

TOODOGGONE RIVER 94E**TOODOGGONE RIVER AREA**

By N. C. Carter

The Toodoggone River area is 170 miles north of Smithers. Access is by floatplane to one of a number of lakes in the region. The area discussed in this report is triangular in outline, being bounded on the north by the Toodoggone River and on the southeast and southwest by the Finlay and Sturdee Rivers respectively (Fig. 2).

Early mining exploration activity took place in the 1930's when placer claims near the junction of Belle Creek and the Toodoggone River were worked and several small blocks of claims were located to cover lead-zinc mineralization near the head of Thutade Lake. Since 1967, considerable exploration activity has taken place in the area, the principal companies involved being Kennco Explorations, (Western) Limited, Cordilleran Engineering Ltd., and Cominco Ltd. Many of the claim blocks located by these companies were in good standing as of December 31, 1971 and are shown on Figure 2.

The western third of the area shown on Figure 2 is within the Spatsizi Plateau, here an open, gently rolling upland surface dissected by wide valleys. The remainder of the area on Figure 2 is part of the Swannell Ranges of the Omineca Mountains and features a more rugged topography. Treeline extends to about 4,500 feet elevation, with tree cover being confined mainly to some of the major valleys.

Much of the area is underlain by volcanic rocks of the Takla Group of Upper Triassic age, which are intruded by granitic stocks of the Omineca intrusions and overlain by Jurassic and younger volcanic and sedimentary rocks. The oldest rocks of the area, of Cambrian and earlier age, include metamorphic and sedimentary rocks and are confined to the eastern edge of the map-area. The Takla Group rocks are mainly basaltic flows and pyroclastic rocks including augite porphyries and crystal and lapilli tuffs. Associated with these rocks are wedges of white crystalline limestone, up to several hundred feet thick, some of which may be of Paleozoic age. The Omineca intrusions, of Jurassic and Cretaceous age, include medium-grained, equigranular pink to grey quartz monzonites and granodiorites, which are cut by dykes and irregular bodies of salmon-pink monzonite porphyry and some fine-grained aplite. A sequence of volcanic rocks, Jurassic or younger in age, and here informally called the Toodoggone volcanic rocks, unconformably overlie Takla Group in the western part of the area. The Toodoggone rocks, which may be several hundred feet thick, include red to green or grey dacite and latite porphyry flows and pyroclastic rocks. Remnants of these volcanic rocks and small intrusions related to them are known to occur to the southeast. A hornblende separate, from a sample collected from the volcanic sequence 9 miles southeast of Drybrough Peak, yielded a K-Ar age of 186 ± 6 million years. Upper Cretaceous pebble conglomerates and sandstones of the lower Tango Creek Formation of the Sustut Group (Eisbacher, 1971) overlie these volcanic rocks and rocks of the Takla Group near the west boundary of the area shown on Figure 2.

A feature of the Toodoggone area is prominent gossans that are visible for many miles because of the scarcity of vegetation. The gossans are associated with many of the known mineral deposits and are due to the presence of disseminated pyrite in the Takla Group. They are mainly a surface feature, with the depth of oxidation generally not exceeding several inches. In addition to gossans from weathered pyrite others, less prominent, result from the breakdown of mafic minerals in the volcanic rocks.

Several types of mineral deposits are known in the area. Recent exploration activity has been directed mainly to copper and molybdenum mineralization associated with monzonite porphyry dykes, a late phase of the granitic rocks of the Omineca intrusions. Examples of this type of mineralization are found on the Riga, Pine, and Pillar claim groups, where chalcopyrite and lesser molybdenite occur in fractures, as disseminations in the rock matrix, or in quartz veins.

A small skarn deposit occurs on the Castle Mountain Crown-granted claims 4 miles northwest of Black Lake. Several trenches in limestone adjacent to a granitic contact contain small amounts of magnetite, sphalerite, and galena.

The Toodoggone volcanic rocks are host to two types of mineralization. Abundant pyrite and minor chalcopyrite mineralization occurs in limonite-stained Takla volcanic rocks adjacent to several small plugs of feldspar porphyry 4 miles northeast of Black Lake. Near the headwaters of Saunders Creek, a feldspar porphyry breccia was noted containing one-quarter inch blebs of chalcopyrite.

On the Chappelle claim group, a quartz vein containing gold and silver occurs in Takla volcanic rocks. Quartz-feldspar porphyry dykes are intimately associated with the vein and may be related to the Toodoggone rocks which occur nearby. Soil samples, locally containing anomalous amounts of gold and silver, were collected from the Kodah and Lawyers claim groups which are mainly underlain by Toodoggone volcanic rocks.

References: Eisbacher, G. H., 1971, A Subdivision of the Upper Cretaceous-Lower Tertiary Sustut Group, Toodoggone Map-Area, British Columbia, *Geol. Surv., Canada*, Paper 70-68; Holland, Stuart S., 1964, Landforms of British Columbia, A Physiographic Outline, *B.C. Dept. of Mines & Pet. Res.*, Bull. 48; Assessment Reports 1802, 1823, 1825, 1846, 1861, 1886, 1888, 1906, 1940, 1959, 1983, 1984, 2035, 2082, 2083, 2582, 2819, 2822, 3265, 3266, 3343, 3361, 3362, 3366, 3367.

KEMESS (No. 16, Fig. B)

LOCATION: Lat. 57° 04' Long. 126° 44' (94E/2)
 OMINECA M.D. Between 4,500 and 6,500 feet elevation 5 miles east of the north end of Thutade Lake.

CLAIMS: KEMESS, totalling 52.

ACCESS: By fixed-wing aircraft from Smithers, 175 miles.

OWNER: KENNCO EXPLORATIONS, (WESTERN) LIMITED, 730, 505 Burrard Street, Vancouver 1.

METALS: Copper, molybdenum.

DESCRIPTION: Disseminated pyrite and chalcopyrite occur in Takla Group andesitic rocks which have been intruded by syenite and monzonite porphyries. Quartz-sericite-biotite alteration is present.

WORK DONE: Surface diamond drilling, two holes totalling 178 feet on Kemess 12 and 14.

REFERENCE: *B.C. Dept. of Mines & Pet. Res.*, G.E.M., 1969, p. 104.

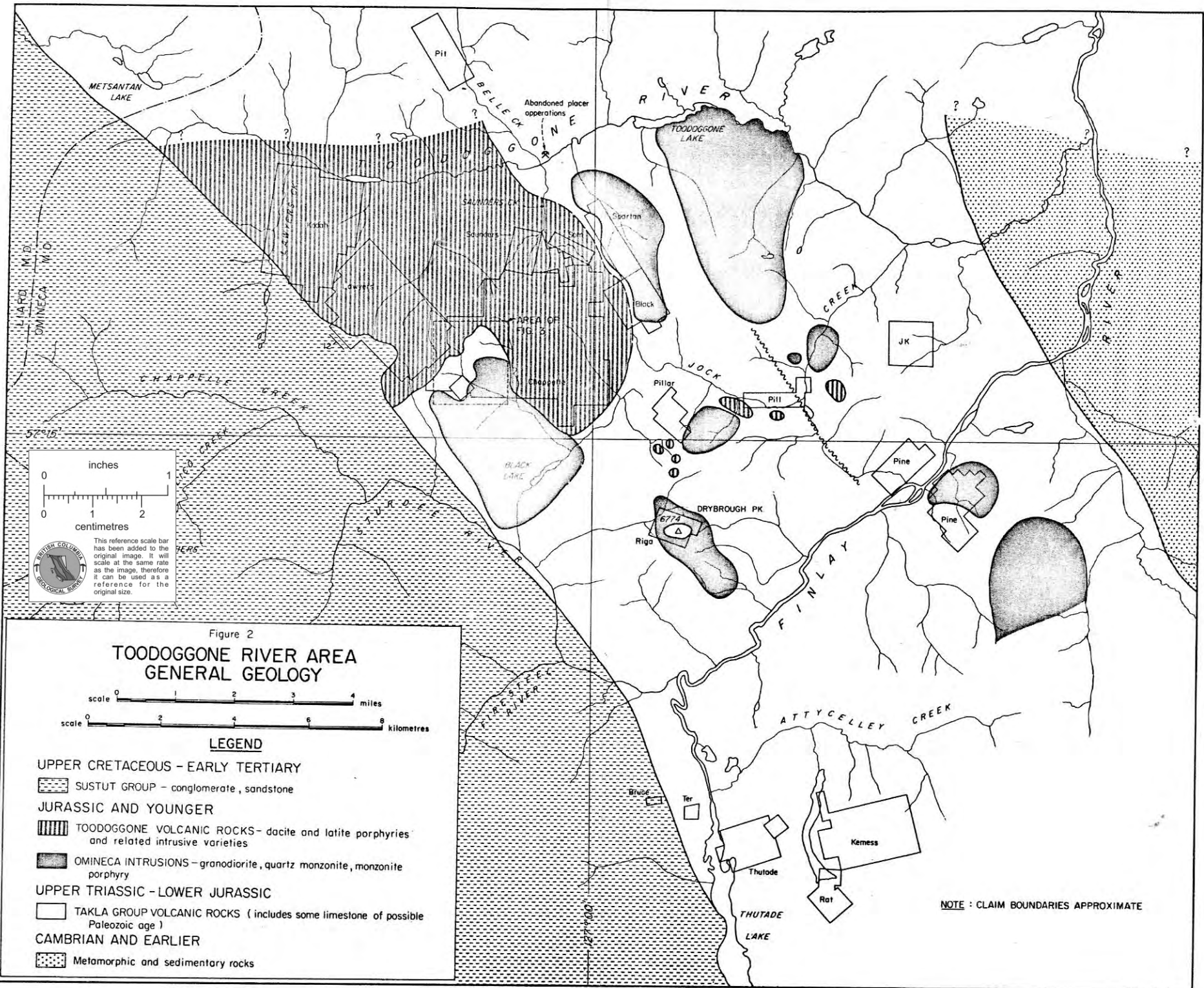
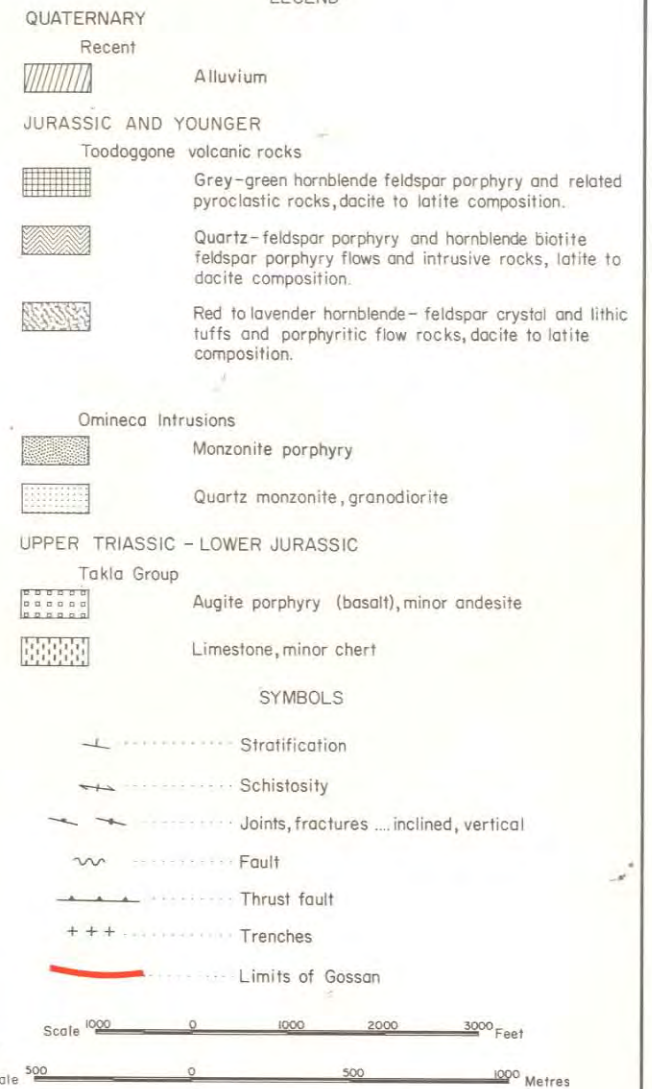
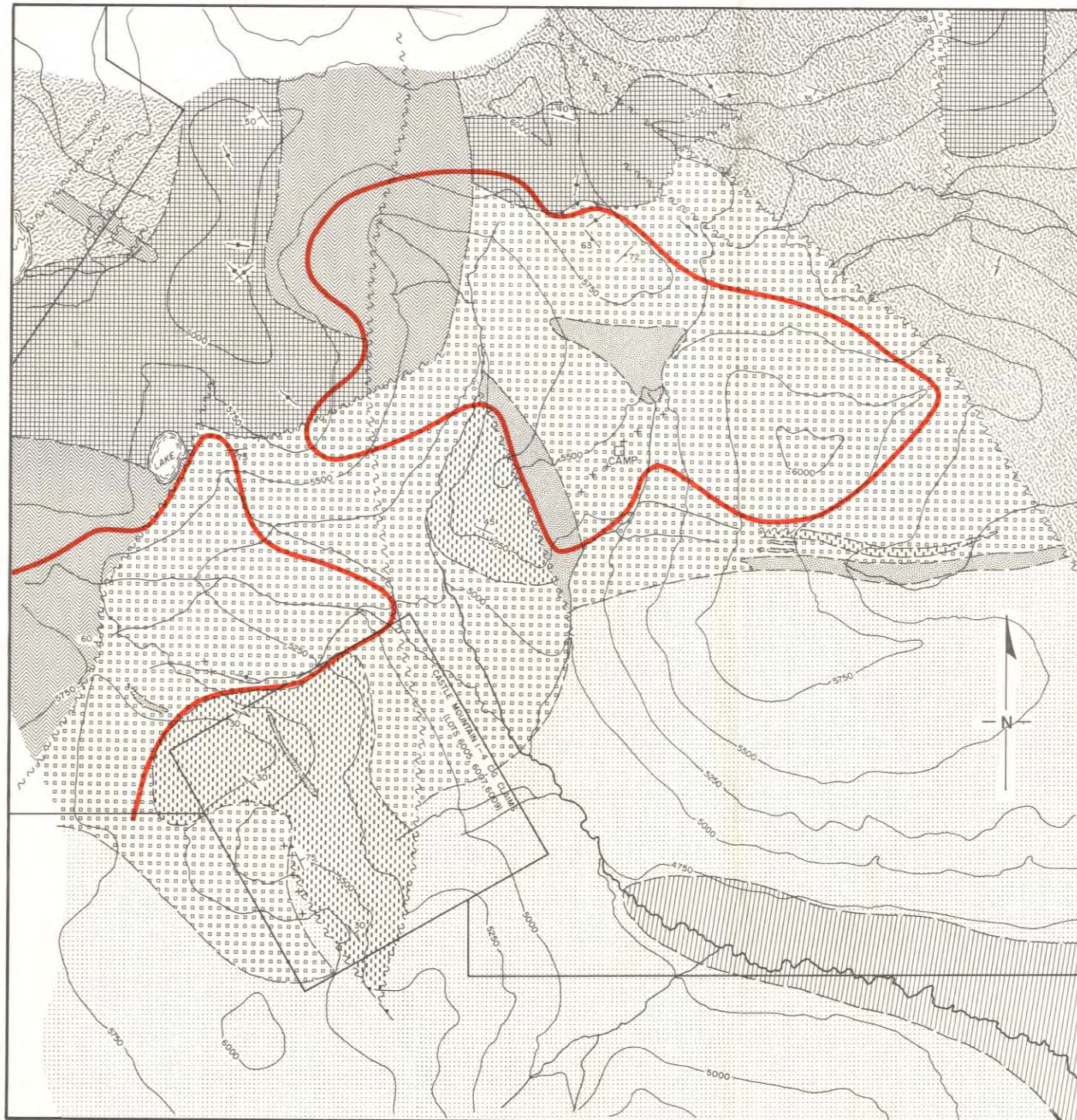
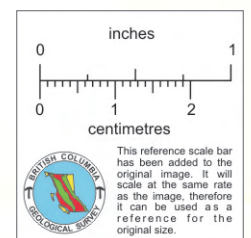


FIGURE 3
 GEOLOGY OF PART OF THE CHAPPELLE CLAIMS
 KENCO EXPLORATIONS, (WESTERN) LTD.
TOODOGGONE RIVER AREA



Base map provided by company
 Geology by N.C. Carter

Note Claim boundaries approximate



PINE (No. 15, Fig. B)

LOCATION: Lat. 57° 12'-15' Long. 126° 38'-44' (94E/2E)
OMINECA M.D. On the southeast side of the Finlay River, 13 miles northeast of Thutade Lake.

CLAIMS: PINE, totalling 54.

ACCESS: By floatplane from Smithers to Pine Lake, 3 miles northeast of the claims.

OWNER: KENNCO EXPLORATIONS, (WESTERN) LIMITED, 730, 505 Burrard Street, Vancouver 1.

METAL: Copper.

DESCRIPTION: Disseminated pyrite and chalcopyrite occur in Takla volcanic rocks and porphyries of the Omineca intrusions.

WORK DONE: Magnetometer and geochemical surveys were made in 1970. Line-cutting, a magnetometer survey covering 8 line-miles, and an induced polarization survey covering 7 line-miles were done in 1971.

REFERENCES: *Minister of Mines, B.C.*, Ann. Rept., 1968, p. 149; *B.C. Dept. of Mines & Pet. Res.*, G.E.M., 1969, p. 103; Assessment Reports 3031, 3119, 3120, 3266.

CHAPPELLE (No. 17, Fig. B)

By N. C. Carter

LOCATION: Lat. 57° 15'-17' Long. 127° 02'-10' (94E/6E)
OMINECA M.D. Seventeen miles northwest of Thutade Lake, between elevations of 4,000 and 7,000 feet.

CLAIMS: CHAPPELLE, totalling 262.

ACCESS: From Smithers by air, a distance of 170 miles.

OWNER: KENNCO EXPLORATIONS, (WESTERN) LIMITED, 730, 505 Burrard Street, Vancouver 1.

METALS: Gold, silver, copper.

DESCRIPTION:

The Chappelle property was located in 1968 to investigate anomalous silt samples collected from the creek which drains the area shown on Figure 3. Soil samples, anomalous in gold and silver, were obtained from a large gossan zone in a cirque at the headwaters of the creek. Abundant quartz float was noted in felsenmeer on a southerly trending spur, and trenching exposed a northeast striking gold and silver bearing quartz vein.

The claim group is within the Spatsizi Plateau and the topography is relatively gentle, with steep slopes occurring only at the heads of cirques. The area is above treeline, with scrub brush found in the valley shown in the southeast part of Figure 3.

The central part of the area is underlain by Takla Group limonite-stained augite porphyries mainly of basalt composition (Fig. 4). Typically, the rock is dark green on fresh surface and has a 25 per cent content of 3 to 5-millimetre euhedral augite phenocrysts.

White crystalline limestone, with some interbedded chert, is generally in fault contact with the Takla volcanic rocks. On the Castle Mountain Crown-granted claims, the limestone is apparently thrust in a southerly direction over the volcanic rocks. Planes of schistosity measured in the limestone represent the limbs of a recumbent isoclinal fold,

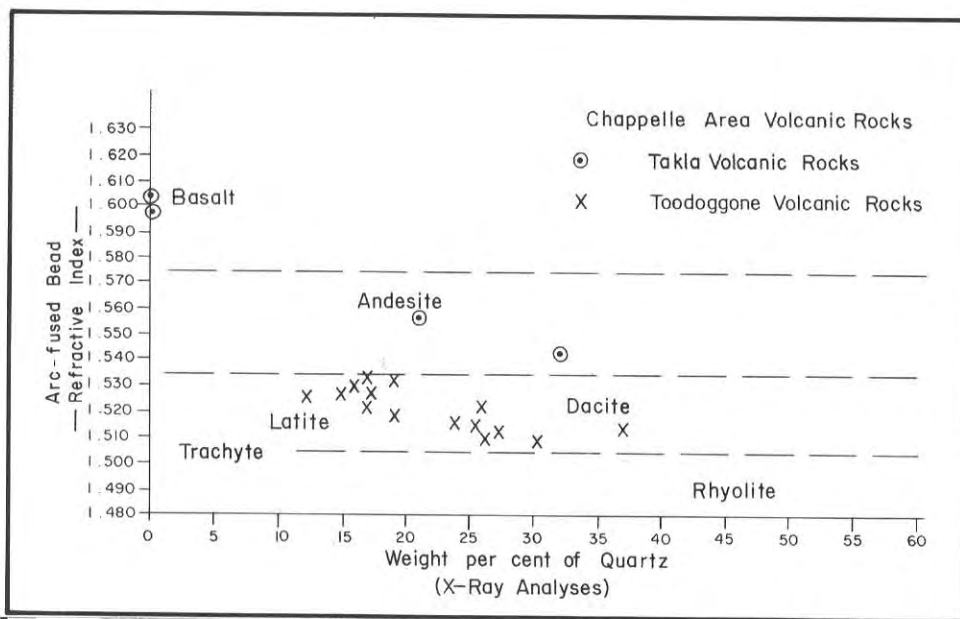


Figure 4. Comparison of refractive index-quartz variation of Takla and Toodoggone volcanic rocks.

which has been warped into a broad open fold, with a northwest striking axis, during a second period of folding probably related to thrust faulting. An area of limestone near the camp is in fault contact with a monzonite porphyry dyke, and a band of limestone on the ridge east of the camp is apparently interbedded with the volcanic rocks, indicating that the limestone is part of the Takla sequence. Some poorly preserved rugose corals were noted in the limestone on the Castle Mountain claims.

The limestones and volcanic rocks are intruded by quartz monzonites, granodiorites, and monzonite porphyries of the Omineca intrusions. The quartz monzonites and the granodiorites occur in an elliptical stock which extends from near the Chappelle camp, as shown on Figure 3, southeasterly for 5 miles. These rocks are pink to grey, medium-grained, equigranular rocks in which plagioclase (oligoclase-andesine) and K-feldspar are nearly equally distributed. Unaltered green hornblende is the chief mafic mineral, and some biotite, partly chloritized, is usually present. Accessory minerals include epidote, apatite, sphene, and metallic minerals.

Monzonite porphyries occur as dyke-like bodies of variable size. The porphyries weather to a distinctive salmon-pink colour and contain 25 per cent of 2 to 4-millimetre euhedral phenocrysts of plagioclase and green hornblende. The fine-grained matrix consists of K-feldspar, plagioclase, minor quartz, and magnetite.

Overlying the Takla Group is a sequence of volcanic rocks, believed to be of Jurassic or younger age, here informally called the Toodoggone volcanic rocks. The sequence consists essentially of hornblende-feldspar porphyry flows and related pyroclastic rocks. Crudely developed columnar jointing noted just west of the map-area indicates that the sequence is generally flat lying. Twenty to 30 per cent of the rock is made up of 2 to 3-millimetre phenocrysts of subhedral, unzoned plagioclase (andesine) and hornblende (altered to a mixture of iron oxides, chlorite, and carbonate), which are set in a fine-grained matrix of plagioclase and K-feldspar. Quartz, generally present in only minor amounts, occurs

locally as rounded phenocrysts. Lapilli-sized fragments were noted in a few areas. Figure 4, a comparison of the refractive index of fused beads and the weight per cent of quartz of a number of these rocks, indicates that they range in composition from dacite to latite.

Although similar in composition, the Toodoggone volcanic rocks within the map-area have been subdivided into three units on the basis of colour and texture (Fig. 3). These include a lower, red to lavender, mainly pyroclastic unit; a middle quartz-feldspar porphyry unit, believed to be intrusive in part; and an upper grey to green hornblende-feldspar porphyry unit. A definite intrusive body, related to the middle unit, forms a step-faulted, northwest striking dyke that cuts rocks of the lower unit near the northwest part of the map-area.

The area is transected by numerous north, northeast, and northwest striking faults that have a topographic expression and define many of the boundaries between the different lithologic units. Two thrust faults were noted; one between the limestones and the volcanic rocks previously described in the southern part of the map-area, and the other near the north boundary, where Takla volcanic rocks are thrust over younger Toodoggone rocks. Fractures are well developed in the Takla volcanic rocks, particularly near the camp.

Limonite staining is widespread in the central part of the area, as outlined on Figure 3, due to the presence of abundant disseminated pyrite in the volcanic rocks and monzonite porphyries. The limestones contain little pyrite and thus are generally free of iron staining.

The principal area of interest is near the camp where a number of trenches expose a northeast striking, vertical to steeply dipping quartz vein. The vein, variable in width from 5 to 15 feet, had been traced for approximately 800 feet by mid-summer. Limited trenching was done on a vein several thousand feet southwest of the camp and in an area to the northwest near the head of the cirque.

As shown on Figure 5, the principal vein is fault bounded along much of its length. Northwest and north striking faults have segmented and offset the vein at several places. Within the vein, hairline carbonate fractures are common, and the main metallic minerals, in approximate decreasing abundance, include fine-grained pyrite, chalcopyrite, bornite, and submicroscopic-size native gold and argentite. Chip samples were taken at several places across the exposed vein width and the results and sample locations are shown on Figure 5.

Takla volcanic rocks adjacent to the vein exhibit varying degrees of hydrothermal alteration which in most intensely developed marginal to faults. The altered zone is up to several hundred feet wide and includes all gradations of alteration, ranging from a light grey variety of augite porphyry, in which the original augite phenocrysts are still visible although altered to a mixture of fibrous clay minerals, to a bleached white variety, in which angular fragments of silicified rock are cemented by veinlets of quartz and minor carbonate. Pyrite is widely distributed in the zone of alteration.

Buff quartz-feldspar porphyry dykes, of pre-mineral age and ranging from 5 to 15 feet wide, are found paralleling the vein in the central trenches. One to 2-millimetre phenocrysts of altered plagioclase and crowded quartz make up 20 per cent of the rock and are set in a very fine-grained matrix of quartz and clay minerals.

The presence of these dykes suggests several possible genetic relationships for the quartz vein. The dykes and vein are bracketed by two intrusive bodies of monzonite porphyry,



Plate IA. Hydraulicking trenches at the Chappelle property.



Plate IB. Camp and trenches on the Chappelle property.

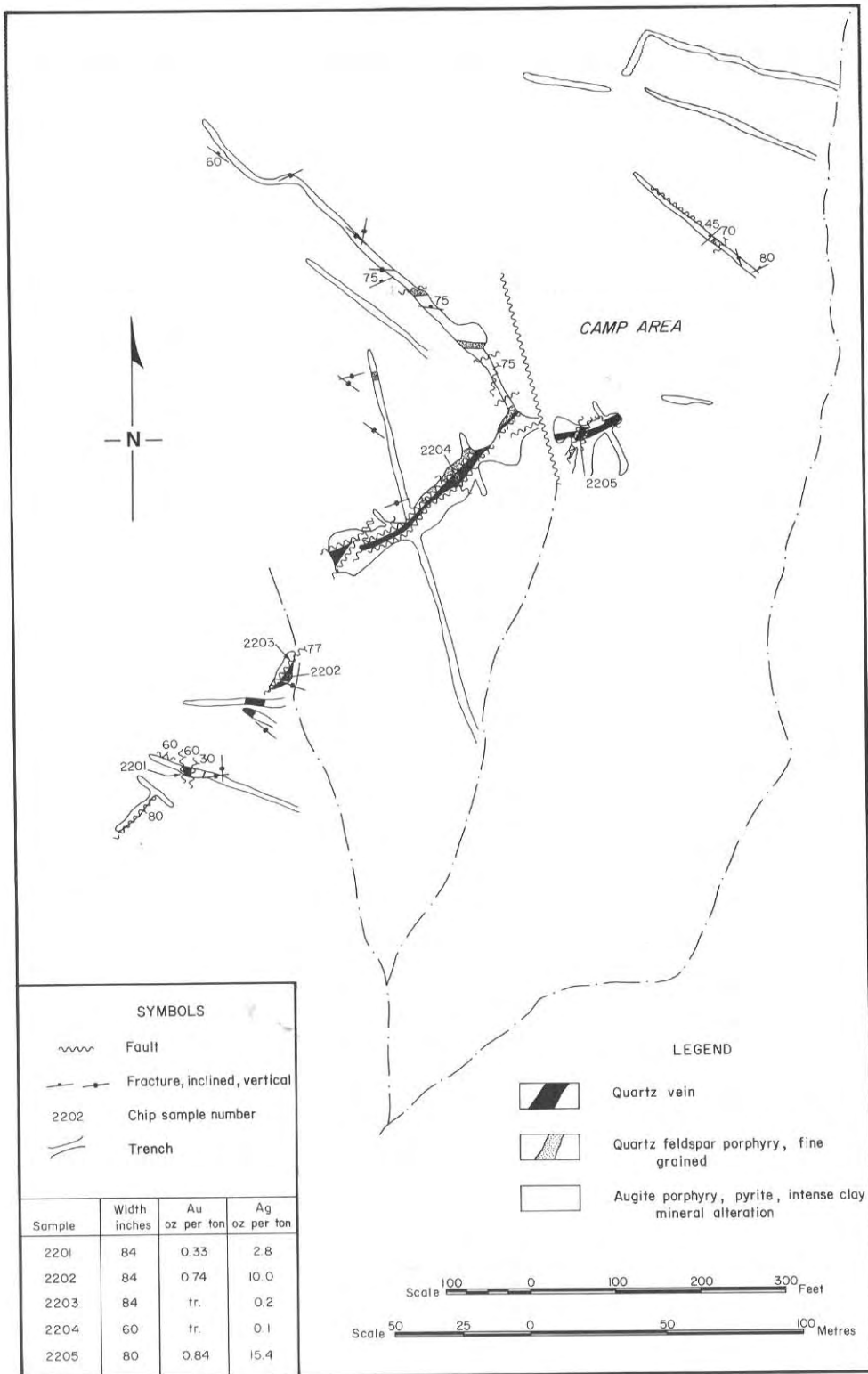
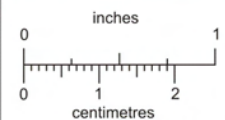


Figure 5. Plan of trenches in the Chappelle camp area.



one of which also contains quartz eyes. If the dykes are related to the monzonite porphyries, the mineralization is of Omineca intrusion age. However, the quartz-feldspar porphyry dykes also resemble the middle unit of the Toodoggone volcanic rocks suggesting that the dykes are feeders and the vein is related to this period of volcanism. No absolute ages have been determined for the monzonite porphyries, and it is possible that these intrusions are also related to the Toodoggone volcanic rocks.

WORK DONE: Regional geological mapping and soil, silt, and rock geochemistry plus detailed geological mapping in the main showings area. Two thousand feet of hydraulic trenching was done, using a fire hose and monitor with a nozzle pressure of 300 pounds per square inch. Water was pumped to the crest of the spur some 300 feet vertically above the trenches and stored in two portable swimming pools. A straight gravity feed from the pools was used. Three short drill holes totalling 300 feet were completed.

REFERENCES: *B.C. Dept. of Mines & Pet. Res.*, G.E.M., 1970, p. 188; Assessment Reports 2582, 2819, 3171, 3198, 3343, 3367, 3417, 3418, 3419.

LAWYERS, KODAH, SAUNDERS (No. 17, Fig. B)

LOCATION: Lat. $57^{\circ} 17'-21'$ Long. $127^{\circ} 03'-17'$ (94E/6)
OMINECA M.D. Seventeen miles northwest of Thutade Lake, between elevations of 4,000 and 7,000 feet.

CLAIMS: LAWYERS, KODAH, SAUNDERS, totalling 549.

ACCESS: From Smithers by air, a distance of 170 miles.

OWNER: KENCO EXPLORATIONS, (WESTERN) LIMITED, 730, 505 Burrard Street, Vancouver 1.

METALS: Gold, silver, copper.

WORK DONE: Regional geological mapping and soil, silt, and rock geochemistry.

REFERENCES: *B.C. Dept. of Mines & Pet. Res.*, G.E.M., 1970, p. 187; Assessment Reports 2822, 3314, 3315, 3316, 3361, 3362, 3366, 3416.

JK (No. 33, Fig. B)

LOCATION: Lat. $57^{\circ} 16.7'-18'$ Long. $126^{\circ} 42.8'-45'$ (94E/7E)
OMINECA M.D. In the Toodoggone River area, 5 miles west of the Finlay River and 2 miles south of the Toodoggone River.

CLAIMS: JK 1 to 36.

ACCESS: By aircraft from Smithers, approximately 170 miles.

OWNER: CORDILLERAN ENGINEERING LTD., 1418, 355 Burrard Street, Vancouver 1.

DESCRIPTION: The claims are underlain by Triassic porphyritic andesite.

WORK DONE: An induced polarization and resistivity survey was done on JK 17-20, 22, 29, 31, and 33.

REFERENCE: Assessment Report 3265.