

of slaty rocks which are part of the Bowser Group of mainly Late Jurassic age.

The dilapidated mine buildings up the hill to the right mark the site of the Premier Gold mine, later known as the Silbak-Premier mine, which operated continuously from 1921 to 1949, and which was the richest single producing mine in British Columbia. During its life the mine produced roughly 2 million ounces of gold and 40 million ounces of silver. The mineral deposits were siliceous replacements developed along an intersecting set of northeast and west-northwest-striking fractures. An important ore control that helped to localize fracturing was the presence of large sill-like bodies of porphyry, referred to in the older literature as the Premier Sills. The largest and richest ore bodies were along the hanging wall of these sills and particularly in the area where the two fracture sets intersected, but some significant ore bodies were developed along flow contacts in the greenstones. The ore minerals included argentiferous galena, a variety of silver sulfosalts and electrum and minor native gold. The deposits were mined from the outcrop at elevation 1,900 feet (580 m), whose oxidized glory-hole is clearly visible, down to the 790 foot (260 m) level which is about the elevation of the road. Although the Premier deposit is less than a mile (1.6 km) from the eastern contact of the granitic complex it bears no genetic relationship to the granitic rocks and is probably very much older. The road continues up the valley of Cascade Creek then turns sharply to the left across the creek. Greenstones and tuffs with well-developed fracture cleavage are well exposed in road cuts to the right.

Mile 15
(Km 24)

To the left is a good view of the toe of the Salmon glacier. The rugged mountains to the west of the Salmon glacier are granitic.

Mile 18
(Km 29)

Another good view of the Salmon glacier to the left. The bus is approximately over the workings of the Big Missouri mine which penetrated completely through the ridge to the right into the Salmon glacier valley. The Big Missouri mine operated intermittently and briefly in the 'thirties and was notable for having the first completely underground mill in Canada. The deposit consisted of shear zones and stock works in Hazelton greenstone, mineralized with quartz, carbonates, and disseminated pyrite, containing local concentrations of galena, sphalerite, electrum and silver sulfosalts.

Mile 20
(Km 33)

The main eastern contact of the granitic rocks has swung sharply to the west. Rocks now seen across the glacier are Hazelton volcanic rocks.

Mile 21
(Km 34)

The large tributary glacier which feeds the Salmon glacier from the west derives its ice supply from an ice field more than 20 miles (32 km) across in which the ice is as much or more than 2,000 feet (600 m) thick. The Granduc deposit outcrops on an inselberg

in this ice field. For the next couple of miles (3 km) the bus will be passing through a "belt of dykes" which strikes easterly and southeasterly for more than 40 miles (64 km). Within the belt are innumerable large and small quartz-feldspar porphyry dykes, some parallel and some forming linked, braided structures. Light-coloured rocks seen at intervals along the road cut and prominently visible across the Salmon River glacier, south of the tributary glacier, are some of these porphyry dykes. On the 49-Summit to the right a number of high-grade silver showings occur in volcanic rocks along dyke contacts.

Mile 22
(Km 36)

The ice-choked surface of Summit Lake appears on the left, its pre-1958 beach being clearly marked. In that year, the lake discharged suddenly southward beneath the Salmon glacier, extensively damaging the road and other works downstream in the Salmon River valley. Since that time the lake has discharged several times but has never regained its 1958 level.

The old buildings seen to the left across Summit Lake near the toe of a small glacier mark the site of the Morris Summit mine, which was extensively developed by several adit levels but never achieved production. The ore bodies, localized along westerly-trending shear zones, consisted of massive replacements of pyrite, pyrrhotite and arsenopyrite with moderate to locally high values in gold. Because of its high arsenic content the ore was refractory to ordinary milling methods. The deposits are in fragmental volcanic rocks, pyritized and epidotized peripheral to an eastward-projecting lobe of coarse-grained granodiorite.

Mile 25
(Km 41)

Slaty rocks along the road cuts, closely folded with well-developed axial plane cleavage are part of a small projection of the Upper Jurassic Bowser Group, which to the northeast attains thicknesses of as much as 10,000 feet (3,050 m). The surface plant of the Granduc mine at the southern end of the Tide Lake valley can now be seen ahead. The flat gravel floor of this valley is the bed of former Tide Lake which was released in 1947 by melting of the Frank Mackie glacier which formed an ice dam at its northern end about 10 miles (16 km) north of the Granduc townsite.

VISIT TO GRANDUC MINE

0800 to 2000 hours

The following article on the geology of Granduc is reprinted from "Tectonic History and Mineral Deposits of the Western Cordillera," Canadian Institute of Mining and Metallurgy, Special Volume #8, 1966. The geological picture has not changed appreciably since that time. Published ore reserves total more than 43,000,000 tons averaging 1.73% copper. Mill capacity is 8,600 tons per day. A unique feature of the operation is its 10.6-mile (17 km) mine access tunnel.

starboard bow are all part of this pendant. The area of older rocks is about 20 miles (32 km) long and extends westerly across the peninsula, separating Observatory Inlet from Portland Canal. However, these rocks are not exposed on the Alaska side of the narrow Portland Canal.

- 1645 hours Interbedded volcanic flows and thin-bedded sediments are well exposed on the southern tip of Larkin Island to starboard. They dip gently eastward, are almost undeformed, but are cut by a few northerly trending dykes. Just past the tip of this island, by looking in a direction a little aft of the beam, the oxidized outcrops and glory hole of the Hidden Creek mine of the Granby Mining Company can be seen in the distance. The ruins of the Anyox Smelter and town are concealed behind the low peninsula in the foreground. The Hidden Creek mine which operated between 1920 and 1936 produced 670,000,000 lbs. of copper. The deposit is a siliceous replacement in strongly chloritized and amphibolitized greenstone. All of the rusty weathering rock on the mountains to starboard is greenstone, which comprises most of the pendant previously mentioned. The light-coloured areas to be seen in places are granitic sills and dykes.
- 1700 hours The southern edge of the Anyox pendant is in the wooded valley to starboard. The rocks ahead on either side of Observatory Inlet are massive, unfoliated quartz diorite. The rock well exposed in the bluffs at Richard Point to starboard is virtually free of inclusions but is criss-crossed with a maze of pegmatite dykes.
- 1800 hours Approaching Cape Hanson where the ship will turn northeasterly into Portland Canal, swarms of dark-coloured inclusions can be seen at intervals in the shore cliffs to starboard.
- 2015 hours Maple Bay to starboard. Dumps of the old Maple Bay mine which had a small production of copper may be seen on the hillside. The red-weathering rocks along the mountain faces represent the eastward continuation of Anyox pendant. As mentioned previously this pendant does not appear on the Alaskan side. The rhombohedral pattern of north-northeast waterways such as Portland Inlet and Observatory Inlet and the lower part of Portland Canal and the north-trending lineaments such as Portland Canal, probably represent a major system of faults. A few miles north of Maple Bay the Anyox pendant ends and light-coloured granitic rocks are once more seen along the British Columbia shore as well as on the Alaska side.
- 2130 hours The prominent valley of Georgia River extends north-northeasterly some distance parallel to the trend of the canal. The rocks on the Canadian side from this point northward for several miles constitute another volcanic pendant of probable Jurassic age, and again, the pendant, which does extend across the narrow waterway, suggests important faulting. A quartz lode

in this pendant a few miles from the beach achieved small production during the 'thirties. The ship will dock at Stewart about midnight and early tomorrow morning passengers will debark for the bus trip to Granduc Mine.

NOTES FROM DOCK-SIDE AT STEWART

The rugged mountain across the inlet is known as Mount Rainey. The top of the low bluff in the foreground which slopes gently to the north is the eastern contact of the Coast Plutonic complex, rocks below the top of the bluff being granodiorite. The overlying rocks are pyroclastics of the Hazelton Group. The contact of the granodiorite with overlying roof rocks is abruptly intrusive, and the thermo-metamorphic halo in the older rocks, only a few feet thick, consists of epidote and some garnet. The mountain exhibits an interesting example of mineral zoning. Gold-bearing quartz veins occur in the granitic rocks, small scheelite and molybdenite deposits are known on either side of the contact, and some 3,000 feet (915 m) above sea-level, near the tip of the small glacier to the left, are silver-lead-zinc deposits. Silverado mine, whose buildings can be seen in the last of the timber below the glacier, has had only a small production. However, on the opposite side of the mountain the old Porter Idaho mine produced about one million ounces of silver.

ROAD LOG FROM STEWART TO GRANDUC MINE

For the first 13 miles (21 km) the road follows the deep valley of the Salmon River in Alaska. The high mountains on either side are granitic rock described by Buddington and Chapin in U.S.G.S. Bull. 800.

Mile 7
(Km 11)

The old buildings ahead are a tungsten mill which operated briefly during the Second World War. The deposits a short distance up the hill to the right were scheelite-bearing quartz veins. This mine is close to the eastern contact of the granitic rocks, a short distance to the north greenstones of the Hazelton Group may be seen in the road cuts on the right.

Mile 13
(Km 21)

The road has left the valley of the Salmon River and continues northward up the deep valley of its tributary Cascade Creek. Rocks to the left are granitic. Ahead and to the right a view can be had of the Bear Ridge which extends from Stewart for about 30 miles (48 km) northward and is composed of andesite flows, volcanic breccias and tuffs as well as porphyry sills and dykes, comprising the Hazelton Group of Upper Triassic and/or Jurassic age. These rocks form the western limb of a broad anticline. A short distance to the north the Hazelton volcanic rocks are unconformably overlain by a synclinal structure