

THE PROSPERITY/PORTER IDAHO SILVER DEPOSITS  
(103P/13)

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INTRODUCTION

The high-grade silver (-lead-zinc) vein deposits of the Prosperity (Mineral Inventory 103P-89) and Porter Idaho (Mineral Inventory 103P-89) mines outcrop on the upper slopes of Mount Rainey, 4.5 kilometres southeast of Stewart. The mine workings are on the south face of the mountain at an elevation of 1 550 metres, overlooking the Kate Ryan Glacier and Ryan Creek (Fig. 62). Access is by helicopter from the Stewart airport 4 kilometres to the northwest, although a hiking trail from the north end of Stewart up Barney Gulch and over or around the Barney Glacier is in fair condition.

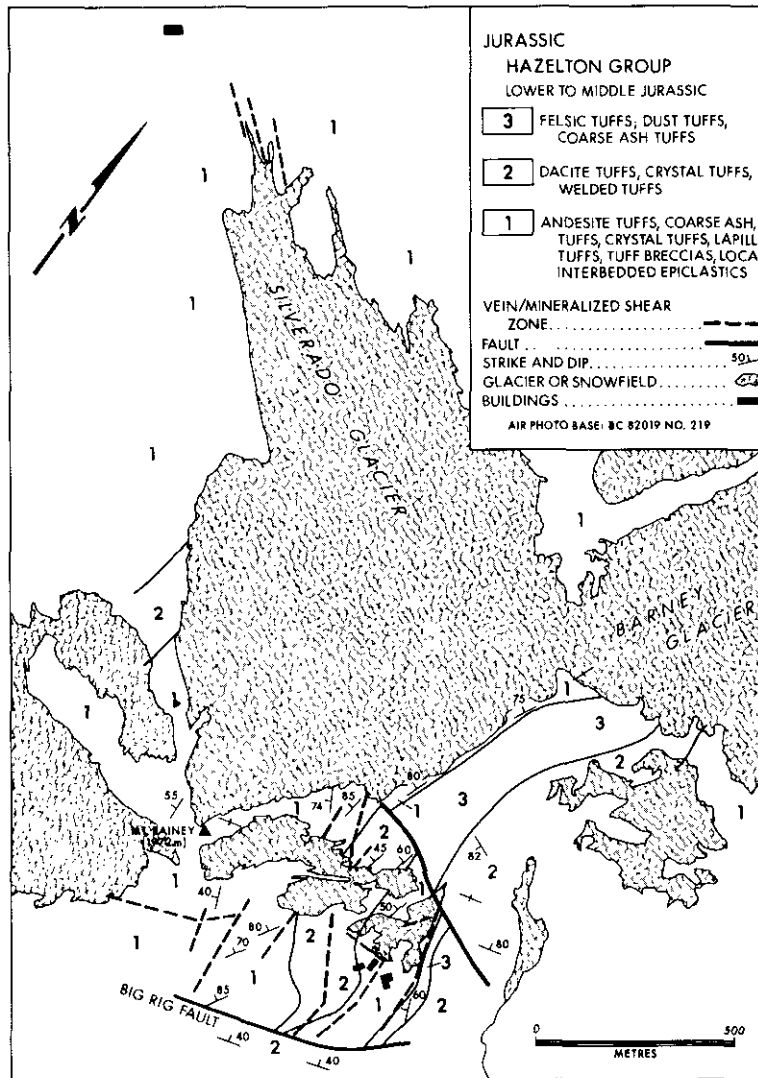


Figure 62. Geology of the Mount Rainey area.

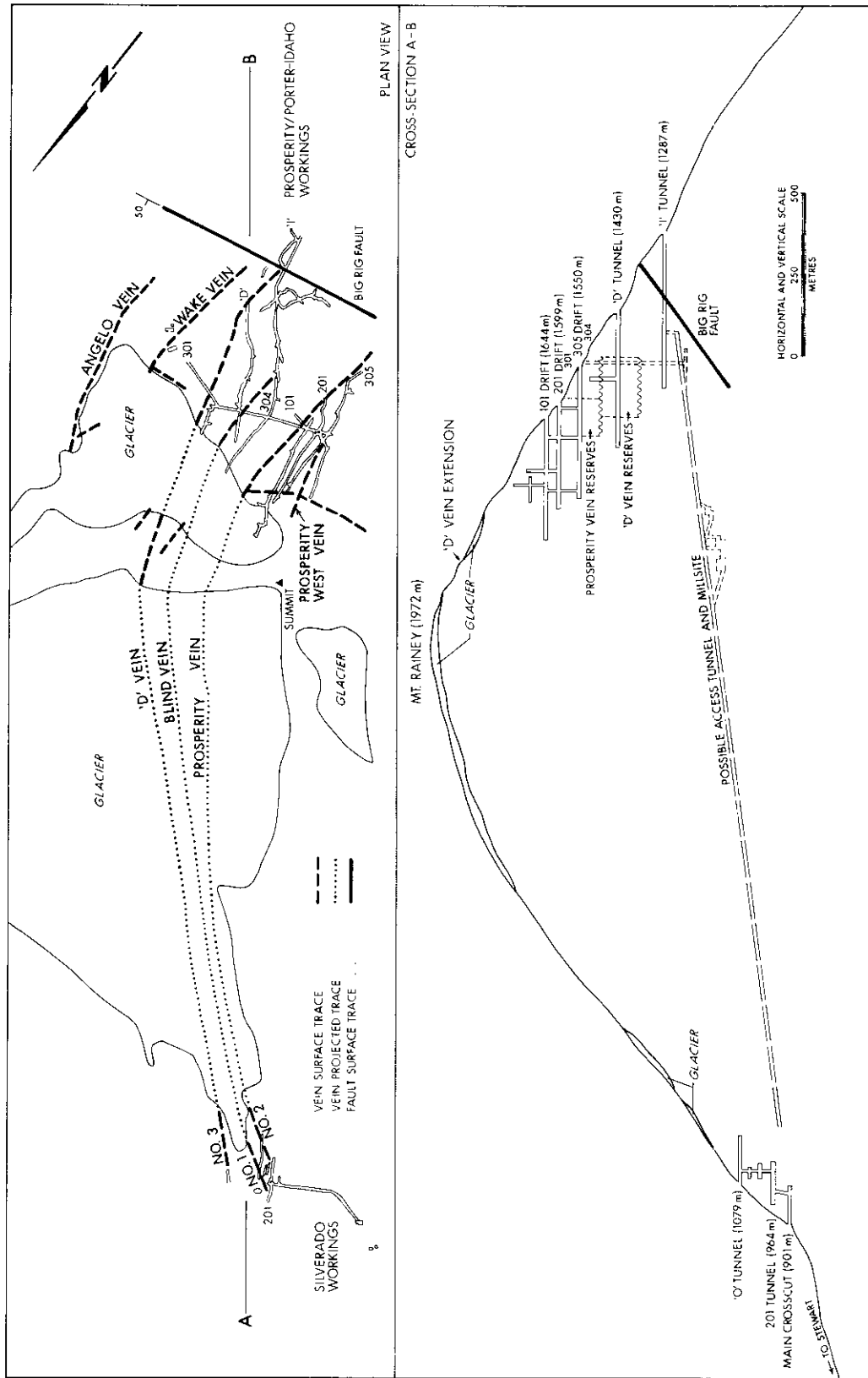


Figure 63. Idealized cross-section through Mount Rainey.

The property is wholly owned by Pacific Cassiar Limited which has been conducting evaluation of ore reserves, rehabilitation of the mine workings, and surface exploration since 1980. This renewed exploration was prompted by elevated silver prices, by the existence of remaining reserves, and by potential for additional ore.

## HISTORY AND PREVIOUS WORK

History and production of the Prosperity/Porter Idaho mine and the nearby Silverado mine (Mineral Inventory 103P-88) were reviewed by Grove (1971). The silver deposits on Mount Rainey have been explored many times since the initial staking of mineralization in 1904 on the Silverado ground. The Porter Idaho ground was staked in 1921, followed by the Prosperity claims in 1926. Premier Gold Mining Company Limited acquired the combined properties in 1928. When the production decision was made silver was \$0.56 per ounce. When production ended after 17 months in April 1931 the silver price was \$0.28 per ounce.

White (1946) published a detailed description of the Silverado property; however, there is no corresponding detailed description of the Prosperity and Porter Idaho mines. Grove (1971) provides a review of both areas with plans and sections of the mine workings. A company newsletter (1983) presents a north-south cross-section through Mount Rainey that correlates the workings on both sides of the mountain, reproduced here as Figure 63.

## GEOLOGY

Silver deposits of Mount Rainey are contained in a complex andesitic to felsic volcanic sequence that is an extension of lithologies that host precious metal deposits in the Salmon River valley to the north (Alldrick, this volume). Lithologies and stratigraphy are similar in both areas but the structural setting for the Mount Rainey area has not been resolved. Mount Rainey does not contain the thick sections of epiclastic sedimentary rocks or the distinctive felsic volcanic sequence exposed near Mount Shorty Stevenson, 21 kilometres to the north. A simplified stratigraphic column is illustrated on Figure 62.

The host rocks to the mineralization in the Prosperity/Porter Idaho area are predominantly dacitic volcanic rocks varying from crystal tuffs to welded tuffs with minor units of andesitic lapilli tuff and dacitic waterlain tuff. In contrast, the host rocks at the Silverado workings are predominately andesitic coarse tuff breccias (White, 1946). Various dykes that outcrop in and around the Silverado deposits are rare in the Prosperity/Porter Idaho workings.

The Hyder granodiorite, a hornblende granodiorite to quartz monzonite, intrudes the volcanic rocks on the west side of Mount Rainey. The intrusive rock is medium to coarse-grained; the core is unaltered but the outermost 100 to 150 metres is cut by a network of widely spaced (50 to 100 centimetres apart) epidote veinlets.

Volcanic rocks at the intrusive contact show no obvious alteration halo, although the rocks are sheared and cut by epidote and chlorite veinlets. The intruded volcanic section comprises a thick sequence of green andesitic coarse ash tuffs. It contains a one-hundred-metre thick section of massive purple epiclastic conglomerate which outcrops as a prominent knob on the ridge top 700 metres east of the intrusive contact. The volcanic sequence further eastward is a complex of andesitic lithic tuffs, including lapilli and medium to coarse tuff breccias and crystal tuffs, interbedded dacitic crystal tuffs, lapilli tuffs, welded tuffs, and local thin waterlain tuff units and epiclastic conglomerate beds. A thick section of massive felsic tuffs are exposed at the head of Barney Glacier in the northeast part of the area mapped. Volcanic strata further east on Mount Magee, near the contact with sedimentary units, have not been examined. The overall strike of the volcanic units is north-south with dips moderately to steeply westward, but large local variations in the strike have been noted.

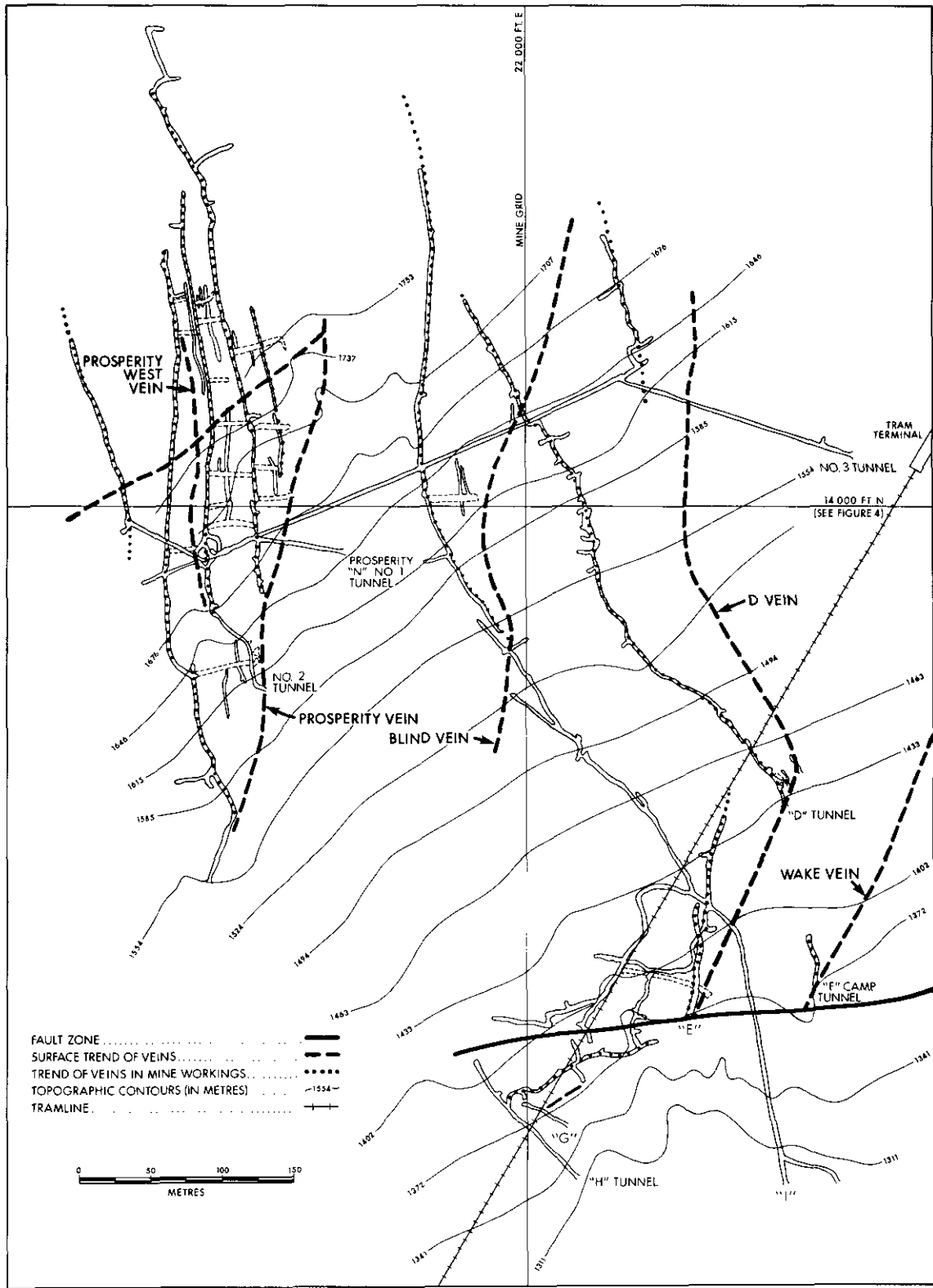


Figure 64. Geology of the Prosperity/Porter Idaho mines property.

## MINERALIZATION AND ALTERATION

The silver mineralization on Mount Rainey occurs in a set of major sub-parallel shear zones (Figs. 62, 63, 64, and 65). Six of these shear structures, spaced roughly 175 metres apart, have been located at the Prosperity/Porter Idaho workings, while four shear structures are known at the Silverado workings, 2.5 kilometres to the north. A few cross-cutting mineralized shear zones have been located both on surface and underground (Figs. 62 and 65) but the economic potential of these cross-cutting shear structures has not yet been evaluated.

Grove (1971) described a minor cross-cutting quartz-breccia vein mineralized with tetrahedrite on the northwest side of Mount Rainey. This deposit was worked in the early 1900's before the discovery of the main Silverado showings nearby in 1927.

At Silverado, White (1946) showed that the mineralized shears trend 155 degrees and dip 65 degrees westward. The structures split along horse-tail-like splays. Some of the shear zones may be spatially associated with felsic dykes which cut the andesite tuff breccias.

At the Prosperity/Porter Idaho workings the major shear zones commonly trend 165 degrees and dip 60 degrees westward. These zones do not splay and are cut but not offset by several lamprophyre dykes in the underground workings. All the shear zones continue northward until covered uphill by talus or ice. Southward, the shears terminate at, or are displaced by, a major north-dipping east-west fault zone called the Big Rig fault.

Detailed mapping in the underground workings by Greig and Kenyon (1982) shows displacement by minor fault structures cross-cutting some of the mineralized shear zones. The shear zones are continuous structures up to 13 metres wide hosting discontinuous, mineralized lenses or shoots. In unmineralized or weakly mineralized areas the material within the shear structures consists of varying amounts and sizes of intensely sheared wallrock fragments and blocks set in a gouge or clay matrix. Some sections of the shear zone display late silicification that escaped subsequent shearing. Mineralized zones pinch and swell within the shear zone resulting in well-mineralized shoots that are up to 13 metres wide and 250 metres long. They extend from surface to a depth of 200 metres where old mine workings end, still in mineralization.

Within the strongly mineralized sections of the shear structures the distribution of sulphide mineralization is complex. Early workers reported a mineral suite of galena, sphalerite, native silver, ruby silver, feibergite, and minor amounts of pyrite, chalcopyrite, and argentite. A petrographic description of a grab sample of massive, vein sulphides by J. McLeod of Cominco Ltd. adds polybasite, arsenopyrite, and trace electrum to the mineral suite. The ore zones consist of one or typically two veins of massive sulphide, each about 60 centimetres wide, hosted in sheared, altered, and mineralized country rock. The massive sulphide veins typically follow, or are near, the footwall and hangingwall. They may locally converge and swell to form a single vein up to 2 metres wide anywhere within the zone. These larger veins are composed of argentiferous galena with minor brown to black sphalerite and quartz; they provided 27 268 tonnes of direct shipping ore with an average grade of 2 692 grams per tonne silver, 1.0 gram per tonne gold, 5.1 per cent lead, and 0.1 per cent copper. The smelter contract at that time stipulated a penalty charge for zinc content, consequently sphalerite-rich ore zones were dumped. Samples of massive black coarse-grained sphalerite containing wire silver have been collected from one of the waste dumps.

The shear zone adjacent to these massive sulphide veins is mineralized with disseminations, blebs, and veinlets of quartz, buff-weathering carbonate, abundant black manganese oxide, and sulphide minerals. These mineralized margins to the massive sulphide veins constituted 'waste' during the mining operations of 1930 to 1931 but they are now known to contain up to 690 grams per tonne silver over widths of 5 to 6 metres on both sides of the massive vein.

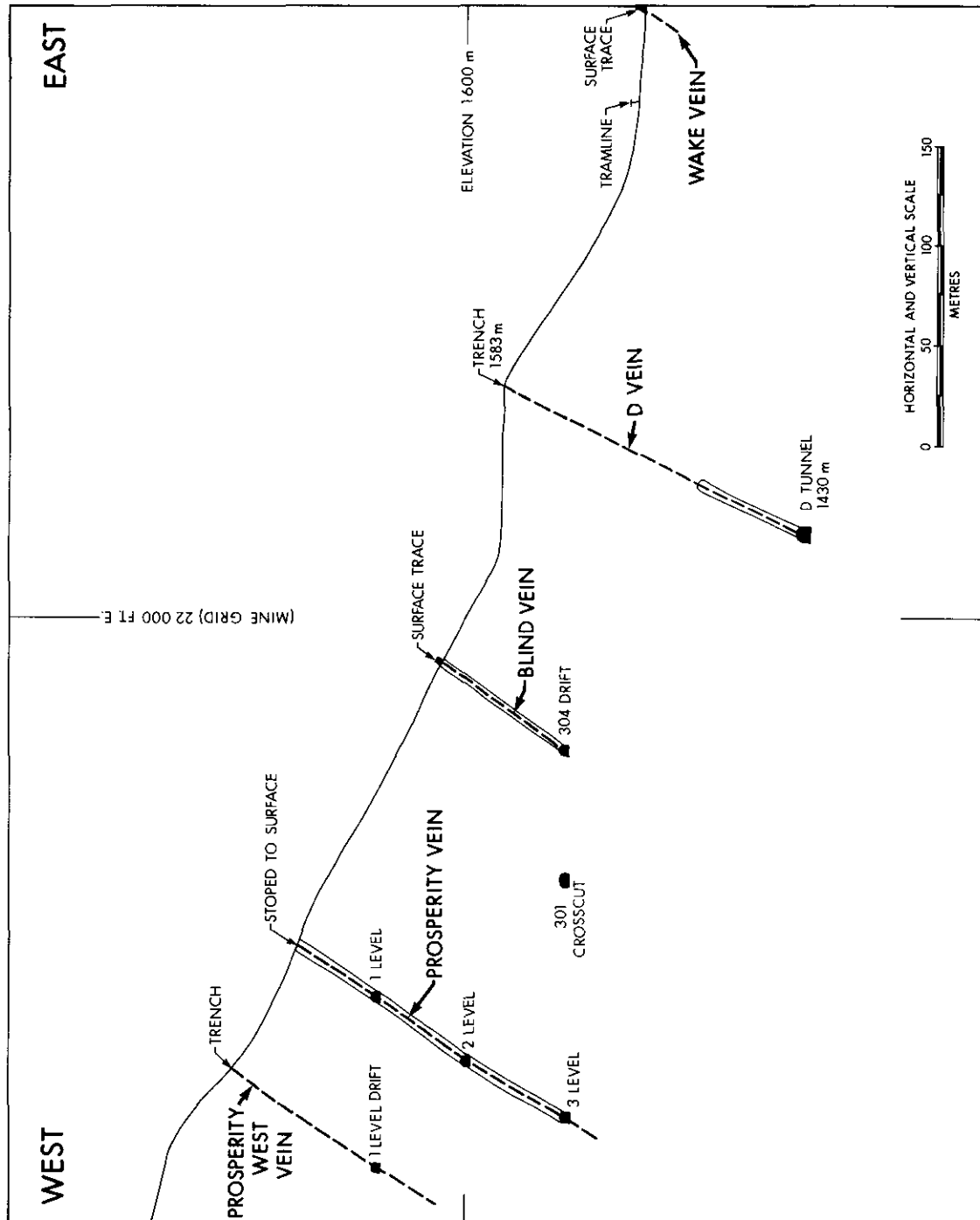


Figure 65. Geologic cross-section through Prosperity/Porter Idaho mines workings, section 14000N.

The shear zones have sharp borders against the country rock and only minor silicification of the volcanic host rocks can be seen in hand sample. There is essentially no known mineralization in the country rock between the shears but one narrow 'blind' mineralized shear has been located 75 metres west of D vein at the 1 430-metre elevation.

Published probable reserves as of December 1983 were 775 800 tonnes of 634 grams per tonne silver from workings which have been assessed.

## EXPLORATION

The recent underground exploration program at the Prosperity/Porter Idaho examined the known reserves remaining in the workings after shutdown in 1931; it was based on an understanding of the original high-grade mining operations and the need to assess the potential of the unexplored strike lengths of the six major shears. The original operations produced direct-shipping ore at a cut-off grade of roughly 785 grams per tonne silver. Much of the mineralized shear zone that constituted 'waste' at that time now provides a substantial tonnage of lower grade ore at current silver prices. The waste dump at the 1 430-metre portal of D tunnel has been bulk sampled and contains reserves of 11 800 tonnes with 396 grams per tonne silver.

The exploration work from 1980-1983 consisted of an underground program to rehabilitate mine workings and systematic percussion drilling of mineralized wallrocks at 15.24-metre (50-foot) centres along the shear zones. The percussion drilling also discovered massive sulphide veins missed by the Premier operation. The surface exploration program consisted of prospecting, detailed geological mapping, geochemical soil and talus sampling, and bulk sampling of waste dumps. Limited geophysical tests have shown little response over mineralized outcrops, and to date, diamond drilling has been limited to three holes cored in 1975. The most effective technique for surface exploration in this area has been intensive prospecting. The snowfields and glaciers on Mount Rainey have retreated substantially in recent years, exposing extensions of known veins, thus reinforcing the concept that the shear structures are continuous through the mountain between the Prosperity/Porter Idaho and the Silverado workings (Fig. 63). Icefield retreat has also exposed other areas on the mountain for prospecting. Discovery of new mineralized outcrops has increased the mineralized strike length to a horizontal distance of 750 metres with a vertical relief of 335 metres.

The shear zones are recessive weathering and exposures are sparse. A typical outcrop exposure of the mineralized shears in the Prosperity/Porter Idaho area is a well-sheared zone containing dull, distinctive black and orange coarsely mottled rock due to manganese and carbonate alteration. In some outcrops manganese alteration predominates, producing a massive to sheared sooty black gossan; in other exposures the alteration is predominantly buff-orange weathering carbonate. Sulphide minerals are partially preserved in some shear-zone outcrops and are leached from others leaving a limonitic boxwork. Shear zones exposed by recent glacial retreat show less oxidation of sulphides; galena and sphalerite are exposed at surface and minor amounts of a bright yellow powdery mineral, greenockite, or hawleyite (?) have been located by Greig and Kenyon; other secondary zinc minerals can be expected to be present.

## ACKNOWLEDGMENTS

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