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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER-RESOURCES RECONNAISSANCE OF THE GOLOVIN AREA, ALASKA

By

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On July 1, 1969, the Alaska District of the Water Resources Division received a letter from Mrs. Verna Mickelson, then center director at Nome for the Rural Alaska Community Action Program (RurALCAP), requesting assistance in developing an adequate water supply for the village of Golovin. The Alaska Department of Natural Resources was contacted, and approval was given under an existing cooperative agreement to conduct a reconnaissance investigation of Golovin involving an inventory of existing sources of water, including the quality of water, and a report of the principal findings. The following is a brief description of the work and the conclusions that have been reached.

The author and Mr. M. M. Hiner visited the village of Golovin on July 18, 1969, accompanied by Mr. Stanley Amorak, the Nome center director for RurALCAP. They met with several of the village residents including the mayor, Mr. Martin Olson. It was learned that about 90 persons live at Golovin during the winter and about 200 persons during fishing season in the summer. Thus, a water supply of about 6 gpm (gallons per minute) during the winter and about 15 gpm during the summer would be adequate to meet the present domestic needs. However, in addition to this, Mr. Thomas Johnson plans to construct a reindeer slaughter house at Golovin that will significantly increase the current water-supply demand, perhaps doubling it.

Most of the water used by the village is presently obtained from Cheenik Creek. Water (or ice during the winter) is hauled about two miles from above the tide-affected reach of the creek. The residents report that the creek flows under the ice during the winter.

An inventory of existing wells, pits, and depressions was made to determine the availability of ground water at the village. Five ground-water samples were collected for chemical-quality analysis by the U.S. Geological Survey Laboratory in Anchorage. The attached sketch and analyses indicate the location of the sample sites and the water quality. Site 1 is a spring that is the principal ground-water supply for the village. Site 5 is a pond in a depression that is fed by ground water. The remaining sites are hand-dug pits or wells in which the water table is 3 to 5 feet below land surface. The analyses indicate either calcium or sodium bicarbonate type water generally containing dissolved-solids concentrations less than 300 mg/l (milligrams per liter), but having relatively high sodium and chloride content. The chloride content is probably the result of salts carried ashore by wind and rain and is well below U.S. Public Health Service standards for potable water. However, the Bureau of Indian Affairs reports a well drilled at the Golovin school produced salt water at about 17 feet and reached bedrock at about 30 feet below land surface. Therefore, a fresh-water lens may overlie the more dense salt water.

A second trip to Golovin was made by the author and Mr. V. W. Norman on August 12, 1969. Water samples were again collected at the same sites as before and analyzed for biological contamination by the State of Alaska, Department of Health and Welfare, in Fairbanks. The results of the analyses showed that all samples were biologically polluted and that the water should be boiled or treated chemically before drinking.

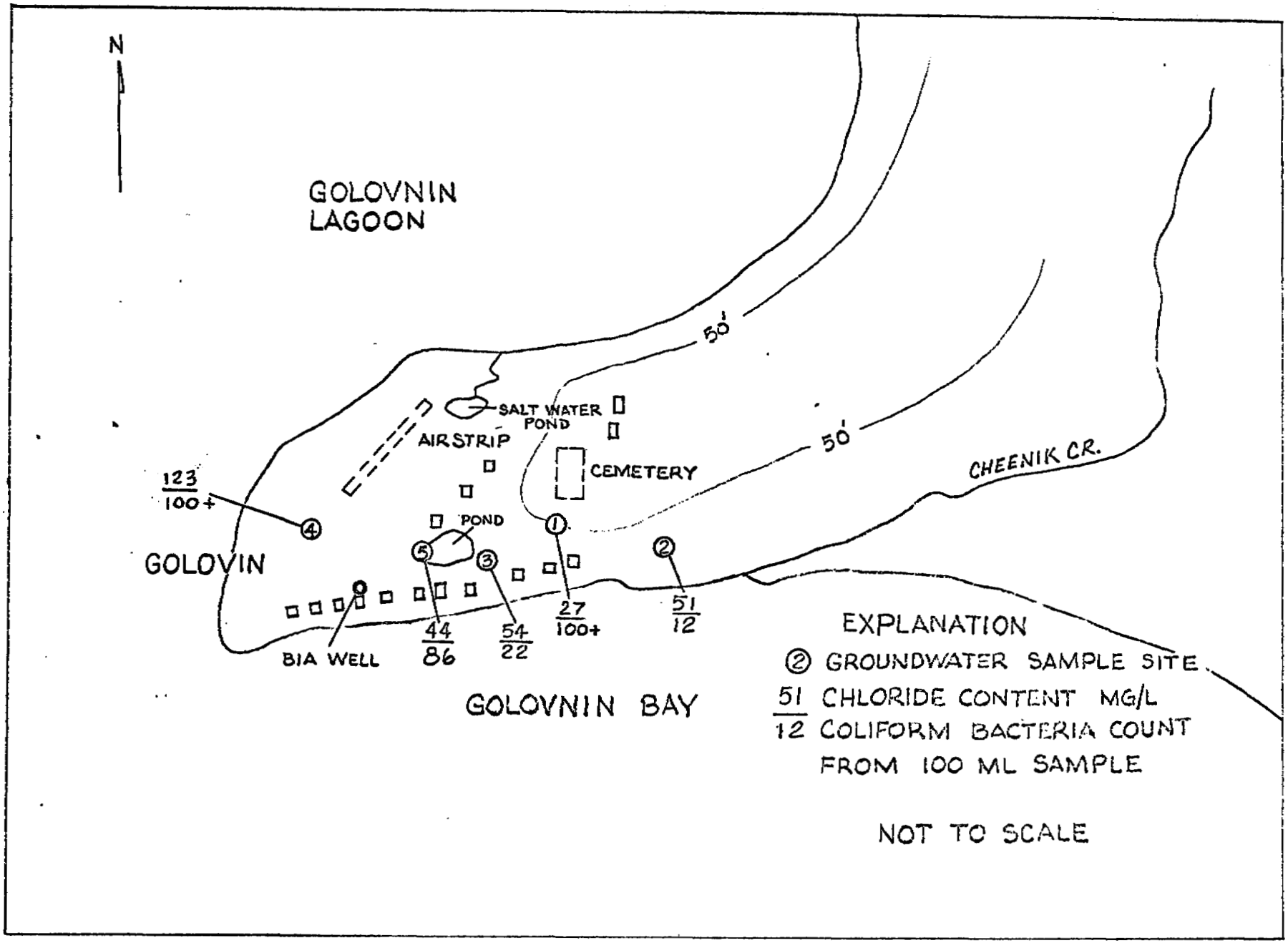
On the basis of the foregoing observations, several alternatives may be considered relative to developing a satisfactory water supply for Golovin:

1) Develop a ground-water supply below the spring at site 1. Horizontal drains driven into the base of the hill may intercept fractures in the bedrock and provide flowing water. However, the villagers report that the spring at site 1 does not flow during the winter so there may not be adequate storage in the fractured rock to develop a perennial water supply.

2) Construct a gallery well near the pond at site 5. A horizontal collector pipe buried below the water table should produce an adequate supply from a fresh-water lens overlying salt water. The advantage of this alternative is that it can be tested beforehand merely by pumping water from the pond at site 5. If water can be pumped from the pond at a rate adequate to supply the village without dewatering the pond or inducing salt water, a gallery should be successful.

3) Develop a water supply from Chennik Creek; however, this will require economic considerations because of its distance from point of use and engineering problems associated with its distribution and storage.

Regardless of the alternative pursued, the water obtained will require treatment to reduce the pollution hazard.



SKETCH MAP OF GOLOVIN SHOWING
QUALITY-OF-WATER SAMPLING SITES

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WATER ANALYSIS

ANALYSIS SITE 1

Location Golovin #1 (below graveyard) County
Source Spring Depth (ft) - Diam (in.) -
Cased to (ft) Date drilled Point of coll. Surface
Owner
Treatment None Use Domestic
WBF WL Yield
Temp (°F) Appear. when coll. Clear
Collected 7-18-69 By Weeks & Hiner
Remarks Lat 64°32'42" Long 163°1'36"

	mg/l	ap/l		mg/l	ap/l
Silica (SiO_2)	3.7		Bicarbonate (HCO_3)	178	2.91
Aluminum (Al)			Carbonate (CO_3)	00	0.00
Iron (Fe)	0.1				
Manganese (Mn)	0.03		Sulfate (SO_4)	4.5	.09
			Chloride (Cl)	27	0.75
			Fluoride (F)	0.2	0.01
Calcium (Ca)	61	3.04			
Magnesium (Mg)	3.8	.31	Nitrate (NO_3)	8.0	0.13
Sodium (Na)	9.8	0.43			
Potassium (K)	.8	.02			
Total		3.80	Total		3.89

	mg/l		
		Specific conductance (micromhos at 25° C)	368
Dissolved solids: Calculated	206	pH	8.2
Residue on evaporation at 180°C		Color	5
Hardness as $CaCO_3$	168		
Noncarbonate	22		
Alk as CaCo3	146		

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WATER ANALYSIS

ANALYSIS SITE 2

Location Golovin #2 - North of Cheenik Creek County
Source Well (dug) Depth (ft) 4 Diam (in.)
Cased to (ft) 4 Date drilled Point of coll. Water surface
Owner
Treatment None Use None
WBF WL 3 ft below lsd Yield
Temp (°F) Appear. when coll. Yellow (iron)
Collected 7-18-69 By Weeks & Hiner
Remarks Lat 64°32'40" Long 163°1'25"

	mg/l	ap/l		mg/l	ap/l
Silica (SiO_2)	3.1		Bicarbonate (HCO_3)	109	1.79
Aluminum (Al)			Carbonate (CO_3)	00	0.00
Iron (Fe)	.16				
Manganese (Mn)	0.02		Sulfate (SO_4)	4.8	.10
			Chloride (Cl)	51	1.44
			Fluoride (F)	0.1	0.01
Calcium (Ca)	40	1.98			
Magnesium (Mg)	4.1	.34	Nitrate (NO_3)	5.6	0.09
Sodium (Na)	23	1.00			
Potassium (K)	1.5	.04			
Total		3.36	Total		3.43

	mg/l		
		Specific conductance (micromhos at 25° C)	344
Dissolved solids: Calculated	186	pH	7.9
Residue on evaporation at 180° C		Color	5
Hardness as $CaCO_3$	166		
Noncarbonate	77		
Alk as CaCo3	89		

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WATER ANALYSIS

ANALYSIS SITE 3

Location Golovin #3 - Old Cold Storage County
Source Well (dug) Depth (ft) 4 Diam (in.)
Cased to (ft) 4 Date drilled Point of coll. Water surface
Owner
Treatment None Use None
WBF WL 3 ft below lsd Yield
Temp (°F) Appear. when coll.
Collected 7-18-69 By Weeks & Hiner
Remarks Lat 64°32'38" Long 163°1'40"

	mg/l	ap/l		mg/l	ap/l
Silica (SiO_2)	3.2		Bicarbonate (HCO_3)	72	1.18
Aluminum (Al)			Carbonate (CO_3)	00	0.00
Iron (Fe)	.90				
Manganese (Mn)	0.07		Sulfate (SO_4)	0.8	0.02
			Chloride (Cl)	54	1.52
			Fluoride (F)	0.3	0.02
Calcium (Ca)	26	1.32			
Magnesium (Mg)	3.4	.28	Nitrate (NO_3)	3.6	0.06
Sodium (Na)	29	1.26			
Potassium (K)	3.5	.09			
Total		2.95	Total		2.80

	mg/l		
		Specific conductance (micromhos at 25° C)	295
Dissolved solids: Calculated	156	pH	7.7
Residue on evaporation at 180°C		Color	99
Hardness as $CaCO_3$	80		
Noncarbonate	21		
Alk as CaCo3	59		

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WATER ANALYSIS

ANALYSES SITE 4

Location Golovin #4 - NW end of runway County
Source Well (dug) Depth (ft) 4 Diam (in.) 30
Cased to (ft) 4 Date drilled Point of coll. Water surface
Owner
Treatment None Use Domestic
WBF WL 4 ft below lsd Yield
Temp (°F) Appear. when coll.
Collected 7-18-69 By Weeks & Hiner
Remarks Lat 62°32'33" Long 163°2'25"

	mg/l	ap/l		mg/l	ap/l
Silica (SiO_2)	3.4		Bicarbonate (HCO_3)	340	5.55
Aluminum (Al)			Carbonate (CO_3)	00	0.00
Iron (Fe)	0.19				
Manganese (Mn)	0.03		Sulfate (SO_4)	20	.42
			Chloride (Cl)	123	3.48
			Fluoride (F)	0.5	0.03
Calcium (Ca)	13	.67			
Magnesium (Mg)	7.1	.58	Nitrate (NO_3)	2.4	0.04
Sodium (Na)	176	7.66			
Potassium (K)	13	.33			
Total		9.24	Total		9.52

	mg/l		
		Specific conductance (micromhos at 25° C)	915
Dissolved solids:			
Calculated	526	pH	8.2
Residue on evaporation at 180°C			
		Color	99
Hardness as $CaCO_3$	63		
Noncarbonate	00		
Alk as CaCo3	279		

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ANALYSES SITE 5

WATER ANALYSIS

Location Golovin #5 - Base of hill below graveyard County
Source Pond (Ground-water fed) Depth (ft) - Diam (in.) -
Cased to (ft) Date drilled Point of coll. Water surface
Owner
Treatment None Use None
WBF WL Yield
Temp (°F) Appear. when coll.
Collected 7-18-69 By Weeks & Hiner
Remarks Lat 64°32'40" Long 163°1'50"

	mg/l	ap/l		mg/l	ap/l
Silica (SiO_2)	1.4		Bicarbonate (HCO_3)	210	3.45
Aluminum (Al)			Carbonate (CO_3)	00	0.00
Iron (Fe)	.49				
Manganese (Mn)	0.13		Sulfate (SO_4)	7.6	.16
			Chloride (Cl)	44	1.25
			Fluoride (F)	0.0	0.00
Calcium (Ca)	57	2.83			
Magnesium (Mg)	9.8	.81	Nitrate (NO_3)	1.0	0.02
Sodium (Na)	26	1.13			
Potassium (K)					
Total		4.86	Total		4.88

	mg/l		
		Specific conductance (micromhos at 25° C)	464
Dissolved solids: Calculated	258	pH	7.7
Residue on evaporation at 180° C		Color	5
Hardness as $CaCO_3$	182		
Noncarbonate	10		
Alk as CaCo3	172		

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