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CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

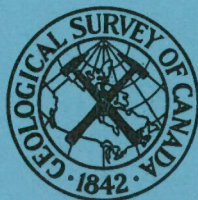
GEOLOGICAL SURVEY OF CANADA
TOPICAL REPORT NO. 117

MACKENZIE RIVER DRAINAGE BASIN
DAM SITE INVESTIGATION

SITE No. 20

LOWER SEAPLANE DAM SITE
(MAP AND NOTES)

E. B. OWEN



OTTAWA
1966

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Lower Seaplane Dam Site

General Description

Lower Seaplane dam site is located on Flat River in the Northwest Territories about 5 and a half miles downstream from the mouth of McLeod Creek and 65 upstream from the junction of Flat and South Nahanni Rivers. An alternate site known as Upper Seaplane is located about a mile upstream. The Upper site has been described in Topical Report No. 118. Both sites are included on National Topographic Series sheet No. 95E (Flat River), scale 1:250,000, and on Royal Canadian Air Force photograph A12277-207. The geology is described in Geological Survey of Canada, Paper 64-52¹.

The chief purpose of the dam site investigation along Flat River was to locate a site which would provide storage for larger dams on South Nahanni River. As Flat River drops about 18 feet between Upper and Lower Seaplane sites through a narrow steep-walled valley the Lower site is not considered as favourable for storage purposes as the Upper. To provide approximately the same amount of storage the dam at the Lower site would have to be the same height as the Upper plus the additional height necessary to compensate for the drop in the river between the two sites.

Lower Seaplane site was included in the investigation because the 56-foot drop in Flat River through the site area would permit the development of hydroelectric power. The design of the project will probably be influenced by the presence of a former drainage channel or draw of Flat River behind the left abutment. This feature is shown on the accompanying map. The draw is about 2,300 feet long and varies in width from 550 to 800 feet. Its level floor is about 100 feet above the river at its upstream end and 150 feet in the downstream area.

1

Gabrielse, H., Roddick, J.A. and Blusson, S.L.: Flat River, Glacier Lake and Wrigley Lake, District of Mackenzie and Yukon Territory, Geol. Surv. Can., Paper 64-52, 1965.

One scheme for the Lower site would be to construct a dam across Flat River in the upstream part of the site area and divert the water through the draw to a power house located at its downstream end. Consequently considerable attention was given to the draw area during the field investigation. Two seismic lines were located on the floor of the draw to determine the thickness of overburden and representative samples of the soil were taken from seismic shot holes and sent to the soils laboratory of the Water Resources Branch in Vancouver for analyses. The grain size analyses curves which accompany this report were prepared by the Water Resources Branch.

Due to the short distance between the sites sources of construction materials would be the same. As well, the mineral content of the river water and of groundwater encountered during excavation and the occurrence of frozen soil would all be similar.

Description of Soil Samples taken from Seismic Shot Holes located on the Floor of the

Draw, Lower Seaplane dam site

Sample Number	Location	Description of Material	Group * Symbol	Description of Overburden	Visible Ice	Remarks
12	Shot hole No. 450A, Seismic Line No. 1, 30 inches below ground surface	Sand: poorly graded, no visible stratification, minor silt, numerous partly weathered pebbles to 3 inches chiefly granitic and quartzitic.	SP - SM	None	Not frozen	In the field this material is a poorly graded, highly weathered, sandy gravel containing granitic and quartzitic boulders up to 14 inches, it covers a large part of the floor of the draw, permeability computed in the field is 6.17 feet per day.
13	Shot hole No. 250A, Seismic Line No. 1, 36 inches below ground surface	Silt: sandy, non-plastic	ML	About 24 inches of sample No. 12	Frozen, ice visible only with hand lens	A till-like material containing a few angular rock fragments to 3 inches, flows when thawed.

* Unified Soil Classification System

WATER RESOURCES BRANCH
GRAIN SIZE ANALYSIS

U.S. STANDARD SIEVES

HYDROMETER ANALYSIS

SCREEN SIZE IN INCHES

1 1/2
3/4
3/8

4
8
16
30
50
100
200

0.42
0.075

Particle size in millimeters

GRAVEL
SAND
FINE
MEDIUM
COARSE

Site Lower Seaplans Site

Depth

Sample #12

Plotted

PLAN REVISED 24-10-62

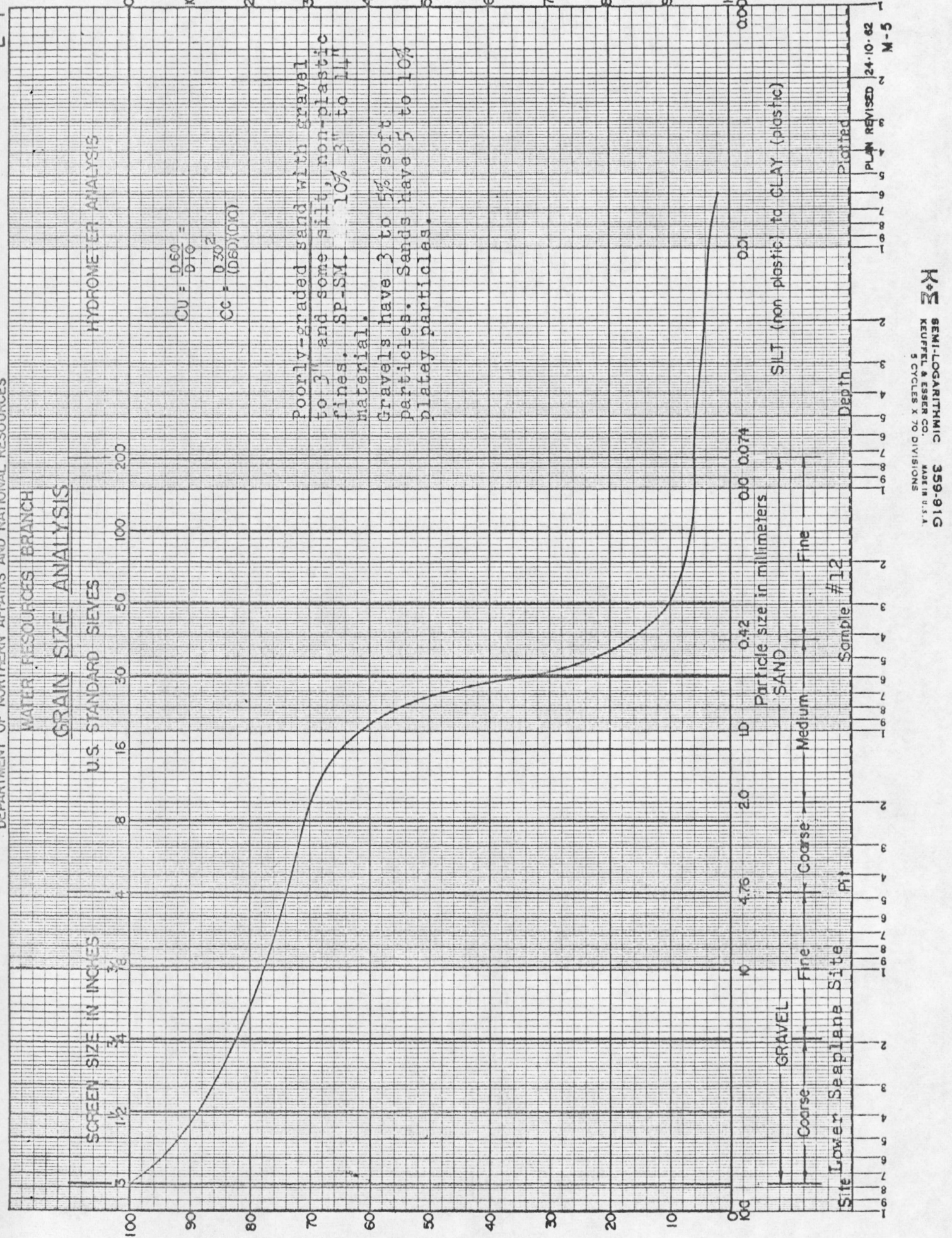
M-5

Percent Passing

Percent Retained

$CU = \frac{D_{60}}{D_{10}} =$
 $CC = (D_{60})^{0.6}$

Poorly-graded sand with gravel to 3" and some silt, non-plastic fines. SP-SM. 10% 3" to 1 1/4" material.
Gravels have 3 to 5% soft particles. Sands have 5 to 10% platy particles.



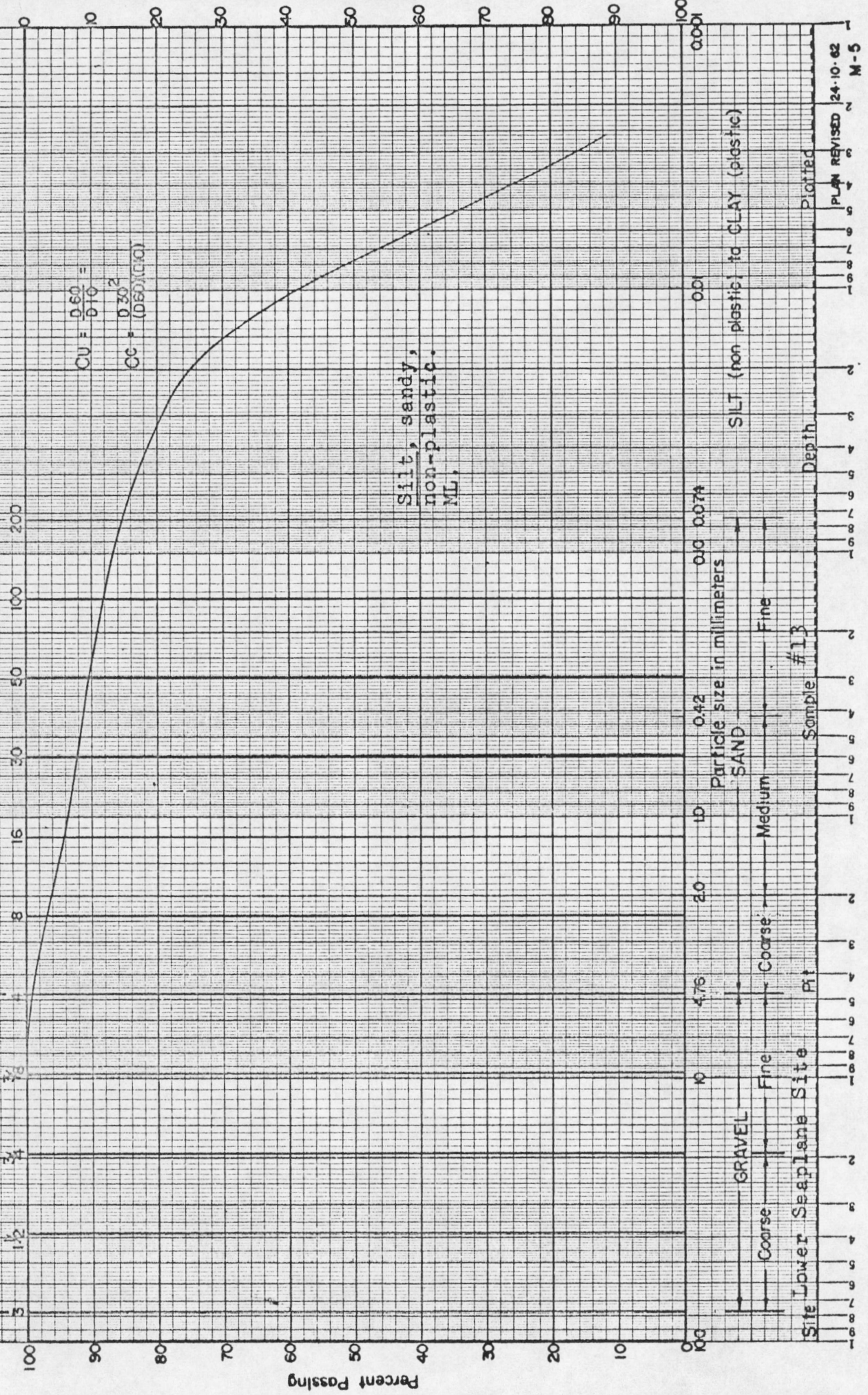
WATER RESOURCES BRANCH

GRAIN SIZE ANALYSIS

HYDROMETER ANALYSIS

U.S. STANDARD SIEVES

SCREEN SIZE IN INCHES



Chemical Analyses of Groundwater from Springs at
Lower Seaplane Dam Site
(parts per million)

Location	Date	Discharge	pH	SiO ₂	Ca	Mg	Na	K	Fe	CO ₃	HCO ₃	SO ₄	Cl	F	NO ₃	Turbidity	Hardness as CaCO ₃
Base of right abutment, about 5 feet above the river	July 14, 1964 Temp. 51°F	low	7.3	22	151	33	2.0	3.5	0.31	0	563	45.3	0.2	0.48	0	0.2	512
Centre of right abutment about 125 feet above the river	July 14, 1964 Temp. 63°F	low	7.3	21	96	34	1.9	5.2	0.05	0	391	60.4	0.3	0.38	0.1	0	379
Centre of right abutment, about 125 feet above the river, 70 feet downstream from previous sample	July 15, 1964 Temp. 63°F	low	7.4	22	152	33.6	2.0	3.2	2.0	0	558	61.3	0.1	0.43	0.2	1	518

Chemical Analysis of Flat River Water at
 Lower Seaplane Dam Site
 (parts per million)

Location	Date	Discharge	pH	SiO ₂	Ca	Mg	Na	K	Fe	CO ₃	HCO ₃	SO ₄	Cl	F	NO ₃	Turbidity	Hardness as CaCO ₃
Centre of river, 12 inches below water surface	July .15 1964 — Temp. 56° F.	low	7.6	5.4	31.5	5.2	1.0	0.7	0.69	0	94.1	21.8	0.1	0.13	0	0.4	99.9

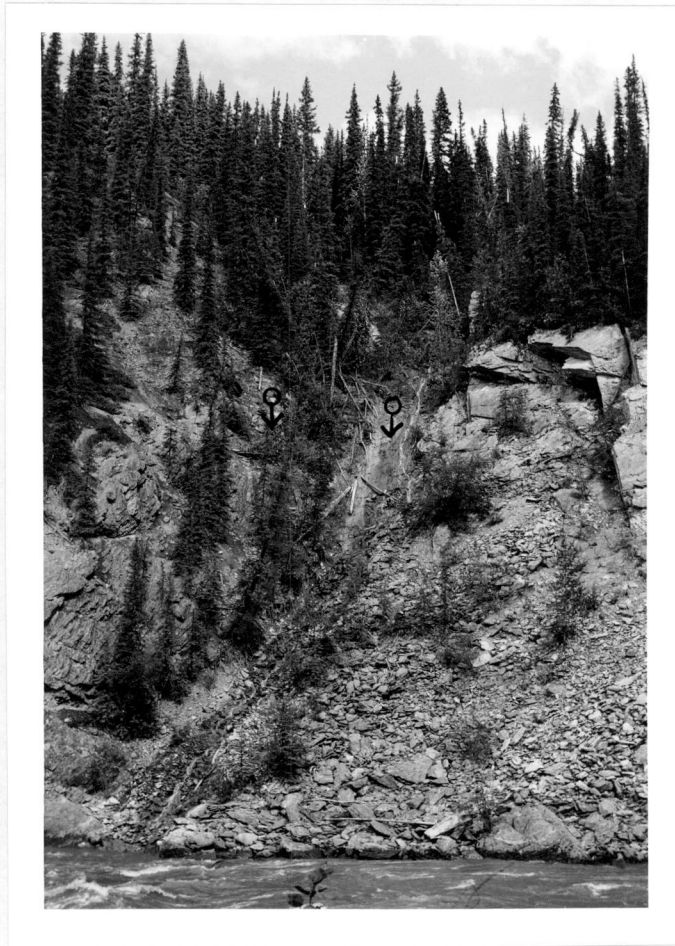


Plate 1

Fine-grained, dark grey, argillaceous limestone exposed along the right side of Flat River at Lower Seaplane dam site; ♀ indicates springs the groundwater from which has been analysed for its mineral content; the springs are about 125 feet above the river.

G.S.C. 5-8-64

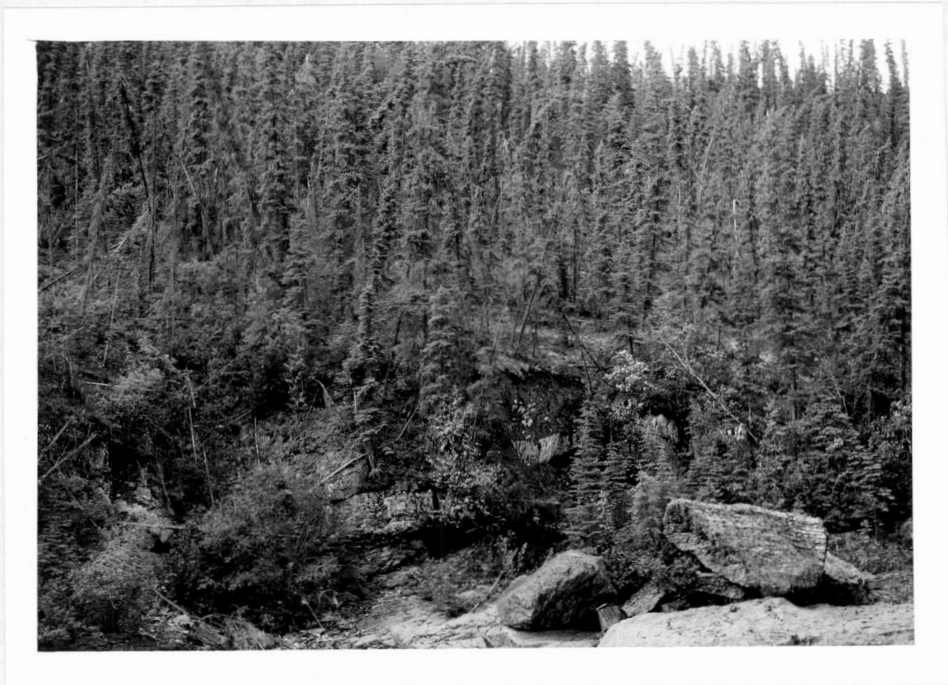


Plate 2

View of wooded slope along the left side of Flat River which ascends to a height of about 280 feet above the river and then descends into the draw; in general bedrock is exposed only in the cut bank along the edge of the river.

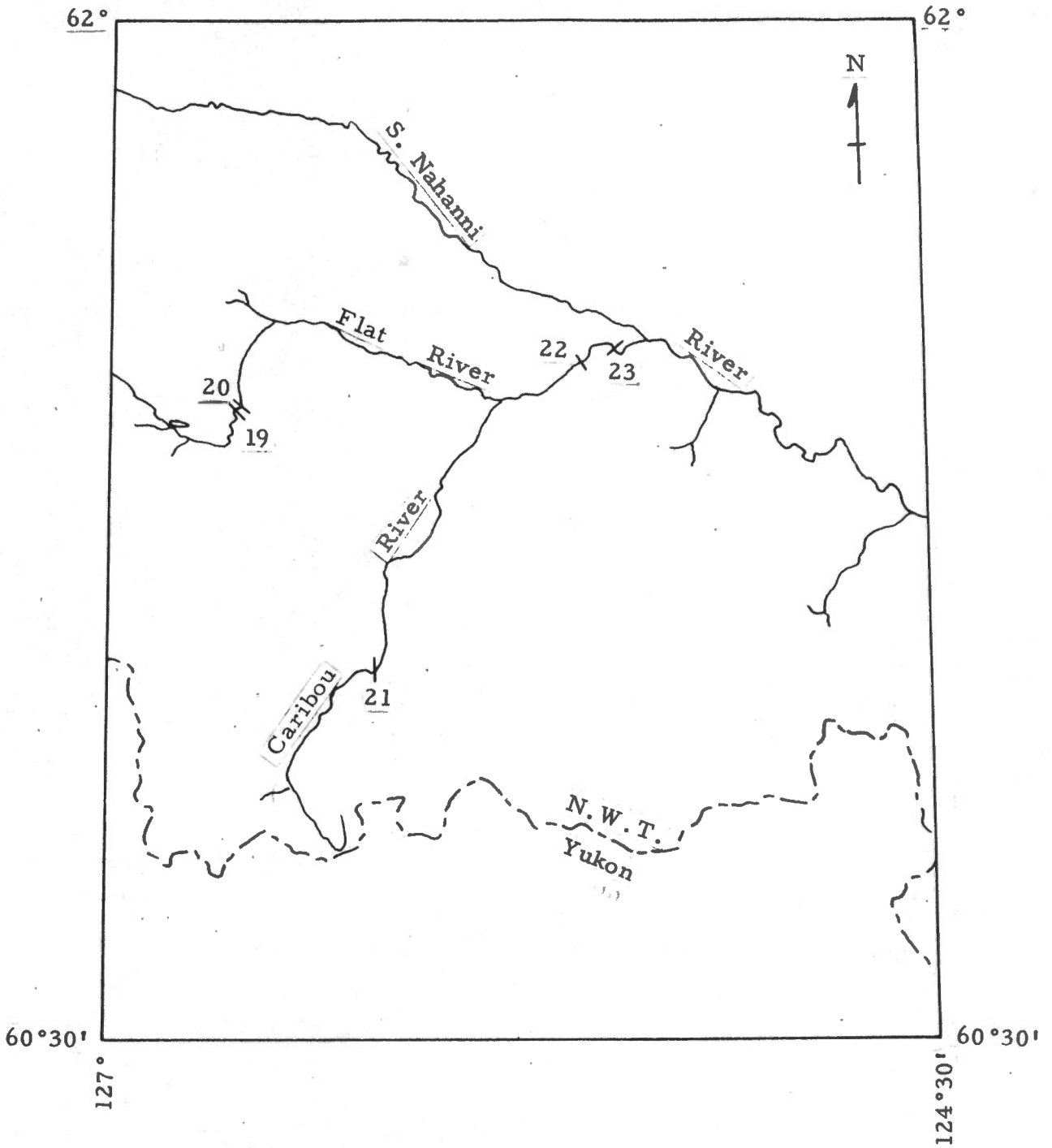
G.S.C. 10-4-64



Plate 3

View looking downstream through the lower half of the dam site area.

G.S.C. 9-3-64



LOCATION OF PROPOSED DAM SITES
MACKENZIE RIVER DRAINAGE BASIN

Scale: 1:1,000,000

<u>Site No.</u>	<u>Name</u>	<u>River</u>
19	Upper Seaplane	Flat
20	Lower Seaplane	Flat
21	Caribou	Caribou
22	Upper Flat Canyon	Flat
23	Lower Flat Canyon	Flat