GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

SHEET 105 M/4

LEGEND

CENOZOIC — QUATERNARY — PLEISTOCENE AND RECENT

7 — ***Surficial deposits***: **7a**, *mainly till and talus*; **7b**, *glacial outwash*; **7c**, *kame moraine deposits*; **7d**, *alpine moraine deposits*; **7e**, *stratified silts*; **7f**, *fluviatile sand and gravel*

MESOZOIC (?)

6 — *Quartz porphyry, granite porphyry, rhyolite*

PALÆOZOIC (?)

5 — *Diorite, gabbro, greenstone*

PRECAMBRIAN

YUKON GROUP (1-4)

4 — *Quartz-mica schist, quartzite, chloritic schist, limestone*

3 — *Quartz-mica schist, graphitic schist; quartzite, limestone*

2 — *Quartzite; graphitic schist, quartz-mica-chlorite schist, limestone*

1 — *Quartz-mica schist, graphitic schist, thin-bedded quartzite, phyllite*

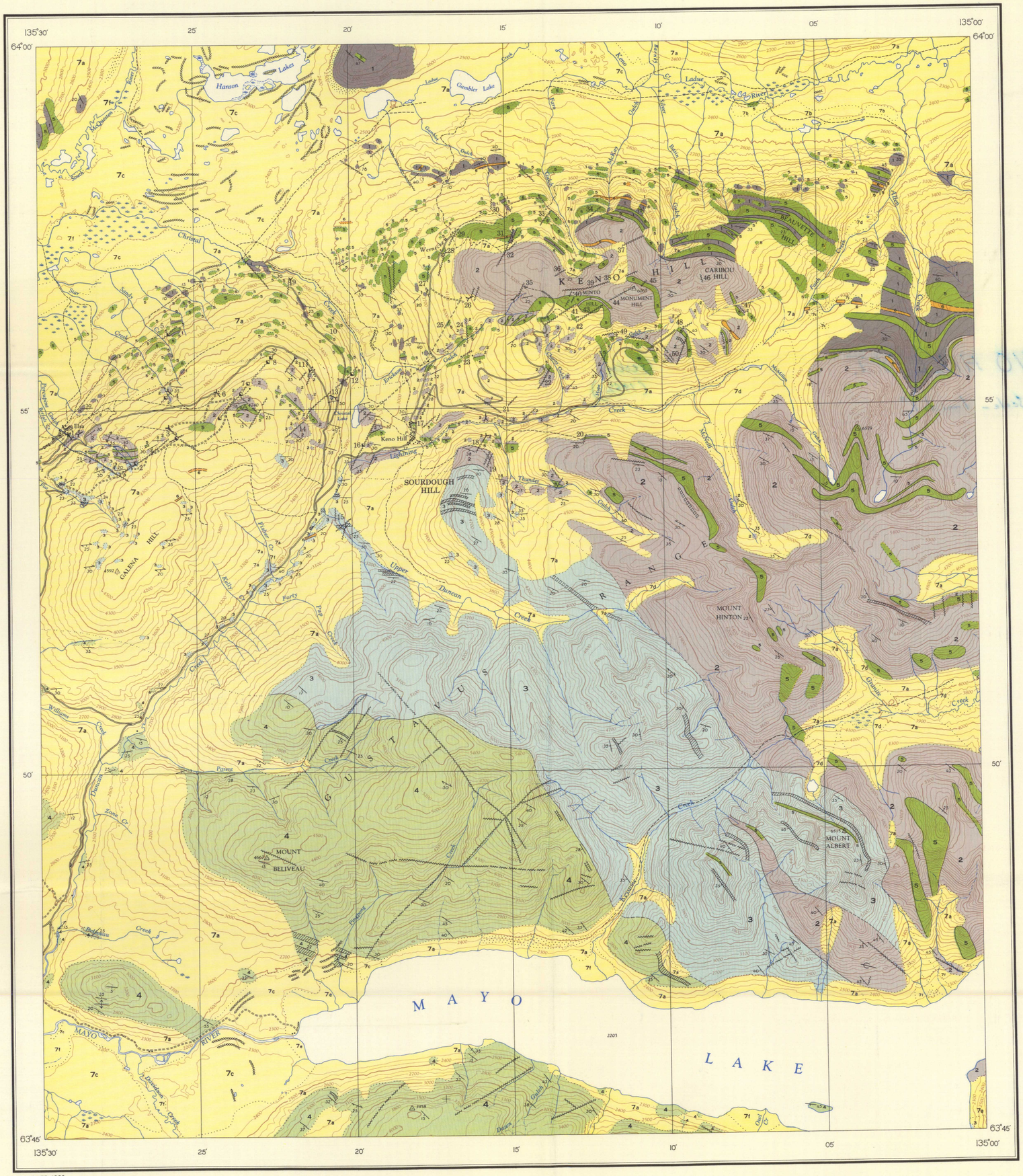
Geological contact projected
Bedding (horizontal, inclined, vertical)
Schistosity (inclined)
Fault (defined, approximate, assumed)
Anticlinal axis (defined)
Glacial striæ
Limestone
Esker
Kame terrace
Shaft
Adit
Mine or prospect 2

Geology by E. D. Kindle, 1952-1954

INDEX TO MINES AND MINERAL PROSPECTS

SILVER-LEAD-ZINC-CADMIUM DEPOSITS

1 Elsa (United Keno Hill Mines Limited)
2 Coral and Wigwarn (United Keno Hill Mines Limited)
3 Arctic and Mastiff (United Keno Hill Mines Limited)
4 No Cash (United Keno Hill Mines Limited)
5 Cream
6 Hector (United Keno Hill Mines Limited)
7 Calumet (United Keno Hill Mines Limited)
8 Dragon
9 Tyee-Rocket (Yukeno Mines Limited)
10 Bluebird
11 Rio-Keno (Galkeno Mines Limited)
12 Tin Can
13 Rico
14 Eagle
15 Overtime (United Keno Hill Mines Limited)
16 Flame and Moth (United Keno Hill Mines Limited)
17 Onek (United Keno Hill Mines Limited)
18 Whipsaw-Tundra (Bellekeno Mines Limited)
19 Ram (Mayo Mines Limited)
20 Homestake (Lustre Yukon Mines Limited)
21 Thunderbird-Greta (Mount Keno Mines Limited and Amco Exploration Inc.)
22 Vanguard
23 Dorothy (Ankeno Mines Limited)
24 Croesus No. 1
25 Kijo
26 Black Cap (Brewis Red Lake Mines Limited)
27 Blue Rock (Klondike-Keno Mines Limited)
28 Sadie-Friendship (United Keno Hill Mines Limited)
29 Ladue (United Keno Hill Mines Limited)
30 Lake
31 Highlander-Bunny
32 Lucky Queen
33 Stone (Jersey Yukon Mines Limited)
34 Spot
35 Shamrock (United Keno Hill Mines Limited)
36 Gambler
37 Silver Basin
38 Ladue Fraction
39 Nabob (Comstock Keno Mines Limited)
40 Roulette (No. 9) (United Keno Hill Mines Limited)
41 Keno (No. 6) (United Keno Hill Mines Limited)
42 Porcupine (United Keno Hill Mines Limited)
43 Minto (Comstock Keno Mines Limited)
44 Goldhill No. 2
45 Gold Queen
46 Caribou
47 Faith
48 Divide
49 Helen Fraction
50 Devon



PUBLISHED, 1962
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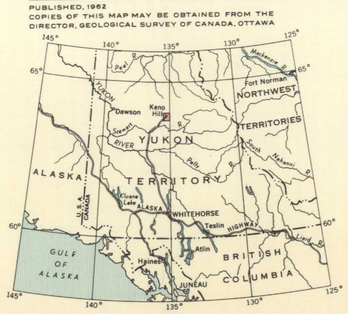

MAP 1105A

GEOLOGY

KENO HILL
YUKON TERRITORY

Scale: One Inch to One Mile = 1/63,360
Miles
1 ½ 0 1 2 3

REFERENCE

Main road and buildings
Other roads
Trail
Horizontal control point
Intermittent stream
Marsh
Contours (interval 100 feet) 2500
Height in feet above mean sea-level 4739

Base-map prepared by the Army Survey Establishment, R. C. E., Department of National Defence, 1951

Cartography by the Geological Survey of Canada, 1960

Air photographs covering this map-area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa, Ontario

Approximate magnetic declination, 34° 04' East

DESCRIPTIVE NOTES

Elsa and Keno Hill mining camps are in Mayo mining district in central Yukon, about 220 miles north of Whitehorse. The area is reached from Whitehorse by a gravelled highway with three river ferries. The nearest airfield is at Mayo Landing, 32 miles by road southwest of Elsa.

Keno Hill map-area lies in the Stewart Plateau which is characterized by individual mountains and small ranges separated by broad deep valleys. The main part of the Gustavus Range lies in the map-area and is a typical isolated, block-like feature, bounded by big valleys such as those of South McQuesten and Keno-Ladue Rivers. North of these valleys lies Davidson Range, whose lowest slopes are on the north edge of the map-area.

All parts of the area except the highest peaks were glaciated late in the glacial epoch and before that even the peaks may have been covered. Kame terraces up to elevations of 3,900 feet, along the south slopes of Mount Albert, suggest that the ice remained below 4,000 feet in this valley throughout its last major advance. The ice moved westerly and scoured the valleys with that general trend.

Valleys normal to its course or of constricted form escaped scouring and became areas of deposition for glacial drift.

Some rearrangement of the drainage was caused by the blocking of streams by ice or glacial deposits. For example, Lightning and Upper Duncan Creeks, and possibly the main Duncan Creek as far down as Forty Pup, flowed through Christal Creek valley to South McQuesten River. Lesser drainage changes occurred along Duncan, Lightning, Parent and Christal Creeks where the pre-glacial or interglacial channels were buried and the streams have cut canyons through rock.

The Yukon group is divided into four map-units (1, 2, 3, and 4) on the basis of general lithological differences.

In map-unit 1, the thin-bedded quartzite weathers brown, the graphitic and quartz-mica schists are mainly black and the quartz-mica-chlorite schist greenish.

In map-unit 2, thickly bedded, blocky fracturing, grey and white quartzite beds are intercalated with minor bands of graphitic, quartz-mica, and quartz-mica-chlorite schists. Much of the quartzite is micaceous particularly towards the base of the map-unit. The quartzite part of the unit thins in a westerly direction, probably as a result of several of the lower quartzite beds changing along the strike to schist.

Map-unit 3, in contrast to map-unit 2, is dominantly schist. Quartz-mica varieties are grey to brown and yellow and chloritic varieties greenish. Dark graphitic schists with limestone lenses lie mainly in the lower part of the formation. The limestone lenses on Sourdough Hill from bottom to top are 6, 10, 30, 8, and 20 feet thick, respectively.

Brownish weathering quartz-mica schist and light coloured schistose quartzite, with beds of massive, white quartzite form the bulk of map-unit 4. Some of the quartzite is coarse, formed of grit to pea-sized quartz grains. The boundary between map-units 3 and 4 is marked by a change from graphitic schist to quartzite. Lenses of limestone up to 25 feet thick are present locally and one persistent bed occurs a few hundred feet above the base. This bed is 50 feet thick along the first stream east of the mouth of Keystone Creek but thins to 10 feet in places on the mountain to the northwest of the mouth of Keystone Creek.

Drawn out lenticular quartz veins, stringers, and pods are a characteristic feature of most of the Yukon group rocks. Most of these lie parallel with the foliation but others trend across it and are highly contorted and broken.

Some of the schists in the map-units described above are glossy and resemble phyllites.

In the map-area strata of the Yukon group form part of the southern limb of an anticline whose axial plane trends easterly along South McQuesten valley, south of Hanson Lakes, and then swings southeasterly at Keno Hill towards Mayo Lake. Small drag-folds with limbs that measure only a few inches across are numerous and a few are from 10 to 15 feet across. The axial planes of the drag-folds lie parallel with the strike and dip of the enclosing quartzites and schists and roughly parallel with the axial plane of the main anticline. They indicate the latter to be overturned to the north and northeast. Secondary cleavage intercepts the bedding along lines that plunge about 30 degrees southeasterly in some of the minor folds. They mark a secondary less severe deformation.

The total thickness of the strata in the map-area is uncertain, but may be some tens of thousands of feet. Map-unit 2 has an approximate thickness of 7,500 feet along a line of section from Sourdough Hill to the north side of Monument Hill. Map-unit 3 is about 6,500 feet thick along the course of Keystone Creek.

Sill-like bodies of diorite and greenstone (5) intrude map-units 1, 2, and 3 and are most numerous in the two lower units. Thick bodies of these intrusions are coarsely crystalline, whereas thin bodies are finely crystalline and are generally sheared and altered, in part at least to greenstone.

Dykes and sills of rhyolite, quartz porphyry, and granite porphyry (6) that cut the diorite and older rocks are probably related to granites that outcrop north of the east end of Mayo Lake, northwest of Hanson Lake, and at Dublin Gulch. A dyke of biotite lamprophyre at the Yukeno mine may also be related. These are all fresh, massive rocks and their unaltered appearance suggests a Mesozoic or younger age.

Most of the ore deposits listed occur along northeasterly striking fault fissures that dip steeply southeast. The most productive and persistent veins are in the quartzite formation and many of them lie near the contacts of the quartzite with overlying and underlying bands of graphitic schist. All quartzites known to contain important deposits belong to map-unit 2, but the quartzites of other map-units are also worth investigating. Some important orebodies have been found where greenstone is faulted against schist and a few vein deposits occur where both hanging- and foot-wall are schist or greenstone. Many of the veins are offset by cross-faults and in some cases ore has been deposited along the cross-faults as well as along the main northeasterly fault system. Most of the ore shoots are from 1 foot to 6 feet wide, but in the Hector mine one ore shoot is 35 feet wide on the 650-level.

Galena, sphalerite, and freibergite are the principal ore minerals. The galena normally carries from 60 to 200 ounces of silver a ton but in places, where freibergite is present, the ore may carry as much as 2,000 ounces. The gangue is coarsely crystalline manganiferous siderite and quartz, with minor quantities of calcite and, rarely, barite. Most of the veins contain in addition some pyrite, arsenopyrite, gold, and chalcopyrite and in a few deposits there are small amounts of ruby silver ore (pyrargyrite and proustite). Post ore fault movements in the Bellekeno mine brecciated the sulphide deposits and, in this breccia, circulating ground waters have redeposited the lead and zinc carbonates, cussite and smithsonite, as a coating or cement about the primary sulphides.

In 1954 the Elsa mill treated 180,249 tons of ore, most of which came from the Hector-Calumet mine (United Keno Hill Mines Limited), the chief mine in the district. The mill heads averaged 34.67 ounces silver a ton, 9.01 per cent lead, and 7.98 per cent zinc. The zinc contained a little under 1 per cent of cadmium.

The map-area is largely covered by overburden except on the northerly slopes and mountain summits. This is particularly true of the two main productive hills where discoveries, following the original discovery of the Silver King and Keno mines, have mostly been made by tracing vein float to its source by trenching. The black weathering manganiferous siderite, a characteristic gangue mineral of the veins, has been a guide. Commonly the float travels downward by gravity along bedrock from its source. Where glacial scouring was marked, float was distributed by the movement of the ice and the source should be looked for in the direction from which the ice moved. The ice, like the unglaciated float, also moved downhill, but in places the course followed along hillsides may have had a grade as low as 200 feet per mile.

The neighbourhood of surface conglomerates that have been cemented by limonite is also a likely place to prospect. These conglomerates are believed to owe their iron cement to the leaching of iron sulphides. One of these occurs at elevation 3,100 feet along the most easterly stream in the map-area entering Mayo Lake from the north.

Placer gold has been found in most streams in the map-area and was mined, generally on a small scale, on the main stream of Duncan Creek up to and during the thirties, but the quantity of gold recovered was small. Shafts were sunk to depths of over 100 feet and in one case to 130 feet without reaching bedrock along lower Duncan Creek. In each case work was stopped because of excessive flows of water from the unfrozen gravel.

Value of placer gold produced between 1898 and 1915 at Duncan Creek was $55,000, and at Lightning Creek was reported to have been $2,000. Thunder Gulch was mined in the late thirties and early forties. Small amounts of gold have also been recovered from Davidson Creek and several of the streams tributary to Mayo Lake, including Dawn Gulch and Owl Creek within the map-area, and Anderson, Steep, and Ledge Creeks a little south of its border.

Placer deposits may lie in the unexplored, deeply buried, pre- or inter-glacial channels of some of the creeks already worked, such as Duncan and Lightning Creeks, and improvements in prospecting and mining methods may ultimately make them available.

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