CANADA
DEPARTMENT
OF
MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

GEOLOGICAL SERIES

SHEET 86 F

LEGEND

PROTEROZOIC

- 9 — Diabase and gabbro
- 8 — Feldspar and feldspar-quartz porphyries (mainly massive; intrusive)
- 7 — **CAMERON BAY GROUP** Conglomerate, breccia, sandstone, greywacke, argillite, limestone, tuff, agglomerate, chert; 7a, conglomerate, arkose, slate, argillite
- 3 — **SNARE GROUP (1-3)** Feldspar and feldspar-quartz porphyries (in part fragmental; probably mainly extrusive); rhyolite, dacite, andesite, tuff, and agglomerate. Age relative to other members of Snare group (1, 2) unknown
- 6 — **ECHO BAY GROUP (4-6)** Feldspar and feldspar-quartz porphyries (in part fragmental and amygdaloidal; probably mainly extrusive); rhyolite tuffs, hornfels. Age relative to volcanic rocks (6) uncertain
- 2 — Andesite, dacite, basalt, tuff. Age relative to sedimentary rocks (1) uncertain
- 5 — Andesite, trachyte, tuff. Age relative to sedimentary rocks (4) unknown
- 1 — Phyllite, greywacke, slate, quartzite, limestone, dolomite; hornfels, knotted quartz-mica schist; 1a, quartzite; 1b, limestone, dolomite
- 4 — Conglomerate, cherty argillite

- A — Massive granite, granodiorite, and allied rocks of various ages
- B — Mainly granitic gneiss, but includes undifferentiated granitized and otherwise metamorphosed rocks of probable sedimentary and volcanic origin

Bedding (horizontal, inclined, vertical, dip unknown)
Bedding (direction of dip known, upper side of bed unknown)
Schistosity, gneissosity (inclined, vertical, dip unknown)
Fault, shear zone, or breccia zone
Glacial striæ
Esker
Quartz vein or stock-work
Mineral occurrence — XCu
Adit

SYMBOLS FOR METALS

Copper — Cu
Silver — Ag
Uranium — U

Geology by C.S. Lord, 1946; W.H. Parsons, 1947
Descriptive notes by C.S. Lord

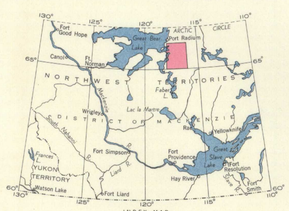
NOTE: W.H. Parsons is responsible for the geology of that part of the map-area lying northwest of a sinuous line extending northeasterly from latitude 65°22', longitude 118°00', through latitude 65°46', longitude 116°30', to latitude 66°00', longitude 116°15'.

Portage
Building
Survey monument
Boundary of Yellowknife Preserve
Lake and stream (position approximate)
Fall and rapid
Marsh
Sand or gravel
Approximate height in feet above mean sea-level

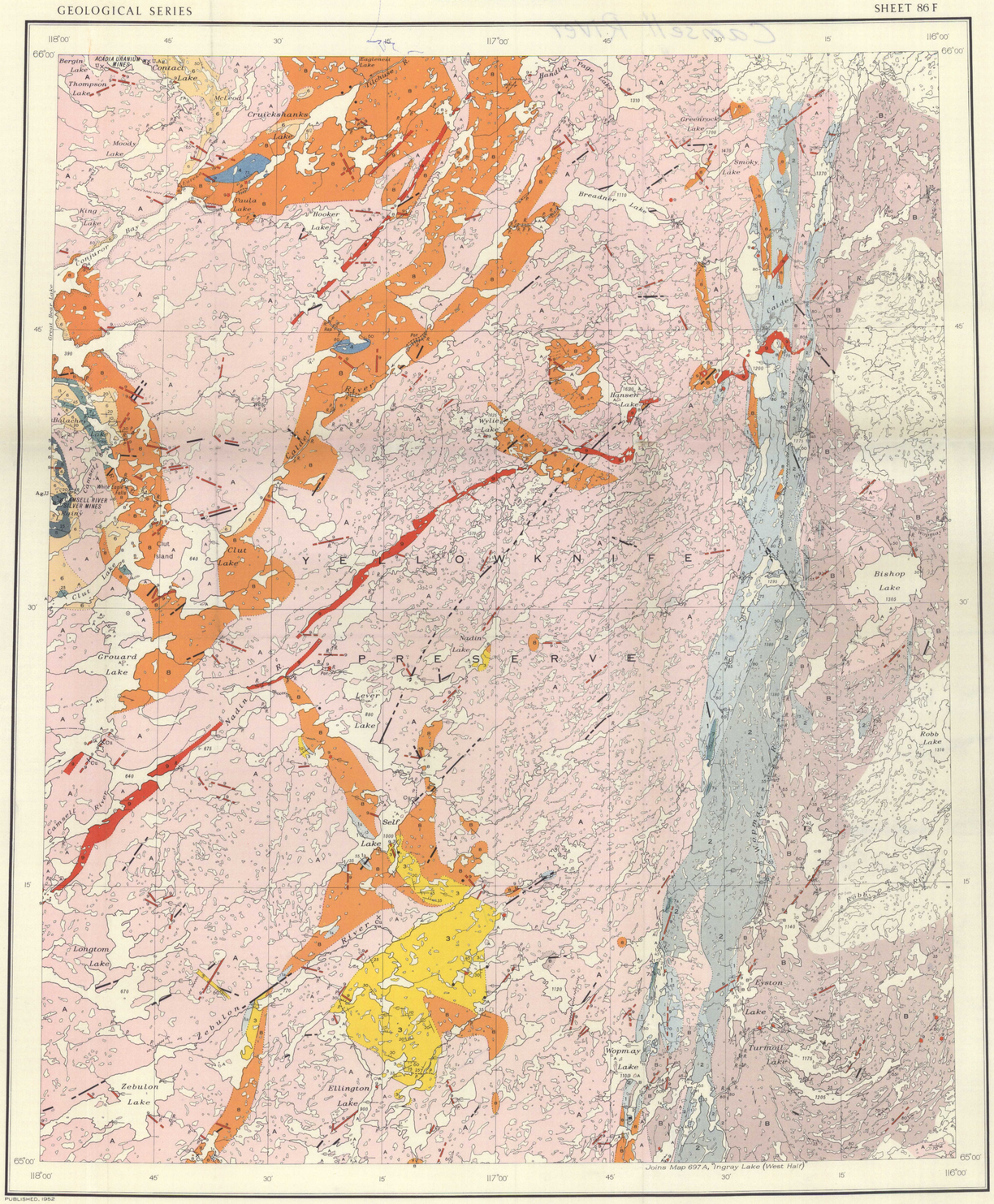
Base-map compiled by the Topographical Survey, 1942, from air photographs taken by the Royal Canadian Air Force in July 1934, and from information supplied by Federal Government department.

Cartography by the Geological Mapping Division

Approximate magnetic declination, 43°00' East



INDEX MAP



PUBLISHED, 1952

MAP 1014A

CAMSELL RIVER

DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES

Scale: One Inch to Four Miles = $\frac{1}{253,440}$

Miles: 4 3 2 1 0 4 8 12

DESCRIPTIVE NOTES

Local relief rarely exceeds 100 feet in areas underlain by granitic rocks (A), whereas belts of volcanic rocks (2) or porphyritic intrusions (8) may stand as much as 600 feet above adjacent lakes and waterways. Large intrusions of diabase and gabbro (9), and quartz veins or stock-works form other prominent ridges. The surface has been polished and gouged by ice moving westerly, and, so far as known, the topography exerted little influence on the direction of ice flow. In the relatively low, western part of the map-area, prominent abandoned beaches, as much as 175 feet above Grouard Lake, indicate a former period of extensive flooding during which deposits of silt and clay were laid down, and, together with glacial drift and muskeg, have obscured large areas of bedrock. Low ground is generally well wooded, whereas the higher ground is sparsely timbered or, especially in the northeast, devoid of trees.

The principal sedimentary rocks (1) of the Snare group are grey to buff weathering phyllites, thin-bedded, fine-grained greywackes, and slates. Occasional layers as much as a foot thick grade from crossbedded, medium- to fine-grained, white quartzite at the base to phyllite or slate at the top. Sizable bodies of massive to indistinctly bedded, commonly crossbedded, white quartzite (1a) were noted here and there, but their stratigraphic position with respect to other sedimentary members of the group is not known. The limestone (1b) on and near Wopmay Lake is in part thinly bedded, fine grained, and grey to white, and in part massive or indistinctly layered, coarse grained, white, grey, or pale buff, and thoroughly recrystallized. In places it is associated with buff-weathered, massive, fine-grained dolomite. Here and there, these limy rocks overlie adjacent phyllites, greywackes, and slates, underlie adjacent andesites and associated volcanic rocks (2), and form a member with a maximum observed thickness of about 200 feet. Near granitic intrusions (A) the phyllites, greywackes, and slates are altered to dense, hard, brown weathering hornfels, and near granitic gneiss (B) they are recrystallized to knotted quartz-mica schists containing andalusite crystals up to an inch in diameter.

Dark to light green, medium- to fine-grained, massive to well-pillowed andesite and related lavas (2) appear to overlie the sedimentary rocks (1) conformably in a few places, but elsewhere, due to the prevalent steep dips and the lack of criteria for top determinations, the succession is unknown. The lavas closely resemble those of the Archæan Yellowknife group of nearby areas, and it is doubtful if they could be distinguished from that group by lithology alone.

Within the map-area, the Snare sedimentary and volcanic rocks may occupy a tightly folded synclinal structure, the axis of which parallels Wopmay River on the west and plunges gently south-southwest. Thus the maximum width of volcanic rocks is exposed in the southern part of the map-area, where the narrow, flanking bands of sedimentary strata commonly dip steeply beneath them.

Bodies of porphyritic rocks, mainly feldspar and feldspar-quartz porphyries, some of them many miles in length, are numerous in the map-area. Although most of these rocks are of very similar appearance, some are extrusive, others intrusive and much younger, and still others are of uncertain origin and age. In the southern half of the map-area, those with evidence of extrusive origin have been provisionally assigned to the Snare group. However, because of intervening granitic rocks (A), the relation of these rocks (3) to other members of the Snare group (1, 2) is unknown. Furthermore, an entirely satisfactory separation of these porphyries from the probably much younger, mainly intrusive porphyries (8), and possibly others, was not attained, and presumably will require much more detailed study and mapping.

Many of the porphyries (3) are massive rocks exhibiting blocky, waxy, greenish white to pink feldspar phenocrysts in an aphanitic to finely granular, brown, grey, or purplish groundmass. Some contain a few quartz 'eyes', and locally these are as abundant as, or more plentiful than, the feldspar grains. The rocks contain scattered porphyritic fragments almost identical with the groundmass. Here and there these massive fragmental phases are associated with well-bedded, acidic to intermediate lavas and pyroclastic rocks, which, near Ellington Lake, commonly display dips of less than 20 degrees.

Previous work provides the basis for the probable correlation of the sedimentary and volcanic assemblage (4-6) with similar rocks of the Echo Bay group at Echo Bay, a few miles north of the map-area. Direct evidence of their relation to rocks of the Snare group (1-3) is not possible because everywhere within the map-area the two groups are separated by many miles of granitic rocks. However, available evidence here and in adjacent or nearby map-areas suggests that the two groups have many features in common and are probably, at least in part, correlative.

The sedimentary rocks (4) of the Echo Bay group are mainly massive to poorly bedded, dark purplish grey conglomerate, which contains well-rounded pebbles, as much as 2 inches in diameter, of vein quartz, quartzite, and purplish feldspar porphyry in a dark grey, clastic matrix. Cherty argillite outcrops here and there along the west shore of Cruikshanks Lake. It is thinly bedded and crossbedded, brown, and very fine grained, with a few larger grains of quartz and feldspar recognizable in hand specimens.

The andesites (5) contain phenocrysts, ½ inch long, of shiny black amphibole in a very fine-grained, dark greenish to black groundmass. The mineralized rock at Camsell River Silver Mines comprises minute phenocrysts of andesine in a felted groundmass of plagioclase and fibrous amphibole; it may be a second type of porphyritic andesite, or a highly altered diabase. Nearby andesitic tuffs are thin-bedded and crossbedded, fine-grained, dark greenish grey rocks containing sodic andesine. Other members of this assemblage (5), metamorphosed by adjacent intrusive granitic rocks (A), are now finely crystalline, banded, grey rocks composed almost entirely of andesine; they may be recrystallized trachyte or crystal tuffs. These volcanic rocks (5) were not found in contact with the sedimentary strata (4), and the sequence is, therefore, unknown. However, on Dowdell Peninsula, just northwest of the map-area, the lower part of the Echo Bay group is predominantly sedimentary and the upper part mainly volcanic. Thus, the volcanic members (5) may be younger than the sedimentary rocks (4).

Feldspar and feldspar-quartz porphyries (6) comprise more than 75 per cent of the Echo Bay rocks exposed in the map-area. They contain many fragmental, amygdaloidal, and tuffaceous zones indicative of an extrusive origin, but are closely associated with other, more massive types, which may likewise be extrusive but which could not be satisfactorily separated from the younger, lithologically similar, but mainly intrusive porphyritic rocks (8). The Echo Bay porphyries (6) comprise red, purple, and, rarely, black rocks exhibiting numerous white, greenish, pink, or glassy feldspar phenocrysts, about ⅛ inch long, in a fine-grained to cherty groundmass. The feldspar phenocrysts are mainly oligoclase and albite, but a few are orthoclase. Quartz phenocrysts are confined mainly or entirely to the purple porphyries, where they are about half as abundant as those of the feldspars. The rhyolite tuffs are thin-bedded, commonly crossbedded, pale grey or greenish rocks in which a few angular quartz fragments are recognizable in a very fine-grained siliceous groundmass. Massive, cherty, red-brown hornfels near granitic intrusions (A) may be, in part at least, metamorphosed equivalents of feldspar porphyry.

The Echo Bay rocks generally have dips of less than 30 degrees, but near contacts with granitic rocks (A) are nearly vertical. A probable synclinal structure trending about north-northwest through the Camsell River Silver Mines property suggests that the andesitic rocks (5) are older and dip beneath the porphyritic flows (6).

The lithologically distinctive Cameron Bay strata (7) were recognized between Clut Lake and Conjuror Bay, and possibly near Wopmay Lake. At the former locality they comprise a horizontal to gently inclined conformable assemblage, perhaps 350 feet thick. A basal, earthy, ferruginous layer, up to 2 feet thick, grades upward into a massive breccia containing closely packed angular boulders, some of which exceed 2 feet in diameter. About half of the boulders are granite, and others in order of abundance, include feldspar porphyry, greenstone, and vein quartz. The matrix is black to brown, and ferruginous. The breccia grades upward into cobble-conglomerate, which is overlain by sandstone containing pebbles of jasper and feldspar porphyry. Other conglomerates, in the upper part of the succession, contain pebbles mainly of probable sedimentary origin and a few of granite in a rusty brown friable cement from which they separate readily. An obscure contact between the basal breccia and underlying granite was examined near the outlet of Balachey Lake. No evidence was found to indicate that the granite intrudes the breccia, and granite fragments from the latter resemble the underlying granite in mineral composition and general appearance.

A band of chocolate-brown conglomerate, arkose, slate, and argillite (7a), with a maximum width of about 1,500 feet, outcrops on the west side of Wopmay Lake and at intervals for a distance of 13 miles north of the north end of the lake. Most of this band is an indistinctly bedded assemblage of conglomerates with an arkose matrix, arkose with pebble-beds, and arkose. The pebbles are well rounded, range up to 6 inches in diameter, and are mainly brown feldspar-quartz porphyry with a flinty groundmass; others are of white, medium-grained quartzite, and grey, flaky phyllite or, rarely, a pink, fine-grained equigranular granitic rock. It is not clear whether this sedimentary band is a part of the Snare group or whether it is a remnant of some other, probably younger group of formations. However, the distinctive colour, and the presence of porphyry, quartzite, and phyllite pebbles characteristic of the Snare group suggest that a period of erosion intervened between the deposition of the Snare rocks and the conglomerate. On the other hand, the conglomeratic strata are steeply inclined to vertical, and thus folded to about the same degree as the adjacent Snare rocks.

In the porphyritic rocks (8), pink, white, and green feldspars, ranging from ⅛ to ½ inch long, are generally the most abundant phenocrysts, but glassy quartz phenocrysts are common, and here and there are more abundant than those of feldspar. The groundmass is felsitic, and red-brown to dark brown. Most of the porphyries of this group are massive, but those associated with the band of sedimentary and volcanic rocks extending northerly through Wopmay Lake are commonly slightly foliated and streaked. In some places the porphyries appear to grade into granitic rocks (A), but in several places the latter are distinctly intruded by porphyry dykes.

Field and microscopic studies, including an examination of associated heavy accessory minerals, failed to afford evidence that the granitic rocks (A) represent more than one general period of intrusion. Indirect evidence, however, suggests that at least two widely separated periods are represented. The most abundant rock is a medium- to coarse-grained, equigranular to porphyritic, pink granite, with feldspar phenocrysts locally as much as 2 inches long. It contains about 25 per cent quartz, 45 per cent microperthite, 25 per cent oligoclase, and a little biotite, and is mainly massive, except for a slightly foliated border, as much as 2 miles wide, adjoining the belt of Snare strata (1, 2) extending northerly from Wopmay Lake. The contact with this belt is sharp, and a few granite dykes were found within the Snare strata. In general, the granite is remarkably free of foreign inclusions. Here and there within it are bodies of biotite or hornblende granodiorite in which plagioclase equals or exceeds the potash-bearing feldspar. Some of this granodiorite appears to be a phase of the granite, but elsewhere the relation is not clear. Several small stocks of massive, brown, medium- to coarse-grained granodiorite (A) outcrop at Contact Lake. They contain about 15 per cent quartz, 25 per cent each of orthoclase and plagioclase, and 35 per cent hornblende and biotite. Pink aplite dykes cut the granodiorite, which may, therefore, be older than the adjacent pink granite (A). However, in places nearby, the contact appears to be gradational, suggesting that the granodiorite is a basic marginal phase of the central granite mass. Six miles east-southeast of Nadin Lake, coarse-grained, rusty brown biotite-hornblende granodiorite forms a body 2 miles wide and of unknown length; in several places it is cut by dykes of granite.

Wherever determined, the granitic intrusions (A) are younger than the Snare and Echo Bay rocks. The obscure contact between granite and Cameron Bay strata at Balachey Lake suggests that the granite is there older than the Cameron Bay formations. However, as porphyry dykes cut these formations, and as large bodies of lithologically similar porphyry (8) in places appear to grade into granite, some of the granite (A) is believed to be younger than the Cameron Bay strata and of about the same age as the porphyries. Here and there dykes of porphyry (8) cut granite. It is not known whether, in such instances, the granite is only slightly older than the porphyry and, therefore, possibly derived from the same magma, or whether it is much older and, therefore, possibly older than the Cameron Bay formations.

The gneissic complex (B) comprises mainly intrusive material, but includes many bands, layers, and irregular bodies of sedimentary or volcanic origin now in various degrees of assimilation. The granitic gneiss is mainly a well-banded, fine- to medium-grained, pink or grey rock. Intercalated layers of mica schists, commonly rusty dlue to disseminated pyrite, are probably of sedimentary origin. Large, irregular areas within the complex are underlain by dark green or black, medium-grained, massive to slightly foliated, amphibole-feldspar-quartz rock, and may represent highly altered volcanic formations. Along Wopmay River Valley and its northerly extensions, the gneiss grades into knotted quartz-mica schist (1) through as much as several hundred feet of mixed schist and gneiss. The banded members of the complex vary widely and commonly abruptly in strike and dip. However, in the southeast corner of the map-area, the average trend, as reflected by the topography, changes progressively from about south near Wopmay River, through east, to about northeast near the east edge of the map-area. The intrusive material in the gneissic complex is, at least in part, younger than the adjacent Snare strata (1, 2) and, therefore, presumably younger than at least part of the Echo Bay group. On the other hand, the intrusive material appears to be cut by, and, therefore, to be older than, the granite stock (A) at Bishop Lake.

Dykes of diabase and gabbro (9) are younger than all other consolidated rocks. They range in width from a few inches to several hundred feet. Most of them are nearly vertical, but one or more dykes with a gentle northwesterly dip form the large bodies of diabase and gabbro extending southwesterly from Calder River, through Hansen Lake, to Camsell River.

Steeply inclined or vertical quartz veins or stock-works that range up to 750 feet or more in width, commonly termed 'giant quartz veins', are particularly common in the southern part of the map-area. Some are composed almost entirely of massive quartz, which appears to replace and grade into reddened and otherwise altered wall-rock; others are stock-works or vein breccias comprising quartz, in part vuggy, of two or more ages. Some contain pockets of specularite, and minute amounts of pyrite and chalcopyrite. The most common trend is northeasterly, and what may be a single vein was noted at intervals for 27 miles northeasterly from Lever Lake. Although, being in part of composite age, their development may represent a considerable period of time, all appear to be younger than the granitic rocks (A) and the intrusive porphyries (8); but one, southwest of Hansen Lake, is cut by, and, therefore, older than, a large dyke of diabase and gabbro (9). Some occupy faults, as west of Bishop Lake; and many others, including those of northeasterly trend near Zebulon River and Self Lake, may do so.

Probably considerable prospecting was done in the northwestern part of the map-area following the discovery of what is now Eldorado mine in 1930. During that period the two principal properties were staked; one of these, now owned by Acadia Uranium Mines Limited, has produced a little silver and pitchblende, and the other, the property of Camsell River Silver Mines Limited, has reached the advanced prospect stage. A re-appraisal of the map-area, following the acquisition of Eldorado mine by the Crown in 1944, failed to disclose important new mineral deposits.

During intermittent operation since 1933, the property of Acadia Uranium Mines Limited has afforded 466,159 ounces of silver and a little pitchblende. Banded, vuggy veins of quartz and a variety of carbonates, some manganiferous, occur in steeply inclined fractured and sheared zones in granodiorite (A). The veins range in width from thin seams to more than 2 feet, and here and there contained ore shoots of native silver, bornite, chalcopyrite, and pitchblende, with small amounts of a great variety of minerals containing cobalt, nickel, copper, bismuth, and other elements. The adjacent granodiorite has been chloritized, cut by veinlets of hematite and magnetite, or altered to a red rock through the formation of disseminated hematite.

The host rock at the Camsell River Silver Mines property is a massive, fine-grained, grey-green rock that may be an altered diabase or an andesitic volcanic rock of the Echo Bay group (5). The principal deposit is a steeply inclined network of veins from ½ inch to 15 inches wide; it pinches and swells from 1 inch to 3 or 4 feet in width. Banding and crustification are common in the veins, and the vein filling is mostly quartz and manganiferous dolomite; these minerals are accompanied by a little pyrite, arsenopyrite, chalcopyrite, sphalerite, galena, native bismuth, bismuthinite, safflorite-rammelsbergite, hematite, argentite and native silver. An ore shoot is exposed in one trench and in workings 60 feet below the trench. An oxidized sample shipped to the Bureau of Mines in 1947, presumably from this shoot, assayed: silver, 2,442.66 ounces a ton; and lead, 7.30 per cent. A sample taken by the Geological Survey in 1947 contained 0.226 per cent U_3O_8.

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