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Enclosures (indicate number of each):

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Received: 2011-10-04

Comments:

Signed: ____________________________  Date: 2011-10-12
Ninth Year Assessment Report

Geological Compilation

Licence 19325M (Ninth Year)

South Golden Promise Project

Central Newfoundland
(NTS 12A/16)

For

Crosshair Exploration and Mining Corporation
And Paragon Minerals Corporation

Work Conducted from
October 1, 2010 to December 20, 2010

Total Claims: 25

Total Expenditures: $11,674.57

Submitted By:

Lindsay Steele
Project Geologist

Crosshair Exploration and Mining Corporation
Suite 1240, 1140 West Pender Street
Vancouver, BC, V6E 4G1

October 3, 2011
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1.0 Introduction and Summary

The South Golden Promise project is located southeast of Red Indian Lake in west central Newfoundland and covers several portions of the 12A (1:250,000) NTS map sheet. The project is part of a joint venture agreement (2003) between Rubicon Minerals Corporation (“Rubicon”) and Crosshair Exploration and Mining Corporation (“Crosshair”).

Reconnaissance soil sampling during the summer of 2004 identified several areas of anomalous gold in soil, including a single station anomaly of 120 ppb Au. Follow-up prospecting of this anomaly resulted in the discovery of the Snow White and subsequently the Linda gold zones. Further soil sampling in 2004 and 2005 concentrated on tracing the southwestern extension of the Snow White zone and resulted in the discovery of several areas of anomalous gold in soil.

Mechanical trenching in the vicinity of the Linda/Snow White zone exposed a composite quartz vein system at least 170 metres in length and up to 5 metres in width. Channel sampling of the vein system returned values up to 29.7 g/t Au over 0.5 metres and grab samples from the quartz veins assayed up to 232 g/t Au.

In May 2006, Crosshair drilled 1,016 metres in 16 holes, intersecting the vein over a 280 metre strike length and to a vertical depth of 115 metres. The highest grade mineralization was returned from drill hole SGP-14, which intersected a zone grading 19.5 g/t Au over 1.15 metres, including 63.3 g/t Au over 0.35 metres.

In the summer of 2010, Crosshair conducted biogeochemical and rock sampling. The program discovered several areas of high arsenic values and trends that warrant follow up.

From October 1, 2010 to December 20, 2010 Tanya Tettelaar compiled all previous South Golden Promise data, made site visits and completed a geological interpretation of the area.
2.0 Location and Access

The South Golden Promise project is located in west central Newfoundland and is entirely within NTS map sheet 12A/16 (figure 1). The work detailed in this report was carried out on licence 19325M.

Licences north of the Exploits River and can be accessed via Route 370, which leads from the Trans Canada Highway at the town of Badger southwest to Buchans Junction. Route 370 crosses the northwestern portion of the Licence 17346M roughly 30km southwest of Badger. The community of Millertown is located approximately 10km west of the licence.

3.0 Claim Status

The South Golden Promise project includes several map-staked licences that are subject to an option agreement signed in 2003 between Rubicon Minerals Corporation (“Rubicon”) and Crosshair Exploration and Mining Corporation (“Crosshair”). In December 2006, Rubicon closed a Plan of Arrangement whereby the company’s Newfoundland and Labrador assets were spun out into a new company called Paragon Minerals Corporation (“Paragon”).

Crosshair has fully earned its 60% in the South Golden Promise Property. Paragon retains a 40% working interest.

Table 1: Claim Status

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4.0 Regional Geology

The South Golden Promise Property is located within the Dunnage tectonostratigraphic zone (Williams, 1979) of central Newfoundland (Figure 3). The Dunnage Zone preserves Cambrian to Middle Ordovician rocks of ophiolitic, island-arc and back-arc affinity representing vestiges of the ancient Iapetus Ocean. The Dunnage Zone can be divided into the Exploits and Notre Dame subzones, which are separated by an extensive regional fault system known as the Red Indian Line (Williams et al, 1988). The Red Indian Line represents a suture zone between the Laurentian and Gondwanan terranes, and is situated immediately northwest of the property.

The region underlying most of the South Golden Promise Property is dominated by rocks of the Victoria Lake Supergroup (Evans and Kean, 2002; Kean 1977) which consists of thick sequences of Cambrian to Middle Ordovician volcanic and epiclastic rocks that outcrop along the western portion of the Exploits Subzone. The Victoria Lake Supergroup hosts numerous volcanogenic massive sulphide deposits (ex: Duck Pond, Boundary, Long Lake, and Boomerang deposits) and gold prospects (ex: Jaclyn Main Zone, Midas Pond prospect).

The rocks of the Victoria Lake Supergroup have been metamorphosed to lower greenschist facies, except along its southern boundary where the rocks have locally undergone middle greenschist to lower amphibolite grade metamorphism. Regionally, the rocks exhibit a penetrative foliation that is subparallel to bedding, and which intensifies to the southwest.

5.0 Property Geology

The South Golden Promise Property is predominantly underlain by sedimentary and volcanic rocks of the Victoria Lake Supergroup (Evans and Kean, 2002), except for the northwest portion of Licence 17346M where a regionally extensive unit of Caradocian shale separates the upper units of the Victoria Lake Supergroup from sedimentary rocks of the overlying Badger Group (Figure 4).

Siliciclastic rocks of the Harpoon Brook Belt account for much of the northeastern portion of the Victoria Lake Supergroup (Evans and Kean, 2002) and predominantly underlie all of the map-staked licences discussed in this report. These rocks typically display a cyclic bedding sequence consisting of basal conglomerate and pebbly sandstone that grades upward into sandstone, which in turn is overlain by thinly laminated siltstone, argillite or shale (Kean and Jayasinghe, 1982; Evans and Kean, 2002). Siliceous siltstone and chert commonly occur near the top of the sedimentary sequence. Volcanic detritus within the sequence suggests that the rocks have been derived from underlying and adjacent volcanic units (Evans and Kean, 2002). Underlying the southern portion of some licences are felsic rocks belonging to the Tally Pond Belt (Evans and Kean, 2002).
Gold mineralization occurs on the property at the Linda/Snow White Zone within grey to milky white quartz veins hosted by greywacke, siltstone and mudstone. A fine to medium grained gabbro unit also occurs in spatial association with the mineralized veins. The quartz veins occur as a series of steeply to moderately dipping composite veins up to several metres wide. Mineralization typically consists of free gold near vein margins or along stylolitic fractures, similar to the gold mineralization on the Golden Promise Property.

6.0 Previous Exploration

Exploration in the Buchans – Badger region of central Newfoundland has traditionally been focused on base metal exploration, and until recently little exploration for gold has been documented. Copper-lead-zinc mineralization was first discovered near Buchans in 1905 by prospector Matty Mitchell. Mining operations began in 1928 and continued on several different ore bodies until the mine closure in 1984.

In 1933, a prospecting party was sent out by the Buchans Mining Company to explore parts of an A.N.D. Company Charter lease which would have included portions of the current South Golden Promise Property. No occurrences were noted within the limits of the claims covered by this report.

In the mid 1970’s, Labrador Exploration and Mining conducted airborne geophysics, geology, geochemistry and diamond drilling in the vicinity of licence 11983M. A total of six holes were drilled south west of Selby’s Pond for a total of 2,239 feet. None of the holes reported significant mineralization.

In 1987-88, Rio Algom Exploration Inc. conducted line cutting, geophysics and diamond drilling in the Gills Pond-Harpoon Brook area, where a total 539 meters were drilled in six holes near the southern portion of licence 11983M. None of the holes intersected alteration or mineralization indicative of a massive sulphide environment.

Throughout the late 1970’s through to the mid 1990’s, Noranda Exploration carried out both reconnaissance and grid scale work in numerous localities in central Newfoundland including portions of Licence 11983M. In 1977, Noranda’s Exploration activities included line cutting and geophysics within the boundaries of licence 11983M, as well as geophysics and the drilling of 2 diamond drill holes immediately west of the south central portion of the licence. No mineralization was reported in either of the holes.

In 2003, Crosshair entered into an agreement with Rubicon giving Crosshair the option to acquire an interest in the South Golden Promise Property, which is contiguous to the southwest with the Golden Promise Property. Work on the South Golden Promise Property by Crosshair and Rubicon/Paragon includes airborne EM/magnetic geophysical surveys, variably detailed soil sampling, prospecting and rock sampling, mechanical trenching and 1,016 metres of diamond drilling in 16 holes. In late 2004, Crosshair discovered the Linda / Snow White gold zone while investigating several soil
geochemical anomalies identified from a reconnaissance survey. Grab samples from the mineralized zone returned values up to 232 g/t Au, while channel sampling returned values up to 29.7 g/t Au over 0.5 metres. The best intersection (in hole SGP-14) from the diamond drilling program returned a grade of 19.5 g/t Au over 1.15 metres, including 63.3 g/t Au over 0.35 metres.

During January of 2008, Crosshair completed soil sampling in the vicinity of the Linda / Snow White vein at South Golden Promise. The survey consisted of 318 combined soil and humus samples designed to evaluate the gold system along strike and also for adjacent parallel mineralization. Five samples returned gold values in the 34-55 ppb range and occur several kilometers southwest of, and along strike from, the Linda / Snow White vein.

During October and November of 2008, Crosshair completed soil and rock sampling in some parts of the South Golden Promise Property. The program was carried out in order to follow-up on several targets including several soil geochemical anomalies identified from reconnaissance sampling in January 2008. A total of 322 soil samples and 22 rock samples were collected which returned some highly gold values of 7,667 and 1,750 g/t Au. These anomalies along with other moderately elevated gold anomalies in soils indicate a northeast-southwest trend across three adjacent survey lines. Rock samples collected to the southwest of the anomalous soils did not return encouraging gold values.

In 2009, follow-up work was conducted on the property where previous soil anomalies were discovered. The work was successful in outlining a new quartz vein, along the regional southwestern strike extension of the Linda/Snow White vein. Unfortunately, the vein discovered in bedrock and angular float did not yield impressive results for gold. A second, and more encouraging discovery, was that of anomalous quartz-carbonate float yielding assays of 6.78 and 2.44 g/t gold. These samples are coincident with highly anomalous soil samples found in 2008.

In the summer of 2010, Crosshair conducted biogeochemical and rock sampling. The program discovered several areas of high arsenic values and trends that warrant follow up.


7.0 2010 Geological Compilation

From October 22nd to November 2nd 2010, Tanya Tettelaar conducted a review of drillcore, trenches and all available drillhole data (core photos, assays, logs, and cross sections). This work was conducted to better constrain the geological parameters of the gold mineralization at the Linda/Snow White prospect. The geological review also covered the Golden Promise property (Appendix 3).

During the review, holes SGP06-01, SGP06-02, SGP06-11, SGP06-14 and SGP06-15 were examined along with the Linda/Snow White Trench.

8.0 Conclusions and Recommendations

The 2010 geological review conducted by Tanya Tettelaar resulted in several recommendations:

1) Target 075 trending geophysical anomalies and possibly consider 045 and 110 trends and intersections that are found along the Exploits River, or that have underlying soil anomalies.

2) Conduct a geochemical review of fault gouge related to vein systems to determine any effects on gold mineralization.

3) Conduct a petrographic/SEM study of:
   - Key units in the Exploits Rapids Formation;
   - Vein margins pale-grey translucent quartz compared to milky white quartz;
   - Microstructures within the veins and how they are related to gold.
9.0 Expenditures

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10.0 References

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Evans, D.T.W., Kean, B.F. and Dunning, G.R.

Evans, D.T.W. and Kean, B.F.

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Noranda Exploration Company Limited;
1977: Diamond Drill Hole Record and Diamond Drill Hole Location Plan, Bobby’s Pond Area (Anomaly 13). Assessment File # 12A/10 (231).

Swinden, H.S.

Thicke, M.J.

Tuffy, F.

Williams, H.

Williams, H., Colman-Sadd, S.P. and Swinden, H.S.

Dunn, C.E
Appendix 1

Statement of Qualifications
Statement of Qualifications

Stewart Wallis

I, C. Stewart Wallis P.Geo., currently residing at 1419 133A Street, Surrey BC, do hereby certify that:

1) I graduated with a Bachelors of Science (Geology Major) degree from McMaster University in 1967.

2) I have worked continuously in my profession from 1967 to the present.

3) I am currently employed as President & CEO of Crosshair Exploration & Mining Corporation, Suite 1240 - 1140 West Pender Street, Vancouver, BC V6E 4G1.

4) I hold no direct interest in any of the mineral claims subject to this report.

5) All statements, interpretations, and conclusions made in this report are based on work supervised by me, or upon review of available data and observations believed to be accurate and correct.

6) I am not aware of any material fact or material change with respect to the subject matter of this report that is not reflected in the report, the omission to disclose which makes the Technical Report misleading.

Dated on this 3rd day of October, 2011.

C. Stewart Wallis PGeo
President
Appendix II

List of Personnel
## List of Personnel

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<th>Name</th>
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<td>Steve Janes</td>
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<td>Lindsay Steele</td>
<td>Vancouver, BC</td>
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Appendix III

Geological Report
Geological Interpretation of the Golden Promise and South Golden Promise Properties Based on Review of Historical Drillcore and Trenches

Christopher Trench

VG Quartz Vein
GP06-47
Jaclyn North

Submitted to Crosshair Exploration & Mining Corp. as an internal report by Tanya Tettelaar, M.Sc., P. Geo.
December 20, 2010
SUMMARY
The Golden Promise and South Golden Promise properties lie within the tectonostratigraphic Exploits Subzone, Dunnage Zone and is underlain by marine, volcaniclastic sedimentary rocks of the Exploits Rapids Formation, Victoria Lake Supergroup, capped by Caradocian Shales. The Exploits Rapids Formation stratigraphy formed within a volcanic arc extensional basin consisting of turbiditic sequences of intercalated mudstone, siltstone and greywacke. At the Jaclyn zone, these sequences also contain massive, metre-thick beds of felsic volcaniclastic arkosic and lithic greywacke as well as zones containing episodic expulsion of quartzofeldspathic lapilli-ash tuff deeper in the stratigraphy, suggesting proximity to a volcanic source. Volcanogenic-driven hydrothermal alteration within this stratigraphy is marked by sericite-chlorite-silica-carbonate alteration and spotted alteration textures. Up stratigraphy, arkosic/lithic greywackes and lapilli-ash beds are no longer present representing a period of volcanic quiescence in the area and greywacke beds wane out. At the Linda/Snow White zone, interbedded mudstone, siltstone and greywacke, similar to the Jaclyn zone are present, however, the above-mentioned alteration is weak, possibly reflecting diagensis and spotting textures are absent. Minor conglomerate beds containing weakly eroded quartz and feldspar clasts and volcanic fragments as well as diorite sills/laccolith suggest sedimentation occurred in a basinal environment distal from a volcanic source.

The basin(s) was subjected to regional F₁ open to tight folding during the Ordovician-Silurian Salinic orogenic event with fold structures verging to the southeast, and generally plunging gently to the northeast. Regional brittle-ductile deformation occurred during syn- to late-folding forming east-northeast, north-northeast and east-southeast trending, brittle-ductile shear zones. These shear zones underwent episodic reactivation and in at least some cases represent east-northeast trending sinistral strike-slip faults, which developed gold-bearing quartz vein systems. More intense shearing of vein margins is correlative to higher gold grades suggesting that greater rheological competency of the lithologies/discordant stratigraphy/alteration zones may be a controlling factor. A possible correlation between early formed fault gouge and gold mineralization may suggest that the fault gouge plays a geochemical role in gold precipitation.

The Jaclyn vein system was locally intruded by fine-grained mafic dykes (Type I), possibly shortly after veining. The Exploits Subzone underwent extensive dyking (Exploits dykes - Type II), which is presumed to occur after gold mineralization. Based on the orientation of these Type II dykes from airborne magnetics data and drill sections they likely intruded into the syn- to late-folding event shear structures suggesting a long-lived, episodic reactivation of these structures.

Exploration should target zones of east-northeast trending geophysical anomalies and topographic lineaments, which lie in proximity to north-northeast and east-southeast trending geophysical anomalies, particularly with respect to soil sampling gold anomalies and where the Exploits River bends mimicking potential lineament intersections.
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INTRODUCTION
A proposal was submitted on October 12, 2010 by the author outlining the importance of re-examining historical data from gold occurrences on Crosshair's Golden Promise and South Golden Promise properties as a follow-up to geological interpretations made on the Jaclyn Main in a report submitted in June, 2010. This work would provide a property-wide comprehensive review and integration of all available drilling and trenching data on gold-bearing vein systems to gain a better understanding of gold distribution in the vein systems and its relationship to stratigraphy, alteration, property-scale folding and faulting. A review of drillcore, trenches and all available drillhole data (core photos, assay data, drill logs and cross sections) was conducted of Jaclyn North and Jaclyn South, Golden Promise property as well as the Linda/Snow White, South Golden Promise property. This work was carried out concurrently with a trenching/bulk sampling program of the Jaclyn Main vein and therefore information gleaned from the Jaclyn Main trench mapping has been added to this report.

The following drillholes and trenches were examined from October 22 – November 2, and November 18-19, 2010.

**Golden Promise – Jaclyn North and South**
(North) GP06-47, GP06-51, GP07-76, GP06-48, -49 and GP07-78; Trench GP-TR-01
(South) GP03-31, GP06-59, GP03-33 and GP06-60; Christopher Trench

**South Golden Promise**
SGP06-01, SGP06-02, SGP06-11, SGP06-14 and SGP06-15; Linda/Snow White Trench

**GOLDEN PROMISE – JACLYN NORTH**
*Trench GP-TR-01*
The only trench that was not backfilled in the Jaclyn North area was GP-TR-01. The majority of the trench was filled with water and silt but a hump of the Exploits Rapids Formation, Victoria Lake Super group mudstone, siltstone and arkosic greywacke is exposed in the middle of the trench. Beds are upright, mm- to cm-thick, and strike 280/65 o N, younging to the north. Pale grey, translucent quartz-filled tension gashes and horsetail structures cut the stratigraphy striking 030/65 o E (*Plate 1a*).

A partially algae-covered quartz stockwork zone is submerged under water adjacent to the north end of the sedimentary rocks (*Plate 1b*). Veins are hosted in a black coloured unit and appear to generally trend north and east, although it is not known if this exposure is outcrop or a boulder.

A boulder of lithic greywacke is located adjacent to the eastern end of the trench (*Plate 1c*). This unit comprises large cobble- and pebble-sized clasts within a feldspar crystal-rich matrix. Large, rounded rock fragments (volcanic bombs?) containing smaller fine-grained clasts, and have diffuse bleached halos. Some fine-grained, pebble-sized clasts also appear to have reaction rims. These textures suggest that the lithic greywacke is likely a volcanioclastic debris flow or possibly a pyroclastic sequence.

**Drilling**
Drilling at Jaclyn North has intersected the upper stratigraphy of the Exploits Rapids Formation along the northwest moderately-dipping limb of the Jaclyn Anticline. Additionally, drillhole GP10-99 collared into Caradocian Shales, which overlie the Exploits Rapids Formation. The stratigraphic sequences and alteration styles in the Jaclyn North area are very similar to that in the most eastern end of Jaclyn Main vein system (T. Tettelaar, 2010). The stratigraphy downhole consists of brittle-ductile deformation of the Caradocian Shale and its contact with the underlying thick sequence of laminated to cm-thick beds of dominantly mudstone/siltstone of the Exploits Rapids Formation. The mudstone sequence is approximately 160m thick (apparent) with minor greywacke beds, which increase in content downhole. The mudstones are generally siliceous, dark grey, light grey and pale green in colour with lesser zones containing maroon interbeds at the uppermost part of the stratigraphy. Carbonaceous beds, nodules and speckling textures
occur locally. Bioturbation and textures such as scouring, load casts, and flame structures are all typical in this section of the stratigraphy with minor zones of disrupted convolute bedding.

Within the lower part of the thick mudstone sequence, two zones approximately 25-30m apart contain six to twelve interbeds of pale pink to buff coloured lapilli-ash tuff (Figure 1). These tuffaceous zones are the same markers horizons noted in the east end of the Jaclyn Main area (T. Tettelaar, 2010). The Upper Ash Bed zone consists of fine-grained quartzofeldspathic lapilli and ash material, usually with black alteration halos at the lower and sometimes upper contacts. The Lower Ash Bed zone is characterized by three cm-thick beds of pebble- to sand-sized quartzofeldspathic porphyritic lapilli clasts as well as dark, translucent quartz clasts fining uphole (Plate 1d). These tuffaceous zones were also observed in the stratigraphy that was drilled to the northwest and are briefly discussed later.

Approximately 50-60m below the Lower Ash Bed zone, the first arkosic or lithic greywacke unit is observed, which demarcates the transition into a zone containing these coarser grained, typically massive, metre-thick beds with sequences of mudstone, siltstone and fine-grained greywacke. The arkosic greywacke is defined by 10-30% euhedral, mm-sized, white plagioclase crystals, some are broken, and may contain minor amounts of lithic clasts. The lithic greywacke is characterized by variable amounts of euhedral feldspar crystal, 10-30% lithic clasts of volcaniclastic material, mudstone rip-up fragments and black angular fragments assumed to be altered glass shards. Some of the larger (cm-sized) volcaniclastic fragments are generally rounded with diffuse contacts and bleached halos (Plate 1e). Other fine-grained, angular fragments have thin reaction rims. Additionally, there are black, very fine-grained fragments similar to the black altered glass shards, which contain euhedral feldspar crystals, some of these fragments are flattened possibly due to welding (Plate 1e, f). The various types of fragments mentioned above all have characteristics suggesting that the lithic greywacke unit is likely either a volcaniclastic debris flow or a pyroclastic deposit. The rounded clasts with bleached halos are suggestive of hot volcanic bombs, while the fine-grained angular fragments represent fine-grained volcanic rock explosively extruded during eruption. Logs indicate the presence of mudstone rip-up clasts which would suggest that this unit is a debris flow, however, it may be possible that the rip-up clasts are actually fine-grained, angular volcanic rock. If at least some of these units are derived from a debris flow, the angular nature of the feldspar crystals, fine-grained clasts and altered glass shards, as well as the heat-induced alteration halos surrounding the volcanic bombs indicate that they have not traveled far from the source. Further implications of this are described in the Discussion section.

Alteration of the uppermost thick sequence of mudstone is generally weak, consisting of sericitized greywacke beds and local hematized, maroon-coloured mudstone/siltstone beds. Spiderweb fracturing (network of black hairline fractures) and minor brecciation is locally observed in siliceous mudstones. Typically between the Lower Ash Bed zone and the first arkosic/lithic greywacke unit weak to moderate sericite/chlorite alteration, a black alteration, silicification and a spotting textured alteration are observed (Figure 1). These alteration packages all increase in intensity down-hole within the zone containing intervals of arkosic and lithic greywackes.

The gold-bearing quartz veins in the Jaclyn North area were sub-divided by Paragon/Rubicon staff into an Upper Subzone and a Middle Subzone (Figure 1), with approximately 50-75m separation. In 2010, two holes were drilled further to the east (GP10-100 & -103), and the separation between the quartz vein subzones is approximately 25m. Both subzones consist of en echelon, bedding sub-parallel, stylolitic, milky white quartz veins. The Upper Subzone vein system always occurs below the Lower Ash Bed zone and generally occurs within the weakly altered zone of interbedded mudstone, siltstone and greywacke. The Middle Subzone typically occurs below the first arkosic/lithic greywacke unit within moderately to strongly sericite/chlorite/silica altered rocks. Of the two subzones, the Upper Subzone vein system generally returned better gold grades and the highest grades from the Jaclyn North vein system were intersected in multiple holes along line section L5000E.
A quick review of the vein system intersected to the northwest (GP04-41, GP10-107, -109, -110, -111) all indicate that the stylolitic quartz veins and associated stockwork zones occur within the weakly altered, thick upper mudstone stratigraphy (generally above the ash beds, GP10-107, interval 138-145m upper ash bed, 168-170m lower ash bed). The area is also faulted, with sections of blocky core, fault-repeated zones of Caradocian Shales within Exploits Rapids Formation mudstones, and in some cases brecciated Jaclyn-style quartz veins (GP10-107, interval from 113-123m).

GOLDEN PROMISE – JACLYN SOUTH

Christopher Trench

The Christopher quartz vein ranges from 0.5 to 2.0m wide and 30m of the vein is exposed along strike within the trench. The vein is oriented 085/80° S and consists of a thicker central zone (2m), pinching out (0.5 to 1.0m) to the east and west. The host rock is massive, grey-green arkosic to lithic greywacke. The central part of the vein is comprised of a massive, inclusion-bearing core with cm-wide, generally weakly sheared margins. The sheared margins are characterized by attenuated seams of wallrock material sometimes surrounding cockscomb textures and rare stylolites. The western end of the Christopher vein is dominantly sheared containing attenuated seams of rockwall material throughout (Plate 2a). A few specks of visible gold were observed adjacent to Fe-oxide stained seams along the sheared footwall. The massive core comprises milky white, coarse- to very coarse-grained quartz, large cm-scale open-spaced cavities and wallrock inclusions. Some inclusions are elongated and the orientation of these and attenuated seams along the hangingwall are suggestive of an S-fabric with sinistral kinematics (Plate 2b). Slickensides along the vein hangingwall range from sub-horizontal to shallow-plunging indicating strike-slip faulting. A faulted fracture oriented 356/60° E cuts stockwork veinlets at the western end, with 5cm dextral offset.

During the site visit, it was noted that all other trenches in the Jaclyn South area were backfilled except GP-TR-04, which was filled with water and the bottom was covered by silt.

Drilling

At Jaclyn South, four holes were drilled, which intersected two en echelon auriferous quartz veins which Rubicon/Paragon staff refer to as the Alpha (upper) and Beta (lower) veins. The veins are sub-parallel to the Jaclyn Main vein system and cut stratigraphy of the Exploits Rapids Formation. This stratigraphy includes sequences of interbedded mudstone/siltstone/greywacke as well as an approximately 75m thick (apparent thickness) unit of massive lithic greywacke. Sections of moderate to strong sericite/chlorite, silica, and black alteration as well as spotting textures are all typical in the interbedded mudstone/siltstone/greywacke units. Within some of the silicified sections is the presence of healed breccias (Plate 2c). Bleached sections and halos around volcaniclastic fragments are present throughout the lithic greywacke unit. A mafic/ultramafic dyke was intersected in three holes approximately 20-25m below the Beta vein. This dyke is sub-parallel to the en echelon quartz veins. Although the dyke is only weakly to moderately magnetic, it could correlate with the geophysical high magnetic linear feature that trends 070° just south of hole GP03-25. In GP03-33 a singular lapilli-ash bed was intersected at 96.5m (Plate 2d) but is not recorded in the historical drill logs. This unit is similar to those observed in the Lower Ash Bed zone (Jaclyn North, Northwest, Main eastern extension), containing pale pink quartzofeldspathic porphyry lapilli and grey quartz clasts at the base and fining up-hole. However, in GP03-33 it is but a single bed, the lapilli and crystals are much coarser grained at the base, and the tuffaceous bed is much thicker (~15-20cm apparent thickness). This suggests that intermittent expulsion of quartzofeldspathic ash may be recorded locally throughout the stratigraphy, and possibly at depths beyond what has been drilled to date.
Figure 1: Schematic of Jaclyn North zone cross section L5000E. Location of Upper and Lower Ash Bed zones are defined. The first observed spotting texture and associated increasing sericite-chlorite-silica-Fe-carbonate alteration occurs in proximity to the first lithic greywacke horizon and below the Upper Subzone vein.
Plate 1: a) Westerly striking, steeply dipping greywacke beds (right) fining to mudstone beds (left) indicating upright bedding, fining to the north (trench TR03-01). Beds are cut by north trending, quartz-filled tension gashes. b) Algae covered stockwork zone under water in trench TR03-01. c) Boulder of lithic greywacke containing volcanic bombs with alteration halos, fine-grained volcanic clasts and mm-sized feldspar crystals. d) Lapilli-ash tuff bed with quartzfeldspathic porphyritic pebbles and quartz fragments at lower contact. (GP07-76). e) Massive, lithic greywacke with bleached alteration halos around clasts, black altered glass fragments containing plagioclase grains (GP10-127). f) Intense, pervasive black alteration overprinting olive green lithic greywacke. Ghost feldspars in black alteration zone and wispy black lenses (suggesting possible welding) containing plagioclase crystals (GP10-135).
Changes in bedding orientation in drillcore and the presence of <10cm thick, sheared, bedding-parallel quartz-carbonate-chlorite veins suggest the presence of a fold hinge in this area. These sheared veins are the same style that has been noted in relation to synclinal folding at the eastern extent of the Jaclyn Main vein (T. Tettelaar, 2010). In fact, the non-mineralized quartz vein intersected at 174.6-175.4m in hole GP10-59 (*Plate 2e*) is this syn-folding style of quartz veining. Bedding measurements taken during historical trench mapping in this area also suggests the presence of a shallow-plunging fold hinge (beds 320/38° NE from mapinfo historical structural data).

Most veins were massive with only minor amounts of stylolites/seams. In GP06-59, a gold-poor quartz veined zone between 157-170m consists of massive, milky white, cockscomb textured quartz vein stockwork, suggestive of an extensional setting (*Plate 2f*). In general, the Beta vein gave higher grades than the Alpha vein. The best intersection was on section L5000E in hole GP03-31 with up to 44 g/t reported from the Beta vein (intersection missing from corebox). To the east, GP03-33 gave up to 2.59 g/t.

Although local zones of potential late faulting were recognized, limited drilling made it difficult to trace out. However, these faults do not seem to produce any major displacement of stratigraphy or the vein.

**GOLDEN PROMISE – JACLYN MAIN**

**Jaclyn Main Trench**

Geological trench mapping of the Jaclyn Main vein, exposed during the fall 2010 bulk sampling program was carried out by the author from November 5th to November 11th, 2010.

The auriferous Jaclyn quartz vein generally strikes 080° and dips steeply to the south. It cuts sedimentary rocks of the Exploits Rapids Formation, Victoria Lake Supergroup, consisting of siliceous mudstone, siltstone and greywacke. Bedding strikes northwest, dipping shallowly to moderately to the northeast. Sedimentary structures such as wavy bedding, crossbedding, scouring and load casts (*Plate 3a*) as well as one location of bioturbation were observed, all indicating upright stratigraphy younging to the northeast.

The vein ranged in thickness from 0.2 to 2.0m, generally thinner in the east with wider zones in the west. The vein is dominantly comprised of quartz with lesser carbonate and chlorite. It is milky white in colour, generally coarse- to very coarse-grained and consists of a massive core with sheared margins containing attenuated seams of wallrock material and stylolites. Additionally, bands/channels of fine-grained, pale grey translucent quartz are typical adjacent to seams/stylolites. Wallrock inclusions are typical throughout, sometimes attenuated along vein margins and generally undeformed within the massive core. Mineralization is generally concentrated within the deformed vein margins. Visible gold is usually observed along or adjacent to stylolites/seams (*Plate 3b*) and between coarse-grained quartz crystals which form cockscomb textures between seams. Gold is typically either observed as singular sub-mm sized nuggets or as clusters of finer-grained specks and is often associated with Fe-oxide staining. Additionally, gold grains were sometimes thinly rimmed by an unidentifiable black mineral (possibly arsenopyrite?). The vein also contains variable amounts of arsenopyrite, pyrite chalcopyrite and malachite throughout while galena and sphalerite are usually more common in the massive core.

To the west, the vein is intruded by a pale green, very fine-grained mafic dyke, which contains tiny acicular, translucent feldspar crystals and minor amounts of mm-sized black spots, possibly chlorite. The dyke trends sub-parallel to the vein margins and is typically observed at the contact between the sheared footwall margin and coarse-grained, massive inner core of the vein. The mafic dyke exhibits chilled margins which can contain quartz vein inclusions and preserved euhedral quartz crystals (*Plate 3c*).
Plate 2: a) Sheared western tail of Christopher quartz vein.  b) Attenuated greywacke clast along Christopher vein hangingwall bending towards core suggesting sinistral movement.  c) Intensely silicified section with diffuse, healed breccia zone. Breccia is cut by black alteration to left (GP06-60).  d) Singular pale pink lapilli-ash bed in GP03-33 with quartzofeldspathic porphyry lapilli and dark grey quartz crystals along base. e) Non-mineralized bedding parallel, sheared, syn-folding quartz-carbonate-chlorite vein (GP06-59).  f) Extensional style of quartz vein stockwork zone with cockscomb textures (GP06-59).
Sedimentary units of the Exploits Rapids Formation have undergone variable sericite + chlorite alteration giving the rocks a pale green colour. This alteration appears to be controlled by stratigraphy. A patchy to pervasive, fine-grained black alteration locally overprints the sericite + chlorite alteration. This black alteration generally appears to trend sub-parallel to the Jaclyn quartz vein. A spotty alteration texture was observed in mudstone and greywacke beds consisting of pale green spots in a black matrix as well as black spots in a pale green matrix (Plate 3d). Stockwork zones tend to be black in colour and silicified, containing variable amounts of arsenopyrite and to a lesser extent pyrite. Spiderweb fractures and weak brecciated zones were observed locally in siliceous mudstone units. Greywacke units are generally carbonaceous, possibly due to a carbonate cement matrix. Locally, the vein-hosting sedimentary rocks are weakly to moderately carbonatized and likely contain Fe-carbonate. The Jaclyn vein usually contains variable amounts of Fe-oxide staining, most common along the sheared margins. Fractures adjacent to the vein containing up to 50% pyrite were observed after blasting.

The vein pinches and swells along surface and at depth (noted after blasting) and undulates along surface, trending east-west and usually steeply dipping to the south, although locally the vein steeply dips to the north. The vein has undergone brittle-ductile deformation indicated by moderately sheared vein margins and local evidence of C-S fabric. Thin seams and trains of inclusions within some veins appear to form an S fabric (Plate 3e), suggesting sinistral kinematics. Horizontal to sub-horizontal slickensides and grooves along vein margins (Plate 3f) indicate strike-slip faulting. The vein margins are moderately sheared, whereas massive cores generally show evidence of weak brittle-ductile deformation. Mafic dykes that intrude the vein in the western end of the exposed vein have undeformed straight to irregular contacts. This may suggest that gold mineralization occurred during early stages of vein development and shearing, while the massive cores developed in dilatational zones during a phase of reactivation when fluids were possibly less concentrated with gold. The mafic dykes were intruded during a last phase of dilation within the vein system.

Faulting of the vein system is suggested in two places. Although exposure was poor, approximately 3m of offset of the vein in the western end of the trench near GP02-01 suggests a northeasterly trending sinistral fault which would correlate with the intersection of a fault zone/lost core reported in the drill logs from DDH holes GP02-01, GP02-02 and GP10-117 (D. Mullen, 2003; B.A. Sparkes, 2010). At the eastern end of the trench, the Jaclyn vein appears to be offset by approximately one metre, suggesting a northerly trending dextral fault.
Plate 3: a) Load casts at mudstone-sandstone contact. b) Visible gold grains, some rimmed by black mineral, adjacent to sheared seam (top below thumb). c) Quartz vein inclusions along rusty, pale green mafic dyke contact. d) Spotting texture in host rock adjacent to Jaclyn vein. e) Attenuated seams in quartz vein, orientation suggests brittle-ductile sinistral kinematics. f) Sub-horizontal grooves and slickensides along plane of attenuated rusty seam adjacent to footwall of vein.
SOUTH GOLDEN PROMISE

Linda/Snow White Trench

The Linda/Snow White prospect is located ~22km southwest of the Jaclyn Main zone. The property area has been described as being underlain by Victoria Lake Supergroup sedimentary units of the Harpoon Brook Belt (Evans & Kean, 2002), an older term that includes the sedimentary rocks of the Jaclyn zone and correlates to the Exploits Rapids Formation (McNeill, 2005).

The vein system is exposed in two, now separate trenches. The Linda vein is a thick (1-5m) quartz vein with a strike-extension of ~170m trending northeast. The Snow White zone consists of a few, thin echelon veins trending northwest, just south of the Linda vein. The trenches expose interbedded black to grey mudstone, siltstone and greywacke, and a diorite sill (previously called a gabbro), which host the gold-bearing Linda vein system along the intrusive contact and along sedimentary beds. Sequences of dominantly mudstone with lesser siltstone and greywacke undulate in both the horizontal and vertical planes, striking 040 – 060° and steeply (55-75°) dipping to the southeast. Graded bedding observed in greywacke units indicates upright stratigraphy (younging direction to the southeast). The sedimentary units have not undergone any obvious alteration except for noticeable Fe-carbonate along bedding planes. Slickensides along bedding planes are oblique (pitch 75°) to bedding-strike and likely formed during folding (flexural slip). A well developed spaced cleavage in the mudstones trends 055°. This likely represents S1 axial planar cleavage indicating that the vein is hosted along a steeply dipping limb of a fold. The diorite is fine- to medium -grained and Fe-carbonate altered, giving it a rusty weathering. The same 055° trending cleavage appears to be present in the diorite as well but it is weakly developed.

In the western trench, the Linda vein ranges in thickness from 1 – 5m. From southwest to northeast, the vein is emplaced along the contact between mudstones and the diorite sill then gradually cuts into the diorite unit, still trending parallel to the intrusive contact. The vein orientation is 245/60° NW, and is generally massive, with very coarse-grained milky white quartz, open spaced cavities, cockscomb textures and both mudstone and diorite inclusions within the widest part of the vein. There is very little evidence of sheared margins, attenuation of inclusions or stylolites in the vein at the Linda trench. Locally, trace to 1% pyrite and arsenopyrite were noted. In the eastern trench, the Linda vein is 0.5 – 1.0m thick, oriented 250/70° NW, and branches into two en echelon veins; the first is emplaced along the diorite intrusive contact and the second is hosted along the sedimentary beds. Grab and channel sampling results indicate that the best gold mineralization (up to 232 g/t) is within the vein hosted exclusively in the sedimentary rocks. Unfortunately the highest grade zone based on sampling was covered by water and silt. The veins contain hostrock inclusions and exhibit better shear development than the western extension of the vein system, although still relatively weak when compared to the Jaclyn veins. Arsenopyrite and pyrite are present, mostly along vein margins.

The Snow White vein system is comprised of a series of thin (<0.5m), veins oriented 330/50° NE, which are weakly to moderately sheared and cut mudstone beds. This vein system does not appear to connect up with the Linda vein, and therefore the relationship between the two vein systems is not clear. Up to 2% arsenopyrite occurs in these veins. No visible gold was observed in any of the veins during the site visit.

Drilling

A total of 16 holes were drilled at South Golden Promise in the spring of 2006. Holes SGP06-01, -02, -11, -14, and -15 were reviewed by the author at the Geological Survey of Newfoundland and Labrador’s core storage facility in Buchans. In addition, vein intersections were also looked at from holes SGP06-04, -08 and -10.

Historical drilling intersected sedimentary units and an intrusive body described in previous reports as a gabbro, both of which host the Linda quartz vein. The stratigraphy consists of mudstone, interbedded mudstone, siltstone and greywacke and minor conglomerate to
conglomeratic sandstone beds. Mudstone/siltstone beds are generally dark grey to grey in colour while greywacke beds range from dark grey, grey, grey-green to olive green. Rare conglomerate beds are clast-supported and moderately well-sorted containing sub-angular and sub-rounded clasts of feldspar and quartz crystals as well as fine-grained grey-green or black lithic fragments (Plate 5a). As the conglomeratic beds fine up stratigraphy some of the black fragments are flattened (Plate 5a), possibly representing compressed glass fragments that were hot during deposition. Alteration is generally minimal. Locally, fine- to medium-grained greywacke beds are weakly to moderately altered by sericite/chlorite giving the beds an olive green colour. This style of alteration is very similar to alteration typically observed in the greywackes within the uppermost mudstone sequence at Golden Promise, and is assumed to be a product of diagenetic processes. Weak to moderate Fe-carbonate alteration, typically within the greywackes, giving the beds a pale orange-brown colour and appears to overprint sericite/chlorite alteration.

Preservation of sedimentary structures such as scouring, load casts and rare bioturbation as well as graded bedding were observed in all holes. SGP06-14 show beds grading uphole, while SGP06-01 and SGP06-11 show beds grading downhole. This is due to the orientation of drilling of the steeply southeast dipping upright stratigraphy seen in the trench. In SGP06-15 bedding orientation changes downhole (0 – 30° to core axis), but stratigraphic information was difficult to determine because the rock is extremely broken and likely representing a fault zone. In SGP06-02 beds fining both uphole and downhole were observed. Bedding orientations change, ranging from 0° to 35° to core axis, in association with the direction of graded bedding, indicating that small-scale folding is present (Plate 5b). Correlation of stratigraphy between drillholes was hampered due to the voluminous nature of the diorite sill and limited drilling data, however, younging directions gave a general sense of contacts and fold relationships (Figure 2). Based on the steeply dipping nature of bedding in most holes and younging directions, the Linda/Snow White area lies within the limb of a syncline verging to the southeast (regional F1 fold structures have southeast vergence).

What has previously been described as a gabbro is more likely dioritic or granodioritic rock. The sill is typically fine-grained along the margins for a few metres and then coarsens towards its core. Fine-grained sections typically contain 0.1-1cm sized, resorbed and partially saussuritized porphyritic plagioclase, black, mm-sized chloritic spots, and >1mm-sized leucoxene spots. Medium-grained sections of the intrusion show minor amounts of translucent, pale grey, anhedral quartz surrounding sub-hedral to euhedral, white feldspar crystals, likely all plagioclase, therefore suggesting diorite to quartz diorite mineralogy (Plate 5c). Minor amounts of a fine-grained black mineral are probably hornblende and >1mm sized leucoxene spots are present throughout. Acicular grains, up to 1cm in length, appear to have a metallic lustre and are overgrown by the feldspar crystals indicating their formation very early in the crystallization history. The diorite also contains up to 1% pyrrhotite and is weakly to moderately magnetic. The sill contains zones of variable Fe-carbonate alteration (Plate 5d), which are locally bleached by fractures and quartz-carbonate veins. The diorite has undergone brittle deformation sometime after the alteration event, and brecciated zones contain sub-angular to sub-rounded diorite clasts within a black chloritic matrix (bleached breccia fragments in Plate 5e). These zones of brecciation occur throughout the sill as well as along its intrusive contact. Brecciation is less typical within the sedimentary units but in SGP06-02 was observed along a fold limb (Plate 5b). This suggests that the brittle deformation is late- to post-folding and the Fe-carbonate alteration is pre- or syn-folding (more likely pre-folding). Since this deformation is more typical in the diorite sill it may be forming in response to greater competency of the massive intrusion and resistance to folding.

Vein intersections typically only gave anomalous gold results (up to 798 ppb over 0.40m) and consisted of milky white, massive quartz veins and stockwork zones typically hosted within the diorite intrusion. Veins emplaced within sedimentary units cut stratigraphy. The quartz veins typically contained inclusions of host rock, had minor seam/stylolite development and bands of pale grey, fine-grained quartz parallel to contacts and seams/stylolites. Pyrite and arsenopyrite is usually present, up to 2%, within the veins and sometimes within the host rock, but is generally not as prevalent as seen in Jaclyn vein systems. The veins do not correlate with any of the
alteration noted in the rock units. However, although brecciated zones are noted throughout the
diorite sill, the veins are preferentially emplaced within some of these zones, including the
intrusive contact noted in the trench. This would suggest that the veins are forming during re-
activation of older structures.

All vein contacts were sharp and either straight or ragged and shearing along the contacts was
rarely observed except in SGP06-01 and -14. The highest anomalous result of 798 ppb from hole
SPG06-01 came from the lower vein contact adjacent to a thin band of fault gouge. In addition,
SGP06-14 contains a 1m thick weakly to moderately stylolitic quartz vein, which was emplaced
into strongly brecciated diorite and gave the best results of 63.3 g/t Au over 0.35m. The lower
contact of this vein contained 20 specks of visible gold in the last 4cm and is adjacent to fine-
grained, black fault gouge which is cut by quartz veinlets. Fault gouge was also observed in the
brecciated diorite a metre above the quartz vein (Plate 5e), which may suggest that this fault
gouge formed during the late syn-folding brittle deformation event. However, this upper gouge
zone was not mentioned in the drill log and it is not known if this is in the correct location of
intersection since the core does not seem well in-tacked. Foliated fault gouge was noted in other
holes (SGP06-02, -11) in both the diorite and sedimentary rocks away from quartz veined zones,
suggesting that it could be an earlier event throughout the area. Since fault gouge and shearing
generally coincide with higher gold grade intercepts at Jaclyn this may be an important key to
gold precipitation.

A geological interpretation was attempted on a cross section containing holes SGP06-01, -02,
and -14 (Figure 2). Based on bedding measurements from hole SGP06-02, the lower contact
between the diorite sill and sedimentary units is interpreted to be open folded on a small-scale.
Correlation of a possible third vein within the northeast trending Linda vein system may exist in an
under-exposed part of the trench adjacent to the Snow White vein system (Figure 3). If this
proposed vein exists then the Snow White veins may be tension gash style veins trending
northwest from the footwall. Alternatively, the third intersected vein zone may represent the
Snow White vein system, although the parallel nature of the third vein with the other two suggests
the first scenario.
Plate 4: a) Greywacke bed at water level grading into mudstone above indicating upright bedding. Note spaced cleavage development in mudstone at top of outcrop by scale card. b) Linda trench vein exposure looking northeast. Vein dips to the northwest (pink dashed line) trending parallel to bedding which dips to the southeast (yellow dashed line). c) Footwall (southern margin) of the Linda vein at the western end. The vein is relatively devoid of stylolites/seams. d) Thinner Linda vein in the eastern end with weak seam development and gabbro inclusion (bottom left).
Plate 5: a) In SGP06-02, conglomerate with clasts of quartz and feldspar crystals and lithic fragments (top), fining downhole with evidence of flattened clasts (above scalecard).

b) Folded stratigraphy, note brecciation of fold limb (right), SGP06-02.

c) Rare unaltered section of dioritic intrusion with pale grey quartz surrounding sub- to euhedral feldspars, which overgrow acicular mineral (arrow), SGP06-11.

d) Fe-carbonate altered section of dioritic unit, SGP06-11. Arrow pointing to altered acicular mineral.

e) Variably Fe-altered and brecciated diorite, which hosts the highest grade gold bearing vein in SGP06-14. Upper vein contact at bottom right hosted in mostly black, chlorite altered zone. Lower contact (centre bottom) shows black, graphitic fault gouge. Red arrows point to quartz veinlets cutting breccia clasts/fractures, yellow arrows point to fault gouge.

f) Fault gouge at lower contact of quartz vein intersected in hole SGP06-14 with 63.3 g/t over 0.3m, also seen in (5e). Note quartz veins cutting the fault gouge.
Figure 2: Geological interpretation of cross section containing holes SGP06-01, -02, and -14, suggesting the possibility of a third quartz vein zone adjacent to the 330° trending Snow White vein in trench where exposure is poor.

Figure 3: Drill plan map showing location of Linda and Snow White veins, quartz veins in yellow, gabbro/diorite in purple, sedimentary rocks in grey. Interpreted location of a third vein traced on map with red dashed line. Modified from Crosshair 2006 Assessment Report.
DISCUSSION

The extensive drilling within the Jaclyn Zone on the Golden Promise property has provided a better understanding of the geological history and its relationship to emplacement of auriferous quartz vein systems. Some of this information can be extracted and compared to the less understood South Golden Promise property.

Stratigraphy

The Jaclyn Zone is underlain by the Exploits Rapids Formation of the Victoria Lake Supergroup, a marine volcaniclastic turbidite sequence forming in an extensional arc basin, generally coarsening down stratigraphy and is capped by the Caradocian Shales. Stratigraphic sequences can be correlated well between Jaclyn Main eastern extension, Jaclyn North and Jaclyn Northwest. In general, the Exploits Rapids Formation lithological units can be categorized into three distinct groups, which down stratigraphy consists of: 1) a thick (160 – 200m apparent thickness) mudstone/siltstone sequence with increasing interbeds of greywacke; 2) two zones containing quartzofeldspathic lapilli-ash tuff (Upper Ash Bed zone and Lower Ash Bed zone) at the lower part of the mudstone sequence; 3) metre-thick, massive beds of arkosic to lithic greywacke interbedded with sequences of mudstone/siltstone/greywacke. The arkosic and lithic greywackes contain variable amounts of broken and in-tacked, euhedral plagioclase crystals; mudstone rip-up clasts; angular and rounded, fine-grained volcanic fragments; and rounded coarser-grained volcanic fragments (volcanic bombs?). The volcanic fragments are usually surrounded by bleached halos, possibly suggesting thermal alteration around hot volcanic rocks. These characteristics all suggest very short transport, likely as a debris flow apron, relatively proximal to an intermediate to mafic volcanic source. The two zones of quartzofeldspathic lapilli-ash indicate bimodal volcanism and appear to mark the last volcanic event within this area followed by fining upward mudstone sequences into shales. The stratigraphy was subjected to regional open to tight F1 folding, during the Salinic orogenic event, ca. 411-445 Ma (McNeill, 2005) with the Jaclyn zone lying within the hinge of a regional-scale anticline, verging to the southeast.

The Linda/Snow White zone is underlain by upright, interbedded mudstone, siltstone and greywacke, younging to the southeast, which are assumed to be Exploits Rapids Formation (McNeill, 2005). Minor beds of moderately well-sorted, clast-supported conglomerate containing weakly to moderately eroded quartz and feldspar crystals and lithic (volcaniclastic) fragments suggest moderate transport of felsic, possibly bimodal volcaniclastic material distal from its source. The sedimentary units are intruded by a diorite sill. Younging direction and bedding orientation to an S1 cleavage, present in both the mudstones and diorite, suggest that the Linda/Snow White zone lies within the steep, southeast verging limb of an F1 syncline.

Alteration

In the Jaclyn zone, the sericite-chlorite-silica-Fe-carbonate alteration system, and particularly the associated spotting/speckling textures in mudstones and siltstones typically appear between the Lower Ash Bed zone and the first arkosic/lithic greywacke unit and increases in intensity down stratigraphy. Above the Lower Ash Bed zone, the alteration system is generally very weak and with occasional carbonate speckling assumed to be a diagenetic texture. The Jaclyn North Upper Subzone vein, and Jaclyn Northeast veins lie above the spotted alteration and associated sericite-chlorite-silica-Fe-carbonate alteration system. Additionally, the Jaclyn Main vein was not intersected in GP10-136 in the eastern extension, yet the consistency of the alteration system with stratigraphy over the lower 300m was observed. This indicates a much stronger correlation between the alteration system, stratigraphy and depth than with the Jaclyn vein system. This could also explain the preliminary finding by (Sandeman, et.al, 2010) where lithic greywacke units, both proximal and distal to quartz veining, show strong sericite and chlorite VIRS responses previously assumed to be attributed to alteration haloes adjacent to auriferous quartz veins. The correlation of alteration and stratigraphic depth at both the northern limb and within the hinge of the Jaclyn Anticline also suggests that alteration occurred pre-folding. This is also suggested by the subtle change of the resistivity data, whereby highs denoted by pink could be related to the alteration zone, while red to green could reflect less resistive upper mudstone sequences. This
would imply either a pre-folding lower greenschist regional metamorphic event or a local hydrothermal event. Since no record of lower greenschist regional metamorphism has been recognized on the Golden Promise property outside of the Jaclyn zone (McNeill, 2005), it is proposed that the alteration system is derived by a volcanic hydrothermal event related to the proximity of a volcanic source during deposition of the arkosic and lithic greywackes. This could also explain why this alteration style is absent at the Linda/Snow White zone in South Golden Promise. However, it is not clear as to where this zone lies within the overall stratigraphic sequence and proximity to conformably overlying Caradocian Shales. If the Linda/Snow White zone lies in close proximity to the Caradocian Shales as suggested by McNeill, 2005 map interpretations then it would be expected to have weaker alteration comparable to the upper mudstone sequence at the Jaclyn zone.

**Quartz Veins**

There are three types of veining systems within the Jaclyn zone. The first (Type I) is a Meguma-style of syn-folded, bedding parallel, sheared quartz-carbonate-chlorite veins, generally < 10cm thick, containing minor amounts of pyrite and occasionally pyrrhotite. The second (Type II) is the generally discordant to bedding, east-northeast trending, brittle-ductile shear zone style Jaclyn veins. The third (Type III) are rare extensional-type veins contemporaneous with Type II Jaclyn shear veins.

Type I veins occur throughout the Jaclyn zone (based on drillcore observations) but are generally more abundant in proximity to small scale-folding demarcated by changes in bedding orientation which are usually accompanied by folds observed in drillcore. Most of the Type I veins are bedding-parallel bands (Plate 6a), however, in some cases folding of the veins is observed (Plate 2e). The interpreted synclinal fold in the Jaclyn Main eastern extension (T. Tettelaar, 2010) shows the best example of these Type I veins and associated spur reef stockwork veining near the fold hinge. In every case, assay results of these syn-folding veins returned very poor to anomalous gold values. This suggests that arsenic + gold-bearing fluids were not present during the F1 folding event.

Type II Jaclyn veins are well documented consisting of a massive inner core and variably sheared margins, which can be associated with fault gouge. The gold-bearing sheared margins comprise milky white quartz partially replaced by contact-parallel bands of pale grey, translucent fine-grained quartz, and cockscomb textures sandwiched between attenuated seams/stylolites (Plate 6b). The gold-poor massive core is vuggy, very coarse-grained, can contain wallrock inclusions and is generally undeformed to weakly deformed based on attenuation of inclusions. These veins contain variable amounts of arsenopyrite, pyrite, chalcopyrite, galena, sphalerite and pyrrhotite. These veins form en echelon, east-northeast trending structures, generally dipping steeply to either the south (Jaclyn Main, Jaclyn South, Christopher) or north (Jaclyn North, Linda). Those that dip to the north appear to be influenced by pre-emplacement structural controls (bedding, syn-folding fault zone). This would imply that the south dipping veins are also controlled by parallel pre-emplacement structures. This could suggest that regional east-northeast brittle-ductile structures were formed syn- to late-folding (as suggested at South Golden Promise), and experienced episodic reactivation late- to post-folding, at which point the gold-bearing veins were emplaced. The veins at Jaclyn Main and Christopher both indicate sinistral strike-slip brittle-ductile shearing. If compared to Meguma Group gold deposits, the Type II gold-bearing vein systems at Jaclyn and Linda would correlate to the style of northwest sinistral fault structures observed in places such as the Oldham Gold District, which cut the Type I bedding-parallel vein system that host the gold at Oldham (Figure 4; Sangster & Smith, 2007). This implies similar structural geometry but different timing of gold-bearing fluids. However, it should be noted that direct relationships between the Type I and Type II vein systems were not observed.
Type III extensional style of veining occurs in close proximity to Type II veins, usually in stockwork zones. The more dominant style is an open space filling vein with undeformed contacts and cockscomb textures (*Plates 2f and 6c*). This style is observed in both drillcore and in the trenches at Jaclyn Main (tension gashes) and Linda (stockwork zone). Assay results from drillcore suggest that these veins generally carry only anomalous gold. In rare cases, extensional breccia veins are observed (*Plate 6d*). The highest gold grade in drillcore of 327.98 g/t over 0.4m was hosted in this breccia vein type in GP06-52. This may suggest that the more dramatic breakage of the breccia veins pulls the gold-bearing fluids into the system more effectively than the cockscomb textured veins (reflective of pump valve faulting). This may also apply to the Type II veins, where the stronger development of the shear margins reflects greater suction and trapping of gold-bearing fluids into the system over multiple episodes of shearing. Since the best gold grades are found in the Jaclyn Main vein, which cuts relatively competent, altered stratigraphy this suggests that these rheological factors play a major role in more intensive shearing associated with high grades.

Minor northerly trending faults are known to cut the Jaclyn Main quartz vein, observed in the Jaclyn Main trench and at the eastern extension where an interpreted reverse fault has been recognized from drilling. The reverse fault offsets and possibly rotates the vein from its original orientation, and is reflected in the steepening of the ore plunge in the longitudinal section. In all cases of known faults to date, offsetting of the vein is generally only metre-scale.
Plate 6: a) Type I style of syn-folding veins (GP10-135). b) Type II Jaclyn style vein with wallrock inclusions, seams and stylolites and bands of fine-grained, pale grey quartz (GP06-49). c) Type III cockscomb textured extensional veins in stockwork zone (GP10-135). d) Type III extensional breccia vein containing angular clasts of lithic greywacke and hosting 327 g/t of Au in GP06-52, VG circled.
The airborne magnetics and to a lesser degree resistivity data seem to suggest three dominant linear trends (*Figure 5*). The first is a north-northeast linear orientation, generally parallel to the axial trace of the Jaclyn Anticline and the Red Indian Line, a major fault zone which marks the eastern boundary of the Exploits Subzone. It is possible that these lineaments represent major fault structures forming during the compressional/transpressional Salinic orogenic event and may have a long-lived history of reactivation. The second are magnetic highs trending east-northeast which are interpreted to reflect the post-folding Exploits dykes (McNeill, 2005) which are likely Type II dykes described by Sandeman & Copeland, 2010. These magnetic highs parallel the Jaclyn vein structures and historical drilling data indicates that weak to moderately magnetic mafic dykes in the Jaclyn zone are vein-parallel, suggesting a long-lived history for reactivation along these structures (syn- to post-F1 folding). These east-northeast trending magnetic highs also seem to be bounded or bent/offset by the north-northeast structures. The Linda vein also trends parallel to these linear magnetic highs. The third lineament is an east-southeast trending magnetic low. These lineaments tend to be more common in the central and western part of the Jaclyn Anticline. The magnetic data also suggests that these east-southeast lineaments are sinistrally offset by the north-northeast lineaments. The Shawn’s Shot occurrence, which lies adjacent to the Exploits River, consists of a 110/78° S oriented gold-bearing vein and is located between these parallel lineaments. Two test holes gave low grades, however, cm-thick east-northeast veins with thin mafic dykes in the vein cores were also intersected (D. Copeland, per. comm.) suggesting a structural relationship and the potential for thicker gold-bearing east-northeast veins in this area.

There is also a strong relationship between the trend of the Exploits River and known prospects/deposits. The east-northeast trending Jaclyn vein system and Linda/Snow White vein are parallel to the river, and both the Jaclyn vein zone and Shawn’s Shot are located in proximity to where the river bends. This seems to suggest that jogs in the river may be linked to east-northeast and north-northeast lineament intersections and should be targeted for future exploration.
Figure 5: Schematic of interpreted major structures within the Jaclyn Anticline based on linear features in the airborne geophysical data. The length of vein trends is exaggerated to better demonstrate trends between vein orientation and interpreted structures.
RECOMMENDATIONS
1 Target 075° trending geophysical anomalies and possibly consider 045° and 110° trends and intersections:
   i) that fall within high resistivity zones (possible silica-sericite-chlorite alteration) within the Jaclyn Anticline;
   ii) that cut folded stratigraphy, particularly if the sedimentary units are strongly altered (Jaclyn Main);
   iii) along the Exploits River, particularly in areas where the river bends (i.e. Shawn’s Shot occurrence);
   iv) underlying soil sampling anomalies; underlying or are near gold-bearing float up-ice.

2 Re-investigate the potential of east-northeast trending vein systems in the Shawn’s Shot area where the Exploits River bends similar to Jaclyn area.

3 Drilling along the Christopher vein toward the its eastern extension, particularly to determine if this vein extends as far as line section L5000E where the best grades in all Jaclyn vein systems have been intersected to date.

4 A geochronological study of the Type I (Hamish & Copeland, 2010) mafic dyke which intrudes the Jaclyn vein system to provide better constraint on the minimum age of quartz veining.

5 Geochemical review of fault gouge related to vein systems to determine any affects on gold mineralization.

6 Petrographic/SEM study of:
   i) key units in the Exploits Rapids Formation; lapilli-ash beds, arkosic greywacke, lithic greywacke, massive fine-grained alteration sections (black and pale green) to gain a better understanding of volcanism within the basin and its relationship, if any, to gold or possible base-metals;
   ii) vein margins pale-grey translucent quartz compared to milky white quartz;
   iii) microstructures within the veins and how they related to gold.
REFERENCES


