UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER-RESOURCES RECONNAISSANCE OF THE OLD HARBOR AREA, KODIAK ISLAND, ALASKA

By

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In response to a letter from the Alaska Department of Natural Resources requesting assistance on a water-supply problem at Old Harbor, Kodiak Island, the Alaska District of the Water Resources Division, under an existing cooperative funding agreement, undertook a reconnaissance investigation to determine the location, quantity, and quality of the water resources in the Old Harbor area. The author visited the village of Old Harbor on June 23, 1970. He was met there by Mr. Mathew Jamin of Old Harbor who assisted him during his reconnaissance trip.

The present economy of Old Harbor village is largely dependent on the summer salmon fishing season. During the winter, most of the villagers have no employment. However, Old Harbor is on the southern coast of Kodiak Island, on the Sitkalidak Strait, which is the heart of the Kodiak shrimp-fishing grounds. All the shrimp caught in these waters are taken to the city of Kodiak for processing. Representatives of the shrimp-canning industry have contacted Mayor Sven Haakanson of Old Harbor about the possibility of locating a cannery there. They stressed that a high-quality water at a maximum rate of 1 mgd (million gallons per day) would be required for shrimp processing. Because shrimping is a winter endeavor, this would provide employment for Old Harbor residents during their most critical period of need.

The existing water-supply system, which utilizes two small streams at the village site, can produce about 0.2 mgd. This is adequate to meet the present domestic needs of the 300 residents but inadequate to supply a shrimp-processing plant. Ground water in the required amount probably is not available at the present townsite. The nearest additional sources of water are two unnamed streams, each about one mile from the village. The attached map locates the data-collection sites on the two streams.

The discharge of stream 1, which is about one mile southwest of Old Harbor, was measured at 4.8 mgd at a section about 100 feet above the stream mouth. It had not rained in the area for about one week when the discharge measurement was made. Therefore, the measurement represents ground-water discharge on that particular day rather than surface runoff from precipitation. The drainage area of stream 1 is about two square miles and the precipitation at Old Harbor is estimated to be about 80 inches per year. Because of orographic effects, rainfall on the watershed of stream 1 may average 100 inches per year. Assuming 30 inches of evapotranspiration loss, annual runoff may be of the order of 70 inches, or about 6.5 mgd. Only a narrow flood plain has been developed in the valley of stream 1. Because of this, the ground-water reservoir is small. The villagers reported that they could remember seeing the stream dry only during dry summers. This can be explained by the difference in evapotranspiration losses between summer and winter. During dry summers, when evapotranspiration is relatively large, the ground-water table declines below the altitude of the stream and discharge to the stream ceases. In the winter when evapotranspiration losses are near zero, discharge from the ground-water reservoir is adequate to maintain streamflow. Winter flows in stream 1 are probably low but may be adequate to meet the 1 mgd requirement of the proposed cannery.

The discharge of stream 2, which is about one mile northeast of Old Harbor, was measured at 8.4 mgd at a section about 500 feet above the stream mouth. Again, because it had not rained for about a week, the measurement represents ground-water discharge rather than surface runoff. The drainage area of stream 2 is 2.5 square miles and, similar to stream 1, the annual runoff may be of the order of 70 inches, or about 8.5 mgd. An extensive flood plain has developed in the lower reach of stream 2. This flood plain was built by the stream, locally called Big Creek, which presently empties into Midway Bay (see map). Consequently, a relatively large ground-water reservoir exists that maintains higher discharge of ground water to stream 2 during low-flow periods than that provided by the ground-water reservoir at stream 1. This is evidenced by observation of the villagers that they had never seen stream 2 dry either during winter or summer periods. Streamflow in stream 2 should be adequate to meet the 1 mgd requirement of the proposed cannery.

The attached map indicates the location of data-collection sites on the two streams, and the attached chemical-quality analyses summarize the chemical character of the streams. The water samples were not analyzed for biological contamination because both watersheds are undeveloped. The analyses indicate that the water from both streams is of the calcium sodium bicarbonate type. The chemical quality of the water is well within the drinking standards set by U.S. Public Health Service and should be excellent for shrimp processing. However, the water is very soft and could cause corrosion problems. It would be particularly detrimental to concrete.

In conclusion, either stream is of excellent chemical quality for shrimp processing and may be able to supply the 1 mgd needed. Stream 2, northeast of Old Harbor, will provide larger and more uniform flows because of the larger ground-water reservoir adjacent. However, gravity flow cannot be obtained from stream 2 within two miles or more of the village. Stream 1, southwest of Old Harbor, rises rapidly from its mouth and a gravity-flow system may be possible at a lesser distance. An engineering study would be required to determine if gravity flow can be obtained and which alternative is the more economical.

KODIAK (A-5) QUADRANGLE
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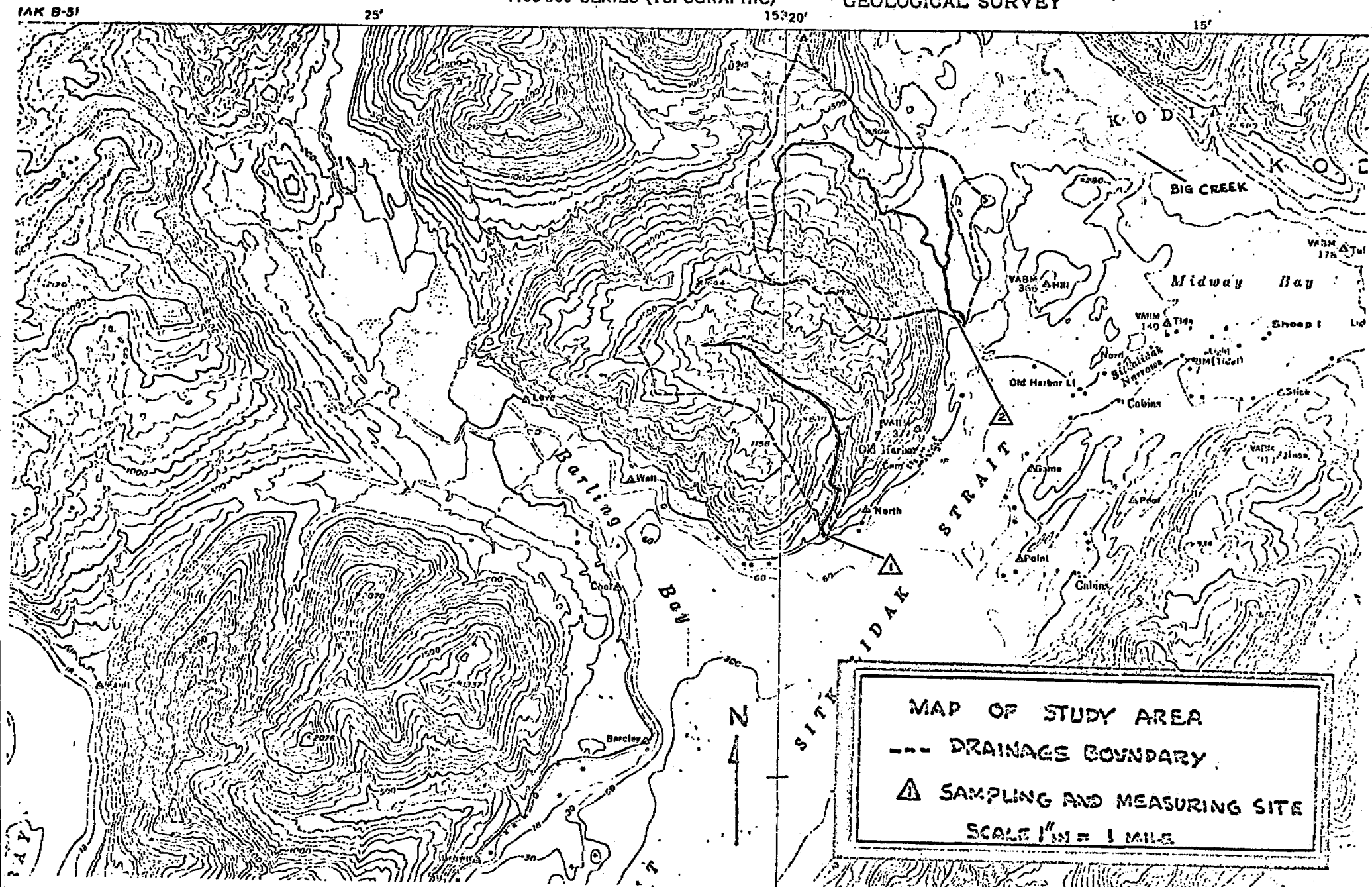

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2SW

WATER ANALYSIS

ANALYSIS 1

Location Stream 1 - one mile SW of Old Harbor County Kodiak
Source
Point of coll. 100 ft above the mouth
Owner State of Alaska Treatment None

Use None Gage height (ft) -- Discharge (cfs) 7.3 Temp (°F) 44
Appear. when coll. Clear
Collected 6-23-70 By J. Weeks
Remarks

	mg/l	ap/l		mg/l	ap/l
Silica (SiO_2)	3.3		Bicarbonate (HCO_3)	10	0.17
Aluminum (Al)	---		Carbonate (CO_3)	0	0.00
Iron (Fe)	0.05	0.20			
Manganese	0.00	0.00	Sulfate (SO_4)	1.8	0.04
			Chloride (Cl)	2.1	0.06
			Fluoride (F)	0.1	0.01
Calcium (Ca)	3.2	0.16			
Magnesium (Mg)	0.5	0.04	Nitrate (NO_3)	0.4	0.01
Sodium (Na)	2.3	0.10			
Potassium (K)	0.2	0.01			
Total		0.31	Total		0.29

	mg/l		
		Specific conductance (micromhos at 25° C)	33
Dissolved solids:			
Calculated	19	pH	7.1
Residue on evaporation at 180°C			
		Color	0
Hardness as $CaCO_3$	8		
Noncarbonate	2		

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2SW

WATER ANALYSIS

ANALYSIS 2

Location Stream 2 - one mile NE of Old Harbor County Kodiak
Source
Point of coll. 500 ft above the mouth
Owner State of Alaska Treatment None

Use None Gage height (ft) -- Discharge (cfs) 13 Temp (°F) 46
Appear. when coll. Clear
Collected 6-23-70 By J. Weeks
Remarks

	mg/l	ap/l		mg/l	ap/l
Silica (SiO_2)	4.2		Bicarbonate (HCO_3)	10	0.16
Aluminum (Al)	---		Carbonate (CO_3)	0	0.00
Iron (Fe)	0.03	0.20			
Manganese	0.00	0.00	Sulfate (SO_4)	1.6	0.03
			Chloride (Cl)	3.2	0.09
			Fluoride (F)	0.0	0.00
Calcium (Ca)	3.2	0.16			
Magnesium (Mg)	0.5	0.04	Nitrate (NO_3)	0.8	0.01
Sodium (Na)	2.5	0.11			
Potassium (K)	0.2	0.01			
Total		0.32	Total		0.29

	mg/l		
		Specific conductance (micromhos at 25° C)	36
Dissolved solids:	21	pH	7.2
Calculated			
Residue on evaporation at 180°C		Color	0
Hardness as $CaCO_3$	8		
Noncarbonate	2		

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