PETROGRAPHIC REPORT ON THREE DRILL CORE SAMPLES FROM WESTERN TASMANIA

For

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On behalf of Saracen Metals

Reference: Memo from Andrew Habets dated October 23, 2005.

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SUMMARY

Three diamond drill core samples, labelled 133783-133785, from the Farrell Group in western Tasmania, were submitted for petrographic preparation, description and interpretation. Standard thin sections were prepared from 133783 and 133784, and a polished thin section was prepared from 133785 as it contained minor amounts of visible sulphides. The sections were subsequently examined microscopically in transmitted and reflected light (with 133783 and 133784 in oblique reflected light). The section offcuts were checked for the presence of K-feldspar (as 133783 and 133784 were pinkish in colour) by the use of hydrofluoric acid and sodium cobaltinitrite, and offcuts were also tested with dilute HCl to check for carbonate speciation. The samples were measured for magnetic susceptibility.

Summary descriptions of each sample are listed below.

133783 TS

Summary: Fine grained altered, deformed and veined siltstone. The rock has preservation of fine grained detrital grain texture and possibly, of diffuse compositional layering. Low grade metamorphism has occurred, leading to fine grained recrystallisation to an assemblage of quartz, sericite and minor carbonate, with imposition of two sericite-defined foliations intersecting at a moderate angle. The rock contains several veins of quartz (plus minor carbonate) approximately parallel to the dominant foliation and these are cut by a few later carbonate veins.

133784 TS

Summary: Fine grained, recrystallised, weakly to moderately foliated and veined felsic pyroclastic or epiclastic rock. There has been replacement by an assemblage dominated by quartz and sericite, with minor chlorite and carbonate and traces of biotite, pyrite, leucoxene, apatite and hematite. Possible relict detrital or microphenocrystal quartz grains occur along with possible textures after former pumiceous material. Deformation has led to development of a foliation largely defined by sericite preferred orientation and the emplacement of several veins. Early veining may be syn-tectonic and is dominated by quartz and minor carbonate. Subsequently, there was emplacement of a few diffuse (maybe tension gash) veinlike masses of quartz + chlorite ± carbonate and finally by a few late veins of carbonate ± quartz.

133785 PTS

Summary: Strongly veined and brecciated, low grade metamorphosed and deformed black shale. This rock has been recrystallised into a quartz + sericite assemblage, with minor graphitic material and disseminated pyrite. Veining, grading into brecciation, has occurred, with early infill by fine to medium grained quartz + carbonate, with local pyrite aggregates and a little biotite-chlorite, followed by the main infill of medium to coarse grained carbonate, with minor quartz and a little biotite-chlorite and pyrite, and followed by late quartz-rich veining. The last veining has "epithermal" textures. Carbonate in the sample may be ankerite or siderite. Traces of sphalerite, galena, chalcopyrite and pyrrhotite occur as tiny inclusions in vein-hosted pyrite.

The three samples represent deformed and low grade metamorphosed rocks, with significant veining representing hydrothermal fluid flux. 133783 and 133785 are most likely representative of original fine grained sedimentary rocks, e.g. siltstone in the case of 133783 and carbonaceous shale in the case of

133785. Sample 133784 could represent a former pyroclastic or epiclastic rock of felsic volcanic origin. Relict textures are better preserved in 133783 (e.g. detrital grain and possible compositional layering/bedding textures). In 133784, relict textures are poorly preserved due to the imposed effects. It is interpreted that 133785 originally contained organic material, subsequently converted into graphitic material upon metamorphism and deformation.

Each of the samples has undergone low grade metamorphism and penetrative deformation. New fine grained mineral assemblages were formed, in part as a result of metamorphism, but perhaps also due to hydrothermal fluid passage prior to, and maybe following, the penetrative deformation. Mineral assemblages are dominated by quartz and sericite; minor carbonate occurs in 133783 and 133784 and a little chlorite occurs in the latter sample, along with traces of biotite (or at least a biotite-chlorite intergrowth). Traces of pyrite and rutile/leucoxene occur in each sample and in 133785, former organic material has been matured into a fine graphitic substance. Development of weak to moderate foliation, mainly defined by sericite preferred orientation, is the main effect of deformation. In 133783 and 133785, a second foliation is evident, crenulating the other foliation at moderate angles.

In 133783, there are several veins dominated by quartz (with minor carbonate) generally parallel to the dominant foliation, with later cross-cutting carbonate veins. In this sample, all carbonate (in veins and as part of the pervasive alteration assemblage) is likely to be dolomitic. In 133784, there may have been three generations of veining. Early veining may have been emplaced syn-tectonically and contains quartz and minor carbonate. Subsequently, there was emplacement of a few diffuse veins containing quartz and chlorite, possibly of tension gash type. Later veining in this sample has been by carbonate and quartz. At least some of the carbonate in this sample (including the later veining) is calcite. In 133785, there is considerable evidence of post-foliation fracturing and disaggregation of the rock, leading to emplacement of many veins, with some development of breccia zones. Basically, this sample is a type of hydrothermal breccia, with textures ranging from clast-supported to matrix-supported. In 133785, early veining has been by quartz and carbonate, with disseminations and aggregates of pyrite and a little biotite-chlorite. Traces of base metal sulphides are found as inclusions in the vein-hosted pyrite. Later veining, grading to breccia infill is dominated by carbonate, with the last veining event dominated by quartz with “epithermal-like” textures. In this sample, carbonate is likely to be of ankerite or siderite composition.

In 133783 and 133784, there are only traces of fine grained disseminated pyrite, as part of the alteration assemblage. In 133785, fine grained disseminated and locally porphyroblastic pyrite occurs in the recrystallised carbonaceous shale, but most pyrite in this sample is vein-hosted. Traces of sphalerite, galena, chalcopyrite and pyrrhotite occur as inclusions in the vein-hosted pyrite. However, overall base metal sulphide contents in this sample are very low (<0.1 volume %). If the sample has significantly anomalous Zn

contents, it is possible that some Zn could be hosted in carbonate (e.g. zincian siderite).

133783 TS

Summary: Fine grained altered, deformed and veined siltstone. The rock has preservation of fine grained detrital grain texture and possibly, of diffuse compositional layering. Low grade metamorphism has occurred, leading to fine grained recrystallisation to an assemblage of quartz, sericite and minor carbonate, with imposition of two sericite-defined foliations intersecting at a moderate angle. The rock contains several veins of quartz (plus minor carbonate) approximately parallel to the dominant foliation and these are cut by a few later carbonate veins.

Handspecimen: The drill core sample is composed of a pale pink to creamy-coloured, fine grained weakly foliated rock. It could represent a low grade metamorphosed or altered sedimentary composition (e.g. shale/siltstone) and is evidently rich in sericite and quartz. Because of its pinkish colour, the section offcut was treated with sodium cobaltinitrite to test for K-feldspar, but none of the latter was apparent. The rock has been cut by a few anastomosing to sub-planar quartz veins up to 3 mm wide and by one or two thinner white carbonate veins. Testing of the section offcut with dilute HCl gave little response, implying that the carbonate is dolomitic. The sample is essentially non-magnetic, with susceptibility of $<10 \times 10^{-5}$ SI units.

Petrographic Section:

a) Primary mineralogy and textures: In the section, the sample is a fine grained altered rock displaying weak to moderate foliation. Relict detrital grain texture is preserved in places, with scattered relict grains of quartz up to 0.1 mm across and rare relict grains of muscovite and zircon. The recognisable detrital grains occur in a finer grained, recrystallised, foliated matrix. Diffuse compositional layering, perhaps reflecting original bedding, occurs on a millimetric scale and is preserved in places, defined by varying amounts of sericite versus quartz in the matrix. From the relict characteristics, the rock is interpreted to represent a former fine grained siltstone.

b) Alteration and structure: The original fine grained sedimentary rock has been deformed, metamorphosed to low grade and hence altered, as well as being veined. The fine grained matrix material, constituting most of the rock, has recrystallised to an aggregate of quartz and sericite, with minor dispersed carbonate and traces of leucoxene and pyrite. Sericite is locally more concentrated along compositional laminae and certain deformational foliae. Two sericite-defined foliations are apparent. One is approximately parallel to the diffuse compositional layering and is intersected at a moderate angle by another foliation (somewhat more intense). The latter foliation is co-planar with several sub-planar to slightly anastomosing ?syn-tectonic, partly recrystallised veins up to 3 mm wide. These are dominated by fine to medium grained quartz, with minor interstitial carbonate in places. The quartz-rich veins also contain a few wispy sericite-rich aggregates that could represent fragments of strongly altered host rock. The quartz-rich veins pre-date and are locally cut by a few anastomosing to sub-planar veins of fine to medium grained carbonate up to 2.5 mm wide.

c) Mineragraphy and paragenesis: The sample contains traces of sparsely dispersed pyrite, forming grains and aggregates up to 0.2 mm across, and interpreted as part of the alteration assemblage.

Mineral Mode: Approximate modal proportions are: quartz 60%, sericite (+ muscovite) 30%, carbonate (dolomite) 9% and traces of pyrite, leucoxene and zircon.

Interpretation and Comments: It is interpreted that the sample is a fine grained altered, deformed and veined siltstone. The rock has preservation of fine grained detrital grain texture and possibly, of diffuse compositional layering. Low grade metamorphism has occurred, leading to recrystallisation to a fine grained assemblage of quartz, sericite and minor carbonate, with imposition of two sericite-defined foliations intersecting at a moderate

angle. The rock contains several veins of quartz (plus minor carbonate) approximately parallel to the dominant foliation and these are cut by a few later carbonate veins.

133784 TS

Summary: Fine grained, recrystallised, weakly to moderately foliated and veined felsic pyroclastic or epiclastic rock. There has been replacement by an assemblage dominated by quartz and sericite, with minor chlorite and carbonate and traces of biotite, pyrite, leucoxene, apatite and hematite. Possible relict detrital or microphenocrystal quartz grains occur along with possible textures after former pumiceous material. Deformation has led to development of a foliation largely defined by sericite preferred orientation and the emplacement of several veins. Early veining may be syn-tectonic and is dominated by quartz and minor carbonate. Subsequently, there was emplacement of a few diffuse (maybe tension gash) veinlike masses of quartz + chlorite ± carbonate and finally by a few late veins of carbonate ± quartz.

Handspecimen: The drill core sample is composed of an irregularly layered, weakly foliated, fine grained, strongly altered rock, with colours varying from pale grey to pinkish and green-grey. It appears to be rich in quartz and sericite, with minor chlorite and could represent a type of altered fine grained sedimentary or felsic volcanic rock (e.g. tuff). There are a few veins up to 3 mm wide, some of which are parallel to layering, whereas others cross-cut. The veins are composed of quartz and/or carbonate, with some also containing minor chlorite. Due to the local pinkish colour, the section offcut was treated with sodium cobaltinitrite to test for K-feldspar, but none of the latter was apparent. Testing of the section offcut with dilute HCl showed that some of the vein carbonate reacted strongly, implying that it is calcite. The sample is essentially non-magnetic, with susceptibility of $<10 \times 10^{-5}$ SI units.

Petrographic Section:

a) Primary mineralogy and textures: In the section, it is evident that the rock is strongly altered, deformed and veined. As a consequence, relict textures are poorly preserved. It is possible that there are scattered relict quartz grains up to 0.3 mm across that might represent former detrital or microphenocrystal grains, and vague textures after former pumiceous pyroclastic material. Diffuse compositional layering is apparent on a millimetric scale, defined by varying proportions of quartz and sericite. Although it could represent former sedimentary or pyroclastic layering, there are no diagnostic criteria. The rock is therefore only tentatively identified as possibly representing a former felsic pyroclastic or epiclastic type.

b) Alteration and structure: Very strong alteration, along with deformation effects and veining have been imposed on the original rock. In part, these effects may result from low grade metamorphism, but hydrothermal processes are also involved. The rock has been finely recrystallised to a generally fine grained (locally medium grained and up to 0.5 mm) assemblage of quartz and sericite, with minor patchy carbonate and chlorite, and traces of brown biotite (perhaps interlayered with chlorite), leucoxene/rutile, pyrite, apatite and hematite. Sericite is commonly more concentrated in particular layers and preferred orientation of sericite largely defines the foliation that is approximately parallel to compositional layering. There may have been up to three events of veining imposed. Earliest veining may be syn-tectonic and shows some recrystallisation. These veins are anastomosing and occur parallel to and cross-cut the foliation, and are up to 3 mm wide. They are dominated by fine to medium grained quartz, with subordinate amounts of carbonate. This type of veining appears to have been cut, along with the altered rock, by diffuse veinlike aggregates up to 1.5 mm wide dominated by quartz and chlorite, with minor carbonate, that could represent some type of tension gash array. Subsequently, there appears to have been emplacement of a few irregular veins and aggregates up to 2 mm wide that are dominated by carbonate with minor quartz.

c) Mineragraphy and paragenesis: The sample contains traces of sparsely dispersed pyrite, forming grains and aggregates up to 0.3 mm across, and interpreted as part of the alteration assemblage.

Mineral Mode: Approximate modal proportions are: quartz 50%, sericite 35%, carbonate (some is calcite) 9%, chlorite 5% and traces of biotite, pyrite, leucoxene/rutile, apatite and hematite.

Interpretation and Comments: It is interpreted that the sample is a fine grained, recrystallised, weakly to moderately foliated and veined felsic pyroclastic or epiclastic rock. There has been replacement by an assemblage dominated by quartz and sericite, with minor chlorite and carbonate and traces of biotite, pyrite, leucoxene, apatite and hematite. Possible relict detrital or microphenocrystal quartz grains occur along with possible textures after former pumiceous material. Deformation has led to development of a foliation largely defined by sericite preferred orientation and the emplacement of several veins. Early veining may be syn-tectonic and is dominated by quartz and minor carbonate. Subsequently, there was emplacement of a few diffuse (maybe tension gash) veinlike masses of quartz + chlorite ± carbonate and finally by a few late veins of carbonate ± quartz.

133785 PTS

Summary: Strongly veined and brecciated, low grade metamorphosed and deformed black shale. This rock has been recrystallised into a quartz + sericite assemblage, with minor graphitic material and disseminated pyrite. Veining, grading into brecciation, has occurred, with early infill by fine to medium grained quartz + carbonate, with local pyrite aggregates and a little biotite-chlorite, followed by the main infill of medium to coarse grained carbonate, with minor quartz and a little biotite-chlorite and pyrite, and followed by late quartz-rich veining. The last veining has "epithermal" textures. Carbonate in the sample may be ankerite or siderite. Traces of sphalerite, galena, chalcopyrite and pyrrhotite occur as tiny inclusions in vein-hosted pyrite.

Handspecimen: The drill core sample is composed of a type of hydrothermal breccia. It displays strongly brecciated dark grey, fine grained sedimentary rock (e.g. carbonaceous shale), forming angular clasts up to 3 cm across. The breccia ranges from matrix-supported to clast-supported, with clasts being strongly veined. A little fine grained disseminated pyrite occurs in the clasts and they have been veined by paragenetically early pyrite, quartz and pale yellow-brown carbonate, then by abundant medium to coarse grained pale yellow-brown carbonate (grading into wider zones of breccia infill), and lastly by a few sub-planar quartz veins up to 3 mm wide. Testing of the section offcut with dilute HCl did not cause a reaction from the carbonate. This fact, together with the colour of the carbonate, implies that it could be of ankerite or siderite composition. No K-feldspar was detected by testing of the section offcut with sodium cobaltinitrite. The sample is weakly to moderately magnetic, with susceptibility of up to 190 x 10^{-5} SI units.

Petrographic Section:

a) Primary mineralogy and textures: In the section, it is apparent that the original rock has been deformed, metamorphosed to low grade, veined and brecciated in places. The host rock has been finely recrystallised, is foliated and exhibits a crenulation in places. The recrystallised rock is dominated by quartz and subordinate sericite, with minor finely dispersed carbonaceous material (e.g. graphite), a little disseminated pyrite and trace leucoxene/rutile. The original rock is interpreted to have been a carbonaceous (i.e. organic-bearing) shale.

b) Alteration and structure: The original fine grained sedimentary rock was metamorphosed to low grade and developed a finely recrystallised, weakly to moderately foliated assemblage of fine grained quartz and sericite, with minor dispersed graphite and pyrite. Foliation is defined by preferred orientation of sericite and graphite and the main foliation is cross-cut at a moderate angle by a later crenulation. Metamorphic and penetrative deformation effects were subsequently followed by veining, grading into brecciation. At least three generations of veining are recognised. There is an early generation of veins (up to ~1.5 mm across) that contain fine to medium grained quartz, with local pyrite aggregates and disseminations and a little brown biotite (or biotite-chlorite intergrowth). In these veins, quartz appears to be partly recrystallised. A subsequent generation of veining grades into wider zones (several millimetres) of breccia infill. This type of infill is dominated by medium to coarse grained carbonate, with minor quartz and a little biotite and pyrite. The last stage of veining has been by sub-planar quartz-rich veins up to 2.5 mm wide. These are fine to medium grained, unstrained and have an "epithermal" appearance.

c) Mineragraphy and paragenesis: The deformed shale clasts contain a little dispersed pyrite, in places as porphyroblasts up to 0.6 mm across. Most pyrite occurs in the veins, especially the earliest type, as disseminated grains and elongate aggregates. Individual grains are up to 1 mm across and some show fracturing. Vein-hosted pyrite contains rare inclusions of sphalerite (up to 0.1 mm across) and even less common inclusions of galena, chalcopyrite and pyrrhotite.

Mineral Mode: Approximate modal proportions are: quartz 55%, carbonate (ankerite or siderite) 20%, sericite 19%, pyrite 3%, biotite/chlorite and graphite each 1% and traces of leucoxene/rutile, sphalerite, galena, chalcopyrite and pyrrhotite.

Interpretation and Comments: It is interpreted that the sample is a strongly veined and brecciated, low grade metamorphosed and deformed black shale. This rock has been recrystallised into a quartz + sericite assemblage, with minor graphitic material and disseminated pyrite. Veining, grading into brecciation, has occurred, with early infill by fine to medium grained quartz + carbonate, with local pyrite aggregates and a little biotite-chlorite, followed by the main infill of medium to coarse grained carbonate, with minor quartz and a little biotite-chlorite and pyrite, and followed by late quartz-rich veining. The last veining has "epithermal" textures. Carbonate in the sample may be ankerite or siderite. Traces of sphalerite, galena, chalcopyrite and pyrrhotite occur as tiny inclusions in vein-hosted pyrite. If the sample contains significant Zn, it is possible that it could be partly hosted in the carbonate, as well as in traces of sphalerite.