

Gossan Hill Area
Brucejack Lk. 803657

104B/8

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INTRODUCTION

First discovered and sampled by Esso Minerals in the early 1980's, the Big Sleep/Grace Zones are characterized by large, continuous quartz-carbonate-(barite) veins and stockworks. These adjacent zones are contained within a relatively unaltered package of intercalated volcanic and sedimentary rocks. Quartz and sericite (with or without pyrite) are the most predominant alteration minerals but some primary textures have survived. Consequently, these areas are important for understanding the stratigraphic relationships between lithologies north of Brucejack Creek and, by extension, for the entire Brucejack property.

Initially thought to be hosted exclusively in volcanic rocks, the 1994 program has discovered that significant portions of these zones are, in fact, hosted within intervolcanic sediments.

The 1994 program consisted of geological mapping, mechanical trenching, rock-saw sampling and diamond drilling. These zones have been intensely investigated with few results of economic interest. This, however, should not diminish the geological significance of the areas and their potential to enhance understanding of the depositional environment of the stratigraphy and subsequent ore forming processes that have acted upon it.

LOCATION AND ACCESS

The Big Sleep/Grace Zones are located approximately 650 metres north of the Brucejack Campsite and are accessible by an all-terrain vehicle road that spurs off the main Catear access road.

ZONE HISTORY/PREVIOUS WORK

Early work done on these areas is poorly documented. Large trenches were blasted and sampled, it is assumed, by Esso Minerals. These have been plotted, albeit inaccurately, on existing 1:500 and 1:1000 scale assay compilation maps but no written documentation of the results have been found. Eleven trenches were investigated with large (up to 3 metre) sample intervals. Results were poor with the highest assay returning .016 opt Au and .032 opt Ag over 3.0 metres.

In 1992 Stephen Roach identified a number of large veins in the vicinity; among them was the Grace Vein, Big Sleep Vein, May Vein, Maddux and SG zones. These veins sometime occurred in areas previously trenched by Esso, as in the case of the Big Sleep Vein. Some veins were incorporated into zones by the author, ie. the Grace Vein and May Vein were combined as the Grace Zone. The Big Sleep Vein, however, is now referred to as the Big Sleep Zone in recognition of its distinct nature with respect to the other zones and its structural uniqueness.

Later in 1992, mapping, trenching and grab/chip sampling was done by Roach along with a geochemical and prospecting program executed by Chuck Kowall. Many results of interest were returned. Among these was a 17,250 ppb Au soil sample in the vicinity of the Big Sleep Zone and a .428 opt Au and .93 opt Ag chip sample over 0.5 metres on the May Vein.

A small trenching program was undertaken on the Grace Vein by Roach in 1992. Seven

trenches were cut over the Grace and Coogan's Bluff Zones. Three trenches were cut on the Grace Zone proper. The highest gold assay returned was .018 opt Au over 1.0 metre. The highest silver assay came from an adjacent sample, returning 4.43 opt Ag over 0.75 metres.

In 1993 Bruce Hardy, following up Kowall's geochemical program, cut five trenches across the Big Sleep Vein. The best result was .348 opt Au with 74.96 opt Ag over 0.4 metres. In addition, four trenches were dug using an excavator. These were grab sampled and returned low values. It is to be noted that these trenches were filled in as part of the reclamation initiative incorporated in the 1994 program.

GEOLOGY

The Grace and Big Sleep Zones make up a portion of the Brucejack stratigraphy that has been described extensively by other authors. The regional geology is composed of Upper Triassic Stuhini Group sediments and volcanics and Lower Jurassic Hazelton Group andesitic volcanics and sediments that have been intruded by Lower Jurassic syenite and diorite-monzonite (from Visagie, 1993 Summary Report, Sulphurets Joint Venture, Bruceside Project).

The Big Sleep/Grace Zones lay on the eastern limb of the northwest trending synform identified by Lewis (MDRU, 1993). The east-west striking stratigraphy of these zones is non-conformable to the regional geology due to faulting and folding. The stratigraphy of these zones are primarily Hazelton Group volcanics and interflow sediments.

What is unique about these zones, and other zones north of Brucejack Creek, is the presence of primary textures within the units. Locally completely altered to quartz, sericite and, occasionally, pyrite and cut by stockwork quartz, calcite and barite veins, the units have remained texturally unaltered in comparison to other zones on the property. This is most marked in the drill core. Surface weathering has obscured most of the outcrops, but even channel cuts revealed significant textural relationships.

The geology of the zones will be summarized individually.

Grace Zone

The Zone's stratigraphy includes intermediate crystal tuff (locally megacrystic), heterolithic lapilli tuff/breccia (consisting of silica, feldspar and argillite fragments within an intermediate to locally graphitic, possibly chloritic, matrix) and polymictic conglomerate (with a predominantly carbonaceous matrix).

Veining/stockwork is preferentially, although not exclusively, associated with the conglomerate/lapilli tuff/breccia units. Each unit has been, locally, completely altered to Quartz-Sericite-Pyrite schist (QSP).

The intermediate crystal tuff is characterized by up to 10% euhedral to subhedral feldspar phenocrysts up to 5 millimetres in length. Megacrysts of feldspar occur locally and range up to 2 centimetres in length. The matrix is light grey in colour becoming bleached locally. The overall pyrite content is less than 1%. The unit is massive and highly silicified.

The hetrolithic lapilli tuff/breccia unit consists of fragments of quartz, feldspar and argillite within an intermediate matrix. The unit is massive and highly silicified. The matrix is locally altered to a dark colour which may be due to chlorite, graphite or very fine grained pyrite. The most characteristic features in this unit are small (less than 1 centimetre) subrounded to angular argillite fragments. These fragments may reach an abundance of 5-8% locally. The unit is completely altered to QSP, locally, but the argillite fragments show resilience to alteration. Mineralization is primarily pyrite (overall 1-2% and is up to 10% locally) with traces of tetrahedrite. Whether the unit is pyroclastic or sedimentary is uncertain. Using the existing legend the closest unit to describe this rock type was 1j (lahar). It was proposed by Henry Marsden that the sub-unit 1j-ht be used.

The polymictic conglomerate is characterized by subrounded argillite fragment up to 3 centimetres, lithic fragments up to 10 centimetres and chert fragments up to 1 metre. Matrix is dark, graphic argillite. The conglomerate is very poorly sorted but a weak bedding of 060 degrees was detected (may be the expression of a weak tectonic overprint). It is massive and highly silicified. Locally the unit is completely altered to QSP. Overall mineralization consists primarily of pyrite (up to 10% locally) and traces of galena, sphalerite and tetrahedrite within veins and stockwork.

The Grace Vein, proper, is a quartz vein, locally with barite, that displays recumbent folding with axis orientation of 092 degrees. It is a large (up to 10 metres wide on surface), vein with associated stockwork that strikes roughly east-west. The dip is shallow to subvertical and is hosted by both intermediate lapilli tuffs (which are locally megacrystic) and polymictic conglomerates.

Conversely, the May Vein is primarily a quartz stockwork zone with some veins up to 0.5 metres in width. The stratigraphy that hosts the May Vein, a hetrolithic lapilli tuff/breccia (1j-ht) and intermediate crystal tuff, has been sheared and displays an apparent north-east strike and northly dip in contrast to the strike and dip of the Grace Vein. The vein/zone extends 200 metres to the west culminating in an enormous vein/breccia blowout dubbed "The Clam". The vein/zone is unmapped along strike to the west.

Both the Grace and the Big Sleep zones were tested by three diamond drill holes S94-450, 451 (partially) and 454. The results will be discussed in detail below but from a stratigraphic point of view, the holes had mixed success proving the continuity of these zones at depth. It also reinforced the suspicion of the complexity of the stratigraphy.

Big Sleep Zone

Mapped and trenched by Hardy in 1993, the Big Sleep Vein itself received little attention in the 1994 program. It is large arcuate quartz-carbonate vein/breccia proximal to an east-west trending fault. The geology that hosts the Big Sleep Vein is highly sheared and altered to Quartz-Sericite-Pyrite Schist (QSP). Only through drill core and channel cuts is it possible to devine the protolith.

Drill hole S94-450 intersected alternating strata of intermediate crystal tuff (locally megacrystic) and hetrolithic lapilli tuff as describe previously. Further discussion of the diamond drill results will be presented below.

Large sections of the zone remained unmapped. As time became a factor, priority was given to the areas that had been trenched. As a result, the Big Sleep Vein remains open along strike.

WORK DONE

In early 1994 an initiative was undertaken to geochemically study and define the zones of known reserves. Using this data base, underexplored zones were targetted as potential hosts for additional reserves. It was the purpose of the program to define a large ore body. Implicit in the initiative was the definition of zones with large volumes of potential ore. The Big Sleep and Grace Zones met this criterion. In addition, preliminary surface sampling results were encouraging and warranted, on their own, further investigation.

The 1994 exploration program consisted of surface mapping at 1:500, trenching and two diamond drill holes (S94-450, 454) that cut the stratigraphy below the Big Sleep and Grace Zones. In addition, a hole (S94-451) tested the Coogan's Bluff Zone which lies in close proximity to the Grace Zone. This hole intersected some of the Grace Zone stratigraphy and was used in geological interpretation.

Extensive channel sampling was done over the Grace Zone. Nineteen trenches totalling 213.2 metres yielding 225 samples were cut, chipped and sent for assay. This included trench G94-1 which was mechanically stripped using an excavator and washed by high pressure pump. Portions of this trench have been subsequently covered so as to comply with Provincial government *regulations*

The Big Sleep Zone, sampled by Hardy in 1993, was tested by only one trench. Cut over an old Esso trench, it was 5.0 metres in length and yielded 5 samples.

An additional three trenches were cut in an area that overlapped both zones. Totalling 31.6 metres in length, these trenches yielded 28 samples.

All together twenty-three trenches, totalling 249.8 metres and 258 samples, were done over the two zones during the 1994 field season. Thirty-five grab samples were also taken, primarily on the Big Sleep Zone.

All samples were sent to Eco-Tech Laboratories in Stewart, BC where they were run for Au using fire assay with atomic absorption finish. A one-half assay ton sample was used. The pulps were shipped to Kamloops, BC where they underwent Ag assay (using aqua regia with an a.a. finish) and nine element ICP. Again a one half assay ton sample was used.

RESULTS

Overall the results returned from the 1994 program were a disappointment.

Big Sleep Zone

The highest assay obtained from the grab samples was .796 opt Au from a 0.3 metre wide gossanous quartz-barite vein which occurs between the Grace and Big Sleep Zones in a splay off the main vein. The average value for the remaining samples was lower than 1 gram/tonne Au.

The one Big Sleep trench along with the three trenches that spanned the area between zones are summarized in the following table:

| TRENCH NUMBER | LENGTH(m) | SAMPLE NUMBERS | SIGNIFICANT ASSAYS |
|---------------|-----------|----------------|--------------------|
| BS94-1 | 5.0 | 10851 - 10855 | None |
| BS94-8 | 12.7 | 10952 - 10964 | None |
| BS94-9 | 4.4 | 10965 - 10969 | None |
| BS94-10 | 9.5 | 10970 - 10970 | None |

Grace Zone

The trenching of the folded quartz-barite vein that defines the eastern extent of this zone was done, prematurely, as a part of the Big Sleep trenching program (BS94-2 to BS94-7). Trench BS94-4 tests the nose and one limb of the recumbent fold structure. Trenches BS94-2 and BS94-3 tested the other limb of this vein. The other trenches cut veins splaying from the main Grace Vein.

The other Grace trenches (G94-1 to G94-13) are cut across the May Vein (G94-1), the Grace Vein (G94-2 to G94-10, G94-12 and G94-13) and the Clam (G94-11).

The results from the trenching program are summarized and discussed below:

| TRENCH NUMBER | LENGTH(m) | SAMPLE NUMBERS | SIGNIFICANT ASSAYS |
|---------------|-----------|--------------------------------|--|
| BS94-2 | 5.9 | 10856 - 10862 | None |
| BS94-3 | 5.4 | 10863 - 10869 | None |
| BS94-4 | 33.7 | 10870 - 10900 10921 - 10924 | None |
| BS94-5 | 2.6 | 10925 - 10927 | None |
| BS94-6 | 3.8 | 10928 - 10932 | None |
| BS94-7 | 4.4 | 10933 - 10936 | None |
| G94-1 | 70.0 | 10980 - 11000 13601 - 13648 | .184 opt Au, .18 opt Ag/0.75m |
| G94-2 | 6.7 | 16764 - 16769 | None |
| G94-3 | 13.3 | 13650 16751-16763 | None |
| G94-4 | 1.8 | 16770 - 16771 | None |
| G94-5 | 2.4 | 16772 - 16774 | None |
| G94-6 | 2.7 | 16775 - 16777 | .132 opt Au, 4.69 opt Ag/1.0m |
| G94-7 | 3.8 | 16778-16781 | .259 opt Au, 2.21 opt Ag, 2282 ppb Pb, 1042 ppb Zn/1.0m |
| G94-8 | 2.0 | 16782 - 16783 | None |
| G94-9 | 6.4 | 16784 - 16791 | None |
| G94-10 | 6.6 | 16792 - 16798 | None |
| G94-11 | 17.3 | 16799 - 16816 | None |
| G94-12 | 10.0 | 16817 -16828 | .147 opt Au, 3.05 opt Ag/1.0 m |
| G94-13 | 2.6 | 16829 - 16831 | .81% Pb, 2.23% Zn (assay) |

DISCUSSION

Trenching

The anomalous assay from trench G94-1 (.184 opt Au, .18 opt Ag) occurs within brecciated, sericite-hematite altered quartz vein. The sample is bracketted on both sides and does not extend beyond the 0.75 metre sample interval.

Trench G94-6 encountered 1.0 metre of .132 opt Au and 4.69 opt Ag within a quartz vein hosted by strongly sericite altered argillaceous polymictic conglomerate. The sample occurs at the top of the trench. To follow up this hanging sample trench G94-13 was cut. It encountered strong alteration and mineralization (15 - 20% pyrite) with highly anomalous Zn (2.23%) and Pb (.81%) but no significant values were obtained.

The highest assay returned by the summer trenching program was in trench G94-7 (.259 opt Au, 2.21 opt Ag, 2282 ppb Pb, 1042 ppb Zn over 1.0 metre). A polymetallic quartz vein hosted in brecciated argillaceous polymictic conglomerate, the sample was taken from a two metre high outcrop face. The vein remains open to the south, on surface, since it impossible to obtain another sample.

The last assay of note occurs on Trench G94-12 (.147 opt Au, 3.05 opt Ag over 1.0 metre) in a highly silicified brecciated hetrolithic lapilli tuff. The sample has been bracketted with no further anomalous results.

ICP

Nine element ICP was done on all the grab and channel samples taken during the 1994 program. In addition to running major base metal elements (Cu, Pb, Zn), Arsenic (As) and Antimony (Sb), results were obtained for Molybdenum (Mo), Mercury (Hg) and Thallium (Tl).

No anomalous assays were received for Mo, Hg and Tl with a minor Sb anomaly of 195 ppm (from channel G94-4) and Cu of 209 ppb (from a grab sample on the Big Sleep Zone). Otherwise, all anomalies are As, Pb, or Zn.

In terms of As, there were no anomalies although there were a few incidences of elevated As results (all < 1000 ppm). Grab samples from the Big Sleep zone, trench G94-1 and trench G94-10 displayed higher than average As concentrations.

Locally anomalous in Pb and Zn was noted in the hetrolithic lapilli tuff/breccia (1j-ht) and the polymictic conglomerate units. Trenches G94-3 to G94-7 and G94-11, all displayed locally anomalous Pb or Zn or both. Of particular note is trenches G94-12 and G94-13. Trench G94-12 had six sample elevated (>1000 ppb) in Pb, including an assay of 7278 ppb) and four elevated (>1000 ppb) in Zn (including an assay of 2086 ppb). Trench G94-13, which tested the northern extension of trench G94-6 returned 0.81% Pb and 2.23% Zn.

Drilling

Two diamond drill holes tested the stratigraphy of these zones.

| HOLE NUMBER | ZONES TESTED | SIGNIFICANT ASSAYS |
|-------------|--------------|--------------------|
| S94-450 | Big Sleep | None |
| S94-450 | Grace | 1922 ppm Zn/1.0m |

Hole S94-450 was drilled below the Big Sleep Zone. It encountered alternating strata of intermediate crystal tuff (locally megacrystic) and hetrolithic lapilli tuff. Collared in the fold nose of the Grace Vein, it proved the shallow nature of the vein. It did not intersect the Big Sleep Vein at depth at all indicating that vein structure pinches out close to surface. No anomalous Au nor Ag assays were obtained.

In terms of ICP data, only the samples drilled through the Big Sleep stratigraphy were examined. Seven samples had elevated values of As (> 1000 ppm) and only two of these were contiguous. One sample showed elevated Zn (1922 ppm over 1.0 metre) at the top of the hole. Otherwise, the other elements were sub-anomalous.

| HOLE NUMBER | ZONE TESTED | SIGNIFICANT ASSAYS |
|-------------|-------------|----------------------------|
| S94-454 | Big Sleep | 1.17% Pb, 1.37% Zn/1.0m |
| S94-454 | Grace | None |

Hole S94-454 intersected both Big Sleep and Grace Zone stratigraphies. The geology consists of intercalations of hetrolithic lapilli tuff/breccia (lj-ht), porphyritic flows/lapilli tuffs, polymictic conglomerates and megacrystic porphyries. The drill hole, initially, confirms the moderate southerly dip of the stratigraphy. As the hole continues the correlation with surface geology becomes less certain.

Unlike Hole S94-450, the down dip extension of the Big Sleep Zone was intersected and found to consist of a quartz breccia/stockwork with pervasive quartz flooding and minor calcite.

The Grace Zone surface stratigraphy does not continue at depth. A strong fault was intersected in the hole. As a result of displacement, it is believed to the north, the geology below the fault is inconsistent with the surface mapping. The Grace Vein/ May Vein stockworks are apparent at depth, but are greatly diminished in size.

The assays returned were all low in Au and Ag. The ICP results were poor with few exceptions. Five As anomalies were found (>1000 ppm) with a high of 1650 ppm in the Big Sleep Zone. The only assay of note was quartz stockwork at the top of the hole that returned 1.17% Pb and 1.37% Zn over 1.0 metre. The Big Sleep also yielded a 3.6 metre interval in a quartz stockwork within a heterolithic lapilli tuff/breccia (1j-ht) averaging 4133 ppm Zn with a high of 6695 ppm (0.7%).

The Grace Zone stratigraphy had no anomalous results.

CONCLUSIONS AND RECOMMENDATIONS

The Grace and Big Sleep Zones were explored intensively with few results of economic interest. Conversely, the work done on the two zones contributed greatly to the geological data base.

It is recommended that the 1:500 surface geological mapping program be continued. It would serve the dual purpose of contributing to the understanding of the stratigraphy of the Brucejack property and to act as a means of finding and exploring targets of economic and geological interest.