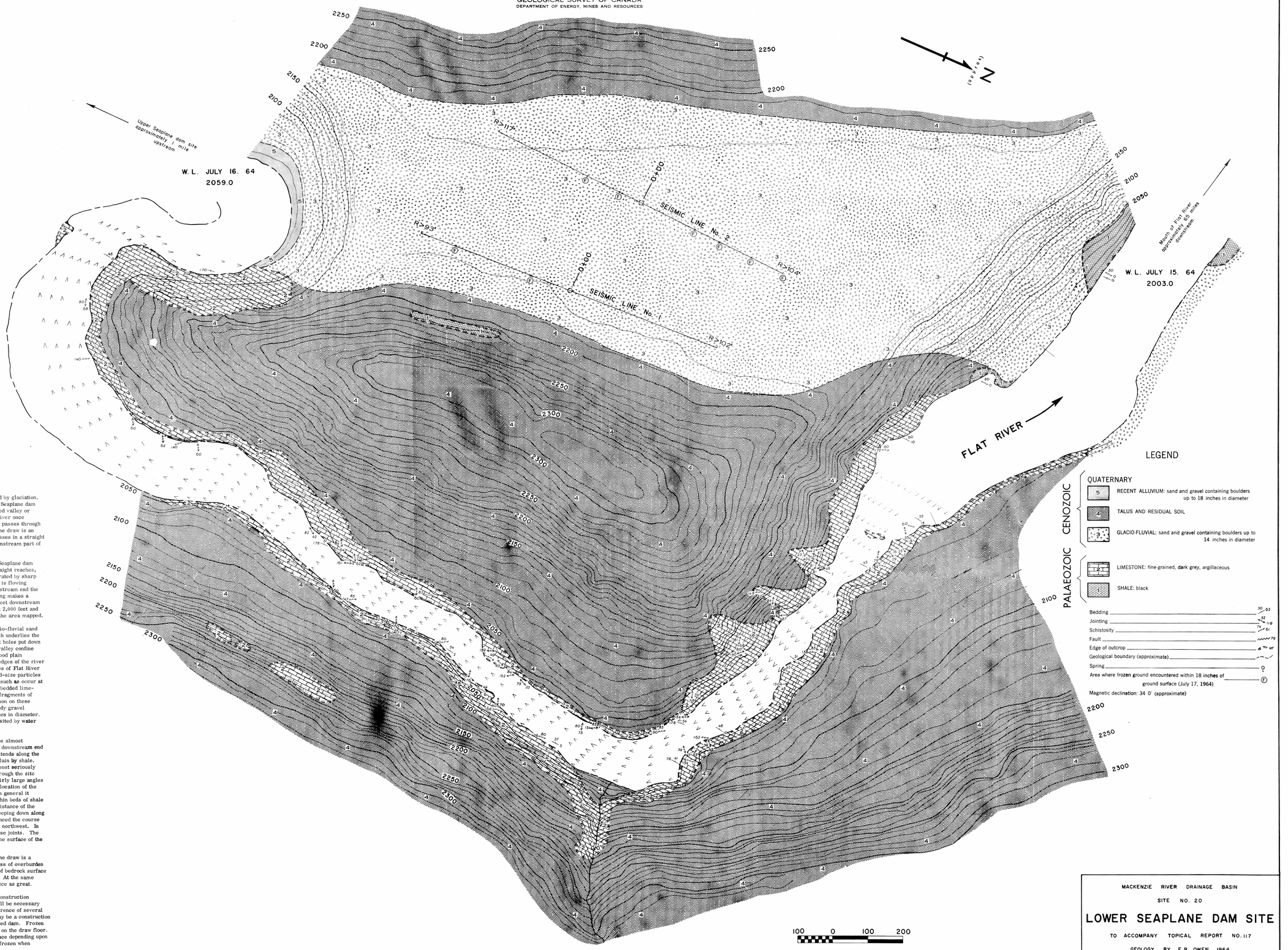
GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES



LEGEND

QUATERNARY

CENOZOIC

5 RECENT ALLUVIUM: sand and gravel containing boulders up to 18 inches in diameter

4 TALUS AND RESIDUAL SOIL

GLACIO-FLUVIAL: sand and gravel containing boulders up to 14 inches in diameter

PALAEOZOIC

LIMESTONE: fine-grained, dark grey, argillaceous

SHALE: black

Bedding 30 63
Jointing 52 119
Schistosity 74 61
Fault ~~~~ 70
Edge of outcrop
Geological boundary (approximate)
Spring
Area where frozen ground encountered within 18 inches of ground surface (July 17, 1964) (F)
Magnetic declination: 34 0' (approximate)

Descriptive Notes

The area drained by Flat River has been greatly altered by glaciation. Among the manifestations of these changes in the vicinity of Lower Seaplane dam site is the presence of disrupted drainage indicated by a deeply filled valley or draw some 1,200 feet west of the left abutment, through which the river once flowed, and by two other former channels of the river, one of which passes through Seaplane Lake, that occur two and three miles to the northwest. The draw is an extension of the valley of Flat River upstream from the site. It passes in a straight line behind the left abutment and rejoins the river valley in the downstream part of the site area.

In the section of Flat River in which Upper and Lower Seaplane dam sites are located the course of the river consists of a series of straight reaches, where it flows parallel to some prominent bedrock structure, separated by sharp bends which may exceed 90 degrees. At the Lower site Flat River is flowing rapidly through a narrow valley with steep, rocky sides. At the upstream end the river which is flowing in a northerly direction parallel to the bedding makes a S-turn to the east to follow a prominent joint set. A few hundred feet downstream it swings to the north to parallel the bedding for a distance of about 2,000 feet and then turns west to follow the jointing to a point beyond the limit of the area mapped.

Overburden consists of Recent alluvium, talus and glacio-fluvial sand and gravel. A silty, sandy, till-like material (sample No. 13) which underlies the glacio-fluvial deposit was exposed only in some of the seismic shot holes put down on the floor of the draw. In general the steep walls of Flat River valley confine the river to its channel and thus have prevented the formation of flood plain deposits. Recent alluvium is exposed only at low water along the edges of the river and in a few scattered bars. A thin mantle of talus covers the sides of Flat River valley. The talus consists of bedrock fragments ranging from sand-size particles to platy, sharp-edged boulders. There is a lack of large boulders such as occur at Upper Seaplane site. This is probably due to the absence of thick-bedded limestone. The talus on the sides of the draw consists of small, platy fragments of black shale mixed with black, silty residual soil. Slides are common on these slopes. The floor of the draw is covered with a thin deposit of sandy gravel (sample No. 12) containing boulders, chiefly granitic, up to 14 inches in diameter. This material is probably glacio-fluvial in origin having been deposited by water flowing from a melting ice mass.

Thin-bedded, dark grey argillaceous limestone outcrops almost continuously along the sides of Flat River with the exception of the downstream end where black shale is exposed. The contact between these rocks extends along the east (right) side of the draw with the result the draw area is underlain by shale. Bedding, jointing, and schistosity are the structures which would most seriously affect the competency of bedrock. As the direction of the river through the site varies considerably and the strike of the structures intersect at fairly large angles construction problems resulting from them would depend upon the location of the dam along the river. Bedding is the most prominent structure. In general it strikes in a northerly direction and dips 35 to 90 degrees west. Thin beds of shale interstratified with the limestone could appreciably reduce the resistance of the rock to sliding along the strata especially if lubricated by water seeping down along the jointing. Joints are numerous. The joint set which has influenced the course of the river strikes in a northeast direction and dips steeply to the northwest. In some places open fractures up to 4 inches in width occur along these joints. The schistosity strikes in a southeast direction and dips vertically. The surface of the highly schisted rock is usually soft and weathered.

The talus covering the sides of Flat River valley and the draw is a thin deposit. Its thickness should not exceed 10 feet. The thickness of overburden beneath the river is estimated to be about 40 feet. The elevation of bedrock surface beneath the floor of the draw is much higher than under the river. At the same time the thickness of overburden in the draw area is more than twice as great.

Bedrock and overburden at the site have little use as construction materials. As at Upper Seaplane site considerable prospecting will be necessary to locate materials suitable for construction purposes. The occurrence of several springs on the sides of Flat River valley indicates groundwater may be a construction problem and grouting will be necessary in abutments of the proposed dam. Frozen soil was encountered in several shot holes along the seismic lines on the draw floor. The frost line existed between 18 and 36 inches below ground surface depending upon the thickness of the overlying vegetation. The till was invariably frozen when encountered. It became fluid when thawed.

MACKENZIE RIVER DRAINAGE BASIN

SITE NO. 20

LOWER SEAPLANE DAM SITE

TO ACCOMPANY TOPICAL REPORT NO. 117

GEOLOGY BY E.B. OWEN, 1964