

EL64/2004 – Waratah
Field Investigation of Geophysical Targets
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Summary

Two key anomalous NW aligned Sn and magmatic element trends were identified via geological mapping and rock chip sampling along the eastern margin of the Mt Bischoff mining lease. These lie in the southwest of the Bischoff East area and in the east of the North Valley Lodes area striking through into the north of the Bischoff East Area.

Peak Sn analysis of 1350 and 1215ppm were obtained from the eastern North Valley Lodes area. However, the best visual alteration and mineralisation was identified in the vicinity of an 880Hz EM anomaly located in the south western portion of the Bischoff East area. Rock chips from here returned elevated Sn to 483ppm, occurring with likely magmatic-related elements (incl. Bi & U), which suggest a more proximal to porphyry environment relative to the peak North Valley Lodes anomaly.

Disseminated pyrite within variably pervasive silica altered sandstones was common throughout the areas investigated, whilst grey silica veined stockwork and hydrothermal breccia is evident locally. There appears to be a correlation of stronger pyritic alteration and Sn analysis with EM and radiometric (U) anomalies. Identified conductors / conductive trends within the North Valley Lodes area can also be at least in part attributed to dark grey siltstone / shale occurrences.

The Weir's Surprise area is somewhat enigmatic with more Cu rich geochemistry, possibly in part related to mafic lithochemistry. Weak alteration here was likely formed more distal to source intrusions, with weak Sn returns from two rock chip samples.

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Introduction

Findings of field investigation of a series of geophysical anomalies (Figure 1) identified by consultant geophysicists (Godber, 2011) for TNT within EL64/2004 are reported herein. Field work was undertaken from 6/6/11 to 10/6/11. The Mt Bischoff Mine Caretaker (Derek Sutton) was helpful with visitor site induction and location of access tracks etc. The weather was bitterly cold with strong wind, hail and sleet, particularly on the 6th and 7th with 6 to 8cm of snow on the ground in Waratah; regardless conditions were reasonable for field activities beneath the forest canopy. Slopes in the main Sn anomalous zones identified east of Mt Bischoff are consistently steep and would require significant work to prepare drill pads.

Geological reconnaissance mapping included the collection of 45 composite and grab rock chip samples from outcrop, subcrop and float. Numerous field localities and sample detail, as well as an appreciation of the area covered is digitally appended as various diagrams, excel spreadsheets and an Access database. Estimated Precision Error (EPE) reported for each waypoint / field locality was relatively high in many instances where the rainforest canopy masked the satellite signal somewhat. Regardless, accuracy is relatively good given the nature of the reconnaissance survey and sample sites are flagged for relocation.

Thematic maps for various pathfinder elements and interpretation was partly undertaken utilising Mapinfo; various maps are appended. Polygons for factual geology were only partly created at this stage, forming a template to the interpreted geology for potential ongoing work. No detailed historic maps were viewed during this interpretation, however the MRT 1:250,000 scale geology was modified to reflect findings of this field work.

Geology

The regional geology of the Waratah EL64/2004 is covered in Herrmann (2011).

The geology shown in figure 1 is derived from the MRT 1:250:000 scale geology. The porphyry mapped does not accurately reflect the distribution evident in the field. For instance, massive sandstone only was evident in extensive road cutting exposure in the eastern portion of the North Valley Lodes anomaly area, where NNW trending porphyry is mapped. Similarly, porphyry in the north of the Bischoff East area is narrow at ~30m true width rather than 100m.

Sandstone is the dominant rock type evident in outcrop and subcrop, with siltstone appearing to be more recessive and eroded in gullies. Porphyry outcrops well over approximately 25m on the North Valley Road in the Bischoff East anomaly area. Scattered float boulders were also located down slope.

The sandstones are commonly pervasively silicified and hornfels with varying degrees of often moderate to strong induration. Disseminated pyrite is very common, ranging up to 5% (or more). The matrix is locally arkose appearing with relict cream muscovite(tr); is this possibly a reflection of alteration?

Notably the Crimson Creek Formation basalt returns high Ti/Zr of 85 to 98. No stereographic interpretation of structural data has been undertaken at this stage.

Varying degrees of pervasive silicification and associated disseminated pyrite are widespread in the field area. Grey silica veined stockwork sometimes forming hydrothermal breccia with jig saw fit clasts is locally evident and is associated with elevated As and Sn.

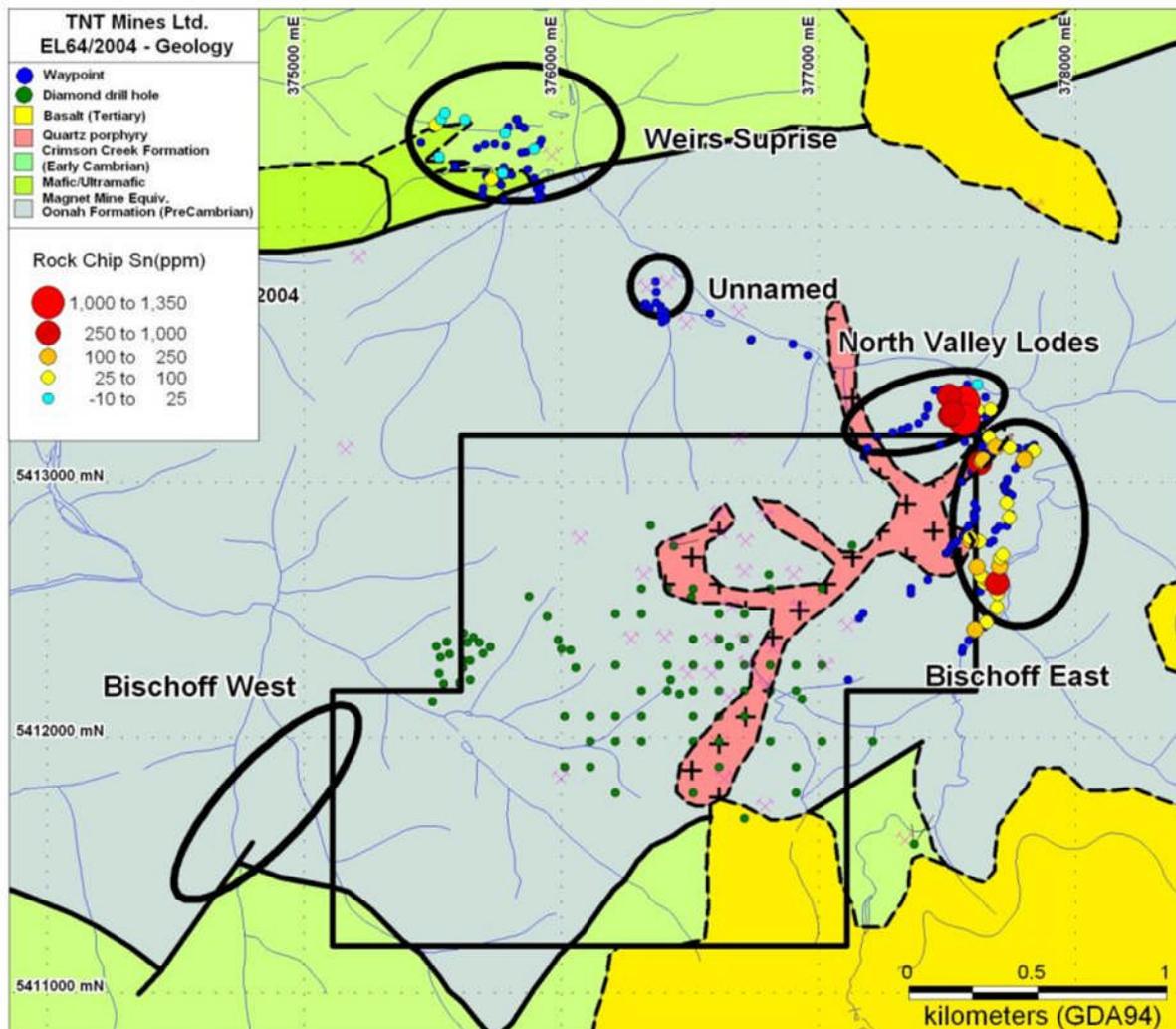


Figure 1: Field Reconnaissance Targets

Sampling and Geochemistry

A total of 45 rock chip samples were collected and analysed via ICP-MS for a multielement suite and via XRF for Sn and W at ALS, Brisbane. These were mostly composite samples, incorporating >6 to ~12 rock fragments from the general subcrop to outcrop area. A few grab samples were also selected to potentially highlight anomalous metal in more strongly mineralised samples. Areas of rock displaying minimal or no megascopic mineralisation were in general not sampled and further sampling of such sites could lead to better definition of the identified anomalous areas. Location and geology data are compiled into an Excel spreadsheet appended. A detailed geological fact map has not been produced at this stage.

The key highlight is two samples of 1350 and 1215ppm Sn from the eastern North Valley Lodes area. Select metal peaks include:- As(1420ppm), Au(BDL), Bi(83.2ppm), Co(69ppm), Cu(120.5ppm), Mn(2.34%), Ni(138ppm), V(704ppm), W(30ppm) and Zn(101ppm).

A thematic map of Sn in rock chip highlights approximately linear trends sympathetic to those identified in MRT 1:250,000 scale mapped porphyry distribution (Figure 1; NB: Thematic maps for numerous metals are appended). Correlation analysis of the dataset (45) was undertaken to highlight potential pathfinder elements/trends. Results tabulating key elements are appended in a large correlation matrix (EL642004_Waratah_RockChip Geochemistry.xls). Key elements of a potentially magmatic suite are Sn, W, As, Bi, Sb, U and Pb. All of these elements are elevated in samples from the porphyry on the North Valley Road.

Sn via Mass Spectrometry correlates weakly with magmatic related elements U and W, but moderate to strongly with As, Bi and Pb. Supporting is that U highs from radiometrics show a relatively good correlation with Sn and U in soils, but K and Th don't correlate as well. Interestingly the correlation between Sn determinations via XRF and Mass Spectrometry is poor (0.2); comparatively for W it's 0.65. Further, XRF analysis for Sn with respect to other mass spectrometry determined analytes is poor, whilst XRF W correlates weakly with Pb, Sb, Sn and U. In both cases, analysis via XRF provides a higher likely near true total analysis, with partial dissolving of mineral matrix reflected in the mass spectrometry returns; the effect being less for W.

Another potentially magmatic related element Bi, correlates well with Sn(MS) and Se, and moderately with Pb, Sb and U. Further attesting to this magmatic association is that Bi is highest in the channel / composite sampled porphyry outcrop on the North Valley Road. Utilising this association, the coherent zone of elevated Bi (& U) standing out in the south of the Bischoff East area is a potentially more proximal to source Sn target. Comparatively Bi (& U) is low in the vicinity of elevated Sn returns from the east end of the North Valley Lodes area, perhaps reflecting a relatively more distal to magmatic source environment. Correlation with S is in general extremely weak, but some relationship to W, Se and U suggests a magmatic source for this element.

Pb distribution is distinctly bimodal, with an anomalous mineralised population in the range >100ppm. Pb is anomalous in the porphyry from the North Valley Road and coincident with weak Sn anomalism immediately east of there. Whilst no significant Pb is associated with Sn in the North Valley Lodes area and it lies peripheral to Sn in the southern central Bischoff East area. These distributions possibly reflect zoning and segregation of hydrothermal fluids away from source intrusions.

Cu and Fe display strong correlation between themselves and a similar element suite including V, Ga, Sc, Li, Zn and Ni; all with correlation coefficients >0.8. This suite may represent a different hydrothermal phase to the Sn mineralisation. The only significant correlation for Mo is Re (~0.6). Mo is low in sampled porphyry, but elevated in the general vicinity of sediments bearing Sn. Mo appears to be zoned peripheral to intrusions, similar to in many porphyry Cu deposits.

Discussion

In general terms, anomalies for Sn and associated potentially magmatic – related elements (W, As, Bi, Sb, U and Pb) appear to reflect proximity to mapped or inferred buried porphyry intrusions. Differences in element distribution / zonation likely reflect a higher level with respect to porphyry at Mt Bischoff. The Sn anomalous zone in the east of the North Valley Lodes area is in general less anomalous in potential magmatic pathfinder metals reflecting a relatively high level w.r.t porphyry intrusion, when compared to the potentially more proximal to porphyry environment inferred for the southwest of the Bischoff East area.

The WTRMP 880Hz EM with geological outlines is shown in figure 2. This highlights that the significant conductor at Mt Bischoff lies on the western side of the intersection of two porphyry trends; NE and roughly NW. In the Bischoff East and North Valley Lodes area's the mineralised trends from Sn distribution in rock chips appears to be related to NW trending structure / buried porphyry.

Uranium in radiometrics appears to correlate well with Sn distribution and highlights a exploration potential to the south of the Bischoff East area and to the west of the North Valley Lodes area (Figures 3 & 4).

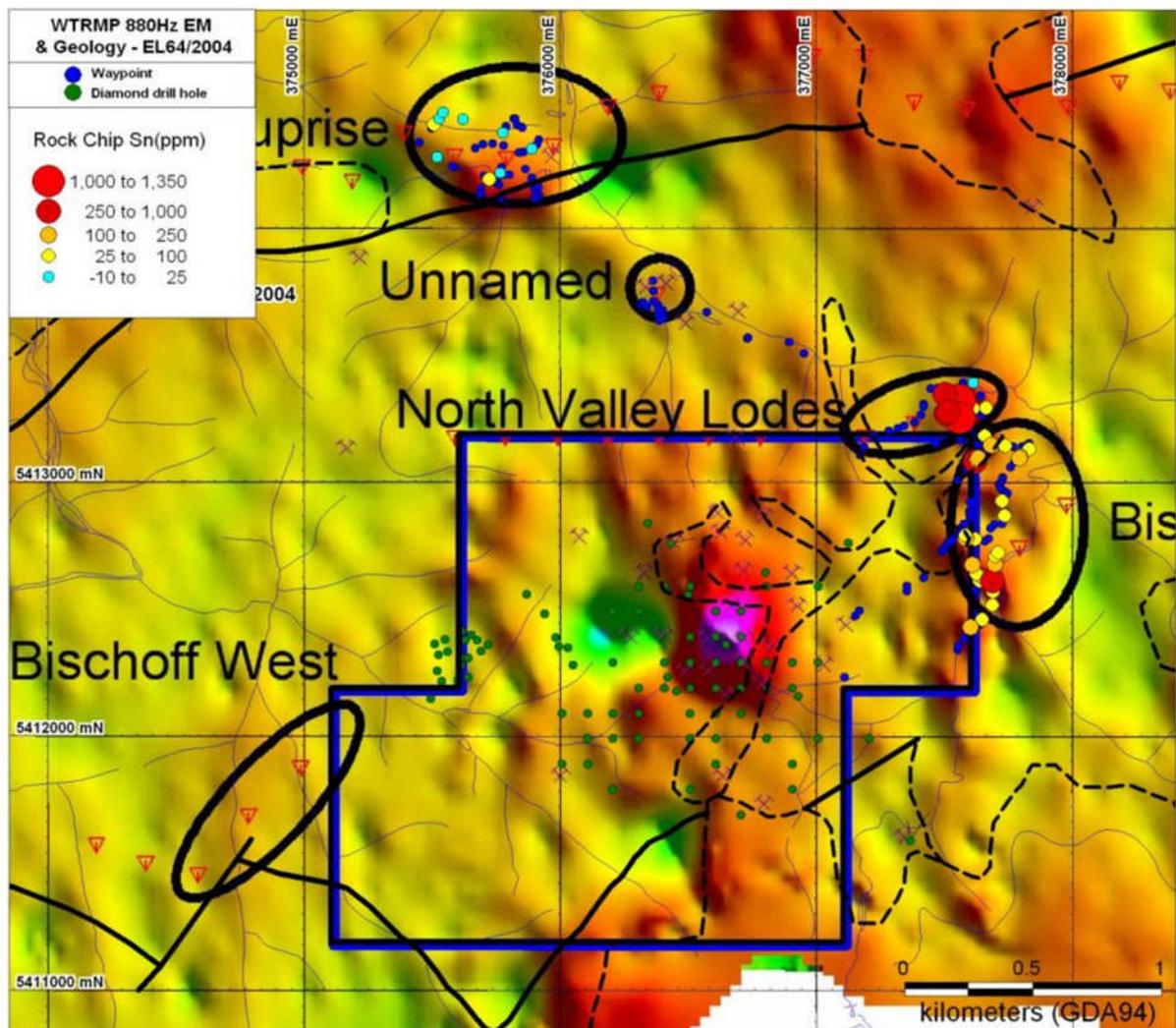


Figure 2: WTRMP 880Hz EM (Geo-referenced from Godber, 2011) showing geophysical targets, geological outlines, drill holes and Rock Chip Sn.

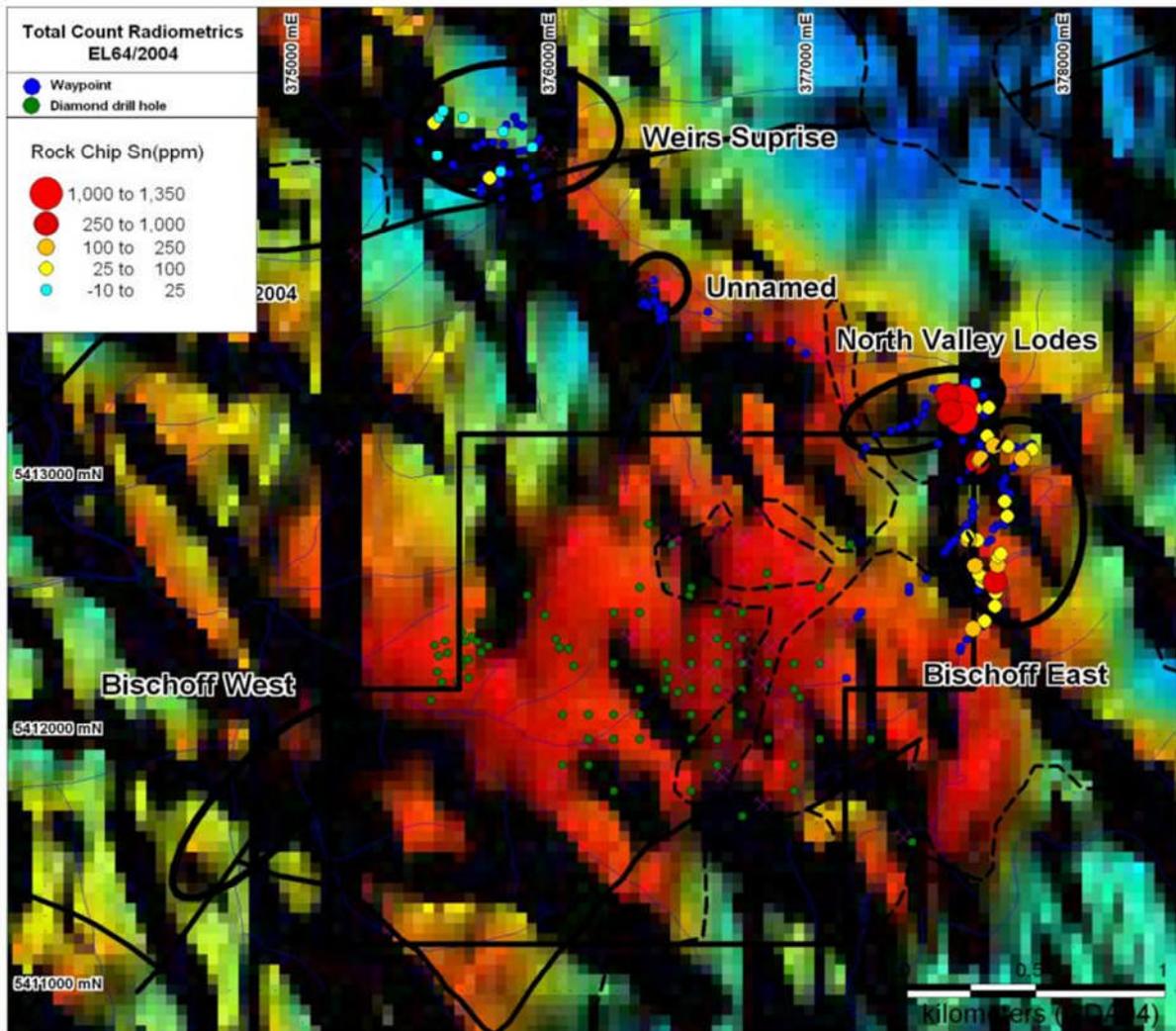


Figure 3: Total Count Radiometrics with geology outlines and geophysical target areas.

Anomaly Reconnaissance

Weirs Surprise

A significant 880Hz EM anomaly exists in the southern central portion of this anomaly area. The anomaly corresponds with outcropping mafic rock, a large settling pond (~80 by 50m) in the west and rifle range huts including 2 shipping containers to the east. The latter likely explains a weak aeromagnetic feature.

Basalt and relict medium grained dolerite/gabbro was located in outcrop on the northern side of the dam. An interesting feature being basalt float bearing weathered radial zeolite and very fine euhedral quartz amygdale fill and disseminated (primary magmatic?) pyrite cubes to 6mm. This outcrop is likely Cambrian in age, fitting with the description of the “Magnet Dyke” and Crimson Creek lithologies (Herrmann, 2011). This area of mafic rock possibly explains the 880Hz conductor mapped over the area. A less likely(?) potential consideration is an origin as a Tertiary basalt feeder, which are known to be somewhat conductive. It’d be worth comparing to the Magnet area EM, as well as other Crimson Creek Formation bearing areas proximal to the Oonah Formation contact. NB: There is

minimal radiometric character associated with this anomaly, versus moderate to strong responses from Bischoff and Bischoff east. The mapped gabbro distribution possibly represents the terminating fingers of coherent basaltic volcanics at the margins of a significant similar unit mapped in MRT 1:250,000k geology (Figure 1). The later includes mafics and ultramafic equivalents of the Magnet Mine host sequence.

A weak spur on the northern margin of the 880Hz EM anomaly bears sparse float of weathered relict crystal rich mafic (volcaniclastic?). North of the EM anomaly, altered siltstone and weakly silica-pyrite altered sandstones (similar to the Oonah Formation on Bischoff) were located. Two occurrences of an enigmatic chert-like siltstone immediately north of the mafics are potentially dolomite; which combined with the mafic lithologies is in keeping with descriptions of the Crimson Creek Formation.

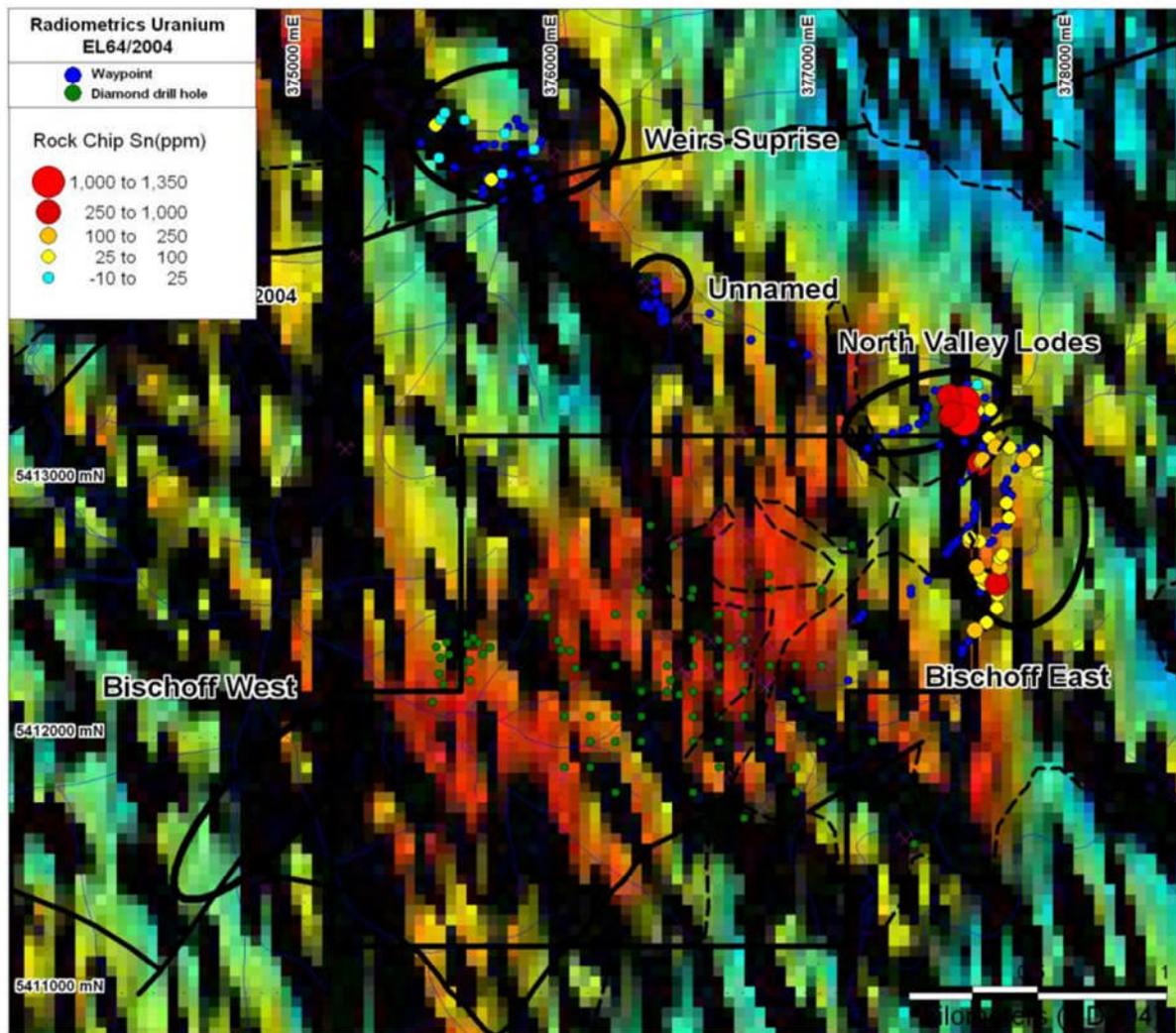


Figure 4: U Radiometrics with geology outlines and geophysical target areas.

A NNE aligned shear / fault zone (5/80E) passes through the dam spillway vicinity in the Wier's Surprise area. At the spillway is strongly foliated basalt within a shear/fault zone bearing basalt boudins. Immediately south is comb vein quartz float/subcrop fragments of 5 to 15cm, aligned ~15TN, similar to the spillway shear zone trend. Further NNE an odd flat drainage area lines up with

the shear/fault on the dam spill way. This weak gully is aligned ~50TN and no rock is evident along its steep west bank.

Mullock and tin bearing alluvium extends along the Waratah River valley floor through the rifle range and is coincident with an elevated 880Hz EM response. At the Rifle Range club site there are two corrugated iron clad sheds and two shipping containers.

Very weak Sn in rock chip forms a trend extending WNW of the marked deposit. Although the later may be an alluvial deposit unrelated to the Sn trend. Elevated Cu (120.5ppm; 520951) was returned from MnO vein bearing siltstone.

Bischoff West

This series of EM point source anomalies was not investigated during the field trip, given that it was ranked lower and time was more gainfully spent investigating the higher priority anomalies. Potential for vein/lode hosted Pb-Zn or possibly Sn exists.

Bischoff East

The Bischoff East anomaly area was accessed via the Pump House Track from both the east and west sides of the Waratah River, as well as via the North Valley Road.

The 880Hz EM anomaly in the south eastern portion of this anomaly area, despite returning lower Sn from rock chip sampling than the North Valley Lodes area, represents the most visually promising of the area's investigated. Sn in rock chip anomalies were located coincident with moderately pervasively silicified and pyritic hornfels sandstone. Grey silica veining, locally forming hydrothermal breccia is a key feature.

The peak Sn analysis of 483ppm via XRF (520978) was from elluvium bearing pyritic hornfels with up to 10% pyrite. Sparse quartz porphyry from this location was not included in the sample, but this rock type was demonstrated to be Sn bearing nearby on the North Valley Road. Also nearby, moderate to strong intensity silica-pyrite replacement and vug filling veins within grey silica flooded hydrothermal breccia was located as float (520979, 177ppm Sn & 3ppm Ag) down slope of good exposure of pervasive silica – disseminated pyrite alteration. This is the strongest silica – pyrite mineralisation seen during the current investigation. Pyritic quartz porphyry boulder subcrop and float was also located in this area.

A pyrite (5 to 15%) – quartz(w/m) porphyry was located on the North Valley Road where it enters the northern portion of this anomaly area. Pyrite within the porphyry is commonly cubic/euhedral from 2 to 8mm in diameter within a cream aphanitic groundmass (Photo 1). Pyrite is commonly leached leaving cubic pits. The mineralogy appears relatively simple with no identifiable greisen being evident. This porphyry extends as float down slope to the east for ~50m. The entire road outcrop was sampled as four 10m composites (chips from every ~0.5 to 1m; the northern most being 12m) returning 456ppm Sn. The true width of the porphyry appears to be ~30m, with the sampling covering approximately 15m of this from the northern contact. The porphyry appears to be intruded parallel to the enclosing sediment strike on steep fold limbs and also parallel to NNW orientated structure. A subsurface spine of the latter orientation is possibly reflected by the alignment of Sn in rock chip anomalies in the east of the North Valley Lodes and north of the Bischoff East area's.



Photo 1: pyritic quartz porphyry – North Valley road outcrop

Unnamed

The exploration potential of the Unnamed anomaly for hard rock Sn ore sources is considered low upon the basis of extensive area covered by conductive sources; both elluvium/mullock and shale outcrop. The anomaly coincides with an area of old batteries that treated ore transported down from the North Valley slopes above. The central and northern portion of this area is extensively covered by conductive ore, often in coarse boulder mullock form. There may be Sn potential in retreatment of ore/mullock and alluvium here.

Outcrop of potentially conductive shale/siltstone is located in the central southern part of the area, within an excavated area, presumably where the batteries were located. Outcrop here reveals a moderately deformed (open folds of steep NW plunge) fissile dark grey shale mixed with grey/pale green siltstone enclosed by hornfels / altered sandstone (Photo 2). Nearby to the west is a large 60 by 20m pond.



Photo 2: Black shale outcrop at the Unnamed Anomaly (376390mE, 5413675mN)

North Valley Lodes

The 880Hz EM anomaly in the east of this area was found to coincide with weak to moderate pervasive silica – disseminated pyrite alteration within sandstone. Whereas point source EM anomalies identified in the central to western portion of the anomaly are roughly coincident with the strike trend of (potentially relatively conductive) outcropping dark grey siltstone / shale.

Significant Sn in rock chip to 1350ppm (520939) was returned from the east of this geophysical target zone. This sample was returned from float down slope from anomalous Sn (1215ppm) in subcrop. However it's possibly from a more local source given that an elevated 386ppm Sn (520940) was located in subcrop approximately 60m to the WNW.

A few indications of old trenches were located in this area. eg. wpt262 where a possible old trench extends down slope to 360TN for 15m, finishing at a 1m deep adit start. Sampling here returned elevated 401ppm Sn (520948) from fine grained massive sandstone displaying little apparent alteration. Whereas, sample 520947 returning 1215ppm Sn was more obviously altered, bearing moderate intensity pervasive silica and relict pitted and some fresh disseminated pyrite of ~2%.

Laminar to thin bedded grey shale and siltstone located in North Valley Road cuts likely explains the weak conductors/trend noted from this area. Opposed bedding dips between field locations 245 & 246 indicate a fold closure is located between these sites; further similar dip changes are noted along the North Valley Road and hinge thickening could explain the distribution of conductors.

Recommendations

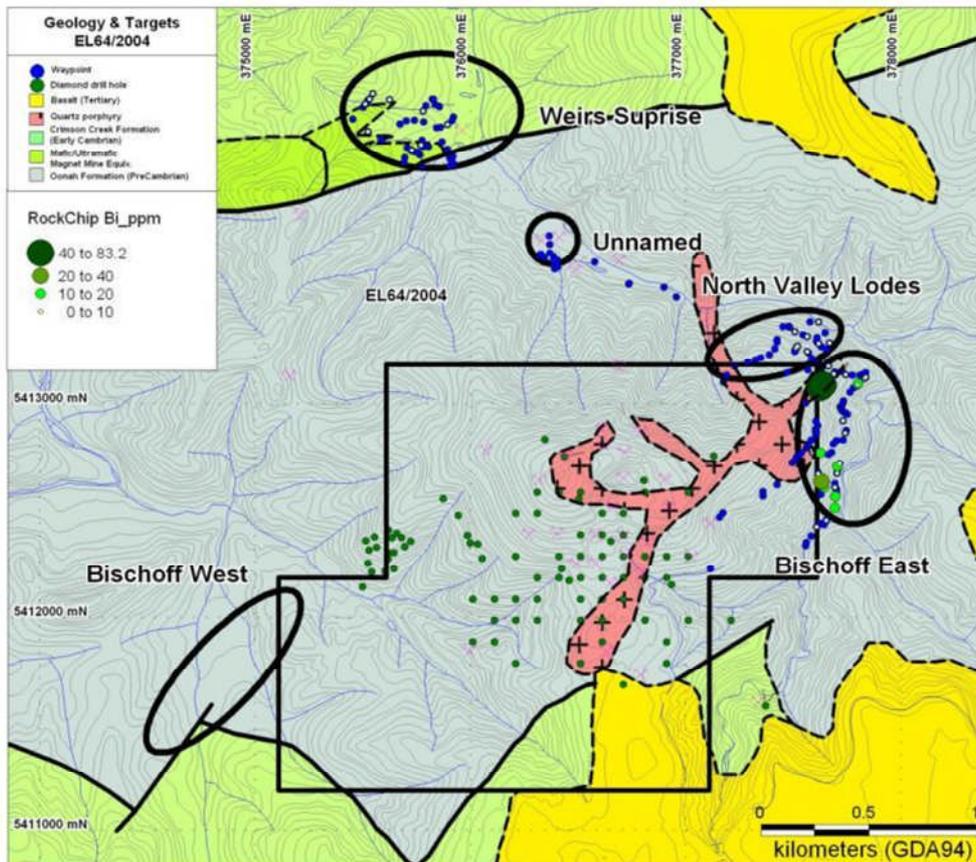
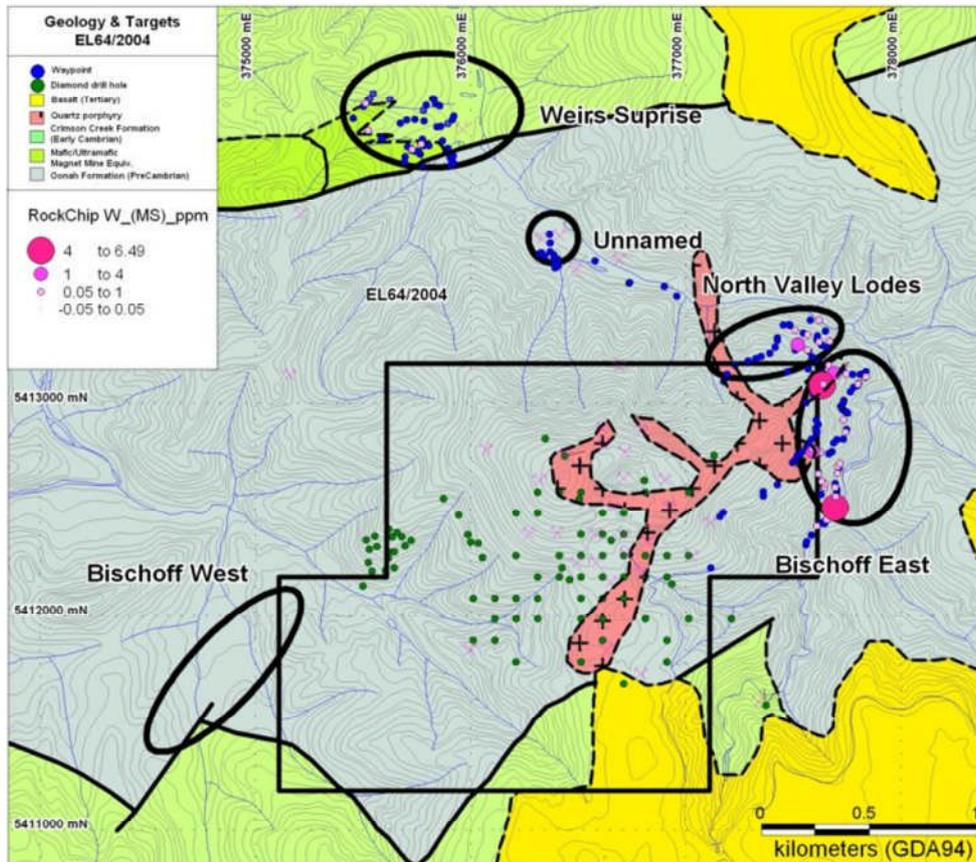
- Current Target infill geology and rock chip sampling
 - In the south of the Bischoff East Anomaly
 - Brief reconnaissance of unexamined Oonah – Crimson Creek contact immediately south of the Weirs Surprise anomaly
 - Reconnaissance investigation of the unexamined Bischoff West anomaly
- Further Targets
 - Follow up mapped porphyry, coincident weak EM and U radiometrics west of the North Valley Lodes
 - Significant U Radiometric anomaly and weak EM south of Bischoff East.
- Composite rock sampling of the Unnamed anomaly dumps and alluvium to test residual Sn in Mullock (Incl. Literature review and mapping investigation to estimate volumes?)

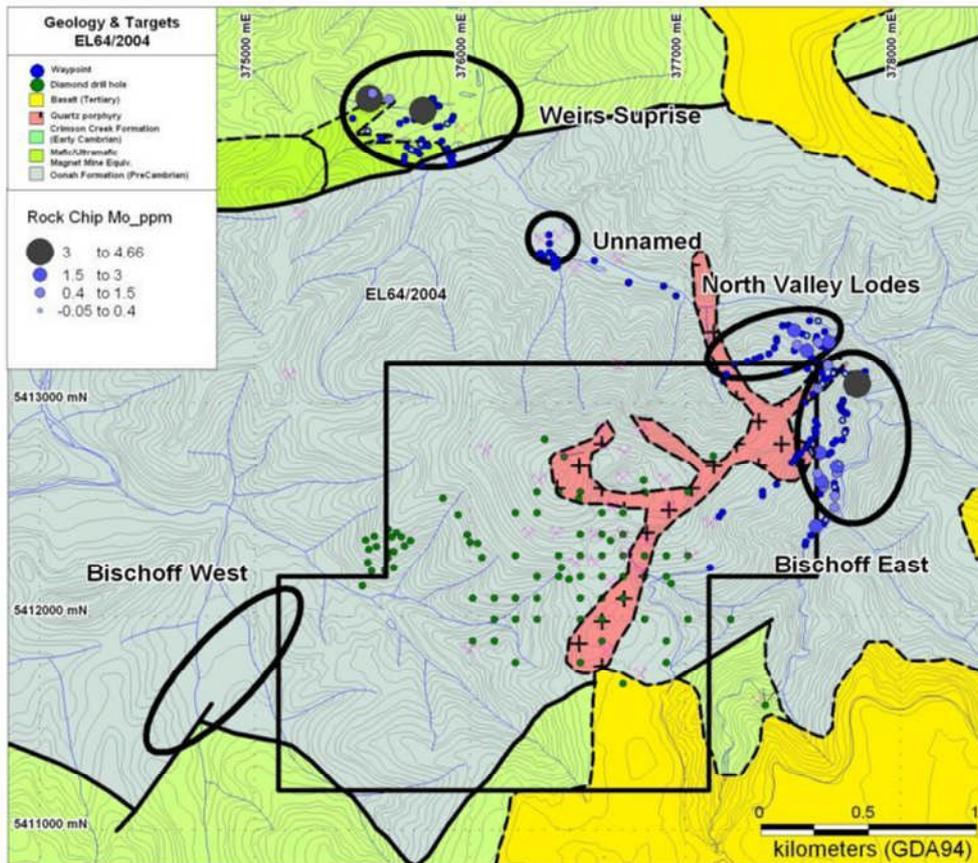
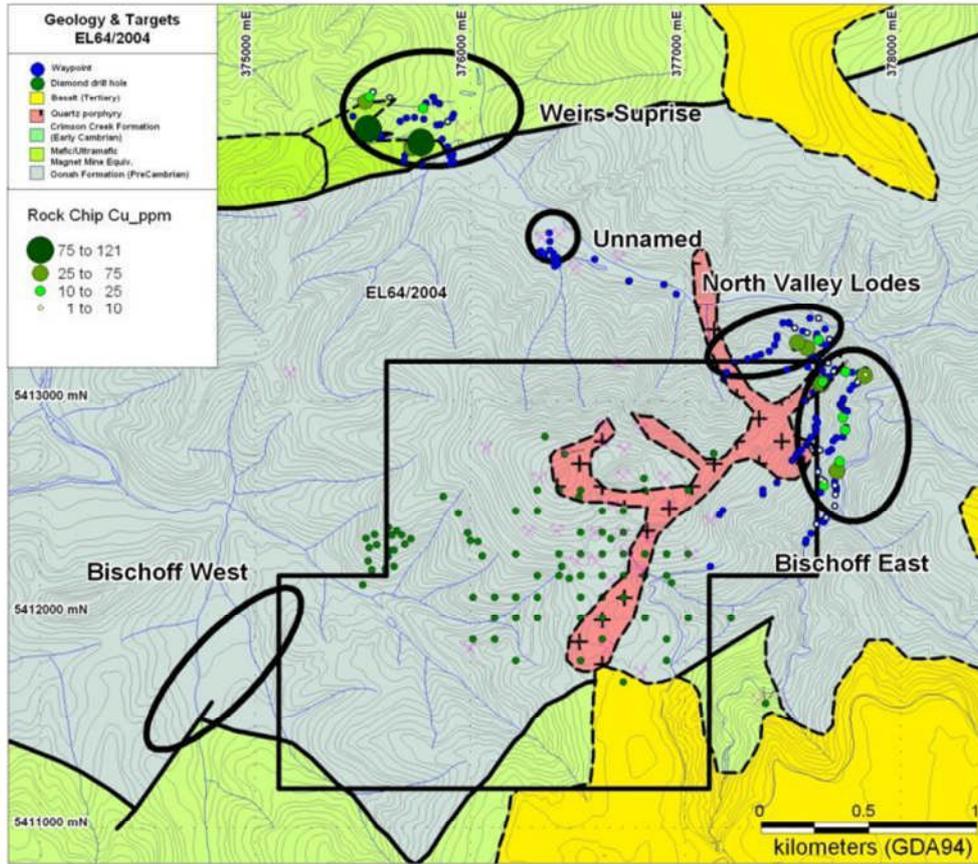
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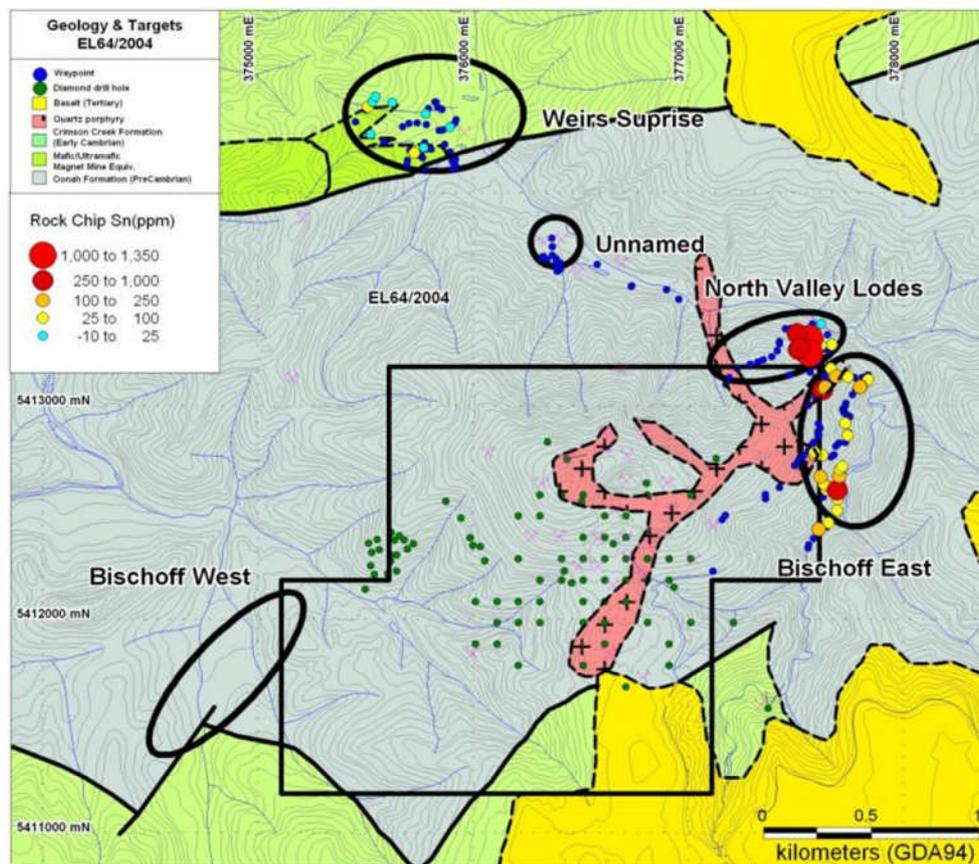
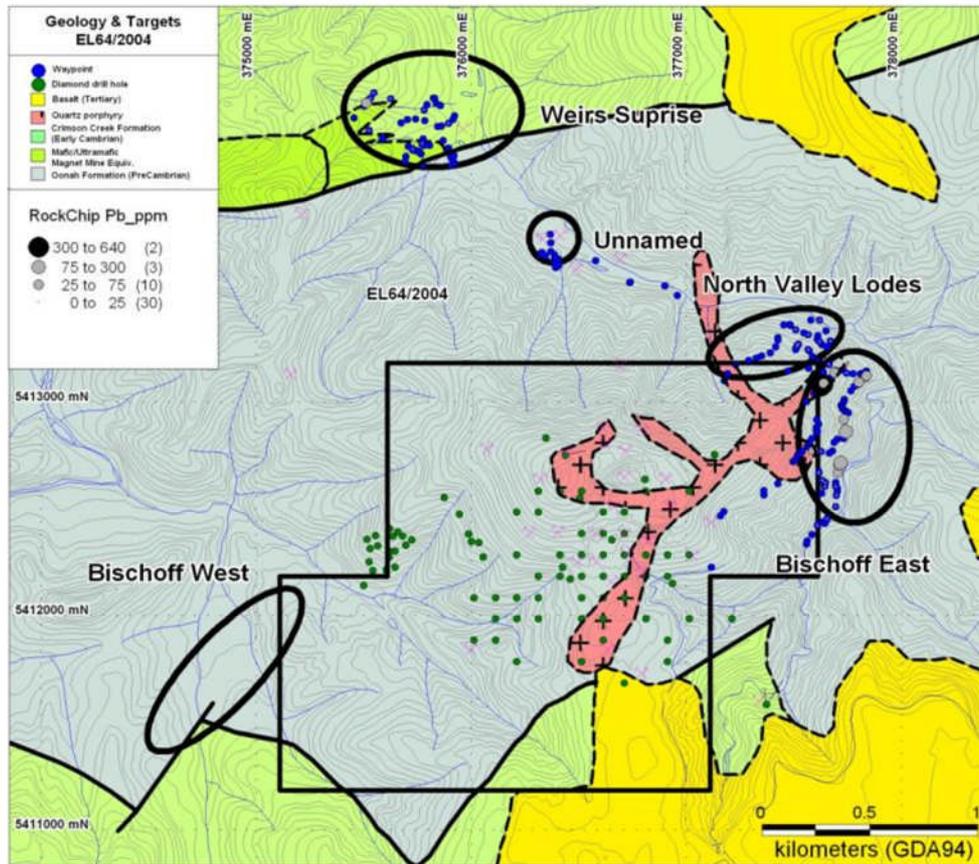
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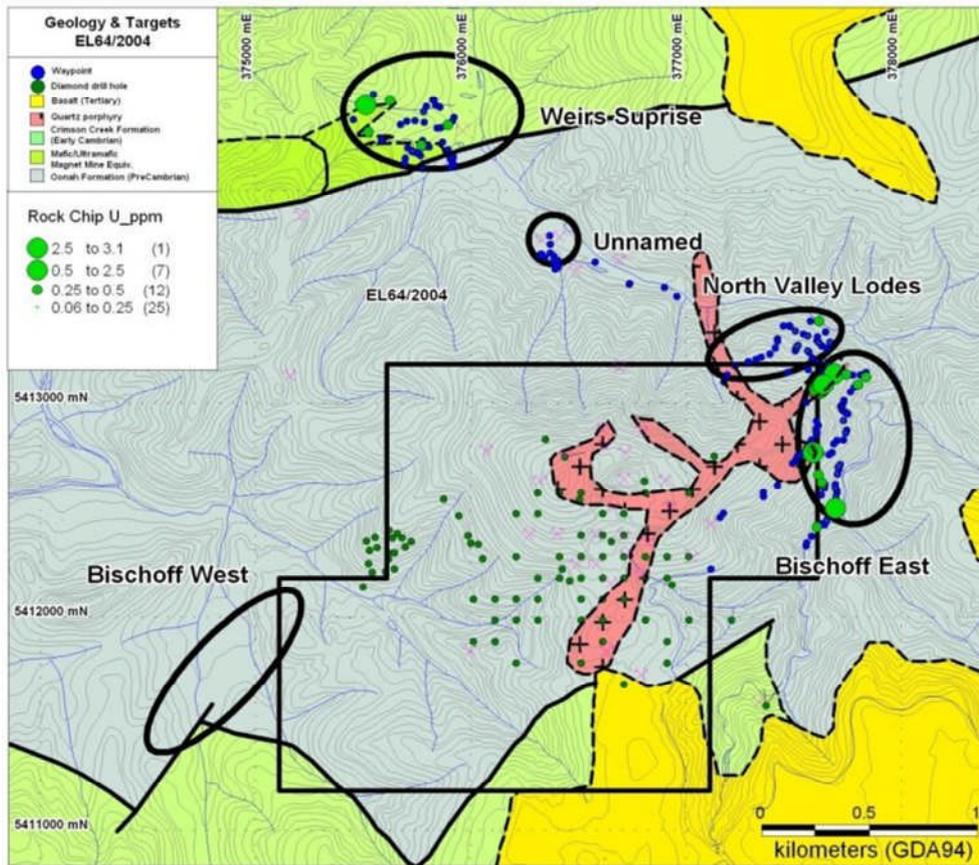
Appendices

Appendix 1 – Thematic maps for various metals









Appendix 2 - Photos



