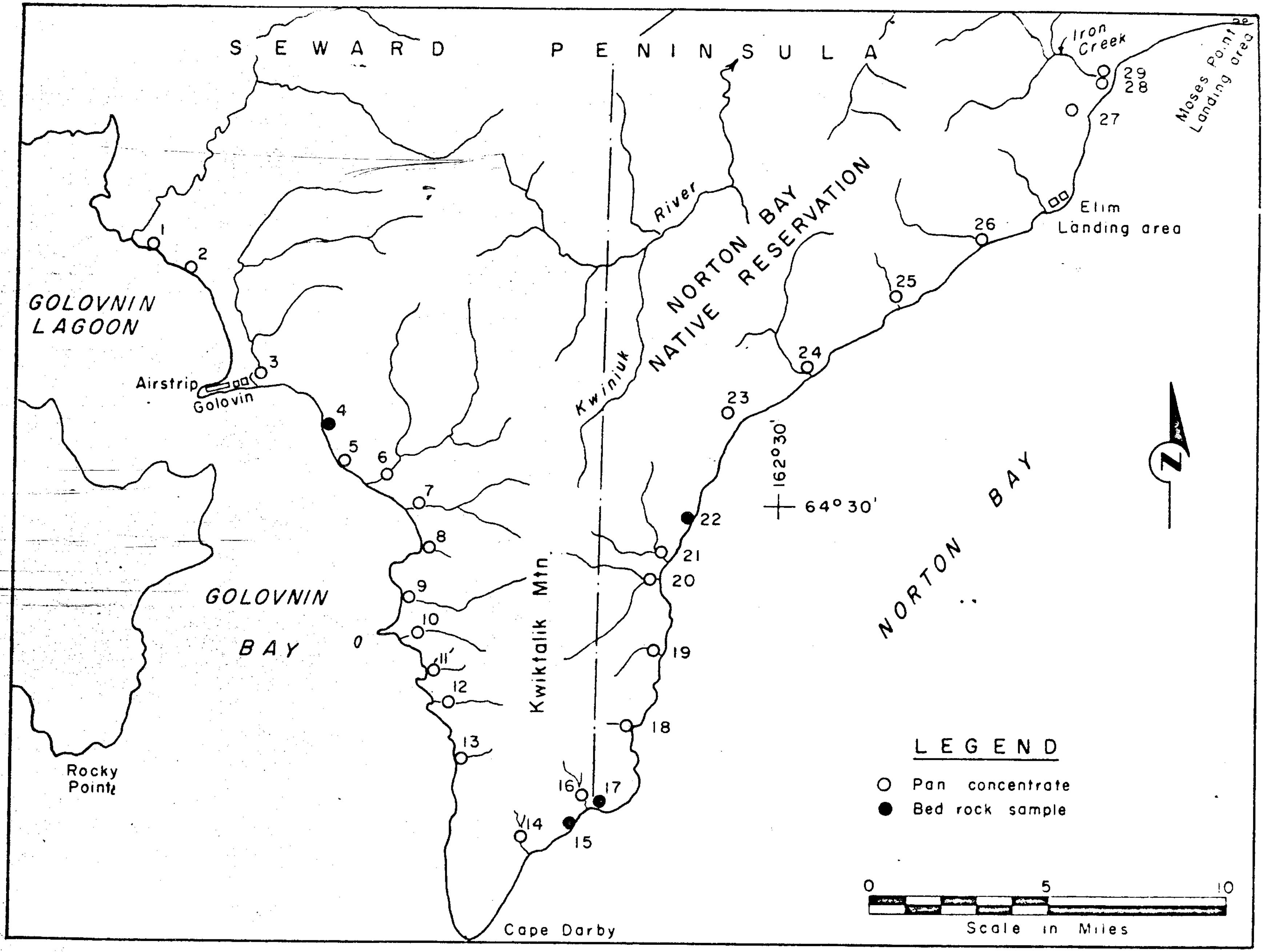

FIGURE 2.– Norton Bay.

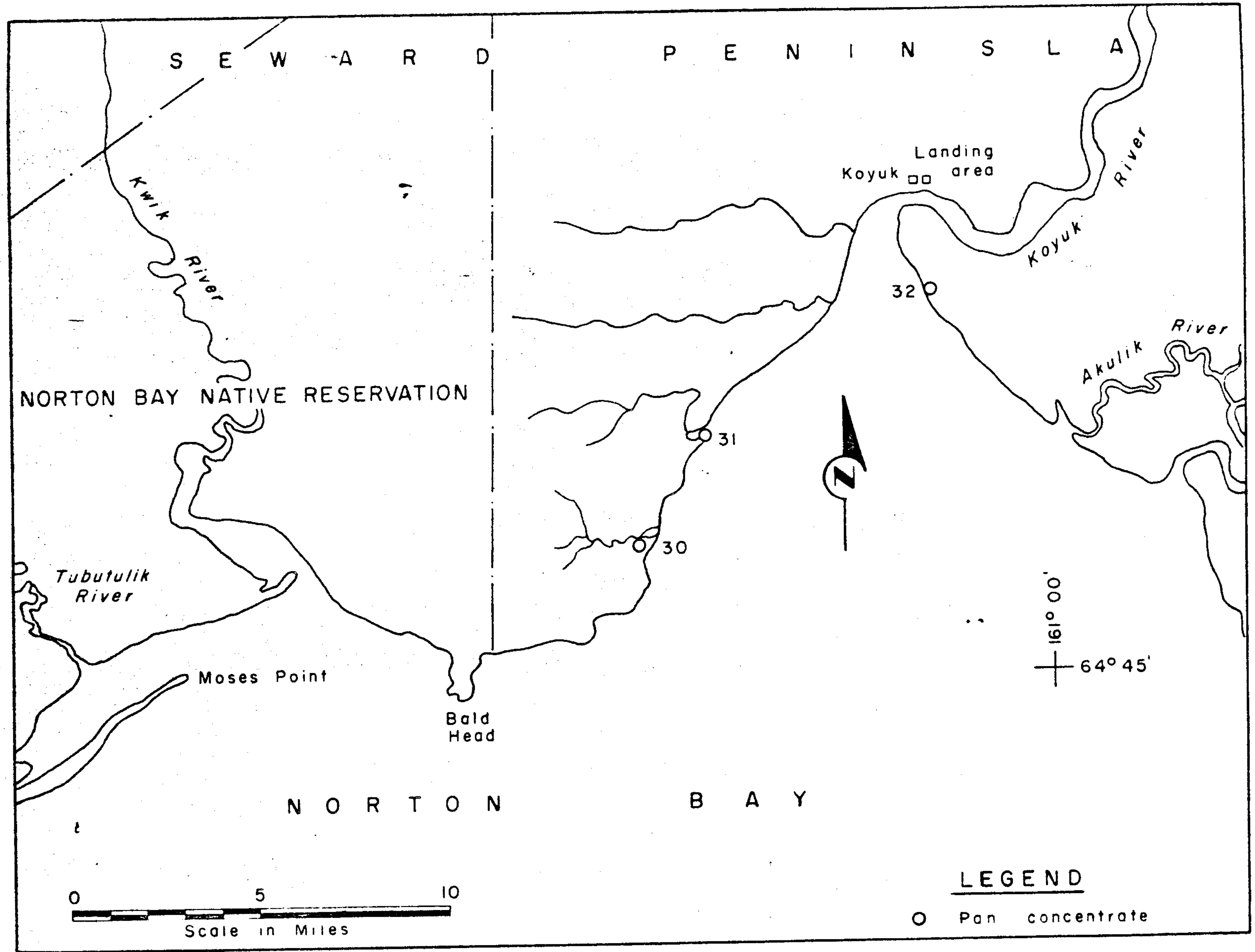

FIGURE 3.- Norton Bay.

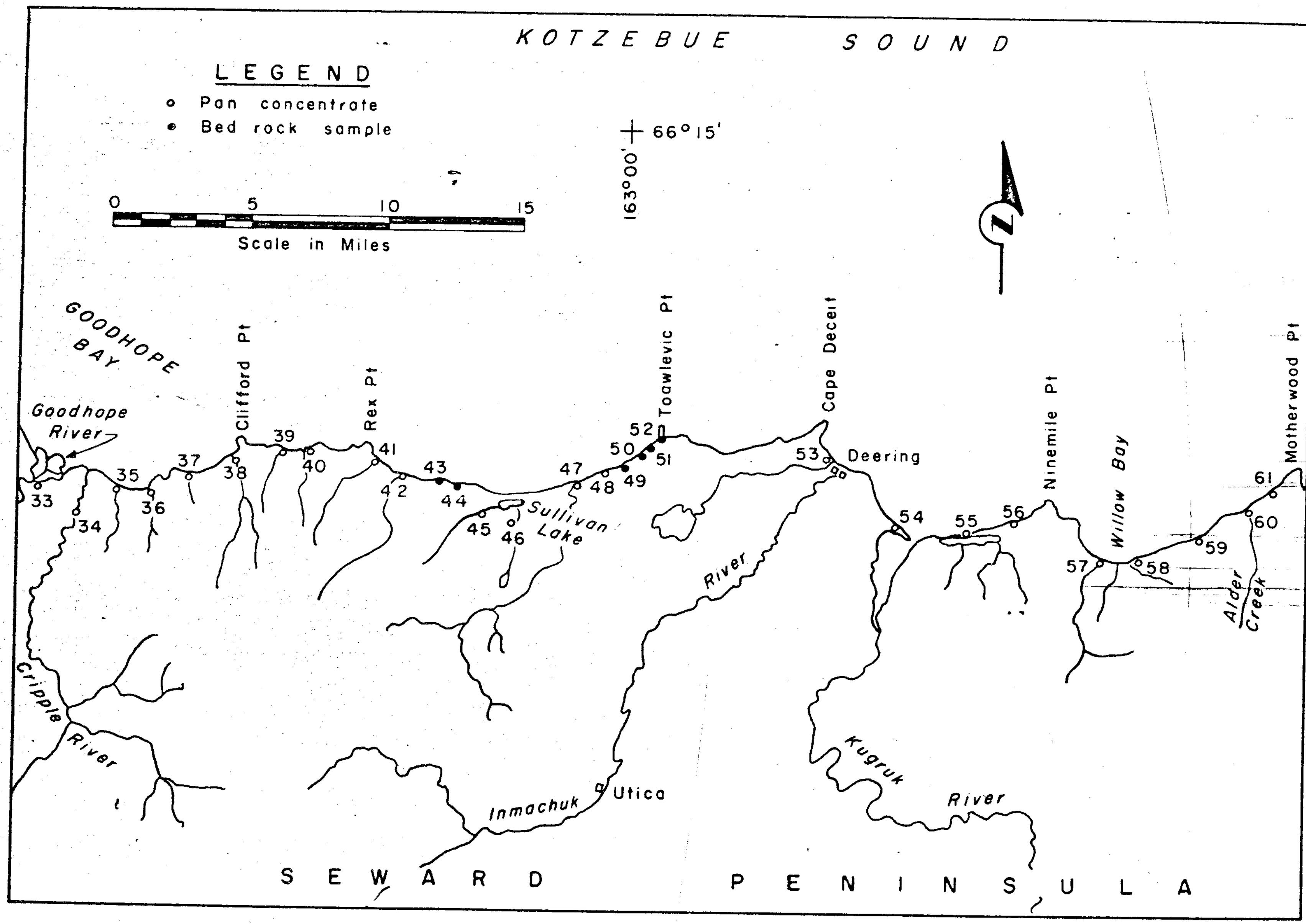

FIGURE 4.– Kotzebue Sound.

PHYSICAL FEATURES AND CLIMATE

Golovnin Bay is al shallow basin west of the Kwiktalik Mountains; along the eastern shore many small beach deposits have developed between a series of bedrock exposires. The western shores of Norton Bay are characterized bysharp bedrock bluffs beneath which few beach deposits have developed;however, small gravel beaches occur at the mouths of the many creeks which drain into the bay. Similar deposits occur in the vicinity of Bald Head at the north end of Norton Bay. Sandy mud deltas occur at the mouths of the Koyuk and Tubutulick-Kwik Rivers.

Dence underbrush and small spruce grow along the eastern shores of Norton Bay; the western limit of timber growth along the shoreline is near sample 18. The eastern shores of Golovnin Bay and the slopes of the Kwiktalik Mountains are characteristic of the low rolling, rounded hills and trundra country in the western portion of the Seward Peninsula.

The soutnern shores of Kotzebue Sound between Goodhope River and Motherwood Point are characterized by a succession of low tundra-covered headlands marking the northern extension of low north-south ridges; beach deposits beneath the bedrock headlands are either lacking or poorly developed. Gravel beaches have developed at the mouths of the smaller streams. The only sizeable shoreline beach deposits are spits at the mouths of the Inmachuk and Kugruk Rivers, and shallow bars forming the Sullivan Lake Lagoon and an unnamed lagoon 2 miles west of the Kugruk River. Several reindeer herds range the area.

The seward Peninsula climate is subartic and semi-arid. Strong winds, light rain, and midsummer snow often make outside work uncomfortable.

Tide range in both Norton Bay and Kotzebue Sound is 2 to 4 feet; strong persistent north or south winds have a greater effect on the water level.

GENERAL GEOLOGY

Beach deposits at creek mouths on the shores of Norton and Golovnin Bays are promarily alluvium mixed with smallquantities of surf-eroded detritus from nearby bedrock exposures. Few beaches have developed where the bedrock crops out along the shore. A spit at the mouth of the Tubutulik-Kwik River drainage is the only sizeable beach deposit in the area examined. Beach material at the mouth of the Koyuk River is very fine sand, and/or silt. Prevailing shore currents in Norton Bay are from west to east as evidenced by a well developed spit at the mouth of the Tubutulik River. Elevated sea caves along the east coast of the Darby

Peninsula, and elevated marine deposits in Norton Bay and elsewhere on the Seward Peninsula are evidence of a once higher base level of erosion. The elevated deposits have been reworked by streams and they are not readily recognized.

The beach deposits along the shores of Kotzebue Sound are promarily reworked river alluvium. Spits have developed at the mouths of the Inmachuk and Kugruk Rivers. The shoreline is characterized by a succession of low bedrock headlands and intervening valleys. Beach deposits beneath the headlands are either absent or poorly developed.

Granitic rocks are exposed on the eastern shore of Golovnin Bay, and from Cape Darby northward to the vicinity of sample 22; limestone and black slates are exposed north and eastward to Bald Head. Recent lava flows, massive dolomites and limestones, and a sequence of highly folded schists and black slates are exposed along the shores of Kotzebue Sound. Surf erosion of schist bluffs in the vicinity of Alder Creek produced a beach deposit 1 to 2 feet deep containing small quantities of placer gold.

WORK BY THE BUREAU OF MINES

Fieldwork was done in August 1959. Bush aircraft based in Nome provided transportation to the areas investigated; travel within areas was bysmall boat.

Because only small river mouth deposits occur along most of the shoreline, most samples were collected upstream from the beach. The concentration of from 12 to 15 pans was often necessary to assure obtaining a satisfactory sample. Only trace quantities of black heavy minerals were found throughout both areas. No wave-concentrated stringers or veneers of black sands were observed in any shoreline deposits. The samples were concentrated in the field using a 16-inch gold pan. The pan concentrates were shipped to Juneau, Alaska where detailed petrographic analyses were made by the Bureau petrographer.

Sixty-one samples were analyzed petrographically; 10 were bedrock chip samples and 51 were pan concentrate samples. Table 1 is a summary of the sample descriptions. Petrographic analyses of bedrock chip samples are shown in table 2. Table 3 is a summary of the pan concentrate analyses. The petrographer detected traces of tin in samples 25 and 32. The tin found in sample 25 indicates the possibility of a bedrock source within the small drainage area of the stream sampled. The tin found in sample 32 may have originated anywhere in the large drainage area of the Koyuk River Basin.

TABLE 1. - Sample descriptions

Sample	Number of pans concentrated	Description
1	4	Beach deposit, mostly platy schist.
2	5	Creek gravels--taken 100 feet+ inland from beach.
3	4	Creek gravels--taken 3/4 mile inland from beach.
4	-	Bedrock exposures on shore.
5	1	Small creek mouth beach deposit.
6	4	Creek gravels--taken 100 feet+ inland from beach.
7	6	Creek gravels--taken 600 feet+ inland from beach.
8	5	Creek gravels--taken 300 feet+ inland from beach.
9	9	Creek gravels--taken 450 feet +inland from beach.
10	12	Creek gravels--taken 300 feet+ inland from beach.
11	10	Creek gravels--taken 100 feet+ inland from beach.
12	10	Creek gravels--taken 150 feet+ inland from beach.
13	10	Creek gravels--taken 150 feet+ inland from beach.
14	10	Creek gravels--taken 50 feet+ inland from beach.
15	-	Bedrock exposure on shore.
16	10	Creek gravels--taken 100 feet inland from beach.
17	-	Bedrock exposure on shore.
18	8	Small creek mouth beach deposit.
19	10	Creek gravels--taken 150 feet+ inland from beach.
20	5	Creek gravels--taken 50 feet+ inland from beach.
21	12	Creek gravels--taken 450 feet+ inland from beach.
22	-	Shear zone 340° Az @ 70° N with traces of sulfide minerals.
23	10	Small creek mouth beach deposit.
24	12	Creek-gravels--taken 150 feet+ inland from beach.
25	10	Creek gravels--taken 50 feet+ inland from beach.
26	12	Creek gravels--taken 50 feet+ inland from beach.
27	12	Creek gravels--taken 20 feet+ inland from beach.
28	3	Creek mouth beach deposit.
29	-	Limonite float pebbles from Iron Creek.
30	15	Creek sands-- taken 600 feet inland from beach.
31	10	Beach gravels.
32	8	Beach sand deposit.
33	12	River sands--taken 1 mile inland from beach.
34	10	River gravels--taken 1 mile inland from beach.
35	12	Creek sands--taken 100 feet+ inland from beach.
36	15	Creek sands--taken 50 feet + inland from beach.
37	15	Creek gravels--taken 25 feet+ inland from beach.
38	15	Creek gravels--taken 300 feet+ inland from beach.
39	15	Creek mouth beach deposit, few fines.
40	15	Creek mouth beach deposit, few fines.
41	15	Creek mouth beach deposit, few fines.

TABLE 1. - Sample Descriptions (con.)

Sample	Number of pans concentrated	Description
42	15	Creek gravels--taken 250 feet ± inland from beach.
43	-	Bedrock exposure on shore.
44	-	Bedrock exposure on shore.
45	15	Creek gravels--taken about 1/2 mile upcreek from Sullivan Lake.
46	15	Creek gravels--taken about 1/4 mile upcreek from Sullivan Lake.
47	15	Creek gravels--taken 1/3 mile ± inland from beach.
48	7	Beach gravels.
49	-	Bedrock exposure on shore.
50	-	Bedrock exposure on shore.
51	-	Bedrock exposure on shore.
52	-	Bedrock exposure on shore.
53	10	Inmachuk Spit gravels.
54	15	Kugruk Spit gravels.
55	7	Lagoon barrier bar gravels.
56	10	Beach sands, narrow deposit.
57	5	Beach gravels at river mouth.
58	9	Beach gravels at river mouth.
59	6	Beach gravels at river mouth.
60	7	Beach gravels at river mouth.
61	3	Beach gravels beneath shcist bluffs, trace Au.

TABLE 2. - Petrographic analyses of bedrock samples

Legend:

P - Predominant	Over 50 percent	X - Detected in sample	
A - Abundant	10 - 50 percent	-	Sought but not detected
S - Subordinate	2 - 10 percent	f	Fluorencent
M - Minor	.5 - 2 percent	R	Radioactive
F - Few	.1 - .5 percent	Numerals percent	
T - Trace	Less than .1 percent		

	Samples										
	4	15	17	22	29	43	44	49	50	51	52
Rock classification:											
Quartz diorite	X	X	X								
Limestone								X	X	X	X
Chlorite schist							X				
Vein quartz and phyllite						X					
Minerals:											
Albite							S				
Andesine	A	A	A								
Biotite	F	M	S								
Calcite				A			A	F	P	P	P
Chlorite		A	T	S		S	A				
Clays				S							
Hornblende	A	T	M								
Limonite				M	P	M					F
Microcline	A	A	A								
Muscovite											F
Oligoclase			T								
Pyrite				S		M					
Quartz	A	A	A	A	M	P	P	M	M	M	S
Sphene	F	T									
Zircon	T	-	-								

Remarks: Traces of copper and zinc were detected spectroscopically in sample 22. Fluorescence was not detected except as zircon in sample 1. Radioactivity was not detected.

TABLE 3. - Petrographic analyses of pan concentrates

Legend:

P - Predominant	Over 50 percent	X - Detected in sample
A - Abundant	10 - 50 percent	- Sought but not detected
S - Subordinate	2 - 10 percent	f Fluorescent
M - Minor	.5 - 2 percent	R Radioactive
F - Few	.1 - .5 percent	Numerals percent
T - Trace	Less than .1 percent	

	Samples									
	1	2	3	5	6	7	8	9	10	11
Rock fragments:										
Biotite schist					X					
Chlorite schist	X	X	T			T				
Diorite					X					
Hornblendite	X				X					
Granite					X					
Minerals:										
Albite	S	S		M		M	S	F	T	-
Andesine	S		M	M	M	S	A	A	A	S
Apatite		F					F	M	M	S
Augite				A	S	S	A	A	P	A
Biotite					T	T	T		T	
Chlorite	S	A	T			T	F			
Dolomite		F								
Epidote		M	M	T	T		T		F	F
Garnet		T	F	S	A	M	F	M	A	A
Hematite	T	T			T	T	T	-		F
Hornblende	S	M	A	S	A	S	T			M
Hypersthene	T				T					
Ilmenite	T	M	F	M	S	-	M	-	S	A
Limonite	F	F	F		T	T	F	F	F	F
Magnetite	T	T	F	0.6	F	T	T	T	A	A
Muscovite		F								
Olivine						M	T			
Orthoclase	A	T	A	A	A	A	A	A	A	S
Pyrite		T	T							
Quartz	A	A	A	A	A	A	A	A	A	A
Sphene		F	M	M		M	F	M	M	F
Staurolite				T	M		-		F	
Tourmaline		T	-		-	F				
Zircon	T	T	F	F	F	M	M	F	M	M

Remarks: The radioactivity detected was associated with high zircon concentrations. Scheelite was not detected. Beryllium, lead, tin, indium, and bismuth were not detected spectroscopically.

TABLE 3. - Petrographic analyses of pan concentrates (con.)

	Samples									
	12	13	14	16	18	19	20	21	23	24
Minerals:										
Albite	-	-	-		-					S
Andesine	-	-	M	M	M		M	M		S
Apetite	-	T					T			
Augite	S	M	F	T	T	F	M			S
Biotite	M		-	T		M	M		S	M
Calcite										S
Chlorite	M	M	M	F	F	F	M	M	M	S
Dolomite										M
Epidote			T					T		F
Garnet	A	F	-	-	M	F	F	F		F
Hornblende	M	S	S	S	S	A	S	S	A	M
Ilmenite	M	T	M	M	M	F	F	T	F	F
Limonite	F	F	F	F	F	F	F	F	F	F
Magnetite	F	T	-	T	M	M	S	T	S	M
Oligoclase						S	M	M		
Olivine			F				M	T		
Orthoclase	A	A	A	A	A	S	A	A	A	A
Quartz	A	A	A	A	A	P	A	A	A	A
Sphene	M	S	F	M	M	S	M	F	M	F
Zircon	T	F	T	T	M	M	F	T	F	T

Remarks: Scheelite was not detected. No radioactivity was detected.

TABLE 3. - Petrographic analyses of pan concentrates (con.)

	Samples									
	25	26	27	28	30	31	32	33	34	35
Rock fragments:										
Carbonaceous schists						X		X		
Minerals:										
Actinolite	T									
Albite		M	M	M	S	M	S	S	–	S
Andesine	M	M			M	A		S		
Apatite					T					
Augite	A					M	A		M	F
Calcite	M	M	S	A	F				M	
Cassiterite	Sn-T						T			
Chlorite	M	S	M	M	S	S	M	S	S	M
Chloritoid	M							F	T	
Dolomite	M		A	A						
Epidote	S	M	M	M		T				T
Garnet	M	F	F		F		S			T
Goethite after pyrite	A	A	A	S						
Graphite						M		M		
Hematite			M				T			
Hornblende	–	–	T		T	T	M			
Ilmenite	T						S	T		
Limonite	F	M	M	M	F	M	F	S	M	M
Magnetite	M	T	T	T	T	T	S	T	T	T
Muscovite						M		M		
Oligoclase					M					
Olivine					T		M	A	M	S
Orthoclase	S	S	A		A	A	M	–	–	
Quartz	A	A	A	P	A	S	A	A	P	P
Sphene	T	F			F		S		T	
Staurolite					T		F			
Tourmaline	T	T					T			
Zircon	T	T	T	T	T	T	M	–	–	T

Remarks: Less than 0.001 percent En was detected in samples 26, 34, and 35. Tr scheelite was detected in sample 30.

TABLE 3. - Petrographic analyses of pan concentrates (con.)

	Samples									
	36	37	38	39	40	41	42	45	46	47
Rock fragments:										
Carbonaceous schist						X	X		X	
Mica schist							X	X	X	X
Olivine basalt				X	X	T				
Minerals:										
Albite	M	M	M	M	F	M	M		M	M
Augite	M		M	M		M			S	
Biotite						T		M		M
Chlorite	M	M	M	F		M	M	M	M	M
Chloritoid	T		F					T	T	M
Epidote	M	S	S	M	S	S	A	S	M	M
Garnet				T					T	T
Glaucophane							T			
Goethite						M		S		S
Hematite					T	F	T			
Ilmenite	T	T								
Limonite	M	M	M	F			M	M	M	M
Magnetite	T	T	T	T	T	T	-	-	-	T
Muscovite	M						M		T	
Oligoclase					M					
Olivine	S	A	M	A	P	S	M	M		S
Orthoclase	-			T						
Quartz	P	P	P	A	A	P	P	P	P	P
Sphene	T									
Zircon	T	T	T	T	T	T	-	T	T	T

Remarks: Less than 0.001 percent Zn was detected in samples 40 and 46. A trace of scheelite was detected in sample 41.

TABLE 3. - Petrographic analyses of pan concentrates (con.)

	Samples									
	48	53	54	55	56	57	58	59	60	61
Rock fragments:										
Carbonaceous schists	X	T	X	X	X	X	X		T	X
Dolomite		A	A	M	M	S	A	M	M	M
Greenschist		T				X	X	X	X	
Hornblende gneise								X	X	X
Mica schist	X								X	X
Olivine basalt			T	T	X					
Minerals:										
Albite	M	M	F	M	M	M	M	M	M	M
Apatite									T	
Augite	M	F	F	M	M	M		M	F	
Biotite	M					F		M		M
Calcite	F		M							M
Chlorite	M	S	M	M	M	S	M	M	S	M
Chloritoid	M	T	T	F	T	T	T			T
Diopside (blue f)		Tf						Tf		
Epidote	M	T	-	M	M	M	M	S	M	M
Garnet		T	-	S	A	S	S	S	S	S
Glaucophene							T		T	
Goethite	A	M	M	M	S	M	M	S	S	T
Hornblende			-	F	F	M	S	S	S	F
Ilmenite			F	F	F	M	F	M	M	
Limonite		T	F	M	F	F	F	F	M	
Magnetite	T	T	T	T	T	T	T	T	T	T
Olivine	M	S	F	S	M	M	M	M	M	
Orthoclase		-	F	F	F	F	F	M	F	
Quartz	P	P	P	P	P	P	P	P	P	P
Sphene						T				
Zircon	T	T	T	F	T	T	T	T	T	T

Remarks: Scheelite was not detected. Less than 0.001 zinc was detected in samples 48, 54, 56, and 61.