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GOLD MINERALIZATION IN THE EASTERN DUNNAGE ZONE, CENTRAL NEWFOUNDLAND

D.T.W. Evans
Mineral Deposits Section

ABSTRACT

During the 1992 field season, four types of quartz-vein-hosted gold mineralization were identified in the areas visited. These are 1) arsenopyrite-rich; 2) pyrite-rich; 3) antimony-rich, and 4) base-metal-rich. These veins are similar in style and setting (i.e., epigenetic and structurally controlled) to other occurrences documented from the eastern Dunnage Zone.

A zone of pervasive silicification, brecciation and quartz stockwork was examined along the Trans-Canada Highway near the Gander airport. This alteration may be related to epithermal processes.

INTRODUCTION

Since 1980, approximately sixty gold occurrences have been discovered within the Dunnage Zone east of the Red Indian Line and west of the Gander Zone (Figure 1). These, combined with the previously known dozen or so occurrences, constitute an important style of mineralization having significant economic potential. With this in mind, a metallogenic study aimed at documenting the nature and setting of this gold mineralization was initiated in 1989. This work involved examining each occurrence and conducting, where necessary, detailed sampling, mapping and diamond-drill core logging.

The 1992 field program concentrated on gold occurrences and alteration zones possibly related to gold in the Millertown, Bay d'Espoir, Glenwood—Gander and Gander Bay areas. A number of previously studied occurrences were revisited and, in some instances, further work was undertaken.

The majority of gold occurrences are readily accessible from the many forest access roads that crisscross the interior. Occurrences in the Bay d'Espoir area are accessible either on foot, by all-terrain-vehicles, helicopter or boat. Both the southern Millertown (Tulks Valley) and the Bay d'Espoir areas are quite rugged. Thick, glacial till, covers vast portions of the region resulting in a paucity of bedrock exposure.

REGIONAL SETTING

Rocks of the Dunnage Zone (Williams, 1979) record the development and subsequent destruction of the early Paleozoic Iapetus ocean. The geological evolution of the zone can subdivided into two broad stages involving pre- and post-accretionary events (Swinden, 1990):

1) Pre-accretionary volcanism and pre- and syn-accretionary sedimentation in a series of Cambrian to Middle Ordovician island arcs and back-arc basins (e.g., Gander River Complex (O'Neill, 1991); Great Bend and Pipestone Pond complexes (Kean, 1974); Victoria Lake Group (Kean, 1977); Davidsville Group (Kennedy and McGonigal, 1972); Exploits Group (Helwig, 1969) and Baie d'Espoir Group (Anderson, 1966; Colman-Sadd, 1976). Emplacement of the Taconic allochthons during the Early Ordovician was closely followed by cessation of island-arc volcanism. Continued closure of the Iapetus Ocean during the Late Ordovician and Early Silurian was accompanied by the deposition of extensive flyschoid sequences in fault-bound basins in the central and eastern Dunnage Zone, and,

2) Syn- and post-accretionary events marked by crustal thickening, resulting in Silurian epicontinental-style volcanism and fluviatile sedimentation (Coyle and Strong, 1987; e.g., Botwood Group, Williams, 1962), extensive regional deformation, metamorphism, plutonism (e.g., Mount Peyton intrusive suite, Blackwood, 1981) and activation or reactivation of major fault systems and thrusting of Dunnage Zone sequences over rocks of the Gander Zone (Colman-Sadd and Swinden, 1984; Keen *et al.*, 1986). These post-accretionary events were punctuated by a climactic Silurian orogeny (Dunning *et al.*, 1990).

GOLD OCCURRENCES STUDIED IN 1992

Most occurrences examined during this field season comprise structurally controlled quartz veins that can be

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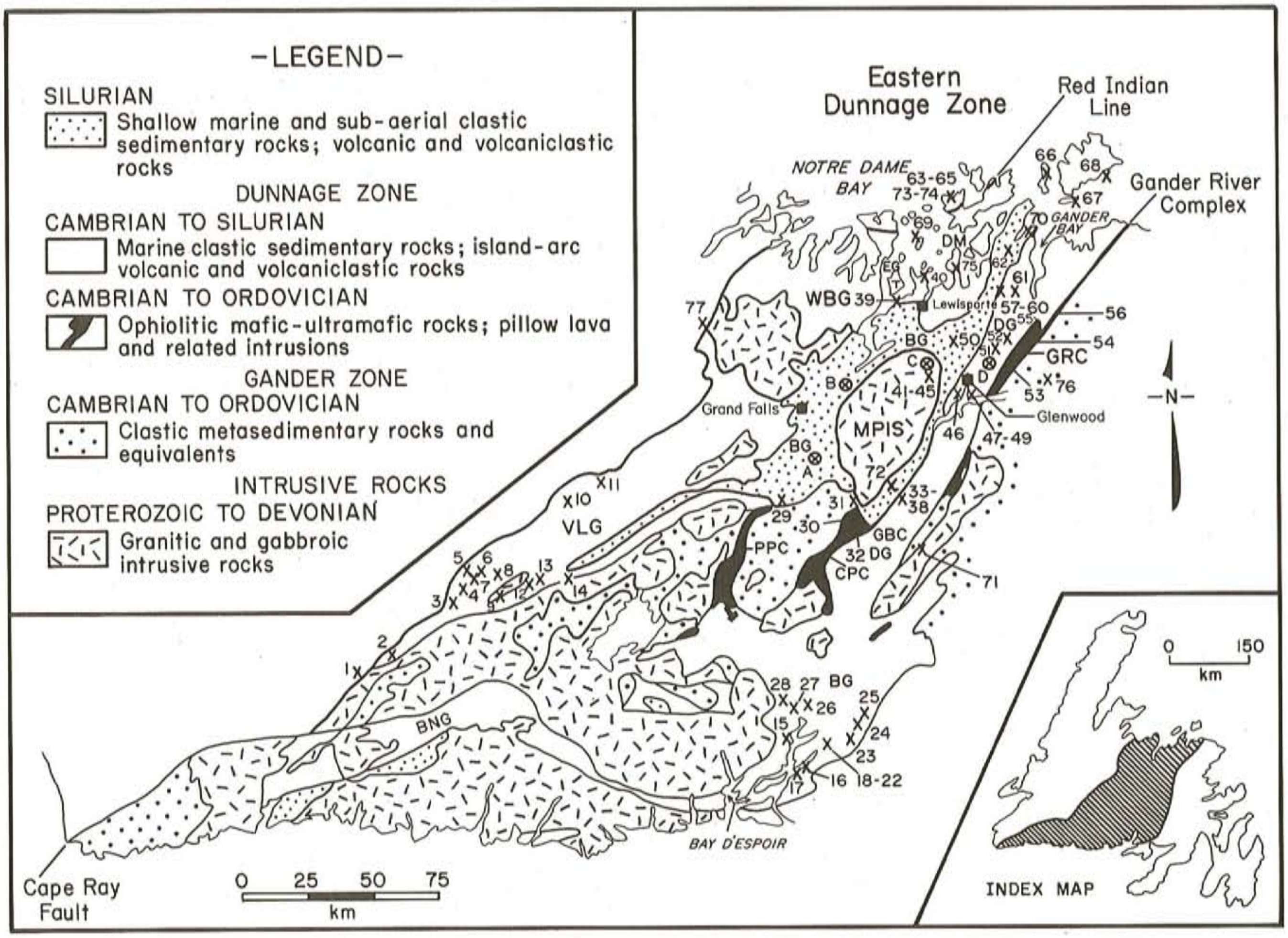


Figure 1. *Simplified regional geology of the eastern Dunnage Zone, central Newfoundland, showing the locations of the significant gold occurrences (numbers are keyed to Table 1; geology modified after Tuach* et al., *1988). DG—Davidsville Group; BG—Botwood Group; DM—Dunnage Mélange; EG—Exploits Group; WB—Wild Bight Group; VLG—Victoria Lake Group; BDN—Bay du Nord Group; BDG—Baie d'Espoir Group; PPC—Pipestone Pond Complex; CPC—Coy Pond Complex; GBC—Great Bend Complex; GRC—Gander River Complex; MPIS—Mount Peyton intrusive suite; T—Thwart Island.*

subdivided based on gangue mineral content into four types (Figure 2): 1) arsenopyrite-rich; 2) pyrite-rich; 3) antimony-rich, and 4) base-metal-rich. Of these, arsenopyrite-rich veins appear to be the most common. Selected grab-sample assays from a number of these occurrences are shown in Table 1. Epithermal-like alteration was observed at one locality near the Gander airport. The alteration comprises a zone of intense silicification and stockwork quartz veining that has no known gold associated with it. Figure 2 outlines a classification scheme developed for gold and antimony occurrences and gold-related alteration zones that occur within rocks of the eastern Dunnage Zone.

Reconnaissance work along new forest access roads in the Tulks Valley area resulted in the discovery of shear-zone-hosted pyritiferous quartz veins called 'The Doe'. Grab samples of the vein did not contain anomalous gold; however, a description of the showing is included in this report.

MILLERTOWN AREA

WOODS LAKE

The Woods Lake area (Figure 1) was included in 1:50 000-scale geological mapping of the King George IV Lake (NTS 12A/4) map area by the Newfoundland Department of Mines and Energy (Kean, 1982). Rocks underlying the showing were mapped as metasedimentary rocks belonging to the Ordovician Bay du Nord Group.

BP Canada Limited discovered gold mineralization in the Woods Lake area in 1987 as a result of detailed soil sampling (Barbour *et al.*, 1988). The exact location of the showing was not reported. A trench excavated near the southwest shore of Woods Lake was visited by the author and found to contain an arsenopyrite-bearing quartz vein. It is believed that this is the original showing as reported by BP Canada Limited.

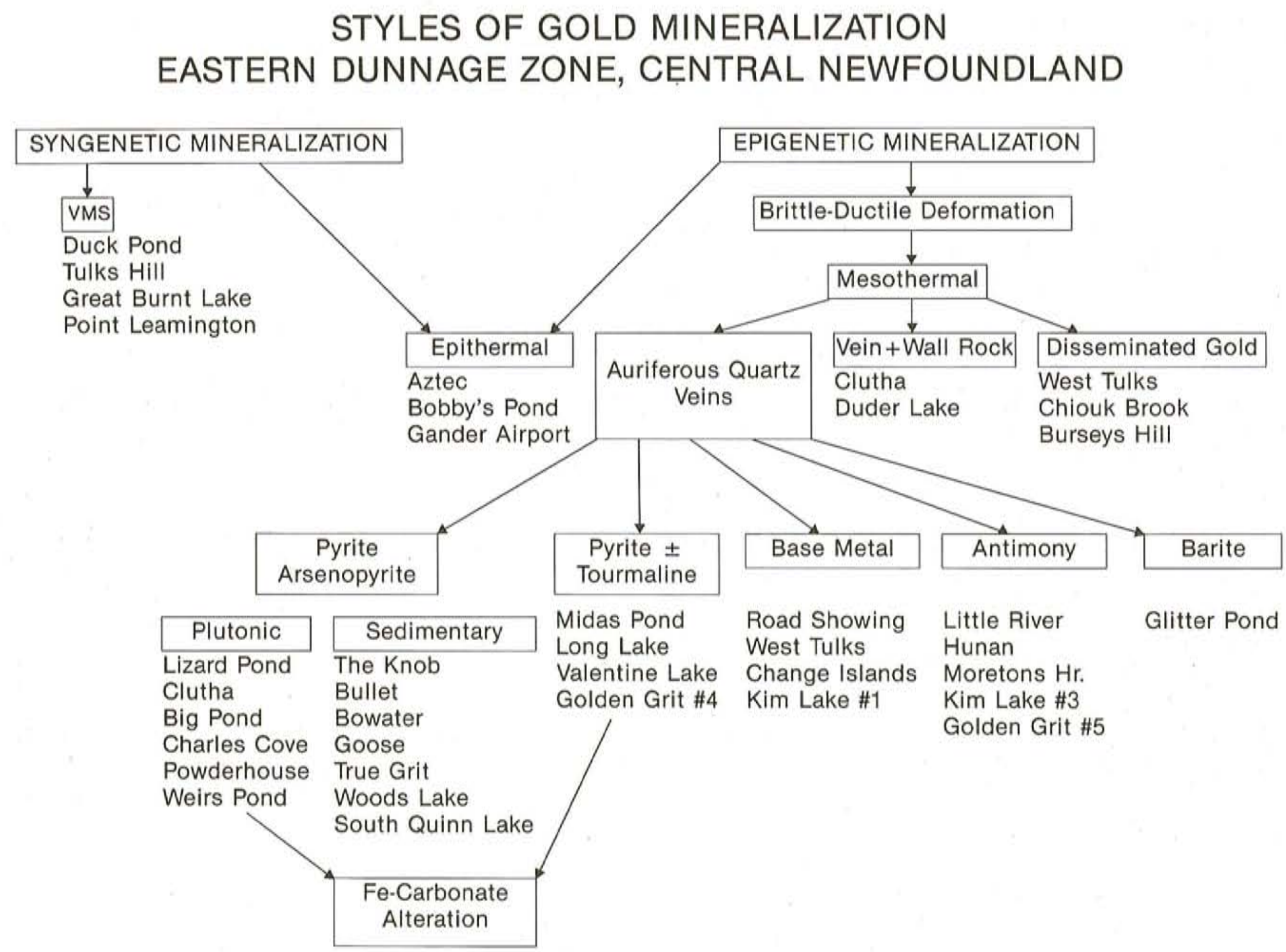


Figure 2. *Classification scheme for gold mineralization within the eastern Dunnage Zone. Included are possible gold-related alteration zones and antimony mineralization that may or may not contain anomalous gold.*

Table 1. Selected assays (grab samples) for gold occurrences in central Newfoundland

Sample	Occurrence	Au	Ag	Cu	Pb	Zn
DE-92-9c	True Grit	9.6g/t	0.1g/t	-	-	-
DE-92-34c	Woods Lake	0.4g/t	0.9g/t	-	-	-
DE-92-40d	Bowers Tickle	3.1g/t	0.3g/t	-	-	-
DE-92-42b	Bowers Tickle	<2ppb	22.3g/t	0.002%	0.14%	0.17%
DE-92-44b	Change Islands	23.2g/t	20.9g/t	0.5%	3.83%	1.07%

Local Geology and Mineralization

The area surrounding the showing is covered by an extensive blanket of glacial till resulting in limited bedrock exposure. Sericitic schist that trends 45°/65°E is exposed in the trench.

The main quartz vein, as exposed in the trench wall, is approximately 25 cm wide and appears to parallel the schistosity. The vein is composed of milky-white quartz and appears to be laminated. Arsenopyrite occurs as fine disseminations, coarse patches and fine anastomosing veinlets within the quartz vein. A grab sample collected by the author assayed 0.4 g/t Au. Grab samples collected from the area by BP Canada Limited assayed up to 11.93 g/t Au (Barbour *et al.*, 1988).

THE DOE

The area was included in regional 1:50 000 scale mapping of the Victoria Lake (NTS 12A/6) map area by the Newfoundland Department of Mines and Energy (Kean, 1977). Rock units hosting the mineralization belong to the Tulks Hill volcanics of the Cambro-Ordovician Victoria Lake Group.

The area has been explored by ASARCO, Price Minerals, Abitibi-Price and BP Canada Limited. The showing was discovered by the author while examining new woods roads along the southeastern side of Tulks Valley. The showing is located approximately 6 km to the northeast of the Midas Pond gold prospect (Figure 1).

Local Geology and Mineralization

Host rocks comprise variably deformed, white-weathering, grey-green quartz crystal tuff. Adjacent to the veins, the host rocks are slightly sericitic and highly cleaved (70°/80°NW).

The main vein trends 115°/85°W, is 5 cm wide, is exposed for approximately 6 m and is fault-controlled. Wall rock to the vein exhibits minor right lateral offset along the fault, which is approximately the same width as the vein. The vein consists of milky-white, coarsely crystalline and locally vuggy quartz. Coarse patches or pods of pyrite are randomly developed within the central part of the vein. Grab-sample assays failed to return anomalous gold values.

Smaller, more erratic quartz veins are developed throughout the deformed tuff. These veins are also vuggy and have coarse patches of fine-grained chlorite. No sulphides were observed within these veins.

BAY D'ESPOIR AREA

TRUE GRIT/GOLDEN GRIT

The area was included in 1:50 000-scale mapping of the St. Albans (NTS 1M/13) map area by the Newfoundland Department of Mines and Energy (Colman-Sadd, 1976). Rocks in the True Grit area were assigned to the St. Josephs Cove Formation of the Ordovician Baie d'Espoir Group.

Detailed work by Teck Exploration Limited in 1989 and 1990 located several significant geochemical (Au, As and Sb) soil anomalies. This work resulted in the discovery of auriferous, arsenopyrite-bearing quartz veins (True Grit showing, Pickett, 1990) and auriferous, pyrite-bearing quartz veins (Golden Grit Trench 4, Pickett, 1991) and stibnite-bearing quartz veins (Golden Grit Trench 5, Pickett, 1991) (Figure 1).

Local Geology and Mineralization (True Grit)

Trenching carried out by Teck Exploration Limited exposed a 1- to 2-m-wide zone of quartz–chlorite veining (Plate 1), with an exposed strike length of approximately 5 m, developed within siltstones of the St. Josephs Cove Formation (Pickett, 1990). The zone trends about 30° and dips 75 to 80° east. The following description of the geology

Plate 1. *Mineralized zone, True Grit.*

and mineralization is based mainly upon the work of Pickett (1990).

Host rocks to the mineralization comprise rusty, sericitic and chloritic siltstone that contain disseminated pyrite and euhedral crystals of arsenopyrite. The degree of sericitization and the abundance of sulphide minerals appear to decrease away from the veining. The arsenopyrite appears to be associated with more chloritic sections of the wall rock.

The mineralized zone appears to occupy the core of a small antiformal fold. This folding may have produced small brittle structures that controlled the site of the mineralization. Bedding to the southeast of the mineralization trends 150°/10°E and, to the west, trends 5° and dips 60 to 70°E (Pickett, 1990). The zone consists primarily of quartz containing irregular patches of chlorite and lesser sericite. The veining contains 1 to 2 percent pyrite and 3 to 10 percent arsenopyrite and is an example of an arsenopyrite-rich quartz vein. The arsenopyrite occurs as: 1) small laths up to 2 mm in length; 2) veinlets developed along quartz–chlorite contacts, and 3) locally as crystals in quartz vugs. A channel sample from the mineralized zone assayed 15.6 g/t Au over 1 m (Pickett, 1990). A grab sample of the arsenopyrite-bearing quartz vein, collected by the author, assayed 9.6 g/t Au.

Local Geology and Mineralization (Golden Grit Trench 4)

Trenches in the Golden Grit area have all been back-filled so descriptions of the mineralization and host rocks are taken from Pickett (1991). Pickett (1991) states that the main rock type exposed by the trenching comprised well-foliated, phyllitic pelite associated with minor interbedded thin sandstone layers. Two trenches, 4 and 7, contained gold mineralization. In trench 4, a rusty quartz pod assayed 16.9 g/t Au. A 1-m-wide zone of rusty quartz veining in trench 7 assayed 4.5 g/t Au. Both of these are examples of pyrite-rich quartz veins.

Significant antimony mineralization was exposed in trench 5 as a result of tracing a quartz–stibnite boulder train

(50 m wide and 1100 m long) and coincident Sb geochemical soil anomaly (Pickett, 1991). This mineralization comprises a 15- to 20-cm-wide quartz vein containing patches of semi-massive stibnite. This vein is not anomalous in gold (Pickett, 1991) and is an example of an antimony-rich vein system.

LITTLE RIVER

The area was included in 1:50 000-scale mapping of the St. Albans (NTS 1M/13) area (Colman-Sadd, 1976). Host rocks to the Little River prospects belong to the Isle Galet Formation of the Baie d'Espoir Group. The Isle Galet Formation consists of submarine clastic sedimentary and felsic tuffaceous rocks that have been subdivided into three distinct but gradational facies termed the western, central and eastern facies (Swinden, 1980). These facies are interpreted to represent variations in water depth and proximity to volcanic centres. Mineralization at Little River appears to be developed within the central facies particularly near its contact with the eastern facies (McHale and McKillen, 1988).

Westfield Minerals Limited began to explore the Little River area in 1984. Two significant gold–antimony mineralized horizons were defined at Kim Lake and Le Pouvoir. A third, more significant belt of mineralization, termed the Little River horizon, was discovered in 1985 (Figure 3). This 30- to 70-m-thick horizon has been traced for approximately 18 km from near the mouth of Little River to Big Spruce Pond (McHale and McKillen, 1988).

The Little River horizon is dominated by felsic to intermediate tuffaceous rocks with lesser pelites and tuffaceous sediments. Sporadic gold and/or antimony mineralization occurs along the entire length of the horizon; however, the most significant mineralization occurs at the Wolf Pond and 22 West zones (Figure 1). Both zones share features common to arsenopyrite-rich, antimony-rich and altered wall-rock types of gold mineralization.

WOLF POND

The Wolf Pond zone has been tested by trenching and diamond drilling. The zone is between 1 and 4.5 m thick and has been traced for approximately 450 m along strike and tested downdip to a depth of 55 m (McHale and McKillen, 1988).

The mineralization is hosted by deformed silicic tuff and consists of disseminated arsenopyrite, various antimony minerals, pyrrhotite, pyrite and limonite. The antimony mineralization appears to be concentrated within siliceous bands or veins. Quartz–carbonate veins and veinlets are widely developed and these veins locally have siliceous, arsenopyrite-bearing alteration haloes (Plate 2).

The gold is fine grained and is associated both with arsenopyrite and the antimony minerals. It occurs in tiny quartz–carbonate fractures or as coatings around the sulphide minerals (McHale and McKillen, 1988). Grades from diamond drilling include 6.51 g/t Au over 3.05 m and 1.37 g/t Au over 6.49 m (McHale and McKillen, 1988).

22 WEST ZONE

Trenching and diamond drilling intersected a zone of mineralization 3 to 9 m wide having a strike length of 350 m (McHale and McKillen, 1988). Two styles of mineralization are described by McHale and McKillen (1988): 1) disseminated arsenopyrite, pyrrhotite, pyrite chalcopyrite, limonite and various antimony minerals that are developed within a felsic intermediate crystal tuff, and 2) arsenopyrite, stibnite, pyrite and pyrrhotite mineralization developed within quartz–carbonate veins. These veins are interpreted to be related to a crosscutting structure (McHale and McKillen, 1988). Assays from diamond drilling include 4.11 g/t Au over 1.52 m.

GLENWOOD–GANDER AREA

THE KNOB

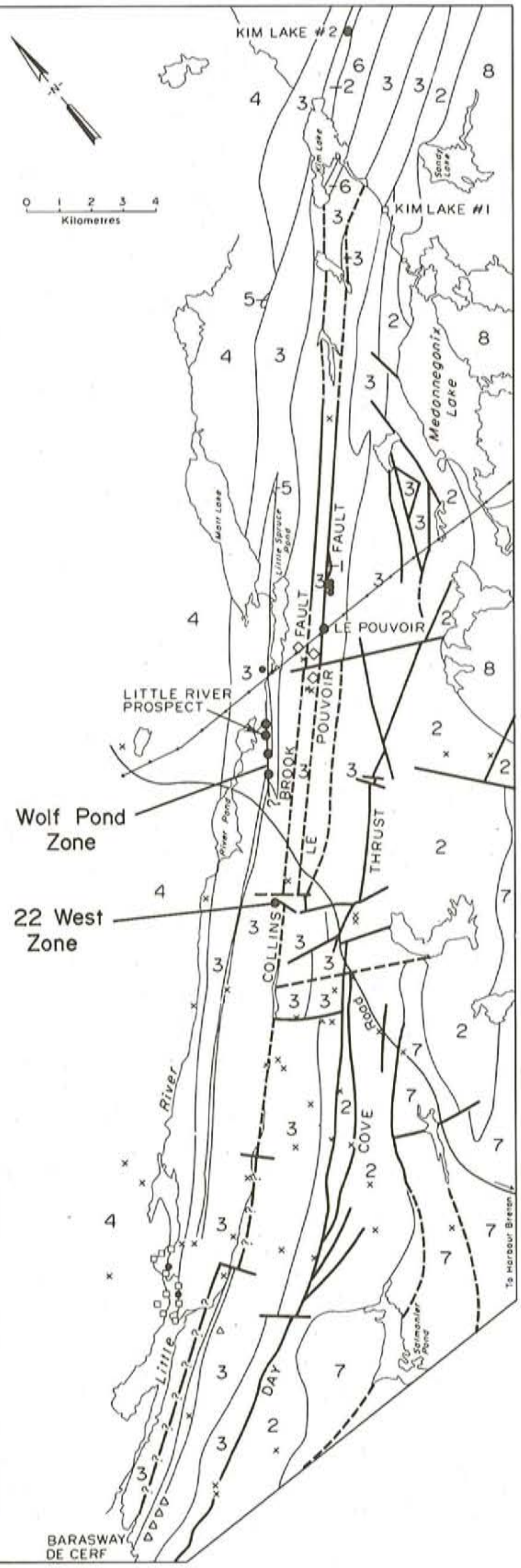
The area was included in 1:50 000-scale geological mapping of the Gander Lake (NTS 2D/15) map area by the Newfoundland Department of Mines and Energy (Blackwood, 1982). The rocks that host The Knob and nearby Bullet prospects were assigned to the Middle Ordovician Davidsville Group.

Gold mineralization was first discovered at the Bullet prospect by Noranda Exploration Limited in 1987. Subsequent work by Noranda in the fall of 1990 resulted in the discovery of spectacular quartz-vein-hosted gold mineralization at the Knob prospect (Figure 1) (Collins, 1991). Recent trenching has further uncovered the structurally complex vein system (D. Sheppard, personal communication, 1992).

Local Geology and Mineralization

The auriferous quartz veins are developed within a variably deformed northeast-trending greywacke unit that is in fault contact with an unmineralized and visibly unaltered sequence of shale. The shale dips steeply to the northwest and forms the structural footwall to the mineralized package. Faulting also appears to have offset the mineralized veins (Plate 3).

Two types of quartz veins are present: 1) pyrite–arsenopyrite-rich veins that contain low values of gold, and 2) milky-white massive and smaller sheeted quartz veins (Plate 3) that contain coarse free gold and relatively minor amounts of pyrite, chalcopyrite and a steel grey mineral identified as boulangerite (Collins, 1991). Both vein types are shear-controlled and are hosted by structures that crosscut the greywacke at a high angle. The veins are typically less than 50 cm wide and exhibit pinch-and-swell textures. Smaller extensional veins are also developed within the greywacke outside of the main shear zones. Although spatially related,



LEGEND

DEVONIAN

8 *Porphyritic biotite granite (massive)*

SILURIAN

7 *Granite, granodiorite, gabbro (foliated)*

ORDOVICIAN?

6 *Kaegudeck diabase*

5 *Granodiorite (sheared)*

MIDDLE ORDOVICIAN

4 Riches Island Formation: *greywacke*

3 Isle Galet Formation: *felsic and mafic volcanic rocks*

2 Little Passage Gneiss *(psammite)*

ORDOVICIAN OR OLDER

1 *Carbonatized ultramafics*

● *Au prospects and occurrences (+ Py, Po, Asp, Sb)*

△ *Volcanogenic massive sulphides (Pb–Zn)*

◇ *Sb veins*

□ *Py-Po ± Sb veins*

× *Minor pyrite occurrence*

—— - - - *Faults (defined, inferred)*

Figure 3. *Simplified geology and mineral occurrences in the Little River area (modified after Tuach* et al., *1988).*

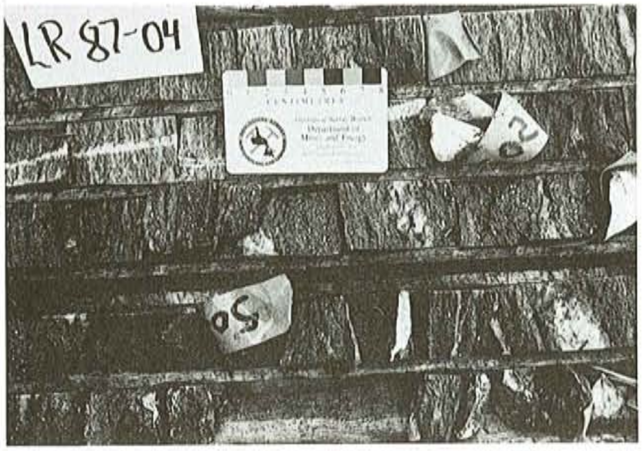


Plate 2. *Arsenopyrite needles within alteration haloes developed around quartz–carbonate veins, Wolf Pond.*

Plate 3. *Shear-controlled sheeted quartz veins, The Knob. The mineralized zone is faulted against barren shale (top of photo). The shale forms the structural footwall to the mineralization.*

temporal or genetic relationships between the two vein types are unknown.

Wall-rock alteration around the milky-white veins comprises both silicification with disseminated pyrite and arsenopyrite, and rusty-weathering, intensely deformed zones.

GANDER AIRPORT

The area was included in 1:50 000-scale geological mapping of the Gander Lake (NTS 2D/15) map area by the Newfoundland Department of Mines and Energy (O'Neill, 1990). Rocks underlying the area were mapped as part of the Jonathan's Pond Formation of the Ordovician Gander Group.

South Coast Resources (Dearin, 1990; Dearin and Jacobs, 1991) carried out exploration for gold mineralization in the area between Gander Lake and the Trans-Canada Highway (TCH)–Gander airport runway (Figure 1).

Local Geology and Mineralization

An extensive zone of pervasive silicification, hydrothermal brecciation and stockwork quartz veining, developed in greyish-green pelites, is exposed in a road cut along the TCH near the Gander airport and along the north shore of Gander Lake. The northeast-trending zone is up to 50 m wide and has been traced for 1.8 km along strike (Dearin, 1990).

Dearin and Jacobs (1991) described the alteration as being related to epithermal-style processes. They described a zonation characterized by intense quartz veining along the margins that grades into intense silicificatiion (opaline silica, cockade textures and possible geyserite eggs) and vuggy and cockscomb-textured quartz stockwork. Rusty sericitic zones were also observed.

Pink feldspar and white to pale-green sericitic or silicified wall-rock fragments occur throughout the zone. The breccia fragments are angular near the zone margins and become diffuse within the intensely silicified parts of the zone. Fine-grained pyrite occurs locally within the hydrothermal breccia.

At Gander Lake, the silicified and hydrothermally brecciated zone is in contact with a gabbro that has been silicified and epidotized along the contact (Dearin, 1990). Disseminated pyrite and pyrrhotite occur along the contact and gabbroic breccia fragments occur within the silicified zone. Significant gold values have not been reported from the zone.

GANDER BAY AREA

WEIR'S POND

The area was included in regional 1:50 000-scale geological mapping of the Weir's Pond area by the Newfoundland Department of Mines and Energy (O'Neill, 1991). Bedrock in the mineralized area comprises mafic volcanic rock, gabbro, diabase and trondhjemite of the Gander River Complex.

Auriferous quartz veins were discovered by Esso Mining (Canada) Limited in 1986 (Lenters, 1986) as a result of detailed exploration in the Weir's Pond area (Figure 1). Esso trenched the showing and drilled 7 short diamond-drill holes in the vicinity of the mineralization.

Local Geology and Mineralization

The Weir's Pond showing occurs within variably altered mafic volcanic rocks (Lenters, 1986). The showing consists of a series of *en echelon* tension gash quartz–carbonate veins (Plate 4) that appear to be fault controlled (Lenters, 1986). Two vein sets are exposed, the dominant set trends 30°/55°E and the second set, which consists of small quartz veinlets, trends 170°/60°E. Veins in the dominant set are up to 5 cm wide and 3 to 4 m long. The veins locally are weakly

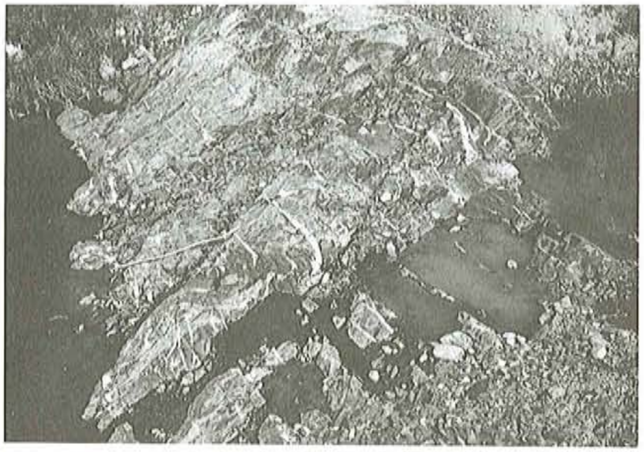


Plate 4. En echelon *quartz–carbonate veins developed within altered mafic volcanic rocks of the Gander River Complex, Weir's Pond. Width of plate is 5 m.*

Plate 5. *Base-metal-rich quartz vein developed within a felsic dyke, Change Islands.*

laminated and contain wall-rock fragments and small patches of sulphide. The prospect is an example of the arsenopyrite-rich quartz vein style of gold mineralization.

Narrow haloes of intense silicification and carbonate alteration are developed within the wall rock adjacent to the veining. Fine-grained pyrite and small needles of arsenopyrite (2 to 3 mm long) are disseminated throughout these haloes. In areas of intense veining, these haloes coalesce to form larger zones up to ten's of metres wide (Lenters, 1986).

Gold values on surface range from 20 to 450 ppb and a grab sample assayed 650 ppb; diamond drilling intersected a narrow zone that assayed 2.5 g/t over 10 cm (Lenters, 1988). Lenters (*op. cit.*) also stated that the alteration and veining is open both down dip and along strike.

CHANGE ISLANDS

The area was mapped by the Geological Survey of Canada (Baird, 1958) at a scale of one inch to one mile. The rocks underlying the mineralized area were assigned to the North End Formation of the Fogo Group. Williams (1967, 1972) reassigned these rocks to the Lawrenceton Formation of the Botwood Group.

Rio Algom Exploration Incorporated conducted detailed geological, geochemical and ground geophysical surveys of the area in 1984-85 (MacGillivary, 1985) and discovered a high-grade auriferous quartz vein that is exposed on a beach on the east side of Change Islands (Figure 1).

Local Geology and Mineralization

The mineralized quartz vein (Plate 5) is hosted by a siliceous feldspar porphyry dyke that intrudes felsic pyroclastic and green tuffaceous rocks. The dyke is 2 to 5 m wide, trends 188°/78°E and contains minor disseminated sulphides. Contacts with the felsic volcanic rocks are sharp but are locally fractured and rusty.

The quartz vein is milky-white, weakly laminated and locally vuggy. It trends 165°/65°W, is approximately 30 cm wide and is exposed continuously for approximately 5 m along strike. The vein was traced to the northwest by trenching for approximately 10 to 12 m (MacGillivary, 1985). Wall-rock margins are slightly sheared and locally brecciated.

The vein contains fine disseminations, patches and stringers of galena, sphalerite, chalcopyrite and pyrite. A grab sample of the vein assayed 23.2 g/t Au, 0.5 percent Cu, 3.8 percent Pb, 1.1 percent Zn and 20.9 g/t Ag. Grab samples collected by Rio Algom Exploration Incorporated assayed between 1.52 to 164.1 g/t Au and between 43 to 121 g/t Ag (MacGillivary, 1985).

A number of weakly mineralized (galena and chalcopyrite) non-auriferous quartz veins and zones of sheared and rusty volcanic rocks (with <1 percent pyrite and pyrrhotite) were also reported by Rio Algom Exploration Incorporated (MacGillivary, 1985).

SUMMARY

The gold mineralization examined is similar in style and setting to gold occurrences described by Evans (1991, 1992) from the northeastern and central parts of the eastern Dunnage Zone. The occurrences fall within the two broad classes, mesothermal veins and epithermal-style alteration, described by Evans (1991).

The mesothermal quartz vein systems are independent of host rock type, occurring in metasedimentary and metavolcanic rocks, felsic dykes and greywacke. The key elements to the location of the mineralization are: 1) a spatial association with major fault zones that are interpreted to have provided plumbing systems for the mineralizing fluids, and 2) host rock characteristics that favoured the formation of quartz veins (i.e., rheological and physiochemical properties).

Epithermal-style alteration has been reported form a number of areas in the eastern Dunnage Zone (i.e., Bobbys Pond, Aztec and The Outflow; Evans, 1991, 1992). These possible epithermal systems exhibit intense hydrothermal brecciation, pervasive silicification, quartz veining and strong argillic alteration. Occurrences such as these are believed to be more common than originally thought, particularly in the country rocks surrounding the Mount Peyton intrusive complex. A similar style of alteration, veining and brecciation is present at the Gander airport zone. This zone constitutes the only alteration system of this style to be documented within the Gander Zone.

Many of the occurrences examined are spatially related to regionally extensive structures: Woods Lake–the Woods Brook–Victoria Lake fault system; Little River–the Collins Brook Fault and Day Cove Thrust; The Knob–Bullet–the Appleton linear; Weir's Pond (faults related to emplacement of the Gander River Complex) and Change Islands–The Reach Fault.

Minor or trace amounts of antimony are associated with many of the gold occurrences in the eastern Dunnage Zone. Antimony-rich occurrences such as the Hunan, typically have low gold values; occurrences in the Bay d'Espoir area are an exception. At Little River, the antimony (up to 2 percent) and gold mineralization occur together. At the Kim Lake #3 prospect (Figure 1), the gold and antimony mineralization occur in quartz veins (Colman-Sadd and Swinden, 1984). Genetic relationships between the gold and antimony are undetermined.

Tallman (1991) suggested a vertical zonation to explain the separation of gold and antimony mineralization. The antimony at the Hunan prospect could have been deposited in a lower temperature, spatially higher environment relative to gold.

In the Bay d'Espoir area the occurrences could be located at a crustal level somewhere between the deeper gold-rich and the shallower antimony-rich occurrences, thereby, imparting the characteristics of both types of mineralization on a single occurrence. Alternately, two separate mineralizing episodes could be present: 1) an arsenopyrite–pyrite episode, and 2) an antimony episode. Such a two-stage model has been propossed for the Lisglassan–Tullybuck deposit in Ireland (Morris *et al.*, 1986).

A systematic isotopic study (sulphur, carbon, oxygen and lead) of gold mineralization in the eastern Dunnage Zone is in the planning stages. Variations in host rock type and gangue mineralogy will be examined. It is hoped that this data will shed some light on the source of auriferous fluids and the mechanisms contributing to gold deposition.

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