Field Report - Heazlewood EL50/2011 - 21/04 to 26/04/2013 - John McDougall

A five day reconnaissance trip was planned to the licence with the intention of looking at the rock types in the vicinity of five main prospects identified in the literature review.

Anomaly E was investigated first with a field traverse leaving easterly from the Lord Brassey Track (pictured above). The lower half of the Lord Brassey track is well used and easily travelled with the only the creek crossing near the highway being a major obstacle. The higher parts of the track are rocky and occasionally have dislodged boulders and it is reasonably steep and partly overgrown, however most 4WD vehicles with reasonable clearance would easily pass to the Lord Brassey workings. The easterly traverse is heavy bauera, melaleuca and cutting grass scrub and then a couple of westerly traverses were done later in the program to see if the edge of the magnetic unit could be defined by any kind of geological feature. The scrub in the lower reaches of the Nickel Creek catchment is more easily traversed with a mosaic of button grass and medium scrub. The upper and lower reaches of Nickel creek from Lord Brassey Mine are pictured below:

Lower nickel creek from Lord Brassey mullock pile.

The Easterly Traverse over Anomaly E:

The rock type at surface was an apparently fine grained serpentinite, within 100m of the track a narrow (2ft maximum thickness) shear in a similar orientation to the Lord Brassey Mine was located on an old track. The shear is moderately foliated, sub vertical and has a strike of 324 degrees (North Westerly). Veins of chrysotile to 1mm and pale green amorphous silicification occurs in 'massive' bands to 3cm.

Sheared serpentinite on old exploration track

Magnetic susceptibility in the fine grained unit with these occasional silicified bands was measured at $64x10^{-3}$ SI units which may adequately explain the magnetic feature associated with the anomaly. Much of the float on the southern slopes of Brassey Hill are sheared and fine grained, there is a subordinate amount of coarser float material that is likely to be a serpentinised pyroxenite, the coarser unit has a lower magnetic susceptibility range of 0.2-0.6 x 10^{-3} SI units.

A coarse dolerite or gabbro unit occurs further east as you move away from the anomaly, this dark greenish brown rock has similar pale translucent silica alteration to the serpentinites and a magnetic susceptibility range of 0.5-6 x 10^{-3} SI units. the silicified bands have a strike of 244 degrees and a 45 degree west dip. The rock is however generally unfoliated and forms prominent subcrop on the steeper slopes. There is possibly amphibole development adjacent to some of the silica veins and the rock is brittle and possibly indurated with a fine 2mm weathering rind suggesting some silicification.

To the east of this again there is a fine grained 'basaltic' unit that has an banded appearance. The unit is massive and forms small outcrops. The layering was measured twice and the orientation was quite consistent with measurements $328^{o}/48^{o}$ W and $320^{o}/52^{o}$W, possibly being a primary layering maybe representing flow structures or discrete shearing/foliation. Where the unit is banded the magnetic susceptibility is low (0-$2x10^{-3}$ SI units), however where the fresh dark bluish part outcrops, ~2% disseminated magnetite is present and has a susceptibility of approximately $20x10^{-3}$ SI units.

Further east again a pyroxene rich gabbro is present as prominent outcrops. It contains pyroxenes (possibly bronzite) to 8mm and is weakly silicified with an altered plagioclase rich 'groundmass'. There are occasional bands of probable magnetite alteration cross cutting the rock and there is no real weathering rind suggesting a reasonable level of induration. There was no outcrop found immediately east of this unit and a traverse was made up Brassey Hill.

Gabbro Outcrop, southern slopes of ridge leading up Brassey Hill

Magnetite veining in Gabbro on the southern slopes of ridge to Brassey Hill

The ridge immediately below Brassey Hill is slightly steeper than the already steep southern slopes and is rather more rocky with a weakly serpentinised pyroxene bearing unit forming boulder scree and occasional outcrops. The unit contains approximately 15% pyroxenes in a dark green 'groundmass', possibly being a harzburgite or similar ultramafic with weak serpentinisation and shearing and associated slickensiding. The unit is moderately magnetic (15-20x10^{-3} SI units) and probably has a similar magnetite content to the altered parts of the gabbro down slope.

On Brassey Hill itself the outcrop is quite poorly covered with a skeletal soil often comprising a very thin pisolite and light vegetation. The unit is a massive dunite with a tan weathered surface with occasional serpentinised veinlets and the occasional gabbroic dyke that strike 036^{o}. Historic drill tracks on the top side of Brassey hill are rocky and poorly revegetated, a costean exposing sheared serpentinite and possible Zaratite (Hydrated Nickel Carbonate) was located and a drill collar is still preserved in the track that tests this outcrop.

Costean on Brassey Hill above Lord Brassey Mine.

The Brassey Mine mullock pile sits on the main access track and is mostly massive and sheared serpentinite. There are several accounts of the mineralisation in historic reports and duplication

here is unnecessary albeit to say that the workings mined Heazlewoodite and Zaratite from a 300m long adit that follows a shear that strikes approximately north westerly . The adit is accessible but contains a significant amount of water, waders and suitable illumination would be required if investigation is considered warranted.

Lord Brassey Adit, note knee high water as far as can be seen along the adit.

Zaratite at Lord Brassey spoils pile.

Western Traverses including Nickel Creek - Anomaly E

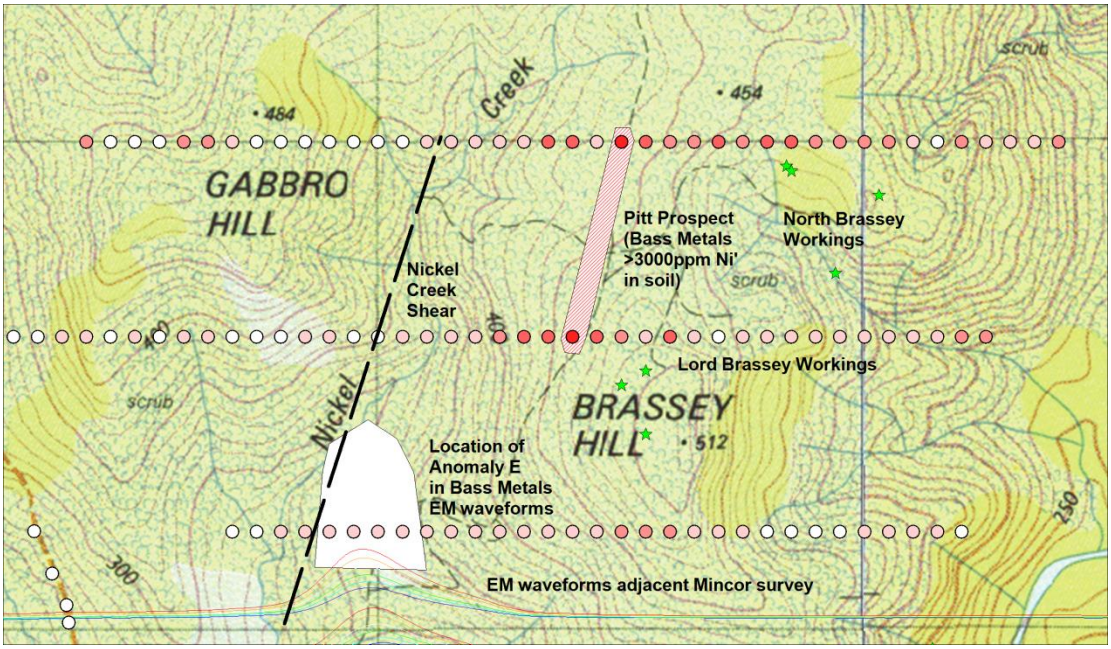
Two short traverses were conducted to the west of the Lord Brassey Track to identify the rock types in the vicinity of the sharp change in magnetic contrast.

The northern traverse was done using the 9000N Bass Metals cut line, the line is partly overgrown but provides significantly easier access than scrub bashing. On the magnetic part of the north trending magnetic unit a fine dunite with black veining and occasional coarse pyroxenite dyklets occurs as bouldery outcrop near nickel creek at the north of the anomaly, the dunites are distinctly magnetic with susceptibilities of 30-80x10^{-3} SI units. The cross cutting dykelets are in the order of 4x less magnetic. The peak magnetic response was found in boulders up slope approaching the contact where the veined dunite contains disseminated magnetite adjacent to veining(160x10^{-3} SI units). It is also likely although cannot be confirmed without a thin section that there is amphibole development in the margins of some of the veins.

The contact is not exposed but boulders indicate that it is within 5m of the sheared "base" of a gabbro-pyroxenite which is probably the unit on Gabbro Hill. The gabbro has no magnetic signature and is apparently partly silicified. Shears within the gabbro trend 005°/85°E.

The southern traverse was taken near the southern licence boundary. A similar situation was found with a pyroxenite with no magnetic signature on the western side of the contact including in outcrop in Nickel Creek with the contact on the steep banks above the creek on the east. The sheared dunites on the eastern side were once again magnetic (25-50x10^{-3} SI units) and are a light grey weathering and black veined containing north - south oriented shears. The dunite up slope from this on the flat areas closer to the Lord Brassey track are chrysotile veined and distinctly altered with obvious disseminated magnetite in the 'groundmass' (~50x10^{-3} SI units).

If the contact can be considered a steep feature (based on the observed shearing and foliation) and continuous between the two traverses it would have a roughly 015° trend.



Nickel Creek 'shear' and magnetic contrast at this contact located as the black dashed line.

Heazlewood (Mt Cleveland) Road access assessment:

The Heazlewood Road is a good quality 2WD maintained Forestry Road that has no overhanging vegetation, it is all weather and leads to a river crossing on the upper Heazlewood River where there is a disused bridge and a relatively new concreted ford on the river that would be passable on all but the very wettest days of the year by 4WD. A second trip to this northern area to access the Wilsons anomaly noted that the most prominent roads lead onto Basalt Hill where the road bifurcates and has a sign indicating to 4WD vehicles that the area is shut in winter. The roads are obviously not maintained beyond this point and have trees down past this junction on either track. The area is preferably accessed by foot if further work is required in this vicinity.

Fenton's EM anomaly (HFD001) and Fenton's Knob assessment:

Fenton's Knob prospect if properly located in the MIRLOCH database is an exposure of 'flat lying' buff and medium green brown dunite with and iron oxide staining on flat lying 'shears' and joints. Weathering in the outcrop is significant and the possible shear surfaces dip at about 15 degrees, these are up to 15cm wide and are slightly more oxide stained. Unfortunately there are no visible sulfides or 'crackle breccia' as described where the supposed pentlandite occurrence was found.

Iron Oxide stained 'shears' in weathered dunite at Fenton's Knob.

A traverse up the hill to the southwest of Fenton's Knob was made on old Metals X exploration track and a second traverse was made to the West to get an indication of the rock types present and whether the area could contain a fold closure for the purpose of locating an Avebury style target.

The traverse to the south was dominated by two rock types, a probable serpentinised pyroxenite (or harzburgite) which is a darkish khaki colour and is coarse, forming a small cliff on a strike of 075, the unit is jointed and weakly foliated and serpentinised. It is not certain whether this unit is a thicker part of the otherwise layered sequence.

The main rock type is a clearly layered dunite-'harzburgite' and probably forms part of the "LDH" sequence defined by T.Brown (1986). The unit weathers to a smooth grey or brown in the dunite sequence and the dunite is highly magnetic with a susceptibility of 50-130 x 10^{-3} SI units. A costean on this ridge of 'LDH' mostly exposes the harzburgite-pyroxenite and this has a much lower magnetic susceptibility of 4-20x10^{-3} SI units. Primary layering within the sequence is quite flat and dips 20^{o}W on a strike of 356^{o}, usually this layering is in the order of 5-30cm thick. In the vicinity of the costean there is also some float material suggestive of bronzitite pyroxenite, so there may be a second unit nearby, however this was not located in outcrop.

Costean of pyroxenite-harzburgite

Coarse pyroxenite float adjacent to costean, possible 'Bronzitite'

Partly overgrown exploration track south west of Fenton's Knob

Further investigation of the rock types to the West of Fenton's Knob was done using a track that followed the creek and subsequent creek traverse. The west draining creek is dominated by light brown and medium green dunite, it is commonly jointed with a weak oxide stain. It weathers to a buff or tan colour and is chromite bearing. There is one large exposed are that may have been excavated when the track was put in, here the dunite is cut by a network of clay filled micro-veinlets with occasional slickensides, the dunite contains up to 1% 'primary' chromite as disseminations and

sub-hedral crystals. Approximately 80m west of this the dunite is less veined possibly suggesting a structure is proximal to the large exposed site.

Micro-veined chromite bearing dunite West of Fenton's Knob

Fenton's Prospect is also poorly located in the MIRLOCH database. The area contains a moderately veined dunite with silicified and cherty textures. The rock type in float is a silicified chert breccia and has obviously seen hydrothermal activity, however outcrop of this material was not able to be located with silicified fragments only present in lag overlying the dunite east of the headwaters of the north draining creek. A track leading north of the creek crossing at Fenton's is overgrown with bauera and cutting grass, this was followed for a short while north of where it intersects the 11000N grid line of Bass Metals, no further outcrop was located on this track. The description of the prospect itself requires further investigation as no workings could be found.

Fenton's EM anomaly was investigated in the vicinity of the drill pad from HFD001. The drill pad itself contains serpentinised dunite and approximately 30m up slope there is significant boulders and small outcrops of harzburgite. This rock unit continues all the way to the top the end of the ground EM line and is massive, un veined and contains approximately 20% pyroxene phenocrysts in a dark 'groundmass'. The drillhole is drilled at -69 degrees at the collar and an assessment of whether the target is adequately tested is required.

Caudry's Prospect assessment:

The track to Caudry's prospect is completely overgrown and impassable in the first short section to vehicles. An assessment was done by foot. The first exposure of the serpentinite is in cuttings on this track. A prominent magnetic anomaly (one in a series striking NNE from here) is located in the headwaters of the creeks adjacent to the tracks, thick bauera scrub lead to float only being located down slope from the track. The float is dominated by dunite with subordinate pyroxenite-harzburgite boulders. The pyroxenite it non magnetic (0.5-1.2x10^{-3} SI units) and the sheared dunites/serpentinites adjacent to the track are much more magnetic. The iron staining on joints probably suggests that the magnetic anomalies are the result of isolated shears and associated magnetite alteration. The dunites have a magnetic susceptibility of 15 to 40x10^{-3} SI units and are reasonably limonitic.

The 'gravel pit' at the end of this track is full of slickensides, it too is a pale green serpentinised chromite bearing dunite with serpentinised faults striking 310^{o} and dipping 68^{o}W. With a plunging lineation of 68^{o} towards 220^{o}. There are similar black joints to those seen west of Fenton's Knob with a strike of 160^{o}, dipping 80^{o}E and a flattish joint set with occasional black coating striking 274^{o}/56^{o}W. In short the rock is strongly deformed and jointed, probably due to its proximity with the western margin of the ultramafic complex which is likely to be thrust bound.

A small pit has been blasted and excavated in the vicinity of the creek before McGinty's Creek, here serpentinised faults strike 310^{o} and dipping 63^{o}W. The strike of the 'primary layering' in the rock is 036^{o} which is the approximate regional strike of most of the ultramafic units and there is a flatter east dipping set of veins which appear to be serpentinite-talc.

On the road further towards Caudrey's the 'primary layering' in the dunite is clearly folded, forming an antiform that verges westwards. The plunge on the two visible fold is contradictory and the only probable interpretation is that there is west vergence, possibly accommodated by movement on the low angle east dipping serpentine-talc surfaces noted in the previous outcrop or of course the large bounding fault interpreted at the western edge of the ultramafic complex.

Caudrey's prospect itself is across McGinty's Creek at the end of the road and again seems to be poorly located in the MIRLOCH database. Two drillholes are present at the south end of the workings where the track is significantly widened. The holes were obviously RC by the amount of chips lying adjacent to the collar. The main primary layering direction appears to be a nearly East-West strike and it appears to be cut by low angle talc rich shears, there are also indications of serpentinised reverse slickensides on the layered parting on 'primary layer' planes.

Short adit at the southern end of Caudrey's workings.

The open cut follows a narrow shear and a short adit further south east than the drill holes is clearly too short to intersect any continuation of the shear. No Osmiridium was located on the partings as described in the literature and the shear is of limited extent. An investigation of the spoils pile at the crusher site revealed only one rock type. There is no evidence of sulfides of any form nor Zaratite in the shears suggesting a low prospectivity for Nickel associated with the rock type or working in the vicinity of Caudrey's prospect.

Spoils pile at Caudrey's crusher site

Assessment of Wilsons Soil anomaly area:

All the way up the rehabilitated track to the drill hole at Wilson's there is a significant amount of boulder material exposed by the excavations. The track itself is particularly muddy to walk and still poorly revegetated. The first rock type on the track is a dolerite. This coarsens to a dark and light grey gabbro/dolerite. Next a sequence reminiscent of the LDH sequence is encountered in mixed float. Then a 'fine grained' dunite followed by a coarse silicified dark green pyroxenite. The next unit is a green serpentinised dunite overlain by a probable thin veneer of Tertiary? Basalt (low magnetic susceptibility) than back into the massive non magnetic chromite bearing dunite with has a distinct buff weathering colour. Then the sequence appears to be an 'LPD' (layered pyroxenite-dunite) sequence with sheared dunites bearing chromite serpentinised to a light green with a high magnetic susceptibility of 15-40x10^{-3}SI units and the coarser pyroxenite units having a magnetic susceptibility of 2x10^{-3}SI units. The dunite is weakly chrysotile veined.

Down the track in the direction of drilling the serpentinised dunite is a weakly veined monotonous pale-light green with little internal structure. If indeed Wilson's sits on an anticline then the rock unit exposed may be the 'basal dunite' which may represent a significant thickness of monotonous serpentinised ultramafic. The high Ni content could be due to the shearing in this unit and may just be a factor of the rock type rather than any mineralisation.