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Invoice 970638
September 28, 1997

Report For Gary Stewart
Tarco Oil & Gas Ltd.
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Calgary, Alberta
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242 3887

Samples:	97C-01-1	97C-01-2	97C-02-1	97C-02-2
	97C-02-3	97C-02-4	97C-02-5	97C-03-1
	97C-03-2	97C-03-3	97C-04-1	97C-05-1
	97C-05-2	97C-05-3	(12 T.S., 2 P.T.S.)	

Note: Detail field relationship descriptions were not included with sample submission and Vancouver Petrographic personnel were not involved in sample collection.

Summary: This sample suite is from the Dot Copper Porphyry Property located 2.5 kilometres northwest of Merritt, British Columbia. The property is within the Guichon Creek Batholith approximately 15 km southeast of the Highland Valley Copper Mine Complex.

The rocks were submitted as being dominated by medium to coarse crystalline intrusives of mainly granodiorite composition. However, considerable variation in alteration, textures and potassium feldspar content is evident within the suite. Petrographic descriptions are attached and the rock names can be summarized as follows:

	Initial Field Name	Rock Name
1)	97C-01-1:48.9m -Granodiorite	Moderately sericitized and chloritized hornblende quartz monzonite.
2)	97C-01-2:119.6m -Granodiorite	Moderately chloritized, sericitized and saussuritized biotite-hornblende quartz diorite. (approaching granodiorite)
✓ 3)	97C-02-1:110.3m -Granodiorite	Moderately chloritized, highly argillic altered and intensely sericitized hornblende quartz diorite.

✓ 4)	97C-02-2:112.7m	-Granodiorite	Moderately silicified and sericitized hornblende granodiorite.
✓ 5)	97C-02-3:113.4m	-Granodiorite	Moderately chloritized and intensely sericitized granodiorite. (exact parent rock not apparent)
✓ 6)	97C-02-4:145.5m	- Aplite Dyke	Potassic altered and carbonatized felsite dyke.
✓ 7)	97C-02-5:191.1m	-Granodiorite	Moderately chloritized and intensely sericitized hornblende-biotite quartz monzonite.
✓ 8)	97C-03-1:28.5m	no name	Zeolitic, sandy, slightly reworked highly sericitized argillic tuff.
✓ 9)	97C-03-2:62.6m	no name	Moderately carbonatized microporphyritic tuff
✓ 10)	97C-03-3:146.4m	-Conglomerate	Intensely carbonatized and argillic altered reworked pebbly tuff
✓ 11)	97C-04-1:206.3m	-Granodiorite	Weakly chloritized and moderately sericitized hornblende-biotite quartz monzonite.
✓ 12)	97C-05-1:48.3m	-Granodiorite	Moderately chloritized and sericitized hornblende granodiorite.
✓ 13)	97C-05-2:109.6m	? ? ?	Intensely sericitized and argillic altered medium crystalline hornblende. (quartz diorite)
14)	97C-05-3:245.2m	-Granodiorite	Moderately chloritized and sericitized hornblende-biotite quartz monzonite.

Since the names of most of these rocks are highly dependent on the potassium feldspar content, I recommend that;

- 1) a portable diamond saw be purchased or rented for future drill programs to ascertain the textures and composition better seen on the sawn surface,
- 2) stain representative core lengths for potassium feldspar with a field kit for K-spar staining.

Alteration is dominated by variable degrees of sericitization. Some specimens, such as 97C-02:113.4m, also contain intense chlorite development. Sphene is present in 97C-01:48.9m, 97C-01:119.6m, 97C-02:110.3m and 97C-02:191.1m as a primary original mineral. Minor saussurite was noted in several samples. (Saussurite is a fine grained assemblage of zoisite, calcite, sericite and albite which forms as a result of hydrothermal alteration of calcic plagioclase.)

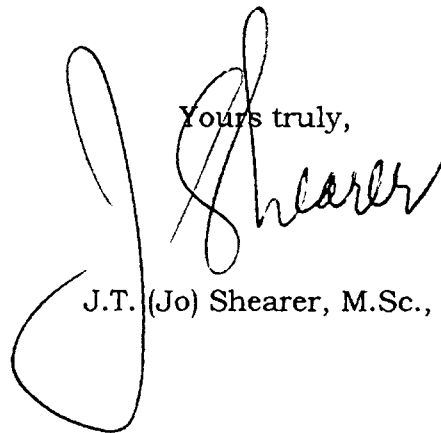
Chalcopyrite is the earliest stage sulfide and is closely associated and contemporaneous with intense development of sericite and secondary quartz flooding. This sericitization is commonly accompanied by minor coarse crystalline muscovite as microveinlets and irregular lenses. Clay mineral development is important in specimen 97C-03:110.3m

Bornite commonly rims the large chalcopyrite lenses. Minor covellite occurs along the grain boundaries of bornite. No native copper was observed in the specimen suite. One small grain of possible electrum was noted in the chalcopyrite.

The three samples from 97C-03, initially identified as Tertiary Sediments, are actually tuffaceous volcanoclastic rocks.

If you have any questions regarding the attached petrographic descriptions or would like other specific lines of inquiry addressed, please call me at 970-6402.

Yours truly,

A handwritten signature in black ink, appearing to read 'J.T. Shearer', written over the typed name below.

J.T. (Jo) Shearer, M.Sc., P.Geo.

1

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-01-1: 48.9m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, hypidiomorphic granular texture, Coarse crystalline, Light brownish grey coloured, Coarsely speckled appearance due to black elongate hornblende crystals up to 4mm in length, Set within a light grey interlocking mosaic of plagioclase, potassium feldspar and quartz, Plagioclase forms euhedral crystals up to 5.0mm in length, K-spar forms smaller grains around and between the larger plagioclase, Quartz occurs as rounded to irregular shaped grains in a mainly interstitial position, Moderately magnetic, Muscovite forms large primary grains over 2mm in width.

INITIAL FIELDNAME: Granodiorite

HANDSPECIMEN ROCK NAME: Slightly chloritized hornblende quartz monzonite

THINSECTION EXAMINATION:

ESTIMATED MODE:

11% Plagioclase
12% Sericite (replacing plagioclase)
3% Saussurite (replacing plagioclase)
15% Hornblende
Trace Sphene
24% Orthoclase
Trace Leucoxene (alteration of sphene)
3% Magnetite (opaques)
21% Quartz
8% Chlorite
2% Muscovite
Trace Apatite
1% Calcite
Trace Epidote

Hornblende forms large composite lenses >3.0mm of mainly anhedral crystals up to 0.6mm across. The edges of these hornblende masses are replaced by chlorite. This chlorite development is associated with rare rounded grains of apatite up to 0.1mm in diameter and euhedral sphene crystals up to 0.8mm in length. Hornblende also fills the interstitial space between large plagioclase grains. Plagioclase forms large subeuhedral laths up to >3mm in length. Plagioclase commonly is partially replaced by moderate development of sericite and minor patchy saussurite and minor calcite. The saussurite is mainly near the edges of the plagioclase grains in irregular lenses up to 0.2mm in length. (Saussurite is a fine grained assemblage of zoisite, calcite, sericite and albite which results from the hydrothermal alteration of calcic plagioclase.)

Quartz forms anhedral rounded interstitial grains up to 0.8mm in diameter which occasionally are corroded by chlorite replacing adjacent hornblende.

Orthoclase occurs as cloudy anhedral grains which contain minor sericite and calcite microveinlets.

Opagues (mainly magnetite?) form grains up to 0.7mm across often spatially associated with hornblende and chlorite alteration. Coarse grained sphene is also closely associated with opaque grains.

ROCK NAME: Moderately sericitized and chloritized hornblende quartz monzonite
(Sphene bearing)

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-01-2: 119.6m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, Moderately melanocratic, hypidiomorphic granular texture, Abundant mafic minerals (hornblende and biotite) which form an interconnected network, Plagioclase forms large phenocrysts up to 8mm in length although plagioclase averages about 2mm in length, Potassium feldspar occurs as small interstitial grains between the larger plagioclase, Strongly magnetic, Quartz forms small irregular grains and composite lenses up to 3mm in length associated with hornblende,

INITIAL FIELDNAME: Granodiorite

HANDSPECIMEN ROCK NAME: Slightly chloritized biotite-hornblende quartz diorite

THINSECTION EXAMINATION:

ESTIMATED MODE:

15% Biotite
 12% Hornblende
 27% Plagioclase
 11% Sericite (replacing plagioclase)
 6% Orthoclase
 12% Quartz
 4% Magnetite (opaques)
 3% Chlorite (mainly replacing biotite)
 2% Muscovite
 10% Saussurite (replacing plagioclase)
 1% Spene

Hornblende forms large (up to 2.5mm in length) anhedral and poikiloblastic grains which contain numerous rounded inclusions of plagioclase. Hornblende is relatively fresh having only traces of chlorite replacement.

Biotite occurs as large irregular sheets >3.0mm in width which also have numerous plagioclase inclusions. Biotite is much more altered by chlorite-magnetite than hornblende. The majority of the opaques are closely associated with the mafic minerals.

Plagioclase forms long laths which commonly are >3.0mm in length. Saussurite development is present in moderate amounts uniformly throughout plagioclase in the specimen. Sericite alteration of plagioclase is concentrated in small lenses up to 0.3mm in width which may be related to adjacent hornblende-biotite masses. Plagioclase composition approximately An₆₅.

Spene is present as subeuhedral crystals up to 1.4mm in length intimately associated with opaque envelopes (perhaps leucoxene alteration).

Quartz forms large irregular grains >3.0mm which contain numerous inclusions of plagioclase and mafic minerals. Quartz occupies a distinct interstitial position. Orthoclase occurs as smaller anhedral grains up to 0.6mm commonly slightly altered by sericite.

ROCK NAME: Moderately chloritized, sericitized and saussuritized biotite-hornblende quartz diorite
(approaching granodiorite)

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-02-1: 110.3m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, Dark greyish-brown, Plagioclase forms small phenocrysts up to 4mm in length set in a fine grained matrix composed of hornblende and quartz, Abundant argillic alteration, Non-magnetic, No potassium feldspar content, Minor hornblende coarser crystals up to 3mm, Minor biotite development (?), Altered appearance,

INITIAL FIELDNAME: Granodiorite

HANDSPECIMEN ROCK NAME: Highly altered hornblende quartz diorite (finely porphyritic)

THINSECTION EXAMINATION:

ESTIMATED MODE:

8% Plagioclase
 20% Sericite (replacing plagioclase)
 32% Quartz
 15% Illite (clay minerals) (replacing plagioclase)
 5% Hornblende
 10% Chlorite
 2% Muscovite
 4% Calcite
 Trace Apatite
 1% Sphene

Quartz forms a distinctive interlocking composite anhedral mosaic which almost completely encloses the coarse subeuhedral network of plagioclase relict laths. Plagioclase is almost completely replaced by sericite and clay minerals. A substantial amount of small sparry calcite is associated with the sericite replaced laths.

Quartz grains average about 0.4mm in diameter. Occasionally quartz is slightly replaced by calcite.

Hornblende clusters are largely replaced by chlorite and minor fine grained magnetite. Subrectangular opaque grains up to 0.2mm are closely associated with the hornblende clusters.

Minor rounded lenses of chlorite up to 0.1mm in diameter have replaced plagioclase. Traces of apatite form grains up to 0.2mm in length within the intensely sericitized plagioclase.

Sphene forms irregular "wormy" patches up to 1.0mm across which has sparry calcite "matrix" associated with rectangular opaque grains.

ROCK NAME: Moderately chloritized, highly argillic altered and intensely sericitized hornblende quartz diorite

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-02-2: 112.7m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, Light grey coloured medium to coarse crystalline, Hypidiomorphic granular texture, plagioclase laths up to 4mm in length, Quartz forms irregular anhedral grains up to 3mm in length between the coarser plagioclase crystals, Hornblende also forms smaller grains associated with the quartz, Potassium feldspar is distributed sparsely throughout the specimen, Potassium feldspar appears to be concentrated along the edge of a 3mm wide quartz veinlet, Sulfides (pyrite & bornite) are associated with the quartz veinlet and k-spar, Finely disseminated chalcopyrite is associated with quartz chlorite and muscovite, Non-magnetic, Traces of muscovite throughout.

INITIAL FIELDNAME: Granodiorite

HANDSPECIMEN ROCK NAME: Slightly altered (silicified) hornblende granodiorite

THINSECTION EXAMINATION:

ESTIMATED MODE:

24% Quartz (primary rock forming)
 12% Quartz (hydrothermal secondary silica)
 11% Orthoclase
 28% Plagioclase
 10% Sericite
 3% Hornblende
 3% Chlorite
 1% Calcite
 8% Muscovite
 <1% Chalcopyrite
 <1% Bornite
 Trace Hematite
 <1% Magnetite
 Trace Covellite
 Trace Electrum

Traces of very fine grained magnetite is associated with chlorite alteration of hornblende. Magnetite forms small lenses up to 0.06mm in length parallel to the long axis of the hornblende crystal.

Chalcopyrite also forms very fine grained isolated grains 0.03mm in diameter which appear to be related to intense sericite alteration. Larger chalcopyrite grains are associated with the wide clear quartz veins often spatially near irregular shaped bornite lenses which are also related to intense sericite development. One small electrum grain occurs on the edge of a bornite microlens at 17.0x61.4. The larger chalcopyrite grains have tiny angular bornite inclusions.

The large lense of reflecting minerals is composed of an irregular core of fractured chalcopyrite up to 8mm wide which has been surrounded by a bornite envelope up to 0.2mm wide, the chalcopyrite core has been veined and fractures filled with bornite. The outer edge of the bornite envelope contains abundant covellite inclusions up to 0.1mm wide. Covellite and bornite also rim quartz grains.

There are traces of sphalerite, up to 0.1mm in length, associated with bornite-chalcopyrite in the coarse muscovite veinlets.

Plagioclase forms large subeuhedral laths up to >3mm in length. All plagioclase has been moderately to intensely replaced by the development of sericite parallel to the albite twinning or concentrated in the cores of the plagioclase grains.

Minor calcite occurs between and along the grain boundaries of plagioclase and orthoclase grains. orthoclase forms large anhedral grains up to >3mm across. Calcite forms short micro-veinlets within the orthoclase grains. Coarse muscovite is associated with the edges of the chalcopyrite lenses.

Hornblende is largely to completely replaced by coarse muscovite and fine grained magnetite near the chalcopyrite. Away from the chalcopyrite hornblende is completely replaced by chlorite. Occasionally chlorite was noted replacing plagioclase.

ROCK NAME: Moderately silicified and sericitized hornblende granodiorite

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-02-3: 113.4m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, No stained section off-cut due to lack of enough specimen, Only small chip available, Highly altered, Dark to light green colour, Extremely chloritic associated with abundant sericite, Disseminated chalcopyrite, pyrite and molybdenite, Non-magnetic, Minor bornite, No carbonate content.

INITIAL FIELDNAME: Granodiorite

HANDSPECIMEN ROCK NAME: Intensely chloritized and sericitized mineralized rock

(No parent rock can be recognized by the handspecimen)

THINSECTION EXAMINATION:

ESTIMATED MODE:

25% Chlorite
 20% Plagioclase
 45% Sericite
 1% Molybdenite
 6% Chalcopyrite
 1% Bornite
 2% Pyrite
 Trace Sphalerite
 Trace Magnetite
 Trace Calcite
 Trace Siderite

Chalcopyrite forms large lenses which contain many small gangue inclusions. Commonly chalcopyrite is highly fractured and narrow bornite micro-veinlets fill these fractures. Often the edges of the bornite micro-veinlets have a delicate branching texture. The gangue inclusions are almost exclusively fine muscovite-sericite needles-flakes. Traces of sphalerite in grains <0.1mm occur along the margins of the large chalcopyrite lenses. Muscovite forms very coarse sheets up to 1.4mm across which are associated with smaller elongate magnetite grains up to 0.04mm in length. The coarser muscovite occurs within patches of massive sericite. Some of the large squareish rosettes of muscovite appear to be replaced by relatively coarse grained, low birefringent chlorite.

Remnants of plagioclase crystals were observed throughout the slide in partial highly corroded grains up to 0.5mm.

Trace amounts of calcite occur replacing the relict plagioclase grains.

Late stage needle-like carbonate (probably siderite) is intimately associated with pyrite which partially replaces the siderite crystals.

ROCK NAME: Moderately chloritized, intensely sericitized granodiorite
(Exact parent rock not discernible from thinsection)

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-02-4: 145.3m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, Brownish-light grey coloured, Very fine grained, Potassium feldspar is abundant as uniform <0.5mm grains which form rare aggregate lenses up to 2mm in length. The remainder of the specimen appears to be a fine grained mixture of quartz and plagioclase, minor quartz hairline veinlets cross-cut the specimen, Non-magnetic, No calcite content.

INITIAL FIELDNAME: Aplite dyke

HANDSPECIMEN ROCK NAME: Rhyolite dyke of potassic altered felsite dyke

THINSECTION EXAMINATION:

ESTIMATED MODE:

19% Quartz
 <1% Opaques
 40% Orthoclase
 <1% Sphene
 28% Plagioclase
 2% Quartz (secondary hydrothermal silica)
 3% Sericite (veinlets)
 1% Epidote
 6% Calcite
 1% Muscovite

Orthoclase forms elongate to irregular cloudy grains averaging 0.4mm in diameter.

Orthoclase appears to replace plagioclase as evidenced by corroded plagioclase grains and plagioclase grains partially altered by orthoclase.

Muscovite forms highly irregular patches up to 0.2mm in length but averaging much smaller.

Muscovite replaces orthoclase.

Calcite occurs as small irregular grains between orthoclase grains and as the core of rounded orthoclase grains.

Sphene is associated with sparry calcite and rare ragged opaque grains up to 0.2mm across. The longest sphene subeuhedral crystal is 0.8mm in length.

Plagioclase forms corroded stubby crystals up to 0.6mm in length but averaging about 0.15mm. The largest plagioclase laths are highly altered by calcite.

Quartz occurs as a very fine grained, almost cherty, network around the primary plagioclase grains. Quartz also appears to be replaced by secondary orthoclase.

Sericite forms veinlets up to 0.3mm in width which cross-cut all other mineral species.

ROCK NAME: Potassic altered (orthoclase) and carbonatized felsite dyke

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-02-5: 191.1m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, Dark grey speckled appearance, sub-porphyrific, Abundant hornblende as small 1 to 2mm rounded grains, Plagioclase forms subeuhedral laths up to 4mm in length, Occasionally plagioclase occurs as strongly zoned rounded crystals 2mm in diameter, Potassium feldspar is roughly equal in abundance as plagioclase distributed uniformly throughout, Quartz forms small interstitial grains, Strongly magnetic, No calcite content, Traces of muscovite, Magnetite forms grains subrectangular in shape up to 2mm, Hornblende is strongly chloritized.

INITIAL FIELDNAME: Granodiorite

HANDSPECIMEN ROCK NAME: Altered hornblende quartz monzonite

THINSECTION EXAMINATION:

ESTIMATED MODE:

13% Plagioclase
 16% Sericite (replacing plagioclase)
 25% Orthoclase
 23% Quartz
 3% Hornblende (relict)
 1% Biotite
 4% Magnetite
 6% Saussurite (altering plagioclase)
 Trace Apatite
 8% Chlorite
 <1% Muscovite
 1% Sphene
 Trace Epidote

Hornblende forms large poikiloblastic grains >5.0mm in length containing rounded opaque grains and plagioclase inclusions. The edges of many of the smaller hornblende grains are replaced by chlorite and minor fine grained opaques (magnetite). There are at least two generations of hornblende formation.

Elongate sphene up to 0.6mm is associated with envelopes and a skeletal arrangement of thin opaque layers. These sphene crystals are often spatially associated with narrow hornblende grains.

Biotite forms rare subrectangular flakes closely associated with hornblende and chlorite. Calcite forms discontinuous microveinlets up to 0.02mm wide which cross cut all mineral species.

Orthoclase and quartz both form relatively clear anhedral irregular interstitial grains having abundant small rounded inclusions of plagioclase and hornblende.

Plagioclase occurs as large >3.8mm elongate laths which are moderately to intensely replaced by sericite development and lesser saussurite. Euhedral epidote crystals up to 0.05mm in length are present in trace amounts. Many of the largest plagioclase crystals are strongly zoned.

ROCK NAME: Moderately chloritized, intensely sericitized hornblende-biotite quartz monzonite

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-03-1: 28.5m

HANDSPECIMEN DESCRIPTION:

Diamond drillcore, No stained off-cut provided, Dark grey matrix with well rounded to subangular siliceous lithic clasts up to 3mm in length, Much of the rock appears to be silt sized particles in an argillaceous matrix, Extremely friable, Minor calcite noted in part of specimen, Traces of zeolite nodules (green chabazite{?}), Non-magnetic, Some large clasts appear kaolinized, Some clear quartz clasts.

INITIAL FIELDNAME: Not submitted

HANDSPECIMEN ROCK NAME: Sandy argillaceous siltstone
(in mature clastic sedimentary rock)

THINSECTION EXAMINATION:

ESTIMATED MODE:

6% Lithic framework grains

25% Quartz grains

18% Clay minerals (illite{?}) (matrix)

36% Sericite (matrix)

5% Plagioclase fragments

10% Calcite

Trace Zeolites, Green chabazite (?)(not present in thinsection)

Trace Opaques

This is a matrix supported by pyroclastic rock. The matrix is composed mainly of fine grained sericite and clay minerals (illite{?}). The alignment and relict texture of the matrix assemblage suggests that the matrix was originally highly vitric. Calcite occurs as fine grained aggregates distributed in an irregular fashion throughout. Some of the larger lithic fragments are well rounded and up to 6mm in length. Brown stained calcite is abundant in these highly altered lithic clasts. Calcite also forms subrounded lenses up to 0.2mm in diameter which are commonly cored by opaques.

Quartz forms the principal clast type. Quartz grains are up to 0.8mm in diameter but average around 0.4mm. Quartz clasts are mainly subangular. Occasionally quartz is the main constituent of fresh, coarse grained lithic fragments which include orthoclase and plagioclase. These lithic fragments appear to have been derived from the Guichon ortholith.

Plagioclase occurs as angular, isolated grains up to 1.2mm in length. Commonly, plagioclase is moderately sericitized. Plagioclase often forms angular composite lithic fragments with quartz, and minor orthoclase.

This rock reflects a depositional environment between clastic fluvial deposition and proximal tuffaceous deposits. The abundance of glassy matrix suggests that the rock formed in a somewhat reworked environment to contribute the angular quartz and immature lithic fragments but close enough to the volcanic source to take into account the pyroclastic matrix.

ROCK NAME: Slightly reworked, highly sericitized, argillic tuff

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-03-2: 62.6m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, (no section off-cut due to insufficient sample, only small chip left), Dark grey in colour, fine grained matrix with large rounded plagioclase clasts up to 6mm in length, These quartz grains are commonly highly fractured and stained brownish-red by hematite, Calcite is associated with some of the large plagioclase clasts as apparent amygdules, The groundmass also contains very small <0.2mm apparent plagioclase and/or lithic fragments, Slightly friable but not as friable as #8.

INITIAL FIELDNAME: not submitted

HANDSPECIMEN.ROCK NAME: Reworked (quartz clasts) fine grained ashfall tuff

THINSECTION EXAMINATION:

ESTIMATED MODE:

10% Quartz

11% Sericite

26% Calcite

35% Groundmass (quartz, plagioclase & alteration products)

13% Plagioclase phenocrysts

5% Opaques

Plagioclase occurs in two main modes; 1) plagioclase forms large distinctly zoned, rounded microphenocrysts up to 1.2mm in diameter. Plagioclase also forms large laths up to 4.0mm in length, 2) plagioclase forms a fine grained network of needle-like crystals averaging about 0.15mm in length. This network is within a matrix of even finer grained plagioclase, quartz and sericite.

Calcite is relatively abundant as small crystals up to 0.1mm in length and as anhedral clusters associated with opaques. Calcite forms large grains up to 0.4mm in length which have a skeletal appearance due to thin lines of opaques. This form of calcite appears to be the complete replacement of original mafic minerals (perhaps pyroxene, judging from the form).

ROCK NAME: Moderately carbonatized microporphyritic tuff

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-03-3: 149.4m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, (no stained section off-cut produced), Light brownish grey colour of matrix with darker grey lithic clasts, Clasts are well rounded 11mm and larger in diameter, quite friable, High clay content, Calcite common throughout, Calcite also occurs as coarse sparry lenses up to 15mm in length.

INITIAL FIELDNAME: Conglomerate

HANDSPECIMEN ROCK NAME: Moderately calcareous pebble conglomerate

THINSECTION EXAMINATION:

ESTIMATED MODE:

40% Lithic pebbles

25% Plagioclase (fine grained)

Matrix (clay minerals abundant \pm sericite, quartz and plagioclase)

26% Calcite

9% Plagioclase (coarse crystalline)

Calcite occurs as very large angular lenses which appear to almost completely replace large plagioclase grains. Calcite also is distributed relatively uniformly throughout the specimen in small fine grained clusters.

Plagioclase forms euhedral crystal up to 1.4mm in length which are variably to almost completely replaced by sparry calcite. Plagioclase also occurs as a 0.2mm average crystal network which composes the matrix of the specimen. This plagioclase network is also variably replaced by calcite and clay minerals (illite(?)). Some of the plagioclase dominant lithic fragments have a thin fine grained calcite rind up to 0.05mm wide.

Opaques form rounded to angular grains up to 0.2mm across. Quartz occurs as large angular framework grains up to 1.8mm in length. Calcite has replaced quartz along grain boundaries.

The main lithic fragments are composed of highly altered tuffaceous plagioclase dominant parent rock.

This specimen appears to be of proximal pyroclastic origin, perhaps a high temperature ash or volcanic mudflow.

ROCK NAME: Intensely carbonatized and argillic altered, reworked pebbly tuff

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-04.1: 206.3m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, Medium to dark grey, Hypidiomorphic granular texture, Medium crystalline, Potassium feldspar is abundant throughout the specimen occurring mainly between plagioclase crystals or in some case completely surrounding plagioclase grains, Quartz occurs as irregular anhedral grains averaging between 1 to 2mm in diameter and occupies an interstitial position, Weakly magnetic, Hornblende is highly chloritic, K-spar equals plagioclase in abundance.

INITIAL FIELDNAME: Granodiorite

HANDSPECIMEN ROCK NAME: Weakly chloritized hornblende quartz monzonite

THINSECTION EXAMINATION:

ESTIMATED MODE:

17% Plagioclase
 15% Sericite (replacing plagioclase)
 30% Orthoclase
 26% Quartz
 4% Hornblende
 1% Biotite (relict)
 2% Magnetite (opaques)
 5% Chlorite
 1% Epidote

Plagioclase forms euhedral laths up to 1.5mm which are variably replaced by sericite development. Sericite is more intense in the cores of the plagioclase grains. Less altered plagioclase crystals give a composition of approximately An₆₁.

Quartz and orthoclase occur as large anhedral grains occupying the interstitial position between the euhedral plagioclase. Much of the quartz has distinctly undulatory extinction. Orthoclase often has small plagioclase inclusions.

Opaques (magnetite?) occur as 0.2mm grains associated with hornblende clusters.

Hornblende is variably to completely replaced by chlorite and minor fine grained magnetite.

Biotite (relict) grains are completely replaced by fibrous chlorite.

Traces of small rounded epidote and apatite grains are associated with chloritized biotite and hornblende clusters.

ROCK NAME: Weakly chloritized and moderately sericitized hornblende-biotite quartz monzonite

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-05-1: 48.3m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, Relatively coarse crystalline, Mainly light grey with dark speckles, Hornblende forms crystal aggregates up to 5mm in diameter, Some hornblende has been altered by chlorite and is associated with magnetite, Strongly magnetic, Potassium feldspar forms grains up to 3mm mainly occurring between plagioclase grains, K-spar grains are slight fleshy colour on the unstained specimen, Plagioclase forms mainly short stubby crystals, Quartz is mainly irregular anhedral interstitial grains, The rock is highly fractured, There may be k-spar alteration of the primary plagioclase grains.

INITIAL FIELDNAME: Granodiorite

HANDSPECIMEN ROCK NAME: Chloritized hornblende granodiorite

THINSECTION EXAMINATION:

ESTIMATED MODE:

22% Plagioclase
 16% Sericite (replacing plagioclase)
 12% Orthoclase
 28% Quartz
 11% Hornblende
 4% Magnetite
 6% Chlorite
 1% Calcite

Plagioclase forms coarse grained euhedral crystals and crystal clusters. Plagioclase is variably replaced by fine grained sericite development. Traces of sparry calcite were also noted replacing plagioclase. Some plagioclase crystals are almost completely replaced whereas others are relatively fresh. Composition of the lesser altered plagioclase is approximately An₆₆.

Hornblende forms large irregular clusters which are variably chloritized. Opaque grains up to 0.4mm are closely associated with the hornblende masses.

Quartz forms large irregular anhedral grains between euhedral plagioclase. Orthoclase occurs as very large anhedral grains which occasionally have perthitic borders. Some of the adjacent plagioclase appears to have been corroded by orthoclase development.

ROCK NAME: Moderately chloritized and sericitized hornblende granodiorite

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-05-2: 109.6m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, Medium crystalline, medium grey, Plagioclase forms randomly oriented crystals up to 4mm in length, many of the plagioclase crystals appear to be of irregular shape and many are strongly zoned, Non-magnetic, The bulk of the specimen is composed of small anhedral quartz grains, no potassium feldspar content.

INITIAL FIELDNAME: not submitted

HANDSPECIMEN ROCK NAME: Siliceous andesitic or dacitic dyke

THINSECTION EXAMINATION:

ESTIMATED MODE:

4% Plagioclase

39% Quartz

38% Sericite & Illite (replacing plagioclase)

5% Muscovite

4% Chlorite

8% Calcite

2% Opaques

Trace Apatite

Plagioclase ghosts form rectangular grains up to 1.4mm in length but average about 0.8mm. Plagioclase is almost completely replaced by intense sericite development. Sericite also replaces the grain edges of adjacent quartz. Many of the smaller plagioclase grains are also rimmed by fine grained calcite and opaques. Illite and sericite appear to form a fine grained assemblage in some plagioclase grains.

Chlorite completely replaces small hornblende (?) grains up to 0.2mm in length. Calcite forms small fine grained clusters throughout and small sparry lenses up to 0.1mm in diameter. Some of the calcite could be iron carbonate.

Quartz occurs as small highly fractured grains averaging 0.4mm across. Quartz is slightly replaced by sericite and often has small inclusions of sericitized plagioclase.

Traces of apatite as small rounded 0.15mm grains occur in the sericite replacements.

ROCK NAME: Intensely sericitized and argillic altered medium crystalline hornblende
(quartz diorite {?})

(original rock composition obscured by intense alteration.

-- PETROGRAPHIC DESCRIPTION --

FOR: Tarco Oil & Gas Ltd., ATTN.: Gary Stewart, Dot Copper Property

SPECIMEN NUMBER: 97C-05-3: 245.2m

HANDSPECIMEN DESCRIPTION:

Diamond Drillcore, Moderately dark grey in colour, Slightly speckled due to diffuse chloritized mafics (hornblende), Hornblende forms crystals up to 2mm in length, Plagioclase occurs as subeuhedral crystals up to 3mm in length, Potassium feldspar is abundant as relatively small grains interstitial to the larger plagioclase crystals, Quartz forms small rounded grains, Moderately strongly magnetic.

INITIAL FIELDNAME: Granodiorite

HANDSPECIMEN ROCK NAME: Chloritized and saussuritized hornblende quartz monzonite

THINSECTION EXAMINATION:

ESTIMATED MODE:

19% Plagioclase (relict)
 23% Orthoclase
 24% Quartz
 15% Hornblende
 2% Chlorite
 12% Sericite ± Minor illite (replacing plagioclase)
 2% Magnetite (opaques)
 1% Epidote
 1% Sphene
 1% Calcite

Plagioclase forms large >3mm euhedral laths which are variably altered by fine grained sericite. Sericite is most abundant in the cores of the plagioclase crystals. Plagioclase composition is approximately An₅₈.

Hornblende occurs as rounded composite clusters up to 2.0mm in diameter which are made up of individual crystals averaging 0.25mm in length. Most of the hornblende clusters are relatively fresh with little or no alteration by chlorite. Some clusters have minor interstitial sphene or epidote content associated with opaques. Opaques up to 0.2mm are closely associated with the hornblende lenses.

Quartz and orthoclase both form irregular anhedral grains averaging 0.4mm in diameter which occupy the interstitial position between the large euhedral plagioclase crystals.

Calcite forms discontinuous cross-cutting microveinlets up to 0.1mm in width. Sparry calcite patches up to 0.15mm have replaced hornblende.

ROCK NAME: Moderately chloritized and sericitized hornblende-biotite quartz monzonite

C97-02 #1 - 110.3m

Hard spec plaq mafic opaque (mt)

Stam Plaq xls in sub-ophitic matrix - but fs is plaq not
Kspcr - No Kspcr

all salmon pink fs

TS Bio - partly \rightarrow chl, encloses Qtz + opaque +
apatite

plaq - strong carb-ser altn - local fusions extra $\sim 10^\circ$
no zoning seen
matrix - rel strong carb altn

carb-sphere - opaque replace mafic? (amp or pyrox.)

amph? \rightarrow chl + carb + ser?

Qtz 'embayed' locally subrounded to
anhedral

Opaque w cracks + rims w chl + carb

apatite

sphere

locally - either rel eq ser (musc) or
bleached biotite

Altered bio plaq 'aphite' ... dike?

? Not question } not sure
" Chatway }

✓ 97C 02 #2 112.7

eyeballing TS - cpy w. intergrowths & veins of ? bn & cct
in qtz veins & upper dissem.

qtz plaq (clouded) amph. (pale green)

STAIN qtz veins w. sulphides + Kspn altn halos

Elsewhere Kspn ~8% interstit. intergrown w 12%
qtz - ameboid to sub- $\frac{1}{2}$ "

plaq - zoned, pink altered (not Kspn) - salmon
mafic chl. Diss. sulph. in mafics / local bleached
plaq near mafics

T-S. -

(carb
veinlets)

bco → chl encloses ap, zircon, sphere?, plaq
brn bir - anom. loc → sericite - clear, mod bir

qtz - several grains together → ameboid shapes

Kspn alt to ser + carb also

opaque + qtz + chl + colorless fibrous radiating (ow) bir mineral
length slow parallel Extr
+ apatite [sericite]

TS may be
thinner than
avg.

thicker area
shows
sericite

"sericite"
Same/mineral alters plaq - also carb

X Kspn is perthite - texture  - no odd qtz

plaq - clouded by altn, local normal zoning - not
not seen

97C 02 #3 - 113.4M.

a large blob of cpy + small upper. dissem bits

The tiny piece of rock has MnS_2 as well +
looks sericitic

TS

with sulphide - rel cg sericite, locally after bio

also as radial xls in $\&$ veins?

'musc' low 2V \ominus apparently + length slow

Qtz

apatite

sphene

Almost completely sericitized rock

Remnants of  "prisms" - do not know

what they were - how Fe carb? + Qtz

97C 02 #4 - 145.3 m

looks of

dissem or networked Kspar

leucocratic vfg pink "rhyolite"

TS -

Fg plag dusted with altn & zoned where partly

replaced - zoning pattern not clear

carbonate altn in matrix

seucite in matrix - small xls with carb repl. fs

Kspar partly replaces plag.

sphene

ragged opaque

Aeriate ^{along} fractures repl. fs's with carbonate
locally.

altered felsite Tertiary?

97C-02-#5 - 191.1m

bio amph zoned plap (altu)

rel. fq, gray green aspect

STAINED

Lots of interstit $qtz + kspen$

multiple zones in plap seen - plap phenos

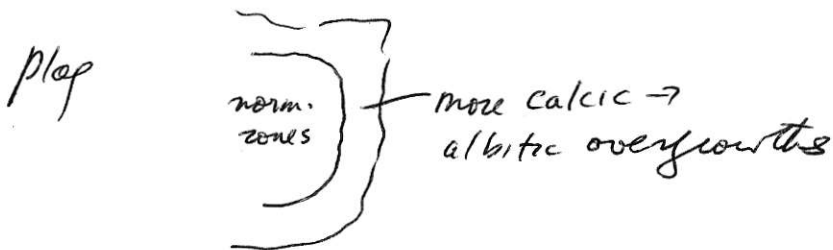
some qtz could be viewed as phenos

TS almost turquoise locally
olive - paler amphibole - closely cracked
but rel. fresh. Encloses ep + opaque

biotite - rel. clear $\frac{1}{3}$ chl grains or ragged + 50%
+ chl \rightarrow 100% locally \pm ep.

Some ep + altu

opaque - mt?



altered ~~ep~~ bio hb ~~qtz~~ ~~granodiorite~~
possibly a dike .. $kspen$ part.
Encloses other components

- qtz rel abundant

⁻⁰²
C97-03L-62.6u

Finely plagiophytic dacite - Tertiary? - pinkish/brown
T.S. -

Plagioclase microlites + lg phenos - cracks - Fe oxide
matrix vfg - carb. alter. locally

plagioclase rel. fresh.

altered matrix? - now ~~is~~ carb + iron oxide
but shape suggests pyroxenes

Tertiary? volcanic.

97C03 #1 28.5m pebbly fault gouge? or Tert. volc.?

'Clasts' 40 to subrounded qtz + other rx
or rel. well rounded

T.S.

Grains • qtz - some cracked, some not / ? some w/ qtz?
• spherulitic volc rx

• plagiophytic basalt? ... carb. alter.

• qtz - plagiophytic granitic rock w/ weak ser. alter.
"rounded grain"

• some plagioclase grains

matrix vfg carb. altered

Tert? volcanoclastic - carb + ser?? alter.
of matrix

97C03-3 149.4m

crumbly bxt'd carb cemented
Fault zone?

no mafics left
gray tan color

looks like
devit. tents in
some clasts

T.S.

Hard lens - multieuhic volc? bxt... clasts rinded/sub~~x~~r

clasts

dk matrix (chertic?) partly devitryf plaq phyruc
mafic volc

carbonate - cement, partly replaces plaq clasts (clean-
looking otherwise)

epidestric/^{looking} matrix? clast? with qtz frags ... could be
broken up amygdaloes

qtz larger 'pieces' are rimmed & have carb in cracks
? matrix ? vein bits?

some carb is either amygs, repl. amygs or replacing
rounded mafic phenos in mafic volc clasts

one clast has a felsic look + carb. celtu - lots of
anhedral plaq (rel. sodic - low & of extra)

large clast plaq extra & ~20° mostly → carb

a few larger xts in a clump show strong normal zoning

Text. volc fragmental rock.

97-C04 #1 206.3m

Plag xls have white rims - wk argillic

bio hb? → chl

looks porphyritic but altn bluro texture

fract has local bleaching envelope + dark mineral

T.S. 2% mt dissem fg -- locally in clumps of fine xls

bio 60% → chl

w. mafics

chl-ep-opaque blebs

15%? Qtz interstit aurobid

plag - rims 'fresh' cores ^{partly or} completely altered to

finely meshed aenite + local ? chlorite brn → gm, v. low bio.

? 10% Kspar intergrn w Qtz erodes plag
- less alt than plag.

plag - strong normal zoning at edges, esp against Kspar

- probable oscillatory zoning locally

plag poik enclosed by Qtz-Kspar locally

amph. remnants → chl + carb. } may have been partly

repl. by bio first

cecidite
some sphene

alt. "hb" bio Granodiorite ... yellowish elements

97C05 - #1 48.3

Granodiorite texture - no stained slab

Rel fresh-looking amphib. (partly chl) bio → chl + mt

T.S. -

plag sericitized, esp adj to Qtz veinlets, ± carb

rel cgy interst. Kspen - less altered

mafic → ? actinolite (green - yell gm plec) rel high bio
(biotite) + ? 20° extra

Qtz - cracked, anhedral to angular between plag xls +
with Kspen

plag - early xls strongly twinned zoned (normal)

Bio - partly chloritized, beat up looking tan → brown where not act.
apatite

minor epid.

veinlets Qtz + brnsh (carb #) ^{locally} / carb ^{veinlets} where / cut Qtz xls
elsewhere Qtz

Altered "Gaichon" gsd ?

97-05 #2 - 109.6m

Plag ppy - no kspar ^{shows} stained slab; matrix gtz - p/af
fg; altn suggests zoning in plag.

T.S. - fs altn strong - sericitic ± brown carbonate (up to 30% locally)
all twinning masked by altn

- matrix - altn ser, hydromica?, carbonate
'amorphous' yell brn (Fe oxide?)
partly stained carb.
does not look like calcite

altered plag ppy - apparently no kspar but
may have been some in matrix.

97-05 - NO 3 245.3m

almost a sericite textured porphyritic rock - crowded
mag ppy

phenos plag, matrix plag 15% kspar 15-20% gtz

can see leucocline, altered euhedral mafic mms ^{length slow}
(pink ampb. in part)

1st order yll brn
5xtn 30% pale grn to
→ pale grn
loc sharp, looks twinned

T.S.

altn - plag ser + ep.

mafic → chl (brn + blue) - biotite

ampb → Tremolite? + carb +
gold. brn 'amorphous' Fe oxide?
some sphere?

Plag - zoned - normal, strongly defined sharp twinning
rel. strong

- can see altn conc at older xl edges



magnetite

local small 'fresh' bio

ampb locally → some epidote + chl

hb.

DOT 96-11
59.1m

porphyritic-plag phenos 25% 2-6 mm

mafic phenos - chl/ep? 5%

qtz - ksp matrix

veined

sphere? second. bio?

TS carb. veins  - carb 2 generations

biotite - 25% → chl to 100 chl / clumps of small xls

opaque - Mt 1%

qtz - ksp ^{duoted w. altn} intergrown in matrix

qtz sugary ksp anhedral

plag phenos sericitized 30 → 80%

carb - green mineral - st. ^{pleo} ~~plag~~ / low bio / rel high relief
zoisite?? chl?

apatite - in plag, so early

• carb-chl zones intergrown w. chl bio
may have been amphibole

? bio. in some may be after amph. earlier on.

Crowded ppm

96-16-194m

Similar to 96-11 sample

veined - Qtz - carb?

plag - greenish - sericitized?

matrix vaguely sugary

mafic - 5%

bleaching on Rr + veins

T.S.

mafic → chl

plag → ser ³⁰~~50~~% + -rel. cg. → 90%; ± carbonate

Qtz in matrix coarser than 96-11 + deformed

Kspen also sericitized locally or nearly unaltered

carb fr + altn patches

sericite rel cg - rosettes - confirm

it is not something else

mafics → ser + chl (yell → green, v low bir)

vein Qtz - carb - chl - ^{v. fr} greenish acicular
crystals (trem - acton?)

97-01-2 119.6m bi hb gray CI 25 mafic Guichon granodiorite

quartz interstitial angular - fills areas between plap xls

minor interstitial Kspar

bio red brown to tan, small slightly chl. | encloses plap also
ragged ? partly resorbed by interst. qtz? - so younger xltm

magnetite $\frac{1}{2}\%$ small apatite xls

amphibole gm \rightarrow yell gm; inclusions } sphere (titanite)
plap, mt; nearby + inclusions of

sub-anhedral; wkly chl.

plap - subhedral wkly sericitized; locally more intense

weak normal zoning

97C01-1-48.9m - Rel leucocratic qtz mafic granodiorite; can see
scattered leucocrone CI ~15 mafic bi + hb?

Stained Slabs: qtz & in to ameboid

Kspar - interstitial -

Plap - sl. yellow - sericitized?

T.S. Intergrown amph/bio -

grn \rightarrow yell gm red brown \rightarrow tan; strongly chl.

plap - mod ser actn \pm epidote
wk to mod chl actn \pm epidote to strong locally

Kspar - weak " " ; interst.; replaced plap

apatite sphere mt

grn v low bio \rightarrow anom. colors

grn \rightarrow yell grn

plap - normally zoned

Biot. locally replaces amph then \rightarrow chl.