



Institute on Lake Superior Geology Thirty-Third Annual Meeting

WAWA, ONTARIO

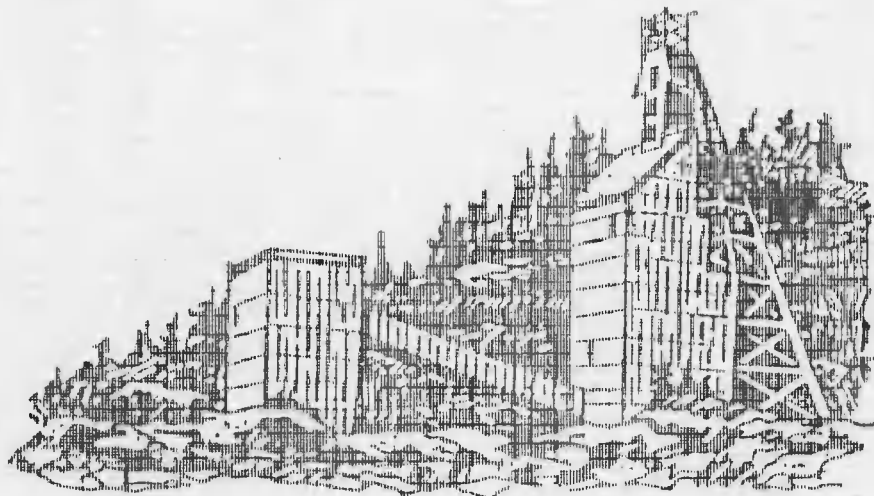
May 12 and 13, 1987

Geology of Wawa Area Gold Mineralization

Sponsored by

Ontario Ministry of Northern Development and Mines
Wawa Resident Geologist's Office

Volume 33, Part 2



GEOLOGY OF WAWA AREA GOLD MINERALIZATION

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Institute on Lake Superior Geology
33rd Annual Meeting
Wawa, Ontario
1987

Fieldtrip Guidebook
Volume 33, Part 2

FOREWORD

This guidebook is a candidate for the most-delayed production award. Three years have passed since I conducted the original fieldtrip twice during the Wawa ILSG meeting. The Citadel Mine has test milled its underground development and continues to explore on surface. Citadel Gold Mines Ltd. has acquired the Parkhill Mine and has conducted extensive surface stripping on that property and surrounding prospects. The Ranson prospect was optioned to FinNeth Explorations Ltd. in late 1987 and has been thoroughly sampled and evaluated. The guidebook incorporates some of these new data. No changes have affected the other sites visited during the ILSG meeting.

ACKNOWLEDGEMENTS

I thank Delio Tortosa, Wawa Resident Geologist, for providing the dedicated time necessary for completion of this project. Contract geologists Rosa Stewart and Ann Wilson prepared the figures. Ann Wilson reviewed the text. Ron Sage, Ontario Geological Survey, Toronto, also provided continued support. Any remaining errors or word fog are my responsibility.

This fieldtrip would not exist without the co-operation of the property owners and operating companies listed below. Their open access policies have contributed greatly to the continuing exchange of observations and ideas on Wawa geology and gold mineralization that characterize the Wawa exploration community.

I thank the management and staff, as noted, of: Citadel Gold Mines Ltd. - Roy Rupert and Alison Leroy; Monk Gold and Resources Ltd.; and Bridget Lake Resources Inc.

INTRODUCTION

The fieldtrip provides a one day overview of the variety of lithological and structural settings of gold bearing quartz vein mineralization in the Wawa area. The route traverses the historical gold mining area south of Wawa and includes several as yet minor occurrences that are of interest for their geological setting (Fig. 1). The 10 stops were selected for their interest and large group accessibility. However numerous additional gold occurrences are known (Fig. 1) and a comprehensive review of the local lithostructural relationships of gold mineralization remains to be done.

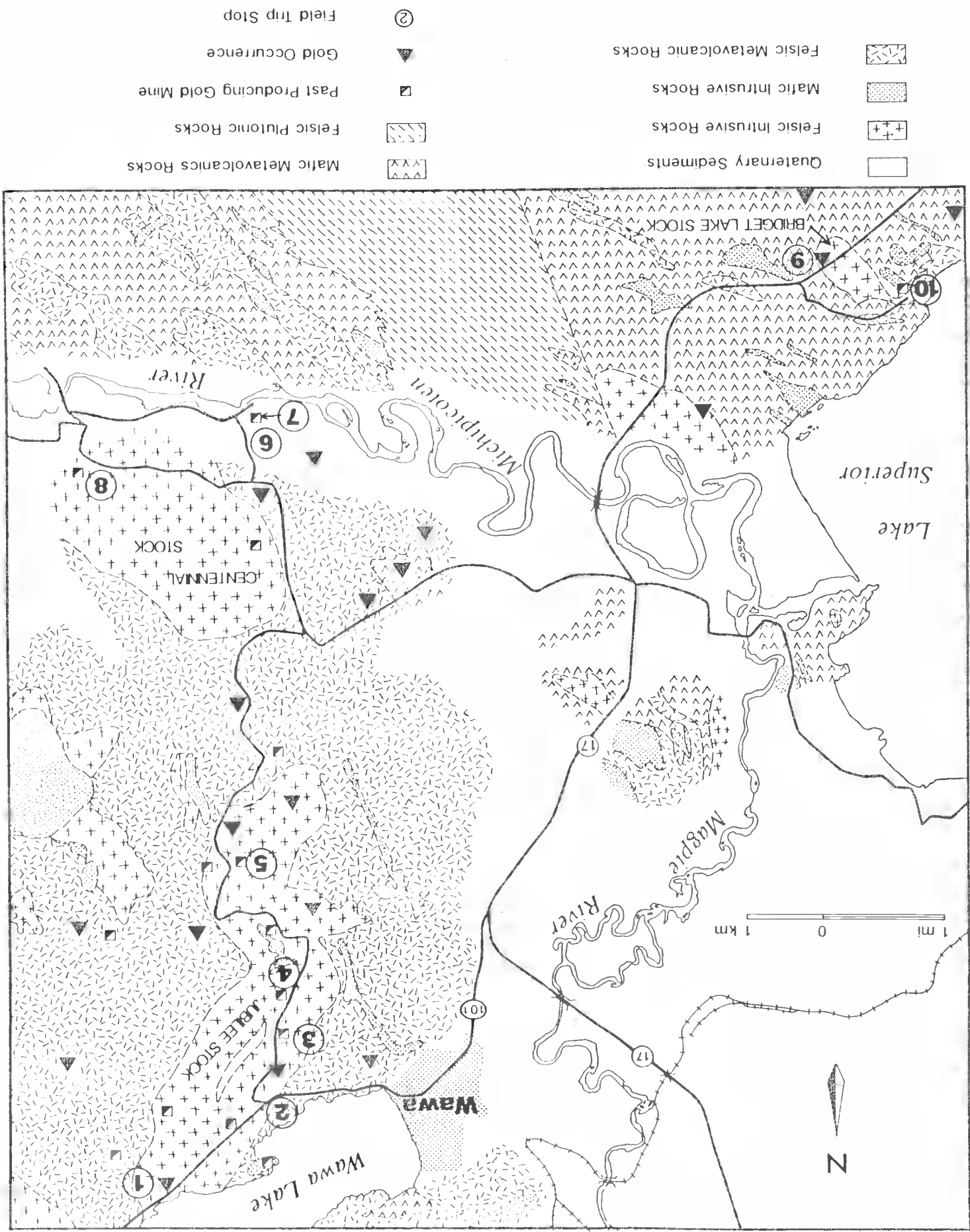
The mineral development history of Wawa began in June 1897 with the discovery of gold on the southwest shore of Wawa Lake by local native William Teddy. The Wawa discovery coincided with the Klondike gold rush and many westward-bound prospectors stopped at Wawa on their steamer journey across Lake Superior.

The first Wawa gold rush ended in 1906 after numerous short-lived mining developments of low tonnage. Gold exploration revived in the 1930s and resulted in fifteen mines that produced through the early 1940s. The total gold production from the Wawa area has been less than 200,000 ounces.

The next cycle of gold exploration was stimulated by the record high gold price of 1980 and the Hemlo discoveries two years later. Continued high demand and a sustained acceptable price have maintained the level of exploration that has resulted in recent mine development activities and production decisions.

An accidental result of the intensive gold prospecting was

Figure 1. Wawa Area General Geology and Gold Occurrences.



the discovery of iron ore in 1898. Iron mining became the mainstay of the Wawa economy until reduced demand for steel following World War I forced the closure of the Helen and Magpie mines by 1920.

Iron mining revived in the late 1930s, prompted by a provincial bounty of two cents per ton in 1937 and the onset of World War II. The open pit Helen Mine re-opened in 1939 and by 1960 had developed into the George W. MacLeod Mine, which continues to operate today as an underground siderite mine.

Modern geological mapping of the Wawa area by the provincial government has been completed by the Ontario Geological Survey (Ministry of Northern Development and Mines) at a scale of 1:15,840 (1 inch = 1/4 mile). This work includes preliminary maps (Sage, et al., 1982a-1982d; Massey, et al., 1982a-1982c; and Mandziuk, et al., 1981) and open file reports (Massey, 1985; Sage, in press).

GEOLOGICAL SETTING

Wawa is in the south central part of the Michipicoten greenstone belt, within the Wawa Subprovince of the Superior Province of the Canadian Shield (Fig. 2). The Michipicoten greenstone belt is composed of supracrustal metavolcanic and metasedimentary rocks, that have been divided into three volcanic cycles (Sage, 1986). Each cycle consists of mafic to felsic metavolcanic rocks and associated subvolcanic intrusions. The volcanic cycles are overlain by iron formation or clastic metasedimentary rocks of volcanic origin.

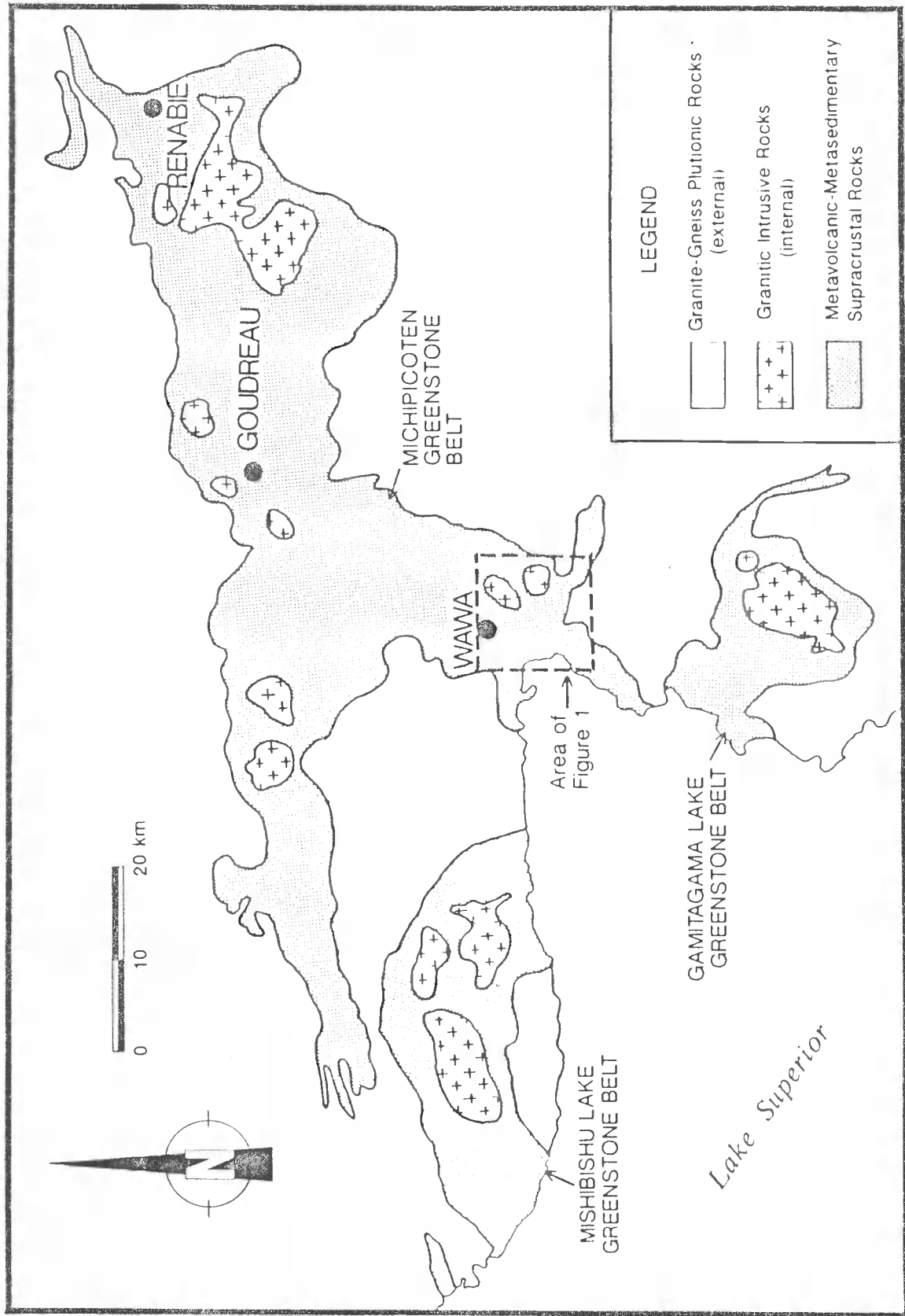


Figure 2. General Geology of the Michipicoten Greenstone Belt

The mafic volcanic compositions vary from basaltic to peridotitic komatiite in the oldest cycle, to tholeiitic basalts in the two younger cycles. The rocks are massive and pillowed flows and minor accumulations of tuff. The intermediate to felsic rocks of the three cycles are pyroclastics and minor flows of rhyolite and dacite, of calc-alkalic affinity.

Michipicoten Iron Formation, dominated by siderite in the Wawa area, caps the oldest volcanic cycle. The clastic metasedimentary rocks that overlie the younger cycles consist of unusually well preserved siltstones to conglomerates that have been deposited in a variety of marine and non-marine settings. The stratigraphic thicknesses of the mafic and felsic-intermediate sections of the oldest cycle, in the Wawa area, are approximately 1800 m and 900 m, respectively. (Sage, 1986; Sage, et al., 1987; Sage, in press)

The Michipicoten greenstone belt is enclosed within Early Precambrian granitic and gneissic rocks that are younger than the supracrustal rocks. The supracrustal rocks have been intruded by coeval to younger stocks of a variety of intermediate to felsic compositions. These events have been dated by the U-Pb zircon method and range from 2888 +/- 9 Ma to 2663 +/- 6 Ma (Turek, et al., 1988; Turek, et al., 1990).

The Michipicoten greenstone belt has been metamorphosed mainly to greenschist grade. Amphibolite grade metamorphism has altered the supracrustal rocks along the margin of the greenstone belt and adjacent to the larger intrusions.

Gold mineralization is hosted almost exclusively in quartz

veins and lenses or pods within shear zones and breccia zones. Only minor quantities of gold have been reported from adjacent wall rocks.

These gold depositional settings occur in a variety of lithologies. Their orientation and character appear to be controlled by the competency of the host rock and its behaviour during the shearing and/or other deformation. Common elements of the gold occurrences are: their lack of preferred host lithology, the presence of recrystallized quartz, and minor amounts of sulphide minerals. The presence and intensity of alteration also appears to be an important factor in evaluating individual gold occurrences. Although the relationship remains unclear, significant gold occurrences rarely occur outside of a zone of pronounced alteration.

STOP 1: JUBILEE STOCK

- High Vertical Rockcut, SE side of Highway 101,
2 km NE from Surluga Road Intersection -

The Jubilee Stock (Fig. 1) is a high-level subvolcanic intrusion which varies in composition from diorite to quartz diorite and granodiorite. It is fine- to medium-grained, equigranular to locally porphyritic. The stock intrudes felsic and intermediate fragmental metavolcanic rocks of the lower volcanic cycle. A U-Pb zircon age of $2745 \pm$ Ma obtained from the stock identifies it as coeval with the metavolcanic rocks of the lower volcanic cycle (2744 ± 10 Ma and 2749 ± 2 Ma, Turek, et al., 1982). The surface expression of the stock is approximately 8 km sq.

The marginal zones of the stock form an intrusive breccia contact. The central stock is dioritic to granodioritic in composition and is partly encircled by a massive quartz-feldspar porphyry. The porphyry may occupy a ring fracture associated with caldera formation during the intrusion of the Jubilee Stock. (Sullivan, et al., 1985; Sage, 1986 & in press)

The Jubilee Stock is highly variable, both within its compositional range and texturally. The variability is displayed within small areas and often within individual outcrops. Also contributing to its mapping complexity are abundant xenoliths of metavolcanic rocks that locally comprise up to 50% of the intrusion and display great size variation. (Sullivan, et al., 1985)

The fieldtrip will examine a 100 m length of a large vertical roadcut of diorite and quartz diorite on the south side of Highway 101. Annually, renewed rock falls provide fresh exposures of the stock and related features: multisized xenoliths, quartz vein occupation of minor shears, and hematitic and carbonate alteration.

STOP 2: JUBILEE TUFFS

- Roadcut and Hillside Outcrops, SE side of Highway 101, SW of Surluga Road Intersection -

Quartz feldspar crystal tuffs are an abundant component of the felsic metavolcanic rocks south of Wawa Lake. They consist mainly of fine to medium grained quartz and feldspar and minor quantities of sericite, carbonate, chlorite, epidote, and biotite. The quartz content is 10% to 15% and quartz crystals

are often up to 5 mm in diameter. Quartz in the tuffs is enriched 3 to 5 times over that of the felsic flows in the area. Lithic fragments up to lapilli size are common and confirm the pyroclastic origin of the tuffs. Previously, most of these and other porphyritic pyroclastic rocks of the area had been mapped as felsic intrusives. (Sage, in press)

The wavy bedding of the tuffs visible along the road dips gently away from the Jubilee Stock. The tuffs also are mapped as conformable to the stock and are interpreted to be the re-worked pyroclastic products of the emplacement of the stock. Elsewhere in the vicinity of the stock polymictic tuff breccias are more common. (Sage, et al., 1982; Sage, in press)

STOP 3: CITADEL MINE

- South on the Surluga Road, 1 km from its Intersection
with Highway 101 -

The Citadel Mine (Fig. 3) was developed on seven levels to a depth of 950 feet in the late 1960s and produced 1,687 ounces of gold and 43 ounces of silver in 1968. Re-evaluation and exploration since 1987 has yielded 358,500 tons of proven and probable ore reserves with a grade of 0.215 oz.Au/ton. An additional 150,000 tons of possible reserves grading 0.23 oz.Au/ton also have been outlined. (Citadel Gold Mines Inc., 1988 Annual Report)

During 1989, Citadel Gold Mines Inc. continued underground operations to sample and to assess the quality and mineability of ore reserves in the Jubilee shear zone. This work terminated in September 1989 and the recalculation of reserves is in progress.

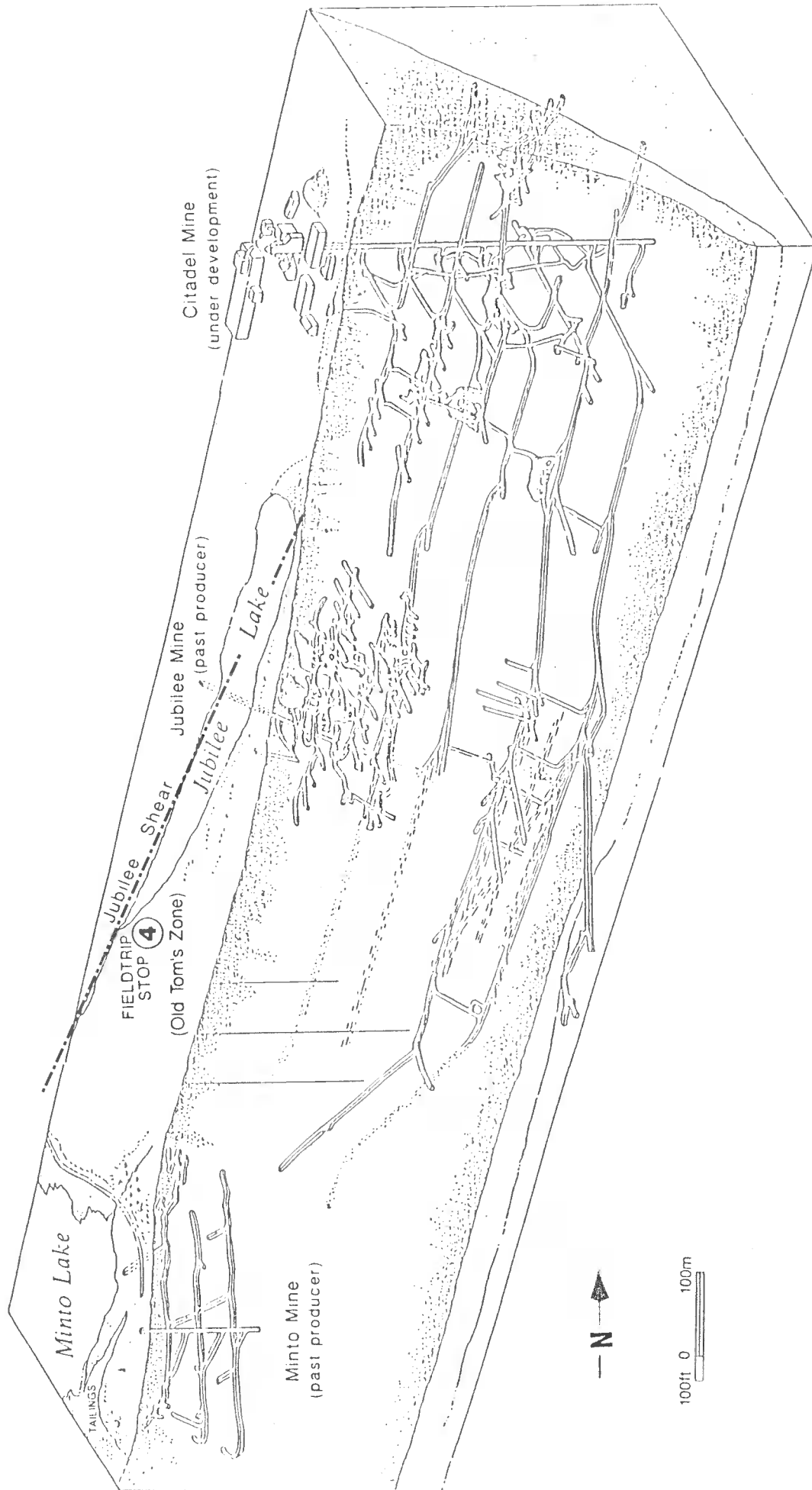


Figure 3. Citadel Mine Exploration and Development - Jubilee and Minto Mines Development.
(Modified from Citadel Gold Mines Inc.)

Also in 1989, a six month long test milling program processed 57,956 tons of ore and produced 4737 Troy ounces of gold.

The ore zones occur within the northeast (020°) trending Jubilee shear zone. They dip 30° to 40° east and plunge to the south. The surface projection of the mineralization within the Jubilee shear is 1800 feet long and 200 to 300 feet wide. Gold is finely disseminated in pods and lenses of quartz within segments of the shear zone, within the Jubilee Stock. Ore appears to be further restricted to areas of carbonatized and locally silicified sericite and chlorite schists within the Jubilee Stock. Citadel geologists will provide an overview of the current exploration and development plan for the property.

The Minto and Jubilee mines and the newly developed Old Tom's Zone are progressively deeper extensions of a south plunging zone of mineralization (Fig. 3). The Minto and Jubilee mines together produced 37,678 ounces of gold and 1,123 ounces of silver between 1929 and 1944.

STOP 4: JUBILEE SHEAR (OLD TOM'S ZONE)

- East side of South end of Jubilee Lake, on lower Hillside, 20 m North of South end of lake, Surluga Road follows West Shore of Jubilee Lake -

The south end of Jubilee Lake provides an excellent perspective on the eroded lineament that forms the surface expression of the Jubilee shear zone. An abandoned decline of unknown depth (exceeding twenty meters), and age, on the southeast side of Jubilee Lake was the site of early mining of a quartz lens within

the Jubilee shear.

The site provides a good introduction to the character of the quartz veins that are typical of the Wawa area. Features to note are the sharp contacts of the veins and host rock, reverse fault movement indicators, the fine to medium grained, recrystallized form of the quartz, the general scarcity of sulphides, rare visible gold on intergrain boundaries and adjacent to sulphides, and the unusual odour released on breakage of the quartz. The latter appears to be characteristic of gold bearing quartz veins in the area and consists of a pungent garlic odour, possibly a mercaptan or another gas from inclusions in the quartz.

Recent surface prospecting and channel sampling of the vein in the vicinity of the decline has yielded up to 0.65 oz. Au/ton over a width of five feet. The average assay result was 0.26 oz. Au/ton.

The vein strikes 020° and dips 37° southeast. Citadel Gold Mines Inc. has identified the vein underground as part of the Old Tom's Zone, the apparent down-plunge extension of the Jubilee Mine orebody (Fig. 3).

STOP 5: PARKHILL MINE (PAST PRODUCER)

- Mine Gate is on West side of Surluga Road, 4 km South of Citadel Mine -

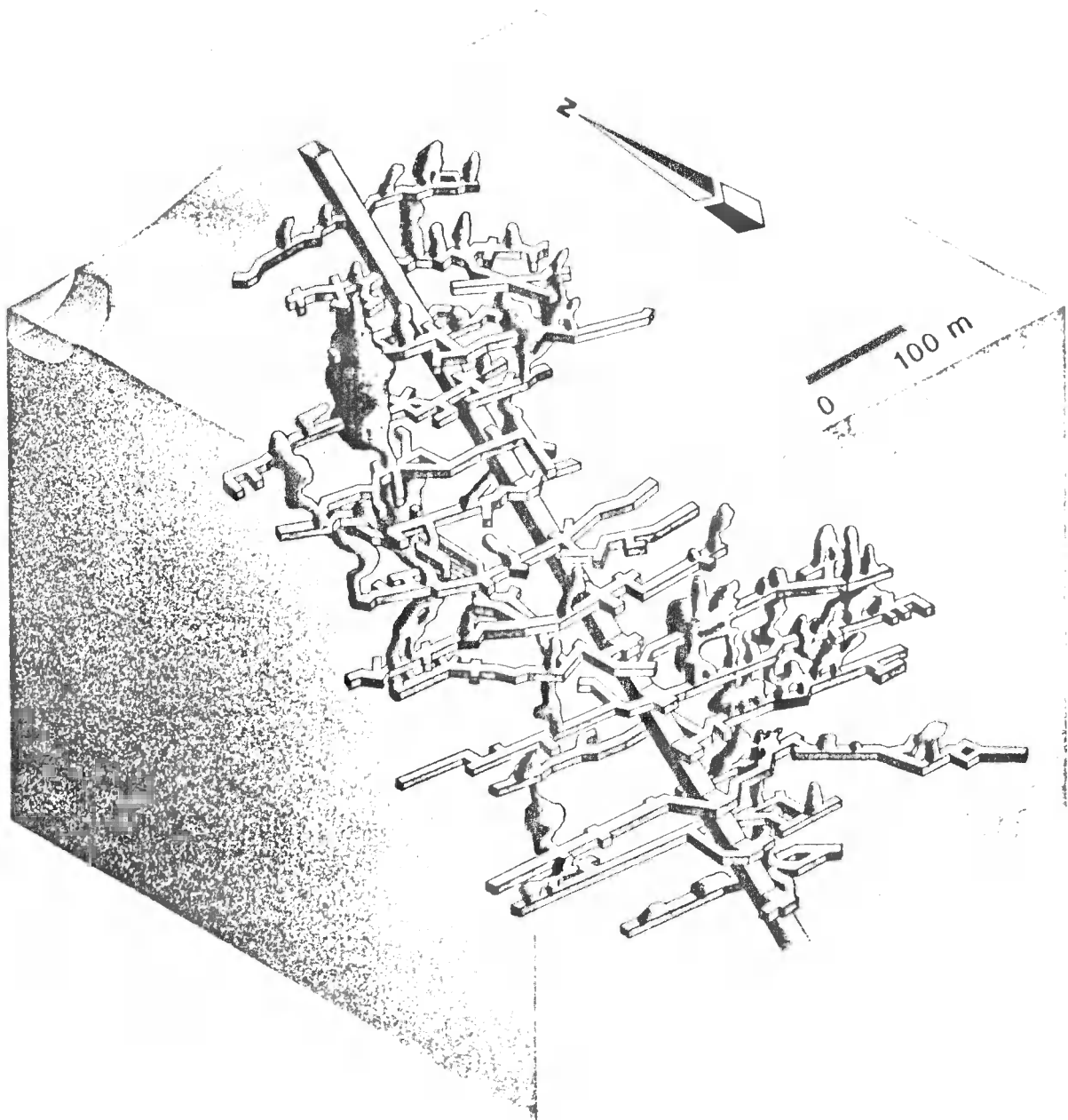
The Parkhill Mine was the largest gold producer in the Wawa area. It produced a total of 54,301 ounces of gold and 2,896 ounces of silver from 125,778 tons of ore milled, yielding an average grade of 0.432 oz. Au/ton. The earliest production reported was 16.8

oz. of gold from 9 tons of ore in 1904. Mining stopped until 1929 and then resumed from 1931 through 1938. Production peaked in 1935 with 9,618.7 ounces recovered from 20,871 tons milled. Surface clean-up from 1940 to 1944 yielded additional gold.

Mine development (Fig. 4) included 14 levels to a vertical depth of 1,244 ft., 30,000 ft. of drifting, 4,000 ft. of cross cutting, and 5,000 ft. of raises. Access was by way of a 1,877 ft. inclined shaft. Extensive development in this style was typical of the narrow-vein gold mines of that era. The property remained dormant until Dunraine Mines Ltd. began a modern surface and underground exploration program in 1980.

The main gold-bearing quartz veins are a series of quartz lenses of short strike length (up to 125 feet) and more extensive down dip dimension, approximately in the ratio of 1:4. The quartz lenses have an average width of two feet and a maximum width of six feet. They occupy a zone of intense schistosity that strikes 090° and dips 30° to 48° to the south, crosscutting metavolcanic and metasedimentary host rocks that strike 050° to 070° . The host rocks are Jubilee Tuff and a polymictic volcanic breccia in the vicinity of the Jubilee Stock (Sage, in press).

Goldun Age Resources entered a joint venture in 1986 with Dunraine Mines Ltd. and completed an extensive evaluation of the underground workings to the 7th level to test a proposed model of paleoplacer gold concentration and to test the potential for gold recovery by stope/drift washing and tailings processing. Neither test yielded ore. The program included more than 13,000 feet of underground diamond drilling.



Shaft, drift, and stope dimensions exaggerated for clarity.

(Dunraine Mines Ltd. 1981 Annual Report)

Figure 4. Parkhill Mine - 1938 Development Plan

Subsurface geology observed by the author to the 3rd level and reported on the 7th level by J.E. Tillsley (personal communication, 1987) is dominated by a massive, fine grained tuff, that is devoid of sedimentary structure, and is stratigraphically below massive to pillowed mafic flows. A fragmental unit, consisting of coarse lapilli to bomb sizes, occurs at the east end of the mine. A transition of clast shape to a flattening fabric marks a high strain area, possibly a shear zone. Lamprophyre dikes of various attitudes are common.

This exploration program concluded that no mineable ore remains above the 14th level, although ore potential exists below it. The quartz veins were well explored and completely mined by previous workers, leaving only minor pillars. The program also concluded that the gold recovery potential from subsurface clean-up is minor due to low volume. Sampling the surface muck piles and tailings yielded an average of 0.01 oz.Au/ton and a maximum of 0.025 oz.Au/ton.

The original fieldtrip examined two outcrops of metagreywacke (water-laid tuff?) that contain truncated bedding and minor crossbedding. Recent overburden stripping reveals these rocks to be clastic metasediments or crystal tuffs interbedded with coarser tuff breccias and massive crystal and lapilli tuffs. The gold bearing silicified zone strikes east, transecting the subvertically dipping pyroclastic rocks at a low angle. A late lamprophyre dike occupies the centre of the shear zone and has a fenitized alteration halo parallel to it. The zone of alteration consists of replacement of quartz by a blue sodic iron amphibole

(x-ray diffraction identification by R.P. Sage, personal communication, 1988).

STOP 6: MONK DEFORMATION ZONE

- Stripped Area 10 m West of Monk Access Road, 0.5 km South of Access Road Intersection with High Falls Road -

Observations in the vicinity of the Monk Prospect (see Stop 7) and several other less developed prospects suggest that the area is part of a wide zone of highly strained metavolcanic rocks, here named the Monk deformation zone (Fig. 5). The Monk zone has a minimum width of one kilometre and a strike length of over three kilometers. Its strike varies slightly but is consistently about 140° and its dip is vertical. The deformation zone will be examined at this site in order to compare its features here, a barren prospect, with those at the Monk Prospect, a gold occurrence.

The deformation zone as viewed at this stop is characterized by intensely flattened breccia fragments of quartz feldspar sericite schist. The abundance of sericite suggests a felsic composition for the protolith. The fragments exhibit flattening ratios from 4:1 to 14:1. Both the fragments and the matrix contain abundant euhedral feldspar megacrysts, 1 cm by 2 mm. Concordant with the foliation are narrow zones, up to 10 cm wide, of foliated mafic tuff (?), continuous for their strike length across the outcrop. The tectonic preservation of such "stratigraphy" is consistent throughout the deformation zone.

Remnants of pre- or syn-deformation quartz veining are recorded by dismembered and ptlygmatically folded narrow vein

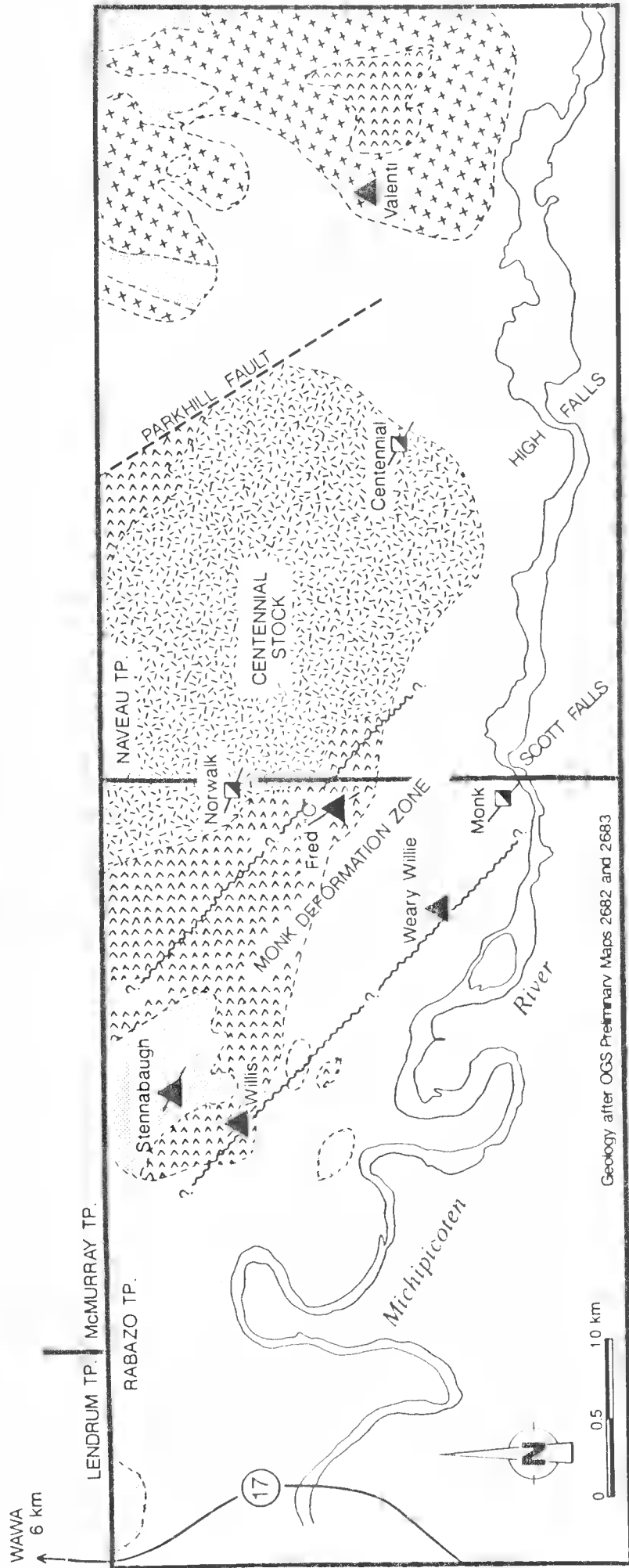
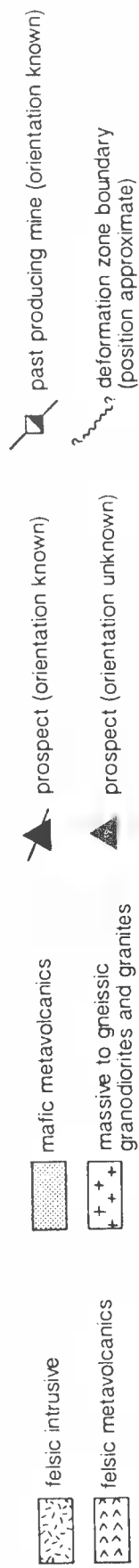


Figure 5. Monk Deformation Zone - Michipicoten River Area Gold Occurrences

segments and tear drop shaped quartz nodules. The nodules have curved tails or sigmoidal shapes that indicate rotational movement but they do not provide consistent kinematic information. Z-folds up to 20 cm amplitude within the sericite schist plunge 50° to the southeast. Intersection lineations in the schist also plunge southeast but more steeply, 70° to 75° .

Minor quantities of sulphide mineralization accompany some of the quartz veins however no gold has been reported from this part of the deformation zone.

STOP 7: MONK PROSPECT

- Trenches, Stripping, and Adit, 300 m NW of Scott Falls -

Total production from several bulk-sampling programs, since gold was discovered on the property in 1936, has been less than 100 ounces. The last exploration program ended in 1987, and the property is currently dormant.

Gold mineralization is concentrated in a series of en echelon quartz veins which strike 050° and dip 45° northwest. Assays from early surface and recent subsurface sampling consistently yielded 0.5 ounce gold per ton. Tonnage calculations are not available.

The shallow-dipping, northeast-trending mineralized veins transect a zone of weakly mineralized quartz-carbonate veins (the "main zone") that are concordant with the regional southeast-striking foliation. The zone consists of a 3 to 4 m wide section of vertical quartz veins and stringers, which are contained

within an intensely sericitized, carbonatized, and silicified host rock. The degree of alteration obscures host rock identification; however property mapping suggests an intermediate to mafic volcanic assemblage.

The "main zone" and the associated shallow-dipping mineralized veins occur at the apparent southwestern margin of a regional zone of intense flattening strain, the Monk deformation zone (cf, Stop 6).

STOP 8: CENTENNIAL STOCK

- Roadside Outcrop Hill 1 km N of High Falls -

The Centennial Stock occupies 7 sq. km of the northwest corner of Naveau Township and adjacent McMurray Township to the north (Fig. 1 & 5). It consists of a grey to white granodiorite to trondhjemite, massive to weakly foliated and medium to coarse grained. It is distinguished by the presence of grey-blue to opalescent quartz-eye phenocrysts that are up to 3 mm diameter. On its southwest margin, massive granodiorite grades into a fine grained granitic quartz-plagioclase porphyry. Granitic aplite dikes occur within the stock. Small xenoliths (up to 0.5 m) of mafic metavolcanic flows are also common, but not abundant. Felsic xenoliths have not been observed, even though the stock intrudes felsic metavolcanics. (Fig. 6)

A series of discrete shears strikes southeast (140°) across the stock. They are usually narrow (<10 cm wide) zones of intensely foliated, black cataclastic rock. Quartz eyes are

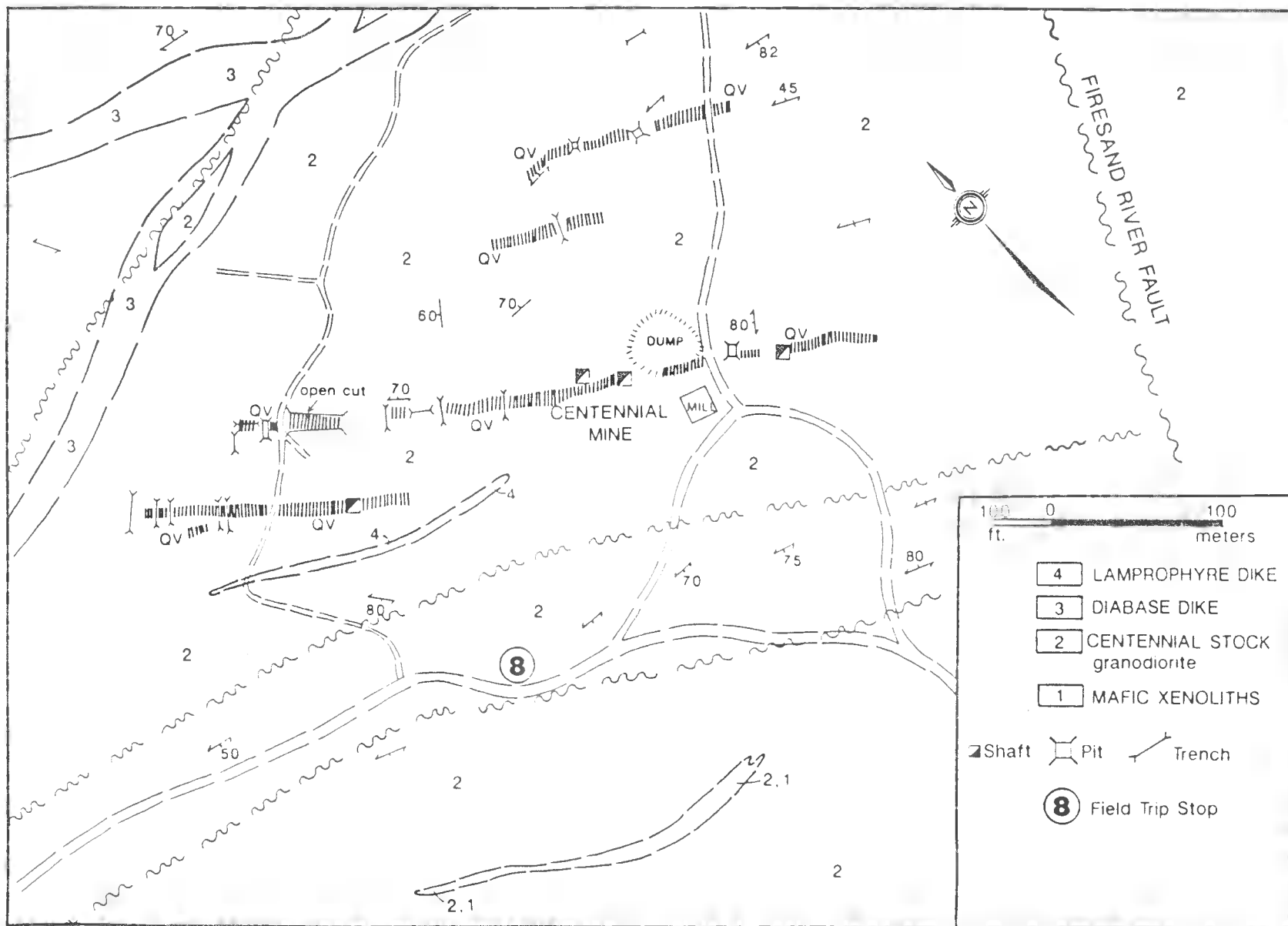


Figure 6. Centennial Mine - Surface Geology

(after WAWA ASSESSMENT FILE WP Naveau-1, S.M. Sears, 1985)

preserved within them and the feldspars are fractured and stretched. Where they have been mapped in the Centennial Mine area (Fig. 6) they are spaced about 100 m apart and have strike lengths of several hundred meters. Their sense of displacement is unknown. Quartz veins of the same orientation and up to a metre in width occupy portions of several of the shears. These veins host the known gold mineralization within the stock (Fig. 5 & 6).

The Centennial Stock hosts two minor past producing gold mines: the Norwalk Mine, 60 ounces (1904 & 1910), and the Centennial Mine, 510 ounces of gold and 30 ounces of silver from 8612 tons of ore (1939) (Fig. 5 & 6). Both mines were shallow operations with their deepest drifts at 200 feet and 250 feet, respectively. Historical information on these operations is sparse but it suggests that mining ceased for financial, management, and/or labour reasons rather than ore depletion.

Although the shear-vein system of the Centennial Stock has not yielded significant quantities of gold, it is analogous in many respects to the mineralization at the Magino Mine, in production near Goudreau since 1988. The most notable difference, in addition to gold content, is the absence of alteration in the Centennial Stock. The Magino ore is within siliceous zones and veins of the sheared portion of the Webb Lake trondhjemite stock and it is accompanied by sericite and potassium feldspar alteration.

STOP 9: BRIDGET LAKE STOCK & IRON FORMATION

- Rock Cut and Surface Stripping, SE Side of Highway 17,
12 km South of Turnoff to Wawa -

This stop displays the character of the Bridget Lake Stock and its unusual intrusive relationship with a magnetite-chert iron formation and mafic flows. It is also the site of a high grade gold occurrence, related to shearing within the iron formation.

The Bridget Lake Stock is a quartz feldspar porphyry that has a surface expression of about 2 sq. km. It outcrops about 6 km south of the mouth of the Michipicoten River (Fig. 1). Its composition, texture and intrusive relationships here and at the next stop suggest that it is a high level, subvolcanic intrusive. The stock consists of a medium grained feldspar porphyry with minor blue quartz eyes. The feldspar phenocrysts are white andesine laths, subhedral to euhedral and up to 1 cm in length, in a fine grained ground mass of quartz and feldspar and minor amounts of chlorite, calcite, sericite, and sphene. The quartz phenocrysts are anhedral and clear. The porphyry texture is generally massive except where it is strongly foliated in local shear zones. (Massey, 1985)

The iron formation consists of alternating layers of chert and magnetite in thicknesses that vary from 1 mm to 5-10 cm, and up to >30 cm for some chert layers. The magnetite content varies from 20% to 70%. Grunerite occurs as spheroids of radiating fibres in some chert-magnetite laminae.

The iron formation layering is commonly contorted into

complex flow(?) - folding or planar disruptions. It is concordant and interfolded with a massive mafic flow at the northeast end of the roadcut. Further south it lies subhorizontally on the upper surface of the porphyry. The porphyry discordantly intrudes the mafic flow but does not display a clearly intrusive contact with the overlying folded iron formation.

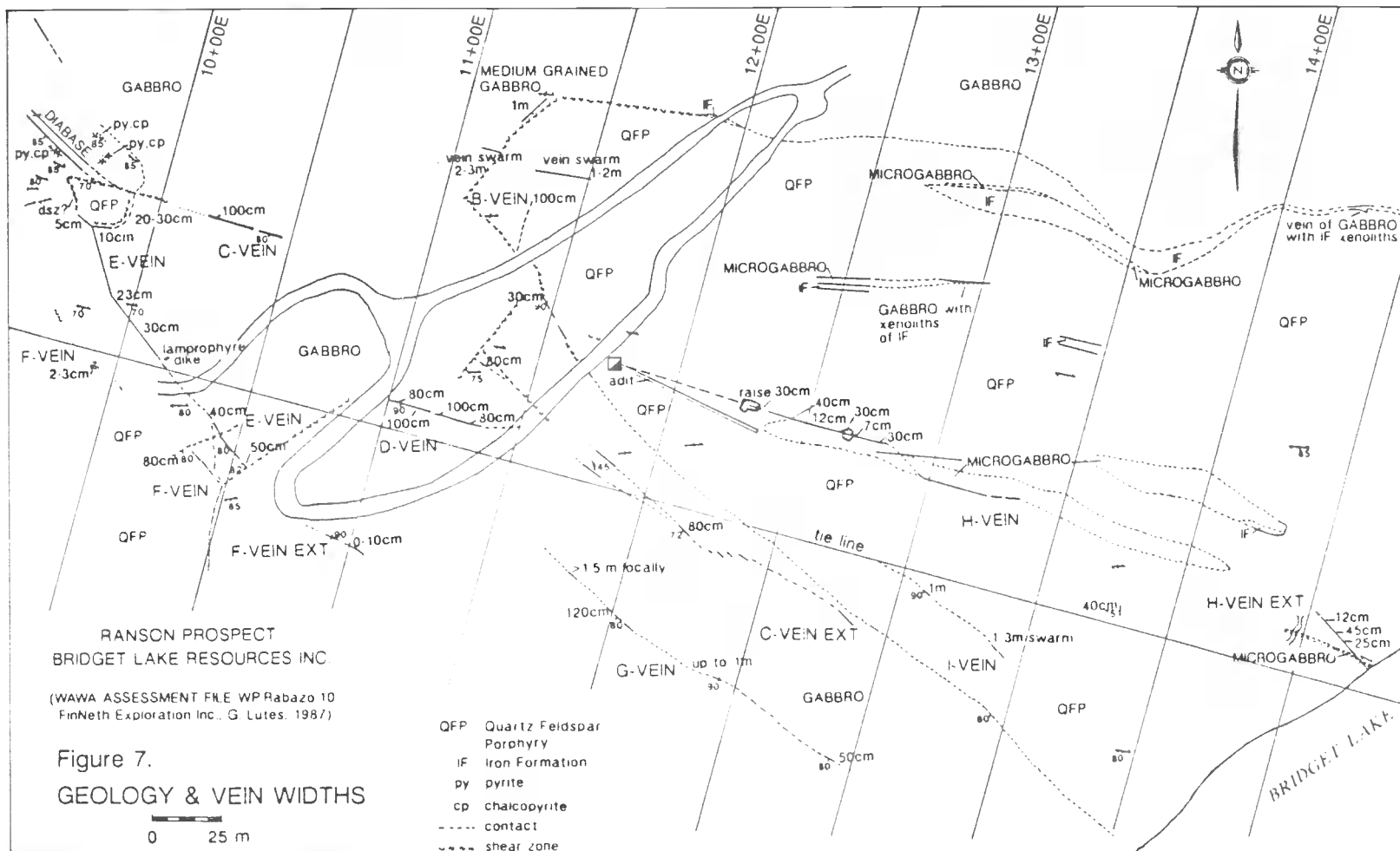
Coarse grained visible gold was exposed in 1981 by trenching adjacent to a pit of unknown vintage, 30 m southeast of the highway. The gold occurs in a vertical bed of sheared, recrystallized chert. The shear zone is a few centimeters wide and is traceable to the vertical roadcut where it is exposed in the underlying porphyry as a zone of intense foliation, without silicification or any gold mineralization.

STOP 10: RANSON MINE (PAST PRODUCER)

- End of 1.6 km Bush Road, Access Road Begins at NW Side of Highway 17, 11 km South of Turnoff to Wawa -

The Ranson Mine (Fig. 7) consisted of a 200 ft. adit along the H vein and a stope raise to surface. All development work and mining occurred during a few months in 1939. An on site mill processed 774 tons of ore and recovered 156 ounces of gold for a grade of 0.20 oz./ton.

The property was dormant until acquired by Bridget Lake Resources in 1982. The company built an access road and prospected the vein systems known from early records. Visible gold was discovered on the E vein and several ounces recovered from hand cobbled samples with the use of a portable mill. In



addition, about 35 ounces were recovered from 188 tons test milled by Pamour Mines Ltd. in Timmins.

The veins are hosted by the Bridget Lake Stock quartz feldspar porphyry and gabbro (Fig. 7). The porphyry is mapped as two stocks: a western body of grey, heterogeneous quartz feldspar porphyry that contains late phase segregations of finer grained granite and xenoliths of mafic and felsic composition; and an eastern intrusion of similar composition but homogeneous and xenolith free.

Both porphyry stocks are intruded by gabbro. The gabbro varies from a coarse grained plagioclase-pyroxene rock to an aphanitic, phenocryst free microgabbro in chilled margins near the porphyry stocks. The eastern porphyry stock has been intruded by numerous veins and dikes of microgabbro.

Banded chert-magnetite iron formation occurs along the northern contact of the quartz feldspar porphyry and along the southern margins of gabbro veins and dikes within the eastern porphyry stock. Contacts between the iron formation and the gabbro are reactive and commonly show brecciation of the magnetite layers by silica remobilized from the cherty beds.

Chloritic alteration of the porphyry is common and extensive adjacent to the gabbro veins and dikes. Carbonate alteration of the host is pervasive within the auriferous veins. Sericite is also abundant as a coating on minor slip planes.

A penetrative cleavage strikes 105° and dips 80° SW, paralleling the gabbro-iron formation contact. Shear zone hosted quartz veins strike 100° to 110° and dip 80° SW,

concordant with the trend of the shear zone. The shear zone is 70 to 80 meters wide and has a dextral sense of motion.

The quartz vein systems of the property have a minimum aggregate strike length of 1000 m and an average width of one meter. Two meter widths are common at depth. Wall rock alteration is minimal to absent. Where present it is sericitic in the quartz feldspar porphyry and chloritic in the gabbro. The veins occupy shear fractures and many display crack-seal zones to 15 cm wide, suggesting multiple episodes of hydraulic emplacement.

Exploration to date suggests the presence of possible reserves, near-surface, of 10,000 to 30,000 tons from the D, E, and H veins with an average grade 0.2 to 0.6 oz. Au/ton. Large samples from these veins and the C vein have defined the gold as fine grained, non-uniformly distributed, and primarily associated with sulphide minerals.

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