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Summary Report on the
Killer Gossan Grid

Detailed mapping of the Killer Gossan area was conducted during a 22 day period (June 1987) by P. MacRobbie (assistants - T. Pilgrim and P. Postuk) using Mt. Sicker Grid L37E to L50E, 1+83S to 10+00S, a logging road and Highway 1.

Mapping was done at 1:1000 scale in the field and plotted at 1:2500 scale. Lithogeochem samples PTL-1 to PTL-96 were collected approximately every 50m, unless already sampled (Min-En, Minnova Standard Package).

Before the grid was cut, S. Kilbreath (1985) mapped the area using airphotos, logging roads and creeks. The most recent mapping was done because of new structural and stratigraphic intrepretations.

The mapped area covers the contact between the steeply dipping, mafic, pyroxene and feldspar phyric ash/crystal/lapilli tuffs and minor breccias of the Nitinat Formation and the overlying, overturned, felsic to intermediate, ash/crystal tuff with minor interbedded cherty tuffs of the Myra Formation. This contact is significant since this stratigraphic level hosts the H-W deposit at Buttle Lake. The Nitinat rocks lie within the hinge area and the Myra rocks within the north limb of the major, WNW striking, anticlinal structure on the Mt. Sicker Property. This stratigraphy has been cut by syn-volcanic QFP dykes and Jurassic/Triassic diorite sills and dykes. A description of each mappable unit follows.

The highest stratigraphic unit consists of felsic to intermediate, feldspar phyric to aphyric ash tuff with minor interbedded chert and cherty tuff. This unit is exposed on baseline 1+83S between L40E and L41E and again near L46E. Cherty tuffs have a dark bluish grey fresh surface, are possibly laminated (≤1-25mm) and contain up to 10%, ≤5mm dark green, chloritic streaks which may represent flattened lapilli, as well as trace fine-grained disseminated pyrite. The interbedded tuffs are light to dark green, siliceous, aphyric fine ash to feldspar phyric ashes with up to 20%, ≤1mm feldspars. The tuff contains up to 2% fine-grained disseminated pyrite and is weakly to moderately chlorite ± sericite altered. Bedding indicates 40 dips to the south.

This unit is underlain by a succession of intermediate to mafic tuffs divided into three mappable units, from base to top: intermediate to mafic, feldspar phyric, laminated fine ash and crystal tuff with minor chert/cherty tuff, an intermediate feldspar ± quartz phyric crystal tuff and a mafic to intermediate crystal/ash tuff.

The laminated intermediate to mafic tuffs consist of well laminated, 4 to 20mm wide, light to medium green, fine to ultrafine ash with 1-2%, ≤1.5mm feldspars and 2-3%, ≤2mm rounded quartz interlaminated with and brecciated within (soft sediment deformation) light to dark green, mafic to intermediate crystal/ash tuff with 30%, <1 to 2.5mm feldspar crystals (i.e. PM87-18).

Two lithogeochemical samples indicate andesitic composition. These tuffs are weak to moderately chloritized and contain rare lapilli and trace to 3%, fine to medium grained pyrite. Rocks at the Killer Gossan are very similar (i.e. PM87-06).

The Killer Gossan consists of mafic, fine to coarse crystal/ash and lapilli tuff characterized by pervasive, moderate chloritization and weak to moderate epidotization (variable replecement of feldspar crystals and 3 to 5% round and elongate balls and patches up to 8cm in diameter), with 30-50%, <1-1.5mm feldspar crystals and up to 15%, dark green, flattened, chloritic lapilli (1 x 3mm to 3 x 25mm). The lapilli tuffs (PM87-06) contain up to 20-30% chert and ash tuff fragments. These tuffs contain 2 to 5%, disseminated fine to medium grained pyrite with up to 20%, 1 to 10mm wide pyritic stringers.

The overlying intermediate-gelsic fledspar ± quartz phyric crystal tuff or flow is found north of the largest diorite dyke. This unit is typically light to medium bluish green, massive and contains 0 to 15%, <1-6mm, rounded and elongate quartz eyes and 10-25%, ≤1mm feldspar crystals. These rocks contain trace pyrite and may correlate with a minor feldspar ± quartz phyric unit west of the Killer Gossan.

The top of the succession consists of mafic to intermediate, very chloritic, strongly foliated, crystal/ash tuff with 10-20%, <1-3mm, subhedral feldspar crystals and may correlate with some of the fine mafic rocks above the Killer Gossan.

A thin felsic quartz feldspar crystal tuff or flow consisting of 3-5%, 1-7mm (avg. 3mm) rounded quartz eyes and 20-30%, ≤1mm subhedral feldspar crystals separates the above unit with an underlying intermediate interlaminated ash and cherty tuff, best exposed in three recent trenches.

The intermediate ashes and cherty tuffs have a light to medium green-grey to light grey streaked appearance consisting of weak to moderate chloritic fine ashes with up to 5% lapilli (≤3mm) and darker, more siliceous aphyric cherty tuff, typically containing trace to 10-% fine-grained disseminated pyrite. One trench contained a 20cm wide stringer with 15-40% pyrite and 2-3% chalcopyrite. This unit is distinctive and laterally continuous and may serve as a marker.

The underlying unit consists of a thick (approx. 400m) succession of felsic QP, QFP and F ± QP crystal tuff (and/or flows??) (PM-87-13B,9). Typically this unit is weak to moderately altered (sericite ± chlorite) with 5-7%, <1=3.5mm rounded and weakly flattened quartz eyes and 10-25%, 0.5=1.5mm euhedral to subhedral feldspar laths. Most quartz eyes are included and may display a weak radial or concentric structure possibly indicative of amygdules. The matrix is siliceous, light to medium green and may contain 5-7% dark chloritic streakds, possibly altered mafic minerals and between 2-5% disseminated fine-grained pyrite (possibly stringers i.e. PM87-09). Locally this tuff appears to be weakly layered as defined by the percentage and size of feldspar crystas. Quartz size and percentage appears relatively constant. From west to east there is a gradation from Q phyric to QF phyric to F ± Q phyric crystal tuffs. Rhyolitic compositions are implied from 26 lithogeochem samples. Mineralization appears sparce within this unit. A shaft was found (approx. 39+20E, 4+88S) within the QP (lithogeochem sample had 315 ppm Cu). On highway 1 a 15cm zone containing 1-20mm pyrite + sphalerite stringers occurs parallel the foliation within the rock. This showing appears to be a stringer and not a horizon.

Between 4+00S and 5+00S, west of L43E, a stronger, chloritized, intermediate to mafic fine ash tuff with trace to 3% disseminated fine-grained pyrite and a few small, ≤3mm, pyritic stringers is found between and appears to wedge out within the QFP crystal tuff.

The above QFP crystal tuff appears to grade into the underlying intermediate, medium to dark blue green, F ±QP crystal/ash tuff. This unit consists of 10=25%, <1-2mm subhedral to subrounded feldspar crystals and 1-3%, <1-3mm rounded quartz eyes in a siliceous weakly altered (sericite ± chlorite) matrix with trace to 5% disseminated fine-grained pyrite. Locally the unit appears massive and siliceous. Rhyolitic compositions are indicated by 6 lithogeochemical samples. This unit was distinguished due to its low quartz eye content and darker colour.

A felsic to intemediate ± F phyric cherty tuff underlies the above intermediate F ±QP crystal tuff. Fresh surfaces appear light to medium blue grey. This tuff is generally massive, silicwous and either aphyric or weakly F phyric (5-10%, <1-1.5mm subhedral crystals) with trace to 3% fine-grained disseminated pyrite. Rare chert horizons (approx. 2cm) with 3% disseminated pyrite ± chalcopyrite can occur. This unit is consistent laterally and appears to mark the base of the Myra Formation. Three lithogeochemical samples indicate rhyolitic to rhyodacitic compositions.

Stratigraphically beneath the cherty tuffs is a thick (approx. 350m) succession of mafic crowded crystal tuffs with local lapilli (previously termed speckled diorite) representing the transition from felsic Myra Formation volcanics to mafic pyroxene bearing Nitinat Formation rocks. This unit typically is moderately to strongly chloritized with between 25-50%, <1-2mm euhedral to subhedral feldspar crystals and characterized by weak to strong epidote alteration. Six lithogeochemical samples indicate andesitic (weak basaltic) compositions.

Weak epidote alteration consists of variably replaced feldspar crystals and the presence of <10% epidote patches ± balls (i.e. PM87-19, 24). Epidote balls are relatively discrete rounded knots of epidote ± silica up to 8cm in diameter. Epidote patches are irregular, more diffuse bodies which tend to be smaller (3-10mm).

Moderate epidote alteration implies variably altered feldspar crystals and 10-20% patches and balls (i.e. PM87-20, 26).

Strong epidote alteration implies variable feldspar crystal replacement and >20% epidote pathces and balls (i.e. PM87-28).

Some epidote patches occur as angular to subangular bodies which may represent fragments.

Locally the tuff contains up to 5% siliceous, subrounded fragments, up to 5cm in size. Other fragments (2-20cm) can contain euhedral pyroxene crystals replaced by epidote. Trace to 15% fine-grained pyrite ± cpy occurs as disseminations and stringers (<1-3mm). The exposure of the transition rocks along the highway contains several pyritic stringers which appear associated with faults or shears. Locally 4-10cm wide pyrite stringers with up to 80% pyrite occurs parallel to foliation. Very impressive stringers !!

Below the base of the transition zone are pyroxene bearing crystal tuffs (50 and 100m thick) separated by about 30m of F phyric fine to coarse crystal/lapilli tuff. These pyroxene bearing units may correlate with the Nitinat exposures along highway 1 (i.e. PM87-19 to 23). This unit includes fine to coarse crystal tuffs consisting of 2-20%, 0.5-7mm euhedral to subhedral pyroxene crystals and 10-30% feldspar euhedral to subhedral crystals (0.5-2.5mm) with a dark green to light grey 'siliceous', generally weakly chloritic matrix, weak to strong epidote alteration and trace to 5% disseminated fine-grained pyrite. Andesitic compositions are indicated by 4 lithogeochemical samples (TiO_2 ranges from 0.38-0.60). Locally this unit consists of pyroxene and feldspar-rich 'bands'. These 'bands' parallel foliation and likely do not represent true bedding. Lenses of possible feldspar-rich beds appear as fragments stretched and boudined parallel to the foliation, up to 5 x 40cm.

Below the pyroxene bearing Nitinat is another thick (approx. 385m) mafic feldspar phyric fine ash/crystal tuff very similar to the transition zone mafic crystal tuffs.

The lowest units, stratigraphically, consist of pyroxene bearing crystal tuffs which contain a 15m thick felsic, feldspar phyric cherty tuff or flow with minor chert (2-5% fine-grained disseminated pyrite) and a 5m thick, medium to dark green-grey, locally chloritic, chert/cherty tuff with trace to 2% disseminated fine-grained pyrite. Thus it appears that the Nitinat may contain felsic cherty ashes and minor cherts which may be significant economically. A thin 45cm cherty horizon with trace to 5% pyrite was found on the highway.

QFP dykes (i.e. PM87-17, 27) are found to cut the Nitinat rocks as well as some of the lowermost Myra rocks. These rocks except for their field relations, appear very similar to QFP crystal tuffs, which these dykes may feed. They contain 5-10%, 1-7mm, rounded and elongate quartz eyes which contain inclusions and are weakly structured internally (radial and concentric) possibly reflecting amygdules (skeletal crystals can also contain embayed or included 'portions' of matrix). 5-10% feldspars, <1-2mm, also occur. The light green aphyric siliceous matrix locally contains chloritic streaks (possible mafic minerals). The dykes appear more massive and homogeneous with respect to percentage and size range of feldspar crystals in particular.

Diorite dykes from 5-100m wide cut the stratigraphy approximately parallel to the foliation. The diorites are massive, homogeneous and generally feldspar phyric and weakly magnetic. Medium to coarse grained strongly magnetic diorite phases are found within the largest dyke. Slices of F $\pm$Q phyric crystal tuff are also found within this dyke. The magnetic nature and high TiO_2 values (approx. 0.85) are due to contamination with the diorite. The diorite at the western edge of the map area is a thick sill likely fed by the smaller dykes.

Rocks within the mapped area are weakly to strongly foliated and sheared. The intensity of deformation reflects the competency of the units (more felsic crystal tuff and/or flows/dykes etc. are less foliated than softer intermediate-mafic ash tuffs). Deformation also increases towards the hinge area of the major anticlinal fold; thus, the Nitinat and Transition Zone are relatively strongly deformed.

The degree of shearing/flattening is strongest in the Nitinat where bedding has been destroyed, boudined and sheared into the foliation. Numerous faults parallel the foliation are found on the highway. Possible tight isoclinal folds with axial planes parallel the foliation can rarely be found within the transition mafic crystal tuffs.

Since bedding has been destroyed, faults are very difficult to find. Whether the feldspar phyric mafic crystal tuffs below pyroxene bearing crystal tuffs are truely part of the Nitinat or just structurally repeated stratigraphy is difficult to determine. From the mapping completed it does appear that the Nitinat does include felsic cherty tuffs and feldspar phyric (no pyroxenes) mafic tuffs.

Stratigraphic Column of KILLER GOSSAN Area

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