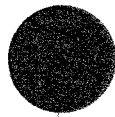


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M 9296



CUNDEELEE PROJECT

**ANNUAL REPORT E28/522, CUNDEELEE
FOR THE PERIOD
23 DECEMBER 1999 TO 22 DECEMBER 2000**

February 2001

COPIES: DEPARTMENT OF MINERALS AND ENERGY (1)
WESTERN AREAS (2)

00001

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1 INTRODUCTION AND SUMMARY

This report describes exploration work carried out by Western Areas NL on E28/522 for the period 23 December 1999 to 22 December 2000. E28/522 is currently registered in the name of Arotinco Resources NL but was acquired by Western Areas from Arotinco when Western Areas listed on the Australian Stock Exchange on 28 July 2000. A transfer of the title to Western Areas is in progress.

E28/522 covers most of the area of the Cundeelee intrusive complex which is located on the eastern margin of the Yilgarn Craton, 180km east of Kalgoorlie. In August 2000, Western Areas drilled a 690m deep vertical diamond drillhole to test for nickel - copper and platinum group metals deposits in the core of a circular pipe within the Cundeelee intrusive complex. The hole intersected a cyclically layered sequence of pyroxenite and serpentinised peridotite units below 551m depth of Permian glacial sediments. Despite the presence of disseminated sulphides and widespread carbonate/chlorite/magnetite alteration and veining, no significant mineralisation was intersected.

2 LOCATION AND ACCESS

The Cundeelee intrusive complex is located 180km east of Kalgoorlie and straddles the boundary between the Queen Victoria Springs Nature Reserve and the Cundeelee Aboriginal Reserve. There is no outcrop in the area which is covered by broadly undulating sand dunes. Vegetation consists of spinifex grass with low scrub and moderate size eucalypt trees scattered throughout. The only river system in the region is Ponton Creek which cuts the western part of the tenement. Ponton Creek is the southeastern extension to Lake Raeside which has its main catchment area in the Agnew/Leonora region 450km northwest of Cundeelee.

Western Areas initially attempted to gain access to E28/522 from the Trans Australian rail line 50km south of the tenement, however the Ponton Creek crossing proved unsuitable for heavy vehicles. The main access now used by Western Areas is via Pinjin Station 167km northeast from Kalgoorlie, then east for 67km along the 'Tojo Highway'. The turnoff south to Cundeelee is poorly marked, being on top of a sand dune on the Tojo Highway. Western Areas upgraded the existing track due south for 42km before a minor track heads west for 4km to diamond drillhole CDD01. Minor upgrading of existing tracks within E28/522 was carried out by Western Areas between the drillhole and campsite/water bore located near the eastern side of Ponton Creek. The CDD01 drillsite and sumps were rehabilitated at the completion of the drilling program.

3 TENEMENT

E28/522 was granted on 23 December 1993. A two year extension of term was granted on 12 June 2000 for the period expiring on 22 December 2001. The expenditure commitment for the year ending 22 December 2001 calculated by Department of Minerals and Energy as \$50,000 may be incorrect and Western Areas has assumed this should be \$100,000. A copy of the Form 5 report submitted to DME for the year ending 22 December 2000, is included in Appendix 5.

4 EXPLORATION COMPLETED

Work completed during the past 12 months includes the following:

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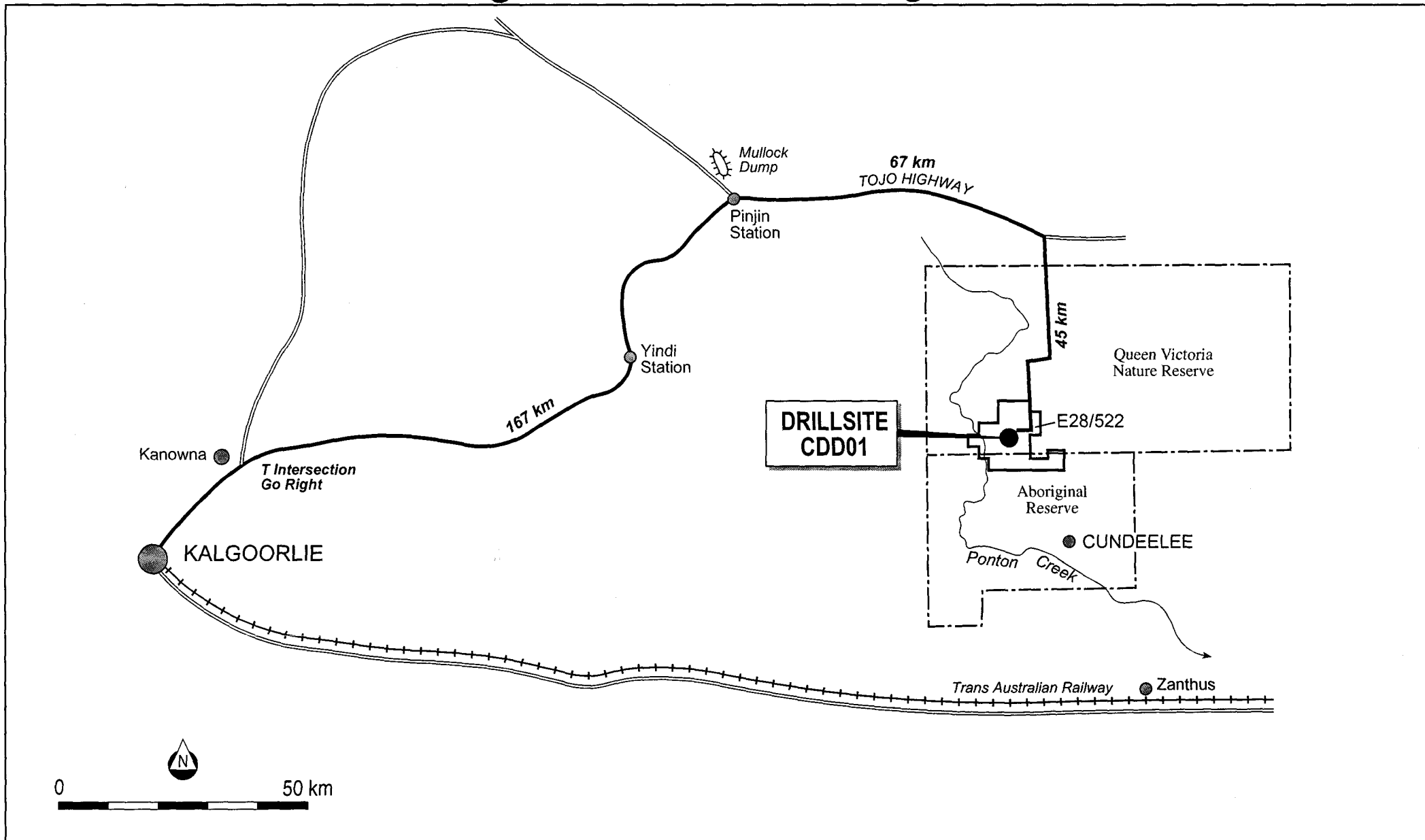
- Reprocessing and imaging of airborne magnetic and gravity data acquired over the tenement by BHP Minerals. Several magnetic images were produced with the one used in determining drill targets included as Figure 2. Diamond core from hole PC2 stored in the DME core storage facility in West Kalgoorlie was relogged.
- Interpretation of the geophysical data to select a drill target. Targets considered include the outer magnetic rim to the complex, the intersection point of major northeast and northwest trending structures and one of the small (~1km diameter) circular magnetic lows, interpreted to be later intrusive pipes within the complex.
- An endangered Flora Survey was conducted along proposed drilling access tracks and approval was received from CALM and DME to conduct minimum ground disturbing activity within the Queen Victoria Nature Reserve. The main track south from the Tojo Highway required minor upgrading by removing overhanging vegetation. Approval was given to conduct minimal clearing of a track from the main north-south track 4km west into the CDD01 drillsite.
- A 690m deep vertical diamond drillhole CDD01 was completed in August 2000. Westralian Diamond Drillers drilled the hole using a roller and blade bit precollar, with drilling mud used to hold the hole open for casing. A hard silcrete band between 34-40m depth required diamond coring to penetrate. Both the overlying Permian glacial sediments and the Proterozoic layered ultramafic sequence were successfully drilled with NQ core. Core recovery was 100% throughout and the hole remained straight with no significant deviation (>1 degree).
- CDD01 was geologically logged with the majority of the hole cut for assay (refer to Appendices 1 and 2). Magnetic susceptibilities were measured on the diamond core. Thin sections were cut from selected lithologies and petrographic descriptions are included in this report as Appendix 3. A consultant, Lyndhurst Enterprises was employed in early 2001 to review the data from Cundelee and discuss geological models to target future drilling. Although the consultant report falls outside this reporting period for E28/522, extracts are included as Appendix 4.

5 RESULTS

Diamond drillhole CDD01 intersected the Permian unconformity at 551m depth, below a sequence of glacial sediments including shales, mudstones and unbedded, poorly sorted conglomerate till. Well rounded pebbles include granite, gneiss, dolerite and granulite.

Below the sharp Permian unconformity, the hole intersected a cyclically layered sequence of pyroxenite and serpentinised peridotite units cut by vertical carbonate/apatite/(phlogopite) veins. Magnetite occurs throughout, as disseminations, veinlets and as massive pegmatoid layers. Minor disseminated pentlandite (nickel sulphide) and chalcopyrite (copper sulphide) occurs within the peridotite units, in carbonate veins and in a massive magnetite layer near the end of the hole.

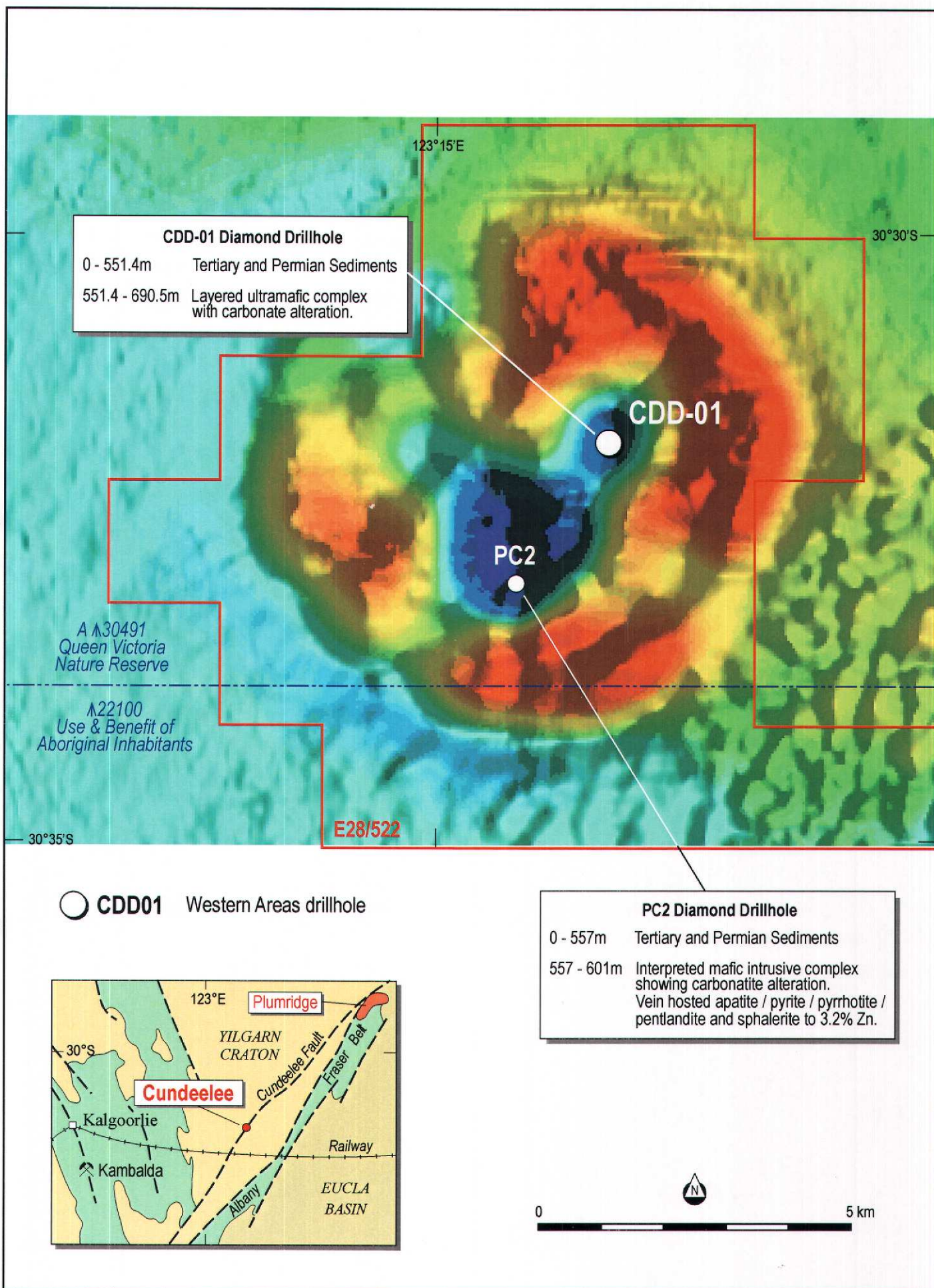
Assays from CDD01 are generally low with best results being 1760ppm nickel, and 1060ppm copper associated with 1460ppm zinc in a massive magnetite layer. The only elevated platinum group metals values were 15ppb platinum and 28ppb palladium intersected. Assay results are included as a table in Appendix 2.



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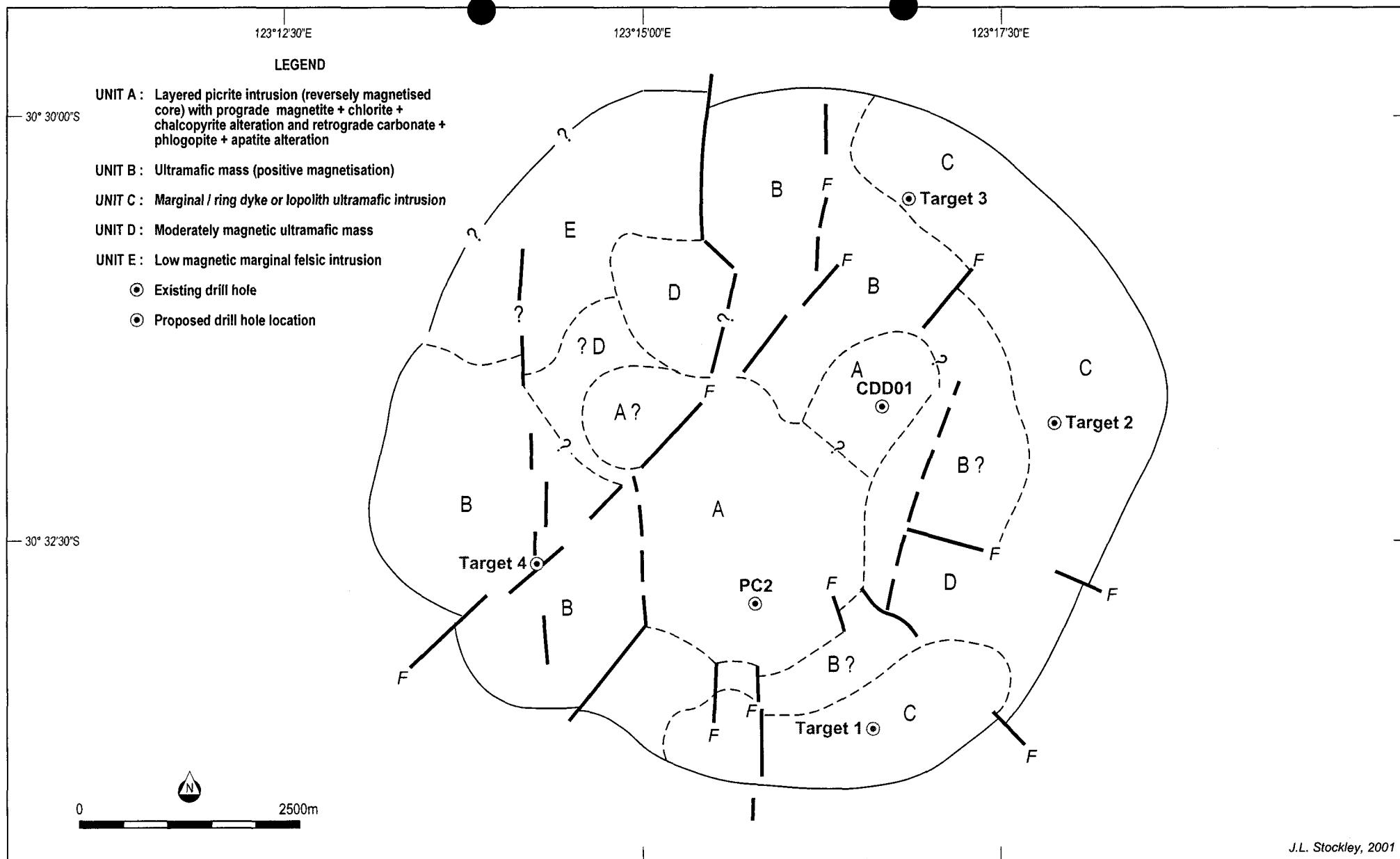
CUNDEELEE PROJECT LOCATION AND ACCESS



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CUNDEELEE PROJECT
AEROMAGNETIC IMAGE AND LOCATION OF DRILLHOLES



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INTERPRETED GEOLOGY OF THE
CUNDEELEE INTRUSIVE COMPLEX

Appendix 1

Summary Drill Log - CDD01

FITTON, Ann

From: Peter Dreverman [PDreverman@westernareas.com.au]
Posted At: Monday, 18 July 2005 11:02 AM
Conversation: Cundeelee E28/522 REF A62140
Posted To: Mail-in Statdata
Subject: Cundeelee E28/522 REF A62140

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18th June 2005

Ms Ann Fitton
Senior Geologist Review
Geological Survey of WA
Plain Street
Perth WA 6000

REF A62140 E28 522 Cundeelee

Dear Ann

Further to your letter of DoIR dated 25 February 2002 and a fax of today's date concerning the Cundeelee Drill Hole CDD01 collar locations and assay methods.

The collar location of CDD01 has been recovered from the 2001 Annual Report and old files. The hole was drilled from the vertical and no down hole survey data was recorded.

CDD01 524 792 E 6 620 912 N AMG84 Zone 51 123° 24' 59"E 30° 41' 42"S

Assays were determined by ALS Perth using standard preparation methods and determinations by ALS Codes IC587 for base metals and PM223 for precious metals. The list of elements and units of measurement are included in the 2001 Annual Report Appendix 2 on Cundeelee.

The drill core is now held in the Joe Lord Core Library in Kalgoorlie

I hope this information should answer your questions.

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19/07/2005

WESTERN AREAS N.L.

HOLE NO: CDD 001

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

PAGE: 1 OF 11

LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
0	.30		-	Roller Cone - Lost Sample
35.30	36.50	Csl	SsI	Light yellow mottled to cream, Fine grained quartz grains set in white silica cement. Solution Cavity semi-vertical with solution breccia gravel recemented by hematite and silica RAD = 50%
36.50	37.50	Rpz	SsI	Variably cream coloured half fine silt-sized quartz grains and white clays in a very weakly mottled light grey silcreted patches RAD = 80%
37.50	38.50	Rspv	SsI	Increasing pink to dark red hematite staining, weakly to non-silcreted siltstone with a shear/pug zone at 38.5m. Lower Zone increasingly broken RAD = 50%
38.50	39.50	Rspl	SsI	Strongly broken, variably medium yellow brown goethitic lower saprolite RAD = 0
39.50	40.50	Rspl	SsI	Light cream very fine grained bleached siltstone with white clay matrix RAD = 0
40.50	42.50	Rspl	SsI	Variably light yellow brown to dark yellow brown, strongly weathered goethitic lower saprolite zone to siltstone protolith. Jointing at 40° to L.C.A.
				Interpretation: Silcrete development is common on iron-poor lithologies in Central Australia and is coeval to post dating the weak but definite laterite relict hematite-goethite redox boundary. The protolith thus predates the major lateritic weathering event, possibly of an Eocene Age - but this is only a best guess.
42.50	160.00	-	-	Roller Cone - Lost Sample
160.00	177.35	Sm	SM	Dark grey, extremely fine grained, fretting core with clear stress-relief "penny-core" separation, normal to L.C.A. None of the core will last very long. RAD = 0 MUDSTONE
177.35	177.90	Ssi	SsI	Medium irregular upper contact/ Medium dark grey, unfoliated siltstone, with occasional sand-size quartz grains, & variably sorted, weakly veined with silt-silcrete(?) network and irregular, heterogeneous flammen-like overlap of mudstone and silt bands RAD = 100%
177.90	185.30	Sm	SM	Dark grey brown, gently lightening in colour with depth, extremely fine grained with rare rounded quartz grains embedded in mudstone. Core is strongly fretting, with stress-relief "penny-core" separation, normal to L.C.A.

WESTERN AREAS N.L.

HOLE NO: CDD 001

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

PAGE: 2 OF 11

LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
185.30	187.35	Sgt	SGR	Light grey, loosely packed heterolithic arenite with irregular bands at contact. Fragments are subrounded to rounded quartz grains, mafic granulite, basalt, pink f.g. cherts and c.g. granitic grits, all fresh but mechanically abraded, and packed irregularly as a gritstone, not a sandstone or cobble RAD=50%
187.35	225.65	Sm	SM	Gradational contact, overlapping siltstones and mudstones / Medium brown, strongly dessicated and tension "stressed penny-core", expanding clays, rare rounded to subrounded pebbles and grits of fresh c.g. granite. RAD=0. A generally featureless mudstone
225.65	225.80	Gg	GG	Large cobble of well rounded m.g. pink granite - glacial erratic or drop stone. RAD=100
225.80	241.63	Sm	SM	Medium brown "stressed penny-core" of dessicating, fretting mudstone with irregular and infrequent grits of quartz and granite parentage RAD=0
241.63	241.74	SMam	MB	Large cobble of rounded, medium green, medium grained with pegmatoidal zones, of amphibolite, recrystallized from a tholeiitic basalt protolith RAD=100
241.74	279.00	Sm	Sm	Medium brown "stressed penny-core" of dessicating, fretting mudstone with irregular and infrequent rounded granite grits and quartz grains RAD=0
279.00	281.00	Ssi	SSE	Same mudstone, with distinctive light yellow, finely banded alternating 0.01-0.1m wide siltstone and brown mudstone zones, up to 10cm wide but erratically distributed. RAD=0
281.00	359.00	Sm	SM	Same mudstone, medium brown "penny-core" stressed with thin, irregular narrow siltstone bands, too narrow to log; some showing cross-bedding structures with wavy-up, up the hole. RAD=0
359.00	398.24	Sti	STI	Sharp but irregular contact at 60-70° to L.C.A. / Abrupt change to Dark Khaki Brown competent core [RAD=100%] of matrix-support TILLITE with irregular distribution, both in size and rock types, of cobble to grit size particles, all well rounded to semi-rounded. Rock types in cobbles include pink granite light pink granulite, medium green mafic granulite, rare xenolith fragments and rare almandine-pyroxene granulites. All cobbles are typical of glacial erratics or dropstones derived from mechanical erosion and glacial rounding off Yilgarn/Mawson craton in ?Permian

WESTERN AREAS N.L.

HOLE NO: CDD 00 1

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

PAGE: 3 OF 11

LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
398.24	398.85	Sm	SM	Dark green grey khaki, poorly banded very fine grained mudstone R&D=100%
398.85	438.50	Sti	STI	Irregular upper contact at 80-85° / Back into dark greenish brown, poorly sorted matrix-supported TILLITE, with irregular glacial erratics or dropstones of sub-rounded to well rounded Fresh granite grits to cobbles of pink granite light grey granodiorite, one excellent cobble of coarse grained almandine-dark green pyroxene-grey albite granulite at 413.50m
438.50	468.04	Sti	STI	Continuation of TILLITE / Excellent core of dark green khaki, poorly sorted matrix-supported tillite with irregular distribution of dropstones, all well rounded to subrounded, of c.g. pink-green granite, dark pink granite c.g. pink garnet - feldspar granulite and finer light grey m.g. granite
468.04	468.27	Sm	SM	Wavy, 85-90° upper contact / change to dark green khaki band mudstones with breaks along laminae R&D=20%
468.27	488.74	Sti	STI	Wavy, 85-90° upper contact, reversion to TILLITE, exactly same as described above R&D=100%
488.74	488.85	Ssa	SSA	Very erratic, irregular upper contact, change to light creamy, reasonably well sorted sandstone of quartz grains. R&D=100
488.85	505.46			Reasonably sharp but 60° upper contact, reversion back to TILLITE with exactly the same description as before, R&D=100%
505.46	509.67	Sm	SM	Sharp 60° upper contact / Darker brownish khaki, well banded mudstone with laminae breaks parallel fairly common, So is 80-85° after upper contact, relative to L.C.A. R&D=10%
509.67	518.79	Sti	STI	Upper contact 60° / Reversion to TILLITE with irregular bands of 10-50cm thickness showing excellent graded bedding e.g. at 513.4m R&D=100%
518.79	532.28			Upper contact 85° / Variable, alternating tillite with excellent graded bedding e.g. at 530.6m dropstone embedding into soft muds below, grading evenly up to another mudstone top over 20cm. Facing up-hole. R&D=100%
532.28	536.09	Sm	SM	Gradational change to / Dark brownish khaki mudstone, strongly broken along So laminae, R&D=10%
536.09	551.40	Sti	STI	Sharp 85° upper contact / Reversion to excellent core TILLITE, R&D=100% / One 20° joint at 547.20m

PAGE: 3 OF 11

551.40m is 80° to L.C.A., Razor-sharp change to underlying Cundeelee Intrusive Complex

[C.I.C.] HOLE NO: CDD 00 1

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WESTERN AREAS N.L.

HOLE NO: CDD001

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

PAGE: 4 OF 11

LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
594.38	601.22			Strongly broken core, upper contact obscured / Dark greenish khaki fine grained ultramafic with 5-10% fractured, but semi-euhedral disseminated grains 2-4 mm in diameter of MAGNETITE, set in matrix of earlier (?) yellowish dark green OLIVINE, in a close-packed accumulative texture. (Difficult to resolve under hand lens. Magnetite appears to be a late-stage phenocryst phase ??; No discernible textural trends down-hole. Strong shear at 10-20° to L.C.A., at approx. 595.5; stringer white carbonate (dol. or cal.?) lining, with narrow veins 1-2 mm of chrys asbestos veining fibres at 90° to vein margin. Core is moderately jointed at 60-70° at 10-20 cm spacing, with minor, network carbonate veining closely associated with each joint. R&D: 90%. Very fine grained sulphides in trace disseminated levels generally evenly distributed. Petrography Sample 597.3-597.4 m.
601.22	601.79			Upper contact 60° / Sharp change to light grey m.g. to c.g. 2-4 mm. diameter closely packed grains of / stubby crystals of (?) possibly orthopyroxene ENSTATITE or similar (??), comprising 95% of rock. Also f.g. to v.f.g. dark grey to black euhedral crystals of MAGNETITE variably disseminated. R&D: 100%
601.79	601.87			Upper contact 45° / Sharp change to alteration zone symmetrically about 3-6 mm white carbonate vein, also dipping at 45° to L.C.A. Alteration is rhythmically banded; crack-seal genesis possibly with a very pale grey, very fine grained matrix, possibly a tremolite group, with medium green opaque to plastic-lustred ultrafine grain size - looks a bit like green epoxy-setting glue!! - obviously a late-stage alteration - even retrograde Green-schist-Facies similarities (??) R&D = 100%
601.87	603.50			Upper contact 45° / Sharp change back to light grey m.g. to c.g. pyroxenite - minor f.g. magnetite rock, with irregular, variable angle to L.C.A. joints with narrow green-mineral alteration 2-4 mm either side of joint R&D = 99%

WESTERN AREAS N.L.

HOLE NO: CDD 001

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

PAGE: 5 OF 11

LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
603.50	603.68			Sharp, upper contact at 40°/ Set of 3 carbonate-veins 2-10 mm wide, all at 40° to L.C.A., set in a strong alteration zone of dark green mineral, waxy in lustre, probably a serpentine group, with m.g. 0.5 to 1 mm euhedral crystals of magnetite scattered throughout; plus minor zones of yellowish green fine grained amphibole near upper contact. R&D = 50%. Also rare, fine grained silvery mineral close to the magnetite. Possibly a sulphide, maybe of interest for P.G.E. checking - by polished section.
603.68	605.30			Reversion by sharp contact 40°/ Back to light grey, m.g. to c.g. crystalline pyroxenite - minor magnetite ultramafic, with minor joints, R&D = 100%
605.30	605.39			Sharp upper contact at 30°/ Dark green ultrafine grained serpentine (?) mineral, like lizardite, as matrix, with irregular light creamy green tremolite? grains, very ragged, possibly altered pyroxenes; plus very large 2-4 mm semi-euhedral grains of pyroxenite irregularly distributed
605.39	605.75			Upper contact at 30°/ Reversion to light grey, coarse grain pyroxene - minor pyrox magnetite ultramafic R&D = 100%
605.75	605.97			Sharp, upper contact at 30°/ Single carbonate vein 5-10 mm wide at centre, dipping at 30° to L.C.A.; with symmetric alteration zones of medium grey, fine grained possibly tremolite altered pyroxene, with medium green, possible lizardite, -serpentine mineral; plus trace fine grained medium brown mineral ?? R&D = 100
605.97	606.50			Sharp, upper contact at 30°/ Reversion to light grey pyroxene - minor magnetite rock. Also strong shear at 606.4 with dark green serpentine - mineral alteration symmetric to shear 1-2 cm wide either side R&D = 50%

WESTERN AREAS N.L.

HOLE NO: CDD 001

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

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LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
606.50	606.68			Sharp 30° upper contact / Two vein set showing clear, cross-cutting relationship of earlier pale green waxy (?) tremolite - epoxy resin mineral, by late-stage dark green serpentine mineral, with possible very fine grained magnetite; and irregular 2-5 mm subhedral pyrrhotite grains overgrowing fine network vein swarm of carbonate. i.e. pyrrhotite is very late stage.
606.68	609.40			Sharp upper contact at 45°, opposite facing to 606.5 vein / Reversion to coarse grained pyroxene - minor magnetite rock R&D = 95% Breaks/shears/joints with 30° L.C.A. angle, narrow alteration of light greenish yellow (?) tremolite - serpentine at 607.82, 608.10 & 609.00 m. R&D 100%
609.40	609.57			Irregular upper contact / Strong shear with irregular, narrow 1-5 mm. carbonate veins at 30° to L.C.A., with interesting, late stage carbonate veinlet with 5 mm x 20 mm aggregate of fractured chalcopyrite cores, with irregular but clear replacement by magnetite i.e. change to oxidising conditions. Very similar to aggregate at 569.26 m shear R&D = 0.
609.57	610.43			Sharp but irregular upper contact / Reversion to coarse grained pyroxene - minor magnetite ultramafic, slightly increasing magnetite. R&D = 100%
610.43	610.65			Sharp upper contact at 40-50° / Change to PEGMATOIDAL UNIT, with very coarse grained, light yellow green feldt pyroxene or tremolite group amphibole with very coarse grained, irregular patches of magnetite as phenocrysts. One thin, 2-4 mm wide late stage carbonate.
610.65	611.30			Upper contact 40° / Sharp change to light greenish grey ultramafic with 20-40% disseminated magnetites of 1-2 mm size, set in light grey, possibly PLAGIOCLASE - PYROXENE matrix R&D = 90%

WESTERN AREAS N.L.

HOLE NO: CDD 001

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

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LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
611.30	615.00			Upper Contact 80°, Sharp / Dark green, very fine grained rock of yellow-green translucent (ad)cumulate olivines with later stage 1-2mm ragged edged fractured magnetite grains, disseminated to 1-5%. RAO=100 Late stage network carbonate veinlets, extensively developed to 615.10
615.00	616.78			Gradational contact / Dark lime green, fine grained (ad)cumulate olivines, with 2-5mm semi-angular magnetite grains, plus very fine disseminated ? sulphides or sericite altered olivines RAO=99%
616.78	617.08			Irregular contact / PEGMATOID ZONE of light creamy ? tremolite with very coarse magnetite grains 2-5mm diameter, subhedral late-stage mineral. RAO=100%
617.08	618.30			Irregular contact 30° / Back into dark lime green, fine grained (ad)cumulate olivines with 5-10% disseminated 2-5mm, plus 5-10% 5-10mm euhedral light grey crystals / phenocrysts of ? FELDSPAR or ORTHOPYROXENE RAO=100% Network carbonate veining near basal contact
618.30	621.13			Gradational contact / Light grey, coarse grained pyroxene - minor magnetite rock RAO=100
621.13	621.18			Upper Contact 60° / White carbonate vein at 60° to LSA, with narrow medium green waxy ? serpentine ? mineral (light yellow fluorescent under U.V.)
621.18	623.82			Gradational contact / Medium lime green, medium grained olivine (ad)cumulate with 2-5mm, 15-20% magnetite grains; RAO=100%
623.82	624.20			Upper contact 60° / PEGMATOID ZONE - Dark Green Serpentine mineral at 5-10mm magnetite.
624.20	624.25			Gradational contact / Coarse grained, light grey pyroxene - minor magnetite rock with minor network carbonate veins RAO=100%
624.25	624.60			Sheared contact 60° / Strongly carbonate veined, dark lime green medium grained olivine (ad)cumulate RAO=50%
624.60	624.73			Sheared contact 60° / PEGMATOID ZONE - Dark green serpentine matrix, 40-50% 5-10mm magnetites, plus lime green late stage waxy (? serpentine mineral veins)

WESTERN AREAS N.L.

HOLE NO: CDD001

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

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LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
624.73	625.93			Sheared, jointed upper contact at 60°-10° / Dark green m.g. olivine adcumulate with 1-5% , 2-5 mm magnetite R&D = 50%.
625.93	626.30			Sheared upper contact 40° / Dark grey massive serpentinite, with disseminated fine magnetite; Intense shearing 626.20 to 626.30, broken core R&D = 0
626.30	631.05			Sheared, carbonate veined upper contact / Dark line-green medium grained adcumulate olivines with 1-5% disseminated 3-5 mm magnetites increasing towards base
631.05	632.40			Sheared upper contact 60° / Light grey, coarse grained pyroxenite - minor magnetite - trace sulphides. Network carbonate veining 1-4 mm across increasing with depth
632.40	632.75			Gradational change / Intense carbonate veined, brecciated and strongly altered pyroxene to dark line green ? serpentinite mineral matrix Shears at 60°, R&D = 0 6cm lost core to 632.40 -
632.75	634.40			Gradational contact / Dark green, medium grained olivine adcumulate with minor light grey pyroxene appearing to 10 cm above base. Network carbonate veining present but infrequent
634.40	640.05			Gradational contact / Light grey, coarse grained pyroxene - minor magnetite rock, with minor 5 cm with serpentinite alteration around 30-40% LA carbonate veins, at 636.1 m & 637.9 m.
640.05	640.60			Gradational contact / Minor light grey pyroxenes overlap into dark green, fine grained olivine - adcumulate rock (hybrid zone) R&D = 100
640.60	644.90			Upper contact 60° / Irregular but sharp / Very fine grained, dark green olivine adcumulate with trace magnetite 1 mm disseminated. Network carbonate veinlets throughout 0.1 to 10 mm thick, with lime green waxy, serpentinite mineral generally closer to vein-rock contact. R&D = 90%
644.90	645.06			Irregular contact / PEGMATOID ZONE of very coarse magnetite - dark green serpentinite matrix.

WESTERN AREAS N.L.

HOLE NO: CDD 001

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

PAGE: 9 OF 11

LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
645.06	645.73			Gradational contact / Highly irregular mineralisation PEGMATOID ZONE with white, strongly crystalline mineral - ? carbonate, with minor light grey ? tremolite, irregular aggregates of 1-2 mm well crystalline light pink ? GARNET (guess only), plus irregular, very coarse 3-10 mm subhedral pyrrhotite grains internal to white mineral. There are probably other finer, more subtle minerals also. (2) RAD=100%
645.73	646.76			Irregular contact / Dark green, fine grained translucent olivines, trace 1 mm magnetites and trace very fine disseminated sulphides. Network carbonate veining is minor. RAD=100%
646.76	647.70			Irregular contact / PEGMATOID ZONE of 5-10 mm v.c.g. magnetite set in pale creamy green serpentine mineral - fluorescent under UV. , plus minor fine grained light creamy pyroxene in the matrix RAD=100%
647.70	654.00			Irregular contact / Strongly jointed and broken core, Dark green fine grained adcumulate-textured olivines, with 1-5%, 2-5 mm coarse subhedral magnetites disseminated throughout. Strong carbonate vein at 651.30 at 40° to L.C.A. 5cm thick. RAD=1%
654.00	654.15			Irregular contact / Loose aggregate of light grey (?) orthopyroxene crystals RAD=100%
654.15	654.80			Very irregular contact / Fine grained, Dark green olivine adcumulate with 5-10% 1-2 mm magnetite.
654.80	655.00			Irregular contact / Loose aggregate of light grey (?) orthopyroxene crystal mush, in a matrix of dark green olivines - Hybrid rock.
655.00	655.60			Gradational contact, / Fine grained dark green olivine adcumulate with 5-10% 2-5 mm light grey orthopyroxene crystals suspended - Hybrid rock RAD=100%
655.60	658.70			Gradational contact / Massive, light grey coarse grained pyroxene(?) orthopyroxene) with very minor fine magnetite. RAD=100%

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HOLE NO: CDD 001

WESTERN AREAS N.L.

HOLE NO: CDD 001

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

PAGE: 10 OF 11

LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
658.70	660.60			Gradational contact / Very coarse PEGMATOID ZONE of 2-10 mm magnetite in a light grey pyroxene matrix, plus minor coarse grained pyrrhotites and minor pink crystalline aggregates; 0.1-1 mm crystal subhedral shapes probably a GARNET, similar to before. Late stage white carbonate network veining irregularly throughout. RQD = 100%
660.60	661.82			Irregular, gradational contact / Back to Dark green, fine grained olivine adcumulate textures with occasional fine light grey pyroxenes in the matrix (1%) RQD = 80%
661.82	662.15			Irregular contact / PEGMATOID ZONE - vcg magnetite, light creamy pyroxenes and trace pink garnet(?)
662.15	665.91			Gradational contact / Dark green, fine grained olivine adcumulate, with trace to 1% disseminated sulphides. Strong jointing at 60-70° and shearing at 10-20° to L.C.A. RQD = 0
665.91	666.83			Sharp contact at 90° / Coarse grained light grey pyroxene mass, moderately jointed. RQD = 50%
666.83	667.00			Irregular contact / Very fine grained, dark green olivine adcumulate, with reasonable network carbonate veining RQD = 100%
667.00	668.00			Sharp upper contact 80° / Light grey, coarse grained pyroxene aggregate with moderate jointing RQD = 50%
668.00	671.60			Sharp upper contact at 40° / Fine grained, dark green olivine adcumulate with minor coarse crystals of ? orthopyroxene towards base RQD = 100%
671.60	673.70			Sharp but irregular contact / Light grey coarse grained pyroxene ortho? style with minor, network carbonate vesicles
673.70	675.36			Irregular contact / Medium green pyroxene or ? tremolite, very coarse grained, magnetite, white ? carbonate mineral and dark green serpentine mineral matrix in a PEGMATOID ZONE. Trace subhedral coarse grained pyrrhotite

WESTERN AREAS N.L.

HOLE NO: CDD 001

DIAMOND DRILLHOLE - GEOLOGICAL SUMMARY LOG

PAGE: 11 OF 11

LITHOLOGY				
FROM (m)	TO (m)	LITH_1	LITH_2	COMMENTS
675.36	678.20			Irregular contact / Dark green fine grained olivine adcumulate with 1% disseminated magnetite, plus variable light grey ? orthopyroxene crystals 1-5 mm across "floating" in dark green olivine adcumulate - Hybrid rock, also jointed badly at 677.0 to 677.10. R&D is ~95%
678.20	682.05			Broken core at contact / Light grey, coarse grained ? orthopyroxenite with trace magnetite. R&D = 99%. Trace carbonate veins
682.05	683.70			Gradational contact / Dark green, half light green ? orthopyroxene (coarse grained) and half dark green fine grained olivines ? as matrix. R&D = 100% - a hybrid rock.
683.70	689.35			Gradational change / Light greenish / chaki: olivine adcumulate, fine grained as matrix, with coarse crystals of 2-5 mm magnetite, subhedral, "floating" in the matrix. R&D = 50%. Moderately jointed and broken
689.35	689.70			Gradational change / Aggregates of light grey, coarse grained ? orthopyroxenes variably mixed with dark green olivine adcumulates, plus minor late stage veining of green serpentine. R&D = 100%
689.70	690.50			Sharp contact at 60° / Light grey, coarse grained massive ? orthopyroxene rock with trace magnetite. R&D = 100%.
	E.O.H			

Appendix 2

Drillhole Assays - CDD01

CUNDEELEE DIAMOND HOLE CDD01 - ASSAY RESULTS

Sample	From	To	Cu	Pb	Zn	Ag	As	Fe	Mo	Co	Bi	Cr	Mg	Ni	P	S	V	W	Pt	Pd	Au	PM223"
No	m	m	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm"
			IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	PM223	PM223	PM223	CHECK:
975441	551.4	552	-5	-5	41	-1	10	5.88	-5	49	-5	1380	8.02	438	317	325	168	-5	-0.001	-0.001	0.004	"
975442	552	553	78	36	337	-1	-5	6.75	-5	38	9	932	9.27	314	1860	661	147	8	-0.001	-0.001	0.001	"
975443	553	554	38	5	31	-1	-5	5.6	-5	46	-5	1330	8.31	439	96	401	157	-5	0.006	0.003	0.001	"
975444	554	555	18	-5	31	-1	-5	5.91	-5	51	-5	1280	8.24	496	52	435	146	-5	-0.001	0.001	0.001	"
975445	555	556	122	-5	33	-1	-5	5.18	-5	40	-5	1350	8.35	392	69	451	153	-5	0.007	0.022	0.003	"
975446	556	557	54	-5	31	-1	-5	6.08	-5	39	-5	1390	9.5	379	242	382	158	-5	0.006	0.028	0.006	"
975447	563	564	-5	-5	51	-1	-5	10.77	-5	117	-5	741	12.94	1410	119	686	60	6	0.002	0.002	0.002	0.002"
975448	564	565	-5	-5	54	-1	-5	11.41	-5	112	-5	687	13.05	1380	168	1080	67	6	0.002	0.002	0.003	"
975449	565	566	13	7	44	-1	-5	8.61	-5	102	-5	1070	10.76	1100	67	1210	98	-5	0.015	0.012	0.002	"
975450	566	567	19	13	33	1	-5	6.03	-5	52	9	1430	8.58	536	35	311	147	-5	0.001	0.003	0.002	"
975451	567	568	13	7	35	-1	-5	6.42	-5	54	-5	1350	9.64	536	114	476	135	-5	0.001	0.003	0.001	"
975452	568	569	45	7	52	-1	-5	7.07	-5	69	-5	1500	9.46	700	199	590	146	-5	0.003	0.006	0.002	"
975453	569	570	181	11	214	-1	-5	6.6	-5	64	-5	1040	9.67	673	5700	809	104	6	0.003	0.002	0.006	"
975454	570	571	20	9	50	-1	-5	8.38	-5	88	6	1310	10.48	897	828	1080	118	5	-0.001	0.001	0.018	"
975455	571	572	32	8	75	-1	-5	11.19	-5	124	-5	1180	13.56	1430	352	1640	67	-5	-0.001	0.001	0.003	"
975456	572	573	12	6	69	-1	-5	12.8	-5	149	-5	1010	13.59	1640	70	1150	53	8	0.001	0.002	0.007	"
975457	573	574	7	8	87	-1	-5	11.58	-5	200	-5	1350	13.15	1750	37	1290	64	-5	0.001	0.001	0.005	0.007"
975458	574	575	-5	5	76	-1	-5	11.29	-5	190	-5	1270	12.55	1640	71	1150	65	-5	0.002	0.001	0.003	"
975459	575	576	16	8	57	-1	-5	8.41	-5	149	-5	776	10.91	1220	2910	887	52	6	0.002	0.001	0.001	"
975460	576	577	50	12	65	-1	8	9.17	-5	166	-5	538	12.05	1300	8990	1040	54	-5	0.002	0.002	0.001	"
975461	577	578	32	6	40	-1	-5	7.7	-5	97	-5	209	10.23	1150	6760	1100	25	-5	0.006	0.005	0.002	"
975462	578	579	73	6	44	-1	-5	5.53	-5	46	-5	948	8.9	473	8890	619	124	-5	-0.001	0.001	-0.001	"
975463	579	580	22	11	28	-1	-5	5.23	-5	40	12	1180	8.66	414	1850	379	141	-5	0.001	0.002	0.001	"
975464	580	581	60	7	29	-1	-5	4.43	-5	21	-5	288	9.56	206	9610	467	84	-5	0.002	0.002	0.002	"
975465	581	582	112	6	47	-1	-5	2.91	-5	25	-5	98	6.95	336	14000	994	43	-5	0.003	0.002	0.004	"
975466	582	583	54	12	32	-1	-5	5.34	-5	44	-5	1210	8.43	463	2070	671	135	-5	0.002	0.004	0.001	0.001"
975467	587	588	136	8	67	-1	-5	8.95	-5	101	14	1230	11.92	1090	737	992	96	-5	0.001	0.005	0.002	"
975468	588	589	133	12	68	-1	-5	9.4	-5	106	-5	1130	11.11	1200	1540	1600	72	5	0.002	0.003	0.002	"
975469	589	590	55	-5	41	-1	-5	5.64	-5	44	-5	1330	8.66	478	509	363	135	-5	0.003	0.004	0.001	"
975470	590	591	63	6	50	-1	-5	6.06	-5	58	-5	1450	8.98	637	204	528	141	-5	0.002	0.003	0.001	"
975471	591	592	56	7	45	-1	-5	6.03	-5	53	-5	1440	9.28	578	341	495	135	-5	0.001	0.001	0.001	"
975472	592	593	53	8	41	-1	-5	6.2	-5	61	-5	1280	8.91	670	4110	708	121	-5	0.002	0.004	0.011	"
975473	593	594	116	9	46	-1	-5	6.16	-5	66	7	870	9.86	725	5330	819	69	5	0.001	0.003	0.001	"
975474	594	595	50	5	61	-1	-5	10.12	-5	116	-5	1410	12.41	1280	69	1100	79	-5	0.002	0.003	0.003	"
975475	595	596	31	-5	57	-1	-5	11.44	-5	170	-5	1230	12.98	1500	74	1030	59	-5	0.002	0.001	0.004	"

Sample	From	To	Cu	Pb	Zn	Ag	As	Fe	Mo	Co	Bi	Cr	Mg	Ni	P	S	V	W	Pt	Pd	Au	Au PM2:
No	m	m	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm"
			IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	PM223	PM223	PM223	CHECK:
975476	596	597	28	11	57	-1	-5	11.63	-5	141	7	1100	13.03	1500	155	955	57	6	0.002	0.002	0.003	"
975477	597	598	19	-5	48	-1	-5	11.12	-5	144	-5	919	13.15	1470	75	888	51	6	0.002	0.001	0.003	"
975478	598	599	22	-5	55	-1	6	10.22	-5	124	-5	885	12.19	1320	41	907	47	-5	0.002	0.001	0.003	"
975479	599	600	-5	6	44	-1	-5	10.62	-5	125	-5	353	12.89	1370	190	948	31	5	0.002	0.001	0.002	"
975480	600	601	81	-5	43	-1	-5	10.23	-5	144	6	299	12.44	1370	60	1230	27	7	0.004	0.002	0.003	"
975481	601	602	75	9	41	2	-5	6.16	-5	64	-5	1190	9.48	702	106	580	128	-5	0.004	0.006	0.004	"
975482	602	603	42	8	28	-1	-5	5.53	-5	45	-5	1410	8.31	488	32	308	148	-5	0.002	0.004	0.002	"
975483	603	604	40	6	36	-1	-5	5	-5	42	-5	1310	7.63	417	35	592	135	-5	0.003	0.004	0.001	"
975484	604	605	78	6	33	-1	-5	5.31	-5	44	11	1440	7.9	465	35	334	145	-5	0.003	0.006	0.003	"
975485	605	606	65	6	29	-1	-5	5.3	-5	40	-5	1420	8.4	412	354	681	142	-5	0.003	0.005	0.001	"
975486	606	607	45	-5	34	-1	-5	5.11	-5	38	-5	1390	8.48	386	128	481	131	-5	0.004	0.005	0.003	"
975487	613	614	51	6	54	-1	-5	11.6	-5	124	5	795	12.63	1450	56	933	42	-5	0.005	0.006	0.001	"
975488	614	615	34	6	56	-1	-5	12.14	-5	128	-5	801	13.87	1590	60	1100	44	8	0.005	0.007	0.001	"
975489	615	616	31	10	55	-1	-5	10.93	-5	126	-5	738	14.16	1480	63	949	45	-5	0.005	0.007	0.001	"
975490	616	617	404	16	82	-1	-5	9.81	-5	124	-5	611	13.05	1310	526	1230	67	-5	0.001	0.001	-0.001	"
975491	617	618	185	8	68	-1	-5	9.57	-5	117	-5	471	12.23	1300	221	1260	60	-5	0.003	0.003	0.003	0.002"
975492	618	619	353	10	53	-1	-5	6.44	-5	58	-5	1390	10.04	692	57	903	141	-5	0.003	0.003	0.002	"
975493	624	625	13	6	66	-1	-5	11.22	-5	141	-5	1090	13.68	1420	512	917	72	10	0.005	0.01	0.003	"
975494	625	626	5	-5	70	-1	-5	11.58	-5	133	10	1430	13.03	1530	39	1220	65	7	0.002	0.004	0.001	"
975495	626	627	685	19	75	-1	5	7.9	-5	98	6	663	13.5	861	1270	1370	57	-5	0.002	0.002	-0.001	"
975496	627	628	13	8	89	-1	-5	11.78	-5	167	-5	1580	13.36	1560	40	1010	73	10	0.001	0.002	0.003	"
975497	628	629	8	10	73	1	-5	11.4	-5	139	6	1230	13.63	1530	72	905	62	9	0.002	0.001	0.001	"
975498	629	630	-5	-5	65	-1	-5	11.26	-5	120	-5	1030	12.95	1500	72	808	53	6	0.002	0.002	-0.001	"
975499	632	633	21	8	71	-1	-5	10.55	-5	128	11	721	12.54	1440	69	1060	49	8	0.006	0.008	0.003	"
975500	633	634	14	7	51	-1	-5	9.85	-5	124	-5	516	12.44	1440	95	1210	48	-5	0.003	0.005	0.001	"
975501	640	641	13	-5	63	-1	-5	10.53	-5	108	15	1260	13.31	1430	97	644	77	-5	0.002	0.004	0.004	0.002"
975502	641	642	5	-5	86	-1	-5	13.1	-5	116	-5	1750	12.7	1600	42	892	82	-5	0.001	0.001	0.001	"
975503	642	643	20	11	69	-1	-5	10.72	-5	171	-5	1210	13.14	1530	92	1060	66	5	0.004	0.004	0.001	"
975504	643	644	76	8	58	-1	-5	10	-5	137	-5	1100	12.91	1420	96	1110	60	-5	0.002	0.002	0.002	"
975505	644	645	107	14	68	-1	-5	10.05	-5	126	7	1040	12.36	1340	666	1040	71	-5	0.003	0.003	0.001	"
975506	645	646	321	8	194	-1	-5	5.17	-5	54	-5	283	9.58	555	10600	736	29	-5	0.001	0.001	0.001	"
975507	646	647	178	16	128	-1	-5	9.52	-5	111	-5	763	12.04	1240	3620	1110	93	-5	0.002	0.002	-0.001	"
975508	647	648	710	10	292	-1	8	10.46	-5	90	-5	516	10.34	641	1880	1000	200	-5	0.002	0.002	0.001	"
975509	648	649	25	8	63	-1	-5	11.38	-5	135	-5	1170	13.95	1760	127	1190	67	8	0.003	0.003	-0.001	0.001"
975510	649	650	18	12	63	-1	-5	10.94	-5	135	10	1130	13.54	1670	111	1090	62	8	0.002	0.002	0.002	"
975511	650	651	6	5	57	-1	-5	11.38	-5	130	-5	1020	13.21	1580	78	897	57	-5	0.002	0.003	0.001	"
975512	651	652	43	5	59	-1	-5	10.76	-5	128	-5	1030	13.11	1550	66	819	59	-5	0.002	0.002	0.001	"

Sample	From	To	Cu	Pb	Zn	Ag	As	Fe	Mo	Co	Bi	Cr	Mg	Ni	P	S	V	W	Pt	Pd	Au	Au PM2.
No	m	m	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm"
			IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	IC587	PM223	PM223	PM223	CHECK
975513	652	653	42	-5	56	-1	-5	10.66	-5	122	-5	1080	13.11	1450	96	632	67	9	0.002	0.002	0.001	"
975514	653	654	27	6	66	-1	-5	11.06	-5	129	7	920	13.49	1530	71	635	56	-5	0.002	0.002	-0.001	"
975515	654	655	231	-5	72	-1	-5	10.02	-5	114	-5	852	13.19	1390	86	816	72	-5	0.003	0.004	0.001	"
975516	657	658	146	-5	59	-1	-5	6.09	-5	56	-5	1510	8.83	639	88	785	137	-5	0.005	0.013	0.001	"
975517	658	659	129	10	66	-1	-5	7.49	-5	69	-5	1190	9.52	625	915	1200	140	-5	-0.001	-0.001	-0.001	"
975518	659	660	261	17	171	-1	8	9.31	-5	66	-5	194	8.04	261	2740	2090	224	-5	-0.001	0.001	-0.001	"
975519	660	661	483	13	1300	-1	-5	7.42	-5	74	-5	756	9.5	750	3660	1730	55	13	0.001	0.001	-0.001	"
975520	661	662	1060	30	1460	-1	-5	11.8	-5	162	-5	810	11.15	1410	2240	2540	181	16	0.003	0.003	0.004	"
975521	662	663	1010	13	1200	-1	-5	15.44	-5	178	12	1110	11.41	1460	1060	2050	226	18	0.002	0.003	0.001	"
975522	663	664	107	5	180	-1	-5	11.47	-5	134	-5	788	13.45	1510	238	1160	59	8	0.002	0.002	0.004	"
975523	664	665	42	-5	101	-1	-5	10.74	-5	105	-5	432	13.63	1380	35	950	38	-5	0.002	0.001	0.003	"
975524	665	666	23	6	38	-1	-5	10.12	-5	109	-5	495	12.5	1430	21	908	44	-5	0.006	0.006	0.002	"
975525	671	672	88	13	44	-1	-5	9.52	-5	115	-5	371	11.22	1290	879	1540	67	7	0.004	0.003	0.002	"
975526	672	673	134	-5	40	-1	-5	5.59	-5	45	10	1350	8.15	472	481	791	149	-5	0.006	0.009	0.002	"
975527	673	674	137	9	29	-1	-5	5.26	-5	46	-5	1360	8.4	549	170	1210	136	-5	0.01	0.017	0.001	"
975528	674	675	87	32	100	-1	-5	5.1	-5	38	-5	733	9.01	419	1990	1130	84	-5	0.007	0.009	-0.001	"
975529	675	676	59	10	51	-1	-5	8.7	-5	95	7	1110	11.64	1060	428	1370	108	-5	0.005	0.009	0.069	"
975530	687	688	11	6	61	3	7	9.99	-5	110	-5	917	12.86	1390	68	541	58	7	0.002	0.002	0.002	"
975531	688	689	-5	-5	58	-1	-5	10.65	-5	111	-5	677	13.71	1500	88	539	62	-5	0.002	0.002	-0.001	"
975532	689	690	65	-5	43	-1	-5	8.01	-5	83	5	934	11.69	1100	36	496	84	-5	0.006	0.009	0.001	"
975533	690	690.5	455	-5	41	-1	-5	5.94	-5	55	-5	1400	9.15	627	33	514	135	-5	0.01	0.019	0.001	"


00024

Appendix 3

Petrographic and Mineragraphic Descriptions - CDD01

PETROGRAPHIC & MINERAGRAPHIC DESCRIPTIONS
OF CORE SAMPLES
FROM DRILL HOLE CDD - 01
CUNDALEE CARBONATITE COMPLEX
FOR
WESTERN AREAS NL
Report 1

12th October 2000

**PATHFINDER EXPLORATION PTY LTD**
(INCORPORATED IN WA)
CONSULTING GEOLOGISTS & GEOCHEMISTS
MINERAGRAPHIC-PETROGRAPHIC SERVICES
Craig S. Rugless Ph.D. M.A.I.M.M.

DISCUSSION

The suite of samples submitted from diamond drill hole CDD - 01 show a close relationship between carbonatite veins and the ultramafic host.

Samples CDD - 01 393.0 m, 575.5 m & 578.2 m clearly confirm the presence of carbonatite veins or dykes with the presence of calcite associated with apatite and subordinate serpentinite (lizardite). The dominance of calcite indicates that the carbonatite is a calciocarbonatite that can be classified either as a sovite (coarse grained) or alvikite (medium to fine grained) based on the overall texture of the veins.

In contrast, the host ultramafic has preserved cumulate textures and includes a clinopyroxenite adcumulate (Samples CDD - 01 558.0 m & 578.2 m) and porphyritic harzburgite adcumulate (Samples CDD - 01 564.0 m & 575.5 m). The latter harzburgite samples have been pervasively serpentinised to antigorite, minor lizardite \pm chrysotile. Biotite and/or phlogopite occurs as a primary intercumulus phase in these samples. There is some evidence that carbonatisation and serpentinisation of the ultramafic host has accompanied the introduction of the carbonatite dykes (refer to Sample CDD 575.5 m).

The close spatial association of the cumulate ultramafic and the carbonatite dykes would appear to indicate a genetic link - ie an alkali intrusive complex. The association has been documented elsewhere including the Cummins Range carbonatite in the East Kimberley where carbonatite - sovite and beforite plugs and dykes occur in a clinopyroxenite to micaceous clinopyroxenite host (Andrew, 1990). A similar association is apparent for the Phalaborwa Complex in South Africa where the carbonatite pipe is closely associated with clinopyroxenites preserving cumulate and layering textures (Eriksson, 1989).

COMMENTS

Additional useful information could be gained from probing (SEM analysis) the Cundalee carbonatite and host ultramafic rocks. The SEM analysis could provide detailed information on the composition of the various components of the carbonatite dykes including carbonate, apatite and possible rare earth minerals, as well as important information including compositions of various ferromagnesian minerals including a possible alkali amphibole (oxyhornblende or kataphorite) occurring in the clinopyroxenite host.

REFERENCES

Andrew, R.L., 1990. Cummins Range carbonatite. In Hughes, F.E. ed. *Geology of the Mineral Deposits of Australia and Papua New Guinea*, pp. 711 - 713. Australian Institute of Mining and Metallurgy, Melbourne.

Eriksson, S.C., 1989. Phalaborwa: A Saga of Magmatism, Metasomatism and Miscibility. In Bell, K. ed. *Carbonatites Genesis and Evolution*, pp. 221 - 277.



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MINERAGRAPHIC AND PETROGRAPHIC DESCRIPTIONS

SAMPLE NO: CDD - 01 393.0 m

TYPE: Core

LOCATION: Cundalee "Carbonatite".

FIELD IDENTIFICATION: Possible carbonatite containing an apatite vein. The carbonate phase reacts moderately to strongly with dilute HCl.

SECTION TYPE: Polished Thin Section

CLASSIFICATION: *Calciocarbonatite or sovite containing abundant apatite and original ferromagnesian minerals including amphibole and possibly pyroxene. The assemblage has been incipiently retrogressed to serpentinite - micritic carbonate - Fe chlorite.*

DESCRIPTION:

MINERALS PRESENT:

Carbonate - calcite	45%	Opakes (2%):
Apatite	40%	Magnetite - dominant
Phlogopite	5%	Chalcopyrite - tr
Secondary green biotite		
to chlorite	1%	
Serpentinite - antigorite	2%	
- chrysotile	4%	
- lizardite	1%	
Opakes	2%	

TEXTURE:

A distinctive band of apatite apparent in hand specimen comprises a fine to coarse grained (up to 6 mm) anhedral mosaic of apatite associated with interstitial carbonate and coarse grained anhedral phlogopite plates. Platy phlogopite is interlayered with minor secondary green biotite to chlorite as a stress - induced retrograde phase. A portion of the matrix is dominated by a coarse grained mosaic of anhedral carbonate (calcite) that has been incipiently altered to secondary micritic carbonate along grain boundaries. Both the carbonate and apatite phases are intimately associated in this assemblage with apatite anhedral to subhedral occurring within the carbonate matrix and fine carbonate inclusions occurring some apatite poikiloblasts. Serpentinite aggregates in the matrix include cross - fibre chrysotile enveloping scaly lizardite as well as prismatic forms replaced by antigorite. The prismatic antigorite forms have locally preserved reticulate cleavage suggesting an amphibole precursor. A series of fibrous serpentinite - micritic carbonate veins have also penetrated the apatite - rich portion of the matrix.

In reflected light, anhedral magnetite grains are typically concentrated in the serpentinite aggregates in the matrix. Some magnetite grains appear to have been corroded by the secondary serpentinite - micritic carbonate phase. Fine anhedral to euhedral magnetite also occur within the carbonate component of the matrix. Similarly, fine to very fine grained anhedral chalcopyrite inclusions also occur within carbonate.

ALTERATION/METAMORPHISM:

The anhedral apatite and carbonate (calcite) mosaics occur within a primary igneous assemblage and are associated with platy phlogopite and ferromagnesian minerals including amphibole and possibly pyroxene. Subsequent retrograde alteration has replaced the ferromagnesian minerals by serpentinite (lizardite, antigorite & chrysotile). Micritic carbonate and secondary green biotite are interpreted to represent components of the retrograde assemblage. Well developed partings and fractures in apatite and interfering twin textures in carbonate confirm ongoing deformation although evidence of a strong metamorphic overprint is lacking.

COMMENTS:

The recognition of distinctive anhedral carbonate (calcite) intimately associated with apatite, phlogopite, along with original ferromagnesian minerals including amphibole and possibly pyroxene are consistent with a *carbonatite* classification. The composition and grain size of the carbonatite is consistent with a calciocarbonatite or sovite. The carbonatite has clearly been affected by ongoing metasomatism or autometasomatism. The presence of trace chalcopyrite is noteworthy.



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MINERAGRAPHIC AND PETROGRAPHIC DESCRIPTIONS

SAMPLE NO: CDD - 01 558.0 m

TYPE: Core

LOCATION: Cundalee "Carbonatite".

FIELD IDENTIFICATION: Medium grained pyroxenite exhibiting an adcumulate texture. Portions of the sample phase react moderately to strongly with dilute HCl.

SECTION TYPE: Polished Thin Section

CLASSIFICATION: *Adcumulate clinopyroxenite containing minor olivine and alkali amphibole (oxyhornblende) that has been incipiently metasomatically retrogressed to tremolite - carbonate - serpentinite - talc - secondary biotite.*

DESCRIPTION:

MINERALS PRESENT:

Clinopyroxene - augite	83%
Amphibole - oxyhornblende(?)	1%
- tremolite	3%
Olivine	tr
Carbonate - calcite	2%
Biotite	5%
Talc	2%
Serpentinite - antigorite	2%
Opagues	2%

Opagues (2%):

Magnetite - dominant
Chromite - tr
Pyrrhotite - minor
Pyrite - minor
Chalcopyrite - minor
Pentlandite - tr

TEXTURE:

A fine to medium grained anhedral clinopyroxene mosaic exhibits an adcumulate texture. Clinopyroxene - weakly pleochroic neutral to green to pink augite has preserved a fine reticulate cleavage texture. Pale brown to red - brown amphibole - oxyhornblende or kataphorite occurs interstitially. Relic polyhedral olivine (representing up to 4% of the matrix) has been replaced by serpentinite - antigorite and/or fibrous talc. The polyhedral pseudomorphs have preserved trace olivine. Distinctive, secondary turbid, fibrous biotite (hydrobiotite?) would also appear to have replaced original olivine. Retrograde alteration of olivine has been accompanied by incipient alteration of the clinopyroxene matrix to fibrous tremolite and patchy interstitial carbonate. Irregular carbonate veins associated with a fibrous biotite matrix cut the matrix.

In reflected light, the olivine pseudomorphs contain fine granular magnetite aggregates, often highlighting the original fractures in the host mineral. Fine magnetite has also penetrated cleavage partings in clinopyroxene. Fine (~70 µm), blebby chromite has also been preserved usually along olivine pseudomorph boundaries. Blebby sulphides also occur as an interstitial phase and comprise pyrrhotite exhibiting simple intergrowths with chalcopyrite. Trace pentlandite also occurs as an exsolved phase in pyrrhotite. Anhedral pyrite occurs in late carbonate veins cutting the matrix.

00030

ALTERATION/METAMORPHISM:

The intrusive assemblage is dominated by anhedral clinopyroxene - augite associated with olivine and an alkali amphibole - oxyhornblende. Retrograde metasomatic alteration has produced a tremolite - carbonate - serpentinite - talc - secondary biotite alteration assemblage possibly as an autometasomatic phase.

COMMENTS:

The clinopyroxene dominant assemblage confirms an adcumulate clinopyroxenite classification although olivine and alkali amphibole represent important accessories. The presence of alkali amphibole suggests that the lithology is potentially associated with an alkali intrusive complex that also includes ultramafic rocks. The Cummins Range Carbonatite in the East Kimberley is enclosed by pyroxenite and mica pyroxenite.



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MINERAGRAPHIC AND PETROGRAPHIC DESCRIPTIONS

SAMPLE NO: CDD - 01 564.0 m

TYPE: Core

LOCATION: Cundalee "Carbonatite".

FIELD IDENTIFICATION: Medium grained, serpentinitised peridotite adcumulate with distinctive, equant (ortho)pyroxene phenocrysts. Late serpentinite - carbonate veins react moderately to strongly with dilute HCl.

SECTION TYPE: Polished Thin Section

CLASSIFICATION: *Pervasively serpentinitised (antigorite - minor chrysotile) adcumulate harzburgite containing porphyritic orthopyroxene, original intercumulus amphibole (?) and biotite.*

DESCRIPTION:

MINERALS PRESENT:

Serpentinite - antigorite	81%
- chrysotile	5%
Biotite	4%
Orthopyroxene - bronzite	4%
Carbonate - calcite	2%
Opagues	4%

Opagues (4%):

Chromite - dominant (2.5%)
Magnetite - minor (1%)
Pyrite - minor (0.5%)

TEXTURE:

The original matrix was dominated by olivine locally preserving closely packed polyhedral forms that have been pervasively serpentinitised. The serpentinite matrix is dominated by antigorite. A minor intercumulus phase has been replaced by fibrous chrysotile and may represent original amphibole based on the local preservation of reticulate cleavages. Medium to coarse grained (1 to 4 mm), prismatic orthopyroxene - bronzite occurs as cumulate phase in the matrix and has preserved abundant inclusions. The orthopyroxene phenocrysts have been progressively replaced by antigorite (bastite). Coarse grained biotite plates, as a primary phase, locally envelop chrysotile pseudomorphs interpreted to be after original amphibole. A series of late micritic to sparry carbonate - fibrous chrysotile veins cut the matrix.

In reflected light, fine residual chromite, typically occurs as equant forms and probably represents a cumulate phase. Chromite has also penetrated along grain boundaries and can highlight relic polyhedral forms. Fine subhedral magnetite is also distributed through serpentinitised matrix. Fine grained pyrite also occurs in the matrix and has penetrated along fractures. Pyrite is associated with late carbonate - chrysotile veins cutting the matrix.

ALTERATION/METAMORPHISM:

The adcumulate olivine - rich intrusive has been pervasively serpentinitised to an antigorite - chrysotile assemblage. Similarly original orthopyroxene has been replaced by antigorite. A series of carbonate - chrysotile veins represent a late stage retrograde phase. Evidence of high grade metamorphism is lacking.

00032

COMMENTS:

The original adcumulate assemblage was dominated by cumulate olivine associated with porphyritic cumulate orthopyroxene - bronzite and possibly amphibole as an intercumulus phase. Platy biotite also appears to have represented part of the original assemblage. The assemblage can be classified as a harzburgite although the presence of intercumulus amphibole (?) and biotite can be regarded as anomalous. Chromite also represents a significant accessory and may have implications for the presence of PGMs.



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MINERAGRAPHIC AND PETROGRAPHIC DESCRIPTIONS

SAMPLE NO: CDD - 01 575.7 m

TYPE: Core

LOCATION: Cundalee "Carbonatite".

FIELD IDENTIFICATION: Medium grained, serpentinised peridotite adcumulate. The ultramafic host would appear to be cut by a late stage vein represented by micritic carbonate containing granular apatite and platy biotite occurring as a selvage. The late carbonate - apatite vein reacts strongly with dilute HCl.

SECTION TYPE: Polished Thin Section

CLASSIFICATION: *Pervasively serpentinised (antigorite - lizardite) adcumulate harzburgite originally containing intercumulus orthopyroxene, that has been invaded by a micritic carbonate - serpentinite - apatite - original amphibole assemblage interpreted to have carbonatite affinities.*

DESCRIPTION:

MINERALS PRESENT:

Host:		Vein:		Opagues (3 to 6%):
Serpentinite - lizardite	24%	Carbonate - calcite	45%	
- antigorite	6%	Serpentinite - lizardite	10%	Chromite - dominant
- chrysotile	3%	Apatite	38%	Magnetite - minor
Carbonate - calcite	61%	Phlogopite	4%	Pentlandite - tr (0.5%)
Opagues	6%	Opagues	3%	Vaesite (?) - tr

TEXTURE:

The ultramafic host has been pervasively serpentinised and carbonated. Original polyhedral olivine textures have been locally outlined by a serpentinised intercumulus phase containing abundant Fe - oxide inclusions and probably representing original orthopyroxene. The original adcumulate olivine matrix now exhibits a distinctive texture where cores have been replaced by sparry carbonate associated with platy lizardite and rimmed by fibrous antigorite. Lizardite is typically dusted by fine granular Fe - oxide - magnetite. Platy phlogopite occurs as a minor intercumulus phase. A series of late, anastomosing fibrous chrysotile \pm carbonate veins cut the matrix and have post-dated lizardite veins.

The carbonate - rich portion of the section is represented by micritic carbonate intimately mixed with serpentinite - probably lizardite and developing as a mosaic. Anhedral apatite occurs as anhedral to subhedral grains in the micritic carbonate - serpentinite matrix and grades into an anhedral apatite aggregate or segregation. Platy phlogopite inclusions also occur within the micritic carbonate - serpentinite matrix. The contact with host ultramafic is defined by the presence of coarse grained prismatic forms that have been pseudomorphed by antigorite dusted by Fe - oxides and may represent original amphibole. The amphibole pseudomorphs contain apatite and phlogopite inclusions. Original prismatic olivine xenocrysts have been replaced by lizardite and network antigorite and contain anhedral apatite inclusions, occur within the micritic carbonate - serpentinite - apatite assemblage.

00034

In reflected light, fine residual chromite is typically associated with phlogopite as an intercumulus phase in the ultramafic host. Some chromite grains contain numerous sulphide inclusions that comprise vaesite (?) and pentlandite exhibiting exsolution textures. A coarser pentlandite grain (0.5 mm) is also associated with chromite. Fine singular pentlandite and pyrrhotite grains are distributed through the ultramafic host. Fine anhedral magnetite defines grain boundaries and relic cleavage traces.

Magnetite also occurs as an accessory within the micritic carbonate - serpentinite - apatite assemblage and contains apatite inclusions.

ALTERATION/METAMORPHISM:

The olivine adcumulate intrusive host has been initially serpentinised (antigorite) and subsequently overprinted by the carbonate - lizardite assemblage that may have accompanied the micritic carbonate - serpentinite - apatite (carbonatite) assemblage. A series of late carbonate - chrysotile veins cut both the ultramafic and carbonatite assemblages.

COMMENTS:

The original adcumulate ultramafic host was dominated by cumulate olivine associated with intercumulus orthopyroxene and minor biotite. The assemblage can be classified as a harzburgite. Chromite also represents a significant accessory and may have implications for the presence of PGMs.

The distinctive micritic carbonate - serpentinite - apatite assemblage is similar to Sample CDD - 01 393.0 m and would appear to have carbonatite affinities. The contact with the host ultramafic is marked by the development of coarse bladed and prismatic crystals interpreted to have been original amphibole.



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MINERAGRAPHIC AND PETROGRAPHIC DESCRIPTIONS

SAMPLE NO: CDD – 01 578.2 m

TYPE: Core

LOCATION: Cundalee “Carbonatite”.

FIELD IDENTIFICATION: Medium grained, serpentinised peridotite adcumulate in contact with a serpentinite – carbonate vein. The serpentinite - carbonate vein reacts strongly with dilute HCl.

SECTION TYPE: Polished Thin Section

CLASSIFICATION: *Serpentinised (antigorite – lizardite) adcumulate clinopyroxenite that has been invaded by a carbonate – serpentinite – apatite – biotite - original amphibole assemblage interpreted to have carbonatite affinities.*

DESCRIPTION:

MINERALS PRESENT:

Host:

Serpentinite - lizardite	19%
- antigorite	63%
- chrysotile	2%
Clinopyroxene – augite	5%
Amphibole - oxyhornblende	1%
- tremolite	1%
Biotite	4%
Carbonate - calcite	2%
Opaques	3%

Vein:

Carbonate – calcite	71%
Serpentinite – lizardite	11%
- chrysotile	19%
Apatite	3%
Biotite	6%
Opaques	tr

Opaques (tr to 3%):

Chromite - dominant
Magnetite - minor
Chalcopyrite - tr
Pyrrhotite - tr
Pyrite - tr

TEXTURE:

The ultramafic host exhibits a similar adcumulate pyroxenite composition described in Sample CDD – 01 558.0 m. Fine to medium grained clinopyroxene - augite has been locally preserved and has been progressively replaced by scaly serpentinite – antigorite. Platy lizardite has replaced an intercumulus phase – probably amphibole and/or biotite that has been locally preserved. Fine grained, brown pleochroic, alkali amphibole – oxyhornblende(?) also occurs as an intercumulus phase. Minor bladed tremolite rims clinopyroxene and, along with minor sparry carbonate, represents a retrograde phase.

The vein apparent in hand specimen comprises coarse grained carbonate closely associated with serpentinite including lizardite exhibiting distinctive spheroidal textures as well as fibrous chrysotile that exhibits cockade textures with carbonate. Fine to medium grained, anhedral to subhedral apatite both as singular grains and aggregates occurs as inclusions within the carbonate matrix. Similarly, coarse grained platy biotite occurs as inclusions within the carbonate matrix and has been concentrated along the contact with the pyroxenite host. Prismatic pseudomorphs after original amphibole occurring in the carbonate – serpentinite vein now comprise lizardite and carbonate.

In reflected light, fine residual chromite occurs within the clinopyroxenite host and has been corroded by serpentinite along the contact with the carbonate – serpentinite – apatite vein. Fine anhedral chalcopyrite is distributed through the matrix and exhibits simple intergrowths with

trace pyrrhotite. Pyrite has been remobilised along veins and fractures. Fine grained magnetite occurs along cleavage traces in clinopyroxene.

Trace magnetite and submicroscopic sulphides occur within the carbonate - serpentinite - apatite (carbonatite) vein.

ALTERATION/METAMORPHISM:

The clinopyroxene adcumulate intrusive host contained intercumulus biotite and alkali amphibole and has been progressively serpentinised (antigorite - lizardite) and altered (tremolite - carbonate) as an alteration selvage to the carbonatite vein. The spherulitic and cockade textures preserved in the carbonate - serpentinite - apatite vein support a relatively low temperature assemblage that has been little affected by metamorphism. Stress twinning in carbonate confirms ongoing deformation.

COMMENTS:

The dominant clinopyroxene composition indicates a similar adcumulate clinopyroxenite classification as described for Sample CDD - 01 558.0 m. The presence of intercumulus biotite and alkali amphibole is also comparable with this sample. The clinopyroxenite host has been clearly cut by the carbonate - serpentinite - apatite - biotite - original amphibole vein that is interpreted to have carbonatite affinities and would appear to have accompanied serpentinisation of the host.



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MINERAGRAPHIC AND PETROGRAPHIC DESCRIPTIONS

SAMPLE NO: CDD - 01 597.4 m

TYPE: Core

LOCATION: Cundalee "Carbonatite".

FIELD IDENTIFICATION: Fine to medium grained, serpentinised peridotite adcumulate with distinctive, equant (ortho)pyroxene phenocrysts. A series of magnetite veins parallel a weak schistosity. Carbonate in fractures react moderately to strongly with dilute HCl.

SECTION TYPE: Polished Thin Section

CLASSIFICATION: *Pervasively serpentinised (antigorite - minor chrysotile) adcumulate harzburgite containing porphyritic orthopyroxene. The assemblage exhibits a weak schistosity.*

DESCRIPTION:

MINERALS PRESENT:

Serpentinite - antigorite	87%
- chrysotile	3%
Biotite	1%
Orthopyroxene - bronzite	3%
Carbonate - calcite	1%
Opaques	5%

Opaques (5%):

Chromite - dominant (3%)
Magnetite - subordinate (1.5%)
Pyrite - minor (0.5%)
Chalcopyrite - tr

TEXTURE:

Similar to Sample CDD - 01 564.0 m with presence of indistinct closely packed polyhedral forms representing original olivine that has been pervasively serpentinised. The serpentinite matrix is dominated by antigorite with partings and fractures infilled by fine granular Fe - oxide (opaque). Fine platy biotite occurs as a minor intercumulus phase. The distinctive phenocrysts, apparent in hand specimen, have locally preserved dark brown - coloured orthopyroxene - bronzite that has been progressively serpentinised to bastite. Fine reticulate cleavage traces have been preserved. The orthopyroxene phenocrysts represent a cumulate phase although there are some cusped grain boundaries suggesting a late cumulate event. An intercumulus phase has been replaced by carbonate rimmed by fibrous chrysotile.

In reflected light, fine residual chromite exhibits cusped grain boundaries and represents a late cumulus to intercumulus phase. Chromite is locally rimmed by ferrochromite that also occurs as a series of parallel stringers paralleling a weak schistosity in the matrix. Fine granular magnetite occurs along the partings and fractures in the serpentinite matrix. Fine, anhedral pyrite is distributed through the matrix and exhibits simple intergrowths with trace chalcopyrite.

ALTERATION/METAMORPHISM:

The olivine adcumulate intrusive has been pervasively serpentinised to an antigorite - minor chrysotile assemblage. A series of ferrochromite veins parallel a weak schistosity outlined by typical serpentinite network textures. A late fibrous chrysotile vein subparallels the schistosity. Evidence of high grade metamorphism is lacking.

PHOTOMICROGRAPHS

00039

COMMENTS:

The original adcumulate assemblage was dominated by cumulate olivine associated with porphyritic cumulate orthopyroxene - bronzite and minor intercumulus platy biotite. Unlike the other samples described the serpentinite assemblage exhibits a weak schistosity that has been penetrated by a series of ferrochromite veins. The presence of late cumulus chromite and ferrochromite as significant accessories may have implications for the presence of PGMs.



Plate 1A Sample CDD - 01 393.0 m showing platy phlogopite (ph) occurring in a serpentine - minor carbonate (carb) matrix. Biotite is interlayered with chlorite (chl) as a stress - induced retrograde alteration phase. Bladed apatite (ap) occurs within the fibrous chrysotile (chy) matrix. Crossed polars. Field of view - 3.6 mm.



Plate 1B Another view of the sample phlogopite (phl - coloured) enveloping anhedral apatite within the carbonatite vein. Carbonate (carb) occurs interstitially. Crossed polars. Field of view - 3.6 mm.

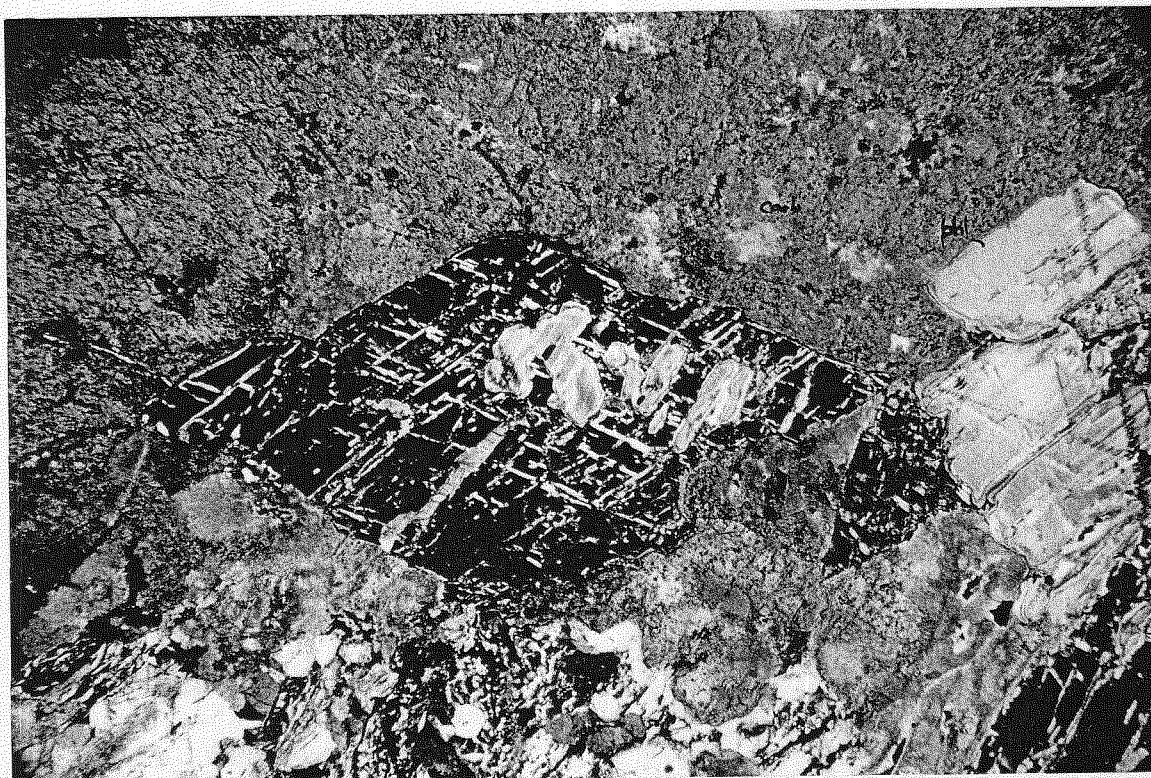


Plate 2A Sample CDD - 01 393 m showing prismatic originally amphibole pseudomorphed by serpentinite (dark) in cloudy carbonate matrix. Platy phlogopite (coloured) represents a primary phase. Crossed polars. Field of view - 3.6 mm.

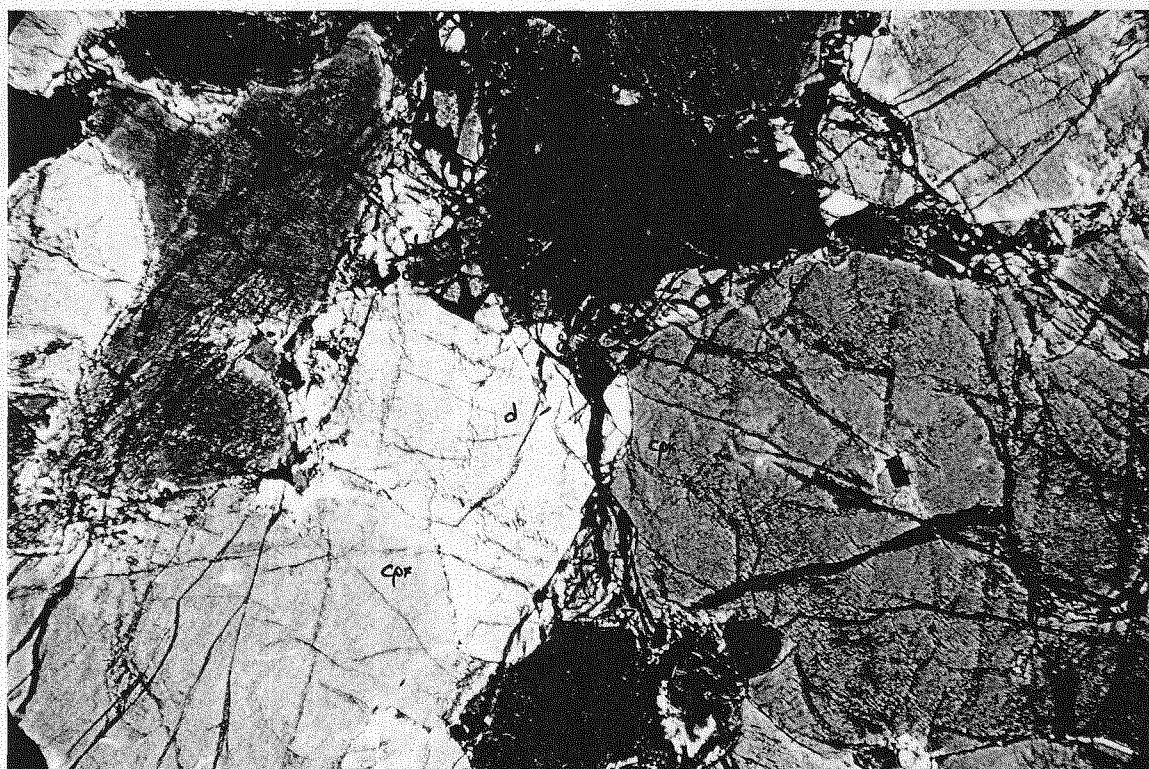


Plate 2B Sample CDD - 01 558 m fine polyhedral olivine (ol) that would appear to have been replaced by dark hydrobiotite (bt) in a cumulate clinopyroxene - augite (cpx) matrix. Clinopyroxene has preserved an adcumulate texture. Crossed polars. Field of view - 3.6 mm.

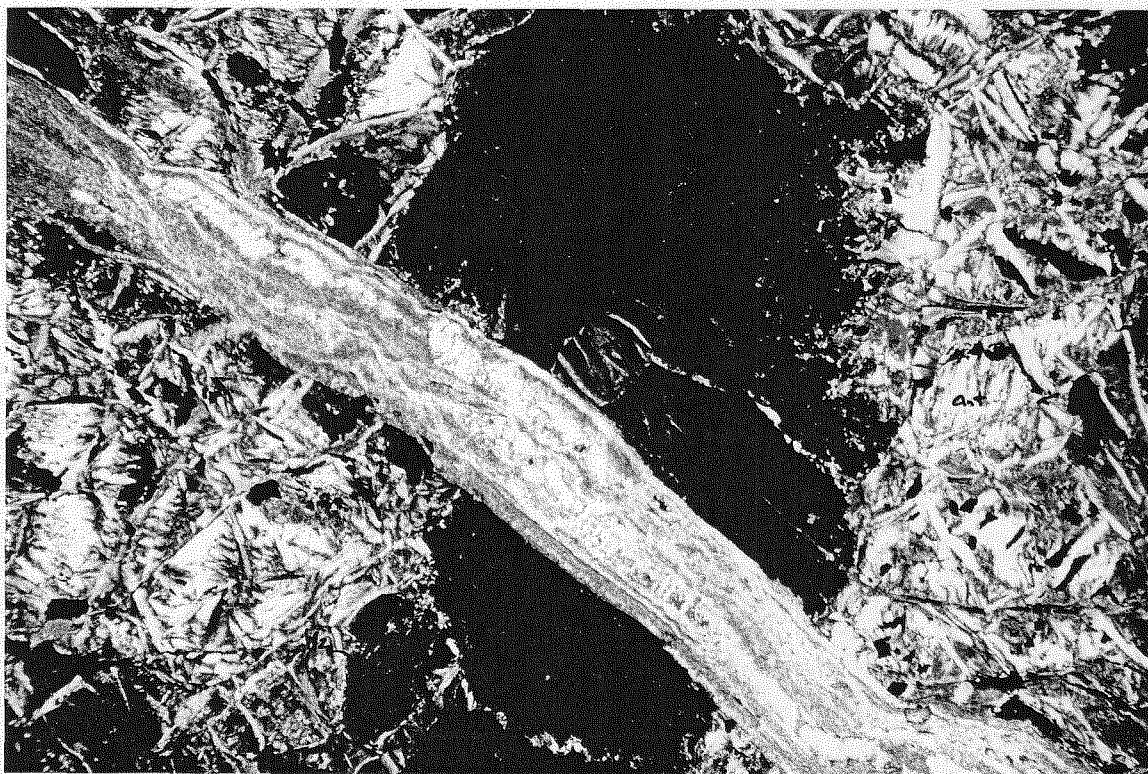


Plate 3A Sample CDD - 01 564.0 m showing dark bastite, after original orthopyroxene (bronzite) occurring in a serpentinite - antigorite (ant) matrix. The antigorite matrix has locally preserved polyhedral forms after original olivine. A late carbonate - fibrous chrysotile vein cuts the assemblage. Crossed polars. Field of view - 3.6 mm.

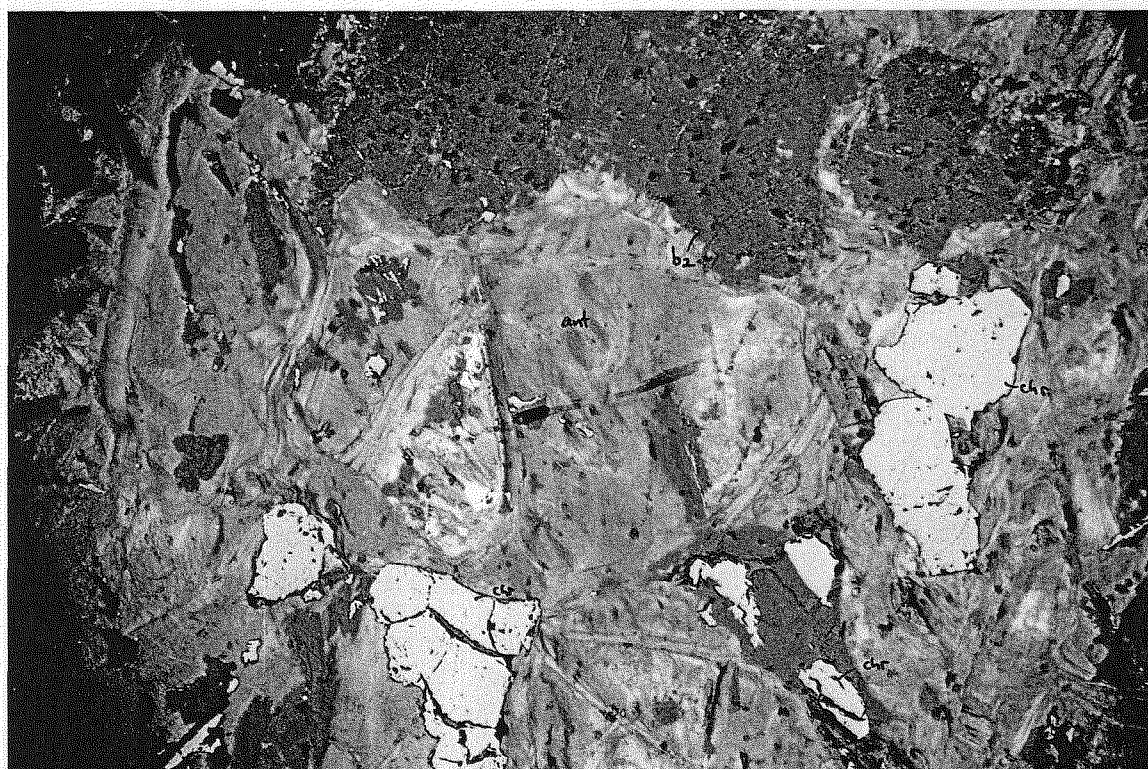


Plate 3B Sample CDD - 01 564.0 m showing residual chromite (chr), locally preserving cusped grain boundaries outlining indistinct olivine polyhedral forms that have been replaced by serpentinite - antigorite (ant). Dark bastite, after original orthopyroxene - bronzite phenocrysts. Crossed polars under reflected and transmitted light. Field of view - 3.6 mm.

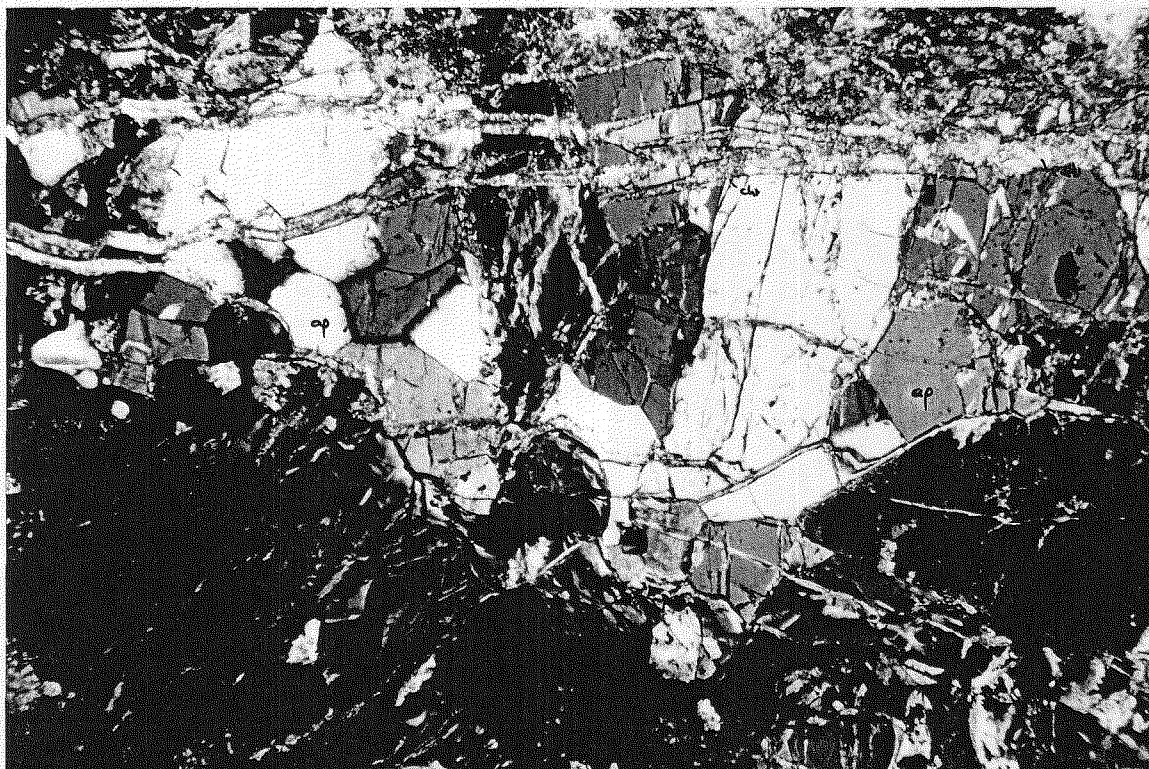


Plate 4A Sample CDD - 01 575.7 m showing an anhedral mosaic of apatite (ap) containing prismatic serpentinite pseudomorphs, after original amphibole. The serpentinite matrix has corroded the apatite lens that has also been cut by a series of anastomosing fibrous chrysotile - carbonate (carb) veins. Crossed polars. Field of view - 3.6 mm.

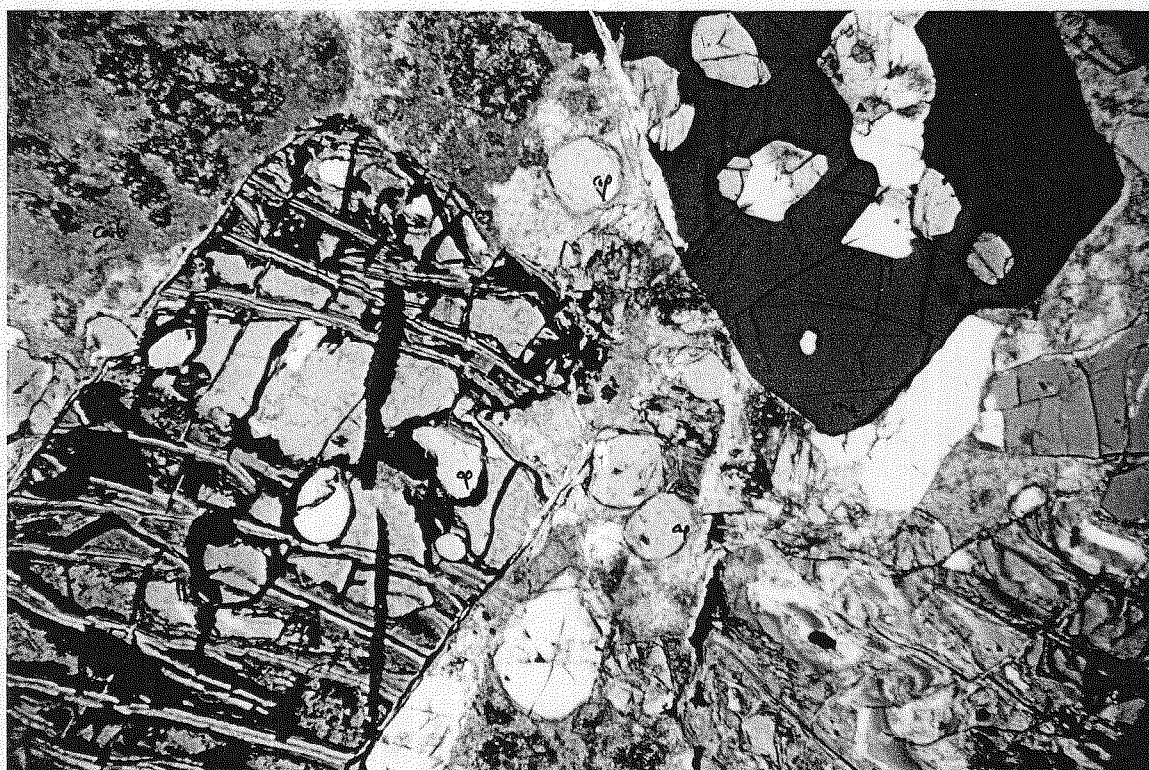


Plate 4B Another view of the sample showing serpentinitised equant forms - possibly an original olivine xenocryst, and polygonal apatite (ap) occurring in a micritic carbonate - serpentinite matrix. Apatite also as inclusions in a magnetite (ma) grain. Crossed polars under transmitted and reflected light. Field of view - 3.6 mm.



Plate 5A Sample CDD - 01 578.2 m showing the contact between the carbonatite vein and the serpentinised clinopyroxene adcumulate host. Platy biotite has developed along the vein selvage. The ultramafic host contains abundant Fe - oxide inclusions (opaque) and has preserved the closed packed polygonal outlines of original adcumulate clinopyroxene. Crossed polars. Field of view - 3.6 mm.

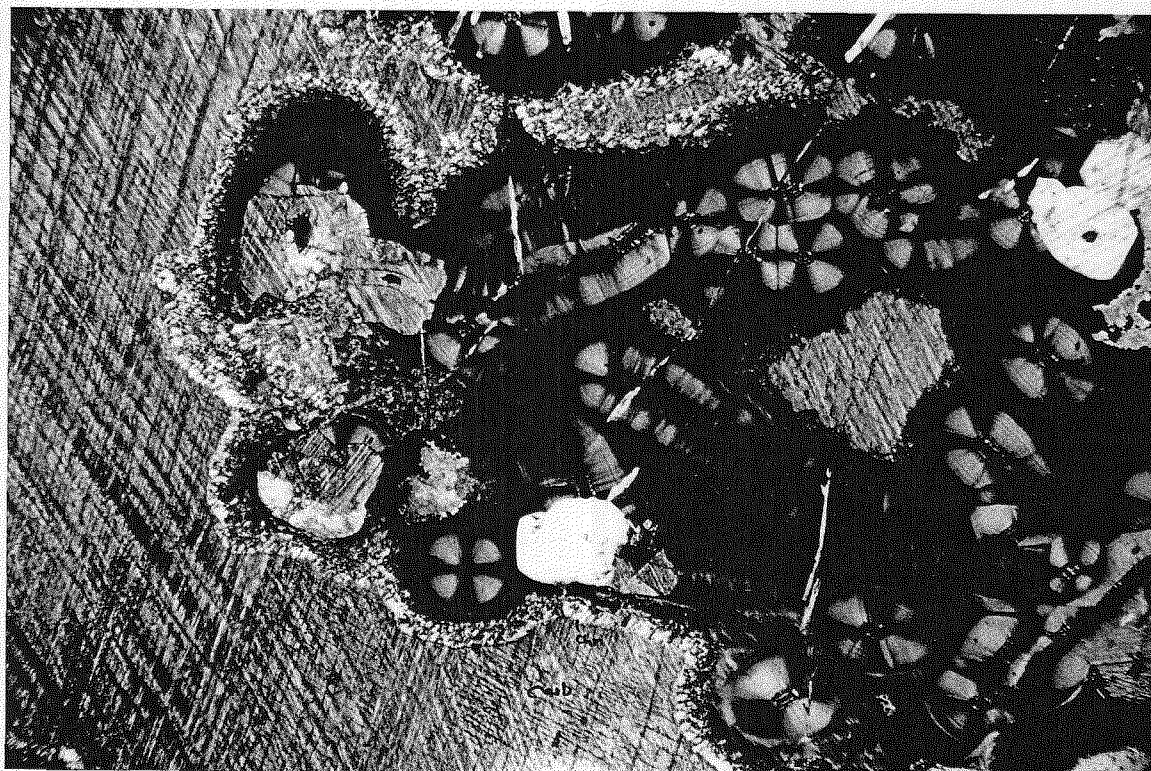


Plate 5B Another view of the sample showing serpentinite including spheroidal - textured lizardite, rimmed by fibrous chrysotile, replacing the carbonate host. The carbonate host exhibits interfering stress twinning. Crossed polars. Field of view - 3.6 mm.

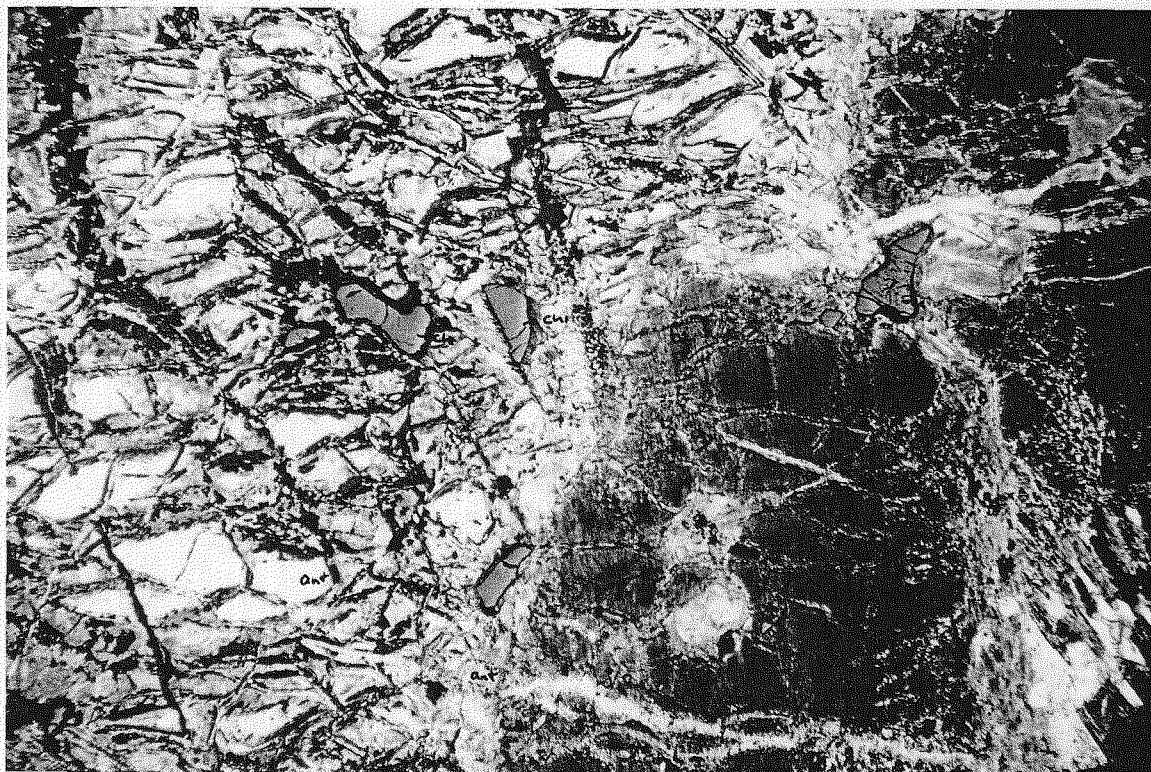


Plate 6A Sample CDD - 01 597.4 m showing dark brown bastite after orthopyroxene - bronzite (bz) in a serpentinised original olivine adcumulate host. Residual chromite, exhibiting cusped grain boundaries, has been preserved in the matrix. Crossed polars under reflected and transmitted light. Field of view - 3.6 mm.



Plate 6B Another view of the sample clearly showing reticulate cleavage textures preserved by Fe - oxide inclusions in the dark brown orthopyroxene - bronzite (bz) phenocryst within the serpentinised (antigorite - ant) adcumulate olivine host. Crossed polars. Field of view - 1.8 mm.

Appendix 4

Extracts from Consultants Report on Cundeelee Complex

LYNDHURST ENTERPRISES PTY LTD

ABN 33 628 596 931

47 Murray Rd Bicton WA 6157

REPORT ON THE GEOLOGY OF THE
CUNDEELEE INTRUSIVE COMPLEX,
CUNDEELEE SHEET SH51-11
WESTERN AUSTRALIA

by

John L. Stockley, C.P. [Geo]
Perth, WA

00048

1. Introduction:

The Cundeelee Intrusive Complex is located on the 1:250,000 scale Cundeelee sheet SH51-11 at about latitude 30°30'S, longitude 123°15'E in flat, open country 25km northwest of Cundeelee Mission.

Access to the area is limited: the main route is the Transline road to Zanthus and then by track 40km northwest to Cundeelee, an alternative route [preferred by Western Areas] is through Pinjin Station northeast of Kurnalpi and then east & south down the "Tojo Highway" onto the Cundeelee sheet.

The area is held under an acquisition agreement by Western Areas NL as E28/522 covering 104 square km.

This writer was contracted by Western Areas NL to review the geology of the Complex, examine the drill data, and to make recommendations as to future work. Part of this evaluation includes comparisons of Cundeelee with other ultramafic intrusive complexes world wide which this writer has some familiarity with: mainly examples in Sweden, Finland, and Canada.

In this report the acronym PGE stands for platinum group element (or elements) and PGM stands for platinum group mineral (or minerals)

2. Previous Work:

The Western Areas NL prospectus contains a good summary of previous work at Cundeelee [see page 67]: the most important work carried out was that of Union Oil during 1984 to 1986. Union Oil drilled diamond hole PC2 into pre-Permian basement rocks at 557m below surface and continued this hole another 43m to a final depth of 600m.

As stated in the prospectus "lithologies encountered included peridotite, dunite, magnetite pyroxenite, and brecciated syenitic picrites----

Mineralisation encountered in the pre-Permian basement in hole PC2 included: "sulphides up to 15%, variably developed in association with carbonate-chlorite veining, include pentlandite, pyrite, pyrrhotite, sphalerite, and chalcopyrite----

The above results substantiate earlier work carried out by the Geological Survey of Western Australia: Bunting & Van de Graaf [1977] interpret a buried "carbonatite, alkaline gabbro, or ultramafic plug" at Cundeelee [see map section]. These authors indicate on page 13 in the plan showing the Precambrian basement interpretation, a 10km diameter "intrusive plug-circular magnetic anomaly with concentric structure" located at the position of hole PC2-drilled 9 years later.

The 1977 mapping picked up the presence of mafic dykes at Kalin Granite Rock: "the main rock type is an extremely altered gabbro---a few relict cores of clinopyroxene remain---the dykes have fine grained margins, in part doleritic". Bunting & Van de Graaf interpret the age of the mafic dykes to be Lower Proterozoic, contemporaneous with the Widgiemooltha Dyke Suite.

In 1997 BHP carried out a detailed review of the Cundeelee Intrusive Complex: this work included analyses of the Union Oil drill core, detailed petrography and mineragraphy, reinterpretation of the airborne magnetic data acquired by Union Oil, and completion of a detailed gravity survey over the complex.

The BHP geochemical work highlighted the presence of very anomalous platinum group elements [PGE] at Cundeelee:

up to 89ppb Pt, 81ppb Pd, and 70ppb Au [ALS data, 1996]

associated with anomalous nickel [up to 1800ppm Ni], copper [1000ppm], zinc [1500ppm], and phosphorus [up to 1.5%P].

Mineragraphic work by BHP in 1997 reported a veinlet of native Ag at 558.5m in sericitised carbonate serpentine chlorite veined biotite syenite. Whole rock multi-element analyses by BHP indicated total Fe+Mg of around 25wt% [equivalent to whole rock Fe O +MgO contents of ~40% i.e. picrite composition].

3. Geology:

The airborne magnetic survey and ground gravity data indicate that the Cundeelee Intrusive Complex is a circular shaped feature with an overall diameter of about 10km [about the same size as the Owendale Intrusive Complex at Fifield in NSW-see Figure]

The intrusive complex is located on a prominent linear magnetic feature, trending northeast-southwest, termed the Cundeelee Fault. This structure is sub-parallel to the northwestern margin of the Albany-Fraser Mobile Belt, which is a granulite-granite-gneiss terrain on the southwestern margin of the Yilgarn Craton.

Also cutting through the complex is a series of northwest trending faults which are well shown on the aeromagnetic data [see Figure 1]. The geological interpretation of the complex is shown in Figure 2. This interpretation is based on the ground truth of the two diamond drill holes which have intersected the pre-Permian basement: Union Oil hole PC2 and Western Areas hole CCD01.

Overlying the Cundeelee Intrusive Complex is a thick sequence of fluvio-glacial sedimentary rocks of the Permian Paterson Formation. Vertical hole CCD01 intersected the basement at 551.40m: the contact was a knife edged one between upper grey, massively bedded tillite with quartzite-granite erratics and lower, fresh, nonfoliated, layered cumulate textured ultramafic rock.

Hole PC2 also intersected the basement at a similar depth, pieces of the core seen in the Western Areas office consist of layered, cumulate textured clinopyroxenite or picrite. Serpentinisation was well developed.

The interpretive geology of the complex shows five major intrusive units:

- Unit A reversely magnetically polarised core of layered clinopyroxenite intrusion which has undergone retrograde carbonate-phlogopite-apatite alteration [based on PC2 and CCD01 observations]
- Unit B normally magnetically polarised ultramafic-mafic mass
- Unit C marginal ring dyke or lopolith ultramafic intrusion
- Unit D moderately magnetic ultramafic mass
- Unit E low magnetic felsic-intermediate intrusion

Logging of hole CCD01 by this writer [Stockley, 2001] confirmed the detailed observations of the Western Areas logging, carried out by Mr Gordon Kelly: essentially a thick, cyclically layered, sequence of clinopyroxenite. Cumulate textures occur throughout, and the layered sequence has been pervasively altered by a propylitic assemblage consisting of dark green chlorite+magnetite, together with a potassic phase consisting of biotite+amphibole.

Notes on the logging are given in Appendix 2, together with the detailed logging of Kelly [2000]. Observations and conclusions drawn from this writer's logging are listed below:

- the core is a section through a layered ultramafic [picritic] complex-mainly cumulate textured clinopyroxenite;
- multiphase ultramafic intrusive activity is evident: cross cutting micropyroxenite dykes occur, together with peridotite/olivinite bodies;
- serpentinised, "pseudo-breccia" pegmatoidal zones occur;
- ultramafic, magnetite rich pegmatoid zones occur;
- retrograde, low temperature, calcite+phlogopite+apatite+/-chalcopryite alteration occurs;
- pervasive magnetite+chlorite+chalcopryite alteration predates the retrograde carbonate phase;
- overall the alteration-mineralisation resulted from a low sulphur fugacity system [presence of magnetite and pyrrhotite]; the retrograde low T alteration was from an oxidised, CO rich, hydrous fluorine bearing fluid [presence of pink-purple apatite];
- the Cunderlee Intrusive Complex is not a carbonatite [e.g. Mt Weld].

The above observations are backed up by detailed petrographic work carried out by Rugless [2000]:

- 564m: serpentinised adcumulate harzburgite containing porphyritic orthopyroxene, original intercumulus amphibole and biotite; 2.5vol% chromite, 1vol% magnetite, 0.5vol% pyrite. Bronzite occurs in the cumulate phase. Evidence of high grade metamorphism is lacking.

- carbonate+serpentine+apatite+biotite alteration. Rock consists of augite-amphibole-biotite with fine grained intercumulus amphibole. Fine grained residual chromite occurs within the clinopyroxenite host, together with fine anhedral chalcopyrite in the matrix as simple intergrowths with trace pyrrhotite.
- 597m: adcumulate harzburgite with orthopyroxene: contains up to 3vol% bronzite, 3vol%chromite, 1.5vol% magnetite, 0.5vol% pyrite, trace chalcopyrite. The biotite rich intercumulus phase has been replaced by carbonate rimmed by fibrous chrysotile; chromite grains are rimmed by ferrochromite [from Rugless 2000].

Appendix 5

Form 5 - Operations Report

Mining Act 1978
(Secs. 51, 68, 70H, 82 and 115A)
(Regs. 16, 22, 23E, 32, 96B and 96C)

OPERATIONS REPORT – EXPENDITURE ON MINING TENEMENT

(To be completed in accordance with instructions)

Annual:	<input checked="" type="checkbox"/>	Final:	<input type="checkbox"/>
Tenement Type:	EXPLORATION LICENCE		Number: 28 / 522
Reporting Period:	From:	23 / 12 / 1999	To: 22 / 12 / 2000

Itemize
activities and
expenditure on
Attachment 1

Evidence of
lodgement to
be provided

MINERAL-EXPLORATION AND/OR MINING ACTIVITIES**A. MINERAL-EXPLORATION ACTIVITIES:**

\$ 109,810

B. MINING ACTIVITIES:

\$ —

C. ABORIGINAL HERITAGE SURVEYS:

\$ —

*Copy to be lodged with the Registrar of Aboriginal Sites.***D. ANNUAL TENEMENT RENT AND RATES:**

\$ 4,124

E. ADMINISTRATION/OVERHEADS:

\$ 11,393

F. (OTHER) LAND ACCESS/NATIVE TITLE COSTS:

\$

\$ —

*Jointly not to exceed 20% of the minimum
commitment or expenditure on the activities
shown above, whichever is the greater (see
instructions).*

TOTAL EXPENDITURE:

\$ 125,327

N.B. Full details and results of mineral-exploration activities must be submitted in the annual mineral-exploration report in accordance with section 115A of the Act and the guidelines published under regulation 96B.

OR

Itemize
activities and
expenditure on
Attachment 2

PROSPECTING AND/OR SMALL SCALE MINING ACTIVITIES**TOTAL EXPENDITURE:**

\$ —

(A to E ON ATTACHMENT 2)

A copy of this page of the Operations Report and Attachment 1 titled "Summary of Mineral-Exploration and/or Mining Activities" or Attachment 2 titled "Summary of Prospecting and/or Small Scale Mining Activities" may be obtained by any person on the payment of the prescribed fee in accordance with regulation 96(3).

Signed & noted 15.01.01

Full name and address of holder/s.

NAME:

ADDRESS:

Full name and address of operator/manager (if mining tenement under option or joint venture).

NAME:

ADDRESS:

List here details of the related annual mineral-exploration report.

Mineral-exploration report (for single tenement)

Title:

Combined mineral-exploration report (for group of two or more tenements)

Title:

Combined reporting number for tenement group:

Combined reporting date for group:

I certify that the information on pages 1 and 2 and in Attachment 1 "Summary of Mineral-Exploration and/or Mining Activities" or Attachment 2 "Summary of Prospecting and/or Small Scale Mining Activities" constitutes a true statement of the operations carried out and monies expended on this mining tenement during the reporting period specified.

Signature of holder or agent

Date:

(Tick appropriate box and show expenditure. If more than one commodity sought, tick appropriate boxes and allocate expenditure for each one).

MINERAL COMMODITY SOUGHT ON TENEMENT

<input type="checkbox"/> Gold	\$	<input type="checkbox"/> Diamond	\$
<input type="checkbox"/> Iron ore	\$	<input type="checkbox"/> Mineral Sands	\$
<input type="checkbox"/> Nickel/Cobalt	\$ 125,327	<input type="checkbox"/> Other (specify)	\$
<input type="checkbox"/> Copper/Lead/Zinc/Silver	\$		

This page is not to be copied in conjunction with regulation 96(3).

Note:

ATTACHMENT 1 — SUMMARY OF MINERAL-EXPLORATION AND/OR MINING ACTIVITIES

OR

ATTACHMENT 2 — SUMMARY OF PROSPECTING AND/OR SMALL SCALE MINING ACTIVITIES

- (A) The attachments to the Form 5 are to provide a summary of the activities carried out and the cost of each activity. For Attachment 1 you may either use the pro-forma sheet or a separate sheet with the suggested headings as shown under 4(A) and (B) in the instructions. For Attachment 2 the pro-forma sheet available from the Department must be used.
- (B) A copy of Attachment 1 or 2 will be provided together with a copy of the front page of the Form 5 to any person on payment of the prescribed fee.

This operations report received

DEPARTMENT OF MINERALS & ENERGY

12 JAN 2001

MINERAL TITLES

HEAD OFFICE

00055

SUMMARY OF EXPLORATION ACTIVITIES: ATTACHMENT 1A

Tenement Type : Exploration Licence

Number: E28/522

Reporting Period: from 23 December 1999 to 22 December 2000

Mineral Exploration Activities

Total

\$

Geological Activities

Exploration Data Review & Planning	2750
Drilling Supervision	9312
Logging & sampling	
Reporting	618
Petrography	1660

Total	14340
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Geochemical assays samples	3866
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Geophysical and data processing	714
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Core Drilling Costs	78034
site access	1445

Field Costs

Food and Accommodation	831
Vehicle costs	4366
Other	362
Field supplies	2275
Travel	1069
Rehabilitation	2508

Total	109,810
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