

Appendix 4e
NCT009 & NCT010
Lithology Summary Logs

(See Digital File EL9_2005_200705_11_Appendix4e.pdf)

Summary Log – NCT009

NCT009 This hole commenced on Monday 28 November and was completed on Friday 15 December to a depth of 506.4m.

- **0 – 88.6 m:** Medium orange/red to dark grey/green pervasive Kspar-He-Ch +/-Ab-Si altered, massive, coherent to locally monomictic autobrecciated hornblende porphyritic andesite to dacitic lava. Short interval of moderate pink/grey weak he-ab+/-ch altered, well to poorly sorted volcanoclastic sandstone between 66-73m. Trace amounts (0.1%) of quartz-chlorite vein hosted cpy-py (52-57m).



Photo 1: Hornblende porphyritic andesite/dacite lava at 8.80m

- **88.6 - 152.4 m:** Medium red to greenish grey He-Ab-Ch+/-Mt altered, fine grained aphanitic to weakly feldspar porphyritic massive rhyolite lava. Anomalous zone of structurally controlled chalcopryite mineralization (up to 0.7%) associated with intense Si-Ab-Se “Henty Style” alteration between 115.8-152m. Mineralisation appears to be controlled by a major dark brown/yellow ferruginous – strongly oxidised, weakly annealed brittle fault zone (113.5-115.8m). Chalcopryite mineralization occurs as two styles: 1) small 1-2mm sized qtz-ch-cpy-py disseminations within tectonically brecciated rhyolite lava clasts; and 2) ch-cpy-py stringer veins, and ch-cpy matrix infill between brecciated lava clasts.

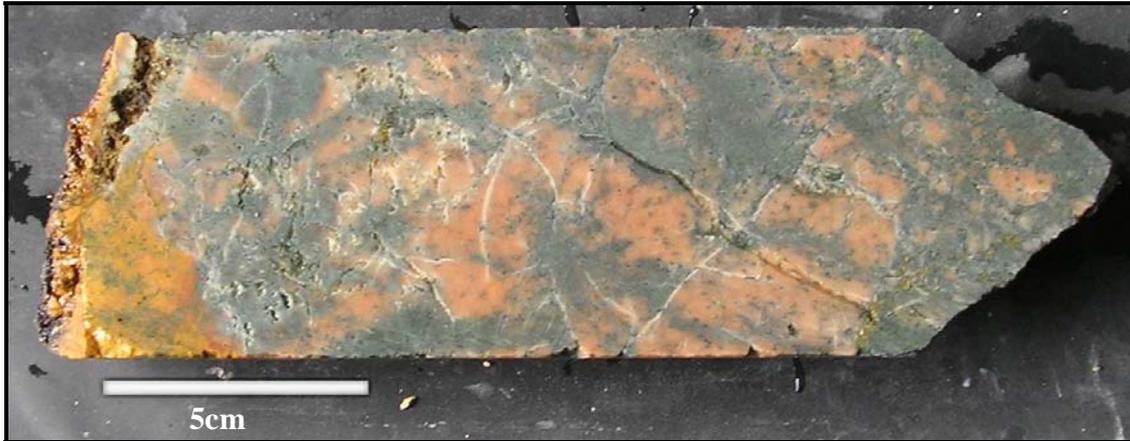


Photo 2: Silica-Albite-Sericite sulphide zone at 123.3m

- **152.4 - 269 m:** Medium to dark red/green He-Ab-Ch altered massive clast-supported, moderately sorted, autobrecciated and coherent aphanitic rhyolite lava. Thin (upto 6m), moderate Se-Cy altered, polymictic, foliated pumice and lithic rich tuffaceous horizons (152.4 m, 176 m, 197 m). Anomalous chalcopyrite mineralization between (233-239m) and (245-256m) associated with strong pervasive Ch alteration. Mineralization generally occurs as thin stringers or ch-cpy matrix infill between He-Ab altered lava clasts. <1% vein and disseminated cpy-py mineralization.

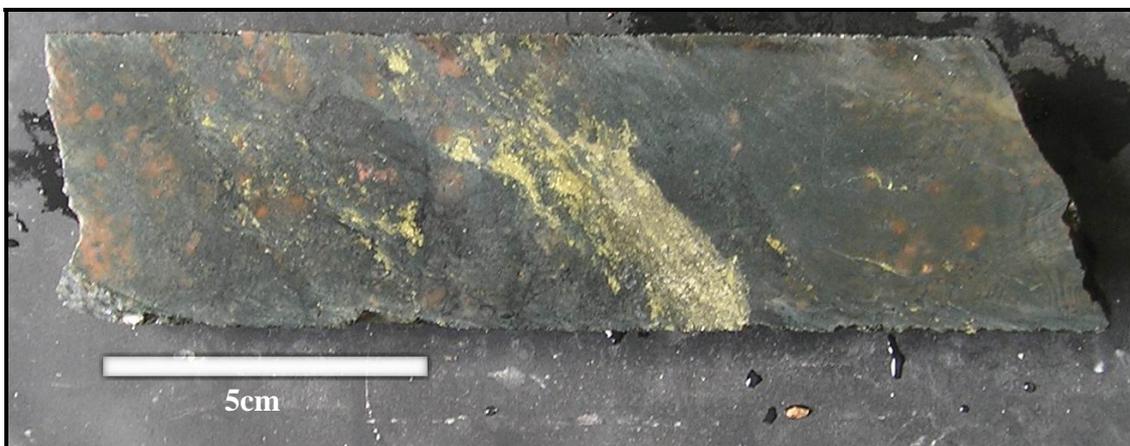


Photo 3: Anomalous copper mineralization associated with diffuse carbonate-chlorite-chalcopyrite-pyrite stringers and minor disseminated chalcopyrite and pyrite at 233.5m



Photo 4: Quartz-chlorite-carbonate-chalcopyrite veins cross-cut by pervasive chlorite flooding at 250.6m

- **269.0m to 376.4m:** Light to medium red / brown, weak pervasive he-ab+/-se-ch altered, aphanitic to weakly porphyritic, coherent rhyodacite lava. Weak to moderate selective Se-Ch-Py alteration of feldspar phenocrysts (upto 4mm). Minor Qtz-Ch-Cb-Ksp and Ch-Cb+/-Py veins. Trace (<0.1%) disseminated and veined pyrite.
- **376.4 – 407.8 m:** Light green/grey, relatively unaltered, weak Se+/-Ch-He-Ab altered, variably feldspar porphyritic (1-2mm), coherent to lightly autobrecciated rhyodacitic lava. Patchy 1-2 m zones of weak to moderate pervasive He-Ab alteration. Cb-Ch+/-Py and rare Qtz-Cb-Gal and Cpy-Gal veins. Minor disseminated and veined pyrite (~0.1%) and chalcopyrite (<0.1%).



Photo 5: Example of unit 404 – 411.2m, transitional contact from weak sericite rhyolitic lava to weak hematite altered rhyolitic lava

- **407.8 – 488.6m:** Medium grey/green to red/brown, very weak, variable he+/-ch-ab-mt altered massive fine grained coherent aphanitic to weakly feldspar porphyritic

rhyolitic lava. Minor intervals of insitu autoclastic brecciation between 420.0 – 425.4 m and 430.5 – 432 m. Trace (<0.1%) disseminated chalcopyrite and pyrite (up to 0.5%). Qtz-Cb-Ch+/-Ksp and Cb-Ch veins.



Photo 6: Example of unit 432.8 – 440m, illustrating variable hematite alteration predominately highlight selvage surrounding qtz-cb-ch veins

- **488.6 - 506.4m (EOH):** Medium red, moderate to strong he-ab+/-ch altered, massive, fine grained coherent rhyolite. Minor disseminated and stringer style (1-2mm) style cpy mineralization up to 0.5% principally associated with ch-cb vein and breccia infill between 488.6-498.6 m. Disseminated and veined pyrite up to 2%. Brittle fault zone between 498.6 – 498.85m composed of milled rhyolitic lava fragments and massive pyrite.

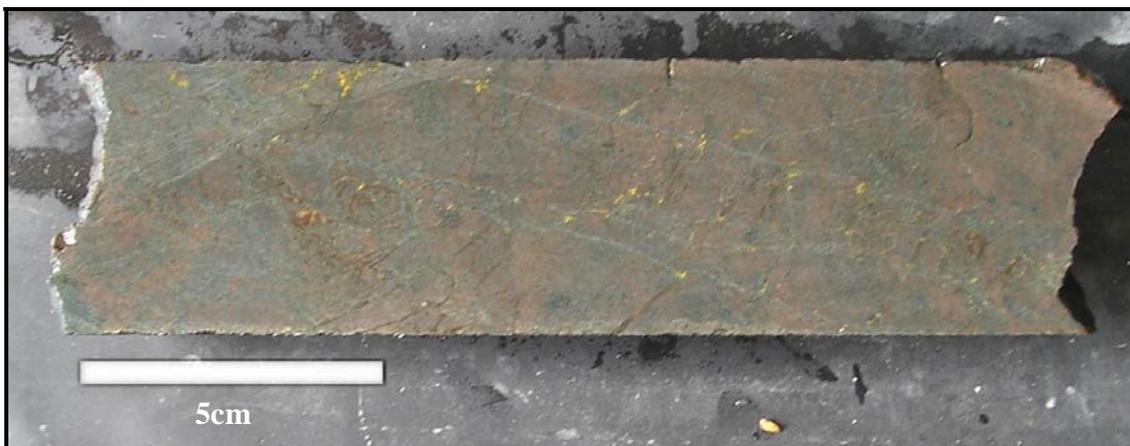


Photo 7: Thin chalcopyrite-chlorite-carbonate-stringer style mineralisation at 488.7m

Summary Log - NCT010

NCT010 This hole commenced on 11 February 2007 and was completed on 23 March 2007 to a depth of 593.3m.

A complete summary log of NCT010 is presented below:

- **0 – 2.9m:** Poorly consolidated transported gravel and sand.
- **2.9 – 36.2 m:** Medium green/grey, moderate to strong pervasive Cb+/-Ch-Se altered, intensely foliated to mylonitic, crudely graded, matrix supported, poorly sorted, polymict, pumice and lithic-rich juvenile volcanoclastic conglomerate and minor sandstone. Foliation defined by moderate to strong Se-altered flattened lenticular wispy pumice clasts. Fault zone (12.2-17.4 m) containing light to medium yellow brown ferruginous oxidised and brecciated siltstone clasts within a clay fault gouge matrix. Minor disseminated pyrite (up to 0.1%) and Cb-Ch+/-Qtz-Py veins.



Photo 1: Volcanoclastic conglomerate at 29.4m

- **36.2 – 69.4 m:** Light cream/grey to white/green, weak to moderate Si-Se+/-Cb-He altered, weakly stratified, very thinly bedded (1-3cm), well sorted, grain-supported, quartz-feldspar-rich siltstone grading to a fine grained sandstone. Thinly interbedded with minor intervals (<1 m) medium green, strong pervasive Se-altered, coarsely quartz-phyric, grain to matrix supported volcanoclastic conglomerate. Trace disseminated pyrite and sphalerite generally <0.1%. Veining dominated by very thin (1-2mm) anastomosing Cb and Cb-Ch veins. Light green/cream, weak Cb-Se altered aphanitic, massive dacitic lava (feldspar>>quartz) between 55.0 – 62.2 m.



Photo 2: Tuffaceous volcaniclastic siltstone and sandstone at 41.7m

- **69.4 – 93.8 m:** Dark black/grey, thinly bedded to laminated and cross laminated fine grained calcareous siltstone/shale, interbedded with minor (1-4cm) light grey, well sorted, non-graded, grain supported calcareous sandstone beds. Cb-Py-Se veins up to 5%, and thinly laminated pyrite beds (0.5cm) appear to be replacement of carbonate along bedding planes. Minor disseminated sphalerite (0.1%).
- **93.8 – 115.4 m:** Light cream/grey to medium red/white, weak hematite altered fine grained fossiliferous and stromatolitic limestone interbedded with thin (<0.5m) strong Se-altered, well sorted, non-graded tuffaceous sandstone and conglomerate.



Photo 3: Limestone at 113.7m

- **115.4 – 156.2 m:** Light green, moderate to strong Se-Fspar(Ab?)+/-Cb altered, juvenile (angular to subangular clasts), poorly sorted, matrix supported, crudely graded polymict (pumice, lithic, chert, rhyolite, limestone) volcanoclastic conglomerate and coarse sandstone. Rare Py-Cb+/-Qtz-Ch and Py-Cb veins, generally <0.1 %. Rare disseminated Py-Sph+/-Gal-Cpy (<0.1 – 0.3 %). Small sericitic + gouge faulted contact at 156.2 m and resultant abrupt increase in Si-Se-Py alteration and mineralization downhole. Interpreted as polymictic mass flow units of the Lynchford Member (Tyndall Group).



Photo 4: Volcaniclastic conglomerate at 153.9m

- **156.2 – 167.3 m:** Light to medium grey/green moderate to intense Si-Se-Py +/-Ab altered volcaniclastic sandstone/conglomerate? Intense Si-Se-Py+/-Ab alteration is analogous to the Henty footwall alteration to the A zone. Alteration is pervasive, texturally destructive with bleaching of primary volcaniclastic textures. Apparent increase in abundant, finely disseminated euhedral pyrite (1-5%) and anhedral sphalerite (0-3%).



Photo 5: Silica-sericite-sulfide alteration zone at 162.6m

- **167.3 – 185.0 m:** Light green/grey, moderate to strong Se-Py-Si +/- Ab altered, massive, weakly foliated, moderately sorted, matrix supported, pumiceous, crystal (fsp) and lithic rich, volcanoclastic breccia. Texturally destructive Se-Ab alteration between 174.2 – 176.5m. Disseminated pyrite and sphalerite mineralisation upto 3%, but generally <0.4%. Trace disseminated galena upto 0.1%. Minor Py-Cb+/-Se veins.
- **185.0 – 353.3 m:** Thick package of dark black, weak Cb altered, laminated to thinly bedded, fine grained carbonaceous black shale and siltstone, interbedded with minor intervals of light grey/green, weak cb+/-se altered, massive, fine grained, non-graded, fossiliferous, calcareous sandstone. Evidence of small scale folding throughout, the interval, where bedding changes with respect to cleavage. Rock is moderately to highly fissile with strong slaty cleavage generally subparallel to bedding.



Photo 6: Black shale at 200.8m

- **347.0 – 349.5 m:** Dark black, weak Cb altered, massive, aphanitic to weakly feldspar glomerophytic, moderately amygdoidal (cb-filled) basic intrusive. Contacts are sharp to slightly irregular, indurated/quenched upper and lower sediment contact margins. Appears to be unmineralised.



Photo 7: Mafic dyke at 348.0m

- **353.3 – 361.5 m:** Light green, weak Se-Si-Cb-Po altered, massive, non-graded, poorly sorted, weakly foliated, polymictic, crystal-pumice-lithic rich volcaniclastic sandstone with chlorite altered pseudoclastic brecciation texture. Strongly disseminated phyrrotite upto 1%. Minor veined pyrite <0.1%. Diffuse carbonate veins <1%.



Photo 8: Felsic volcaniclastic sandstone at 361.1m

- **361.5 – 384.5 m:** Light green/grey, weak Se altered, massive, non-graded coarse siltstone and sandstone interbedded with dark black, massive, non-graded carbonaceous siltstone and shale. Massive sulfide bands (sph-po-gal+/-cpy+/-py) and disseminated sphalerite concentrated throughout the carbonaceous siltstone and shale horizons contain upto 4%

sphalerite. Minor chalcopyrite and galena, generally <0.1%. Minor Qtz-Cb-Sph+/-Po-Py-Gal-Cpy veins.



Photo 9: Siltstone - black shale at 382.4m

- **384.5 – 398.4 m:** Light to mid green, weak to moderate Se-Ab+/-Si altered, massive, matrix supported, weakly foliated volcanoclastic breccia. Selectively pervasive Se altered angular jigsaw fit clasts, supported in Ab+/-Si altered matrix. *An 0.6m interval of banded to semi-massive polymetallic sulphide comprising upto 10% sphalerite, 4.5% chalcopyrite, 2.3% galena, 2% pyrrhotite, 1% pyrite. The mineralised interval is intimately associated with strong Ch-Cb+/-Si alteration, which has caused partial to complete textural destruction of the primary breccia fabric. Mineralised, milled fault breccia composed of milled quartz-carbonate vein fragments and black shale cemented in a massive pyrrhotite-sphalerite matrix (~10% pyrrhotite, 4% sphalerite, 0.3% chalcopyrite, 0.3% galena) occurs at the shale-volcanosedimentary contact between 384.3 – 384.5m. The nature and form of the sulfide banding is enigmatic. In part, the sulfide banding appears to be conformable to the foliation of the host rock which is defined by the alignment of breccia clasts. However, in other sections of the interval the sulfide banding appears to be strung out along the core axis.



Photo 10: Felsic volcanoclastic sandstone/pumice breccia at 390.2m



Photo 11: Sulfide zone at 396.6m

- **398.4 – 482.5 m:** Light to medium green, weak to moderate pervasive Se-Si-Py-Cb+/-Ch altered, massive, well sorted, non-graded, crystal rich (Fsp), medium grained volcanoclastic sandstone. Minor intervals of medium green, moderate Se+/-Si altered, massive, very poorly sorted non-graded, lithic rich, volcanoclastic breccia (402.4-403.4m and 406-407.2m). The base of the sequence consists of light green/grey, weak Se+/-Si-Py altered, massive non-bedded, poorly sorted non-graded, matrix supported polymictic volcanoclastic conglomerate (476.5-482.5). Conglomerate composed of rounded to subrounded siliceous clasts (typically >1cm) containing disseminated sphalerite-pyrite (~1%). Minor Qtz-Cb-Sph-Py veins <1% and disseminated Py-Po-Sph upto 0.3%



Photo 12: Felsic volcaniclastic sandstone-siltstone at 417.4m

- **482.5-512.5m:** Light green/grey, weak se+/-ab altered, massive, coherent, fine grained sericitic felsic volcaniclastic with spotty chlorite alteration. Transitional decrease in sulphide abundance moving downhole from the contact with volcaniclastic conglomerate (From 0.4% Sph, 0.6% Py at contact to 0% Sph-Py at lower margin).



Photo 13: Tuffaceous siltstone at 482.6m

- **512.5-540.9m:** Medium pink/green, moderate Ch-Ksp-Hem altered, massive, coarse-grained, polymictic, feldspar crystal-rich ?volcaniclastic sandstone. Sparse disseminated pyrite (<0.1%). Dominant straight sided to anastomosing qtz-ch-cb veins (upto 1.5cm) containing trace Py and Cpy.

- **540.9-559.3m:** Medium orange/green, moderate Ksp-He-Ch+/-Se altered, massive, coherent, feldspar porphyritic rhyolite. Insitu-brecciated upper contact margin (540.9-543.1m). Additional local zones of insitu, monomict, matrix supported rhyolite breccia (549.1-552.9m). Sulphide abundance, extremely low. Generally <0.1% py and cpy hosted within thin (<0.5cm) quartz-carbonate veins.
- **559.3-593.3m:** Light to medium pink/grey, weak to moderate He-Ksp-Ch+/-Se altered massive to weakly internally brecciated, aphyric to weakly porphyritic rhyolite (“Red Hills Lava”). <0.1% disseminated and veined pyrite. Minor (<1%) unmineralised qtz-cb-ch veins (suspect Devonian). Dark green, moderate to strong Ch-Se+/-Cb-Py altered milled fault breccia contact at 559.3m. Fault breccia contains quartz-carbonate vein fragments and disseminated pyrite (<0.1%) in dark chlorite-sericite altered matrix.



Photo 14: Rhyolitic lava (Red Hills Lava) at 582.7m