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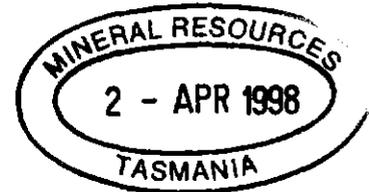
ANNUAL REPORT - EL 28/88

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Rio Tinto Exploration Pty. Limited

A.C.N. 000 057 125

A member of the Rio Tinto Group



**Ninth Annual Report
For The Period Ending 9 November 1997
Queenstown SK55-05
EL 28/88 Zeehan 1, Tasmania**

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| MINERAL RESOURCES |
| EL 28/88 |
| 2 - APR 1998 |
| See folio 33 |

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Rio Tinto Report No. 23738

98-4136

ANNUAL REPORT - EL 28/88
RIO TINTO-ZEEHAN
SAJ RUSSELL

Abstract

Zeehan 1, EL 28/88 covers 29 km² located near Zeehan on the Tasmanian W coast (Plan Tv 1309). EL 28/88 was granted to "His Grace, The Most Noble, The Duke of Avram" on 9th December, 1988, and transferred to Major Mining Ltd on the 23rd November 1989. Rio Tinto Exploration Pty. Limited entered into a joint venture agreement with Major Mining to explore EL 28/88, commencing on 23rd April 1991. Major Mining Ltd divested its interest in the joint venture to Allegiance Mining NL, with the exploration tenements transferred to Rio Tinto (90%) and Allegiance (10%) as tenants in common on 22nd January 1994.

Work undertaken during the annual reporting period included;

- Diamond drilling (3 holes totalling 791m; DD96ZA1, 2 and DD97ZA3) at the Avebury Prospect
- Petrological descriptions of selected intervals from diamond drill core (24 samples)
- Relinquishment of 55% of EL 28/88 Zeehan 1 from 64.6 km² to 28.7 km².
- Negotiation of farm out and joint venture agreement with Allegiance Mining NL for the reduced area of tenement.

Best intersections from mineralised zones in DD96ZA1 were;

- 8m @0.61% Ni from 151.6m (including 2.4m @ 1.44% Ni)
- 10m @ 0.34% Ni from 188.5m

Best results from DD96ZA2 were;

- | | |
|--------------------------------|------------------------------|
| • 3.85m @ 1.67% Ni from 68.85m | • 2.2m @0.57% Ni from 183.1m |
| • 2.6m @ 0.59% Ni from 90.5m | • 1.1m @0.98% Ni from 189.6m |
| • 3.7m @ 0.77% Ni from 102.1m | • |

Best results from DD97ZA3 were;

- | | |
|-------------------------------|-------------------------------|
| • 0.4m @ 1.09% Ni from 185.6m | • 0.7m @ 1.12% Ni from 189.3m |
|-------------------------------|-------------------------------|

It was concluded that;

- Results from preliminary diamond drilling at the Avebury Prospect are promising, however do not indicate a Rio Tinto sized orebody.
- Follow up diamond drilling and exploration will be conducted by Allegiance Mining who will manage the negotiated farm in and joint venture area.

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1. Conclusions and Recommendations

It was concluded that;

- Results from preliminary diamond drilling at the Avebury Prospect are promising, however do not indicate a Rio Tinto sized orebody.
- Follow up diamond drilling and exploration will be conducted by Allegiance Mining who will manage the negotiated farm in and joint venture area.

2. Introduction

Zeehan 1, EL 28/88 covers 29 km² located near Zeehan on the Tasmanian W coast (Plan Tv 1021). EL 28/88 was granted to "His Grace, The Most Noble, The Duke of Avram" on 9th December, 1988, and transferred to Major Mining Ltd on the 23rd November 1989. Rio Tinto Exploration Pty. Limited entered into a joint venture agreement with Major Mining to explore EL 28/88, commencing on 23rd April 1991. Major Mining Ltd divested its interest in the joint venture to Allegiance Mining NL, with the exploration tenements transferred to Rio Tinto (90%) and Allegiance (10%) as tenants in common on 22nd January 1994.

Rio Tinto's principal focus in the Zeehan area has been zinc, either as:

- 1) Irish-style carbonate hosted zinc mineralisation in the Ordovician Gordon Limestone Formation - at Myrtle, Pyramid, Sassafras and Firewood Siding prospects, or
- 2) Shale-hosted zinc mineralisation in the Late Proterozoic Oonah Formation - at Stonehenge

During the reporting period the focus for exploration shifted towards what were previously considered secondary targets in the Zeehan area. These include nickel mineralisation in ultramafic bodies (Trial Harbour), and skarn-type Zn-Pb deposits peripheral to the Heemskirk Granite (Avebury).

Work undertaken on the licence during 1997 included diamond drilling at Avebury. The licence was reduced in size by 55%, and now covers an area of 29 km² (Plan Tv1309).

See Parkinson (1992, 1993, 1994) and Tear (1995) for regional setting, prospect geology and mineralisation.

3. Review of Previous Work

3.1 Prior to Current Tenement

Refer to Parkinson, 1992 for a brief description of work conducted prior to current tenement.

3.2 During Current Tenement 1989-1991 (Major Mining)

Activities by Major Mining prior to Rio Tinto's involvement are detailed in the relevant statutory reports. Field activities included a gradient array IP survey covering a small area between the South Comstock and Tasmanian workings.

1990-1991

Exploration by Rio Tinto focused on;

- compilation and review of existing open-file data (Summons, 1991).
- analysis of structural controls on historic mineralisation. Research indicated that Devonian NNW-trending shear/fracture controlled mineralisation possibly overprints an earlier (Precambrian?) ENE-trending mineralised corridor.
- statistical evaluation of Ag:Pb ratios, which indicated a decline in Ag:Pb from Proterozoic to Ordovician deposits. Considering the ratio as a vector, areas of high Ag:Pb could be close to a postulated Precambrian "Mother Lode". On this basis, the Spray, Montana No. 2 and Junction deposits are the "closest to source".

1991-1992 (Parkinson, 1992)

Rio Tinto's exploration philosophy was to test these 2 models. Work included;

- Dipole-dipole IP surveys at Stonehenge, which defined a chargeable conductor exceeding 1 km strike length coincident with mapped black shale.
- Soil and wacker sampling indicated this horizon to be anomalous in Zn and Pb.
- Previous drilling by RGC (hole TH12) intersected several metres of percent-level Zn in the area of interest. Diamond drilling to test stratigraphic and structural targets within the envelope of anomalous geophysics and geochemistry were proposed for 1992/93.
- Soil sampling at the Avebury stream sediment anomaly, which detected Zn-Pb-Cu-As anomalism in an area of poor outcrop within either Cambrian or Proterozoic lithologies. Infill soil sampling was proposed.
- Open-file literature review revealed the presence of significant surface enrichment of Zn within residual black clays developed over Ordovician Gordon Limestone. Air-core drilling traverses were recommended for Myrtle and Pyramid prospects.
- Systematical soil/rock sampling of dunite at Trial Harbour was recommended to determine whether the body was capable of hosting a bulk low-grade Ni sulphide resource.

1992-1993 (Parkinson, 1993).

- Three diamond drill holes were drilled at Stonehenge testing stratigraphic and structural targets within the black shale package. Low grade Zn mineralisation was intersected in Devonian age structures, not considered to be economically significant. An air-core traverse across the shale is recommended as diamond drill recoveries were poor near surface.
- Infill soil sampling at the Avebury showed the central area to be characterised by high background Zn-Pb-Fe. High Fe is suggestive of skarn-related mineralisation. Further investigations are required.
- Air-core drilling of near-surface decomposed limestone at Myrtle intersected significant Zn mineralisation in several holes (best hole ZM18 - 36m @ 4.3% Zn). The Zn is present as clean monominerallic grains of low Fe sphalerite, apparently easily liberated from the unconsolidated pug. Additional air-core and diamond drilling is warranted.
- Air-core drilling of near-surface decomposed limestone at Pyramid showed patchy weak mineralisation was developed in several holes. Further air-core drilling is required closer to the Limestone-Moina Sandstone contact.
- Wacker sampling of limestone at the N end of Firewood Siding prospect

returned strongly elevated Zn values near the contact with the Crotty Quartzite. Air-core drilling is recommended.

- Soil/rock sampling at Trial Harbour outlined a large area of elevated Ni. Nickel sulphides in olivine orthocumulates were observed in the adit, and a 50m wide unit of olivine orthocumulate was mapped within the body. Drilling beneath the adit intersected weak pyrrhotite mineralisation only, and the intercumulus phases within the main olivine orthocumulate were dominated by magnetite and chromite. Elevated Ni in soil/rock samples is due to a thin skin of secondary Ni-rich serpentinite. No further work is required.

1993-1994 (Parkinson, 1994)

- Reconnaissance soil sampling and magnetometry was confined to a single line across the magnetic anomaly at Avebury.
- At Myrtle a total of 121 reverse circulation air-core drillholes amounting to 1876m was completed; air-core bottom-of-hole sampling was also undertaken with assay results being merged with previous wacker sampling. Follow-up diamond drilling consisted of 3 holes totalling 361.4m using a LY38 rig (ZM185-187). The drilling failed to intersect significant mineralisation or relevant alteration of limestone. Some sampling of previously unsampled EZ drillcore was carried out with the best result being 2.4% Zn for 7.05m from 6.85m.
- Minor amounts of additional rock chip and wacker sampling were also completed.
- At Pyramid air-core drilling amounted to 32 holes totalling 348m; end-of-hole samples were also collected with results merged into the wacker sampling database.

1994-1995 (Tear 1996)

- Three diamond drill holes (totalling 1107.4m) were drilled at Myrtle. Two of these holes aimed to test the upper and lower sandstone/limestone contacts, following up elevated zinc values in wacker samples. Weakly elevated zinc mineralisation was intersected (maximum 0.28% Zn). The third hole was designed to test a major gravity high, which was inferred to be a down dip extrapolation of the Grieves mineralisation. No immediate explanation for the gravity feature was found although it is possible that it is in response to a greater than normal thickness of clean calcarenites. These calcarenites would be more calcareous and possess slightly higher than average densities.
- One diamond drill hole was drilled at Pyramid, designed to test the lower sandstone/limestone contact close to where siderite alteration was recorded in AC94ZP43. Assay results for the dark clay unit at the lower contact were disappointing (0.21% Zn for 1.5m from 201m).
- One diamond drill hole was drilled at Firewood Siding to test a geochemical anomaly associated with the upper sandstone/limestone contact identified during previous deep overburden sampling. Elevated zinc grades (0.38% Zn) were intersected for 10m from 59m across the Crotty Quartzite/Upper Dolomite contact, and also associated with brown dolomite zones for 3.2m @ 0.5% Zn from 87.8m.
- Aircore drilling at Stonehenge (27 holes totalling 503m) designed to systematically test inferred shallow mineralisation produced significant zinc mineralisation in several holes. Drilling was conducted on two 0.3 km traverses at a 25m spacing. Best result was 17m @ 2.82% Zn, 2.06% Pb from 9m to EOH. Mineralisation consisted of galena and dark brown

sphalerite, intergrown with fine grained pyrite in a black shale unit within the Oonah Formation. One follow-up diamond drill hole (DD95ZS31) was drilled in an attempt to get superior core recovery. Results included 10.15m @ 4.49% from 30.35m, inc. 6.5m @ 6.3% from 34m; and 3.25m @ 2.51% Zn from 152.95m.

- A new Gordon Limestone prospect at Sassafras was explored. Reconnaissance wacker drilling (130 holes) confirmed relatively simple geology with an elongate base metal anomaly associated with the lower sandstone/limestone contact (+/- siderite alteration). Moina Sandstone, however, is absent in most instances with limestone overthrust by Cambrian Dundas Group sediments. Results showed a peak zinc value of 2590 ppm (mean 164 ppm) with lead values up to 441 ppm (mean 31 ppm).
- The Gordon Limestone in the Zeehan area was flown over as part of a sub-regional helicopter magnetic survey. Line spacing was approximately 60m with an average flight height of 30m. Sampling intervals were approximately every 3-4m. A feature of the survey was that the flight lines were aimed at being perpendicular to the strike of the limestone.

1995-1996 (Tear, SJ & Russell, SAJ 1996)

- One 300m diamond drillhole (DD96ZM191) was completed at the Myrtle Prospect. No significant base metal mineralisation was intersected.
- 2 diamond drillholes were drilled at the Pyramid Prospect (DD96ZP64 and 65). DD96ZP65 intersected 100m of quartzite within the carbonate sequence. Small scale galena and sphalerite veins were intersected between 40.9m and 41.2m giving a maximum lead value of 1.4% and a maximum zinc value of 0.4%.
- 2 reconnaissance bedrock wacker sampling lines were completed at the central and southern parts of the Pyramid Prospect. Elevated zinc values up to 1780 ppm Zn were found in association with siderite alteration at the Moina Sandstone/Gordon Limestone contact on the western limb of the Pyramid syncline.
- A basin analysis study was conducted by Dr Clive Burrett from Geosea Consultants. Three formations were recognised in the Gordon Limestone, corresponding to different carbonate depositional environments.
- An Honours thesis entitled 'The Geology and Mineralisation of the Stonehenge Prospect, Zeehan, Tasmania' was completed by Mark Upton from Monash University.
- Preliminary interpretation of helimag data identified a discrete magnetic anomaly at the Avebury Prospect. The source of the anomaly was thought to be in Gordon Limestone overlain by a thrust sheet of Cambrian Sediments (Dundas Group). Modelling of data indicated the anomaly to be a body of <100m wide, 1km long, buried between 30-100m and dipping steeply to the south.

4. Exploration Activities for the 12 Month Period Ending 9/11/1997

4.1 Avebury Prospect - Introduction

The Avebury Prospect occurs in the northern part of the central block of EL 28/88, immediately to the east of Comstock Creek. Regional stream sediment sampling indicated creeks draining the area between McLean and Comstock Creeks to be anomalous in Pb-Zn.

A summary of geology, geochemistry and geophysics of the Avebury Prospect is included in Appendix 4 (Technical Memorandum from T Green to T von Strokirch).

4.2 Diamond Drilling

A three hole diamond drilling programme at the Avebury Prospect was conducted during late 1996 and early 1997. Drilling was designed to test a coincident dumbbell shaped aeromagnetic anomaly and elevated Pb-Zn geochemical anomaly. The target was skarn related base metal and/or gold mineralisation associated with the tightly folded Ordovician Gordon Limestone believed to underlie over-thrusted Cambrian and Proterozoic rocks, close to the periphery of the Heemskirk Granite. The location of these holes relative to the magnetic anomaly is shown in Figure 1.

A detailed description of geology and geochemistry of DD96ZA1, 2 and DD97ZA3 is included in Appendix 4 (Technical Memorandum from T Green to T von Strokirch).

4.2.1 DD96ZA1

DD96ZA1 (354793E, 5357206N) was drilled into the western centre of the magnetic anomaly. It was oriented 65° towards 360 (AMG), and was drilled to a depth of 284.5m. Drill logs and assay ledgers are included in Appendices 1 and 2.

A summary of geology intersected in DD96ZA1 is shown in Plan Tv1204

Petrological descriptions are included in Appendix 3.

Best intersections from mineralised zones in DD96ZA1 were;

- 8m @ 0.61% Ni from 151.6m (including 2.4m @ 1.44% Ni)
- 10m @ 0.34% Ni from 188.5m

4.2.2 DD96ZA2

DD96ZA2 was drilled into the western part of the main Pb-Zn geochemical anomaly (355609E, 5357297N), associated with the eastern centre of the magnetic anomaly. The hole was oriented at 50° towards 360 (AMG) and was drilled to a depth of 255.5m.

Drill logs and assay ledgers are included in Appendices 1 and 2.

A summary of geology intersected in DD96ZA2 is shown in Plan Tv1202

Petrological descriptions are included in Appendix 3.

Best results from DD96ZA2 were;

- 3.85m @ 1.67% Ni from 68.85m
- 2.6m @ 0.59% Ni from 90.5m
- 3.7m @ 0.77% Ni from 102.1m
- 2.2m @ 0.57% Ni from 183.1m
- 1.1m @ 0.98% Ni from 189.6m

4.2.3 DD97ZA3

DD97ZA3 was drilled into the centre of the main geochemical anomaly (355790E, 5357060N). The hole was oriented at 50° towards 005 (AMG) and was drilled to a depth of 256m.

Drill logs and assay ledgers are included in Appendices 1 and 2.

A summary of geology intersected in DD97ZA3 is shown in Plan Tv1203

Petrological descriptions are included in Appendix 3.

Best results from DD97ZA3 were;

- 0.4m @ 1.09% Ni from 185.6m
- 0.7m @ 1.12% Ni from 189.3m

4.3 Discussion of Results

The aim of the drilling programme was to test a discrete magnetic anomaly and associated geochemical anomaly located at Avebury, in order to identify a possible Rio Tinto sized skarn type base-metal +/- gold orebody.

The source of the magnetic anomaly appears to be magnetite-rich layers from within an ultramafic. Drilling failed to intersect any significant lead-zinc mineralisation associated with the geochemical anomaly, however, some minor, though potentially significant nickel mineralisation was identified from within the ultramafics. Best Ni results were recorded from DD96ZA2 which returned 3.85m @ 1.67% Ni from 68.85m (including 1m @ 2.08% Ni).

The ultramafic body thickens from east to west, with the largest intersection occurring in DD96ZA1 (and open at depth). Thinner ultramafic bands intersected in DD96ZA2 and DD97ZA3 may be sills associated with the main body. The main ultramafic body underlies the western centre of the 'dumbbell-shaped' magnetic anomaly. Petrological analysis indicates the presence of Ni bearing minerals such as millerite (NiS), gerdorffite (NiAsS) and niccolite (NiAs). The presence of minerals such as millerite with high Ni contents (64.67% Ni), could indicate the presence of a potential low sulphide bearing nickel deposit associated with the ultramafic units.

Sulphide mineralisation intersected during diamond drilling is closely associated with high and variable magnetite contents within serpentinite. These magnetite-rich zones appear to have been repeatedly mobilised. These re-mobilised zones perhaps offer the best targets for locating significant Ni-sulphide mineralisation. Such zones may be likely to occur near the margins, and at the contacts of the ultramafic body. Possibly further ground magnetic traverses would help in better defining these zones.

5. Rehabilitation

Chrysotile asbestos was logged during drilling of DD96ZA1. Chrysotile is of the serpentine family, which is less dangerous to health than asbestos of the amphibole family. Notwithstanding this, Rio Tinto sought advice from our Honeymoon Well Project Team who have established guidelines for handling any

asbestos encountered during drilling. These guidelines are included in Appendix 5, and formed the basis for procedures followed at Avebury.

Rehabilitation has been completed on the diamond holes at the Avebury Prospect. Incomplete environmental monitoring sheets are included in Appendix 5. Monitoring of these sites will be ongoing. Allegiance will be managing future exploration programmes and any required environmental monitoring within EL 28/88, Zeehan 1.

A summary of all work relating to rehabilitation conducted within EL 28/88 Zeehan 1 was compiled during the reporting period, and is included in Table 2.

6. Expenditure

Expenditure on the Zeehan 1 licence (EL 28/88) for the 12 month ending 9 November 1997 was \$303,597. Total expenditure during the licence history is \$1,604,870.

7. References

- | | | |
|------------------------|-------|---|
| Parkinson RG | 1992b | Zeehan No. 1 EL 28/88, Tasmania. Report on exploration for the fourth year of tenure, 9/11/91 to 9/10/92. <i>Rio Tinto Report No. 18355.</i> |
| Parkinson RG | 1993 | Zeehan No. 1 EL 28/88, Tasmania. Report on exploration for the fifth year of tenure, 9/11/92 to 9/11/93. <i>Rio Tinto Report No. 19284.</i> |
| Parkinson RG | 1994 | Zeehan No. 1 EL 28/88, Tasmania. Report on Exploration for the Sixth Year of Tenure 9/11/93 - 9/11/94. |
| Russell SAJ Tear SJ | 1996 | Zeehan No. 1 EL 28/88, Tasmania. Report on Exploration for the Eighth Year of Tenure 9/11/95 - 9/11/96. <i>Rio Tinto Report No. 22160</i> |
| Summons TG | 1991 | EL 28/88 Zeehan, Tasmania. Statutory Progress Report for the Period Ending 9th November 1991. <i>Rio Tinto Report No. 17636.</i> |
| Tear SJ | 1995 | Zeehan No. 1 EL 28/88, Tasmania. Report on Exploration for the Seventh Year of Tenure 9/11/94 - 9/11/95. <i>Rio Tinto Report No. 21102.</i> |

8. Location

| | | |
|------------|--------|-----------|
| Queenstown | SK55-5 | 1:250,000 |
| Pieman | 7914 | 1:100,000 |
| Zeehan | 7914-S | 1:50,000 |

9. Keywords

Tasmania, Late Proterozoic, Ordovician, Gordon Limestone, Helicopter-borne
Magnetics, Diamond Drilling, Zinc, Nickel, Dundas Group, Crimson Creek
Formation

10. DPO Register

Refer to Table 1

Table 1

Rio Tinto Exploration Pty. Limited
DPO Register

EL 28/88 Zeehan 1

| DPO Number | LAB Batch Number | Lab Name | Lab Location | Office Date | Geologist | Tenement Number | Tenement Name | Sample Type | Number of Samples | 250,000 Map Sheet |
|------------|------------------|---------------------------|---------------|-------------|-----------|-----------------|---------------|--------------------|-------------------|--------------------|
| 77320 | - | University of New England | Armidale, NSW | 31/12/96 | S. Tear | 28/88 | Zeehan 1 | Petrology | 12 | Queenstown SK55-05 |
| 82176 | CRA204.60.12687 | Analabs | Burnie, Tas | 6/3/97 | S. Tear | 28/88 | Zeehan 1 | Diamond drill core | 124 | Queenstown SK55-05 |
| 82177 | - | University of New England | Armidale, NSW | 2/2/97 | T Green | 28/88 | Zeehan 1 | Petrology | 14 | Queenstown SK55-05 |
| 82178 | ? | Analabs | Burnie, Tas | 22/1/97 | T. Green | 28/88 | Zeehan 1 | Diamond Drill Core | 75 | Queenstown SK55-05 |
| 82179 | 7AD0508 | Amdel | Adelaide, SA | 18/2/97 | T. Green | 28/88 | Zeehan 1 | Diamond drill core | 78 | Queenstown SK55-05 |
| 82180 | 7AD0403 | Amdel | Adelaide, SA | 18/2/97 | T. Green | 28/88 | Zeehan 1 | Diamond drill core | 86 | Queenstown SK55-05 |
| 82181 | 7AD0507 | Amdel | Adelaide, SA | 18/2/97 | T. Green | 28/88 | Zeehan 1 | Diamond drill core | 166 | Queenstown SK55-05 |

Table 2 EL 28/88 Zeehan 1 - Summary of Rehabilitation

| Drill Hole ID | Prospect | EL | Easting | Northing | Total Depth (m) | Rehabilitation Conducted |
|--|-----------------|-------|--------------------------------------|--|--------------------------------|--|
| DD96ZA1 DD96ZA2 DD97ZA3 | Avebury | 28/88 | 354793 355609 355790 | 5357206 5357297 5357060 | 384.5 255.5 256 | Native vegetation was dragged over areas of disturbance in order to allow natural regeneration. All holes were capped and plugged using 6m of 4" PVC (leaving 30cm above ground). |
| DD95ZP63 DD96ZP64 DD96ZP65 | Pyramid | 28/88 | 364311 364335 364329 | 5356348 5356607 5356591 | 228 48 252 | These holes were drilled by a truck mounted U250 rig. The holes were drilled on button grass plains. They all had above ground sumps, and drill cuttings were collected and removed from site. The holes were capped and left for natural regeneration. |
| DD94ZM185 DD94ZM186 DD94ZM187 DD95ZM188 | Myrtle | 28/88 | 363743 364285 364419 364473 | 5351786 5352296 5352296 5351780 | 137 120.9 103.5 201.1 | LY38 rig used to drill these holes, and brought on site by an excavator. All holes were drilled on already disturbed ground (old costeans). Drill holes were capped and rehabilitated. Drill sumps were back filled using an excavator. |
| DD95ZM190 | Myrtle | 28/88 | 364448 | 5351933 | 203.9 | Hole was drilled on button grass plain by a truck mounted U250. An above ground sump was used, and drill cuttings were collected and removed from site. The hole was capped and left for natural regeneration. |
| DD95ZM189 DD96ZM191 | Myrtle | 28/88 | 364288 364056 | 5351001 5352092 | 702.4 300 | Both holes were drilled on button grass plains. A U250 rig was used to drill holes. An above ground sump was used to collect drill cuttings. All cuttings and rubbish were removed from site. The holes were capped and left for natural regeneration. |
| DD96ZF37 | Firewood Siding | 28/88 | 362759 | 5347544 | 49.9 | This hole was in dense bush, and the drill site was cleared using chainsaws. A helicopter supported LY38 rig was used to drill the hole. An above ground sump was used and drill cuttings were bagged and removed from site. Native vegetation was dragged over disturbed areas to promote natural regeneration. |

| Drill Hole ID | Prospect | EL | Easting | Northing | Total Depth (m) | Rehabilitation Conducted |
|---|---------------|-------|--|---|--|---|
| DD95ZS31 | Stonehenge | 28/88 | 359733 | 5359462 | 209.5 | A D650 rig was used, and an above ground sump was used to collect drill cuttings. The hole was capped and vegetation was dragged over the disturbed area to promote natural regeneration. |
| DD93ZT1 DD93ZT2 DD93ZT3 DD93ZT4 DD93ZT5 DD93ZT6 DD93ZT7 DD93ZT8 DD93ZT9 | Trial Harbour | 28/88 | 349010 349000 349150 349160 349293 349288 349255 349276 349278 | 5356108 5356078 5356150 5356200 5356275 5356150 5356050 5355950 5355868 | 54.95 50.65 66.15 63.5 66.65 51.7 48.55 57.4 56.25 | All drill holes were drilled on the road or over old drill sites. All holes were capped. No sumps were required. Natural regeneration will occur. |

Table 3

EL 28/88 Zeehan 1
Expenditure Table

| | 1/11/96 - 31/10/97 | Total Expenditure |
|-----------------------------------|--------------------|-------------------|
| Drilling | 86,826 | 491,013 |
| Contractors | 8,950 | 125,991 |
| Laboratory | 36,911 | 120,156 |
| Rent & Property | 2,634 | 40,627 |
| Payroll & Benefits | 53,739 | 336,996 |
| Field & Transport | 42,692 | 152,326 |
| Travel & Accommodation | 3,524 | 35,689 |
| Computer Services | 3,707 | 12,913 |
| Professional | 7,477 | 13,858 |
| Office & Miscellaneous | 12,938 | 26,552 |
| District Administration | 17,424 | 120,923 |
| Regional Costs | 24,816 | 114,289 |
| Tenements | 1,960 | 13,540 |
| TOTAL | 303,597 | 1,604,870 |

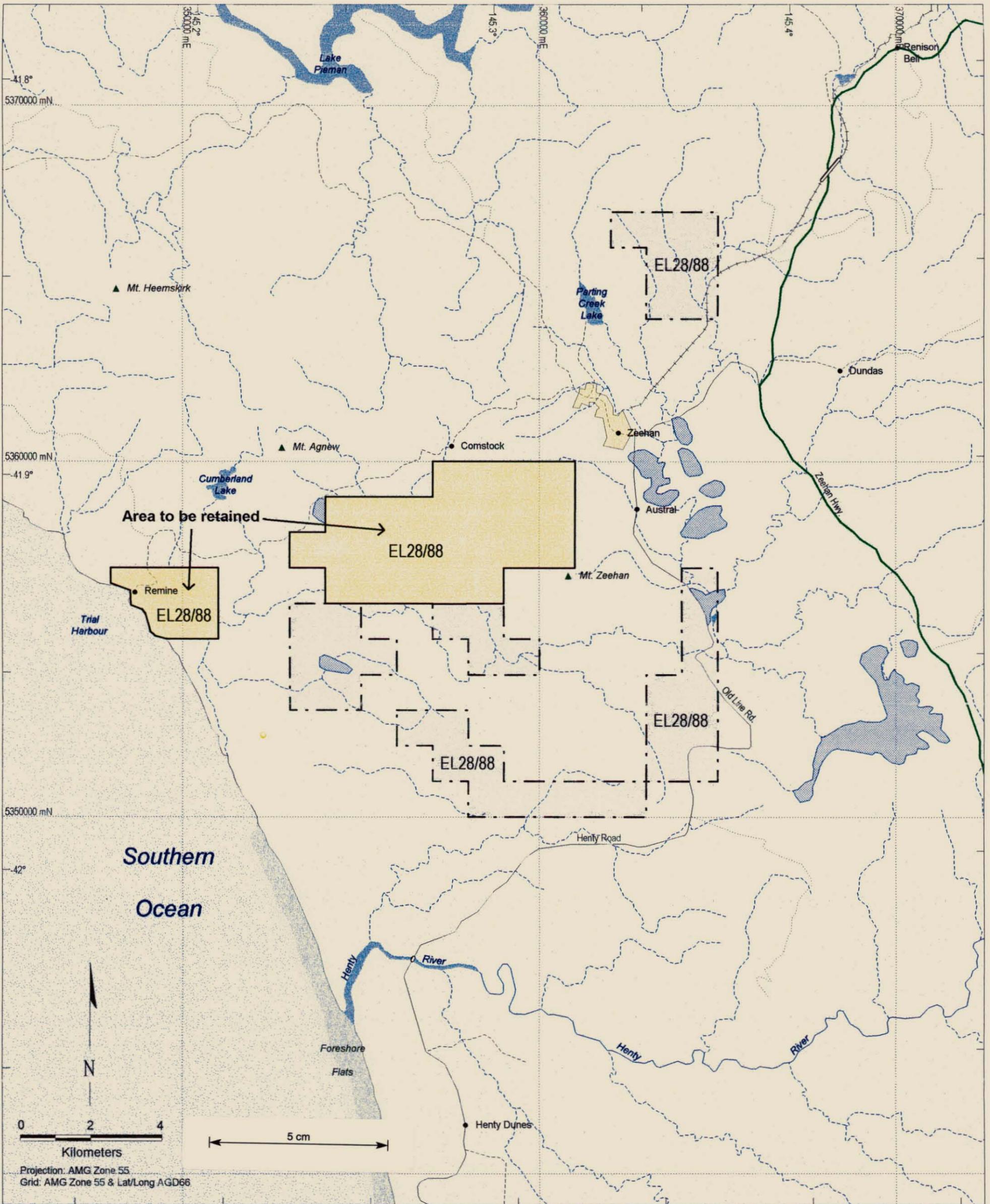
Arcbury Prospect West Drillhole Locations And Aeromagnetic Contours



Figure 1

Tmc/NW 4-2-97 T0029.cdr

428017



Location Diagram

| | | |
|--------------------------|------------------------|------------------|
| Conical Rocks 7814 | Pieman 7914 | Sophia 8014 |
| | Cape Sorell 7913 | Franklin 8013 |

Mapsheet Reference

Legend

- Town
- ▲ Mountain
- - - EL Boundary
- Perennial Drainage
- - - Non-Perennial Drainage
- Highway
- Secondary Road
- Minor Road
- Track
- Railway
- Lake
- Swamp
- Urban

RIO TINTO EXPLORATION PTY. LIMITED

428018
EL28/88 Zeehan 1

Location Plan

| | |
|-----------------------|--------------------------------|
| Author: Sarah Russell | Reference: SW Tasmania SK55-22 |
| Drawn: John Terrill | File Name: Tv1309.wor |
| Date: March 1998 | Report No: |
| Scale: 1:100,000 | Plan No: Tv1309 |

SOUTH

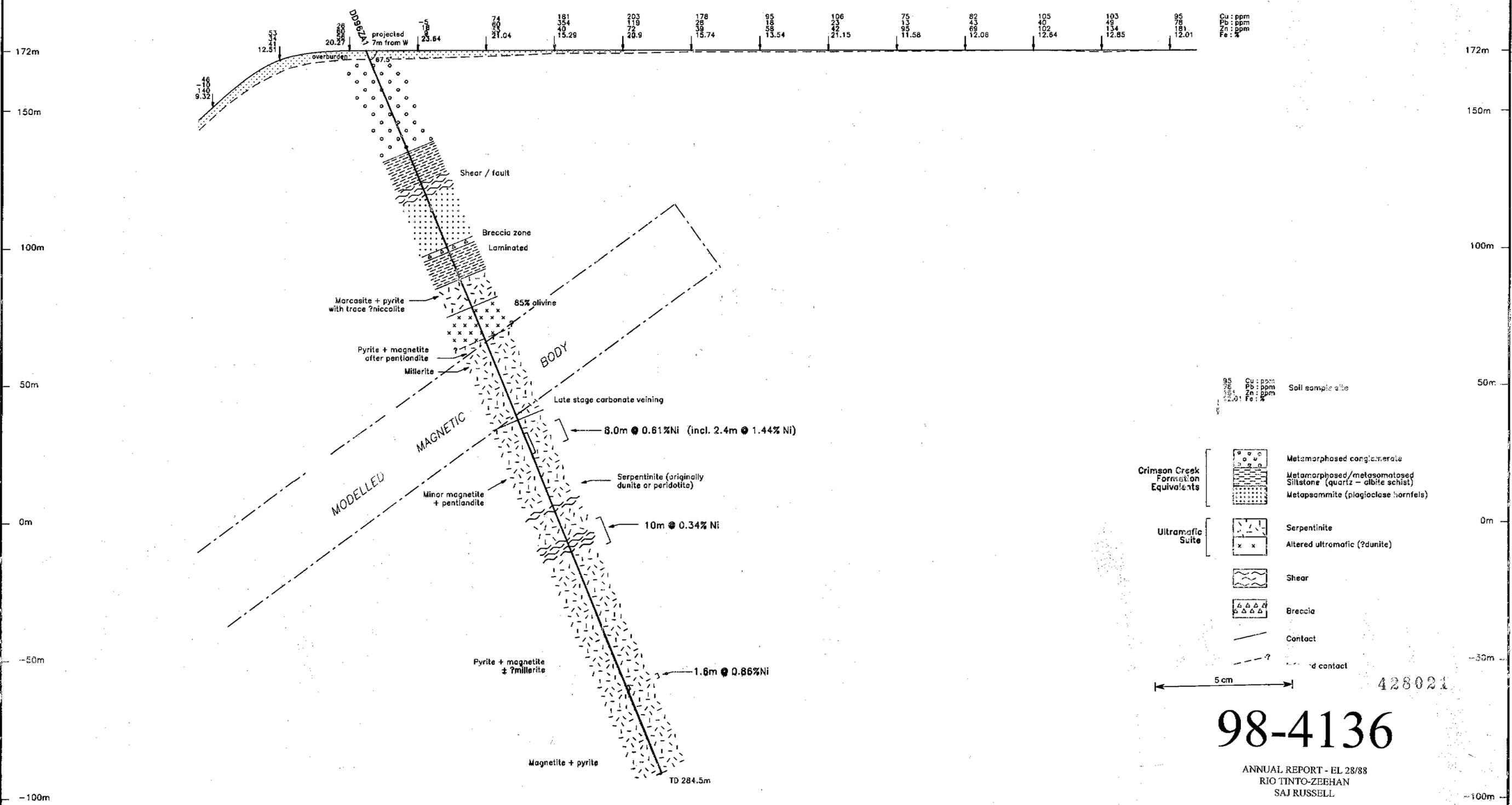
5357200mN

5357300mN

5357400mN

5357500mN

NORTH



Cu : ppm
 Pb : ppm
 Zn : ppm
 Fe : %

95 Cu : ppm
 96 Pb : ppm
 97 Zn : ppm
 98 Fe : %

- Metamorphosed conglomerate
- Metamorphosed/metasomatized Siltstone (quartz - albite schist)
- Metapsammite (plagioclase hornfels)
- Serpentinite
- Altered ultramafic (?dunite)
- Shear
- Breccia
- Contact
- ?d contact

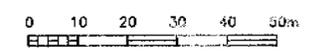
5 cm

428021

98-4136

ANNUAL REPORT - EL 28/88
 RIO TINTO-ZEBHAN
 SAJ RUSSELL

CRA EXPLORATION PTY LIMITED
 EL 28/88 - Zeehan 1
AVEBURY PROSPECT
 Section 354800 E
 DD96ZA1



| | |
|-------------------|----------------------------|
| Author : T Green | Reference : Burnie SK25-03 |
| Drawn : D Oliver | File Name : Tv1204.dwg |
| Date : April 1987 | Report No : |
| Scale : 1:1000 | Plan No : Tv1204 |

SOUTH

NORTH

5357300mN

5357400mN

5357500mN

5357600mN

200m

200m

150m

150m

100m

100m

50m

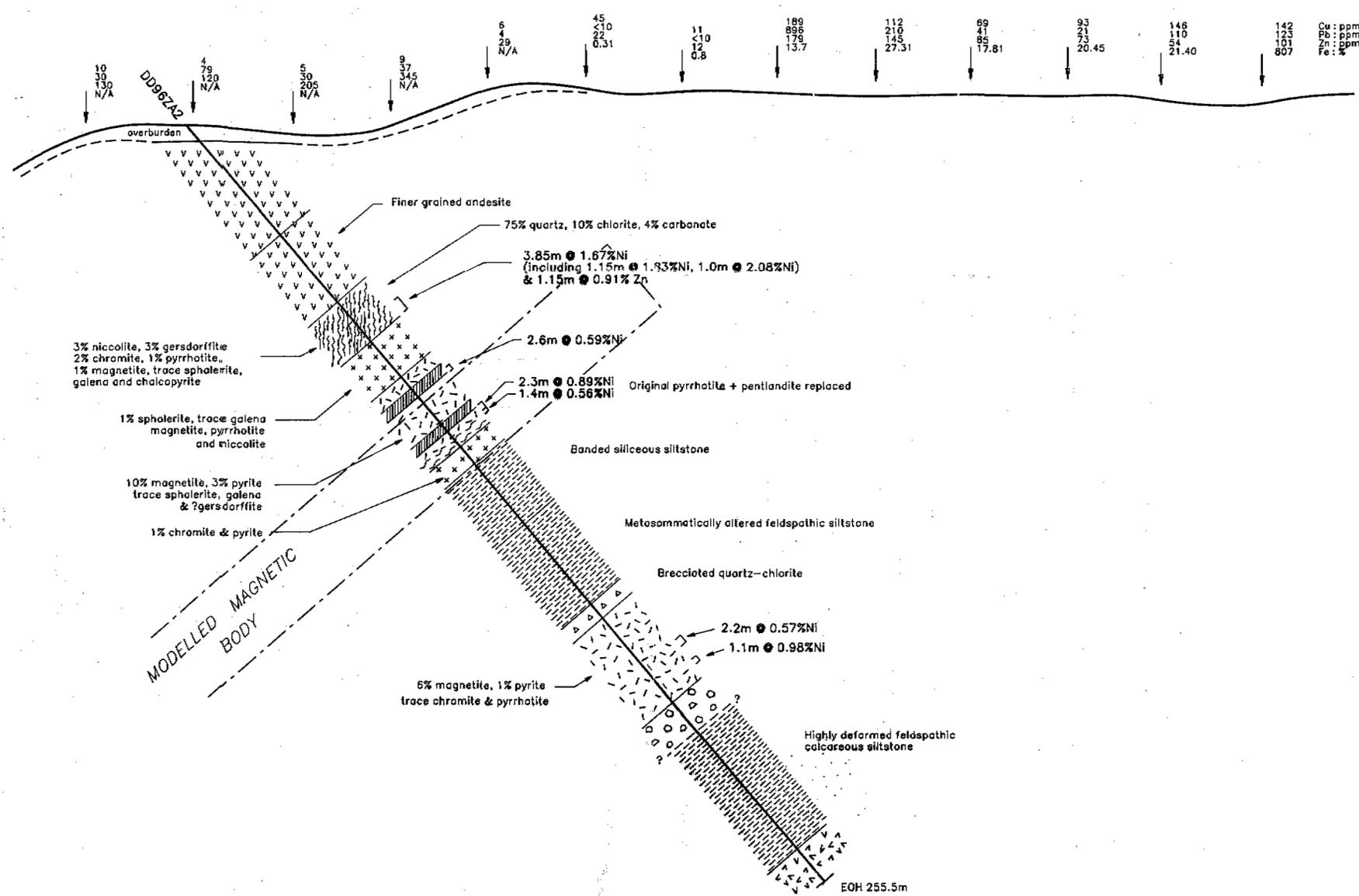
50m

0m

0m

-50m

-50m



95 Cu : ppm
78 Pb : ppm
181 Zn : ppm
12.01 Fe : %

Soil sample site

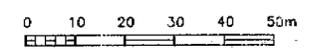
- Crimson Creek Formation Equivalents**
- Siltstone/mudstone
 - Porphyritic volcanic - andesite
 - Mafic volcanic - dolerite
- Ultramafic Suite**
- Intensely altered ultramafic, 75% quartz
 - Tremolite rich altered ultramafic
 - Serpentinite with massive magnetite
 - Calc silicate - ?Metasomatized calcareous sediment or possibly of mafic composition
 - Shear
 - Breccia (fault)
 - Contact
 - Inferred contact

98-4136

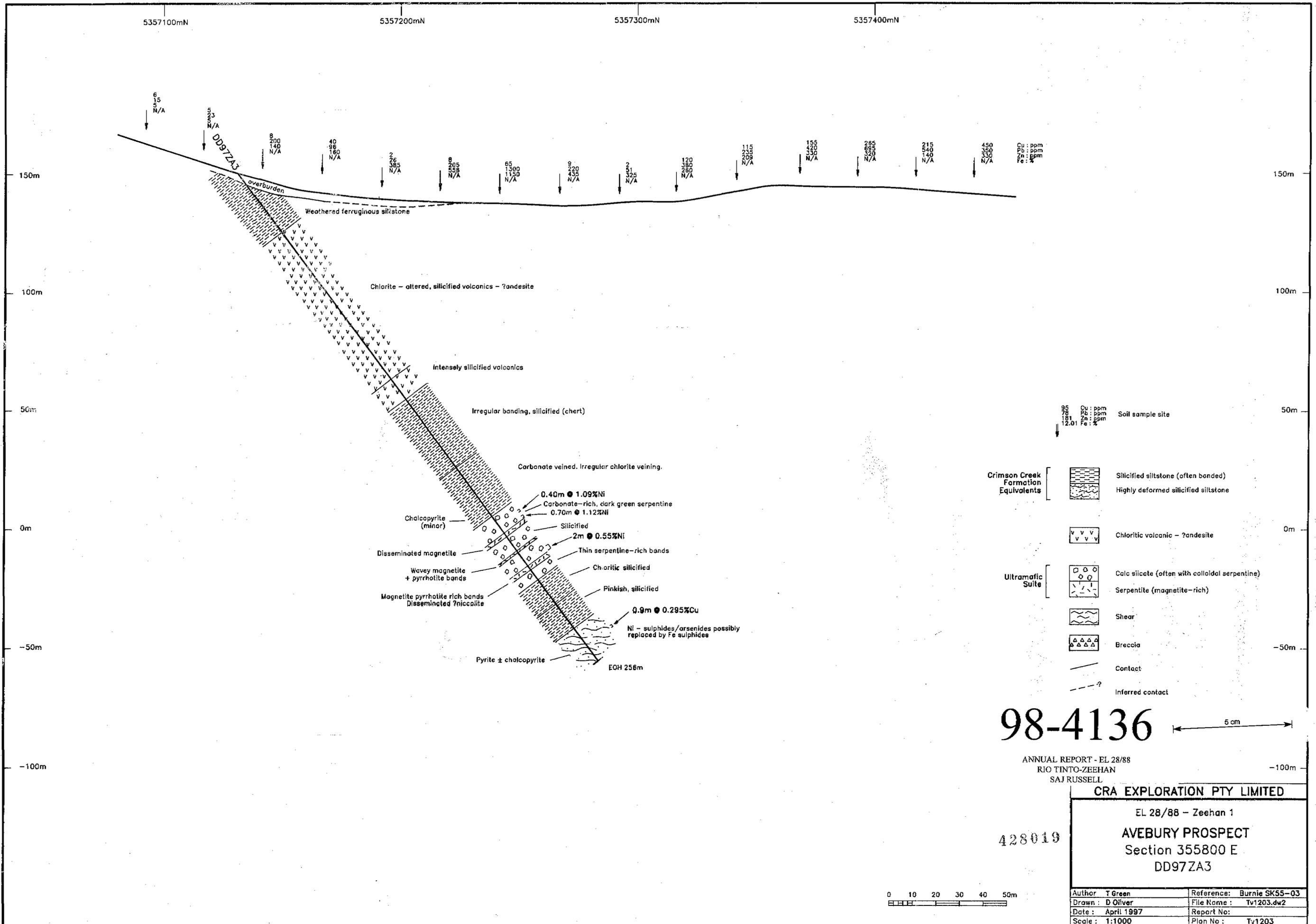
ANNUAL REPORT - EL 28/88
RIO TINTO-ZEEHAN
SAJ RUSSELL

5 cm

428020



| | |
|------------------------------------|---------------------------|
| CRA EXPLORATION PTY LIMITED | |
| EL 28/88 - Zeehan 1 | |
| AVEBURY PROSPECT | |
| Section 355600 E | |
| DD96ZA2 | |
| Author : T Green | Reference: Burnie SK55-03 |
| Drawn : D Oliver | File Name : Tv1202.dwg |
| Date : April 1997 | Report No : |
| Scale : 1:1000 | Plan No : Tv1202 |



5357100mN

5357200mN

5357300mN

5357400mN

150m

150m

100m

100m

50m

50m

0m

0m

-50m

-50m

-100m

-100m

6
15
N/A

52
N/A
DD97ZA3

8
200
140
N/A

40
96
160
N/A

2
26
385
N/A

8
205
558
N/A

65
1300
1150
N/A

9
220
435
N/A

2
51
325
N/A

120
380
260
N/A

115
235
209
N/A

155
420
330
N/A

285
695
320
N/A

215
540
140
N/A

450
350
330
N/A

Cu: ppm
Pb: ppm
Zn: ppm
Fe: %

95
78
181
12.01
Cu: ppm
Pb: ppm
Zn: ppm
Fe: %

Soil sample site

Crimson Creek
Formation
Equivalents



Silicified siltstone (often banded)
Highly deformed silicified siltstone



Chloritic volcanic - ?andesite

Ultramafic
Suite



Calc silicate (often with colloidal serpentinite)
Serpentinite (magnetite-rich)



Shear



Breccia

Contact

Inferred contact

98-4136

50m

ANNUAL REPORT - EL 28/88
RIO TINTO-ZEEHAN
SAJ RUSSELL

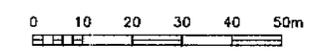
CRA EXPLORATION PTY LIMITED

EL 28/88 - Zeehan 1

AVEBURY PROSPECT
Section 355800 E

DD97ZA3

428019



| | |
|------------------|---------------------------|
| Author: T Green | Reference: Burnie SK55-03 |
| Drawn: D Oliver | File Name: Tv1203.dwg |
| Date: April 1997 | Report No: |
| Scale: 1:1000 | Plan No: Tv1203 |

Appendix 1

**Geological and Geotechnical Logs for
DD96ZA1, DD96ZA2 and DD97ZA3
Avebury Prospect**

ORRA EXPLORATION PTY. LIMITED
 DRILL-HOLE SUMMARY LOG

428023
 Graphic Log

HOLE NAME: DD962A1
 PROSPECT: AVEGWAY
 EL: ZEEHAN 1 EL28189 RL 172m. DEPTH 284.5m
 AMG EAST 354793 NORTH 5357206
 GRID EAST NORTH

DATE DRILLED: 11/12/96
 LOGGED BY: B. THOMAS
 DRILLING CO.: ALMAC
 DRILL TYPE: DIAMOND
 DRILL RIG: LF70
 DRILL CORE: ZEEHAN

SURVEYS:

| DEPTH | AZIM (AMG) | DIP | DEPTH | AZIM (AMG) | DIP |
|-------|------------|-------|-------|------------------------|-----|
| 0 | 000° | 65° | 250 | 343° | 68° |
| 50 | 341° | 67° | 290 | 340 301° | 68° |
| 97 | 352° | 67.5° | | | |
| 180 | 353° | 67.5° | | | |
| 200 | 352° | 67.5° | | | |

OBJECTIVES OF HOLE:
 Diamond drilltest of the helimag anomaly - 6000nT anomaly

LITHOLOGICAL SUMMARY:

| FROM | TO | FORM CODE | COMMENTS |
|-------|-------|-----------|--|
| 0 | 2 | Qha | Overburden |
| 2 | 24 | | Ferruginous rotted conglomerate |
| 24 | 43.9 | | Chloritic conglomerate |
| 43.9 | 57.5 | | Chloritised volcanics - highly sheared |
| 57.5 | 62.8 | | Broken core - fault zone |
| 62.8 | 72.0 | | Chloritised volcanics |
| 72.0 | 83.3 | | Chloritised hornfels |
| 83.3 | 93.7 | | Fault breccia zone |
| 93.7 | 104.6 | | White quartz/carbonate unit with magnetite |
| 104.6 | 130.7 | | Serpentinite |
| 130.7 | 147.8 | | White quartz/carbonate unit with magnetite (argillaceous limestone) |
| 147.8 | 151.3 | | Uniform fine grained serpentinite |
| 151.3 | 163.1 | | Multicoloured serpentinite |
| 163.1 | 284.5 | | Mixed serpentinite and white replaced limestone units Serpentinite with green/yellow and white/green blotches |

MINERALISATION SUMMARY:

| FROM | TO | COMMENTS |
|------|----|----------|
| | | |

CONCLUSIONS:



C.R.A. EXPLORATION PTY. LIMITED
DRILL CORE LOG

F = Fracture
V = Vein
B = Bedding
C = claystone

RD DATA
1 = > 30cm
2 = 10-30cm
3 = 3-10cm
4 = 1-3cm
5 = < 1cm

TENEMENT NAME Zeehanle 28/8 No.

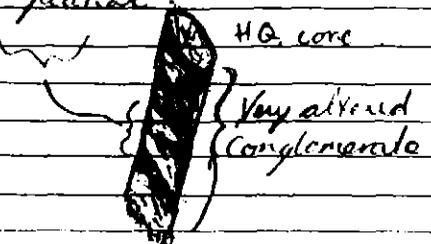
COORDINATES 354793mE 5357206mN AZIMUTH 000° (AMG) DRILLERS ALMAC COMMENCED 11/12/96

PLAN - MAP REFERENCE

RL COLLAR INCLINATION 65° DRILL TYPE DIAMOND COMPLETED DEPTH HOLE No. D962A1
CASING LEFT DPO No(s) ST Tear

| DEPTH | | Core Rec. % | Graphic Log | CORE DESCRIPTION | SPECIAL FEATURES Weath, Alteration, Fracturing, Veining, Mineralization | Sample No. | From (M) | To (M) | Rec (M) | ASSAY VALUES (Analysed by | | | |
|----------|--------|-------------|-------------|--|---|------------|----------|--------|---------|---------------------------------|-----|-----|----|
| From (M) | To (M) | | | | | | | | | (From To) | (m) | % | |
| 0 | 3 | - | - | Overburden no recovery | | | | | | 0 | 3 | 30 | - |
| 3 | 4.5 | 60 | 5X | Red/brown rotted bedrock probably pink quartzite with scattered iron blebs (? pyrite) | Heavily limonitic (+/- minor hematite alteration/weathering) | | | | | 3 | 4.5 | 105 | 70 |
| 4.5 | 5.0 | 75 | 5X | ~4cm of sst (pink med gr) then into red/brown rotted bedrock Brecciated appearance - rounded clasts of pink sst (up to 5cm fractured and manganese veins within clasts) Also smaller, red clasts up to 1cm + v. white small clasts - finer | Fe staining + mn veins possibly along fractures. Some Brecciated appearance - rounded clasts of pink sst (up to 5cm fractured and manganese veins within clasts) Clay matrix supported (80%) 20% clasts (sand) clay = 10% | | | | | 4.5 | 5.0 | 0.8 | 80 |
| 5.0 | 6.5 | 80 | 5X | As above with 5-10cm quartzite (med gr) at 6m. Last 40cm very brecciated - manganese rich veins + redness | Becomes very red at 6.3-6.5m. Sericite or fractured at similar orientations to Mn | | | | | 5.0 | 6.5 | 0.7 | 70 |
| 6.5 | 7.5 | 80 | 5X | 1st 40cm - v. brecciated/red Manganese rich. Last 60cm same as 4.5-5m | - Small (0.5mm) voids could possible be weathered away pyrite cubes? | | | | | 6.5 | 7.5 | 0.2 | 80 |
| 7.5 | 8.5 | 70 | 5X | 1st 5cm = v. fine grained quartzite (chert) - broken up (1-4cm angular clasts - very little clay matrix - 7.5-8.45m is same as 4.5-5m although red clasts dominate. Last 5cm is med gr. sst (quartzite) and a coarser grained rock - v. coarse gr sst (last few cms) v. weathered + sericized (pink-white colour). | Red clasts very brightly coloured after chert. | | | | | 7.5 | 8.5 | 0.7 | 70 |

| DEPTH | | Core Rec. (M) | Core Size | Graphic Log | CORE DESCRIPTION | SPECIAL FEATURES Weath, Alteration, Fracturing, Veining, Mineralization | Sample No. | From (M) | To (M) | Rec (M) | ASSAY VALUES (Analysed by.....) | | | | | | | | | | | |
|----------|--------|---------------|-----------|-------------|--|--|------------|----------|--------|---------|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| From (M) | To (M) | | | | | | | | | | % | | | | | | | | | | | |
| 41.3 | 42.8 | | | | <p>Brecciated, weathered conglomerate with green matrix. Some lenticular looking clasts are quite large (~10x5cm) and become more common. The green silt and to silt matrix now makes up the majority of the rock (~60%) and the clasts are small (except for a few lg. clasts at 41.3-41.7m). Cream silicified, rounded clasts are small (~0.5-1cm). They are common in column and are often fractured.</p> | <p>Manganese veins are and very thin (brown) - Fe stained areas common - after along fractures. There is no preferred fracturing direction seen.</p> | | 41.3 | 42.8 | 1.4 | | | | | | | | | | | | |
| 42.8 | 43.9 | | | | <p>Some white areas probably where cream clasts were concentrated as now cream, whitish patches within the green matrix. Round clasts are very rare, most are unrecognizable as clasts or are fractured with green matrix between the fractures.</p> | <p>Whitish, cream col. veins generally intersect the log core axis at roughly 45° and are generally planar.</p> | | 42.8 | 43.9 | 1.0 | | | | | | | | | | | | |



428048

DRILL CORE LOG

TENEMENT NAME..... No.

PLAN - MAP REFERENCE.....

CO-ORDINATES..... AZIMUTH..... DRILLERS..... COMMENCED..... DEPTH..... HOLE No. **DD962A1**

RL COLLAR..... INCLINATION..... DRILL TYPE..... COMPLETED..... CASING LEFT..... DPO No(s).....

| DEPTH | | Core Rec. (M) | Core Size | Graphic Log | CORE DESCRIPTION | SPECIAL FEATURES Weath, Alteration, Fracturing, Veining, Mineralization | Sample No. | From (M) | To (M) | Rec (M) | ASSAY VALUES (Analysed by.....) | | | | | | | | | | | |
|----------|--------|---------------|-----------|-------------|---|---|------------|----------|--------|---------|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| From (M) | To (M) | | | | | | | | | | | | | | | | | | | | | |
| 149.5 | 152.5 | 3.0 | | | <p>The first 2 m of this section are dark bluish grey serpentinite with irregularly shaped and bluish greenish cream, wispy patches of green serpentinite and calcium carbonate (dolomite? + calcite). The amount of cream and green blocks (wispy patches) within the blue/grey serpentinite varies considerably (from faint serpentinite to zones of mainly cream and green material, white wispy patches of quartz occur (small over the last 1.1 m. (ie 151.4 to 152.5 m).</p> | <p>*Note: Some creamy quartz (often anhedral shaped) described earlier (mainly 104 - 125m) may have been possibly dolomite? rather than qz.</p> | | 149.5 | 152.5 | 3.0 | | | | | | | | | | | | |
| 152.5 | 164.5 | 12.0 | | | <p>Dark grey/blue, very fine grained serpentinite that contains large patches of light grey to white wispy patches of quartz. (10-40 cm long). Within the quartz rich zones, qz usually makes</p> | <p>Magnetite patches occur throughout the qz rich and serpentinite zones. (very magnetic rock). Pyrite or possibly Pyrrhotite occurs as disseminated, concentrations within some areas of serpentinite.</p> | 1' | 152.5 | 155.5 | 3.0 | | | | | | | | | | | | |
| | | | | | | | | 155.5 | 158.5 | 3.0 | | | | | | | | | | | | |
| | | | | | | | | 158.5 | 161.5 | 3.0 | | | | | | | | | | | | |
| | | | | | | | | 161.5 | 164.5 | 3.0 | | | | | | | | | | | | |

between 154 & 154.8 m mainly.

| Magnetic Susceptibility | | | | | |
|-------------------------|-------|-------|----------------------------|-------|-------|
| Total Depth: | | | Drillhole Number: DD96 ZA1 | | |
| CL - Core Loss | | | | | |
| Depth | Value | Depth | Value | Depth | Value |
| 0.0 | C.L | 20.0 | | 40.0 | 0 |
| 0.5 | C.L | 20.5 | 20 | 40.5 | 30 |
| 1.0 | C.L | 21.0 | 9 | 41.0 | 20 |
| 1.5 | C.L | 21.5 | C.L | 41.5 | 20 |
| 2.0 | C.L | 22.0 | 9 | 42.0 | 30 |
| 2.5 | C.L | 22.5 | C.L | 42.5 | 25 |
| 3.0 | 20 | 23.0 | 15 | 43.0 | 15 |
| 3.5 | C.L | 23.5 | 5 | 43.5 | 10 |
| 4.0 | 25 | 24.0 | 6 | 44.0 | 20 |
| 4.5 | 5 | 24.5 | 15 | 44.5 | 35 |
| 5.0 | 10 | 25.0 | 14 | 45.0 | 10 |
| 5.5 | 12 | 25.5 | C.L | 45.5 | 36 |
| 6.0 | 15 | 26.0 | 16 | 46.0 | 40 |
| 6.5 | 30 | 26.5 | 10 | 46.5 | 22 |
| 7.0 | 25 | 27.0 | 20 | 47.0 | 19 |
| 7.5 | 5 | 27.5 | 22 | 47.5 | 35 |
| 8.0 | 10 | 28.0 | 40 | 48.0 | 25 |
| 8.5 | 5 | 28.5 | 23 | 48.5 | 32 |
| 9.0 | 10 | 29.0 | 20 | 49.0 | 40 |
| 9.5 | C.L | 29.5 | 5 | 49.5 | 39 |
| 10.0 | 5 | 30.0 | 11 | 50.0 | 40 |
| 10.5 | C.L | 30.5 | C.L | 50.5 | 30 |
| 11.0 | C.L | 31.0 | C.L | 51.0 | 60 |
| 11.5 | C.L | 31.5 | C.L | 51.5 | 20 |
| 12.0 | 5 | 32.0 | 11 | 52.0 | 26 |
| 12.5 | C.L | 32.5 | 12 | 52.5 | 52 |
| 13.0 | C.L | 33.0 | 10 | 53.0 | 16 |
| 13.5 | C.L | 33.5 | 10 | 53.5 | 30 |
| 14.0 | C.L | 34.0 | 0 | 54.0 | 20 |
| 14.5 | C.L | 34.5 | 11 | 54.5 | 15 |
| 15.0 | C.L | 35.0 | 29 | 55.0 | 30 |
| 15.5 | C.L | 35.5 | 10 | 55.5 | 15 |
| 16.0 | C.L | 36.0 | 35 | 56.0 | 30 |
| 16.5 | C.L | 36.5 | 14 | 56.5 | 19 |
| 17.0 | C.L | 37.0 | 10 | 57.0 | 50 |
| 17.5 | C.L | 37.5 | 15 | 57.5 | 40 |
| 18.0 | 19 | 38.0 | 40 | 58.0 | C.L |
| 18.5 | C.L | 38.5 | 25 | 58.5 | 10 |
| 19.0 | C.L | 39.0 | 10 | 59.0 | 5 |
| 19.5 | C.L | 39.5 | 30 | 59.5 | 10 |

Read do = R d

428053

| Magnetic Susceptibility | | Drillhole number: DD962A1 | | | |
|-------------------------|-------------------|---------------------------|-------|-------|---------------------|
| Depth | Value | Depth | Value | Depth | Value |
| 60.0 | 20 | 82.0 | 45 | 104.0 | 4000 |
| 60.5 | 50 | 82.5 | 35 | 104.5 | 60000 |
| 61.0 | 40 | 83.0 | 45 | 105.0 | 20000 |
| 61.5 | 40 | 83.5 | 65 | 105.5 | 8500 |
| 62.0 | 11 | 84.0 | 30 | 106.0 | 16000 |
| 62.5 | 45 | 84.5 | 900 | 106.5 | 8000 |
| 63.0 | 60 | 85.0 | 300 | 107.0 | 9000 |
| 63.5 | 40 | 85.5 | 2000 | 107.5 | 20000 |
| 64.0 | 11 | 86.0 | 45 | 108.0 | 15000 |
| 64.5 | 15 | 86.5 | 400 | 108.5 | 20000 |
| 65.0 | 10 | 87.0 | 250 | 109.0 | 30000 |
| 65.5 | 5 | 87.5 | 2500 | 109.5 | 15000 |
| 66.0 | 30 | 88.0 | 2000 | 110.0 | 15000 |
| 66.5 | 15 | 88.5 | 1000 | 110.5 | 15000 |
| 67.0 | 40 | 89.0 | 3000 | 111.0 | 20000 |
| 67.5 | 50 | 89.5 | 85000 | 111.5 | 15000 |
| 68.0 | 20 | 90.0 | 60 ? | 112.0 | 85000 |
| 68.5 | 25 | 90.5 | 60 ? | 112.5 | 7500 |
| 69.0 | 30 | 91.0 | 60 ? | 113.0 | 5000 |
| 69.5 | 50 | 91.5 | 80000 | 113.5 | 2500 |
| 70.0 | 33 | 92.0 | 85000 | 114.0 | 150 |
| 70.5 | 30 | 92.5 | 25000 | 114.5 | 6000 |
| 71.0 | 60 | 93.0 | 20000 | 115.0 | 15000 |
| 71.5 | 80 | 93.5 | 3000 | 115.5 | 20000 |
| 72.0 | 60 | 94.0 | 600 | 116.0 | 20000 |
| 72.5 | 60 | 94.5 | 2000 | 116.5 | 350 |
| 73.0 | 70 and | 95.0 | 4000 | 117.0 | 45000 |
| 73.5 | 45 | 95.5 | 4000 | 117.5 | 53000 |
| 74.0 | 50 | 96.0 | 2600 | 118.0 | 6000 |
| 74.5 | 55 and | 96.5 | 1100 | 118.5 | 4500 |
| 75.0 | 55 | 97.0 | 4000 | 119.0 | 9500 |
| 75.5 | 50 | 97.5 | 3500 | 119.5 | 7000 |
| 76.0 | 39 | 98.0 | 2600 | 120.0 | 15000 |
| 76.5 | 40 | 98.5 | 2000 | 120.5 | 4400 |
| 77.0 | 50 and | 99.0 | 3100 | 121.0 | 5500 and |
| 77.5 | 48 | 99.5 | 3100 | 121.5 | 9600 |
| 78.0 | 10 | 100.0 | 2600 | 122.0 | 3500 |
| 78.5 | 30 | 100.5 | 3400 | 122.5 | 4500 |
| 79.0 | 32 | 101.0 | 2000 | 123.0 | 9000 |
| 79.5 | 30 | 101.5 | 3900 | 123.5 | 15000 |
| 80.0 | 50 | 102.0 | 6500 | 124.0 | 9000 |
| 80.5 | 20 | 102.5 | 5500 | 124.5 | 15000 |
| 81.0 | 45 | 103.0 | 6000 | 125.0 | 16000 |
| 81.5 | 35 | 103.5 | 3500 | 125.5 | 4000 |

| Magnetic Susceptibility | | Drillhole number: 00962A1 | | | |
|-------------------------|--------------------|---------------------------|--------|-------|--------|
| Depth | Value | Depth | Value | Depth | Value |
| 126.0 | 20000 | 148.0 | 5400 | 170.0 | 7000 |
| 126.5 | 6000 | 148.5 | 15000 | 170.5 | 15000 |
| 127.0 | 8500 | 149.0 | 6300 | 171.0 | 20000 |
| 127.5 | 40000 | 149.5 | 5200 | 171.5 | 15000 |
| 128.0 | 40000 | 150.0 | 19000 | 172.0 | 17000 |
| 128.5 | Greater 100,000 | 150.5 | 14000 | 172.5 | 26000 |
| 129.0 | 25000 | 151.0 | 8000 | 173.0 | 20,000 |
| 129.5 | Greater 100,000 | 151.5 | 16000 | 173.5 | 12000 |
| 130.0 | Greater 100,000 | 152.0 | 8900 | 174.0 | 14000 |
| 130.5 | 40000 | 152.5 | 16000 | 174.5 | 26000 |
| 131.0 | 4600 | 153.0 | 45000 | 175.0 | 20000 |
| 131.5 | 7200 | 153.5 | 50000 | 175.5 | 23000 |
| 132.0 | 20000 | 154.0 | 52000 | 176.0 | 17000 |
| 132.5 | 22000 | 154.5 | 25000 | 176.5 | 22,000 |
| 133.0 | 4700 | 155.0 | 59000 | 177.0 | 11000 |
| 133.5 | 7100 | 155.5 | 25000 | 177.5 | 18000 |
| 134.0 | 8900 | 156.0 | 33000 | 178.0 | 26000 |
| 134.5 | 7000 | 156.5 | 16000 | 178.5 | 18000 |
| 135.0 | 6000 | 157.0 | 10000 | 179.0 | 16000 |
| 135.5 | 6400 | 157.5 | 22000 | 179.5 | 17000 |
| 136.0 | 4600 | 158.0 | 4000 | 180.0 | 14000 |
| 136.5 | 6200 | 158.5 | 42000 | 180.5 | 20000 |
| 137.0 | 5600 | 159.0 | 20000 | 181.0 | 27000 |
| 137.5 | 7500 | 159.5 | 22000 | 181.5 | 19000 |
| 138.0 | 6000 | 160.0 | 14000 | 182.0 | 7000 |
| 138.5 | 8300 | 160.5 | 14000 | 182.5 | 13000 |
| 139.0 | 5200 | 161.0 | 16000 | 183.0 | 20000 |
| 139.5 | 5400 | 161.5 | 18000 | 183.5 | 24000 |
| 140.0 | 6100 | 162.0 | 13000 | 184.0 | 20000 |
| 140.5 | 7200 | 162.5 | 3500 | 184.5 | 35000 |
| 141.0 | 4400 | 163.0 | 39000 | 185.0 | 24000 |
| 141.5 | 6800 | 163.5 | 3000 | 185.5 | 24000 |
| 142.0 | 5900 | 164.0 | 4200 | 186.0 | 13000 |
| 142.5 | 5200 | 164.5 | 3500 | 186.5 | 9500 |
| 143.0 | 7600 | 165.0 | 28000 | 187.0 | 8000 |
| 143.5 | 14000 | 165.5 | 30000 | 187.5 | 7300 |
| 144.0 | 5400 | 166.0 | 28000 | 188.0 | 6700 |
| 144.5 | 5200 | 166.5 | 18,000 | 188.5 | 8800 |
| 145.0 | 5600 | 167.0 | 12000 | 189.0 | 9300 |
| 145.5 | 7600 | 167.5 | 14000 | 189.5 | 9700 |
| 146.0 | 14000 | 168.0 | 17000 | 190.0 | 12000 |
| 146.5 | 20000 | 168.5 | 11000 | 190.5 | 17000 |
| 147.0 | 5500 | 169.0 | 22000 | 191.0 | 11000 |
| 147.5 | 9500 | 169.5 | 16000 | 191.5 | 9800 |

| Magnetic Susceptibility | | Drillhole number: DD96 ZAI | | | |
|-------------------------|-------|----------------------------|-------|-------|---------------------|
| Depth | Value | Depth | Value | Depth | Value |
| 192.0 | 15000 | 214.0 | 13000 | 236.0 | 17000 |
| 192.5 | 43000 | 214.5 | 15000 | 236.5 | 28000 |
| 193.0 | 15000 | 215.0 | 17000 | 237.0 | 30000 |
| 193.5 | 12000 | 215.5 | 14000 | 237.5 | 30000 |
| 194.0 | 6000 | 216.0 | 13000 | 238.0 | 30000 |
| 194.5 | 15000 | 216.5 | 20000 | 238.5 | 35000 |
| 195.0 | 15000 | 217.0 | 16000 | 239.0 | 20000 |
| 195.5 | 12000 | 217.5 | 13000 | 239.5 | 20000 |
| 196.0 | 25000 | 218.0 | 20000 | 240.0 | 17000 |
| 196.5 | 9200 | 218.5 | 17000 | 240.5 | 24 15000 |
| 197.0 | 9000 | 219.0 | 17000 | 241.0 | 28000 |
| 197.5 | 25000 | 219.5 | 16000 | 241.5 | 20000 |
| 198.0 | 7000 | 220.0 | 19000 | 242.0 | 20000 |
| 198.5 | 7000 | 220.5 | 22000 | 242.5 | 20000 |
| 199.0 | 13000 | 221.0 | 19000 | 243.0 | 18000 |
| 199.5 | 18000 | 221.5 | 22000 | 243.5 | 17000 |
| 200.0 | 18000 | 222.0 | 16000 | 244.0 | 19000 |
| 200.5 | 17000 | 222.5 | 16000 | 244.5 | 15000 |
| 201.0 | 20000 | 223.0 | 26000 | 245.0 | 14000 |
| 201.5 | 16000 | 223.5 | 21000 | 245.5 | 26000 |
| 202.0 | 16000 | 224.0 | 19000 | 246.0 | 19000 |
| 202.5 | 16000 | 224.5 | 18000 | 246.5 | 22000 |
| 203.0 | 19000 | 225.0 | 22000 | 247.0 | 35000 |
| 203.5 | 15000 | 225.5 | 57000 | 247.5 | 27000 |
| 204.0 | 20000 | 226.0 | 26000 | 248.0 | 12000 |
| 204.5 | 23000 | 226.5 | 19000 | 248.5 | 23000 |
| 205.0 | 17000 | 227.0 | 30000 | 249.0 | 17000 |
| 205.5 | 17000 | 227.5 | 22000 | 249.5 | 16000 |
| 206.0 | 17000 | 228.0 | 52000 | 250.0 | 16000 |
| 206.5 | 16000 | 228.5 | 47000 | 250.5 | 17000 |
| 207.0 | 12000 | 229.0 | 46000 | 251.0 | 19000 |
| 207.5 | 17000 | 229.5 | 26000 | 251.5 | 16000 |
| 208.0 | 19000 | 230.0 | 18000 | 252.0 | 12000 |
| 208.5 | 15000 | 230.5 | 14000 | 252.5 | 16000 |
| 209.0 | 15000 | 231.0 | 22000 | 253.0 | 18000 |
| 209.5 | 17000 | 231.5 | 8000 | 253.5 | 10000 |
| 210.0 | 14000 | 232.0 | 8700 | 254.0 | 17000 |
| 210.5 | 13000 | 232.5 | 12000 | 254.5 | 12000 |
| 211.0 | 14000 | 233.0 | 33000 | 255.0 | 13000 |
| 211.5 | 12000 | 233.5 | 26000 | 255.5 | 12000 |
| 212.0 | 14000 | 234.0 | 24000 | 256.0 | 10000 |
| 212.5 | 17000 | 234.5 | 22000 | 256.5 | 6000 |
| 213.0 | 12000 | 235.0 | 41000 | 257.0 | 5500 |
| 213.5 | 14000 | 235.5 | 32000 | 257.5 | 6000 |

| Magnetic Susceptibility | | Drillhole number: DD96 ZAI | | | |
|-------------------------|-------|----------------------------|-------|-------|-------|
| Depth | Value | Depth | Value | Depth | Value |
| 258.0 | 7000 | 280.0 | 10000 | 302.0 | |
| 258.5 | 4500 | 280.5 | 10000 | 302.5 | |
| 259.0 | 5200 | 281.0 | 7000 | 303.0 | |
| 259.5 | 4800 | 281.5 | 7200 | 303.5 | |
| 260.0 | 6700 | 282.0 | 8000 | 304.0 | |
| 260.5 | 5000 | 282.5 | 7500 | 304.5 | |
| 261.0 | 8700 | 283.0 | 6000 | 305.0 | |
| 261.5 | 7700 | 283.5 | 8500 | 305.5 | |
| 262.0 | 8100 | 284.0 | 8000 | 306.0 | |
| 262.5 | 6800 | 284.5 | 10000 | 306.5 | |
| 263.0 | 8700 | 285.0 | | 307.0 | |
| 263.5 | 9700 | 285.5 | | 307.5 | |
| 264.0 | 7700 | 286.0 | | 308.0 | |
| 264.5 | 6100 | 286.5 | | 308.5 | |
| 265.0 | 7400 | 287.0 | | 309.0 | |
| 265.5 | 8600 | 287.5 | | 309.5 | |
| 266.0 | 8400 | 288.0 | | 310.0 | |
| 266.5 | 6700 | 288.5 | | 310.5 | |
| 267.0 | 7700 | 289.0 | | 311.0 | |
| 267.5 | 10000 | 289.5 | | 311.5 | |
| 268.0 | 8000 | 290.0 | | 312.0 | |
| 268.5 | 11000 | 290.5 | | 312.5 | |
| 269.0 | 16000 | 291.0 | | 313.0 | |
| 269.5 | 12000 | 291.5 | | 313.5 | |
| 270.0 | 7000 | 292.0 | | 314.0 | |
| 270.5 | 15000 | 292.5 | | 314.5 | |
| 271.0 | 12000 | 293.0 | | 315.0 | |
| 271.5 | 15000 | 293.5 | | 315.5 | |
| 272.0 | 15000 | 294.0 | | 316.0 | |
| 272.5 | 15000 | 294.5 | | 316.5 | |
| 273.0 | 12000 | 295.0 | | 317.0 | |
| 273.5 | 20000 | 295.5 | | 317.5 | |
| 274.0 | 18000 | 296.0 | | 318.0 | |
| 274.5 | 20000 | 296.5 | | 318.5 | |
| 275.0 | 10000 | 297.0 | | 319.0 | |
| 275.5 | 11000 | 297.5 | | 319.5 | |
| 276.0 | 15000 | 298.0 | | 320.0 | |
| 276.5 | 16000 | 298.5 | | 320.5 | |
| 277.0 | 20000 | 299.0 | | 321.0 | |
| 277.5 | 15000 | 299.5 | | 321.5 | |
| 278.0 | 10000 | 300.0 | | 322.0 | |
| 278.5 | 10000 | 300.5 | | 322.5 | |
| 279.0 | 25000 | 301.0 | | 323.0 | |
| 279.5 | 20000 | 301.5 | | 323.5 | |

428058

DRILL CORE LOG

TENEMENT NAME ZEEKAN 1 No.

PLAN - MAP REFERENCE ANEBURY

CO-ORDINATES..... AZIMUTH..... DRILLERS ALMAC COMMENCED 31/12/96

DEPTH..... HOLE No. DA6ZA

RL COLLAR..... INCLINATION..... DRILL TYPE LFD COMPLETED.....

CASING LEFT..... DPO No(s)..... 2

| DEPTH | | Core Rec. LMT % | Core Size RD | Graphic Log | CORE DESCRIPTION | SPECIAL FEATURES Weath, Alteration, Fracturing, Veining, Mineralization | Sample No. | From (M) | To (M) | Rec (M) | ASSAY VALUES (Analysed by.....) | | | |
|----------|--------|-----------------|--------------|-------------|--|---|------------|----------|--------|---------|---------------------------------|--------|----------|--------|
| From (M) | To (M) | | | | | | | | | | From (M) | To (M) | From (M) | To (M) |
| 0 | 2 | - | - | - | Overburden - not recovered | | | | | | 2 | 3.5 | 1.3 | |
| 2 | 5.9 | 75 | SX | | Ferruginous clay rock more iron rusty at top of unit. | | | | | | 3.5 | 5 | 1.5 | 100 |
| | | | | | | | | | | | 5 | 6.5 | 1.2 | 80 |
| | | | | | | | | | | | 6.5 | 7.4 | 0.7 | 77 |
| | | | | | | | | | | | 7.4 | 7.7 | 0.25 | 83 |
| | | | | | | | | | | | 7.7 | 9.2 | 0.5 | 100 |
| 5.9 | 15.0 | 90 | IF | | Partially weathered Grey/green volcanic rock probably tuff material or Agglomerate End of HQ @ 15m. | Silicified and chloritized Purple mineral < 1mm blobs disseminated throughout core possibly carbonate Almost porphyritic - med/coarse grained. | | | | | 9.2 | 10.7 | 1.5 | 100 |
| | | | | | | | | | | | 10.7 | 12.2 | 1.5 | 100 |
| | | | | | | | | | | | 12.2 | 13.7 | 1.5 | 100 |
| | | | | | | | | | | | 13.7 | 15.0 | 1.3 | 100 |
| | | | | | | | | | | | 15.0 | 17.0 | 2.0 | 100 |
| | | | | | | | | | | | 17.0 | 19.8 | 2.8 | 100 |
| | | | | | | | | | | | 19.8 | 21.0 | 1.2 | 100 |
| 15.0 | 42.0 | 100 | IF | | Start of HQ Green/grey volcanic rock probably an andesitic/dacitic lava agglomerate. Locally porphyritic (med/coarse grained) localised intraformational brecciation; hints of presence of amygdalae. | Strongly silicified and chloritized - chlorite more prevalent downhole. Purple/off white mineral disseminated thro' rock probably carbonate or smectite. Zones of massive fine grained chlorite after 30m? veins. No qtz or carb veins unshattered core - no sulphides. | | | | | 21.0 | 23.0 | 2.0 | 100 |
| | | | | | | | | | | | 23.0 | 24.9 | 1.9 | 100 |
| | | | | | | | | | | | 24.9 | 27.9 | 3.0 | 100 |
| | | | | | | | | | | | 27.9 | 29.0 | 1.1 | 100 |
| | | | | | | | | | | | 29.0 | 32.0 | 3.0 | 100 |
| | | | | | | | | | | | 32.0 | 35.0 | 3.0 | 100 |
| | | | | | | | | | | | 35.0 | 38.0 | 3.0 | 100 |
| | | | | | | | | | | | 38.0 | 40.2 | 2.2 | 100 |
| | | | | | | | | | | | 40.2 | 42.0 | 1.8 | 100 |
| | | | | | | | | | | | 42.0 | 44.0 | 2.0 | 100 |
| | | | | | | | | | | | 44.0 | 46.2 | 2.2 | 100 |
| | | | | | | | | | | | 46.2 | 49.0 | 1.9 | 100 |
| 42.0 | 48.5 | 100 | IF | | Finer grained porphyritic andesitic lava. | Chlorite alteration Minor zones of silicification 2 phases of chlorite Purple mineral not obvious. | | | | | 48.0 | 50.0 | 2.0 | 100 |
| | | | | | | | | | | | 50.0 | 53.0 | 3.0 | 100 |
| | | | | | | | | | | | 53.0 | 56.0 | 3.0 | 100 |
| | | | | | | | | | | | 56.0 | 59.0 | 3.0 | 100 |
| | | | | | | | | | | | 59.0 | 62.0 | 3.0 | 100 |
| | | | | | | | | | | | 62.0 | 65.0 | 3.0 | 100 |

428059

DRILL CORE LOG

TENEMENT NAME..... No.....

PLAN - MAP REFERENCE.....

CO-ORDINATES..... AZIMUTH..... DRILLERS..... COMMENCED..... DEPTH..... HOLE No. **DD962A2**

RL COLLAR..... INCLINATION..... DRILL TYPE..... COMPLETED..... CASING LEFT..... DPO No(s).....

| DEPTH | | Core Rec. (M) | Core Size | Graphic Log | CORE DESCRIPTION | SPECIAL FEATURES Weath. Alteration, Fracturing, Veining, Mineralization | Sample No. | From (M) | To (M) | Rec (M) | ASSAY VALUES (Analysed by.....) | | | | |
|----------|--------|---------------|-----------|-------------|--|---|------------|----------|--------|---------|---------------------------------|-------|-------|------|------|
| From (M) | To (M) | | | | | | | | | | From | To | Rec | % | |
| 48.5 | 51.7 | 100 | 1f | | Mixed fine grained andesitic lava and porphyritic lava. | Localized reappearance of purple mineral. Highly variable alteration patterns - mainly chloritization +/- silicification | | | | | | 65.0 | 68.0 | 3.0 | 100 |
| | | | | | | | | | | | | 67.0 | 69.3 | 1.2 | 90 |
| | | | | | | | | | | | | 69.3 | 71.0 | 1.7 | 100 |
| | | | | | | | | | | | | 71.0 | 74.0 | 3.0 | 100 |
| | | | | | | | | | | | | 74.0 | 77.0 | 3.0 | 100 |
| | | | | | | | | | | | | 77.0 | 80.0 | 3.0 | 100 |
| 51.7 | 56.4 | 100 | 1f | | Fine grained porphyritic andesitic lava; sec clasts suggesting agglomeratic generally quite uniform. | Chloritized | | | | | | 82.0 | 83.0 | 3.0 | 100 |
| | | | | | | | | | | | | 83.0 | 86.0 | 3.0 | 100 |
| | | | | | | | | | | | | 86.0 | 89.0 | 3.0 | 100 |
| | | | | | | | | | | | | 89.0 | 92.0 | 3.0 | 100 |
| | | | | | | | | | | | | 92.0 | 95.0 | 3.0 | 100 |
| 56.4 | 58.0 | 100 | 1f | | Volcanic breccia with rounded clasts in a partially silicified chlorite/carbonate matrix ?lapilli tufts | | | | | | | 95.0 | 98.0 | 3.0 | 100 |
| | | | | | | | | | | | | 98.0 | 101.0 | 3.0 | 100 |
| | | | | | | | | | | | | 101.0 | 104.0 | 3.0 | 100 |
| | | | | | | | | | | | | 104.0 | 104.5 | 0.5 | 100 |
| | | | | | | | | | | | | 104.5 | 109.5 | 2.85 | 95 |
| | | | | | | | | | | | | 109.5 | 110.5 | 3.0 | 100 |
| 58.0 | 62.0 | 100 | 2f | | Fine grained porphyritic lava with possibly large amygdaloides | Chloritized localized variable alteration in 2 nd phase chlorite, silica (+/- carbonate + serpentine). | | | | | | 110.5 | 113.5 | 3.0 | 100 |
| | | | | | | | | | | | | 113.5 | 116.5 | 3.0 | 100 |
| | | | | | | | | | | | | 116.5 | 119.5 | 2.85 | 95 |
| | | | | | | | | | | | | 119.5 | 122.5 | 3.0 | 100 |
| | | | | | | | | | | | | 122.5 | 125.5 | 3.0 | 100 |
| 62.0 | 63.8 | 100 | 1f | | Thermally altered fine grained lava. | Possible small scale spherulite (dark brown) veining 25° t.c./A. 2 nd phase chlorite alteration abundant. | | | | | | 125.5 | 127.5 | 2.0 | 100 |
| | | | | | | | | | | | | 127.5 | 129.0 | 1.4 | 92 |
| | | | | | | | | | | | | 129.0 | 131.0 | 2.0 | 100 |
| | | | | | | | | | | | | 131.0 | 133.4 | 2.4 | 100 |
| | | | | | | | | | | | | 133.4 | 135.1 | 1.7 | 37.5 |
| 63.8 | 68.4 | 100 | 1f | | lt grey/green soft unit Probably chlorite, carbonate (calcite) and serpentine - minor etc or ?clasts. | Upper contact 60° t.c./A. Disseminated magnetite Sharp increase in magnetic susceptibility. | | | | | | 135.1 | 137.0 | 1.9 | 100 |
| | | | | | | | | | | | | 137.0 | 139.2 | 2.2 | 100 |
| | | | | | | | | | | | | 139.2 | 140.0 | 0.8 | 100 |

DRILL CORE LOG

TENEMENT NAME..... No.

PLAN - MAP REFERENCE.....

428060

CO-ORDINATES..... AZIMUTH..... DRILLERS..... COMMENCED..... DEPTH..... HOLE No. DD962A2

RL COLLAR..... INCLINATION..... DRILL TYPE..... COMPLETED..... CASING LEFT..... DPO No(s).....

| DEPTH | | Core Rec. (M) | Core Size | Graphic Log | CORE DESCRIPTION | SPECIAL FEATURES Weath, Alteration, Fracturing, Veining, Mineralization | Sample No. | From (M) | To (M) | Rec (M) | ASSAY VALUES (Analysed by.....) | | | |
|----------|--------|---------------|-----------|-------------|--|--|------------|----------|--------|---------|---------------------------------|--------|---------|-----|
| From (M) | To (M) | | | | | | | | | | From (m) | To (m) | As. (m) | % |
| | | | | | Qtz vein with associated magnetite 67.7-68m. | Minor calcite veins generally 70° to c/a. Clots of reddish brown sphalerite from 66m onwards (< 3cm size). Dissem. sphalerite zone 3cm @ 67.55m. in ? limestone. | | | | | 140.0 | 143.0 | 3.0 | 100 |
| | | | | | | | | | | | 143.0 | 146.0 | 2.85 | 95 |
| | | | | | | | | | | | 146.0 | 149.0 | 3.0 | 100 |
| | | | | | | | | | | | 149.0 | 152.0 | 3.0 | 100 |
| | | | | | | | | | | | 152.0 | 153.3 | 1.0 | 76 |
| | | | | | | | | | | | 153.3 | 154.8 | 1.3 | 79 |
| | | | | | | | | | | | 154.8 | 155.5 | 0.7 | 55 |
| 3.4 | 68.8 | 100 | 1f | | Qtz-carbonate vein | Diffuse contact - upper lower contact 45° E c/a. | | | | | 155.5 | 158.0 | 2.5 | 100 |
| | | | | | | | | | | | 158.0 | 161.0 | 2.9 | 98 |
| | | | | | | | | | | | 161.0 | 164.0 | 3.0 | 100 |
| 68.8 | 70.95 | 100 | 2f | | DK grey/black magnetic unit | Abundant disseminated (10%) sphalerite (+/- pyrrhotite) localised zones of pyrite irregular calcite veins and vugs lower contact 75° E c/a but irregular. | | | | | 164.0 | 167.0 | 2.85 | 95 |
| | | | | | | | | | | | 167.0 | 170.0 | 3.0 | 100 |
| | | | | | | | | | | | 170.0 | 172.6 | 2.6 | 100 |
| | | | | | | | | | | | 172.6 | 175.7 | 3.1 | 100 |
| | | | | | | | | | | | 175.7 | 178.8 | 3.1 | 100 |
| | | | | | | | | | | | 178.8 | 181.6 | 2.8 | 100 |
| | | | | | | | | | | | 181.6 | 184.6 | 3.0 | 100 |
| | | | | | | | | | | | 184.6 | 187.7 | 3.1 | 100 |
| 70.95 | 72.6 | 100 | 1f | | lt grey/green unit calcareous - possibly replaced clean limestone. Strong possibility of serpentine alteration | Partially silicified - minor pyrite dissem blebs - ? calcification. | | | | | 187.7 | 189.2 | 1.5 | 97 |
| | | | | | | | | | | | 189.2 | 189.9 | 0.7 | 100 |
| | | | | | | | | | | | 189.9 | 191.7 | 1.2 | 95 |
| | | | | | | | | | | | 191.7 | 193.4 | 2.0 | 100 |
| | | | | | | | | | | | 193.4 | 196.4 | 3.0 | 100 |
| 72.6 | 72.75 | 100 | 1f | | Calcite/serpentine/magnetite vein with large < 3cm mass of pyrite, sphalerite + chalcopyrite | Vein contacts 85° to c/a. | | | | | 196.4 | 197.4 | 3.0 | 100 |
| | | | | | | | | | | | 197.4 | 200.0 | 2.5 | 95 |
| | | | | | | | | | | | 200.0 | 203.0 | 3.0 | 100 |
| | | | | | | | | | | | 203.0 | 206.0 | 3.0 | 100 |
| 72.75 | 73.65 | 100 | 4f | | Green/Dark Turquoise calcareous unit | | | | | | 206.0 | 209.0 | 3.0 | 100 |
| | | | | | | | | | | | 209.0 | 211.9 | 2.9 | 100 |
| | | | | | | | | | | | 211.9 | 214.4 | 2.5 | 100 |
| | | | | | | | | | | | 214.4 | 217.4 | 3.0 | 100 |

428061

DRILL CORE LOG

42

TENEMENT NAME..... No.....

PLAN - MAP REFERENCE.....

CO-ORDINATES..... AZIMUTH..... DRILLERS..... COMMENCED..... DEPTH..... HOLE No. DD962A2

RL COLLAR..... INCLINATION..... DRILL TYPE..... COMPLETED..... CASING LEFT..... DPO No(s).....

| DEPTH | | Core Rec. (M) | Core Size | Graphic Log | CORE DESCRIPTION | SPECIAL FEATURES Weath, Alteration, Fracturing, Veining, Mineralization | Sample No. | From (M) | To (M) | Rec (M) | ASSAY VALUES (Analysed by.....) | | | | |
|----------|--------|---------------|-----------|-------------|--|---|------------|----------|--------|---------|---------------------------------|--------|---------|-----|-----|
| From (M) | To (M) | | | | | | | | | | From (m) | To (m) | Rec (m) | % | |
| 73.65 | 75.0 | 100 | if | | Lt grey/green calcareous unit - replaced limestone | ?clots of sphalerite (reddish brown) locally | | | | | | 217.4 | 220.5 | 3.1 | 100 |
| | | | | | | | | | | | | 220.5 | 223.6 | 3.1 | 100 |
| | | | | | | | | | | | | 223.6 | 226.6 | 3.0 | 100 |
| 77.0 | 82.7 | 100 | if | | Magnetite - carbonate - serpentine altered limestone unit. locally semi-massive magnetite or disseminated blebs < 2mm in size. | Disseminated veinlets of pyrite. Minor blebs of sphalerite. Weakly calcareous at base - ? calcilicites present. | | | | | | 226.6 | 229.6 | 3.0 | 100 |
| | | | | | | | | | | | | 229.6 | 232.6 | 3.0 | 100 |
| | | | | | | | | | | | | 232.6 | 234.0 | 1.3 | 95 |
| | | | | | | | | | | | | 234.0 | 236.0 | 2.0 | 100 |
| | | | | | | | | | | | | 236.0 | 236.8 | 0.8 | 100 |
| | | | | | | | | | | | | 236.8 | 239.0 | 2.2 | 100 |
| 82.7 | 83.05 | 100 | if | | 3-4mm disseminated magnetite zone | with blebs of reddish/brown sphalerite. | | | | | | 239.0 | 242.0 | 3.0 | 100 |
| | | | | | | | | | | | | 242.0 | 245.0 | 3.0 | 100 |
| | | | | | | | | | | | | 245.0 | 247.0 | 3.0 | 100 |
| 93.05 | 96.0 | 100 | if | | Grey/dark grey/green carbonate magnetite-serpentine unit possible calcilicites | Occ blebs of pyrite, + minor sphalerite | | | | | | 247.0 | 250.0 | 2.9 | 100 |
| | | | | | | | | | | | | 250.0 | 252.5 | 1.6 | 100 |
| | | | | | | | | | | | | 252.5 | 254.0 | 1.5 | 100 |
| | | | | | | | | | | | | 254.0 | | | |
| 86.0 | 87.0 | | | | Magnetite-Carbonate-serpentine unit with semi-massive magnetite | Minor pyrite blebs (2-5mm) or disseminated veinlets. | | | | | | | | | |
| 87.7 | 90.7 | 100 | if | | Grey/dark grey carbonate = magnetite - serpentine unit | Minor pyrite & sphalerite blebs (2-5mm) | | | | | | | | | |
| 90.7 | 93.3 | 100 | if | | Magnetite-carbonate-serpentine unit - semi massive magnetite | Minor pyrite blebs. | | | | | | | | | |
| 93.3 | 102.2 | 100 | if | | Grey/dark grey carbonate magnetite-serpentine unit. | Minor pyrite & pyrrhotite blebs. Magnetite (semi-massive) areas ~3-8cm bands and blebs occur every 20-40m. | | | | | | | | | |

occur every 20-40m.

| CRA Exploration Pty. Limited - Diamond drill core log | | | | Hole No: DD97ZA3 | |
|---|-------|---|--|-----------------------------------|--|
| Tenement: EL 28/88 Avebury, Tasmania | | | Map Ref.: SK 55-5, Queenstown | | |
| Collar R.L.: 150m | | Co-ordinates: 354793E, 5357206N | | Hole Orientation: 65° towards 360 | |
| | | | | Logged by: TJG | |
| From | To | Geological Description | Special Features | Core Orientation | |
| 0 | 8 | Limonitic Fe-stained overbuden (?siltstone). | Possible bedding angle @ 20° to LCA | | |
| 8 | 10.2 | Ferruginous clay altered siltstone. Orange Fe-staining. 3 to 10mm clasts evident may be indicative of a conglomerate. | Minor limonite. | | |
| 10.2 | 28 | Ferruginous siltstone. Orange to light grey | Minor limonite. Bedding @ 25 - 30° to LCA. Some shearing evident. | | |
| 28 | 92.5 | Fine- to medium-grained blue/grey to greenish chloritic volcanic. Initially quite broken, becoming more competent around 36.0m. Partially silicified, with small zone of chert. | Contact with siltstone marked by a clay-altered puggy zone. @ 34.3m - quartz carbonate vein 3cm thick which contains a 2mm pyrite vein. Minor Limonite present, none below 40m. ?Chrysotile/gypsum veins @ 40° to LCA | | |
| 92.5 | 95.5 | 3m cavity. Waterwashed, chloritic volcanic pebbles. | | | |
| 95.5 | 109.1 | Grey to bluish green, medium- to fine-grained volcanic unit. Chloritic clasts up to 5cm. | Minor fine-grained disseminated sulphides. Fine-grained pinkish-white mineral throughout, possibly a sulphide. | | |
| 109.1 | 119.3 | Highly silicified, chloritic mafic volcanic, becoming increasingly altered with depth. Some epidote evident, as well as large chlorite clasts, often washed out. Contact with chert below irregular and marked by carbonate veins @ moderate angle to LCA. | | | |
| 119.3 | 154 | Silicified siltstone. Banding @ 45 to 60° to LCA. Chlorite veins @ moderate angle to LCA. Banding in chert steepens around 124.3m, steepening to 30° around 153m. Occasional brittle disruption evident. Reddish bands in chert associated with Fe-sulphides. | Straw-coloured crystals with reddish cores @ 119.8 - 124.2m & 133.6m. Fe sulphides in @ 121m, largely pyrite but possibly some pyrrhotite. Silicified chlorite veins around 138m containing sphalerite, galena, pyrite and pyrrhotite. | | |
| 154 | 162.5 | Irregularly banded silicified siltstone and coarser unit, ?volcanic (feldspar phenocrysts). Coarser units more chloritic. Banding in siltstone @ 45° to LCA. Carbonate veining. | | | |
| 162.5 | 181.6 | Similar to above unit, but more fractured. Irregular steep veining responsible for hydraulic fracturing. Carbonate veining @ 30° to LCA. Broken core from 165.7 related to cavities. Serpentine associated with carbonate from 180.4m indicative of ultramafic. | Chalcopyrite @ 180m associated with pyrite. 30cm wide magnetite-rich band from 180.5m. | | |
| 181.6 | 188.2 | Greenish calc-silicate unit. Patchy serpentinite throughout, indicative of altered ultramafic. Becoming increasingly serpentine-rich between 184.9 & 185.5m. Contact with unit above more or less gradational becoming increasingly carbonate rich. | Sparsely disseminated sphalerite has strong association with pyrrhotite. Rare galena. | | |
| 188.2 | 189.7 | Similar to unit above, but more serpentine-rich. Carbonate-rich altered ultramafic. Serpentine almost ?colloidal. | Rare sphalerite. Up to 1% disseminated pyrrhotite. Greenish mineral present in minor amounts, similar to malachite but doesn't have the same colour. | | |
| 189.7 | 192.3 | Carbonate-rich unit with occasional serpentine. 20cm serpentine-rich band @ 191.5m and 10cm band @ 190.3m. Disseminated magnetite throughout. | Pyrrhotite patchy, in very crude bands. Pinkish bronze mineral gives the appearance of native copper, patchy (minor). | | |
| 192.3 | 194 | Serpentine-rich band. Colloidal. Carbonate-rich. | Minor disseminated sulphide (Cu-looking). | | |
| 194 | 198.4 | White carbonate-rich unit. Possibly some silicification. Occasional black crystalline minerals, ?pyroxene. 15cm band from 194.3m has sedimentary appearance. Appears to be composed largely of banded pyrrhotite and dolomite. Rock greenish with depth. | Rare sulphides including pinkish bronze mineral (non-magnetic). | | |
| 198.4 | 199.8 | Contact irregular but approximately 20° to LCA. Unit grey, becoming greenish, with lower contact grading to a green calc-silicate. Unit probably an altered ultramafic possibly serpentinitised. | Wavy magnetite + pyrrhotite bands throughout, with 10cm band from 199m | | |

| CRA Exploration Pty. Limited - Diamond drill core log | | | Hole No: DD97ZA3 |
|---|---------------------------------|---|---|
| Tenement: EL 28/88 Avebury, Tasmania | | Map Ref.: SK 55-5, Queenstown | |
| Collar R.L.: 150m | Co-ordinates: 354793E, 5357206N | Hole Orientation: 65° towards 360 | Logged by: TJG |
| 199.8 | 205.3 | Greenish-white calc-silicate. Sparsely disseminated black crystals possibly pyroxene. Minor serpentine. Carbonate-rich. Becoming grey between 204.2 and 204.7m associated with an increase in mafics, magnetite and pyrrhotite. | Non-magnetic pinkish bronze sulphides in sparsely disseminated 1cm patches. |
| 205.3 | 209 | Serpentinite, with slightly irregular magnetite-rich bands up to 40cm. Serpentine very green and soft. Some radial, acicular asbestos present. | Aggregates (up to 1cm) of non-magnetic pinkish bronze mineral throughout. These have silvery-grey altered margins, ?niccolite. Pyrrhotite in crude bands (<1%), associated with second sulphide phase, ?pentlandite. |
| 209 | 211.4 | White-green calc-silicate with 35cm serpentine-rich band from 210.55m. From 209.3 to 210m brownish bands (?dolomite and ?pyrrhotite) have a sedimentary appearance. Some relict chromite in calc-silicate and possibly some ?adularia. Epidote present. | Fine-grained sulphides ?pyrrhotite in serpentinite. |
| 211.4 | 213.5 | Dark green unit with common carbonate veining. Little silicification evident. Occasional 'sedimentary' bands comprising ?dolomite evident. Unit generally devoid of sulphides. | |
| 213.5 | 228.5 | Pinkish, carbonate-veined chert (silicified siltstone). Carbonate veins <1mm, with occasional 1cm veins, generally @ >45° to LCA. 1.1m zone of green calc-silicate from 225.7m. | |
| 228.5 | 241.4 | Highly deformed, grey, silicified, carbonate-rich unit (siltstone). Occasional breccia zone with angular to sub-angular clasts. Banding variable due to deformation. Pinkish bands in overall grey unit, similar to unit above. | |
| 241.4 | 243.9 | Pink silicified siltstone. Carbonate-rich. Rare fine-grained pyrite. | |
| 243.9 | 246.9 | Silicified, grey carbonate-rich siltstone. Occasional carbonate veins. Devoid of sulphides. Chlorite-rich in parts + epidote. Occasional pinkish bands. | |
| 246.9 | 256 | Highly deformed silicified siltstone. Initially chloritic with granular epidote evident. Carbonate veins common (1 up to 1cm). | Sulphides in @ 247.5m, yellowish green and pinkish bronze, one possibly replacing the other. Pyrite and pyrrhotite around 247.8m. 2nd zone of sulphides between 252.5 and 254m. Pyrrhotite and yellowish green sulphide dominant. |
| EOH | | | |

| Magnetic Susceptibility | | | | | |
|-------------------------|-------|-------|---------------------------|-------|-------|
| Total Depth: 256 | | | Drillhole Number: DD97ZA3 | | |
| CL = Core Loss | | | | | |
| Depth | Value | Depth | Value | Depth | Value |
| 0.0 | | 20.0 | 10 | 40.0 | CL |
| 0.5 | | 20.5 | CL | 40.5 | CL |
| 1.0 | | 21.0 | 4 | 41.0 | 19 |
| 1.5 | | 21.5 | 11 | 41.5 | CL |
| 2.0 | 10 | 22.0 | 4 | 42.0 | 15 |
| 2.5 | 5 | 22.5 | 5 | 42.5 | 30 |
| 3.0 | 15 | 23.0 | 0 | 43.0 | 32 |
| 3.5 | 10 | 23.5 | 0 | 43.5 | 30 |
| 4.0 | CL | 24.0 | CL | 44.0 | 30 |
| 4.5 | CL | 24.5 | 0 | 44.5 | 40 |
| 5.0 | 6 | 25.0 | 5 | 45.0 | 30 |
| 5.5 | CL | 25.5 | CL | 45.5 | 36 |
| 6.0 | 5 | 26.0 | 5 | 46.0 | 32 |
| 6.5 | 0 | 26.5 | 5 | 46.5 | 25 |
| 7.0 | 10 | 27.0 | CL | 47.0 | 15 |
| 7.5 | 14 | 27.5 | 10 | 47.5 | 22 |
| 8.0 | 0 | 28.0 | 14 | 48.0 | 30 |
| 8.5 | - | 28.5 | CL | 48.5 | 40 |
| 9.0 | 0 | 29.0 | CL | 49.0 | 30 |
| 9.5 | - | 29.5 | 32 | 49.5 | 35 |
| 10.0 | 0 | 30.0 | CL | 50.0 | 34 |
| 10.5 | - | 30.5 | CL | 50.5 | 31 |
| 11.0 | - | 31.0 | 23 | 51.0 | 45 |
| 11.5 | 5 | 31.5 | 35 | 51.5 | 50 |
| 12.0 | 0 | 32.0 | 39 | 52.0 | 40 |
| 12.5 | 0 | 32.5 | CL | 52.5 | 30 |
| 13.0 | 5 | 33.0 | 15 | 53.0 | 30 |
| 13.5 | 10 | 33.5 | CL | 53.5 | 40 |
| 14.0 | 4 | 34.0 | 5 | 54.0 | 39 |
| 14.5 | 8 | 34.5 | CL | 54.5 | 20 |
| 15.0 | 15 | 35.0 | 20 | 55.0 | 40 |
| 15.5 | 15 | 35.5 | 29 | 55.5 | 30 |
| 16.0 | 2 | 36.0 | 40 | 56.0 | 38 |
| 16.5 | CL | 36.5 | 30 | 56.5 | 39 |
| 17.0 | 0 | 37.0 | 22 | 57.0 | 30 |
| 17.5 | 5 | 37.5 | CL | 57.5 | 40 |
| 18.0 | 0 | 38.0 | 25 | 58.0 | 38 |
| 18.5 | 2 | 38.5 | 10 | 58.5 | 25 |
| 19.0 | 4 | 39.0 | 22 | 59.0 | 35 |
| 19.5 | 0 | 39.5 | 30 | 59.5 | 32 |

| Magnetic Susceptibility | | Drillhole number: DD972A3 | | | |
|-------------------------|-------|---------------------------|-------|-------|-------|
| Depth | Value | Depth | Value | Depth | Value |
| 60.0 | 35 | 82.0 | 40 | 104.0 | 42 |
| 60.5 | 32 | 82.5 | 4 | 104.5 | 40 |
| 61.0 | 38 | 83.0 | 50 | 105.0 | 10 |
| 61.5 | 42 | 83.5 | 25 | 105.5 | 25 |
| 62.0 | 42 | 84.0 | 40 | 106.0 | 0 |
| 62.5 | 30 | 84.5 | 40 | 106.5 | 40 |
| 63.0 | 28 | 85.0 | CL | 107.0 | 45 |
| 63.5 | 16 | 85.5 | 15 | 107.5 | 26 |
| 64.0 | 33 | 86.0 | CL | 108.0 | 30 |
| 64.5 | 25 | 86.5 | CL | 108.5 | 30 |
| 65.0 | 20 | 87.0 | CL | 109.0 | 25 |
| 65.5 | 26 | 87.5 | CL | 109.5 | 15 |
| 66.0 | 30 | 88.0 | 26 | 110.0 | 21 |
| 66.5 | 20 | 88.5 | 25 | 110.5 | 40 |
| 67.0 | 30 | 89.0 | 21 | 111.0 | 6 |
| 67.5 | 25 | 89.5 | 23 | 111.5 | 9 |
| 68.0 | 26 | 90.0 | 30 | 112.0 | 35 |
| 68.5 | 23 | 90.5 | 12 | 112.5 | 16 |
| 69.0 | 25 | 91.0 | 45 | 113.0 | 36 |
| 69.5 | 24 | 91.5 | 20 | 113.5 | 40 |
| 70.0 | 23 | 92.0 | 23 | 114.0 | 38 |
| 70.5 | 10 | 92.5 | 6 | 114.5 | CL |
| 71.0 | 37 | 93.0 | CL | 115.0 | CL |
| 71.5 | 25 | 93.5 | CL | 115.5 | CL |
| 72.0 | 24 | 94.0 | CL | 116.0 | 46 |
| 72.5 | 14 | 94.5 | CL | 116.5 | CL |
| 73.0 | 30 | 95.0 | CL | 117.0 | CL |
| 73.5 | 10 | 95.5 | CL | 117.5 | 30 |
| 74.0 | 15 | 96.0 | CL | 118.0 | 23 |
| 74.5 | 22 | 96.5 | CL | 118.5 | 36 |
| 75.0 | 35 | 97.0 | 35 | 119.0 | 12 |
| 75.5 | 15 | 97.5 | CL | 119.5 | 6 |
| 76.0 | 33 | 98.0 | 15 | 120.0 | 19 |
| 76.5 | 11 | 98.5 | 26 | 120.5 | 7 |
| 77.0 | 24 | 99.0 | 30 | 121.0 | 11 |
| 77.5 | 30 | 99.5 | 33 | 121.5 | 320 |
| 78.0 | 30 | 100.0 | 30 | 122.0 | 15 |
| 78.5 | 25 | 100.5 | 38 | 122.5 | 65 |
| 79.0 | 15 | 101.0 | 14 | 123.0 | 30 |
| 79.5 | 13 | 101.5 | 15 | 123.5 | 36 |
| 80.0 | 40 | 102.0 | 26 | 124.0 | 200 |
| 80.5 | 35 | 102.5 | 35 | 124.5 | 28 |
| 81.0 | 35 | 103.0 | 20 | 125.0 | 26 |
| 81.5 | 35 | 103.5 | 10 | 125.5 | 6 |

| Magnetic Susceptibility | | Drillhole number: DD97 ZA3 | | | |
|-------------------------|-------|----------------------------|-------|-------|-------|
| Depth | Value | Depth | Value | Depth | Value |
| 126.0 | 20 | 148.0 | 2 | 170.0 | 18 |
| 126.5 | 6 | 148.5 | 3 | 170.5 | 12 |
| 127.0 | 5 | 149.0 | 5 | 171.0 | 15 |
| 127.5 | 5 | 149.5 | 4 | 171.5 | 10 |
| 128.0 | 4 | 150.0 | 10 | 172.0 | 15 |
| 128.5 | 5 | 150.5 | 4 | 172.5 | 12 |
| 129.0 | 3 | 151.0 | 3 | 173.0 | 10 |
| 129.5 | 5 | 151.5 | 5 | 173.5 | 5 |
| 130.0 | 6 | 152.0 | 15 | 174.0 | 10 |
| 130.5 | 3 | 152.5 | 10 | 174.5 | 10 |
| 131.0 | 5 | 153.0 | 6 | 175.0 | 5 |
| 131.5 | 5 | 153.5 | 25 | 175.5 | 50 |
| 132.0 | 4 | 154.0 | 25 | 176.0 | 40 |
| 132.5 | 6 | 154.5 | 25 | 176.5 | 10 |
| 133.0 | 5 | 155.0 | 5 | 177.0 | 15 |
| 133.5 | 8 | 155.5 | 6 | 177.5 | 10 |
| 134.0 | 9 | 156.0 | 7 | 178.0 | 32 |
| 134.5 | 13 | 156.5 | 22 | 178.5 | 55 |
| 135.0 | 15 | 157.0 | 15 | 179.0 | 50 |
| 135.5 | 15 | 157.5 | 22 | 179.5 | 60 |
| 136.0 | 18 | 158.0 | 15 | 180.0 | 35 |
| 136.5 | 17 | 158.5 | 20 | 180.5 | 20 |
| 137.0 | 5 | 159.0 | 10 | 181.0 | 520 |
| 137.5 | 25 | 159.5 | 15 | 181.5 | 300 |
| 138.0 | 5 | 160.0 | 8 | 182.0 | 29 |
| 138.5 | 5 | 160.5 | 22 | 182.5 | 25 |
| 139.0 | 8 | 161.0 | 15 | 183.0 | 33 |
| 139.5 | 15 | 161.5 | 6 | 183.5 | 20 |
| 140.0 | 22 | 162.0 | 15 | 184.0 | 34 |
| 140.5 | 45 | 162.5 | 15 | 184.5 | 40 |
| 141.0 | 13 | 163.0 | 14 | 185.0 | 45 |
| 141.5 | 4 | 163.5 | 15 | 185.5 | 30 |
| 142.0 | 20 | 164.0 | 10 | 186.0 | 25 |
| 142.5 | 6 | 164.5 | 7 | 186.5 | 45 |
| 143.0 | 22 | 165.0 | 15 | 187.0 | 30 |
| 143.5 | 9 | 165.5 | 5 | 187.5 | 25 |
| 144.0 | 4 | 166.0 | 10 | 188.0 | 50 |
| 144.5 | 13 | 166.5 | 17 | 188.5 | 100 |
| 145.0 | 15 | 167.0 | 25 | 189.0 | 1800 |
| 145.5 | 3 | 167.5 | CL | 189.5 | 60 |
| 146.0 | 2 | 168.0 | CL | 190.0 | 650 |
| 146.5 | 3 | 168.5 | CL | 190.5 | 50 |
| 147.0 | 2 | 169.0 | 10 | 191.0 | 70 |
| 147.5 | 3 | 169.5 | 10 | 191.5 | 40 |

| Magnetic Susceptibility | | Drillhole number: DD97ZAB | | | |
|-------------------------|-------|---------------------------|-------|-------|-------|
| Depth | Value | Depth | Value | Depth | Value |
| 192.0 | 70 | 214.0 | 15 | 236.0 | 32 |
| 192.5 | 45 | 214.5 | 25 | 236.5 | 26 |
| 193.0 | 50 | 215.0 | 20 | 237.0 | 28 |
| 193.5 | 30 | 215.5 | 10 | 237.5 | 28 |
| 194.0 | 30 | 216.0 | 10 | 238.0 | 37 |
| 194.5 | 4500 | 216.5 | 8 | 238.5 | 17 |
| 195.0 | 90 | 217.0 | 15 | 239.0 | 35 |
| 195.5 | 15 | 217.5 | 13 | 239.5 | 28 |
| 196.0 | 40 | 218.0 | 12 | 240.0 | 39 |
| 196.5 | 65 | 218.5 | 10 | 240.5 | 28 |
| 197.0 | 25 | 219.0 | 10 | 241.0 | 22 |
| 197.5 | 20 | 219.5 | 8 | 241.5 | 13 |
| 198.0 | 09 | 220.0 | 13 | 242.0 | 18 |
| 198.5 | 75 | 220.5 | 13 | 242.5 | 15 |
| 199.0 | 450 | 221.0 | 17 | 243.0 | 17 |
| 199.5 | 70 | 221.5 | 17 | 243.5 | 13 |
| 200.0 | 400 | 222.0 | 10 | 244.0 | 15 |
| 200.5 | 35 | 222.5 | 11 | 244.5 | 18 |
| 201.0 | 10 | 223.0 | 14 | 245.0 | 16 |
| 201.5 | 15 | 223.5 | 10 | 245.5 | 13 |
| 202.0 | 15 | 224.0 | 10 | 246.0 | 16 |
| 202.5 | 23 | 224.5 | 10 | 246.5 | 26 |
| 203.0 | 00 | 225.0 | 6 | 247.0 | 21 |
| 203.5 | 29 | 225.5 | 4 | 247.5 | 20 |
| 204.0 | 15 | 226.0 | 11 | 248.0 | 190 |
| 204.5 | 65 | 226.5 | 18 | 248.5 | 13 |
| 205.0 | 20 | 227.0 | 10 | 249.0 | 29 |
| 205.5 | 15000 | 227.5 | 11 | 249.5 | 11 |
| 206.0 | 6000 | 228.0 | 8 | 250.0 | 12 |
| 206.5 | 2500 | 228.5 | 32 | 250.5 | 7 |
| 207.0 | 85 | 229.0 | 9 | 251.0 | 10 |
| 207.5 | 20000 | 229.5 | 11 | 251.5 | 6 |
| 208.0 | 15000 | 230.0 | 16 | 252.0 | 11 |
| 208.5 | 23000 | 230.5 | 16 | 252.5 | 22 |
| 209.0 | 15 | 231.0 | 16 | 253.0 | 11 |
| 209.5 | 17 | 231.5 | 7 | 253.5 | 40 |
| 210.0 | 75 | 232.0 | 21 | 254.0 | 23 |
| 210.5 | 23 | 232.5 | 25 | 254.5 | 20 |
| 211.0 | 20 | 233.0 | 26 | 255.0 | 13 |
| 211.5 | 45 | 233.5 | 12 | 255.5 | 10 |
| 212.0 | 46 | 234.0 | 32 | 256.0 | 10 |
| 212.5 | 12 | 234.5 | 13 | 256.5 | |
| 213.0 | 19 | 235.0 | 10 | 257.0 | |
| 213.5 | 62 | 235.5 | 27 | 257.5 | |

Case Recovered DD97ZA3

| From | To | RECOVERED | From | To | RECOVERED |
|------|------|--------------------|------|------|-----------|
| 2 | 2.5 | 0.5 | 39.1 | 41.2 | 1.1 |
| 2.5 | 3.5 | 1.0 | 41.2 | 41.6 | 0.4 |
| 3.5 | 5.0 | 0.8 | 41.6 | 42.6 | 0.9 |
| 5.0 | 6.5 | 0.9 | 42.6 | 44.0 | 1.4 |
| 6.5 | 8.0 | 2.0 | 44.0 | 47.0 | 3.0 |
| 8.0 | 10.0 | 1.5m? | 47.0 | 49.2 | 2.2 |
| 10.0 | 11.5 | 1.5 | 49.2 | 51.6 | 2.1 |
| 11.5 | 13.0 | 1.5 | 51.6 | 54.3 | 2.7 |
| 13.0 | 14.0 | 1.0 | 54.3 | 55.5 | 1.2 |
| 14.0 | 16.0 | 2.0 | 55.5 | 57.7 | 2.2 |
| 16.0 | 16.8 | 0.8 | 57.7 | 60.6 | 2.9 |
| 16.8 | 17.9 | 1.1 | 60.6 | 62.9 | 2.3 |
| 17.9 | 19.0 | 1.1 | 62.9 | 63.8 | 0.9 |
| 19.0 | 20.0 | 1.0 | 63.8 | 64.6 | 0.7 |
| 20.0 | 21.3 | 1.2 | 64.6 | 66.7 | 1.95 |
| 21.3 | 22.3 | 1.0 | 66.7 | 67.6 | 0.8 |
| 22.3 | 23.5 | 1.2 | 67.6 | 68.3 | 0.85 |
| 23.5 | 25.0 | 1.2 | 68.3 | 69.9 | 1.6 |
| 25.0 | 26.5 | 1.3 | 69.9 | 70.4 | 0.5 |
| 26.5 | 28.0 | 0.8 | 70.4 | 71.0 | 0.5 |
| 28.0 | 29.5 | 0.9 | 71.0 | 72.4 | 1.4 |
| 29.5 | 31.0 | 0.6 | 72.4 | 74.0 | 1.60 |
| 31.0 | 31.9 | 0.6 | 74.0 | 76.9 | 2.8 |
| 31.9 | 33.2 | 0.8 1.0 | 76.9 | 80.0 | 3.0 |
| 33.2 | 34.3 | 0.8 | | | |
| 34.3 | 34.8 | 0.5 | | | |
| 34.8 | 35.6 | 0.8 | | | |
| 35.6 | 36.2 | 0.6 | | | |
| 36.2 | 37.8 | 1.6 | | | |
| 37.8 | 38.0 | 0.4 | | | |
| 38.0 | 39.1 | 1.1 | | | |

DD97

ZA.3.

428082

| From | To | read. curves | From | To | read curves |
|-------|-------|------------------------|-------|---------|--------------|
| 81.1 | 81.7 | .55 | 108.4 | 109.4 | .95 |
| 81.7 | 82.1 | .4 | 109.4 | 111.9 | 2.4 m |
| 82.1 | 82.4 | .3 | 111.9 | 114.2 | 2.3 m |
| 82.4 | 82.7 | .1 | 114.2 | 116.2 | .1 m cavity. |
| 82.7 | 83.1 | .55 | 116.2 | 117.5 | .8 |
| 83.1 | 84.3 | 1 m | 117.5 | 118.3 | .25 |
| 84.3 | 85.9 | 1.1 | 118.3 | 121 m | 2.6 m |
| 85.9 | 87.8 | 1.7 m core loss .15 | 121 m | 122 m | .95 |
| 87.8 | 88.1 | .2 | 122 m | 123.4 | 1.4 m |
| 88.1 | 88.8 | .5 | 123.4 | 123.9 | .6 m |
| 88.8 | 89.2 | .35 | 123.9 | 126.3 | 2.1 m |
| 89.2 | 90.2 | .75 | 126.3 | 129.4 | 3 m |
| 90.2 | 90.9 | .8 | 129.4 | 132.5 | 2.8 m |
| 90.9 | 91 m | .1 | 132.5 | 133.7 | 1 m |
| 91 m | 92 m | .88 | 133.7 | 136 m | 2.2 m |
| 92 m | 92.5 | .4 | 136 m | 139 m | 3.1 m |
| 92.5 | 95.5 | 0 | 139 m | 142 m | 2.8 m |
| 95.5 | 96.3 | 0 | 142 m | 144.6 | 2.55 m |
| 96.3 | 96.7 | .15 | 144.6 | 147.2 | 2.65 m |
| 96.7 | 97.1 | .2 | 147.2 | 148.2 | .8 m |
| 97.1 | 98 m | .3 | 148.2 | 151 m | 2.6 m |
| 98 m | 98.3 | .3 | 151 m | 154 m | 2.9 m |
| 98.3 | 99.3 | .9 | 154 m | 157 m | 2.9 m |
| 99.3 | 100 | .6 | 157 m | 160 m | 2.85 m |
| 100 | 101.1 | 1.1 | 160 m | 162.3 m | 2.45 m |
| 101.1 | 101.7 | .35 | 162.3 | 163.8 m | 1.55 m |
| 101.7 | 102.6 | .9 | 163.8 | 164.9 m | 1.1 m |
| 102.6 | 103.4 | .65 | 164.9 | 165.7 m | .5 m |
| 103.4 | 103.7 | .3 | 165.7 | 165.9 m | .05 m |
| 103.7 | 104.4 | .6 | 165.9 | 166.1 m | .25 m |
| 104.4 | 105.8 | .9 | 166.1 | 169 m | .55 m |
| 105.8 | 107.2 | 1.1 | 169 | 170 | .95 |
| 107.2 | 108.4 | .98 | 170 | 173 | .95 |

| From | To | read curries | From | To | read curries. |
|--------------------|--------------|--------------|------|----|---------------|
| 173 | 176.2 | 3.1 | | | |
| 176.2 | 177.4 | .9 | | | |
| 177.4 | 177.9 | .25 | | | |
| 177.9 | 180.8 | 2.6 | | | |
| 180.8 | 183.9 | 3.05 | | | |
| 183.9 | 187 m | 3 m | | | |
| 187 m | 189.2 | 2.3 m | | | |
| 189 m | 192.3 | 3.1 | | | |
| 192.3 | 195.4 | 3 m | | | |
| 195.4 | 198.5 | 3 m | | | |
| 198.5 | 201.6 | 3.05 m | | | |
| 201.6 | 204.7 | 3.1 m | | | |
| 204.7 | 207.8 | 2.95 m | | | |
| 207.8 | 210.9 | 3 m | | | |
| 210.9 | 214 m | 2.8 m | | | |
| 214 m | 216.6 m | 2.4 | | | |
| 216.6 m | 219.7 | 3.05 m | | | |
| 219.7 | 222.7 | 3.05 m | | | |
| 222.7 | 225.7 | 2.9 m | | | |
| 225.7 | 228.8 m | 2.85 | | | |
| 228.8 m | | | | | |
| 228.5 | 230 m | 1.04 | | | |
| 230 m | 232 m | 2.10 | | | |
| 232 m | 235 m | 3 m | | | |
| 235 m | 238 | 2.9 m | | | |
| 238 m | 240.7 | 2.58 m | | | |
| 240.7 | 243.8 | 3.1 m | | | |
| 243.8 | 246.9 | 3.02 m | | | |
| 246.9 | 250 m | 3.04 m | | | |
| 250 m | 253 m | 2.85 m | | | |
| 253 m | 256 | 3.07 m | | | |
| | END of hole. | | | | |

Appendix 2

Assay Ledgers for Diamond Drilling - Avebury Prospect

Assays

DD97ZA1 - Assays

| Sample No | DPO | From | To | Ag (ppm) | Al (ppm) | As (ppm) | Ba (ppm) | Ca (ppm) | Co (ppm) | Cr (ppm) | Cu (ppm) | Fe (ppm) | K (ppm) | Mg (ppm) | Mn (ppm) | Mo (ppm) | Na (ppm) | Ni (ppm) | P (ppm) | Pb (ppm) | Sb (ppm) | Ti (ppm) | V (ppm) | Zn (ppm) | Sn (ppm) | W (ppm) | Au (ppb) | Pt (ppb) | Pd (ppb) |
|-----------|-------|-------|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|----------|----------|----------|----------|----------|---------|----------|----------|----------|---------|----------|----------|---------|----------|----------|----------|
| 5470314 | 82176 | 2 | 4.5 | -0.5 | 49200 | 13 | 714 | 1600 | 10 | 303 | 108 | 181300 | 4350 | 1690 | 157 | -10 | 3800 | 73 | 800 | 55 | -5 | 7690 | 263 | 93 | 7 | -10 | 5 | 15 | 17 |
| 5470315 | 82176 | 4.5 | 6.5 | -0.5 | 65400 | -5 | 559 | 1350 | 7 | 286 | -13 | 145000 | 2600 | 1640 | 137 | -10 | 2550 | 58 | 850 | 39 | -5 | 8110 | 233 | 74 | 10 | 10 | -2 | 9 | 10 |
| 5470316 | 82176 | 6.5 | 8.5 | -0.5 | 78000 | -5 | 1010 | 2150 | -5 | 243 | 11 | 155100 | 4700 | 2220 | 325 | -10 | 4050 | 81 | 900 | 38 | -5 | 8640 | 227 | 81 | -3 | -10 | 4 | 10 | 11 |
| 5470317 | 82176 | 8.5 | 10 | -0.5 | 87500 | -5 | 1010 | 2350 | 22 | 223 | 10 | 83600 | 3050 | 3730 | 898 | -10 | 4250 | 84 | 1000 | 42 | -5 | 9100 | 233 | 86 | 6 | -10 | 2 | 7 | 6 |
| 5470318 | 82176 | 10 | 12 | -0.5 | 44300 | 7 | 555 | 1050 | 15 | 248 | -5 | 59900 | 4600 | 3630 | 716 | -10 | 1650 | 68 | 500 | 22 | -5 | 5390 | 144 | 100 | 4 | 10 | 2 | -2 | 6 |
| 5470319 | 82176 | 17.4 | 20.5 | -0.5 | 63300 | -5 | 1650 | 2200 | 23 | 294 | 9 | 77900 | 18200 | 9300 | 1080 | -10 | 3150 | 112 | 850 | 27 | -5 | 6060 | 222 | 160 | 8 | 15 | -2 | 3 | 6 |
| 5470320 | 82176 | 20.5 | 23 | -0.5 | 57200 | 15 | 1390 | 3550 | 31 | 300 | 34 | 81700 | 18400 | 12500 | 1180 | -10 | 3100 | 150 | 800 | 28 | -5 | 7230 | 204 | 198 | 8 | 10 | -2 | 3 | 7 |
| 5470321 | 82176 | 23 | 25 | -0.5 | 61200 | -5 | 930 | 12200 | 31 | 236 | 19 | 62700 | 9500 | 20300 | 788 | -10 | 6550 | 170 | 650 | 13 | -5 | 7470 | 169 | 122 | 6 | -10 | -2 | 2 | 5 |
| 5470322 | 82176 | 25 | 26.7 | -0.5 | 60500 | -5 | 913 | 20100 | 32 | 220 | -5 | 73600 | 12800 | 27200 | 1050 | -10 | 8450 | 188 | 550 | 18 | -5 | 7690 | 182 | 191 | 5 | 10 | -2 | -2 | 5 |
| 5470323 | 82176 | 26.7 | 28.95 | -0.5 | 69900 | 10 | 1450 | 27200 | 37 | 405 | 9 | 85800 | 23500 | 32400 | 1810 | -10 | 5750 | 196 | 850 | 31 | -5 | 9040 | 218 | 246 | -3 | 25 | -2 | -2 | 6 |
| 5470324 | 82176 | 28.95 | 30.5 | -0.5 | 63000 | 19 | 1620 | 24500 | 26 | 286 | -5 | 67900 | 23400 | 28200 | 1260 | -10 | 8950 | 178 | 500 | 25 | -5 | 7950 | 186 | 200 | 4 | -10 | -2 | -2 | 5 |
| 5470325 | 82176 | 30.5 | 33 | -0.5 | 64800 | 9 | 1940 | 29900 | 34 | 291 | -5 | 75900 | 22000 | 33300 | 1460 | -10 | 10900 | 190 | 500 | 29 | -5 | 8430 | 208 | 209 | 10 | -10 | -2 | -2 | 7 |
| 5470326 | 82176 | 33 | 35.5 | -0.5 | 63500 | 6 | 2370 | 35600 | 35 | 312 | -5 | 72300 | 21400 | 35900 | 1740 | -10 | 16700 | 173 | 450 | 26 | -5 | 7110 | 184 | 223 | 5 | -10 | -2 | -2 | 5 |
| 5470327 | 82176 | 35.5 | 38.5 | -0.5 | 72800 | 15 | 1850 | 34000 | 36 | 345 | -5 | 85300 | 17100 | 37700 | 2020 | -10 | 16300 | 210 | 700 | 30 | -5 | 8280 | 222 | 270 | 8 | -10 | -2 | -2 | 6 |
| 5470328 | 82176 | 38.5 | 41.3 | -0.5 | 67800 | 9 | 1970 | 33500 | 29 | 225 | -5 | 61100 | 20800 | 27600 | 1200 | -10 | 13100 | 175 | 600 | 24 | -5 | 7950 | 182 | 171 | -3 | -10 | -2 | 2 | 5 |
| 5470329 | 82176 | 41.3 | 43.9 | -0.5 | 70900 | 20 | 3000 | 42200 | 25 | 416 | 18 | 60800 | 33100 | 28000 | 1280 | -10 | 13700 | 181 | 850 | 31 | -5 | 8800 | 208 | 159 | -3 | 30 | -2 | -2 | 6 |
| 5470330 | 82176 | 43.9 | 45.5 | -0.5 | 69300 | 28 | 1710 | 61500 | 47 | 93 | 23 | 72500 | 13800 | 47100 | 1860 | -10 | 18000 | 186 | 1800 | 126 | -5 | 9140 | 167 | 242 | 6 | 15 | 8 | -2 | 3 |
| 5470331 | 82176 | 45.5 | 47 | -0.5 | 80000 | 35 | 2270 | 35900 | 25 | 141 | 12 | 49100 | 31500 | 21900 | 1160 | -10 | 25300 | 147 | 1900 | 24 | -5 | 13700 | 212 | 163 | 8 | 15 | -2 | -2 | 2 |
| 5470332 | 82176 | 47 | 49 | -0.5 | 85400 | -5 | 2240 | 47200 | 23 | 98 | -5 | 63800 | 25100 | 31100 | 1560 | -10 | 20800 | 160 | 1300 | 116 | -5 | 9510 | 153 | 319 | 7 | -10 | -2 | -2 | 2 |
| 5470333 | 82176 | 49 | 51.5 | -0.5 | 77400 | 59 | 2550 | 41000 | 52 | 104 | 372 | 47000 | 23400 | 24600 | 918 | -10 | 25500 | 154 | 1950 | 44 | -5 | 10300 | 173 | 180 | 4 | 25 | -2 | -2 | 3 |
| 5470334 | 82176 | 51.5 | 53.5 | -0.5 | 75000 | 47 | 2840 | 41000 | 17 | 102 | 196 | 44400 | 36100 | 23200 | 1060 | -10 | 20700 | 110 | 2050 | 67 | -5 | 11800 | 179 | 212 | 8 | -10 | -2 | -2 | 3 |
| 5470335 | 82176 | 53.5 | 56 | -0.5 | 69600 | 68 | 2380 | 43200 | 28 | 142 | 347 | 47300 | 31400 | 25400 | 1200 | -10 | 24000 | 144 | 2050 | 76 | -5 | 12300 | 204 | 218 | 4 | -10 | 3 | -2 | 4 |
| 5470336 | 82176 | 56 | 57.5 | -0.5 | 68800 | 13 | 1520 | 39500 | 46 | 136 | 173 | 81100 | 26200 | 26900 | 1010 | -10 | 16100 | 155 | 2000 | 42 | -5 | 10700 | 185 | 201 | -3 | -10 | 2 | -2 | 3 |
| 5470337 | 82176 | 57.5 | 60 | -0.5 | 60500 | 20 | 1560 | 23700 | 34 | 159 | 43 | 55500 | 31300 | 28600 | 595 | -10 | 14700 | 204 | 1550 | 33 | -5 | 10100 | 201 | 2200 | 8 | -10 | -2 | -2 | 4 |
| 5470338 | 82176 | 60 | 62.8 | -0.5 | 72500 | -5 | 1080 | 29200 | 31 | 117 | 57 | 52900 | 23400 | 21600 | 531 | -10 | 12800 | 182 | 1750 | 41 | -5 | 10700 | 177 | 423 | 9 | 10 | -2 | -2 | 3 |
| 5470339 | 82176 | 62.8 | 65 | -0.5 | 73200 | 48 | 1760 | 41600 | 31 | 93 | 122 | 43900 | 31800 | 27400 | 1160 | -10 | 27100 | 300 | 1700 | 101 | -5 | 8560 | 152 | 249 | 12 | -10 | -2 | -2 | 4 |
| 5470340 | 82176 | 65 | 67 | -0.5 | 70500 | 32 | 1730 | 30400 | 20 | 134 | 68 | 43200 | 30800 | 22600 | 802 | -10 | 20900 | 147 | 1850 | 75 | -5 | 11000 | 172 | 194 | 7 | -10 | -2 | -2 | 4 |
| 5470341 | 82176 | 67 | 69 | -0.5 | 70700 | 20 | 1580 | 29000 | 37 | 134 | 100 | 62000 | 22100 | 28000 | 726 | -10 | 19700 | 193 | 1450 | 23 | -5 | 11500 | 167 | 137 | 8 | -10 | -2 | -2 | 2 |
| 5470342 | 82176 | 69 | 70.5 | -0.5 | 77600 | 24 | 828 | 23000 | 35 | 160 | 36 | 74700 | 30300 | 27200 | 849 | -10 | 13500 | 191 | 1250 | 11 | -5 | 12800 | 198 | 124 | 7 | -10 | -2 | -2 | -2 |
| 5470343 | 82176 | 70.5 | 72 | -0.5 | 68400 | 11 | 1000 | 33700 | 35 | 124 | 155 | 60500 | 19600 | 23500 | 584 | -10 | 14300 | 114 | 1400 | -10 | -5 | 9760 | 167 | 92 | 5 | -10 | -2 | -2 | 2 |
| 5470344 | 82176 | 72 | 74.5 | -0.5 | 71700 | 33 | 1570 | 50500 | 41 | 158 | 73 | 70200 | 22100 | 37000 | 1260 | -10 | 16000 | 165 | 850 | 29 | -5 | 8710 | 170 | 148 | 5 | -10 | -2 | -2 | 2 |
| 5470345 | 82176 | 74.5 | 76.5 | -0.5 | 65800 | -5 | 2370 | 53300 | 54 | 785 | 29 | 82200 | 15200 | 71800 | 1630 | -10 | 13600 | 510 | 250 | 13 | -5 | 3970 | 182 | 175 | 16 | -10 | 2 | -2 | 8 |
| 5470346 | 82176 | 76.5 | 78 | -0.5 | 77800 | -5 | 2420 | 53300 | 50 | 401 | -5 | 85600 | 23700 | 66500 | 1540 | -10 | 13800 | 486 | 450 | 11 | -5 | 5560 | 197 | 170 | 5 | 10 | -2 | -2 | 3 |
| 5470347 | 82176 | 78 | 80.2 | -0.5 | 87700 | 10 | 2620 | 46400 | 46 | 493 | -5 | 70100 | 25800 | 60300 | 1220 | -10 | 15900 | 591 | 450 | -10 | -5 | 6510 | 218 | 149 | 5 | -10 | 2 | -2 | 4 |
| 5470348 | 82176 | 80.2 | 83.3 | -0.5 | 57000 | 18 | 1080 | 57400 | 60 | 1020 | -5 | 78500 | 6800 | 81300 | 2050 | -10 | 7850 | 612 | 200 | 20 | -5 | 2390 | 167 | 184 | -3 | -10 | 2 | 4 | 9 |
| 5470349 | 82176 | 83.3 | 84.2 | -0.5 | 62800 | 11 | 1820 | 52800 | 65 | 1500 | 153 | 85000 | 3750 | 99900 | 2360 | -10 | 11500 | 783 | 100 | 12 | -5 | 2590 | 178 | 259 | -3 | 10 | -2 | 2 | 10 |
| 5470350 | 82176 | 84.2 | 86.5 | 0.7 | 34700 | 6 | 399 | 91900 | 64 | 1860 | -5 | 54200 | 800 | 100300 | 2300 | -10 | 2350 | 1410 | 50 | 36 | -5 | 1350 | 107 | 397 | -3 | -10 | -2 | -2 | 6 |
| 5470351 | 82176 | 86.5 | 88.5 | -0.5 | 36200 | 378 | 248 | 109100 | 78 | 2780 | -5 | 55600 | 1450 | 92300 | 3010 | -10 | 1750 | 1260 | 100 | 25 | 56 | 2230 | 128 | 505 | 5 | -10 | 5 | -2 | 6 |
| 5470352 | 82176 | 88.5 | 90 | -0.5 | 56200 | 74 | 1090 | 67800 | 105 | 1250 | -5 | 76300 | 3800 | 99100 | 3390 | -10 | 5950 | 1010 | 100 | 13 | 7 | 2810 | 177 | 340 | 5 | -10 | -2 | 3 | 8 |
| 5470353 | 82176 | 90 | 91.9 | -0.5 | 3750 | 508 | 30 | 150400 | 41 | 600 | 11 | 47900 | 200 | 80900 | 2310 | -10 | 450 | 749 | -50 | 36 | 22 | 65 | 16 | 297 | -3 | 30 | 3 | -2 | -2 |
| 5470354 | 82176 | 91.9 | 93.7 | 0.8 | 1150 | 530 | 19 | 131000 | 47 | 748 | -5 | 71300 | 100 | 90900 | 1730 | -10 | 350 | 1090 | -50 | 32 | 10 | 27 | 11 | 216 | -3 | -10 | 5 | -2 | -2 |
| 5470355 | 82176 | 93.7 | 95.5 | 0.5 | 1850 | 40 | 31 | 5500 | 71 | 308 | -5 | 35600 | 100 | 196900 | 1610 | -10 | 250 | 1810 | -50 | 32 | 13 | 20 | 3 | 165 | -3 | -10 | -2 | -2 | -2 |
| 5470356 | 82176 | 95.5 | 96.9 | 0.8 | 1350 | 93 | 17 | 5100 | 70 | 481 | 7 | 34600 | -100 | 201600 | 1550 | -10 | 250 | 2040 | -50 | 55 | 12 | 39 | 6 | 223 | 5 | 15 | -2 | -2 | -2 |
| 5470357 | 82176 | 96.9 | 98.7 | 0.6 | 1300 | 75 | 20 | 1550 | 72 | 864 | -5 | 33400 | -100 | 203600 | 1120 | -10 | 250 | 2140 | -50 | 32 | 10 | 10 | 7 | 178 | -3 | 20 | -2 | -2 | -2 |
| 5470358 | 82176 | 98.7 | 100.4 | -0.5 | 900 | 71 | 18 | 550 | 79 | 788 | -5 | 34300 | -100 | 196100 | 1070 | -10 | 200 | 2080 | -50 | 21 | 11 X | | 6 | 173 | 4 | 20 | -2 | -2 | 2 |
| 5470359 | 82176 | 100.4 | 102.5 | 0.6 | 1050 | 81 | 22 | 250 | 87 | 618 | 5 | 40300 | -100 | 197800 | 1080 | -10 | 250 | 1820 | -50 | 32 | 13 X | | 6 | 160 | 8 | 20 | -2 | -2 | -2 |
| 5470360 | 82176 | 102.5 | 104.5 | -0.5 | 1450 | 54 | 38 | 1900 | 90 | 660 | 9 | 46800 | -100 | 198000 | 1540 | -10 | 250 | 2000 | -50 | 25 | 10 X | | 5 | 166 | 4 | 30 | -2 | -2 | -2 |
| 5470361 | 82176 | 104.5 | 106.5 | 0.7 | 700 | 53 | 18 | 141000 | 50 | 553 | -5 | 52000 | -100 | 109800 | 1910 | -10 | 250 | 1070 | -50 | 61 | 12 X | | 10 | 232 | 6 | -10 | -2 | -2 | -2 |
| 5470362 | 82176 | 106.5 | 108.3 | 0.7 | 1050 | 61 | | | | | | | | | | | | | | | | | | | | | | | |

Assays

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|-------|-------|-------|------|------|------|----|--------|-----|------|----|--------|------|--------|------|-----|-------|-------|-----|------|----|-----|----|------|----|-----|----|----|----|
| 5470369 | 82176 | 121 | 123.4 | 1.2 | 1700 | 771 | 71 | 189800 | 82 | 1050 | 57 | 51900 | 100 | 84500 | 1510 | -10 | 500 | 1510 | -50 | 24 | 9 | 22 | 16 | 172 | 15 | 10 | 11 | -2 | -2 |
| 5470370 | 82176 | 123.4 | 125.5 | 1.1 | 2700 | 1090 | 42 | 157400 | 146 | 1130 | -5 | 36800 | -100 | 91700 | 1360 | -10 | 300 | 1200 | -50 | 341 | 6 | 21 | 13 | 659 | -3 | -10 | 27 | -2 | -2 |
| 5470371 | 82176 | 125.5 | 127.2 | 10.4 | 1300 | 1280 | 19 | 118200 | 282 | 1160 | -5 | 43700 | -100 | 113000 | 1620 | -10 | 250 | 1230 | -50 | 1180 | -5 | X | 10 | 1080 | 14 | -10 | 7 | -2 | 2 |
| 5470372 | 82176 | 127.2 | 128.3 | 0.8 | 1000 | 431 | 17 | 49000 | 111 | 1370 | -5 | 73500 | -100 | 154100 | 2300 | -10 | 250 | 979 | -50 | 167 | -5 | X | 5 | 463 | 33 | 15 | 4 | -2 | 3 |
| 5470373 | 82176 | 128.3 | 129.5 | 1.2 | 400 | 320 | 48 | 11100 | 160 | 1470 | -5 | 284900 | -100 | 111700 | 4970 | -10 | 350 | 1860 | -50 | 501 | -5 | X | 5 | 748 | 70 | 15 | 4 | -2 | -2 |
| 5470374 | 82176 | 129.5 | 130.6 | 0.8 | 1700 | 1010 | 50 | 68100 | 86 | 653 | -5 | 104800 | 500 | 131600 | 2400 | -10 | 300 | 1500 | -50 | 83 | 11 | 29 | 3 | 228 | 20 | -10 | 28 | -2 | -2 |
| 5470375 | 82176 | 130.6 | 132 | 0.6 | 1850 | 718 | 36 | 900 | 105 | 1210 | -5 | 66100 | -100 | 207600 | 2830 | -10 | 250 | 1740 | -50 | 24 | 11 | X | 7 | 209 | 4 | 15 | 42 | -2 | -2 |
| 5470376 | 82176 | 132 | 134.2 | 2.4 | 600 | 594 | 22 | 450 | 85 | 955 | -5 | 57100 | -100 | 215500 | 2780 | -10 | 250 | 1950 | -50 | 68 | -5 | X | 7 | 222 | -3 | 30 | 26 | -2 | -2 |
| 5470377 | 82176 | 134.2 | 136.3 | 0.8 | 1550 | 523 | 18 | 400 | 87 | 1110 | -5 | 46300 | -100 | 215800 | 2200 | -10 | 250 | 2110 | -50 | 71 | -5 | 22 | 8 | 251 | 23 | 25 | 10 | -2 | -2 |
| 5470378 | 82176 | 136.3 | 138.3 | -0.5 | 1200 | 365 | 15 | 1700 | 77 | 809 | -5 | 48300 | -100 | 202600 | 2010 | -10 | 250 | 1920 | -50 | 25 | -5 | X | 6 | 96 | 6 | 25 | -2 | -2 | -2 |
| 5470379 | 82176 | 138.3 | 140.3 | 0.6 | 750 | 409 | 16 | 5200 | 78 | 1130 | -5 | 51600 | -100 | 198400 | 2220 | -10 | 250 | 1990 | -50 | 20 | -5 | X | 7 | 121 | -3 | 30 | 15 | -2 | 2 |
| 5470380 | 82176 | 140.3 | 142.3 | -0.5 | 950 | 376 | 17 | 6700 | 75 | 1200 | -5 | 53700 | -100 | 203900 | 2460 | -10 | 250 | 1890 | -50 | 18 | -5 | X | 5 | 142 | -3 | 30 | 8 | -2 | 2 |
| 5470381 | 82176 | 142.3 | 144.4 | -0.5 | 500 | 611 | 15 | 5200 | 83 | 1150 | -5 | 51600 | -100 | 208900 | 2510 | -10 | 250 | 2140 | -50 | 20 | 9 | X | 7 | 149 | 4 | 30 | 10 | -2 | -2 |
| 5470382 | 82176 | 144.4 | 146.5 | 0.5 | 550 | 468 | 13 | 5500 | 80 | 1140 | -5 | 57100 | -100 | 191900 | 2380 | -10 | 200 | 1750 | -50 | 17 | 7 | X | 6 | 132 | 6 | 40 | 10 | -2 | -2 |
| 5470383 | 82176 | 146.5 | 147.8 | -0.5 | 1150 | 649 | 14 | 6600 | 86 | 874 | 9 | 49900 | -100 | 200500 | 2340 | -10 | 250 | 1660 | -50 | 20 | 7 | X | 6 | 118 | 4 | 30 | 19 | -2 | 2 |
| 5470384 | 82176 | 147.8 | 149.5 | -0.5 | 1450 | 1440 | 19 | 19600 | 76 | 1160 | -5 | 60400 | -100 | 173500 | 1920 | -10 | 250 | 2110 | -50 | 20 | -5 | 12 | 5 | 120 | 8 | 30 | 39 | -2 | -2 |
| 5470385 | 82176 | 149.5 | 151.6 | -0.5 | 800 | 1390 | 16 | 19400 | 58 | 1380 | -5 | 52200 | -100 | 168000 | 1760 | -10 | 250 | 1970 | -50 | 25 | 11 | 18 | 4 | 144 | -3 | 25 | 51 | -2 | -2 |
| 5470386 | 82176 | 151.6 | 153.3 | -0.5 | 900 | 1010 | 16 | 55100 | 123 | 2020 | 7 | 90400 | 100 | 127700 | 1710 | -10 | 300 | 3810 | 100 | 32 | 7 | 67 | 12 | 187 | 8 | 30 | 25 | -2 | -2 |
| 5470387 | 82176 | 153.3 | 155.7 | 1.1 | 1350 | 1190 | 19 | 9100 | 261 | 2900 | 21 | 151800 | 100 | 143400 | 2010 | -10 | 250 | 14400 | 300 | 40 | 8 | 177 | 25 | 150 | -3 | 30 | 19 | -2 | -2 |
| 5470388 | 82176 | 155.7 | 157.7 | -0.5 | 1550 | 461 | 18 | 44900 | 71 | 1470 | -5 | 82800 | 100 | 143800 | 1650 | -10 | 300 | 3040 | 150 | 16 | 5 | 66 | 11 | 116 | -3 | 35 | 34 | -2 | -2 |
| 5470389 | 82176 | 157.7 | 159.6 | -0.5 | 900 | 175 | 17 | 68900 | 74 | 1210 | -5 | 72000 | 150 | 130700 | 1690 | -10 | 400 | 3220 | 150 | 14 | -5 | 64 | 12 | 104 | -3 | 20 | 11 | -2 | 2 |
| 5470390 | 82176 | 159.6 | 161.5 | -0.5 | 500 | 52 | 15 | 10100 | 46 | 1040 | -5 | 69200 | -100 | 174200 | 1920 | -10 | 250 | 1570 | 150 | 17 | 5 | 43 | 9 | 107 | 6 | 40 | 11 | -2 | -2 |
| 5470391 | 82176 | 161.5 | 163.3 | -0.5 | 850 | 55 | 14 | 41700 | 50 | 1300 | -5 | 57300 | -100 | 181000 | 2510 | -10 | 300 | 1910 | 150 | 14 | -5 | 42 | 9 | 133 | -3 | 45 | 8 | -2 | 2 |
| 5470392 | 82176 | 163.3 | 166.5 | 0.7 | 500 | 58 | 15 | 3800 | 79 | 1070 | -5 | 93900 | -100 | 186800 | 2330 | -10 | 250 | 3250 | 200 | 15 | -5 | 53 | 11 | 89 | -3 | 25 | 17 | -2 | 2 |
| 5470393 | 82176 | 166.5 | 168.7 | 0.5 | 550 | 38 | 15 | 2700 | 54 | 900 | -5 | 71300 | -100 | 198400 | 2490 | -10 | 250 | 1950 | 50 | 14 | -5 | 42 | 11 | 74 | 8 | 25 | 6 | -2 | 2 |
| 5470394 | 82176 | 168.7 | 170.5 | -0.5 | 750 | 34 | 15 | 1550 | 54 | 944 | -5 | 65000 | -100 | 187000 | 1990 | -10 | 250 | 2010 | -50 | 21 | -5 | 36 | 12 | 82 | 5 | 20 | 3 | -2 | -2 |
| 5470395 | 82176 | 170.5 | 172.5 | -0.5 | 450 | 7 | 15 | 4050 | 50 | 963 | -5 | 83600 | -100 | 186000 | 1980 | -10 | 250 | 1800 | -50 | 18 | -5 | 32 | 11 | 74 | 4 | 20 | -2 | -2 | -2 |
| 5470396 | 82176 | 172.5 | 175.4 | -0.5 | 400 | 28 | 14 | 5600 | 64 | 827 | -5 | 88400 | -100 | 181800 | 2380 | -10 | 250 | 1860 | 100 | 16 | -5 | 34 | 11 | 93 | -3 | 20 | 3 | -2 | -2 |
| 5470397 | 82176 | 175.4 | 178 | -0.5 | 500 | 75 | 13 | 1950 | 71 | 869 | -5 | 82800 | -100 | 180500 | 2260 | -10 | 200 | 2310 | -50 | 15 | -5 | 27 | 11 | 121 | -3 | 15 | 7 | -2 | -2 |
| 5470398 | 82176 | 178 | 180.4 | -0.6 | 200 | 6 | 15 | 5700 | 77 | 698 | -5 | 71000 | -100 | 196200 | 2460 | -10 | 250 | 2190 | -50 | 31 | -5 | 20 | 8 | 122 | -3 | 30 | -2 | -2 | -2 |
| 5470399 | 82176 | 180.4 | 182.5 | -0.5 | 750 | 31 | 14 | 16800 | 53 | 772 | -5 | 70200 | -100 | 182800 | 2220 | -10 | 300 | 1600 | -50 | 19 | -5 | 25 | 8 | 85 | -3 | 25 | -2 | -2 | -2 |
| 5470400 | 82176 | 182.5 | 185.5 | -0.5 | 2750 | 79 | 26 | 6850 | 73 | 838 | -5 | 108200 | -100 | 174700 | 2170 | -10 | 250 | 2780 | -50 | 18 | -5 | 45 | 12 | 85 | -3 | 35 | 4 | -2 | -2 |
| 5474501 | 82176 | 185.5 | 188.5 | 0.7 | 1500 | 308 | 14 | 5600 | 124 | 771 | 8 | 65800 | -100 | 198500 | 2320 | -10 | 250 | 6760 | -50 | 45 | -5 | 24 | 8 | 174 | -3 | 25 | 12 | -2 | -2 |
| 5474502 | 82176 | 188.5 | 191.5 | -0.5 | 850 | 22 | 12 | 3350 | 56 | 1000 | -5 | 66200 | -100 | 207100 | 2190 | -10 | 200 | 1780 | -50 | 20 | -5 | X | 8 | 82 | -3 | 50 | -2 | -2 | -2 |
| 5474503 | 82176 | 191.5 | 194.5 | -0.5 | 1650 | 16 | 12 | 4250 | 61 | 1190 | -5 | 84800 | -100 | 197600 | 2210 | -10 | 200 | 1850 | -50 | 15 | -5 | 22 | 12 | 88 | -3 | 30 | -2 | -2 | -2 |
| 5474504 | 82176 | 194.5 | 196.5 | -0.5 | 950 | 24 | 13 | 2900 | 57 | 1070 | -5 | 96600 | -100 | 193500 | 2160 | -10 | 200 | 2010 | -50 | 23 | -5 | 18 | 10 | 86 | -3 | 50 | -2 | -2 | -2 |
| 5474505 | 82176 | 196.5 | 198.8 | -0.5 | 700 | 22 | 11 | 3150 | 68 | 924 | -5 | 78100 | -100 | 202100 | 2030 | -10 | 200 | 2170 | -50 | 20 | -5 | 13 | 8 | 63 | -3 | 50 | -2 | -2 | -2 |
| 5474506 | 82176 | 198.8 | 201.5 | -0.5 | 600 | 77 | 11 | 1550 | 106 | 705 | -5 | 84400 | -100 | 199300 | 2260 | -10 | 200 | 5350 | -50 | 26 | -5 | 15 | 8 | 118 | 7 | 45 | 5 | -2 | -2 |
| 5474507 | 82176 | 201.5 | 203.5 | -0.5 | 250 | 84 | 11 | 1500 | 100 | 741 | -5 | 79400 | -100 | 202800 | 2390 | -10 | 200 | 4280 | -50 | 39 | -5 | 21 | 10 | 116 | 9 | 30 | 6 | -2 | -2 |
| 5474508 | 82176 | 203.5 | 206.5 | -0.5 | 500 | 57 | 13 | 3600 | 70 | 850 | -5 | 79200 | -100 | 204000 | 2310 | -10 | 200 | 2090 | -50 | 28 | -5 | 14 | 8 | 74 | 4 | 65 | 5 | -2 | -2 |
| 5474509 | 82176 | 206.5 | 209.5 | -0.5 | 500 | 19 | 12 | 1800 | 52 | 936 | -5 | 77000 | -100 | 212700 | 2510 | -10 | 250 | 1740 | -50 | 26 | -5 | 16 | 9 | 65 | 7 | 45 | -2 | 2 | -2 |
| 5474510 | 82176 | 209.5 | 212.5 | -0.5 | 750 | 20 | 12 | 3000 | 69 | 988 | -5 | 75200 | -100 | 208000 | 2320 | -10 | 200 | 2200 | -50 | 23 | -5 | 10 | 7 | 71 | 12 | 65 | -2 | -2 | -2 |
| 5474511 | 82176 | 212.5 | 215.5 | -0.5 | 800 | 14 | 13 | 2650 | 65 | 1180 | -5 | 75200 | -100 | 198400 | 2200 | -10 | 200 | 2010 | -50 | 26 | -5 | X | 7 | 68 | 5 | 60 | -2 | -2 | -2 |
| 5474512 | 82176 | 215.5 | 217.7 | -0.5 | 1150 | 21 | 13 | 1550 | 75 | 1130 | -5 | 82000 | -100 | 198700 | 2300 | -10 | 250 | 2210 | -50 | 33 | -5 | X | 7 | 125 | 7 | 55 | -2 | -2 | -2 |
| 5474513 | 82176 | 217.7 | 220.2 | -0.5 | 900 | 22 | 13 | 2900 | 69 | 1180 | -5 | 82500 | -100 | 200800 | 2230 | -10 | 250 | 2110 | -50 | 26 | -5 | X | 7 | 137 | 9 | 35 | -2 | -2 | -2 |
| 5474514 | 82176 | 220.2 | 223.2 | -0.5 | 900 | 22 | 13 | 1550 | 62 | 987 | -5 | 81200 | -100 | 192700 | 2030 | -10 | 200 | 1930 | -50 | 29 | -5 | X | 7 | 86 | -3 | 55 | -2 | -2 | -2 |
| 5474515 | 82176 | 223.2 | 227 | -0.5 | 1250 | 23 | 13 | 1350 | 73 | 994 | -5 | 115400 | -100 | 197500 | 2400 | -10 | 200 | 2930 | -50 | 30 | -5 | 38 | 13 | 92 | -3 | 45 | 3 | -2 | -2 |
| 5474516 | 82176 | 227 | 230.1 | -0.5 | 900 | 17 | 13 | 800 | 84 | 1640 | -5 | 125200 | -100 | 196900 | 2550 | -10 | 200 | 2780 | -50 | 20 | -5 | 47 | 18 | 73 | -3 | 45 | -2 | -2 | -2 |
| 5474517 | 82176 | 230.1 | 233.1 | -0.5 | 550 | 32 | 14 | 350 | 60 | 818 | -5 | 86100 | -100 | 204200 | 2390 | -10 | 200 | 2190 | -50 | 36 | -5 | 28 | 9 | 48 | 9 | 30 | -2 | -2 | -2 |
| 5474518 | 82176 | 233.1 | 236.1 | -0.5 | 850 | 12 | 16 | 600 | 57 | 910 | -5 | 102500 | -100 | 208500 | 2310 | -10 | 200 | 1870 | -50 | 29 | -5 | 42 | 12 | 49 | 5 | 55 | -2 | -2 | -2 |
| 5474519 | 82176 | 236.1 | 239.2 | -0.5 | 1750 | 15 | 13 | 1250 | 105 | 1250 | -5 | 103800 | -100 | 206500 | 2400 | -10 | 250</ | | | | | | | | | | | | |

Assays

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|-------|-------|-------|------|------|----|----|------|----|------|----|-------|------|--------|------|-----|-----|------|-----|----|------|---|----|----|----|----|----|----|
| 5474528 | 82176 | 256.4 | 259.5 | -0.5 | 650 | -5 | 11 | 4800 | 72 | 1030 | -5 | 44900 | -100 | 199800 | 2100 | -10 | 200 | 1900 | -50 | 19 | -5 X | 5 | 71 | -3 | 50 | -2 | -2 | -2 |
| 5474529 | 82176 | 259.5 | 262.6 | -0.5 | 1000 | -5 | 30 | 3350 | 73 | 853 | -5 | 51300 | -100 | 201100 | 2130 | -10 | 250 | 1890 | -50 | 14 | -5 X | 6 | 71 | 17 | 55 | 2 | -2 | -2 |
| 5474530 | 82176 | 262.8 | 265.7 | -0.5 | 1250 | -5 | 12 | 2800 | 61 | 1050 | -5 | 49400 | -100 | 200300 | 2330 | -10 | 200 | 1740 | -50 | 21 | -5 X | 6 | 62 | 8 | 55 | -2 | -2 | -2 |
| 5474531 | 82176 | 265.7 | 268.8 | -0.5 | 850 | -5 | 12 | 3100 | 59 | 732 | -5 | 52400 | -100 | 205800 | 2490 | -10 | 200 | 1510 | -50 | 13 | -5 X | 6 | 59 | 26 | 50 | -2 | -2 | -2 |
| 5474532 | 82176 | 268.8 | 270.8 | -0.5 | 900 | -5 | 12 | 1950 | 60 | 969 | -5 | 65200 | -100 | 192100 | 2350 | -10 | 200 | 1700 | -50 | 22 | -5 X | 5 | 75 | 6 | 55 | -2 | -2 | -2 |
| 5474533 | 82176 | 270.8 | 272.5 | -0.5 | 600 | -5 | 13 | 1800 | 64 | 1040 | 12 | 68200 | -100 | 195000 | 2410 | -10 | 200 | 1800 | -50 | 16 | -5 X | 5 | 96 | 8 | 55 | -2 | -2 | -2 |
| 5474534 | 82176 | 272.5 | 275.5 | -0.5 | 650 | -5 | 16 | 1050 | 69 | 851 | 20 | 72600 | -100 | 196600 | 2800 | -10 | 200 | 1870 | -50 | 15 | -5 X | 7 | 88 | 7 | 60 | -2 | -2 | -2 |
| 5474535 | 82176 | 275.5 | 278.5 | -0.5 | 850 | -5 | 12 | 2350 | 60 | 1120 | -5 | 63400 | -100 | 202900 | 2480 | -10 | 200 | 1590 | -50 | 16 | -5 X | 7 | 56 | 8 | 40 | -2 | -2 | -2 |
| 5474536 | 82178 | 278.5 | 281.5 | -0.5 | 1000 | -5 | 12 | 3300 | 59 | 1200 | -5 | 53900 | 100 | 198400 | 2390 | -10 | 200 | 1820 | -50 | 17 | -5 X | 6 | 77 | 7 | 45 | -2 | -2 | -2 |
| 5474537 | 82178 | 281.5 | 284.5 | -0.5 | 800 | -5 | 13 | 2750 | 59 | 1320 | 10 | 49600 | -100 | 185500 | 2340 | -10 | 200 | 1940 | -50 | 18 | -5 X | 7 | 81 | 24 | 65 | -2 | -2 | -2 |

DD96ZA2 - Assays

| Sample No | DPO | From | To | Ag (ppm) | As (ppm) | Ba (ppm) | Bi (ppm) | Ca (ppm) | Cd (ppm) | Ce (ppm) | Co (ppm) | Cr (ppm) | Cu (ppm) | Fe (ppm) | K (ppm) | Mg (ppm) | Mn (ppm) | Mo (ppm) | Na (ppm) | Nb (ppm) | Ni (ppm) | P (ppm) | Pb (ppm) | Sr (ppm) | Ti (ppm) | V (ppm) | Y (ppm) | Zn (ppm) | S (ppm) | Au (ppb) | Pt (ppb) | Pd (ppb) | | | | |
|-----------------|-------|-------|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|----------|----------|----------|----------|----------|----------|---------|----------|----------|----------|---------|---------|----------|---------|----------|----------|----------|----|--|--|--|
| 5474538 | 82179 | 2 | 3.5 | -1 | 12 | 410 | -5 | 2450 | -5 | -10 | 16 | 185 | -2 | 124000 | 18200 | 4400 | 650 | -3 | 340 | -5 | 250 | 230 | 75 | 40 | 4500 | 490 | 6 | 290 | 600 | 3 | 35 | 37 | | | | |
| 5474539 | 82179 | 3.5 | 6.2 | -1 | 10 | 1600 | -5 | 11400 | -5 | 20 | 35 | 230 | -2 | 63100 | 37100 | 22700 | 3100 | -3 | 6800 | -5 | 290 | 145 | 40 | 200 | 3950 | 450 | 32 | 450 | -500 | 3 | 25 | 38 | | | | |
| 5474540 | 82179 | 6.2 | 7.7 | -1 | 8 | 6100 | -5 | 17900 | -5 | 10 | 33 | 185 | -2 | 42300 | 26500 | 29300 | 3750 | -3 | 15800 | -5 | 250 | 195 | 15 | 290 | 3650 | 310 | 15 | 290 | -500 | 4 | 25 | 33 | | | | |
| 5474541 | 82179 | 7.7 | 9.2 | -1 | 6 | 3400 | -5 | 31300 | -5 | 15 | 47 | 135 | -2 | 58100 | 32500 | 39200 | 6650 | -3 | 21800 | -5 | 290 | 195 | 15 | 340 | 3550 | 360 | 19 | 400 | -500 | 1 | 20 | 33 | | | | |
| 5474542 | 82179 | 21 | 23 | -1 | 10 | 1700 | -5 | 27900 | -5 | 15 | 36 | 64 | -2 | 50700 | 23100 | 34000 | 3650 | -3 | 34500 | -5 | 240 | 170 | 15 | 350 | 3550 | 330 | 14 | 200 | -500 | 4 | 15 | 31 | | | | |
| 5474543 | 82179 | 32 | 34 | -1 | 10 | 750 | -5 | 45500 | -5 | -10 | 30 | 230 | 3 | 42100 | 10900 | 35100 | 2350 | -3 | 40400 | -5 | 210 | 210 | 30 | 400 | 2750 | 330 | 9 | 135 | -500 | 2 | 15 | 26 | | | | |
| 5474544 | 82179 | 44 | 46.2 | -1 | 8 | 600 | -5 | 41400 | -5 | -10 | 34 | 150 | -2 | 50500 | 12700 | 41200 | 3150 | -3 | 33600 | -5 | 175 | 220 | 20 | 360 | 3050 | 340 | 13 | 200 | -500 | 1 | 15 | 27 | | | | |
| 5474545 | 82179 | 53 | 55 | -1 | 4 | 700 | -5 | 72000 | -5 | 10 | 59 | 45 | -2 | 69100 | 19200 | 64500 | 4400 | -3 | 9600 | -5 | 250 | 160 | 25 | 550 | 3050 | 300 | 23 | 280 | -500 | -1 | 20 | 29 | | | | |
| 5474546 | 82179 | 55 | 56.3 | -1 | 6 | 850 | -5 | 60900 | -5 | -10 | 36 | 56 | -2 | 54600 | 17500 | 53500 | 3350 | -3 | 13200 | -5 | 165 | 125 | 35 | 500 | 2900 | 290 | 19 | 210 | -500 | 7 | 20 | 29 | | | | |
| 5474547 | 82179 | 56.3 | 58.2 | -1 | -3 | 115 | -5 | 180000 | -5 | -10 | 68 | 61 | -2 | 78000 | 5550 | 80800 | 6100 | -3 | 4350 | -5 | 10 | 300 | 200 | 20 | 600 | 3050 | 350 | 28 | 340 | -500 | -1 | 15 | 25 | | | |
| 5474548 | 82179 | 58.2 | 60.2 | -1 | 4 | 1050 | -5 | 57700 | -5 | 10 | 54 | 200 | -2 | 82200 | 27700 | 58500 | 4550 | -3 | 7050 | -5 | 350 | 80 | 15 | 400 | 1900 | 260 | 11 | 260 | -500 | -1 | 15 | 23 | | | | |
| 5474549 | 82179 | 60.2 | 62 | -1 | -3 | 800 | -5 | 77200 | -5 | -10 | 78 | 195 | -2 | 75500 | 13100 | 72600 | 6100 | -3 | 2500 | -5 | 470 | 30 | 15 | 170 | 800 | 160 | 7 | 310 | 650 | -1 | -5 | 12 | | | | |
| 5474550 | 82179 | 62 | 63.8 | -1 | 6 | 1000 | -5 | 84600 | -5 | -10 | 71 | 750 | -2 | 66300 | 18000 | 64000 | 5650 | -3 | 3500 | -5 | 390 | 35 | 15 | 390 | 600 | 145 | 6 | 320 | -500 | -1 | 10 | 7 | | | | |
| 5474551 | 82179 | 63.8 | 65.8 | -1 | 600 | -5 | 10 | 140000 | -5 | -10 | 75 | 900 | 19 | 39300 | 105 | 94500 | 3150 | -3 | 210 | -5 | 10 | 900 | 15 | 185 | 48 | 15 | 14 | 4 | 750 | 1000 | 1 | -5 | -1 | | | |
| 5474552 | 82179 | 65.8 | 67.5 | -1 | 500 | -5 | 25 | 155000 | -5 | -10 | 59 | 600 | 12 | 46800 | 85 | 114000 | 4200 | -3 | 250 | -5 | 10 | 900 | 15 | 105 | 35 | -10 | 12 | 4 | 1650 | 1350 | 1 | -5 | -1 | | | |
| Standard CS15 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.4% Ni | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5474553 | 82179 | | | -1 | 28 | -5 | 10 | 4650 | -5 | 40 | 60 | 1000 | 1000 | 61300 | 260 | 243000 | 1100 | 44 | 370 | -5 | 5 | 4050 | 55 | 15 | 12 | 750 | 27 | 4 | 195 | 6900 | 32 | 30 | 80 | | | |
| 5474554 | 82179 | 68.85 | 70 | 91 | 20000 | -5 | 600 | 42600 | 30 | -10 | 1350 | 12700 | 380 | 132000 | 550 | 35800 | 7000 | -3 | 45 | -5 | 6 | 18300 | 340 | 2450 | 21 | 70 | 70 | -3 | 9100 | 18700 | 17 | -5 | 1 | | | |
| 5474555 | 82179 | 70 | 71 | 30 | 23800 | -5 | 140 | 37600 | -5 | -10 | 1500 | 13700 | 37 | 122000 | 400 | 29900 | 4800 | -3 | 45 | -5 | 6 | 20800 | 220 | 1200 | 16 | 65 | 59 | 2 | 900 | 11400 | 4 | 5 | 3 | | | |
| 5474556 | 82179 | 71 | 72.7 | 5 | 2550 | -5 | 35 | 186000 | -5 | -10 | 180 | 1550 | 73 | 41200 | 35 | 102000 | 2500 | -3 | 155 | -5 | 10 | 7000 | 65 | 390 | 51 | 15 | 14 | 4 | 1300 | 9200 | 18 | -5 | -1 | | | |
| 5474557 | 82179 | 72.7 | 73.8 | -1 | 500 | -5 | 10 | 98800 | -5 | 15 | 80 | 1100 | 6 | 46200 | 180 | 120000 | 3500 | -3 | 280 | -5 | 5 | 1450 | 10 | 80 | 22 | -10 | 11 | 2 | 185 | -500 | 1 | -5 | -1 | | | |
| 5474558 | 82179 | 73.8 | 76 | 1 | 105 | -5 | 25 | 142000 | -5 | -10 | 51 | 700 | 35 | 49800 | 105 | 107000 | 2350 | -3 | 200 | -5 | 10 | 1450 | 15 | 240 | 23 | 10 | 9 | 3 | 600 | 1750 | 2 | -5 | -1 | | | |
| 5474559 | 82179 | 76 | 78 | -1 | 38 | -5 | 10 | 67200 | -5 | -10 | 82 | 1600 | -2 | 215000 | 105 | 98300 | 2050 | -3 | 185 | -5 | 5 | 1650 | -5 | 40 | 11 | 10 | 12 | 2 | 185 | 1100 | -1 | 5 | -1 | | | |
| 5474560 | 82179 | 78 | 80 | -1 | 115 | -5 | 15 | 72600 | -5 | 15 | 79 | 1800 | 4 | 80900 | 115 | 123000 | 1650 | -3 | 220 | -5 | 5 | 1950 | -5 | 130 | 8 | -10 | 8 | -2 | 290 | 1100 | 2 | -5 | -1 | | | |
| 5474561 | 82179 | 80 | 81.5 | 18 | 120 | -5 | 90 | 59400 | -5 | 10 | 105 | 1350 | 5 | 189000 | 130 | 133000 | 1750 | -3 | 240 | -5 | 5 | 2550 | -5 | 1300 | 6 | 10 | 7 | 2 | 340 | 1650 | 4 | -5 | -1 | | | |
| 5474562 | 82179 | 81.5 | 84.2 | 4 | 370 | -5 | 35 | 78300 | -5 | 10 | 100 | 1350 | 5 | 116000 | 230 | 123000 | 1450 | -3 | 210 | -5 | 5 | 2350 | -5 | 310 | 5 | 15 | 10 | 2 | 220 | 1650 | 9 | -5 | -1 | | | |
| 5474563 | 82179 | 84.2 | 86 | 3 | 370 | -5 | 140 | 79700 | -5 | 10 | 135 | 650 | 2 | 143000 | 160 | 119000 | 2150 | -3 | 145 | -5 | 5 | 1600 | -5 | 95 | 5 | 15 | 9 | 3 | 210 | 850 | 10 | -5 | -1 | | | |
| 5474564 | 82179 | 86 | 87.2 | -1 | 36 | -5 | 165 | 19000 | -5 | -10 | 120 | 600 | -2 | 274000 | 80 | 107000 | 1750 | -3 | 75 | -5 | 5 | 1950 | 60 | 90 | 2 | 30 | 16 | -2 | 120 | 1000 | 25 | -5 | -1 | | | |
| 5474565 | 82179 | 87.2 | 88.7 | -1 | 30 | -5 | 95 | 37700 | -5 | 10 | 105 | 500 | 6 | 195000 | 100 | 127000 | 1550 | -3 | 95 | -5 | 5 | 2000 | 55 | 75 | 3 | 30 | 12 | -2 | 92 | 1150 | 15 | -5 | -1 | | | |
| 5474566 | 82179 | 88.7 | 90.5 | -1 | 28 | -5 | 5 | 45200 | -5 | 15 | 65 | 950 | -2 | 145000 | 110 | 136000 | 1700 | -3 | 100 | -5 | 5 | 1350 | -5 | 20 | 4 | 30 | 10 | -2 | 75 | 600 | 2 | -5 | -1 | | | |
| 5474567 | 82179 | 90.5 | 93.1 | 2 | 125 | -5 | 25 | 5000 | -5 | 15 | 240 | 1250 | 4 | 259000 | 15 | 166000 | 2400 | -3 | -10 | -5 | 5 | 5850 | -5 | 185 | 4 | 80 | 16 | -2 | 230 | 4600 | 19 | -5 | -1 | | | |
| 5474568 | 82179 | 93.1 | 95.2 | -1 | 36 | -5 | -5 | 31600 | -5 | 10 | 145 | 3200 | 4 | 214000 | 85 | 148000 | 2100 | -3 | 80 | -5 | 5 | 3050 | -5 | 300 | 4 | 80 | 20 | -2 | 360 | 2150 | 6 | -5 | -1 | | | |
| 5474569 | 82179 | 95.2 | 97.1 | -1 | 20 | -5 | -5 | 31500 | -5 | 15 | 110 | 800 | -2 | 203000 | 85 | 141000 | 2050 | -3 | 80 | -5 | 5 | 2400 | -5 | 130 | 4 | 80 | 21 | 2 | 150 | 1400 | 3 | -5 | -1 | | | |
| 5474570 | 82179 | 97.1 | 98.3 | 1 | 32 | -5 | -5 | 5850 | -5 | 25 | 185 | 1200 | -2 | 192000 | 25 | 175000 | 2350 | -3 | -10 | -5 | 5 | 3500 | 370 | 95 | 3 | 90 | 21 | -2 | 150 | 2600 | 5 | -5 | -1 | | | |
| 5474571 | 82179 | 98.3 | 100.2 | -1 | 30 | -5 | -5 | 48500 | -5 | 10 | 78 | 1250 | -2 | 200000 | 115 | 145000 | 2150 | -3 | 100 | -5 | 5 | 1550 | -5 | 120 | 5 | 105 | 23 | 3 | 180 | 600 | 3 | -5 | -1 | | | |
| 5474572 | 82179 | 100.2 | 102.1 | -1 | 65 | -5 | 5 | 52300 | -5 | 15 | 135 | 950 | 41 | 149000 | 125 | 152000 | 2000 | -3 | 110 | -5 | 5 | 3500 | 50 | 430 | 7 | 95 | 19 | 3 | 440 | 3000 | 9 | -5 | -1 | | | |
| 5474573 | 82179 | 102.1 | 104.4 | -1 | 180 | -5 | -5 | 3950 | -5 | 15 | 310 | 1400 | 21 | 228000 | 35 | 181000 | 3500 | -3 | 15 | -5 | 5 | 8950 | 45 | 120 | 4 | 260 | 31 | 2 | 400 | 7600 | 6 | -5 | -1 | | | |
| 5474574 | 82179 | 104.4 | 105.8 | -1 | 150 | -5 | 25 | 84100 | -5 | 15 | 190 | 1500 | 21 | 141000 | 210 | 142000 | 1600 | -3 | 270 | -5 | 5 | 5550 | -5 | 25 | 4 | 165 | 28 | 3 | 240 | 5000 | 11 | -5 | -1 | | | |
| 5474575 | 82179 | 105.8 | 107.3 | -1 | 60 | -5 | 10 | 124000 | -5 | 15 | 43 | 800 | 5 | 32300 | 250 | 133000 | 2450 | -3 | 410 | -5 | 10 | 950 | -5 | 55 | 14 | 150 | 19 | 3 | 150 | -500 | 2 | -5 | -1 | | | |
| 5474576 | 82179 | 107.3 | 108.8 | 3 | 42 | 5 | 220 | 77600 | -5 | 80 | 160 | 1300 | 6 | 59600 | 1100 | 154000 | 6400 | -3 | 105 | -5 | 10 | 4550 | 170 | 260 | 100 | 4850 | 200 | 10 | 650 | 2550 | 11 | 5 | 9 | | | |
| 5474577 | 82179 | 108.8 | 110 | -1 | 4 | -5 | 10 | 143000 | -5 | 35 | 110 | 1750 | 3 | 57500 | 220 | 132000 | 6500 | -3 | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-------|-----------|-------|----|------|------|----|-------|------|-----|-----|-----|-----|-------|-------|--------|--------|-----|-------|-----|------|------|-----|-----|-------|-----|----|-----|-------|------|----|----|----|
| 5474595 | 82179 | 173 | 175.7 | -1 | 91 | -5 | 5 | 470 | -5 | 35 | 79 | 800 | 6 | 57000 | 25 | 198000 | 1550 | -3 | 15 | -5 | 1300 | -5 | -5 | -2 | 35 | -2 | -2 | 30 | 1900 | 4 | -5 | -1 | |
| 5474596 | 82179 | 175.7 | 178.8 | -1 | 320 | -5 | 10 | 105 | -5 | 35 | 115 | 650 | 87 | 59700 | 20 | 208000 | 2050 | -3 | 15 | -5 | 2450 | -5 | 290 | -2 | 20 | 2 | -2 | 800 | 3400 | 13 | -5 | -1 | |
| 5474597 | 82179 | 178.8 | 181.6 | -1 | 290 | -5 | 5 | 45 | -5 | 35 | 74 | 750 | 7 | 55600 | 15 | 214000 | 2500 | -3 | -10 | -5 | 1300 | -5 | 35 | -2 | 15 | -2 | -2 | 185 | 1250 | 29 | -5 | -1 | |
| 5474598 | 82179 | 181.6 | 183.1 | -1 | 1050 | -5 | 5 | 70 | -5 | 35 | 74 | 850 | 5 | 52700 | 10 | 204000 | 2350 | -3 | -10 | -5 | 1800 | -5 | -5 | -2 | 15 | 2 | -2 | 76 | 800 | 100 | -5 | -1 | |
| 5474599 | 82179 | 183.1 | 185.3 | -1 | 4650 | -5 | 15 | 55 | -5 | 35 | 120 | 700 | 18 | 63200 | 25 | 274000 | 2500 | -3 | 10 | -5 | 5650 | -5 | 15 | -2 | 15 | 3 | -2 | 310 | 1750 | 610 | -5 | -1 | |
| Standard CS27 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5474600 | 82179 | 0.255% Ni | | | -1 | 650 | -5 | 10 | 1000 | -5 | 30 | 42 | 500 | 48 | 21900 | 45 | 182000 | 250 | 4 | 200 | -5 | 2250 | -5 | -5 | 3 | 220 | 6 | -2 | 32 | 2450 | 22 | -5 | 32 |
| 5474101 | 82179 | 187 | 189.6 | -1 | 150 | -5 | 10 | 4200 | -5 | 40 | 89 | 700 | 8 | 56200 | 50 | 220000 | 1700 | -3 | 40 | -5 | 1850 | -5 | 40 | 6 | 25 | 3 | -2 | 62 | 3950 | 8 | -5 | -1 | |
| 5474102 | 82179 | 189.6 | 190.7 | -1 | 44 | 40 | 20 | 6500 | -5 | 30 | 189 | 700 | 97 | 84200 | 1300 | 235000 | 3300 | -3 | 95 | -5 | 9800 | 85 | -5 | 9 | 360 | 11 | 3 | 36 | 18800 | 8 | -5 | 3 | |
| 5474103 | 82179 | 190.7 | 193.5 | -1 | 105 | 650 | 10 | 61000 | -5 | 35 | 57 | 370 | 33 | 43000 | 13000 | 85400 | 2150 | -3 | 7150 | 20 | 1850 | 600 | 30 | 88 | 6000 | 91 | 20 | 73 | 4100 | 2 | -5 | 9 | |
| 5474104 | 82179 | 193.5 | 196 | -1 | 44 | 900 | 15 | 30200 | -5 | 75 | 34 | 100 | 340 | 51600 | 27800 | 28500 | 850 | -3 | 19900 | 40 | 97 | 1500 | 125 | 220 | 13300 | 185 | 33 | 150 | 12700 | 2 | -5 | 1 | |
| 5474105 | 82179 | 203 | 205.1 | -1 | 120 | 380 | 15 | 59200 | -5 | 70 | 47 | 64 | 140 | 37100 | 12300 | 34400 | 850 | -3 | 29300 | 40 | 77 | 1350 | 95 | 210 | 12400 | 175 | 40 | 600 | 4450 | 1 | -5 | 1 | |
| 5474106 | 82179 | 220.9 | 222.6 | -1 | 51 | 650 | 10 | 70900 | -5 | 70 | 30 | 96 | 280 | 45000 | 16700 | 33400 | 1150 | -3 | 16900 | 35 | 84 | 1500 | 50 | 210 | 11500 | 165 | 36 | 800 | 5350 | -1 | -5 | 1 | |
| 5474107 | 82179 | 222.6 | 223.8 | -1 | 36 | 390 | 10 | 69800 | -5 | 60 | 39 | 75 | 480 | 56200 | 11100 | 37000 | 1350 | -3 | 17900 | 35 | 83 | 1200 | 240 | 210 | 10500 | 145 | 35 | 600 | 13200 | -1 | -5 | 7 | |
| 5474108 | 82179 | 225.6 | 226.6 | -1 | 40 | 550 | 15 | 55100 | -5 | 65 | 43 | 89 | 470 | 51500 | 21500 | 29400 | 650 | -3 | 14900 | 40 | 98 | 1300 | 10 | 155 | 12100 | 170 | 30 | 110 | 18500 | -1 | -5 | 4 | |
| 5474109 | 82179 | 222.6 | 228.8 | -1 | 18 | 340 | 10 | 58500 | -5 | 65 | 31 | 76 | 290 | 53700 | 12000 | 30700 | 850 | -3 | 27000 | 35 | 84 | 1200 | 5 | 175 | 11000 | 150 | 34 | 105 | 13900 | -1 | -5 | -1 | |
| 5474110 | 82179 | 235.4 | 236.8 | -1 | 20 | 420 | 10 | 45900 | -5 | 65 | 34 | 85 | 310 | 80200 | 14200 | 25000 | 700 | -3 | 21800 | 40 | 82 | 1250 | 25 | 230 | 12600 | 175 | 35 | 160 | 19700 | 2 | -5 | -1 | |
| 5474111 | 82179 | 244.3 | 245.3 | -1 | 34 | 230 | 10 | 92600 | -5 | 55 | 27 | 93 | 4 | 59000 | 9350 | 35100 | 1500 | -3 | 16300 | 35 | 91 | 1700 | -5 | 135 | 10400 | 165 | 36 | 89 | -500 | 2 | -5 | 3 | |
| 5474112 | 82180 | 9.2 | 10 | -1 | -3 | 1550 | -5 | 29300 | -5 | -10 | 31 | 160 | 2 | 47700 | 16900 | 27000 | 3250 | -3 | 38000 | -5 | 195 | 145 | 15 | 400 | 3450 | 270 | 10 | 260 | -500 | -1 | 15 | 32 | |
| 5474113 | 82180 | 10 | 12 | -1 | -3 | 2450 | -5 | 28800 | -5 | -10 | 43 | 105 | 3 | 72000 | 24500 | 35000 | 5600 | -3 | 23100 | -5 | 280 | 270 | 10 | 210 | 4000 | 320 | 14 | 310 | -500 | 1 | 5 | 15 | |
| 5474114 | 82180 | 12 | 14 | -1 | -3 | 3650 | -5 | 29000 | -5 | -10 | 43 | 125 | 2 | 66300 | 32900 | 33200 | 4850 | -3 | 22500 | -5 | 250 | 170 | 20 | 270 | 3550 | 310 | 11 | 270 | -500 | 2 | 15 | 26 | |
| 5474115 | 82180 | 14 | 16 | -1 | -3 | 2550 | -5 | 26600 | -5 | -10 | 32 | 105 | 3 | 47400 | 25000 | 26200 | 2800 | -3 | 31300 | -5 | 195 | 180 | 15 | 270 | 3500 | 300 | 10 | 210 | -500 | 3 | 15 | 26 | |
| 5474116 | 82180 | 16 | 18 | -1 | -3 | 550 | -5 | 28900 | -5 | -10 | 42 | 82 | 6 | 53000 | 10100 | 30100 | 3300 | -3 | 43300 | -5 | 270 | 190 | 10 | 170 | 4100 | 340 | 11 | 220 | -500 | -1 | 15 | 29 | |
| 5474117 | 82180 | 18 | 20 | -1 | -3 | 1150 | -5 | 31100 | -5 | -10 | 38 | 60 | 7 | 43100 | 15200 | 28900 | 2450 | -3 | 44500 | -5 | 310 | 210 | 15 | 250 | 4200 | 350 | 12 | 150 | -500 | 1 | 15 | 28 | |
| 5474118 | 82180 | 20 | 21 | -1 | -3 | 2750 | -5 | 40400 | -5 | -10 | 27 | 82 | 2 | 35700 | 24000 | 24300 | 2250 | -3 | 29400 | -5 | 210 | 185 | 20 | 410 | 3950 | 270 | 12 | 140 | -500 | 3 | 10 | 22 | |
| 5474119 | 82180 | 23 | 24 | -1 | -3 | 850 | -5 | 34600 | -5 | -10 | 32 | 70 | 2 | 51000 | 13800 | 31600 | 2950 | -3 | 36900 | -5 | 170 | 185 | 10 | 175 | 3750 | 330 | 12 | 175 | -500 | 2 | 20 | 34 | |
| 5474120 | 82180 | 24 | 26 | -1 | -3 | 1550 | -5 | 29300 | -5 | -10 | 28 | 89 | 2 | 39900 | 17600 | 26800 | 2250 | -3 | 37500 | -5 | 180 | 140 | 20 | 320 | 3450 | 260 | 10 | 125 | -500 | 2 | 20 | 33 | |
| 5474121 | 82180 | 26 | 28 | -1 | -3 | 1800 | -5 | 30400 | -5 | -10 | 29 | 145 | 2 | 43500 | 16200 | 31000 | 2400 | -3 | 30800 | -5 | 175 | 115 | 10 | 330 | 3650 | 290 | 10 | 120 | -500 | 2 | 15 | 24 | |
| 5474122 | 82180 | 28 | 29 | -1 | -3 | 1700 | -5 | 33500 | -5 | -10 | 31 | 260 | 2 | 50700 | 23900 | 35100 | 2400 | -3 | 29500 | -5 | 150 | 70 | 25 | 380 | 3000 | 330 | 9 | 140 | -500 | -1 | 10 | 25 | |
| 5474123 | 82180 | 29 | 30 | -1 | -3 | 700 | -5 | 50300 | -5 | -10 | 28 | 210 | 6 | 39600 | 10700 | 29300 | 1850 | -3 | 39400 | -5 | 185 | 80 | 20 | 340 | 3050 | 320 | 10 | 185 | -500 | -1 | 10 | 24 | |
| 5474124 | 82180 | 30 | 32 | -1 | -3 | 650 | -5 | 44500 | -5 | -10 | 28 | 140 | 9 | 39800 | 9700 | 27900 | 2000 | -3 | 43500 | -5 | 210 | 130 | 40 | 330 | 3600 | 310 | 10 | 130 | -500 | 2 | 15 | 29 | |
| 5474125 | 82180 | 34 | 35 | -1 | -3 | 340 | -5 | 49400 | -5 | -10 | 33 | 165 | 3 | 54400 | 5550 | 36500 | 2450 | -3 | 36100 | -5 | 170 | 105 | 20 | 180 | 2550 | 290 | 10 | 125 | -500 | 2 | 10 | 19 | |
| 5474126 | 82180 | 35 | 38 | -1 | -3 | 250 | -5 | 47800 | -5 | -10 | 29 | 125 | 4 | 49300 | 4500 | 35300 | 2200 | -3 | 42200 | -5 | 150 | 120 | 25 | 180 | 3100 | 310 | 11 | 110 | -500 | 2 | 15 | 27 | |
| 5474127 | 82180 | 36 | 38 | -1 | -3 | 1000 | -5 | 41500 | -5 | -10 | 30 | 290 | -2 | 47500 | 12400 | 37900 | 2300 | -3 | 35300 | -5 | 145 | 105 | 25 | 340 | 3750 | 330 | 9 | 120 | -500 | -1 | 10 | 21 | |
| 5474128 | 82180 | 38 | 39.4 | -1 | -3 | 185 | -5 | 40200 | -5 | -10 | 26 | 220 | 3 | 39700 | 3700 | 29200 | 1950 | -3 | 44800 | -5 | 110 | 120 | 20 | 165 | 2850 | 250 | 9 | 155 | -500 | 1 | 10 | 25 | |
| 5474129 | 82180 | 39.4 | 40 | -1 | -3 | 800 | -5 | 46500 | -5 | -10 | 29 | 105 | 2 | 38900 | 10300 | 31200 | 2600 | -3 | 44100 | -5 | 135 | 165 | 20 | 300 | 3900 | 310 | 9 | 145 | -500 | 2 | 20 | 33 | |
| 5474130 | 82180 | 40 | 42 | -1 | -3 | 2300 | -5 | 43700 | -5 | -10 | 31 | 210 | 3 | 45000 | 22000 | 33100 | 3050 | -3 | 30400 | -5 | 135 | 95 | 20 | 280 | 3500 | 280 | 9 | 190 | -500 | -1 | 15 | 26 | |
| 5474131 | 82180 | 42 | 44 | -1 | -3 | 800 | -5 | 66200 | -5 | -10 | 48 | 125 | 2 | 78000 | 23600 | 50900 | 4650 | -3 | 20100 | -5 | 210 | 170 | 15 | 115 | 2550 | 300 | 14 | 240 | -500 | 2 | 10 | 19 | |
| 5474132 | 82180 | 46.2 | 47 | -1 | -3 | 800 | -5 | 54000 | -5 | -10 | 41 | 210 | 3 | 62100 | 18800 | 45400 | 4300 | -3 | 28300 | -5 | 190 | 175 | 10 | 380 | 3700 | 340 | 14 | 230 | -500 | 3 | 20 | 28 | |
| 5474133 | 82180 | 47 | 48 | -1 | -3 | 500 | -5 | 51700 | -5 | -10 | 37 | 190 | -2 | 52700 | 11100 | 39500 | 2800 | -3 | 32900 | -5 | 165 | 150 | 15 | 380 | 3350 | 280 | 13 | 155 | -500 | 2 | 15 | 26 | |
| 5474134 | 82180 | 48 | 50 | -1 | -3 | 700 | -5 | 68900 | -5 | -10 | 48 | 100 | 2 | 66400 | 20500 | 46700 | 4050 | -3 | 17400 | -5 | 200 | 165 | 35 | 320 | 3250 | 300 | 15 | 220 | -500 | 1 | 15 | 26 | |
| 5474135 | 82180 | 50 | 52 | -1 | -3 | 550 | -5 | 73200 | -5 | -10 | 45 | 34 | -2 | 67000 | 13600 | 46800 | 3550 | -3 | 16800 | -5 | 185 | 290 | 15 | 270 | 4300 | 320 | 17 | 190 | -500 | 2 | 15 | 29 | |
| 5474136 | 82180 | 52 | 53 | -1 | -3 | 900 | -5 | 64300 | -5 | -10 | 69 | 46 | -2 | 86200 | 19600 | 66900 | 4400 | -3 | 7700 | -5 | 270 | 200 | 20 | 310 | 3350 | 330 | 24 | 280 | -500 | -1 | 15 | 30 | |
| 5474137 | 82180 | 127.5 | 129.9 | -1 | 14 | 750 | -5 | 33900 | -5 | 65 | 31 | 105 | 5 | 49800 | 22700 | 29200 | 1150 | -3 | 11100 | 30 | 170 | 1300 | 10 | 290 | 13300 | 170 | 24 | 68 | -500 | -1 | -5 | 4 | |
| 5474138 | 82180 | 131 | 132 | -1 | 56 | 600 | -5 | 35500 | -5 | 85 | 36 | 290 | 15 | 75400 | 23000 | 37100 | 1000 | -3 | 9300 | 20 | 165 | 1250 | 35 | 320 | 17000 | 240 | 31 | 73 | -500 | -1 | -5 | 2 | |
| 5474139 | 82180 | 132 | 134 | -1 | 55 | 480 | -5 | 29700 | -5 | 70 | 45 | 155 | 130 | 58900 | 28900 | 27600 | 700 | -3 | 9900 | 25 | 195 | 1500 | 25 | 260 | 13500 | 190 | 22 | 93 | 6050 | -1 | -5 | 1 | |
| 5474140 | 82180 | 134 | 136 | -1 | 34 | 600 | -5 | 30000 | -5 | 65 | 38 | 260 | 76 | 58400 | 17900 | 26600 | 1200 | -3 | 12000 | 30 | 185 | 1250 | 60 | 300 | 17300 | 230 | 23 | 150 | 2450 | -1 | -5 | 1 | |
| 5474141 | 82180 | 136 | 137 | -1 | 4 | 750 | -5 | 53400 | -5 | 90 | 34 | 250 | 42 | 26600 | 15600 | 21500 | 1700 | -3 | 17600 | 30 | 170 | 1200 | 45 | 40 | | | | | | | | | |

| Standard CS27 - | | 0.255% Ni | | -1 | 800 | 10 | 15 | 1600 | -5 | -10 | 70 | 550 | 54 | 32900 | 500 | 199000 | 350 | -3 | 370 | -5 | 2350 | 65 | 15 | 6 | 350 | 15 | -2 | 43 | 2900 | -1 | -5 | 40 |
|-----------------|-------|-----------|-------|----|-----|------|----|--------|----|-----|-----|-----|------|--------|-------|--------|------|----|-------|----|------|------|-----|-----|-------|-----|----|-----|-------|----|----|----|
| 5474158 | 82180 | 160 | 162 | -1 | 66 | 750 | -5 | 43400 | -5 | 95 | 31 | 185 | 19 | 28500 | 25300 | 27300 | 600 | -3 | 41900 | 30 | 130 | 1300 | 30 | 270 | 14900 | 200 | 37 | 110 | -500 | -1 | -5 | 2 |
| 5474158 | 82180 | 162 | 163 | -1 | 12 | 1450 | -5 | 45300 | -5 | 100 | 19 | 145 | 7 | 19500 | 24400 | 22700 | 490 | -3 | 34700 | 25 | 110 | 1350 | 5 | 280 | 16800 | 220 | 36 | 32 | -500 | -1 | -5 | 1 |
| 5474159 | 82180 | 163 | 164 | -1 | 4 | 2250 | -5 | 56600 | -5 | 95 | 19 | 140 | 5 | 23400 | 32300 | 25200 | 850 | -3 | 12500 | 25 | 115 | 1250 | -5 | 190 | 15700 | 210 | 36 | 54 | -500 | -1 | -5 | -1 |
| 5474180 | 82180 | 196 | 198 | -1 | 240 | 450 | -5 | 95400 | -5 | 80 | 72 | 76 | 7 | 51000 | 20200 | 47600 | 1900 | -3 | 13700 | 25 | 110 | 1250 | 20 | 220 | 11400 | 160 | 35 | 160 | 500 | -1 | -5 | 2 |
| 5474161 | 82180 | 198 | 200 | -1 | 120 | 250 | -5 | 104000 | -5 | 70 | 29 | 53 | 3 | 55000 | 14900 | 68900 | 1800 | -3 | 5400 | 20 | 88 | 1150 | 25 | 75 | 9350 | 140 | 32 | 125 | -500 | -1 | -5 | 2 |
| 5474162 | 82180 | 200 | 202 | -1 | -3 | 800 | -5 | 112000 | -5 | 220 | 11 | 49 | 3 | 43400 | 31800 | 59600 | 2600 | -3 | 7800 | 20 | 27 | 1650 | 40 | 165 | 11500 | 155 | 35 | 155 | -500 | -1 | -5 | 2 |
| 5474163 | 82180 | 202 | 203 | -1 | 145 | 390 | -5 | 92200 | -5 | 110 | 59 | 63 | 4 | 46300 | 17100 | 51500 | 1850 | -3 | 17500 | 20 | 55 | 1700 | 250 | 150 | 11400 | 175 | 34 | 500 | 700 | -1 | -5 | 3 |
| 5474164 | 82180 | 205 | 206 | -1 | 105 | 410 | -5 | 46400 | -5 | 85 | 43 | 99 | 270 | 58000 | 10600 | 37200 | 900 | -3 | 35900 | 30 | 88 | 1650 | 105 | 180 | 14000 | 195 | 37 | 185 | 13500 | -1 | -5 | 1 |
| 5474165 | 82180 | 206 | 206.9 | 2 | 90 | 410 | -5 | 54100 | -5 | 80 | 63 | 145 | 500 | 62600 | 8900 | 40600 | 1100 | -3 | 34000 | 30 | 88 | 1700 | 135 | 175 | 14500 | 200 | 35 | 360 | 14300 | -1 | -5 | 2 |
| 5474166 | 82180 | 206.9 | 208 | -1 | 98 | 170 | -5 | 102000 | -5 | 85 | 23 | 83 | 6 | 58300 | 11300 | 47800 | 2100 | -3 | 16800 | 25 | 82 | 1350 | 85 | 90 | 11100 | 155 | 36 | 150 | -500 | -1 | -5 | 3 |
| 5474167 | 82180 | 208 | 210 | -1 | 10 | 550 | -5 | 110000 | -5 | 105 | 17 | 70 | 7 | 52300 | 22100 | 42100 | 2650 | -3 | 7450 | 25 | 50 | 1250 | 40 | 96 | 10900 | 140 | 33 | 140 | 550 | -1 | -5 | 1 |
| 5474168 | 82180 | 210 | 211 | -1 | 38 | 700 | -5 | 107000 | -5 | 75 | 19 | 79 | 4 | 49900 | 30500 | 37400 | 2700 | 4 | 10400 | 25 | 74 | 1400 | 60 | 220 | 11100 | 145 | 32 | 125 | -500 | -1 | -5 | 1 |
| 5474169 | 82180 | 211 | 211.4 | -1 | -3 | 600 | -5 | 120000 | -5 | 100 | 15 | 99 | 4 | 50100 | 14100 | 38800 | 2050 | -3 | 11700 | 25 | 50 | 1500 | 260 | 270 | 12400 | 160 | 38 | 350 | -500 | -1 | -5 | 2 |
| 5474170 | 82180 | 211.35 | 212 | -1 | 150 | 240 | -5 | 76700 | -5 | 90 | 25 | 120 | 18 | 44200 | 6350 | 35300 | 1200 | -3 | 32000 | 25 | 130 | 1650 | 55 | 300 | 13900 | 185 | 35 | 155 | 550 | 1 | -5 | 2 |
| 5474171 | 82180 | 212 | 212.4 | 1 | 190 | 200 | -5 | 84800 | -5 | 90 | 28 | 110 | 240 | 61200 | 5900 | 42900 | 1650 | -3 | 26200 | 25 | 165 | 1500 | 85 | 200 | 12400 | 185 | 35 | 220 | 1100 | 1 | -5 | 2 |
| 5474172 | 82180 | 212.35 | 214 | -1 | 150 | 160 | -5 | 99800 | -5 | 100 | 27 | 91 | 16 | 54000 | 9150 | 42700 | 2050 | -3 | 17100 | 25 | 120 | 1350 | 90 | 120 | 12800 | 165 | 34 | 350 | 550 | 1 | -5 | 2 |
| 5474173 | 82180 | 214 | 216 | -1 | 195 | 410 | -5 | 68000 | -5 | 115 | 31 | 130 | 15 | 46800 | 9750 | 38900 | 1800 | -3 | 35300 | 25 | 135 | 1600 | 40 | 250 | 13600 | 180 | 39 | 115 | -500 | 1 | -5 | 2 |
| 5474174 | 82180 | 216 | 217 | -1 | 6 | 340 | -5 | 96700 | -5 | 80 | 16 | 94 | 4 | 57200 | 15800 | 43400 | 3050 | -3 | 16800 | 20 | 50 | 1200 | 10 | 165 | 10700 | 145 | 33 | 90 | -500 | -1 | -5 | 1 |
| 5474175 | 82180 | 217 | 218 | -1 | -3 | 1200 | -5 | 105000 | -5 | 65 | 15 | 76 | 4 | 51300 | 27700 | 44600 | 2900 | -3 | 8450 | 25 | 36 | 1500 | 200 | 210 | 11600 | 150 | 37 | 240 | -500 | -1 | -5 | 2 |
| 5474176 | 82180 | 218 | 220 | -1 | 130 | 470 | -5 | 96700 | -5 | 90 | 32 | 71 | 9 | 54200 | 14500 | 41300 | 2050 | -3 | 19600 | 25 | 135 | 1600 | 15 | 260 | 13500 | 185 | 35 | 87 | -500 | 1 | -5 | 2 |
| 5474177 | 82180 | 220 | 220.9 | -1 | 40 | 145 | -5 | 126000 | -5 | 80 | 19 | 87 | 6 | 51100 | 6250 | 43400 | 1750 | -3 | 13000 | 20 | 56 | 1450 | 55 | 105 | 11200 | 155 | 37 | 170 | -500 | 1 | -5 | 1 |
| Standard CS15 - | | 0.4% Ni | | -1 | 58 | 5 | 15 | 5200 | -5 | -10 | 100 | 700 | 1000 | 62000 | 330 | 228000 | 1050 | 34 | 490 | -5 | 3900 | 125 | 30 | 12 | 850 | 38 | 3 | 210 | 5950 | 60 | 60 | 99 |
| 5474178 | 82180 | 223.75 | 225.6 | 1 | 92 | 500 | -5 | 96500 | -5 | 70 | 44 | 105 | 240 | 70200 | 12200 | 45800 | 1750 | -3 | 13500 | 25 | 110 | 1350 | 230 | 165 | 11400 | 165 | 34 | 600 | 9450 | 2 | -5 | 2 |
| 5474180 | 82180 | 228.6 | 230 | -1 | 105 | 290 | -5 | 114000 | -5 | 75 | 42 | 86 | 25 | 64700 | 13400 | 34900 | 2800 | -3 | 13300 | 20 | 90 | 1250 | 25 | 230 | 10700 | 150 | 35 | 155 | 800 | 3 | -5 | 2 |
| 5474181 | 82180 | 230 | 232 | -1 | -3 | 250 | -5 | 133000 | -5 | 70 | 22 | 75 | 4 | 85000 | 19100 | 38400 | 3550 | -3 | 1850 | 20 | 65 | 1200 | 90 | 145 | 10300 | 135 | 35 | 190 | 600 | 1 | -5 | 2 |
| 5474182 | 82180 | 232 | 234 | -1 | -3 | 15 | -5 | 140000 | -5 | 115 | 19 | 59 | 3 | 97500 | 1750 | 33000 | 4200 | -3 | 700 | 20 | 58 | 1200 | 5 | 170 | 10900 | 155 | 38 | 145 | 1150 | 1 | -5 | 1 |
| 5474183 | 82180 | 234 | 235.4 | -1 | 16 | 50 | -5 | 127000 | -5 | 50 | 25 | 52 | 4 | 120000 | 2750 | 37400 | 4500 | -3 | 1300 | 15 | 59 | 1050 | 25 | 180 | 9000 | 140 | 30 | 460 | 1200 | 1 | -5 | 1 |
| 5474184 | 82180 | 236.8 | 238 | -1 | 52 | 400 | -5 | 74200 | -5 | 105 | 56 | 105 | 390 | 89600 | 11200 | 34900 | 1250 | -3 | 21000 | 25 | 87 | 1300 | 10 | 280 | 12100 | 170 | 43 | 120 | 17200 | 1 | -5 | 2 |
| Standard CS15 - | | 0.4% Ni | | -1 | 67 | 10 | 15 | 5900 | -5 | -10 | 110 | 750 | 1050 | 68100 | 470 | 247000 | 1150 | 36 | 550 | 5 | 4300 | 135 | 45 | 14 | 1000 | 40 | 4 | 230 | 6350 | 39 | 40 | 79 |
| 5474185 | 82180 | 238 | 239 | -1 | 20 | 330 | -5 | 129000 | -5 | 100 | 23 | 77 | 82 | 92400 | 23400 | 45700 | 2450 | -3 | 5900 | 20 | 46 | 1300 | 80 | 125 | 10000 | 145 | 38 | 360 | 2750 | 1 | -5 | 1 |
| 5474187 | 82180 | 239 | 240 | -1 | 140 | 500 | -5 | 112000 | -5 | 85 | 49 | 62 | 45 | 75900 | 39700 | 33400 | 2450 | -3 | 4050 | 20 | 77 | 1250 | 165 | 135 | 9900 | 135 | 38 | 370 | 1350 | -1 | -5 | 3 |
| 5474188 | 82180 | 240 | 242 | -1 | 54 | 450 | -5 | 66500 | -5 | 80 | 30 | 97 | 220 | 58600 | 17100 | 29100 | 1650 | -3 | 24200 | 20 | 83 | 1500 | 75 | 87 | 9900 | 150 | 34 | 260 | 2150 | -1 | -5 | 3 |
| 5474189 | 82180 | 242 | 244.3 | -1 | 135 | 950 | -5 | 60800 | -5 | 100 | 42 | 115 | 27 | 57800 | 30600 | 33600 | 1750 | -3 | 32700 | 20 | 99 | 2050 | 15 | 240 | 11100 | 175 | 40 | 90 | -500 | -1 | -5 | 6 |
| 5474190 | 82180 | 245.3 | 246 | -1 | 105 | 480 | -5 | 58100 | -5 | 125 | 36 | 140 | 15 | 51600 | 20900 | 26900 | 1350 | 4 | 33700 | 25 | 110 | 2000 | 10 | 350 | 12200 | 175 | 45 | 94 | -500 | -1 | -5 | 4 |
| 5474191 | 82180 | 246 | 248 | -1 | 34 | 250 | -5 | 67500 | -5 | 85 | 27 | 110 | 18 | 62900 | 13600 | 35700 | 1200 | -3 | 15500 | 15 | 83 | 1700 | -5 | 220 | 9250 | 150 | 38 | 88 | -500 | -1 | -5 | 3 |
| 5474192 | 82180 | 248 | 249.1 | -1 | 16 | 300 | -5 | 44700 | -5 | 95 | 24 | 120 | 31 | 47300 | 21200 | 25300 | 450 | -3 | 14000 | 20 | 74 | 1800 | -5 | 200 | 9500 | 150 | 36 | 54 | -500 | -1 | -5 | 4 |
| 5474193 | 82180 | 249.1 | 250 | -1 | 51 | 240 | -5 | 49900 | -5 | 90 | 28 | 96 | 20 | 54400 | 19800 | 32500 | 950 | -3 | 32500 | 20 | 79 | 1550 | 5 | 125 | 9800 | 155 | 41 | 76 | 700 | 2 | -5 | 4 |
| 5474194 | 82180 | 250 | 252 | -1 | 48 | 280 | -5 | 54600 | -5 | 95 | 29 | 130 | 13 | 58800 | 17200 | 33800 | 850 | -3 | 20800 | 25 | 105 | 2250 | -5 | 200 | 13300 | 195 | 39 | 72 | -500 | -1 | -5 | -1 |
| 5474195 | 82180 | 252 | 252.5 | -1 | 50 | 600 | -5 | 32700 | -5 | 95 | 27 | 145 | 28 | 44300 | 27600 | 20000 | 400 | 4 | 19700 | 20 | 100 | 1200 | 5 | 220 | 10000 | 165 | 36 | 61 | -500 | -1 | -5 | 3 |
| 5474196 | 82180 | 252.5 | 254 | -1 | 26 | 1200 | -5 | 78800 | -5 | 105 | 32 | 86 | 5 | 68700 | 26800 | 36200 | 1750 | -3 | 10800 | 20 | 140 | 1900 | 75 | 155 | 11100 | 160 | 43 | 240 | -500 | -1 | -5 | |

Assay

DD97ZA3 - Assays

| Sample No | DPO | From | To | Ag (ppm) | As (ppm) | Ba (ppm) | Bi (ppm) | Ca (ppm) | Cd (ppm) | Ce (ppm) | Co (ppm) | Cr (ppm) | Cu (ppm) | Fe (ppm) | K (ppm) | Mg (ppm) | Mn (ppm) | Mo (ppm) | Na (ppm) | Nb (ppm) | Ni (ppm) | P (ppm) | Pb (ppm) | Sr (ppm) | Ti (ppm) | V (ppm) | Y (ppm) | Zn (ppm) | S (ppm) | Au (ppb) | Pt (ppb) | Pd (ppb) | | | | | |
|-----------------|-------|-----------|------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|----------|----------|----------|----------|----------|----------|---------|----------|----------|----------|---------|---------|----------|---------|----------|----------|----------|--|--|--|--|--|
| 4142430 | 82184 | 2 | 4 | -1 | 4 | 70 | -5 | 2650 | -5 | 120 | 20 | 125 | 27 | 74300 | 1400 | 1250 | 8550 | -3 | 110 | 20 | 50 | 250 | 470 | 22 | 5400 | 89 | 4 | 550 | 850 | 3 | -5 | 2 | | | | | |
| 4142431 | 82184 | 4 | 6 | 2 | 20 | 230 | 15 | 480 | -5 | 270 | 115 | 210 | 88 | 155000 | 230 | 650 | 33200 | -3 | 140 | 35 | 150 | 650 | 1700 | 3 | 7200 | 125 | 6 | 1000 | 2250 | 3 | -5 | 2 | | | | | |
| 4142432 | 82184 | 6 | 8 | -1 | -3 | 280 | -5 | 5400 | -5 | 60 | 47 | 72 | 33 | 95400 | 4300 | 5200 | 7200 | 4 | 210 | 30 | 80 | 500 | 320 | 48 | 7200 | 120 | 9 | 600 | 900 | 2 | -5 | 2 | | | | | |
| 4142433 | 82184 | 8 | 10 | -1 | -3 | 290 | -5 | 2200 | -5 | 110 | 45 | 79 | 66 | 63600 | 21400 | 8450 | 1850 | -3 | 360 | 40 | 105 | 750 | 140 | 31 | 10100 | 160 | 14 | 360 | -500 | -1 | -5 | 1 | | | | | |
| 4142434 | 82184 | 10 | 12 | -1 | -3 | 250 | -5 | 110 | -5 | 70 | 11 | 78 | 64 | 47300 | 28900 | 6750 | 500 | -3 | 410 | 35 | 65 | 550 | 50 | 22 | 10400 | 175 | 16 | 185 | -500 | 3 | -5 | 2 | | | | | |
| 4142435 | 82184 | 12 | 14 | -1 | -3 | 270 | -5 | 410 | -5 | 50 | 14 | 91 | 78 | 57600 | 29100 | 8850 | 650 | -3 | 460 | 35 | 75 | 800 | 110 | 27 | 11000 | 185 | 18 | 170 | -500 | 1 | -5 | 1 | | | | | |
| 4142436 | 82184 | 14 | 16 | -1 | -3 | 280 | -5 | 115 | -5 | 60 | 13 | 92 | 93 | 58900 | 24700 | 9750 | 600 | -3 | 340 | 35 | 81 | 850 | 210 | 29 | 10600 | 175 | 18 | 155 | -500 | -1 | -5 | -1 | | | | | |
| 4142437 | 82184 | 16 | 18 | -1 | -3 | 350 | -5 | 120 | -5 | 90 | 20 | 100 | 95 | 56800 | 21500 | 8850 | 1150 | -3 | 310 | 35 | 105 | 850 | 200 | 39 | 11000 | 170 | 18 | 200 | -500 | 2 | -5 | 1 | | | | | |
| 4142438 | 82184 | 18 | 20 | -1 | -3 | 310 | -5 | 130 | -5 | 65 | 29 | 135 | 94 | 47600 | 22700 | 7150 | 900 | -3 | 340 | 35 | 85 | 750 | 200 | 32 | 10100 | 160 | 20 | 170 | -500 | 2 | -5 | 1 | | | | | |
| 4142439 | 82184 | 20 | 22 | -1 | -3 | 400 | -5 | 180 | -5 | 55 | 25 | 97 | 105 | 53300 | 23900 | 7950 | 700 | -3 | 390 | 35 | 100 | 700 | 130 | 35 | 10900 | 165 | 29 | 220 | -500 | 2 | -5 | 2 | | | | | |
| 4142440 | 82184 | 22 | 24 | -1 | 4 | 800 | -5 | 1200 | -5 | 85 | 28 | 115 | 105 | 57300 | 45400 | 20000 | 1300 | -3 | 650 | 50 | 105 | 700 | 200 | 87 | 15600 | 230 | 48 | 330 | -500 | -1 | -5 | -1 | | | | | |
| 4142441 | 82184 | 24 | 26 | 1 | -3 | 600 | -5 | 420 | -5 | 85 | 27 | 115 | 130 | 63400 | 33400 | 23000 | 1300 | -3 | 490 | 50 | 110 | 650 | 250 | 51 | 15300 | 230 | 40 | 490 | -500 | 2 | -5 | 8 | | | | | |
| 4142442 | 82184 | 26 | 28 | -1 | 4 | 750 | -5 | 3100 | -5 | 75 | 36 | 92 | 93 | 62600 | 25300 | 24700 | 1350 | -3 | 800 | 45 | 145 | 600 | 80 | 57 | 13300 | 210 | 37 | 550 | 1500 | 3 | -5 | 4 | | | | | |
| 4142443 | 82184 | 28 | 30 | -1 | -3 | 2850 | -5 | 30100 | -5 | -10 | 50 | 45 | 185 | 77900 | 42600 | 37300 | 2050 | -3 | 6950 | -5 | 190 | 320 | 115 | 200 | 4550 | 430 | 22 | 430 | -500 | 4 | 15 | 25 | | | | | |
| 4142444 | 82184 | 30 | 32 | 1 | -3 | 1550 | -5 | 34800 | -5 | -10 | 65 | 94 | 460 | 103000 | 20900 | 56000 | 2650 | -3 | 14400 | -5 | 270 | 260 | 70 | 155 | 4550 | 480 | 31 | 950 | 950 | -1 | 20 | 32 | | | | | |
| 4142445 | 82184 | 32 | 34 | 3 | 10 | 850 | -5 | 38100 | -5 | -10 | 79 | 93 | 2400 | 93000 | 12300 | 58700 | 3450 | 4 | 6650 | -5 | 185 | 180 | 90 | 105 | 3400 | 290 | 16 | 1050 | 3350 | -1 | 20 | 30 | | | | | |
| 4142446 | 82184 | 34 | 36 | -1 | -3 | 1500 | -5 | 38000 | -5 | -10 | 38 | 57 | 21 | 64900 | 25800 | 42800 | 2600 | -3 | 10300 | -5 | 135 | 175 | 10 | 210 | 3400 | 290 | 15 | 280 | -500 | 2 | 20 | 31 | | | | | |
| 4142447 | 82184 | 36 | 38 | -1 | -3 | 700 | -5 | 31100 | -5 | -10 | 36 | 120 | 13 | 57500 | 14200 | 39200 | 2100 | -3 | 22700 | -5 | 130 | 120 | 10 | 220 | 3050 | 260 | 13 | 230 | -500 | 1 | 15 | 23 | | | | | |
| 4142448 | 82184 | 38 | 40 | -1 | -3 | 1050 | -5 | 34000 | -5 | -10 | 60 | 190 | 330 | 77800 | 26400 | 52500 | 2550 | -3 | 29400 | -5 | 240 | 155 | 50 | 310 | 4200 | 340 | 17 | 370 | 1150 | 4 | 20 | 28 | | | | | |
| 4142449 | 82184 | 40 | 42 | -1 | -3 | 650 | -5 | 40100 | -5 | -10 | 64 | 550 | 5 | 69900 | 12700 | 78000 | 3450 | -3 | 11900 | -5 | 340 | 75 | 25 | 120 | 1750 | 210 | 9 | 600 | -500 | 2 | 10 | 16 | | | | | |
| 4142450 | 82184 | 42 | 44 | -1 | -3 | 550 | -5 | 43500 | -5 | -10 | 59 | 550 | 4 | 63900 | 5750 | 77300 | 2800 | -3 | 7400 | -5 | 330 | 60 | 20 | 110 | 1150 | 170 | 7 | 360 | -500 | -1 | 10 | 12 | | | | | |
| 4142451 | 82184 | 44 | 46 | -1 | -3 | 700 | -5 | 54800 | -5 | 10 | 80 | 750 | 14 | 86500 | 6300 | 93300 | 3100 | -3 | 9350 | -5 | 440 | 80 | 20 | 175 | 1550 | 220 | 8 | 440 | -500 | 3 | 10 | 12 | | | | | |
| 4142452 | 82184 | 46 | 48 | -1 | -3 | 410 | -5 | 44500 | -5 | -10 | 55 | 550 | 6 | 60000 | 4350 | 69800 | 1850 | -3 | 8950 | -5 | 270 | 65 | 10 | 165 | 1150 | 165 | 6 | 240 | -500 | 2 | 10 | 13 | | | | | |
| 4142453 | 82184 | 48 | 50 | -1 | -3 | 250 | -5 | 49900 | -5 | -10 | 59 | 750 | 3 | 66600 | 4650 | 74000 | 1950 | -3 | 9150 | -5 | 280 | 70 | -5 | 220 | 1150 | 170 | 6 | 220 | -500 | 3 | 15 | 17 | | | | | |
| Standard CS27 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4142454 | 82184 | 0.255% Ni | | -1 | 750 | 10 | 20 | 1800 | -5 | 15 | 100 | 650 | 59 | 30400 | 280 | 222000 | 360 | -3 | 360 | 5 | 2750 | 55 | 10 | 6 | 310 | 17 | -2 | 45 | 3250 | | | | | | | | |
| 4142455 | 82184 | 50 | 51.5 | -1 | -3 | 410 | -5 | 62100 | -5 | -10 | 59 | 410 | 57 | 76200 | 7700 | 66100 | 2750 | 4 | 8550 | -5 | 2600 | 50 | 60 | 135 | 1150 | 170 | -11 | 600 | -500 | -1 | 15 | 17 | | | | | |
| 4142456 | 82184 | 51.5 | 52 | -1 | -3 | 500 | -5 | 54600 | -5 | -10 | 76 | 400 | 37 | 88000 | 13900 | 75000 | 3100 | -3 | 9600 | -5 | 320 | 95 | 25 | 190 | 1500 | 220 | 12 | 410 | -500 | -1 | 10 | 13 | | | | | |
| 4142457 | 82184 | 52 | 54 | -1 | -3 | 410 | -5 | 48200 | -5 | -10 | 54 | 480 | 24 | 61500 | 13900 | 54600 | 2750 | -3 | 10800 | -5 | 230 | 50 | 40 | 165 | 1150 | 175 | 6 | 600 | -500 | -1 | 15 | 20 | | | | | |
| 4142458 | 82184 | 54 | 56 | -1 | -3 | 600 | -5 | 54900 | -5 | -10 | 69 | 750 | 4 | 78400 | 11400 | 76200 | 2900 | -3 | 14600 | -5 | 420 | 75 | 15 | 160 | 1550 | 210 | 9 | 430 | -500 | -1 | 10 | 11 | | | | | |
| 4142459 | 82184 | 56 | 58 | -1 | -3 | 260 | -5 | 49800 | -5 | -10 | 67 | 600 | 24 | 71800 | 9300 | 68700 | 2350 | -3 | 13000 | -5 | 330 | 85 | 25 | 150 | 1400 | 185 | 8 | 360 | -500 | -1 | 10 | 14 | | | | | |
| 4142460 | 82184 | 58 | 60 | -1 | -3 | 360 | -5 | 50300 | -5 | -10 | 55 | 330 | 110 | 57900 | 12800 | 52800 | 2050 | -3 | 14600 | -5 | 200 | 70 | 30 | 270 | 1500 | 190 | 8 | 310 | -500 | 3 | 15 | 18 | | | | | |
| 4142461 | 82184 | 60 | 61.7 | -1 | -3 | 350 | -5 | 38100 | -5 | -10 | 43 | 150 | 92 | 56800 | 12600 | 44900 | 1800 | -3 | 15200 | -5 | 135 | 120 | 35 | 240 | 2750 | 260 | 14 | 270 | -500 | -1 | 15 | 23 | | | | | |
| 4142462 | 82184 | 61.7 | 62 | -1 | -3 | 310 | -5 | 45800 | -5 | 20 | 42 | 125 | 26 | 65400 | 15200 | 44300 | 2650 | -3 | 15900 | -5 | 110 | 125 | 35 | 195 | 2600 | 250 | 26 | 270 | -500 | -1 | 10 | 14 | | | | | |
| 4142463 | 82184 | 62 | 64 | -1 | -3 | 370 | -5 | 31500 | -5 | -10 | 42 | 120 | 25 | 54000 | 15400 | 44600 | 1700 | -3 | 17300 | -5 | 110 | 130 | 20 | 240 | 3150 | 260 | 17 | 220 | -500 | -1 | 15 | 24 | | | | | |
| 4142464 | 82184 | 64 | 66 | -1 | -3 | 460 | -5 | 26600 | -5 | -10 | 46 | 92 | 9 | 54800 | 11800 | 43300 | 2700 | -3 | 10900 | -5 | 120 | 210 | 30 | 200 | 4150 | 240 | 25 | 450 | -500 | -1 | 15 | 18 | | | | | |
| 4142465 | 82184 | 66 | 67.1 | -1 | -3 | 800 | -5 | 36100 | -5 | -10 | 40 | 68 | 8 | 57700 | 14500 | 43600 | 3300 | -3 | 18600 | -5 | 110 | 105 | 35 | 260 | 3450 | 300 | 22 | 1350 | -500 | -1 | 25 | 36 | | | | | |
| 4142466 | 82184 | 67.1 | 68 | -1 | -3 | 650 | -5 | 53200 | -5 | -10 | 39 | 120 | 5 | 59100 | 12800 | 42100 | 2850 | -3 | 16400 | -5 | 115 | 100 | 85 | 290 | 2750 | 250 | 15 | 370 | -500 | -1 | 15 | 25 | | | | | |
| 4142467 | 82184 | 68 | 69.2 | -1 | -3 | 1500 | -5 | 41700 | -5 | -10 | 38 | 94 | 7 | 53700 | 22700 | 41300 | 2300 | -3 | 20100 | -5 | 115 | 180 | 50 | 250 | 3600 | 240 | 23 | 320 | -500 | -1 | 20 | 25 | | | | | |
| 4142468 | 82184 | 69.2 | 70 | -1 | -3 | 1900 | -5 | 42200 | -5 | -10 | 38 | 115 | 9 | 51300 | 30400 | 42700 | 2450 | -3 | 13500 | -5 | 110 | 130 | 25 | 280 | 3050 | 260 | 13 | 400 | -500 | -1 | 20 | 24 | | | | | |
| 4142469 | 82184 | 70 | 72 | -1 | -3 | 1200 | -5 | 43700 | -5 | -10 | 44 | 115 | 6 | 65400 | 21400 | 49800 | 2850 | -3 | 16900 | -5 | 135 | 120 | 30 | 230 | 3100 | 270 | 15 | 410 | -500 | -1 | 15 | 25 | | | | | |
| 4142470 | 82184 | 72 | 74 | -1 | -3 | 1050 | -5 | 38200 | -5 | -10 | 43 | 115 | 3 | 55900 | 18200 | 42100 | 2750 | -3 | 16100 | -5 | 135 | 135 | 25 | 240 | 3150 | 280 | 14 | 400 | -500 | -1 | 20 | 27 | | | | | |
| 4142471 | 82184 | 74 | 76 | -1 | -3 | 1100 | -5 | 44200 | -5 | -10 | 45 | 150 | 2 | 56800 | 20900 | 45400 | 2850 | -3 | 14600 | -5 | 155 | 140 | 20 | 290 | 3750 | 290 | 16 | 440 | -500 | -1 | 20 | 28 | | | | | |
| 4142472 | 82184 | 76 | 78 | -1 | -3 | 1050 | -5 | 44800 | -5 | -10 | 49 | 165 | -2 | 60100 | 17800 | 44600 | 3000 | -3 | 16500 | -5 | 135 | 170 | 25 | 340 | 3800 | 310 | 16 | 370 | -500 | -1 | 25 | 33 | | | | | |
| 4142473 | 82184 | 78 | 78.8 | -1 | -3 | 1200 | -5 | 46100 | -5 | -10 | 39 | 130 | 2 | 54200 | 18700 | 39900 | 2400 | -3 | 11000 | -5 | 110 | 140 | 20 | 340 | 3050 | 260 | 15 | 330 | -500 | -1 | 20 | 30 | | | | | |
| 4142474 | 82184 | 78.8 | 80 | -1 | -3 | 1900 | -5 | 39900 | -5 | -10 | 47 | 145 | -2 | 55900 | 28000 | 39500 | 2400 | -3 | 7850 | -5 | 105 | 125 | 30 | 380 | 2950 | 250 | 13 | 300 | -500 | -1 | 20 | 31 | | | | | |
| Standard CS15 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4142475 | 82184 | 0.4% Ni | | -1 | 38 | -5 | 10 | 3900 | -5 | -10 | 99 | 440 | 850 | | | | | | | | | | | | | | | | | | | | | | | | |

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|-----------------|-------|-----------|------|----|-----|------|----|-------|----|-----|----|-----|-----|-------|-------|--------|------|----|-------|----|------|-----|------|-----|------|-----|----|------|-------|----|----|----|
| 4142481 | 82184 | 90 | 92 | -1 | -3 | 2600 | -5 | 55700 | -5 | -10 | 39 | 36 | -2 | 61700 | 31300 | 41300 | 3100 | -3 | 9850 | -5 | 145 | 260 | 30 | 320 | 4150 | 370 | 21 | 290 | -500 | 1 | 25 | 29 |
| 4142482 | 82184 | 92 | 92.5 | -1 | -3 | 3150 | -5 | 35100 | -5 | -10 | 43 | 44 | -2 | 62900 | 35500 | 42900 | 3550 | -3 | 11000 | -5 | 185 | 260 | 20 | 290 | 4500 | 380 | 17 | 420 | 700 | 3 | 30 | 35 |
| 4142483 | 82184 | 92.5 | 98 | -1 | 4 | 3000 | -5 | 55500 | -5 | -10 | 46 | 95 | -2 | 61300 | 20600 | 45600 | 2400 | -3 | 8000 | -5 | 195 | 190 | 5 | 240 | 3250 | 310 | 13 | 360 | 1300 | -1 | 15 | 23 |
| 4142484 | 82184 | 98 | 100 | -1 | -3 | 1050 | -5 | 75400 | -5 | -10 | 45 | 270 | -2 | 63000 | 12300 | 52200 | 2600 | -3 | 8050 | -5 | 160 | 145 | -5 | 270 | 2850 | 250 | 14 | 210 | -500 | 1 | 15 | 31 |
| 4142485 | 82184 | 100 | 102 | -1 | -3 | 1700 | -5 | 63800 | -5 | -10 | 52 | 230 | -2 | 62900 | 26300 | 50700 | 2600 | -3 | 6150 | -5 | 190 | 145 | 10 | 300 | 3100 | 280 | 15 | 330 | -500 | 3 | 20 | 25 |
| 4142486 | 82184 | 102 | 104 | -1 | -3 | 500 | -5 | 73100 | -5 | -10 | 48 | 180 | 13 | 66900 | 8500 | 46200 | 3200 | -3 | 9900 | -5 | 170 | 150 | 10 | 145 | 2950 | 260 | 16 | 340 | 750 | -1 | 15 | 15 |
| 4142487 | 82184 | 104 | 106 | -1 | -3 | 260 | -5 | 51400 | -5 | -10 | 49 | 57 | -2 | 69100 | 5850 | 40700 | 4150 | -3 | 22000 | -5 | 170 | 210 | 10 | 280 | 3950 | 340 | 20 | 460 | 1000 | -1 | 25 | 27 |
| 4142488 | 82184 | 106 | 108 | -1 | -3 | 350 | -5 | 36500 | -5 | -10 | 41 | 175 | -2 | 58500 | 10300 | 36400 | 4650 | -3 | 23800 | -5 | 140 | 185 | 10 | 290 | 3200 | 300 | 15 | 420 | -500 | -1 | 15 | 23 |
| 4142489 | 82184 | 108 | 110 | -1 | -3 | 480 | -5 | 40800 | -5 | -10 | 33 | 165 | 5 | 43400 | 9300 | 28900 | 2600 | -3 | 28500 | -5 | 135 | 180 | 10 | 320 | 3100 | 280 | 15 | 420 | -500 | -1 | 20 | 27 |
| 4142490 | 82184 | 110 | 112 | -1 | -3 | 600 | -5 | 52700 | -5 | -10 | 37 | 450 | 6 | 52300 | 11700 | 39400 | 3700 | -3 | 15300 | -5 | 210 | 155 | 15 | 280 | 2650 | 250 | 13 | 360 | -500 | 1 | 20 | 26 |
| 4142491 | 82184 | 112 | 114 | -1 | -3 | 700 | -5 | 73600 | -5 | 15 | 44 | 270 | 3 | 61000 | 15100 | 46000 | 5350 | -3 | 6300 | -5 | 190 | 290 | 25 | 400 | 3550 | 270 | 16 | 700 | -500 | -1 | 15 | 23 |
| 4142492 | 82184 | 114 | 116 | -1 | -3 | 500 | -5 | 58500 | -5 | 15 | 50 | 92 | 3 | 69100 | 15100 | 45300 | 5650 | -3 | 5850 | -5 | 170 | 300 | 15 | 320 | 4050 | 300 | 16 | 500 | -500 | -1 | 20 | 31 |
| 4142493 | 82184 | 116.2 | 118 | -1 | -3 | 1250 | -5 | 48400 | -5 | 25 | 35 | 260 | 19 | 52900 | 27600 | 31800 | 5200 | -3 | 8100 | 10 | 130 | 460 | 45 | 400 | 4500 | 250 | 20 | 300 | -500 | 3 | 15 | 21 |
| Standard CS27 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4142494 | 82184 | 0.255% Ni | | -1 | 650 | -5 | 15 | 1050 | -5 | -10 | 74 | 450 | 41 | 22200 | 50 | 179000 | 260 | -3 | 230 | -5 | 2050 | 45 | 10 | 3 | 220 | 13 | -2 | 32 | 2400 | | | |
| 4142495 | 82184 | 118 | 119 | -1 | 4 | 3800 | -5 | 46700 | -5 | 100 | 25 | 240 | 59 | 37900 | 19000 | 32600 | 2950 | 4 | 5850 | 20 | 64 | 650 | 55 | 290 | 6400 | 115 | 25 | 500 | -500 | -1 | -5 | 3 |
| 4142496 | 82184 | 119.3 | 120 | 2 | 34 | 3550 | -5 | 31000 | -5 | 40 | 44 | 145 | 550 | 23500 | 23500 | 21500 | 1350 | 4 | 10600 | 15 | 66 | 600 | 105 | 210 | 4350 | 105 | 18 | 600 | 1150 | -1 | -5 | 4 |
| 4142497 | 82184 | 120 | 121 | 4 | 93 | 2800 | -5 | 30400 | 15 | 45 | 68 | 155 | 480 | 24800 | 24200 | 20800 | 1300 | 6 | 14300 | 15 | 69 | 600 | 850 | 220 | 4650 | 115 | 20 | 3500 | 3200 | -1 | -5 | 4 |
| 4142498 | 82184 | 120.7 | 122 | 3 | 63 | 2050 | -5 | 33300 | -5 | 35 | 49 | 89 | 230 | 31500 | 18900 | 23500 | 1650 | -3 | 13800 | 15 | 105 | 650 | 350 | 180 | 4650 | 115 | 20 | 650 | 5200 | -1 | -5 | 3 |
| 4142499 | 82184 | 122 | 124 | 1 | 40 | 330 | -5 | 33400 | -5 | 45 | 29 | 90 | 165 | 32500 | 25200 | 25000 | 1300 | -3 | 12300 | 15 | 62 | 600 | 110 | 210 | 4700 | 115 | 21 | 300 | 5900 | -1 | -5 | 3 |
| 4142500 | 82184 | 124 | 126 | 1 | 8 | 420 | -5 | 22300 | -5 | 30 | 23 | 105 | 145 | 34600 | 16900 | 19800 | 850 | 4 | 11700 | 10 | 54 | 550 | 80 | 150 | 4150 | 100 | 18 | 140 | 11500 | -1 | -5 | 3 |
| 5855001 | 82184 | 126 | 128 | -1 | 16 | 1300 | -5 | 35400 | -5 | 40 | 23 | 110 | 135 | 33400 | 12100 | 24500 | 1600 | -3 | 6300 | 15 | 51 | 700 | 135 | 220 | 5100 | 125 | 21 | 490 | 2900 | -1 | -5 | 3 |
| 5855002 | 82184 | 128 | 130 | -1 | -3 | 1250 | -5 | 51900 | -5 | 50 | 17 | 71 | 28 | 34200 | 14400 | 31300 | 2400 | -3 | 7150 | 15 | 43 | 700 | 25 | 210 | 5400 | 130 | 23 | 320 | -500 | -1 | -5 | 3 |
| 5855003 | 82184 | 130 | 132 | -1 | -3 | 1250 | -5 | 45400 | -5 | 50 | 24 | 87 | 115 | 33300 | 15500 | 29200 | 1850 | -3 | 7200 | 15 | 47 | 700 | 55 | 210 | 5350 | 125 | 23 | 450 | 600 | 1 | -5 | 3 |
| 5855004 | 82184 | 132 | 134 | 1 | 14 | 1150 | -5 | 31400 | -5 | 40 | 28 | 77 | 175 | 35100 | 14500 | 26100 | 1800 | -3 | 6100 | 15 | 48 | 700 | 240 | 170 | 5100 | 125 | 21 | 550 | 2600 | -1 | -5 | 3 |
| 5855005 | 82184 | 134 | 136 | -1 | 4 | 850 | -5 | 27800 | -5 | 40 | 23 | 94 | 135 | 34900 | 13600 | 22400 | 800 | 4 | 5950 | 15 | 56 | 600 | 230 | 155 | 4550 | 115 | 19 | 290 | 9550 | 1 | -5 | 3 |
| 5855006 | 82184 | 136 | 137 | 1 | 16 | 700 | -5 | 26300 | -5 | 55 | 24 | 100 | 155 | 38800 | 14600 | 23600 | 1300 | 4 | 4550 | 15 | 60 | 650 | 430 | 185 | 4800 | 115 | 20 | 700 | 7250 | -1 | -5 | 2 |
| 5855007 | 82184 | 137.45 | 138 | 6 | 44 | 650 | -5 | 50200 | 30 | 40 | 46 | 150 | 750 | 53500 | 11200 | 27200 | 1850 | 4 | 2300 | 10 | 94 | 550 | 1900 | 180 | 3850 | 110 | 18 | 6550 | 15700 | 2 | -5 | 3 |
| 5855008 | 82184 | 138 | 139 | 7 | 18 | 600 | 10 | 38000 | 10 | 35 | 17 | 145 | 120 | 37400 | 10000 | 23500 | 1550 | -3 | 1100 | 10 | 38 | 600 | 3650 | 210 | 4000 | 105 | 18 | 2500 | 4200 | -1 | -5 | 2 |
| 5855009 | 82184 | 138.6 | 140 | -1 | 4 | 800 | -5 | 28600 | -5 | 50 | 20 | 170 | 100 | 36500 | 11900 | 20900 | 600 | 8 | 3800 | 15 | 57 | 650 | 220 | 195 | 4550 | 110 | 19 | 190 | 10100 | -1 | -5 | 2 |
| 5855010 | 82184 | 140 | 142 | -1 | 8 | 550 | -5 | 27900 | -5 | 45 | 19 | 90 | 95 | 36700 | 14300 | 22400 | 650 | 6 | 2350 | 15 | 57 | 600 | 290 | 185 | 4400 | 110 | 18 | 330 | 10800 | -1 | -5 | 3 |
| 5855011 | 82184 | 142 | 143 | -1 | 8 | 700 | -5 | 25100 | -5 | 35 | 20 | 125 | 95 | 33400 | 15600 | 20000 | 650 | 6 | 3350 | 15 | 60 | 550 | 240 | 175 | 4150 | 105 | 17 | 190 | 10000 | -1 | -5 | 2 |
| 5855012 | 82184 | 142.6 | 144 | -1 | 4 | 700 | -5 | 31900 | -5 | 45 | 18 | 135 | 90 | 34000 | 18100 | 24800 | 900 | 6 | 3050 | 15 | 53 | 600 | 195 | 185 | 4250 | 105 | 20 | 230 | 6650 | -1 | -5 | 2 |
| 5855013 | 82184 | 144 | 145 | -1 | 4 | 900 | -5 | 28200 | -5 | 50 | 25 | 87 | 125 | 34700 | 12400 | 21000 | 650 | 8 | 3400 | 15 | 97 | 600 | 260 | 220 | 4550 | 120 | 18 | 220 | 8500 | -1 | -5 | 3 |
| 5855014 | 82184 | 145.2 | 146 | -1 | -3 | 420 | -5 | 34800 | -5 | 55 | 9 | 92 | 15 | 26600 | 14200 | 22000 | 700 | 8 | 3350 | 15 | 32 | 600 | 80 | 200 | 4650 | 115 | 17 | 89 | 1300 | -1 | -5 | 3 |
| 5855015 | 82184 | 146 | 148 | 1 | 14 | 850 | -5 | 35600 | -5 | 50 | 15 | 105 | 84 | 27500 | 14900 | 23100 | 1150 | 8 | 4150 | 15 | 63 | 600 | 230 | 185 | 4400 | 110 | 21 | 460 | 850 | -1 | -5 | 2 |
| 5855016 | 82184 | 148 | 149 | -1 | 6 | 1100 | -5 | 43700 | -5 | 45 | 24 | 120 | 55 | 35200 | 9050 | 23500 | 2150 | 8 | 4200 | 15 | 105 | 600 | 240 | 175 | 4650 | 140 | 20 | 330 | 700 | -1 | -5 | 2 |
| 5855017 | 82184 | 149 | 150 | 2 | 26 | 1150 | -5 | 27500 | 10 | 45 | 43 | 200 | 260 | 32200 | 10800 | 15700 | 1550 | 8 | 5550 | 15 | 94 | 600 | 500 | 190 | 4650 | 145 | 21 | 2700 | 5350 | -1 | -5 | 3 |
| 5855018 | 82184 | 150 | 152 | -1 | 10 | 600 | -5 | 32800 | -5 | 50 | 26 | 185 | 85 | 26600 | 7250 | 19800 | 1050 | 6 | 7400 | 15 | 65 | 700 | 135 | 260 | 5000 | 180 | 20 | 175 | 1100 | -1 | -5 | 3 |
| 5855019 | 82184 | 152 | 154 | -1 | -3 | 240 | -5 | 35700 | -5 | 50 | 20 | 88 | 15 | 24800 | 5750 | 25400 | 2000 | -3 | 18100 | 15 | 57 | 750 | 55 | 240 | 5250 | 145 | 23 | 200 | -500 | -1 | -5 | 3 |
| 5855020 | 82184 | 154 | 156 | -1 | -3 | 150 | -5 | 45300 | -5 | 60 | 21 | 96 | 11 | 30200 | 8300 | 25000 | 2600 | -3 | 9350 | 15 | 61 | 750 | 50 | 170 | 5300 | 155 | 22 | 300 | -500 | -1 | -5 | 4 |
| 5855021 | 82184 | 156 | 158 | -1 | -3 | 230 | -5 | 52800 | -5 | 40 | 15 | 89 | 12 | 34300 | 4850 | 31700 | 2650 | -3 | 12600 | 15 | 49 | 800 | 40 | 165 | 4800 | 130 | 22 | 320 | -500 | -1 | -5 | 10 |
| 5855022 | 82184 | 158 | 160 | -1 | -3 | 230 | -5 | 37200 | -5 | 50 | 13 | 65 | 16 | 31100 | 5550 | 23800 | 2200 | -3 | 10900 | 15 | 39 | 750 | 25 | 165 | 5000 | 110 | 22 | 210 | -500 | -1 | -5 | 3 |
| 5855023 | 82184 | 160 | 162 | -1 | -3 | 320 | -5 | 48400 | -5 | 45 | 16 | 62 | 7 | 28700 | 7450 | 27200 | 1850 | -3 | 8300 | 15 | 52 | 800 | 20 | 185 | 4950 | 115 | 22 | 200 | -500 | -1 | -5 | 3 |
| 5855024 | 82184 | 162 | 163 | -1 | -3 | 420 | -5 | 41300 | -5 | 40 | 16 | 91 | 16 | 25600 | 5500 | 27300 | 1300 | 4 | 12900 | 15 | 58 | 750 | 115 | 240 | 5250 | 115 | 25 | 360 | -500 | -1 | -5 | 6 |
| 5855025 | 82184 | 162.5 | 164 | -1 | 12 | 600 | -5 | 33400 | -5 | 55 | 26 | 120 | 13 | 23500 | 9350 | 21800 | 1100 | -3 | 9850 | 15 | 115 | 550 | 45 | 220 | 5300 | 120 | 21 | 175 | -500 | -1 | -5 | 6 |
| 5855026 | 82184 | 164 | 166 | -1 | 14 | 390 | -5 | 34000 | -5 | 45 | 27 | 120 | 43 | 23800 | 10500 | 21800 | 1200 | -3 | 9150 | 15 | 125 | 950 | 90 | 200 | 5400 | 130 | 22 | 200 | -500 | 1 | -5 | 7 |
| 5855027 | 82184 | 166 | 168 | -1 | 18 | 850 | -5 | 39800 | -5 | 35 | 30 | | | | | | | | | | | | | | | | | | | | | |

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| 5855037 | 82184 | 182 | 183 | 1 | 700 | 10 | 25 | 161000 | -5 | 20 | 76 | 380 | 2 | 20900 | 125 | 88600 | 2400 | -3 | 145 | -5 | 850 | 30 | 14 | 35 | 12 | -2 | 220 | 900 | -1 | -5 | -1 | |
| 5855038 | 82184 | 183 | 184 | -1 | 1950 | 5 | 35 | 160000 | -5 | 25 | 115 | 310 | 7 | 23100 | 105 | 85900 | 2600 | -3 | 140 | -5 | 1850 | 25 | 35 | 16 | 20 | 10 | -2 | 155 | 600 | -1 | -5 | -1 |
| Standard CS26 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5855039 | 82184 | 1.0% Ni | | -1 | 2600 | 10 | 15 | 9000 | -5 | 15 | 280 | 550 | 110 | 31600 | 135 | 209000 | 1000 | 8 | 1250 | 5 | 9700 | 70 | 35 | 25 | 230 | 15 | -2 | 90 | 9050 | | | |
| 5855040 | 82184 | 184 | 185 | -1 | 4500 | -5 | 155 | 161000 | -5 | 20 | 250 | 270 | 6 | 32000 | 105 | 83500 | 2850 | -3 | 170 | -5 | 5150 | 35 | 90 | 13 | 25 | 10 | 2 | 105 | 2450 | -1 | 10 | 7 |
| 5855041 | 82184 | 184.7 | 185 | -1 | 280 | 45 | -5 | 156000 | -5 | 35 | 49 | 600 | -2 | 42400 | 430 | 76600 | 3800 | -3 | 280 | -5 | 550 | 25 | 10 | 16 | 30 | 12 | 4 | 105 | -500 | 3 | 5 | -1 |
| 5855042 | 82184 | 185 | 186 | -1 | 2050 | 10 | 50 | 160000 | -5 | 95 | 130 | 470 | 2 | 29800 | 290 | 90300 | 2700 | -3 | 190 | -5 | 1550 | 30 | 55 | 14 | 25 | 11 | 4 | 105 | 800 | -1 | -5 | 3 |
| 5855043 | 82184 | 185.6 | 186 | 4 | 12900 | -5 | 1200 | 155000 | 130 | 15 | 400 | 320 | 19 | 23600 | 50 | 85600 | 2200 | -3 | 130 | -5 | 10900 | 2400 | 850 | 11 | 15 | 8 | 3 | 130 | 2950 | -1 | -5 | 1 |
| 5855044 | 82184 | 186 | 188 | -1 | 1900 | 5 | 40 | 164000 | -5 | 20 | 120 | 370 | 4 | 24500 | 160 | 87100 | 2650 | -3 | 175 | -5 | 1550 | 30 | 40 | 13 | 25 | 9 | -2 | 115 | 650 | -1 | -5 | -1 |
| 5855045 | 82184 | 188 | 189 | 1 | 1200 | 260 | 20 | 144000 | -5 | 15 | 115 | 950 | 11 | 57700 | 2200 | 65700 | 4950 | -3 | 550 | -5 | 1400 | 45 | 25 | 31 | 230 | 27 | 5 | 330 | 2100 | -1 | -5 | 2 |
| 5855046 | 82184 | 189.3 | 190 | -1 | 850 | 20 | 35 | 87400 | 70 | -10 | 380 | 950 | 7 | 60200 | 500 | 94800 | 2450 | -3 | 1100 | -5 | 11200 | 1300 | -5 | 19 | 310 | 20 | 2 | 340 | 25100 | -1 | 5 | 1 |
| 5855047 | 82184 | 190 | 192 | 2 | 900 | 10 | 90 | 149000 | -5 | 15 | 125 | 900 | 7 | 61000 | 420 | 68500 | 5200 | -3 | 450 | -5 | 1400 | 25 | 75 | 15 | 50 | 23 | 3 | 460 | 2450 | -1 | -5 | 1 |
| 5855048 | 82184 | 192 | 193 | 2 | 310 | 10 | 65 | 152000 | -5 | 20 | 78 | 950 | 3 | 53000 | 410 | 67100 | 4350 | -3 | 370 | -5 | 750 | 25 | 80 | 18 | 55 | 20 | 4 | 800 | 950 | -1 | -5 | -1 |
| 5855049 | 82184 | 192.9 | 194 | -1 | 22 | -5 | 5 | 171000 | -5 | 25 | 28 | 500 | -2 | 21700 | 60 | 88200 | 2200 | -3 | 140 | -5 | 230 | 25 | 10 | 14 | 30 | 10 | -2 | 260 | 500 | -1 | -5 | -1 |
| 5855050 | 82184 | 194 | 194 | 1 | 86 | -5 | 5 | 132000 | 5 | -10 | 19 | 550 | -2 | 52200 | 40 | 65300 | 21000 | -3 | 110 | -5 | 210 | 25 | 45 | 17 | 750 | 8 | 6 | 2400 | 8650 | -1 | -5 | -1 |
| 5855051 | 82184 | 194.4 | 196 | -1 | 44 | -5 | 5 | 162000 | -5 | 15 | 20 | 500 | -2 | 24500 | 45 | 79800 | 4950 | -3 | 115 | -5 | 165 | 25 | 15 | 15 | 35 | 9 | -2 | 230 | 750 | -1 | -5 | -1 |
| 5855052 | 82184 | 196 | 198 | -1 | 10 | -5 | -5 | 179000 | -5 | 15 | 28 | 650 | -2 | 23500 | 30 | 95700 | 2300 | -3 | 155 | -5 | 220 | 25 | 20 | 12 | 30 | 10 | -2 | 210 | -500 | -1 | -5 | -1 |
| 5855053 | 82184 | 198 | 198 | 1 | 400 | -5 | 75 | 170000 | -5 | 20 | 47 | 1100 | -2 | 23300 | 30 | 91900 | 2650 | -3 | 165 | -5 | 500 | 30 | 115 | 14 | 40 | 14 | -2 | 330 | -500 | -1 | -5 | -1 |
| 5855054 | 82184 | 198.4 | 200 | 1 | 500 | -5 | 20 | 101000 | -5 | 15 | 200 | 3300 | 150 | 59200 | 240 | 110000 | 3050 | -3 | 340 | -5 | 3000 | 55 | 80 | 10 | 110 | 40 | -2 | 650 | 4200 | -1 | 5 | -1 |
| 5855055 | 82184 | 200 | 202 | 2 | 650 | -5 | 80 | 157000 | -5 | -10 | 51 | 600 | 2 | 18900 | 20 | 90700 | 1700 | -3 | 135 | -5 | 550 | 25 | 95 | 9 | 25 | 9 | -2 | 270 | -500 | 2 | -5 | -1 |
| 5855056 | 82184 | 202 | 204 | -1 | 77 | -5 | 15 | 167000 | -5 | 15 | 23 | 750 | 2 | 18200 | 30 | 92600 | 1750 | -3 | 120 | -5 | 185 | 25 | 40 | 11 | 35 | 9 | -2 | 260 | -500 | -1 | -5 | -1 |
| Standard CS15 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5855057 | 82184 | 0.4% Ni | | -1 | 55 | 5 | 10 | 4600 | -5 | -10 | 115 | 850 | 1000 | 55200 | 250 | 196000 | 1000 | 40 | 410 | 5 | 3200 | 105 | 30 | 12 | 850 | 33 | 3 | 210 | 5700 | | | |
| 5855058 | 82184 | 204 | 205 | 2 | 145 | -5 | 35 | 161000 | -5 | 20 | 31 | 650 | 3 | 19700 | 75 | 97000 | 1850 | -3 | 185 | -5 | 360 | 25 | 75 | 12 | 40 | 10 | -2 | 460 | 550 | -1 | -5 | 1 |
| 5855059 | 82184 | 205.3 | 206 | 1 | 330 | -5 | 20 | 56200 | -5 | -10 | 160 | 1600 | 120 | 78900 | 120 | 137000 | 2100 | -3 | 340 | -5 | 2850 | 70 | 135 | 11 | 75 | 17 | -2 | 500 | 4100 | -1 | -5 | -1 |
| 5855060 | 82184 | 206 | 207 | -1 | 5450 | -5 | 20 | 68600 | -5 | 10 | 185 | 1150 | 7 | 55600 | 190 | 126000 | 2050 | -3 | 480 | -5 | 6150 | 60 | 195 | 14 | 65 | 14 | -2 | 370 | 2150 | 36 | -5 | 6 |
| 5855061 | 82184 | 207 | 208 | -1 | 3950 | -5 | 25 | 58100 | -5 | 15 | 160 | 1500 | 6 | 67700 | 175 | 150000 | 2200 | -3 | 350 | -5 | 4800 | 100 | 50 | 11 | 90 | 15 | -2 | 230 | 2500 | 28 | -5 | 6 |
| 5855062 | 82184 | 208 | 209 | -1 | 490 | -5 | 20 | 70900 | -5 | 10 | 69 | 2250 | 3 | 54600 | 145 | 124000 | 1900 | -3 | 260 | -5 | 1250 | 70 | 25 | 12 | 70 | 16 | -2 | 195 | 1200 | 3 | -5 | 3 |
| 5855063 | 82184 | 209 | 210 | -1 | 220 | -5 | -5 | 105000 | -5 | 15 | 20 | 550 | -2 | 65300 | 145 | 55000 | 23100 | -3 | 150 | -5 | 260 | 15 | 110 | 32 | 90 | 30 | 5 | 1250 | 1300 | -1 | -5 | 2 |
| 5855064 | 82184 | 210 | 211 | -1 | 63 | 5 | 10 | 148000 | -5 | 20 | 33 | 600 | -2 | 31300 | 330 | 90400 | 3500 | -3 | 550 | -5 | 390 | 25 | 35 | 25 | 115 | 37 | 2 | 260 | -500 | 1 | -5 | 1 |
| 5855065 | 82184 | 211.4 | 212 | -1 | 30 | 250 | -5 | 17500 | -5 | 15 | 70 | 550 | -2 | 77600 | 9650 | 52000 | 5350 | -3 | 5150 | 5 | 410 | 430 | 70 | 125 | 7650 | 200 | 24 | 550 | -500 | 1 | -5 | 5 |
| 5855066 | 82184 | 212 | 214 | -1 | -3 | 330 | -5 | 87300 | -5 | 35 | 28 | 260 | -2 | 54000 | 12900 | 42200 | 4850 | -3 | 2450 | 20 | 185 | 490 | 10 | 160 | 7550 | 175 | 21 | 260 | -500 | -1 | -5 | 4 |
| 5855067 | 82184 | 213.5 | 214 | -1 | -3 | 410 | -5 | 95100 | -5 | 35 | 21 | 130 | -2 | 31200 | 11500 | 39500 | 4150 | -3 | 4950 | 45 | 115 | 1150 | 30 | 200 | 8400 | 140 | 25 | 200 | -500 | -1 | -5 | 3 |
| 5855068 | 82184 | 214 | 216 | -1 | 95 | 380 | -5 | 110000 | -5 | 70 | 21 | 170 | -2 | 35100 | 16400 | 30500 | 5800 | -3 | 3400 | 35 | 155 | 700 | 55 | 195 | 6050 | 130 | 27 | 650 | 750 | -1 | -5 | 2 |
| Standard CS27 - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5855069 | 82184 | 0.255% Ni | | -1 | 800 | 5 | 15 | 1200 | -5 | 15 | 93 | 410 | 52 | 28300 | 60 | 206000 | 330 | -3 | 260 | 5 | 2300 | 55 | 5 | 3 | 280 | 15 | -2 | 40 | 2950 | | | |
| 5855070 | 82184 | 216 | 218 | -1 | -3 | 360 | -5 | 147000 | -5 | 70 | 25 | 155 | -2 | 25300 | 15500 | 44000 | 2650 | -3 | 7900 | 60 | 185 | 900 | 25 | 360 | 8200 | 175 | 32 | 180 | -500 | -1 | -5 | 2 |
| 5855071 | 82184 | 218 | 220 | -1 | -3 | 260 | -5 | 164000 | -5 | 70 | 25 | 160 | 2 | 24400 | 11500 | 49900 | 2300 | -3 | 10700 | 60 | 160 | 1200 | 35 | 350 | 10100 | 190 | 37 | 210 | -500 | -1 | -5 | 2 |
| 5855072 | 82184 | 220 | 222 | -1 | -3 | 270 | -5 | 158000 | -5 | 55 | 23 | 145 | -2 | 22600 | 9500 | 51000 | 2150 | -3 | 13700 | 10 | 155 | 650 | 30 | 440 | 10700 | 240 | 29 | 430 | -500 | -1 | -5 | 2 |
| 5855073 | 82184 | 222 | 224 | -1 | -3 | 360 | -5 | 134000 | -5 | 50 | 21 | 125 | -2 | 20300 | 10300 | 40200 | 2050 | -3 | 11400 | 25 | 135 | 1550 | 30 | 410 | 13500 | 250 | 27 | 500 | -500 | -1 | -5 | 1 |
| 5855074 | 82184 | 224 | 226 | -1 | -3 | 500 | -5 | 149000 | -5 | 55 | 23 | 190 | -2 | 21600 | 12900 | 48900 | 2150 | -3 | 11300 | 25 | 160 | 1250 | 20 | 370 | 13400 | 220 | 31 | 250 | -500 | -1 | -5 | 2 |
| 5855075 | 82184 | 225.7 | 226 | -1 | -3 | 290 | -5 | 114000 | -5 | 40 | 57 | 450 | -2 | 50800 | 4700 | 81100 | 3950 | -3 | 4050 | 15 | 480 | 600 | 10 | 190 | 6350 | 140 | 25 | 460 | 800 | -1 | -5 | -1 |
| 5855076 | 82184 | 226 | 227 | -1 | 8 | 5 | 5 | 155000 | -5 | 40 | 26 | 650 | -2 | 19900 | 200 | 94000 | 2400 | -3 | 380 | -5 | 200 | 85 | 10 | 17 | 300 | 32 | 9 | 190 | -500 | -1 | -5 | -1 |
| 5855077 | 82184 | 226.8 | 228 | -1 | -3 | 600 | -5 | 137000 | -5 | 85 | 23 | 230 | -2 | 22600 | 11100 | 43100 | 2350 | -3 | 8350 | 20 | 185 | 1100 | 20 | 260 | 12200 | 200 | 27 | 360 | -500 | -1 | 5 | 5 |
| 5855078 | 82184 | 228 | 230 | -1 | 12 | 3100 | -5 | 82400 | -5 | 75 | 33 | 120 | 2 | 29000 | 19000 | 35300 | 1550 | -3 | | | | | | | | | | | | | | |

Assay

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|---------|-------|-------|-----|----|-----|------|----|--------|----|-----|-----|-----|------|-------|-------|-------|------|----|-------|----|-----|------|-----|-----|-------|-----|----|------|-------|----|----|----|
| 5855090 | 82184 | 248 | 249 | 6 | 450 | 1400 | -5 | 82400 | 10 | 65 | 280 | 115 | 2950 | 39200 | 15000 | 32600 | 1750 | 4 | 13900 | 40 | 185 | 1400 | 290 | 350 | 15500 | 200 | 32 | 2350 | 5650 | 1 | -5 | 2 |
| 5855091 | 82184 | 248.9 | 250 | -1 | 125 | 500 | -5 | 124000 | -5 | 125 | 98 | 77 | 35 | 51000 | 9150 | 56100 | 3250 | 4 | 3950 | 40 | 140 | 1400 | 50 | 210 | 15200 | 185 | 41 | 450 | 550 | -1 | -5 | -1 |
| 5855092 | 82184 | 250 | 252 | -1 | 8 | 3650 | -5 | 67500 | -5 | 50 | 28 | 64 | 3 | 21000 | 31800 | 27500 | 1150 | 12 | 10400 | 20 | 52 | 800 | 15 | 350 | 7500 | 135 | 26 | 170 | -500 | -1 | -5 | 2 |
| 5855093 | 82184 | 252 | 253 | -1 | 230 | 2700 | -5 | 70900 | -5 | 95 | 165 | 115 | 59 | 31400 | 30800 | 32800 | 950 | 16 | 12800 | 45 | 250 | 1600 | 30 | 390 | 14500 | 185 | 38 | 110 | -500 | -1 | 5 | 2 |
| 5855094 | 82184 | 252.5 | 254 | 5 | 420 | 600 | -5 | 67300 | -5 | 100 | 300 | 110 | 2900 | 37400 | 9700 | 24500 | 800 | 4 | 16100 | 35 | 165 | 1500 | 155 | 350 | 12900 | 175 | 32 | 950 | 10300 | 2 | -5 | 3 |
| 5855095 | 82184 | 254 | 256 | -1 | 34 | 900 | -5 | 75100 | -5 | 105 | 41 | 120 | 33 | 25900 | 14900 | 32700 | 800 | 4 | 22000 | 45 | 82 | 1450 | 20 | 410 | 16400 | 210 | 36 | 65 | -500 | -1 | -5 | 1 |

Appendix 3

Petrological Reports

PETROGRAPHIC REPORT ON TWELVE SAMPLES OF DRILL CORE
FROM THE ZEEHAN DISTRICT, TASMANIA

for .

CRA Exploration Pty Ltd

DPO #77320

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January, 1997

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SUMMARY

Twelve samples of drill core (5473308-5473319) from the Zeehan district in western Tasmania were submitted for petrographic observation and interpretation. From these samples, 6 thin sections and 6 polished thin sections were prepared. Offcuts from three samples (5473308-10) were treated with hydrofluoric acid and sodium cobaltinitrite to check for the presence of K-feldspar.

Summary descriptions of each of the samples are listed below:

5473308 TS ZA1 33.8 m:

Summary: Metamorphosed conglomeratic rock containing rounded to subangular heterolithic fragments of ?felsic to mafic volcanic material and pelitic to psammopelitic low grade metasedimentary material in a fine grained matrix. The fragments have been variably recrystallised to fine to medium grained assemblages of albite + amphibole, with minor biotite/phlogopite, K-feldspar, sericite and titanite/leucoxene, whereas the matrix is now amphibole-rich.

5473309 TS ZA1 63.6 m:

Summary: Metamorphosed and metasomatised, strongly folded and fractured quartzofeldspathic siltstone/argillite. The rock assemblage of quartz and K-feldspar, with minor amphibole, clinopyroxene, chlorite, prehnite and zoisite has been cut by numerous veins and patches which range in composition from amphibole-rich to K-feldspar-rich, with generally minor clinopyroxene, prehnite, chlorite and traces of pyrrhotite and pyrite.

5473310 TS ZA1 73.5 m:

Summary: Metamorphosed dominantly psammitic rock, probably with an original rather mafic provenance. The rock has been recrystallised, probably to a plagioclase-amphibole (-FeTi oxide) assemblage, then metasomatically altered with strong development of fine grained phlogopite/biotite, K-feldspar and minor sericite. Several veins containing phlogopite/biotite (-sericite-amphibole) cut the sample.

5473311 TS ZA1 82.0 m:

Summary: Metamorphosed laminated sedimentary rock, possibly originally a siltstone with a mafic provenance (\pm dolomite). The rock was deformed and recrystallised, probably to a foliated amphibole-feldspar assemblage, but was subsequently metasomatically altered with replacement of feldspar by fine grained muscovite/sericite, chlorite and minor phlogopite and K-feldspar. Several amphibole-rich veins occur in the rock.

5473312 TS ZA1 92.2 m:

Summary: Metamorphosed ultramafic rock which may have previously undergone strong metasomatic alteration (e.g. rodingitic or "blackwall" type alteration). The rock has recrystallised to a banded olivine-clinopyroxene-rich assemblage, with subordinate amounts of magnetite, garnet and carbonate; relict chromite is sparsely disseminated throughout. The rock contains a little marcasite \pm pyrite (mainly in late stage carbonate veins and patches and probably representing the retrogressive breakdown of former pyrrhotite) as well as traces of niccolite and ?gersdorffite as inclusions in garnet.

5473313 TS ZA1 96.65 m:

Summary: Serpentinite derived from the alteration of a previously metamorphosed ultramafic rock dominated by olivine, but also containing amphibole. The rock has been completely serpentinised, leaving only relict textures and a little disseminated relict chromite. Small amounts of sulphides are irregularly disseminated; pentlandite may have originally dominated, but it has been mainly altered to pyrite + magnetite during serpentinisation.

5473314 TS ZA1 113.8 m:

Summary: Metamorphosed ultramafic rock dominated by granular to bladed olivine, but containing minor clinopyroxene, relict igneous chromite, magnetite, antigorite and disseminations of sulphides. The latter are dominated by millerite, but include a little pyrite and pentlandite, and are generally accompanied by magnetite.

5473315 TS ZA1 128.5 m:

Summary: Metamorphosed ultramafic rock composed dominantly of fine to medium grained acicular antigorite and granular magnetite. There is a trace of relict chromite enclosed in magnetite and the rock is cut by a few thin carbonate veins containing traces of pyrite.

5473316 TS ZA1 141.2 m:

Summary: Serpentinised metamorphosed ultramafic rock, perhaps originally of peridotitic or dunitic composition. The rock contained a metamorphic assemblage of olivine and amphibole (e.g. anthophyllite), with relict chromite, but has been completely serpentinised to give a pseudomorphic assemblage of lizardite and minor magnetite. There is a trace of sulphide (?pentlandite) and thin, late-stage carbonate veins.

5473317 TS ZA1 170.4 m:

Summary: Serpentinised ultramafic rock, perhaps originally of dunite or olivine-rich peridotite composition. The rock contains relict textures after formerly abundant olivine and retains a few grains of relict chromite. Complete serpentinisation has occurred with formation of a lizardite-dominated assemblage, with minor magnetite, but there has been local formation of antigorite-rich replacive patches. A few grains of ?pentlandite are sparsely scattered in the sample.

5473318 TS ZA1 247.7 m:

Summary: Serpentinised ultramafic rock, perhaps originally of dunite or olivine-rich peridotite composition, with abundant aggregates dominated by pyrite + magnetite + subordinate millerite. The original ultramafic may have been metamorphosed to give an olivine-amphibole assemblage and was then serpentinised to yield lizardite (-magnetite). Sulphide aggregates rich in pentlandite and pyrrhotite may have been present in the serpentinite, but have been altered to pyrite + magnetite ± millerite, probably attending the emplacement of carbonate-quartz-magnetite veining.

5473319 TS ZA1 284.0 m:

Summary: Serpentinised ultramafic rock, perhaps originally of dunitic composition, with a few aggregates of relict chromite showing alteration to magnetite as well as scattered masses of magnetite + pyrite. Clots of flaky chlorite are commonly found with the magnetite-rich patches. The original ultramafic may have been metamorphosed prior to serpentinisation and contained granular olivine and a little amphibole.

The sample suite is comprised of four metamorphosed and variably metasomatically altered sedimentary rocks from the upper part of drill hole ZA1 (samples 5473308-11) and eight ultramafic rocks from the deeper part of the drill hole (5473312-9). The relationship between these two groups of rocks is not discernable from the samples available (e.g. the ultramafic suite could be intrusive into the sedimentary rocks, or it could have a tectonic contact).

The sedimentary rocks include a conglomerate, a psammite and two siltstone/argillites. There is some evidence, at least in the coarser grained

samples, that the sediments had a rather mafic igneous provenance. The ultramafic rocks have relict textures and interpreted compositions indicating that they originated as dunitic or olivine-rich peridotitic igneous rocks. Most contain relict chromite and therefore cannot be the products of metamorphism or metasomatism of a sedimentary rock such as an impure dolomite or dolomitic limestone. It is possible that some of the ultramafic rocks could have originally been of cumulate origin, but diagnostic relict textures are not well preserved.

It is interpreted that all rocks of the suite have been metamorphosed and that several show the effects of penetrative deformation. The sedimentary rocks have recrystallised to assemblages rich in plagioclase and amphibole (5473308, -10, -11) or to quartz + K-feldspar + calc-silicates (5473309). The former three samples also show the effects of imposed K (-Ca) metasomatism, with replacement of the prior metamorphic assemblages by biotite/phlogopite, muscovite/sericite, K-feldspar, amphibole, prehnite, etc. The primary ultramafic rocks have also been thoroughly recrystallised, commonly to granular olivine-rich assemblages, but a few samples appear to have generated metamorphic amphibole, perhaps anthophyllite (e.g. in 5473313, -16, -18) and clinopyroxene (5473312, -14). The latter two samples retain their metamorphic assemblage of olivine \pm clinopyroxene. Sample 5473312 contains an unusual metamorphic assemblage dominated by olivine, clinopyroxene and garnet and could reflect the product of metasomatic alteration of the ultramafic rock (e.g. "blackwall" or rodingitic alteration) before metamorphism. From metamorphic assemblages in the sedimentary and ultramafic rocks, it is likely that the sample suite was metamorphosed to hornblende hornfels facies. The implication of contact metamorphism, rather than regional metamorphism, is because the metamorphic assemblages tend to have randomly-oriented grain growth which overprints earlier foliation in some samples (e.g. 5473309, -11, -12).

Except for samples 5473312 and 5473314, the metamorphosed ultramafic rocks have been completely serpentised to form serpentine + minor magnetite. Serpentinisation has occurred after the metamorphic peak. The dominant serpentine mineral appears to be lizardite, but antigorite has been formed in 5473314, -15 and -17. Most magnetite has probably formed simply as a result of serpentisation (replacement of olivine mainly), but relict chromite has also been variably replaced by magnetite. However, a few samples (e.g. 5473315) contain abundant magnetite, far in excess of the amount normally formed by serpentisation, and this could reflect metasomatic addition of Fe to the rocks under rather oxidising conditions.

Several of the ultramafic rocks contain trace to significant amounts of sulphide and related minerals. In 5473312, which retains a rather high grade metamorphic mineral assemblage, there are traces of niccolite and ?gersdorffite and pyrite/marcasite after ?pyrrhotite. Several other samples contain pyrite aggregates, in places accompanied by magnetite and millerite (e.g. in 5473314, -18). The amount of millerite in the latter two samples is implicit that Ni grades could be as high as 0.5-1%. In most

ultramafic rocks, it is possible that they contained traces of disseminated pentlandite and pyrrhotite at an early stage in their evolution (e.g. magmatic sulphides). Metamorphism could have modified these sulphides, but it is more likely that alteration to pyrite + magnetite \pm millerite occurred during serpentinisation, and probably at a late stage in serpentinisation, as a result of increasing oxygen fugacity. The sulphide-bearing aggregates are locally associated with apparent metasomatic patches and veins containing phases such as carbonate, quartz, chlorite and magnetite.

5473308 TS ZA1 33.8 m:

Summary: Metamorphosed conglomeratic rock containing rounded to subangular heterolithic fragments of ?felsic to mafic volcanic material and pelitic to psammopelitic low grade metasedimentary material in a fine grained matrix. The fragments have been variably recrystallised to fine to medium grained assemblages of albite + amphibole, with minor biotite/phlogopite, K-feldspar, sericite and titanite/leucoxene, whereas the matrix is now amphibole-rich.

Handspecimen: Drill core is composed of a fragmental rock, probably a type of conglomerate, with pale greenish to creamy coloured heterolithic fragments including some with vague relict fine to medium grained igneous textures and some which are evidently fine grained sedimentary in character. The fragments are rounded to subangular and are up to 12 mm across. They are set in a fine grained, greyish-green matrix; comprising about 30 volume % of the sample and probably composed of amphibole and/or chlorite. The sample is essentially non-magnetic and staining of the section offcut with sodium cobaltinitrite indicated that there was a little K-feldspar in some of the fragments.

Thin Section:

a) Primary mineralogy and textures: In thin section, the rock has a relict fragmental texture although there has been considerable recrystallisation, especially of the matrix. Fragments are rounded to subangular in outline and up to 8 mm across. The majority retain poorly to quite well preserved relict igneous textures, although it is clear that several fragments are composed of foliated, fine grained low grade metasedimentary rocks, probably pelitic to psammopelitic in composition. The fragments with relict igneous textures appear to range from rather feldspathic compositions through to mafic (maybe a range from andesite/dacite to basalt/dolerite) and retain indications of inequigranular intergrown textures (especially in mafic rocks), plus weakly porphyritic and possibly flow-banded textures. This former igneous fragments appear to have been composed dominantly of plagioclase, with a little K-feldspar in some and ferromagnesian phases (e.g. clinopyroxene and FeTi oxide) in the more mafic materials. All fragments are set in an originally fine grained matrix, but the latter has been entirely recrystallised and no primary textures or minerals are preserved.

b) Alteration and structure: Alteration of fragments in the rock has been strong and the matrix totally recrystallised. Several fragments have been veined by matrix amphibole. Fragments with relict igneous textures have been pseudomorphically replaced by fine to medium grained aggregates of albitic plagioclase, subordinate pale green amphibole (?actinolite) and local minor biotite/phlogopite, K-feldspar, sericite and titanite/leucoxene. Metasedimentary fragments have recrystallised to fine grained aggregates of biotite/phlogopite, amphibole, plagioclase, ?quartz and trace leucoxene. Matrix material is now dominated by inequigranular, fine to medium grained prismatic to acicular pale green amphibole (?actinolite), with minor interstitial plagioclase, biotite/phlogopite and traces of quartz and titanite/leucoxene. The rock has been slightly weathered and weak goethite staining is patchily and pervasively developed.

c) Mineragraphy and paragenesis: No sulphide minerals have been recognised in the sample.

Mineral Mode: Approximate modal proportions are: amphibole 50%, albite 40%, biotite/phlogopite 5%, sericite and K-feldspar each 2% and traces of quartz, titanite/leucoxene and goethite.

Interpretation and Comments: The sample contains rounded to subangular heterolithic fragments in a recrystallised matrix. The fragments include a range of relatively felsic through to mafic igneous rocks (possibly volcanics), plus low grade pelitic to psammopelitic metasediments. The rounding of fragments and the diversity of rock types is supportive of a sedimentary clastic origin for the sample, i.e. it is interpreted to have originally been a heterolithic conglomerate. The fragments and matrix have been altered and recrystallised,

although these effects may have been solely due to imposed metamorphism. Rock fragments have partly retained relict textures, but have recrystallised to assemblages of albite + amphibole with minor biotite/phlogopite, sericite and K-feldspar and the matrix is now amphibole-rich. The matrix composition implies that it is CaMgFe-rich; it could originally have been dominated by mafic detritus or have been dolomitic in character.

5473309 TS ZA1 63.6 m:

Summary: Metamorphosed and metasomatised, strongly folded and fractured quartzofeldspathic siltstone/argillite. The rock assemblage of quartz and K-feldspar, with minor amphibole, clinopyroxene, chlorite, prehnite and zoisite has been cut by numerous veins and patches which range in composition from amphibole-rich to K-feldspar-rich, with generally minor clinopyroxene, prehnite, chlorite and traces of pyrrhotite and pyrite.

Handspecimen: Drill core is composed of a fine grained, dark grey, strongly fractured and folded metasediment, possibly a type of siltstone/argillite. It appears to be mainly composed of quartz and feldspar, with abundant K-feldspar being indicated by sodium cobaltinitrite staining of the section offcut. The rock contains a few irregular veins and patches of grey-green amphibole up to several millimetres across and is essentially non-magnetic.

Thin Section:

a) Primary mineralogy and textures: In thin section, there is little indication of relict texture. The rock is a strongly fractured, veined and folded, fine grained quartzofeldspathic type. It has a weak to moderate foliation and a vague layering. Slight differences in grain size across layers (which are up to 2 mm thick) may reflect original bedding. The rock is composed mainly of fine grained recrystallised quartz and K-feldspar (typical grain size <0.05 mm), with foliation defined by disseminations and elongate aggregates of fine grained leucoxene and aggregates of metasomatic minerals.

b) Alteration and structure: The rock has been strongly recrystallised and metasomatically altered. The main assemblage of fine grained granular quartz and K-feldspar is accompanied by irregularly distributed porphyroblastic aggregates, generally 0.1-1 mm across, of pale green amphibole (actinolite, or possibly magnesiohornblende), clinopyroxene, chlorite, zoisite, prehnite and traces of carbonate. Numerous anastomosing (folded) veins and irregular metasomatic patches up to several millimetres across in the rock and are composed dominantly of fine to medium grained prismatic amphibole and/or granular K-feldspar, commonly with minor chlorite, clinopyroxene, prehnite and traces of sulphides. There are uncommon late stage, sub-planar cross-cutting veins of prehnite up to 0.2 mm wide. The rock has been initially deformed with the development of the foliation, then has been subsequently microfolded and fractured. The foliation has been folded and contains numerous anastomosing to sub-planar shear fractures, defined by planar concentrations of leucoxene and of metasomatic minerals. The sample is slightly affected by weathering, with traces of brown ?nontronitic clay being found in amphibole (-sulphide) patches.

c) Mineragraphy and paragenesis: The sample contains a few aggregates and sparse disseminations of pyrrhotite and pyrite, forming grains up to 0.1 mm across, mostly associated with the amphibole-rich and K-feldspar-amphibole-rich patches.

Mineral Mode: Approximate modal proportions are: K-feldspar 40%, quartz 30%, amphibole 15%, clinopyroxene 5%, chlorite 4%, prehnite and leucoxene each 2%, zoisite 1% and traces of carbonate, pyrrhotite, pyrite and ?nontronite.

Interpretation and Comments: The sample may have originally been a fine grained quartzofeldspathic siltstone/argillite, perhaps containing minor dolomitic carbonate. It was metamorphosed to medium grade and strongly deformed. It is likely that at least two generations of folding occurred, with second stage microfolding being accompanied by shear fracturing. It is interpreted that there was syn-tectonic metasomatic introduction of K, Ca, Mg and trace S into the rock, resulting in development of vein-controlled and disseminated patches of amphibole, K-feldspar, chlorite, clinopyroxene, prehnite, zoisite and traces of pyrrhotite and pyrite. The sample bears little resemblance to sample 5473308, except that it has undergone a similar style of metamorphism and has experienced strong amphibole development.

5473310 TS ZA1 73.5 m:

Summary: Metamorphosed dominantly psammitic rock, probably with an original rather mafic provenance. The rock has been recrystallised, probably to a plagioclase-amphibole (-FeTi oxide) assemblage, then metasomatically altered with strong development of fine grained phlogopite/biotite, K-feldspar and minor sericite. Several veins containing phlogopite/biotite (-sericite-amphibole) cut the sample.

Handspecimen: Drill core is composed of a fine to medium grained, dark grey rock, possibly a metamorphosed psammopelite/psammite. Apparent weak bedding is present with slightly finer and coarser grainsizes being discernable. The rock may be rich in fine grained biotite, but also evidently contains abundant K-feldspar, as indicated by sodium cobaltinitrite staining of the section offcut. A few thin fractures cut the sample and these contain veins of greenish ?amphibole. The rock is essentially non-magnetic.

Thin Section:

a) Primary mineralogy and textures: In thin section, the rock retains a vague relict clastic texture but it has been strongly recrystallised. It is likely that the original rock was a weakly bedded psammite/psammopelite, with constituent components from a rather mafic source region. The dominant, fine to medium grained (0.2-0.5 mm) portion of the sample may have been psammitic and rich in plagioclase and a ferromagnesian component (e.g. clinopyroxene and/or amphibole), along with accessory FeTi oxide (probably ilmenite) and traces of apatite and quartz. There is a sharp change to a much fine grained rock type towards one end of the section. The latter retains a weak relict foliation, but no other relict textures or primary minerals.

b) Alteration and structure: The rock has been strongly recrystallised, metasomatically altered and locally veined. The original metamorphic mineral assemblage of plagioclase, amphibole and accessory FeTi oxide has been partly changed with only the FeTi oxide remaining largely unaffected. Plagioclase has been replaced by fine grained K-feldspar, albite and minor sericite, orange-brown phlogopite/biotite and local green amphibole (actinolite or hornblende). The former ferromagnesian component may have originally been altered to amphibole, but subsequently it has been strongly replaced by fine grained phlogopite/biotite, with variable amounts of amphibole and minor disseminated titanite. In places, amphibole is quite abundant in the sample, whereas in other parts of the section, the assemblage is dominated by phlogopite/biotite, K-feldspar, sericite and minor titanite. This latter assemblage is typical of the alteration of the finer grained rock in the section. Several sub-planar veins up to 1 mm wide cut the sample. Most are dominated by fine grained phlogopite/biotite, with minor sericite, but in places, there are fine to medium grained aggregates of green amphibole and traces of quartz. The rock also contains a few thin late stage veins of prehnite up to 0.1 mm wide .

c) Mineragraphy and paragenesis: No sulphide minerals have been recognised in the sample.

Mineral Mode: Approximate modal proportions are: K-feldspar 35%, phlogopite/biotite 30%, albitised plagioclase 20%, amphibole 7%, sericite 5%, FeTi oxide and titanite each 1% and traces of quartz, apatite and prehnite.

Interpretation and Comments: The rock is interpreted to have been a psammitic sediment, with possible interbeds of psammopelite. It is considered to have had a rather mafic source region (e.g. basaltic), resulting in the sediment being composed of a clastic assemblage dominated by plagioclase and a ferromagnesian phase. The rock was metamorphosed to medium grade, resulting in recrystallisation and formation of a plagioclase-amphibole (-FeTi oxide) assemblage. A metasomatic overprint followed, with strong replacement of the rock by fine grained phlogopite/bioite and K-feldspar, with minor sericite. Fracturing occurred, with emplacement of veins containing phlogopite/biotite, with minor sericite and amphibole.

5473311 TS ZA1 82.0 m:

Summary: Metamorphosed laminated sedimentary rock, possibly originally a siltstone with a mafic provenance (\pm dolomite). The rock was deformed and recrystallised, probably to a foliated amphibole-feldspar assemblage, but was subsequently metasomatically altered with replacement of feldspar by fine grained muscovite/sericite, chlorite and minor phlogopite and K-feldspar. Several amphibole-rich veins occur in the rock.

Handspecimen: Drill core is composed of a dark grey-green, fine to medium grained, layered rock, with layering approximately normal to the core axis. Individual layers range from <1 mm to about 5 mm in thickness. The rock appears to be rich in amphibole and may also contain quartz or feldspar. Layering is defined by differing mineral proportions and could represent former sedimentary bedding. The sample is locally weakly magnetic (i.e. certain layers are magnetic).

Thin Section:

a) **Primary mineralogy and textures:** In thin section, layering is apparent on a scale of 0.5-5 mm. Layers are compositionally different and this is interpreted to reflect original sedimentary bedding. A few layers contain vague relict textures after detrital components, especially former feldspar grains. However, the rock has been thoroughly recrystallised and no primary minerals are retained.

b) **Alteration and structure:** The rock has been totally recrystallised and mineralogically reconstituted. Grainsize is generally fine grained (<0.3 mm), although amphibole grains may be a little larger. Individual layers have differing alteration mineral assemblages and include amphibole-rich, amphibole-chlorite-rich (commonly with a little phlogopite) and muscovite/sericite-amphibole-rich. Amphibole is pale green, fine to medium grained and forms masses comprising prismatic to acicular crystals. The mineral may be actinolite or magnesio-hornblende. Chlorite is very pale green to colourless and phlogopite has a pale orange-brown colour. Traces of disseminated titanite occur in all layer types, whereas traces of fine grained magnetite, epidote and K-feldspar tend to be present in the muscovite/sericite-amphibole layers. The original rock has been quite strongly deformed, with development of a moderate foliation mainly defined by preferred orientation of amphibole grains. This foliation is approximately layer-parallel. A weak crenulation is apparently causing flexuring of the foliation and the incipient crenulation cleavage is approximately normal to the foliation. In the layers which retain relict clastic texture, the likely former feldspar component has been totally replaced, mostly by fine grained muscovite/sericite. Other layers may have originally been richer in ferromagnesian components (\pm dolomite). A few veins cut the rock. The more common type may have formed early and is dominated by fine to medium grained amphibole which is somewhat foliated. A late-stage type is represented by a thin vein containing K-feldspar.

c) **Mineragraphy and paragenesis:** No sulphides have been recognised in the sample.

Mineral Mode: Approximate modal proportions are: amphibole 55%, muscovite/sericite 30%, chlorite 12%, phlogopite and K-feldspar each 1% and traces of epidote, titanite and magnetite.

Interpretation and Comments: The relict compositional layering and vague preservation of relict clastic texture in some layers is interpreted to indicate that the rock was originally a laminated sediment, probably a siltstone. It could have been derived from a rather mafic source region, although a dolomitic component is also plausible. The rock was metamorphosed to medium grade and deformed, with development of a foliation and weak crenulation. The rock was totally recrystallised, perhaps initially to an amphibole-feldspar assemblage, but this was subsequently metasomatically altered with replacement of feldspar by muscovite/sericite, chlorite and minor phlogopite and K-feldspar. The alteration is indicative of K-metasomatism of a rock which was rather rich in CaMg (-Fe).

5473312 TS ZA1 92.2 m:

Summary: Metamorphosed ultramafic rock which may have previously undergone strong metasomatic alteration (e.g. rodingitic or "blackwall" type alteration). The rock has recrystallised to a banded olivine-clinopyroxene-rich assemblage, with subordinate amounts of magnetite, garnet and carbonate; relict chromite is sparsely disseminated throughout. The rock contains a little marcasite \pm pyrite (mainly in late stage carbonate veins and patches and probably representing the retrogressive breakdown of former pyrrhotite) as well as traces of niccolite and ?gersdorffite as inclusions in garnet.

Handspecimen: Drill core is composed of a crudely banded fine to medium grained rock with diffuse pale greenish-grey bands up to 1-2 cm wide interspersed with darker grey/black bands. In places, there are scattered grains of a yellow-green ?calc-silicate mineral up to 4 mm across. The darker bands are rich in magnetite and parts of the sample are strongly magnetic. The rock contains a traces of disseminated and fracture-controlled fine grained sulphide (?pyrite).

Thin Section:

a) Primary mineralogy and textures: In the section, it is clear that the rock is very strongly recrystallised and that the crude banding has been overprinted by the effects of recrystallisation. New metamorphic grain growth has random orientation and is developed across the prior banding, which is approximately normal to the core axis. No definitive relict textures are apparent in the sample and the only relict mineral is chromite, occurring as sparsely distributed, sub-rounded fractured grains up to 0.4 mm across, commonly partly replaced by magnetite. Chromite is deep red-brown in colour, indicative of a high Cr content. All other components of the rock have been recrystallised into a fine to medium grained assemblage dominated by olivine and granular to prismatic colourless clinopyroxene (probably diopside), with subordinate amounts of magnetite, garnet, and carbonate. Some bands are rich in fine granular olivine and clinopyroxene, others in coarser prismatic olivine and clinopyroxene, or in magnetite or in garnet.

b) Alteration and structure: The rock has been almost totally reconstituted by alteration and metamorphism and only chromite remains as a relict phase. The assemblage is dominated by granular to prismatic olivine and clinopyroxene, with much having a grain size of <0.1 mm, but with some of the prismatic grains being up to 1 mm in length. Granular fine grained magnetite occurs throughout the sample, as inclusions in clinopyroxene and other silicates, and as a replacement of chromite. It forms up to 25 volume % of some bands. Pale yellow-brown garnet, probably of andradite-grossular composition, is irregularly distributed in the rock, commonly as interstitial patches, with carbonate. However, one part of the section contains large zoned garnets up to 4 mm across, enclosed in carbonate and containing inclusions of clinopyroxene, magnetite and rare chromite, niccolite and ?gersdorffite. Fine to medium grained carbonate (probably magnesite or dolomite) occurs interstitially to silicates and magnetite. In places it is a retrograde phase, replacing garnet, in association with minor sulphides and green chlorite, and occurring as cross-cutting late-stage veins up to 0.3 mm wide, commonly containing patches of sulphides.

c) Mineragraphy and paragenesis: The rock contains scattered grains of relict chromite, partly replaced by magnetite. The latter mineral is disseminated irregularly throughout the sample and is quite abundant in some bands. Larger garnet grains contain scattered inclusions of niccolite (NiAs) and ?gersdorffite (NiAsS) up to 50 μ m across and there are scattered masses of marcasite \pm pyrite up to 0.5 mm across occurring interstitially to silicates and magnetite, commonly in association with carbonate. Late-stage carbonate veins also contain small masses of marcasite \pm pyrite. It is probable that original pyrrhotite in the rock was replaced by marcasite \pm pyrite.

Mineral Mode: Approximate modal proportions are: olivine 40%, clinopyroxene 35%, magnetite 7%, olivine, garnet and carbonate each 5%, chromite and marcasite each 1% and traces of chlorite, niccolite, ?gersdorffite and pyrite.

Interpretation and Comments: The rock is interpreted to be a metamorphosed, altered ultramafic igneous rock, now being a type of ultramafic hornfels. It was clearly of igneous origin, due to the presence of relict chromite. The rock was definitely not formed by the replacement of a limestone or dolomite. It is likely that the original ultramafic, such as peridotite, underwent deformation to develop a tectonic banding, perhaps at the same time as it was undergoing serpentinisation and metasomatic addition of Ca. Due to the present mineralogical constitution of the rock (i.e. rich in olivine and clinopyroxene), the sample cannot simply be the product of isochemical metamorphism of peridotite/serpentinite. It must have been enriched in Ca and this could have occurred in a reaction zone environment at the contact between the ultramafic rock and country rocks (i.e. a rodingitic or "blackwall" type of alteration). The rock was subsequently metamorphosed to medium grade, resulting in a new assemblage dominated by olivine and clinopyroxene, but with minor magnetite, garnet and carbonate. It is likely that traces of sulphides could have been in the original altered ultramafic and these were reconstituted into sparse disseminations of pyrrhotite, niccolite and ?gersdorffite during metamorphism. Later, the pyrrhotite was retrogressively altered to marcasite \pm pyrite which occur in late stage veins and patches of carbonate.

5473313 TS ZA1 96.65 m:

Summary: Serpentinite derived from the alteration of a previously metamorphosed ultramafic rock dominated by olivine, but also containing amphibole. The rock has been completely serpentinised, leaving only relict textures and a little disseminated relict chromite. Small amounts of sulphides are irregularly disseminated; pentlandite may have originally dominated, but it has been mainly altered to pyrite + magnetite during serpentinisation.

Handspecimen: Drill core is composed of a dark grey to black serpentinite. The rock retains some relict textures after former olivine and ?pyroxene and contains a few grains of relict chromite. Alteration to serpentine minerals appears to be complete and there is a considerable amount of fine grained magnetite, causing the dark colour of the sample as well as moderate to strong magnetism. A few small sub-planar veins of chrysotile cut the rock.

Thin Section:

a) Primary mineralogy and textures: In the section, it is evident that the rock is a serpentinite. It contains pseudomorphic textures after formerly abundant olivine and a local prismatic phase, interpreted to have originally been an amphibole (e.g. anthophyllite). The rock was crudely banded, with formerly finely granular (typically <0.2 mm) olivine-rich bands up to several millimetres wide, intercalated with bands up to 3-4 mm wide containing formerly more coarse grained olivine (up to 1 mm) and bladed amphibole prisms up to 3 mm in length. The sample contains scattered relict grains of fractured chromite up to 0.5 mm across, some of which are formed into local elongate aggregates.

b) Alteration and structure: Apart from the presence of relict chromite, all other primary minerals in the original ultramafic rock have been altered. Former olivine has been replaced by serpentine and fine grained dusty magnetite, plus ultrafine (<10 µm) sparsely disseminated grains of sulphides. Former amphibole has been replaced by serpentine. Chromite has been partly altered to ferrichromite, thence to magnetite. The rock contains a few small aggregates of sulphides + magnetite up to 1 mm across. Most of the serpentine mineral formed by replacement of olivine and amphibole appears to be lizardite, but in places, there may have been some recrystallisation to form acicular masses of antigorite. The rock has been weakly fractured, with emplacement of rare early serpentine (?lizardite) veins, a few sub-planar chrysotile veins and very thin late-stage veins of carbonate.

c) Mineragraphy and paragenesis: The rock contains scattered grains of relict chromite, partly replaced by ferrichromite and magnetite. Irregular sulphide aggregates up to 1 mm across, commonly with magnetite rims, are sparsely distributed and there are ultrafine inclusions of sulphides (<10 µm across) dispersed in the serpentine pseudomorphous after olivine. The sulphides appear to be mostly pyrite, but the aggregates also contain small inclusions of pentlandite. It is considered likely that the original sulphide in the ultramafic rock was dominantly pentlandite, but that it has been mostly replaced by pyrite + magnetite during serpentinisation.

Mineral Mode: Approximate modal proportions are: serpentine minerals 95%, magnetite 3%, chromite (including ferrichromite) and pyrite each 1% and tiny traces of carbonate and pentlandite.

Interpretation and Comments: The sample was originally of ultramafic igneous parentage, probably a peridotite or dunite. It may have developed a compositionally banded texture early, e.g. by magmatic crystallisation or by imposed tectonic processes. It is likely that the rock was metamorphosed to medium grade, causing complete recrystallisation of olivine and development of bladed amphibole in certain compositional bands. The amphibole may have been anthophyllite. Primary chromite in the ultramafic rock was partly altered to ferrichromite during metamorphism. Subsequently the rock was completely serpentinised, with replacement of olivine and amphibole by serpentine minerals (mainly lizardite),

minor magnetite and traces of sulphides; chromite was further altered to magnetite. A small amount of disseminated sulphide, possibly mainly pentlandite, was present in the metamorphosed ultramafic rock and on serpentinisation was largely altered to pyrite + magnetite. A few veins of chrysotile and late carbonate cut the serpentinised rock.

5473314 TS ZA1 113.8 m:

Summary: Metamorphosed ultramafic rock dominated by granular to bladed olivine, but containing minor clinopyroxene, relict igneous chromite, magnetite, antigorite and disseminations of sulphides. The latter are dominated by millerite, but include a little pyrite and pentlandite, and are generally accompanied by magnetite.

Handspecimen: Drill core is composed of a heterogeneous pale greenish to dark grey coloured rock of fine to medium grain size. It may be a type of ultramafic rock, rich in olivine and pyroxene. It also contains a few disseminated grains of chromite up to 1 mm across and the dark grey areas contain fine disseminated magnetite, causing these areas to be strongly magnetic. A few small aggregates of brassy-coloured sulphides up to 1 mm across are sparsely distributed.

Thin Section:

a) Primary mineralogy and textures: In the section, the rock is composed dominantly of recrystallised olivine, which together with the presence of scattered grains of relict dark red-brown (high-Cr) chromite up to 0.7 mm across, are indicative of an ultramafic igneous parentage. From the textures, it is apparent that almost total recrystallisation has occurred and only the fractured chromite grains remain as relicts.

b) Alteration and structure: The rock has been thoroughly recrystallised and metamorphically reconstituted. It is now dominated by generally fine grained granular olivine (typical grain size 0.05-0.3 mm), but with gradations into patchy zones of bladed olivine, with individual grains being up to 2 mm in length. In the latter zones, the rock contains minor colourless clinopyroxene (e.g. diopside). In places there are small interstitial masses up to 1 mm across of fine grained antigorite, in which it is common to have aggregates of fine granular magnetite and a traces of orange-brown phlogopite and carbonate. Granular magnetite inclusions are irregularly distributed in the granular to bladed olivine and magnetite is also rather abundant as fracture-filling and replacement of relict olivine grains. Several aggregates of sulphides \pm magnetite are scattered throughout the sample, being enclosed within olivine-rich areas and in contact with antigorite.

c) Mineralogy and paragenesis: The rock contains irregularly distributed relict fractured grains of chromite up to 0.7 mm across, partly replaced by magnetite. Disseminated fine grained magnetite also occurs throughout the sample and there are several globular to irregular masses of sulphides \pm magnetite up to 1 mm across. The latter are dominated by millerite (NiS), but also contain traces of pyrite and pentlandite. The sulphides appear to be in equilibrium with magnetite.

Mineral Mode: Approximate modal proportions are: olivine 85%, clinopyroxene 5%, magnetite 4%, antigorite 3%, chromite and millerite each 1% and traces of phlogopite, carbonate, pyrite and pentlandite.

Interpretation and Comments: It is likely that the sample represents a medium grade metamorphosed ultramafic rock, originally of igneous parentage. The presence of disseminated relict chromite is indicative of an igneous source and the rock is not the product of metamorphism of limestone or dolomite. The rock was metamorphically reconstituted, from a dunitic or peridotitic precursor, to form an olivine-rich assemblage, with minor clinopyroxene, magnetite, antigorite and disseminated sulphides. No cassiterite is recognised in the sample. The sulphide aggregates are now dominated by millerite (with minor magnetite and traces of pyrite and pentlandite). They could represent original magmatic sulphides, subsequently modified by ?serpentinisation reactions and metamorphism. It is estimated that the sample may contain approximately 1% Ni.

5473315 TS ZA1 128.5 m:

Summary: Metamorphosed ultramafic rock composed dominantly of fine to medium grained acicular antigorite and granular magnetite. There is a trace of relict chromite enclosed in magnetite and the rock is cut by a few thin carbonate veins containing traces of pyrite.

Handspecimen: Drill core is composed of a massive to crudely banded serpentine-magnetite rock, possibly a type of ultramafic rock, but enriched in magnetite. In places, there are patches of yellow-green serpentine up to 15 mm across, but most of the sample is composed of intergrown magnetite + serpentine, grading to relatively massive granular magnetite. Consequently, the sample is very strongly magnetic in magnetite-rich zones.

Thin Section:

a) Primary mineralogy and textures: In the section, the sample is composed dominantly of serpentine + magnetite, with a totally recrystallised texture, i.e. essentially no relict textures are discernable. However, traces of deep red-brown relict chromite, forming fractured grain aggregates up to 1 mm across, are preserved in magnetite and there are rare pseudomorphic textures after a prismatic to ?hexagonal phase, outlined by magnetite and infilled by serpentine. It is possible that the latter may be pseudomorphs after former olivine grains.

b) Alteration and structure: Almost total reconstitution has occurred and only the traces of fractured chromite remain as a relict phase. The sample is dominated by fine to medium grained, acicular antigorite, forming sub-radiating to fibrous aggregates, in places in serpentine-rich domains up to 15 mm across. Mostly, however, antigorite is intergrown with disseminated to irregular semi-massive aggregates of granular magnetite. The latter forms grains with a typical size of 0.05-0.5 mm and locally forms semi-massive elongate to anastomosing patches up to several millimetres across. Rare cores of relict chromite are fractured and partly replaced by magnetite. The sample contains rare patches of carbonate (probably magnesite) up to 1 mm across, enclosed in antigorite, as well as a few late-stage anastomosing veins of carbonate up to 0.3 mm wide. Traces of fine grained pyrite occur sparsely in the carbonate veins.

c) Mineragraphy and paragenesis: The rock contains about 30-35 volume % of disseminated to semi-massive magnetite, in places with relict chromite cores. Late carbonate veins contain traces of fine grained pyrite.

Mineral Mode: Approximate modal proportions are: serpentine (antigorite) 65%, magnetite 33%, carbonate 1% and traces of chromite and pyrite.

Interpretation and Comments: It is interpreted that the original rock was of ultramafic igneous parentage, with evidence from the preservation of relict chromite grains. The rock was metamorphosed, but evidence is equivocal as to whether this may have occurred directly from the original ultramafic, or following serpentinisation. The formation of the present assemblage of antigorite + magnetite could have been in part from original igneous minerals (e.g. mostly olivine), or from metamorphically regenerated olivine. In any case, the present texture of the sample is of metamorphic origin. The amount of magnetite in the sample (30-35 volume %) is inconsistent with derivation by serpentinisation of a "normal" ultramafic rock (e.g. a peridotite or dunite). It could be implied that the rock was enriched in Fe, perhaps during serpentinisation or metamorphism. Following development of the antigorite + magnetite assemblage, the rock was cut by a few late carbonate veins, containing traces of pyrite.

5473316 TS ZA1 141.2 m:

Summary: Serpentinised metamorphosed ultramafic rock, perhaps originally of peridotitic or dunitic composition. The rock contained a metamorphic assemblage of olivine and amphibole (e.g. anthophyllite), with relict chromite, but has been completely serpentinised to give a pseudomorphic assemblage of lizardite and minor magnetite. There is a trace of sulphide (?pentlandite) and thin, late-stage carbonate veins.

Handspecimen: Drill core is composed of a massive fine grained black serpentinite. It is strongly magnetic due to the presence of disseminated magnetite and it also contains rare grains of disseminated brassy-coloured sulphide up to 0.5 mm across.

Thin Section:

a) Primary mineralogy and textures: In thin section, the sample preserves a relict texture, pseudomorphed by fine grained serpentine and minor magnetite. Textures indicate that the rock was formerly rich in granular olivine (perhaps with a grain size of 0.05-0.3 mm), with a subordinate amount of prismatic/acicular amphibole. The latter originally formed elongate to sub-radiating masses up to 4 mm across, with individual prisms being up to 2 mm in length. The amphibole may have been anthophyllite, and, along with olivine, has been completely serpentinised. The rock contains a few relict grains of deep red-brown (Cr-rich) chromite up to 0.3 mm across, in places forming small elongate aggregates. The relict textures displayed between former olivine and amphibole are considered to most likely represent an original metamorphic fabric.

b) Alteration and structure: The rock has been almost totally altered and only a few disseminated grains of relict chromite are preserved. All former olivine and amphibole have been replaced by fine grained serpentine (probably lizardite), with an outlining of relict grain boundaries and fractures by ultrafine dusty magnetite. Relict chromite has been partly altered to magnetite. Weak fracturing of the rock has occurred after serpentinisation and the fractures are the sites of emplacement of thin, anastomosing to sub-planar veins of carbonate.

c) Mineragraphy and paragenesis: The rock contains a few scattered relict grains of chromite and fine dusty serpentinisation-derived magnetite. There are also a few very sparsely disseminated grains of a brassy sulphide (?pentlandite) up to 0.5 mm across.

Mineral Mode: Approximate modal proportions are: serpentine (lizardite) 95%, magnetite 4% and traces of carbonate, chromite and ?pentlandite.

Interpretation and Comments: The rock is ultramafic in composition and was originally of igneous derivation, due to the presence of relict chromite. However, the original rock (peridotite or dunite) must have been metamorphosed to develop an olivine-dominated granular texture, with scattered porphyroblastic masses of prismatic to acicular amphibole (e.g. anthophyllite). This metamorphosed ultramafic assemblage was subsequently serpentinised, leading to formation of pseudomorphic-textured lizardite and minor magnetite. The rock contains tiny traces of disseminated sulphides (?pentlandite - perhaps serpentinisation-derived) and a few thin late-stage carbonate veins.

5473317 TS ZA1 170.4 m:

Summary: Serpentinised ultramafic rock, perhaps originally of dunite or olivine-rich peridotite composition. The rock contains relict textures after formerly abundant olivine and retains a few grains of relict chromite. Complete serpentinisation has occurred with formation of a lizardite-dominated assemblage, with minor magnetite, but there has been local formation of antigorite-rich replacive patches. A few grains of ?pentlandite are sparsely scattered in the sample.

Handspecimen: Drill core is composed of a fine grained, speckled pale greenish and dark grey serpentinite. It is probably composed mainly of fine grained serpentine minerals and may preserve a vague relict texture after primary silicates (e.g. olivine). Darker zones in the sample evidently contain fine disseminated magnetite, as the rock is strongly magnetic, as well as a few aggregates of chromite up to 1.5 mm across. There are a few sparsely distributed grains of a pale bronzy-coloured sulphide phase (?pentlandite) up to 1 mm across in the rock.

Thin Section:

a) Primary mineralogy and textures: In thin section, the rock contains domains in which there is preservation of relict texture after former granular olivine, typically in grains up to 0.5-1 mm across and with conspicuous fracturing. There is also preservation of a few scattered grains and aggregates of deep red-brown (Cr-rich) chromite up to 1.5 mm across. The relict textures after originally abundant olivine indicate that the rock may have formerly been a dunite or olivine-rich peridotite.

b) Alteration and structure: The original minerals in the ultramafic rock have been almost entirely altered and only a little relict chromite remains. All olivine has been altered to serpentine (probably mainly lizardite) with disseminated fine grained granular magnetite. In places, the pseudomorphous texture defined by lizardite has been replaced by fine to medium grained aggregates of acicular antigorite up to several millimetres across. Within these aggregates, most magnetite seems to have been expelled to the margins, leading to heterogeneous distribution of magnetite and the blotchy colour of the sample in handspecimen. Relict chromite has been partly to completely replaced by magnetite and the rock contains a few isolated aggregates of a pale bronzy sulphide phase (?pentlandite) up to 0.4 mm across.

c) Mineragraphy and paragenesis: The rock contains a grains of relict chromite, partly to completely replaced by magnetite. The latter mineral has also formed by the replacement of olivine and is heterogeneous distributed throughout, with concentrations at the margins of antigorite masses. There are a few sparsely disseminated grains of ?pentlandite in the sample.

Mineral Mode: Approximate modal proportions are: serpentine (lizardite and antigorite) 95%, magnetite 4% and traces of chromite and ?pentlandite.

Interpretation and Comments: The original rock was a dunite or olivine-rich peridotite. It is possible that it retains primary igneous cumulate textures, but the textures after former granular olivine could also be interpreted as a result of metamorphism of an ultramafic rock giving an olivine-rich metamorphic assemblage. Complete serpentinisation ensued, with formation of a lizardite (-magnetite-trace ?pentlandite) assemblage. This appears to have been partly overprinted by patchy development of replacive antigorite domains.

5473318 TS ZA1 247.7 m:

Summary: Serpentinised ultramafic rock, perhaps originally of dunite or olivine-rich peridotite composition, with abundant aggregates dominated by pyrite + magnetite + subordinate millerite. The original ultramafic may have been metamorphosed to give an olivine-amphibole assemblage and was then serpentinised to yield lizardite (-magnetite). Sulphide aggregates rich in pentlandite and pyrrhotite may have been present in the serpentinite, but have been altered to pyrite + magnetite \pm millerite, probably attending the emplacement of carbonate-quartz-magnetite veining.

Handspecimen: Drill core is composed of a relatively massive dark grey to black fine grained serpentinite, containing scattered aggregates of bronzy-yellow sulphides up to several millimetres across. The rock is moderately to strongly magnetic and this may be due to disseminated magnetite as well as the presence of possible pyrrhotite. A few anastomosing veins of pale grey carbonate cut the rock.

Thin Section:

a) Primary mineralogy and textures: In the section, a relict texture is preserved which indicates that the rock was originally ultramafic and rich in fine to medium grained granular olivine, with a subordinate amount of prismatic amphibole, forming grains up to 3 mm long. It is likely that the amphibole may have been anthophyllite. The relict olivine-amphibole textures are interpreted to have developed by metamorphic recrystallisation.

b) Alteration and structure: The rock has been completely serpentinised and also mineralised with sulphides and magnetite. No olivine or amphibole remain and they have been pseudomorphosed by fine grained serpentine (probably lizardite) with outlining of grains, fractures and cleavages by ultrafine dusty magnetite. Tiny grains of carbonate are sparsely scattered in the serpentinite. The sample contains numerous composite aggregates up to several millimetres across, dominated by fine to medium grained pyrite and magnetite, in places with a subordinate amount of intergrown millerite (in grains up to 1.5 mm across) and traces of other sulphides. These aggregates also contain rare inclusions of a translucent grey-olive oxide phase, possibly ferroan spinel or hercynite. However, no relict chromite has been recognised in these aggregates, or elsewhere in the sample. In the section, there is an anastomosing 2-3 mm wide vein containing fine to medium grained carbonate, fine grained quartz (commonly fibrous texture) and granular magnetite. Where this vein cuts the sulphide-bearing serpentinite, there has been almost complete replacement of sulphides by magnetite. An apparent weak alteration selvage extends out 2-3 mm from the vein, with patchy replacement of serpentine by fine grained quartz and traces of carbonate.

c) Mineragraphy and paragenesis: The rock contains irregularly distributed aggregates up to several millimetres across of pyrite + magnetite, locally accompanied by millerite grains up to 1.5 mm across, traces of sphalerite, galena and the above-mentioned spinel phase. There has been strong alteration of sulphides to magnetite in and about the carbonate-quartz-magnetite vein. Traces of fine grained ?marcasite and a valleriite-like phase (e.g. tochilinite) occur about the margins of some pyrite-magnetite aggregates and are attributed to late-stage retrograde alteration.

Mineral Mode: Approximate modal proportions are: serpentine (lizardite) 85%, pyrite 5%, magnetite 4%, quartz and carbonate each 2%, millerite 1% and traces of spinel phase, sphalerite, galena, ?marcasite and ?valleriite-like phase.

Interpretation and Comments: The original rock was ultramafic, probably a dunite or olivine-rich peridotite. It was metamorphosed to form a granular olivine texture, with scattered prisms and aggregates of amphibole (e.g. anthophyllite). The rock was then serpentinised with development of a lizardite (-magnetite) assemblage, with a probable influx of S during or after serpentinisation (alternatively, the original ultramafic rock could have contained minor magmatic sulphides). It is interpreted that the main sulphides in the rock after serpentinisation could have been pentlandite and pyrrhotite, but that these were altered to pyrite + magnetite \pm millerite, perhaps during the formation of the

carbonate-quartz-magnetite vein. The pyrite-magnetite-millerite assemblage is indicative of formation under rather high oxygen fugacity conditions following serpentinisation. It is likely that the sample contains approximately 0.5-1 % Ni.

5473319 TS ZA1 284.0 m:

Summary: Serpentinised ultramafic rock, perhaps originally of dunitic composition, with a few aggregates of relict chromite showing alteration to magnetite as well as scattered masses of magnetite + pyrite. Clots of flaky chlorite are commonly found with the magnetite-rich patches. The original ultramafic may have been metamorphosed prior to serpentinisation and contained granular olivine and a little amphibole.

Handspecimen: Drill core is composed of a massive, black fine grained serpentinite, with a few masses of a fine grained pale grey flaky mineral (?chlorite) commonly associated with small aggregates of magnetite and a bronzy-coloured sulphide. The sample is strongly magnetic due to the presence of disseminated magnetite.

Thin Section:

a) Primary mineralogy and textures: In the section, much of the rock retains a relict texture after formerly abundant olivine and indicates that the original rock was probably of dunitic composition. All olivine has now been replaced but relict textures imply that it was granular and had a grain size of 0.05-0.3 mm. The rock also contains a few pseudomorphs after former bladed amphibole (e.g. anthophyllite) up to 2 mm long. These are most commonly associated with elongate aggregates of relict chromite up to several millimetres in length. Chromite is deep red-brown in colour (Cr-rich) with individual grains up to 0.5 mm across.

b) Alteration and structure: The rock has been almost completely altered and only a little relict chromite remains. All former olivine and amphibole have been replaced by fine grained pseudomorphic-textured serpentine (probably lizardite) and fine dusty to granular magnetite. Chromite grains have been fractured and partly to completely replaced by magnetite. The rock also contains a few composite aggregates of pyrite + magnetite up to 2 mm across; these together with the chromite + magnetite aggregates are commonly associated with enclosing masses of very pale green to colourless flaky chlorite and with traces of carbonate.

c) Mineragraphy and paragenesis: The rock contains irregularly distributed composite aggregates up to 2 mm across of pyrite + magnetite, generally accompanied by chlorite. Textures indicate that pyrite is being replaced by magnetite. In addition, there are several composite masses of relict chromite, partly replaced by magnetite.

Mineral Mode: Approximate modal proportions are: serpentine (lizardite) 90%, chlorite 5%, magnetite 3%, chromite and pyrite each 1% and a trace of carbonate.

Interpretation and Comments: The original rock was ultramafic, probably a dunite with scattered chromite grains. It is interpreted that the rock was metamorphosed, leading to the development of a granular texture in olivine and formation of a few bladed amphibole grains. Subsequently, the rock was completely serpentinised, with formation of a lizardite (-magnetite) assemblage, possibly with a few grains of ?pentlandite and/or pyrrhotite. The rock was further altered, perhaps under conditions of rising oxygen fugacity, leading to replacement of the early sulphides by pyrite and then magnetite, alteration of chromite to magnetite and the formation of chlorite-rich masses associated with magnetite.

**PETROGRAPHIC REPORT ON TWELVE DRILL CORE AND TWO
SURFACE SAMPLES FROM THE ZEEHAN DISTRICT, TASMANIA**

for

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SUMMARY

Twelve samples of diamond drill core and two surface samples from a prospect in the Zeehan district in western Tasmania were submitted for petrographic examination. Thin sections were prepared from 10 samples and polished thin sections from the remaining four samples. Section offcuts from six samples were treated with hydrofluoric acid and sodium cobaltinitrite to test for the presence of K-feldspar.

Summary descriptions of each of the samples are listed below:

5473320 TS:

Summary: Metamorphosed porphyritic igneous rock, possibly originally an andesite. It now contains a recrystallised assemblage dominated by plagioclase (probably albitic), with subordinate amphibole (?actinolite), carbonate, prehnite and minor titanite. There are a few veins of amphibole \pm carbonate, and of carbonate.

5473321 TS:

Summary: Intensely altered ultramafic rock with total replacement of the original assemblage (except for relict chromite) by medium to coarse grained quartz, subordinate chlorite and minor carbonate, magnetite, arsenide and sulphide minerals. Of the latter, niccolite, gersdorffite and pyrrhotite are the most abundant and the rock probably contains several % Ni.

5473322 TS:

Summary: Metamorphosed altered ultramafic rock, probably a meta-rodingite. It is now dominated by an inequigranular assemblage rich in diopsidic clinopyroxene, with interstitial and vein-like carbonate, minor plagioclase and talc, and a little disseminated garnet, relict chromite and sulphides. The latter are mostly sphalerite and pyrite, but there are traces of chalcopyrite, galena and pyrrhotite, as well as a trace of niccolite. Sulphides occur in thin carbonate-talc veins and interstitial to clinopyroxene.

5473323 TS:

Summary: Tremolite-rich rock with subordinate carbonate and minor talc, representing an altered and metamorphosed ultramafic composition. The rock retains a little disseminated chromite and contains traces of pyrite.

5473324 TS:

Summary: Metamorphosed banded siliceous siltstone/mudstone with formation of a fine grained assemblage of quartz, biotite and muscovite, with minor K-feldspar. Some K-metasomatism has occurred with fracture-controlled formation of biotite, in conjunction with emplacement of thin veins of K-feldspar, biotite and quartz.

5473325 TS:

Summary: Metasomatically altered feldspathic siltstone retaining detrital plagioclase grains but showing strong recrystallisation and alteration to an assemblage of albite, prehnite, amphibole and minor titanite. The sample contains a large prehnite-rich patch and several late planar prehnite veins.

5473326 TS:

Summary: Calc-silicate rock, possibly a metamorphosed and metasomatised calcareous sediment or of mafic igneous composition. The rock is dominated by tremolite/actinolite, with extensive metasomatic patches and veins containing K-feldspar, carbonate, vesuvianite and epidote. The patches and veins appears to be retrograde.

5473327 TS:

Summary: Strongly deformed ?metasedimentary rock possibly originally a feldspathic calcareous siltstone. The rock has a strong foliation and in places has been tectonically brecciated, perhaps due to competency contrasts during shearing. Alteration occurred during deformation to produce an assemblage with varying amounts of amphibole, K-feldspar, albite and minor titanite. This deformed assemblage was later overprinted by metasomatic patches and veins containing K-feldspar, epidote, prehnite, amphibole and carbonate.

5473328 TS:

Summary: Metamorphosed dolerite, now composed of abundant fine grained phlogopite-biotite with altered (probably albitised) plagioclase and recrystallised quartz veins containing phlogopite and amphibole. The rock was probably initially altered to a sericite (-chlorite) assemblage with some quartz veining along fractures, but it was subsequently thermally metamorphosed to yield the currently observed composition.

5473329 TS:

Summary: Rather magnetite-rich serpentinite formed from an olivine-rich precursor ultramafic rock. It is possible that the ultramafic underwent thermal metamorphism prior to complete serpentinitisation as relict chromite grains have been variably replaced by magnetite. Disseminated sulphides occur in the serpentinite and are dominated by pyrite, with traces of galena, sphalerite and ?gersdorffite. Original pyrrhotite or pentlandite in the ultramafic may have been replaced by pyrite.

5473330 TS:

Summary: Metamorphosed altered ultramafic rock, now dominated by an assemblage of clinopyroxene (diopside), talc and carbonate, with a little chlorite and antigorite. It is possible that the original ultramafic underwent Ca-metasomatism in a rodingitic environment and was subsequently thermally metamorphosed. There has since been minor carbonate retrogression of clinopyroxene.

5473331 TS:

Summary: Serpentinite derived from a dunitic or olivine-rich peridotite precursor. The rock retains a little relict chromite. The serpentinite is dominated by antigorite and also contains a little amphibole, suggestive that thermal metamorphism has occurred following serpentinitisation. Chromite has been partly replaced by magnetite. The rock has been cut by post-metamorphic veins of chrysotile, followed by thin veinlets of pyrite and of carbonate.

5473333 TS:

Summary: Metamorphosed medium grained lithic-feldspar-quartz sandstone. The rock was weakly foliated, fractured and probably altered prior to thermal metamorphism, which resulted in extensive development of amphibole (including in replacive patches and veins) and minor sericite, epidote, tourmaline, chlorite, magnetite and titanite. A few thin post-metamorphic veins containing epidote, albite and K-feldspar have been emplaced.

5473334 TS:

Summary: Metamorphosed bedded siltstone, with finer grained and coarser grained components. The finer grained siltstone is moderately foliated. Thermal metamorphism has caused development of extensive fine grained biotite and there may have been minor metasomatic introduction of B and S to form tourmaline and pyrite.

The sample suite is diverse and includes six rocks of ultramafic parentage (5473321-3, 5473329-31), two of mafic to intermediate igneous parentage (5473320, 5473328) and the remainder (5473324-7, 5473333-4) being of sedimentary origin. Most samples show the effects of alteration and subsequent thermal metamorphism. It is likely that the sedimentary and mafic to intermediate igneous rocks are part of the Crimson Creek

Formation and the ultramafic rocks representative of one of the ultramafic complexes of western Tasmania.

From relict textures in some of the ultramafic samples, it can be deduced that the original rocks were olivine-rich, possibly dunite or olivine-rich peridotite. All interpreted ultramafic rocks retain relict chromite, characteristically with a deep red/orange/brown colour indicative of a high Cr content. Rocks of the Crimson Creek Formation include a porphyritic andesite (5473320), a dolerite (5473328), possible calcareous sediments (5473326-7) and clastic lithic-feldspathic-quartz sediments ranging from fine siltstone/mudstone (5473324-5, 5473334) to medium grained sandstone (5473333). The sediments reflect a rather mafic provenance, with the sandstone containing detrital mafic lithic grains.

Many rocks of the suite appear to have undergone some type of alteration and deformation prior to a subsequently imposed thermal metamorphic event. The Crimson Creek Formation rocks have been weakly deformed (mostly manifest in the finer grained sediments as a foliation) and were probably metamorphosed to lower greenschist facies, possibly with emplacement of low grade alteration assemblages, commonly along fractures. It is also possible that the ultramafic rocks were partly to completely serpentinised at this stage, with some development of rodingitic/blackwall alteration assemblages at or near the contacts between the ultramafics and Crimson Creek Formation. The latter alteration occurred prior to thermal metamorphism and involved Ca-metasomatism of the ultramafics (typical rodingite-blackwall assemblages include phases such as diopside, chlorite, tremolite, talc, carbonate, prehnite, vesuvianite, clinozoisite). The ultramafic rocks could have contained traces of sulphides prior to, or during, serpentinisation, with pentlandite and pyrrhotite being the most likely phases.

Most samples in the suite show some evidence of thermal metamorphism of low to medium grade, probably due to the emplacement of the Heemskirk Granite. Ultramafic rocks could have been recrystallised, with development of antigorite and local amphibole from serpentinites and complex CaMg-rich assemblages from interpreted metaroddingite/blackwall assemblages. The latter contain phases such as diopside, tremolite, talc, carbonate, with minor chlorite and traces of uvarovite. Relict chromite is characteristic, but has been commonly partly to completely replaced by magnetite. One ultramafic sample (5473321) was evidently strongly silicified, with development of a quartz-magnetite-chlorite-garnet-sulphide-arsenide assemblage, with subsequent retrogression of garnet to chlorite. Other altered and metamorphosed ultramafic samples show local development of retrograde carbonate.

Rocks of the Crimson Creek Formation have been partly recrystallised, but there is generally some retention of relict textures. Depending on bulk rock composition, development of phases such as phlogopite-biotite, amphibole (actinolite or possible hornblende), plagioclase, K-feldspar,

prehnite and epidote is attributed to the thermal metamorphic event. The presence of relatively common tourmaline in 5473333-4 could imply that some B-metasomatism has accompanied metamorphism; likewise S (and base metals and As) has probably been hydrothermally introduced into several samples, including 5473321-2, 5473329-30, 5473334). Two samples, tentatively interpreted to have been calcareous sediments (5473326-7) have been very strongly altered to amphibole-rich calc-silicate assemblages, with subsequent development of large retrograde patches and veins containing K-feldspar, prehnite, epidote, carbonate, amphibole and vesuvianite.

Most samples from the Crimson Creek Formation are not significantly mineralised with sulphides, although metasilstone 5473334 contains appreciable disseminated pyrite. Several ultramafic samples contain opaque minerals, including locally abundant magnetite (in part a result of serpentinisation and possible later metamorphic reconstitution), sulphides and arsenides. Sample 5473321 contains disseminated niccolite, gersdorffite and pyrrhotite and may contain several % Ni. In this sample, it is interpreted that S and As may have been introduced metasomatically in conjunction with silicification of the ultramafic. Sample 5473322 contains disseminated pyrite and sphalerite, and traces of other base metal sulphides and niccolite. Pyrite is abundant in sample 5473329 and it also occurs in minor amounts in 5473323 and 5473331. Although some S could have been redistributed from early magmatic or serpentinisation-derived pentlandite or pyrrhotite in the ultramafics, the abundance of sulphides (and arsenides) in some samples is implicit of an external S source (e.g. from the Heemskirk Granite, or mobilised from the Crimson Creek Formation).

5473320 TS:

Summary: Metamorphosed porphyritic igneous rock, possibly originally an andesite. It now contains a recrystallised assemblage dominated by plagioclase (probably albitic), with subordinate amphibole (?actinolite), carbonate, prehnite and minor titanite. There are a few veins of amphibole ± carbonate, and of carbonate.

Handspecimen: Drill core is composed of a rather fine grained greenish-grey altered igneous rock in which a vague relict porphyritic texture is apparent. The rock was probably originally rich in feldspar (plagioclase), with some ferromagnesian component, but has been strongly altered to phases such as carbonate, ?chlorite and amphibole. There are numerous small white aggregates of carbonate and a few pale greenish veins of amphibole. The sample is essentially non-magnetic and staining of the section offcut with sodium cobaltinitrite did not reveal the presence of K-feldspar.

Thin Section:

a) Primary mineralogy and textures: In thin section, the rock displays weak preservation of a former porphyritic texture. It may have contained relatively abundant plagioclase phenocrysts up to 2 mm long, in places intergrown with a possible former ferromagnesian phase (e.g. clinopyroxene). There are also pseudomorphs after a former FeTi oxide phase (e.g. titanomagnetite) up to 1.2 mm across. The rock may have originally contained a rather fine grained groundmass between the phenocrystal phases, but all components have been completely altered and recrystallised.

b) Alteration and structure: The rock has been altered and recrystallised and now contains an inequigranular, interlocking, metamorphic texture. All former feldspar (in phenocrysts and in groundmass) has been recrystallised to fine grained, and in places, medium grained, aggregates of plagioclase (probably albitic). The medium grained aggregates of plagioclase are commonly intergrown with minor acicular grains of pale green amphibole (?actinolite), pale brown carbonate (e.g. ankerite or siderite) and prehnite. The former ferromagnesian phase has been replaced by irregular fine to medium grained aggregates of amphibole ± carbonate. Igneous FeTi oxide has been altered to fine grained masses of titanite. The groundmass is dominated by recrystallised fine grained plagioclase, but there are scattered aggregates up to 2 mm across which are dominated by granular carbonate, or by prehnite ± carbonate ± amphibole. Rare apatite has been observed as a component in the recrystallised groundmass. The rock has been weakly fractured and there appears to have been emplacement of two sets of veins. An early vein type contains fine to medium grained aggregates of amphibole ± carbonate up to 1 mm wide (and may represent the metamorphosed products of early fracture filling). A later vein type is thin and anastomosing and contains carbonate.

c) Mineragraphy and paragenesis: No sulphide minerals have been recognised in the sample.

Mineral Mode: Approximate modal proportions are: plagioclase (probably albitic) 80%, amphibole 10%, carbonate 5%, prehnite 4%, titanite 1% and a trace of apatite.

Interpretation and Comments: From the relict texture and the present assemblage (plagioclase-amphibole-carbonate-prehnite-titanite), it is interpreted that the original rock was porphyritic, and of mafic to intermediate composition. Since it is plagioclase-rich, it was possibly andesitic. The rock may have been altered to produce abundant albite, but it was evidently subsequently metamorphosed (e.g. in a contact metamorphic environment, as grain growth has been random in orientation) to produce the present mineral assemblage and inequigranular, interlocking texture. The mineralogy of the sample is indicative of relatively low grade metamorphism.

5473321 TS:

Summary: Intensely altered ultramafic rock with total replacement of the original assemblage (except for relict chromite) by medium to coarse grained quartz, subordinate chlorite and minor carbonate, magnetite, arsenide and sulphide minerals. Of the latter, niccolite, gersdorffite and pyrrhotite are the most abundant and the rock probably contains several % Ni.

Handspecimen: Drill core is composed mostly of a black, altered serpentinite with a large pale grey aggregate of coarse grained quartz + carbonate in one part of the sample. The serpentinite is strongly magnetic and evidently contains disseminated magnetite as well as possible pyrrhotite in abundant disseminated aggregates up to 2 mm across of bronzy-coloured to white sulphide (?and arsenide minerals). In addition to sulphides, the serpentinite appears to be replaced by quartz and carbonate.

Thin Section:

a) Primary mineralogy and textures: In the section, it is clear that the sample is an intensely altered ultramafic igneous rock, due to the presence of scattered relict grains of fractured red-brown chromite up to 2 mm across. All primary igneous textures in the rock have, however, been obliterated.

b) Alteration and structure: The rock has been intensely altered and is now dominated by an assemblage of medium to coarse grained quartz, with subordinate chlorite and minor carbonate, sulphide and arsenide minerals, relict chromite and disseminated magnetite. There has been strong replacement of most of the rock by interlocking grains of poikiloblastic quartz, generally up to 2 mm across. In places, quartz is intergrown with coarse carbonate (?dolomite or magnesite) and green chlorite. In one part of the section, there is a large patch of quartz up to 3 cm across (?part of a vein) in which granular quartz is intergrown with minor carbonate. Quartz grains enclose traces of acicular amphibole and a few rosettes of chlorite. Two-phase, liquid + vapour fluid inclusions are common in quartz in this region. As part of the alteration assemblage, the rock contained irregularly distributed disseminations and aggregates of subhedral garnet, with a typical grainsize of 0.1-0.2 mm. However, all garnet has since been retrogressed to pale brown chlorite and locally to quartz and magnetite. In addition to chlorite being derived from the breakdown of garnet, there are patches of fine to medium grained pale green chlorite up to 2 mm across which appear to have been formed by the replacement of earlier serpentine minerals (e.g. antigorite). Minor disseminated magnetite is associated with chlorite and is sparsely distributed in quartz. Magnetite has also formed from the partial replacement of relict chromite. Disseminations and aggregates of sulphide and arsenide minerals up to 2 mm across are abundant in the altered serpentinite, but do not occur in the quartz-rich patch.

c) Mineragraphy and paragenesis: The altered serpentinite contains abundant disseminations and aggregates of sulphide and arsenide minerals up to 2 mm across, as well as a little magnetite and scattered fractured grains of relict chromite up to 2 mm across. Chromite has been slightly replaced by magnetite. It is likely that there was early deposition of pyrrhotite throughout the altered serpentinite, accompanied by traces of sphalerite, galena and chalcopyrite. However, hydrothermal conditions evidently changed and much pyrrhotite was replaced by fine to medium grained masses of niccolite (NiAs) and gersdorffite (NiAsS). The latter mineral predominates in places and forms subhedral masses up to 0.6 mm across. Elsewhere, niccolite is abundant and preserves cores of unreplaced pyrrhotite. Minor aggregates of fine grained pyrite occur locally in association with carbonate patches.

Mineral Mode: Approximate modal proportions are: quartz 75%, chlorite 10%, carbonate 4%, niccolite and gersdorffite each 3%, chromite 2%, magnetite and pyrrhotite each 1% and traces of amphibole, sphalerite, galena, chalcopyrite and pyrite.

Interpretation and Comments: It is interpreted that the original rock was ultramafic, e.g. dunite or peridotite, with relatively abundant chromite (perhaps cumulus origin). The rock was probably serpentinitised, yielding a serpentine + magnetite assemblage, but there was subsequently intense hydrothermal alteration. Most of the rock, except for relict chromite

and perhaps some of the serpentinisation-derived magnetite, was replaced by quartz, with subordinate amounts of garnet (e.g. andradite-uvarovite), chlorite and carbonate. It is probable that strongly disseminated pyrrhotite was formed during this alteration and was accompanied by traces of sphalerite, galena and chalcopyrite. It is possible that a Ni sulphide mineral such as pentlandite could also have been formed at this time. Further retrograde alteration ensued, with replacement of garnet by chlorite \pm quartz \pm magnetite and the strong introduction of As into the rock, resulting in the strong replacement of pyrrhotite (?and any prior pentlandite) by niccolite and gersdorffite. The sample probably contains several % Ni. The unusual assemblage in this sample has been the result of polyphase hydrothermal activity on an ultramafic precursor. It is likely that the Ni was sourced from the ultramafic, but that silica, CO₂, As, S and base metals could have come from an external source.

5473322 TS:

Summary: Metamorphosed altered ultramafic rock, probably a meta-rodingite. It is now dominated by an inequigranular assemblage rich in diopsidic clinopyroxene, with interstitial and vein-like carbonate, minor plagioclase and talc, and a little disseminated garnet, relict chromite and sulphides. The latter are mostly sphalerite and pyrite, but there are traces of chalcopyrite, galena and pyrrhotite, as well as a trace of niccolite. Sulphides occur in thin carbonate-talc veins and interstitial to clinopyroxene.

Handspecimen: Drill core is composed of a massive fine to medium grained calc-silicate rock, probably rich in clinopyroxene, but with some carbonate and minor disseminated oxide and sulphide minerals. The latter may include sphalerite and pyrite, forming aggregates up to 3 mm across. The rock contains spotty carbonate patches up to 1-2 mm across, plus a few carbonate veins. The sample is weakly magnetic, signifying the possibility of traces of disseminated magnetite.

Thin Section:

a) Primary mineralogy and textures: In the section, no relict textures are preserved as the rock has been totally altered and metamorphically recrystallised. However, it does contain a few isolated grains and aggregates of red-brown chromite up to 0.8 mm across. These attest to the likelihood of the original rock being of ultramafic igneous parentage.

b) Alteration and structure: The rock has been intensely altered and recrystallised and only relict chromite remains as a primary mineral. The sample is now dominated by inequigranular fine to medium grained clinopyroxene, forming stubby prismatic to squarish grains with a maximum grain size of 0.8 mm. This mineral is colourless and likely to be diopside in composition. Locally intergrown with clinopyroxene are a few grains of calcic plagioclase and rare pale green garnet. Interstitial to clinopyroxene are significant zones of medium to coarse grained carbonate (possibly dolomite), forming irregular masses up to 2 mm across, as well as anastomosing veins up to 1 mm wide. These carbonate patches are commonly associated with irregular disseminations of green garnet (subhedral to euhedral grains up to 0.3 mm across and likely to be uvarovite in composition), fine grained blady talc and a little sulphide. Relict chromite grains are disseminated irregularly throughout and are partly replaced by magnetite. Sulphides are also irregularly distributed, interstitial to clinopyroxene and in carbonate (-talc) veins.

c) Mineralogy and paragenesis: The sample contains about 1-2 volume % of sulphides, plus traces of relict chromite (partly replaced by magnetite). Tiny inclusions of pyrrhotite and chalcopyrite are enclosed in clinopyroxene, but the larger sulphide aggregates (up to 3 mm in length) are dominated by sphalerite and pyrite, with local galena and chalcopyrite, generally in composite masses in carbonate (-talc) veins and interstitial to clinopyroxene. One aggregate of niccolite about 0.4 mm across was observed interstitial to clinopyroxene.

Mineral Mode: Approximate modal proportions are: clinopyroxene (diopside) 75%, carbonate 13%, talc and plagioclase each 4%, garnet, pyrite and sphalerite each 1% and traces of chromite, magnetite, chalcopyrite, galena, pyrrhotite and niccolite.

Interpretation and Comments: The presence of scattered relict chromite grains in the sample is indicative of an ultramafic igneous parentage. However, the rock has been completely altered and metamorphically recrystallised. It is interpreted that the original ultramafic rock underwent Ca-metasomatism, perhaps in a serpentinising environment, to form a rodingitic rock. This could have happened near a contact between the ultramafic rock and country rocks (i.e. a rodingite/blackwall reaction zone contact). This altered rock was subsequently thermally metamorphosed and recrystallised to form a clinopyroxene-dominated assemblage, with subordinate carbonate, minor plagioclase, talc, garnet and sulphides. The latter minerals are commonly concentrated in reaction zone contacts involving serpentinising ultramafics, but it is possible that there has been introduction of base metals and As into the rock from an external source (i.e. introduced into the ultramafic).

5473323 TS:

Summary: Tremolite-rich rock with subordinate carbonate and minor talc, representing an altered and metamorphosed ultramafic composition. The rock retains a little disseminated chromite and contains traces of pyrite.

Handspecimen: Drill core is composed of a massive pale greenish-grey, fine grained calc-silicate rock, probably rich in diopside or tremolite. It contains sparsely disseminated black spots of an oxide phase up to 1 mm across and a trace of pyrite. Uncommon weak fractures are coated with fine grained talc. The sample is essentially non-magnetic.

Thin Section:

a) Primary mineralogy and textures: In thin section, the rock displays a completely recrystallised metamorphic texture and there are no relict textures preserved in what is dominantly a fine to medium grained interlocking mass rich in tremolite. However, the rock does contain scattered grains and aggregates of dark orange-brown chromite up to 0.8 mm across which are indicative of an ultramafic parentage.

b) Alteration and structure: The rock is composed of a massive metamorphic aggregate and represents an intensely altered and recrystallised ultramafic. It is dominantly composed of fine to medium grained prismatic to acicular colourless tremolite, commonly forming interlocking decussate (and locally, radial) aggregates. Tremolite prisms have a maximum length of 0.7 mm. Patches of medium to coarse grained carbonate (?dolomite or magnesite) up to several millimetres across are irregularly distributed in the rock. Carbonate occurs interstitial to tremolite and textural relations are suggestive of partial replacement of tremolite by carbonate. A few small aggregates of fine grained talc also occur interstitial to tremolite. Relict grains of chromite are commonly fractured and locally associated with traces of pyrite. The latter phase is also present in trace amounts elsewhere in the sample, as irregular aggregates up to 0.4 mm across. The rock contains rare sub-planar veins containing tremolite and a little talc.

c) Mineragraphy and paragenesis: The sample contains sparsely disseminated relict chromite and a few grains and small aggregates of pyrite. No sphalerite has been recognised.

Mineral Mode: Approximate modal proportions are: tremolite 85%, carbonate 10%, talc 3% and chromite and pyrite each 1%.

Interpretation and Comments: The presence of isolated grains of relict chromite in the sample is indicative of an original ultramafic parentage, e.g. a dunite or peridotite. It is interpreted that the rock underwent strong Ca-metasomatism in a blackwall/rodingite contact environment to form a tremolite-rich assemblage, with subordinate carbonate and minor talc. Recrystallisation to a fine to medium grained decussate aggregate may be the result of thermal metamorphism. The S necessary to form the sparsely disseminated pyrite in the sample could have been introduced during alteration of the ultramafic rock.

5473324 TS:

Summary: Metamorphosed banded siliceous siltstone/mudstone with formation of a fine grained assemblage of quartz, biotite and muscovite, with minor K-feldspar. Some K-metasomatism has occurred with fracture-controlled formation of biotite, in conjunction with emplacement of thin veins of K-feldspar, biotite and quartz.

Handspecimen: Drill core is composed of a prominently banded fine grained metasedimentary hornfels, probably a siliceous siltstone or mudstone. The rock contains pale grey bands intercalated with dark brownish-grey bands, each on a scale of a few millimetres to 2 centimetres. The pale bands are probably siliceous, whereas the dark bands may contain metamorphic biotite and maybe graphite. Fractures occur in places at a high angle to the banding and there is dark biotitic alteration extending out from the fractures. The rock contains a tiny trace of fine grained pyrite and is essentially non-magnetic. Staining of the section offcut with sodium cobaltinitrite indicates that fine grained K-feldspar is a minor component in the rock, being more abundant in the darker, biotitic bands and in a few of the cross-cutting fractures.

Thin Section:

a) Primary mineralogy and textures: In thin section, it is evident that the sample is a metamorphosed, deformed fine grained sedimentary rock, probably a bedded siliceous siltstone or mudstone. The latter is preferred as there is little recognisable in terms of relict clastic grains (i.e. the original rock was dominated by mud-sized particles). The sample has compositional layering on a scale of several millimetres, probably reflecting original sedimentary bedding. There are two types of layer, the paler one being dominated by very fine grained quartz and muscovite, with minor K-feldspar and biotite and with internal fine lamination defined by a finely dispersed opaque phase, possibly graphite. The darker layers are composed of dominant fine grained biotite and quartz, with minor K-feldspar and muscovite and with traces of leucoxene and ?graphite. In the biotitic layers, there is prominent spotting, with biotite-free, ovoid to elongate spots up to 0.3 mm across being composed of fine grained quartz, K-feldspar and muscovite. In addition, these layers contain a few elongate, layer-parallel aggregates of somewhat coarser biotite + K-feldspar + quartz and chlorite + tourmaline + trace titanite and pyrite.

b) Alteration and structure: The rock has undergone a type of K-metasomatism, with development of fine grained biotite (and K-feldspar + trace tourmaline and chlorite) along certain compositional layers and controlled by fracture systems. The rock has a moderately developed foliation, mainly defined by preferred orientation of muscovite and to a lesser extent by biotite. There are two main sets of fractures and veining, both displaying thin veins (up to 0.3 mm across). An earlier set is represented by anastomosing (folded) to sub-planar veins of biotite + K-feldspar with biotitic selvages, and the later set by simple biotitic fractures in places containing planar quartz veins. The spotting in the biotitic bands may be due to development of a metamorphic aluminosilicate phase (e.g. cordierite, andalusite), but this has been replaced by fine grained quartz, K-feldspar and muscovite.

c) Mineragraphy and paragenesis: Traces of disseminated pyrite form rare masses up to 0.5 mm across. There seems no association of pyrite with any band type or with fractures.

Mineral Mode: Approximate modal proportions are: quartz 55%, biotite 20%, muscovite 18%, K-feldspar 5%, ?graphite 1% and traces of chlorite, tourmaline, pyrite, titanite, leucoxene and graphite.

Interpretation and Comments: The sample represents a metamorphosed and deformed siliceous siltstone/mudstone. It was probably deformed with formation of a moderate foliation, then subsequently thermally metamorphosed, resulting in recrystallisation and formation of a dominant assemblage of quartz, biotite, muscovite and minor K-feldspar. Biotite was also developed along many cross-cutting fractures in conjunction with thin veins containing biotite, K-feldspar and quartz. This alteration could be a type of K-metasomatism and related to the thermal metamorphic event.

5473325 TS:

Summary: Metasomatically altered feldspathic siltstone retaining detrital plagioclase grains but showing strong recrystallisation and alteration to an assemblage of albite, prehnite, amphibole and minor titanite. The sample contains a large prehnite-rich patch and several late planar prehnite veins.

Handspecimen: Drill core is composed of a fine grained pale grey metasedimentary rock, possibly originally a siltstone. It appears to be quartzofeldspathic in composition and is cut by several thin planar veins containing quartz or possibly a calc-silicate mineral. The sample retains a weak lamination, possibly representative of original sedimentary bedding and staining of the section offcut with sodium cobaltinitrite did not indicate the presence of K-feldspar. The sample is essentially non-magnetic.

Thin Section:

a) Primary mineralogy and textures: In thin section, the rock retains a relict clastic texture in places, but portions have been texturally reconstituted. The rock was evidently a type of feldspathic siltstone originally, perhaps with a significant calcareous component. It contains rather abundant relict detrital angular to sub-rounded grains of plagioclase (now albitised) up to 0.3 mm across, enclosed in a totally recrystallised, generally fine grained matrix. A weak to moderate banding, based on compositional differences, is evident in the sample and is considered to reflect original sedimentary bedding. The rock is also foliated, with foliation being parallel to the compositional layering.

b) Alteration and structure: The rock has been recrystallised, strongly altered and veined. It is dominated by fine grained granular plagioclase, in which relict detrital grains of plagioclase are entrained. These components are intergrown with fine to medium grained prisms and aggregates of prehnite and colourless amphibole (probably tremolite). Fine grained titanite is common in the sample, occurring as disseminations and most abundantly as elongate aggregates defining the foliation. The sample contains a few layer-parallel bands (or veins) up to 1 mm wide rich in medium grained prehnite, in places accompanied by acicular amphibole and minor clinozoisite, titanite and apatite. A trace of chlorite has been recognised intergrown with plagioclase and prehnite. In one part of the section, there has been intense replacement of the rock by a interlocking mass of fine to medium grained prehnite, accompanied by fine disseminated titanite. This prehnite aggregate is about 15 mm across. The sample has been fractured during or following growth of the plagioclase-prehnite-amphibole assemblage and several planar veins of fine to medium grained prehnite up to 0.5 mm wide have been emplaced. An X-ray diffractogram was run from the sample and it confirmed the presence of abundant albite, prehnite and amphibole (tremolite/actinolite) and minor titanite.

c) Mineragraphy and paragenesis: One grain of pyrite about 0.1 mm across has been recognised in a prehnite vein.

Mineral Mode: Approximate modal proportions are: plagioclase (albite) 55%, prehnite 25%, amphibole (tremolitic) 15%, titanite 2%, clinozoisite and apatite each 1% and traces of chlorite and pyrite.

Interpretation and Comments: The sample is interpreted to represent a metamorphosed and metasomatised calcareous feldspathic siltstone. It contains relict detrital plagioclase grains and was moderately deformed to develop a foliation parallel to bedding. The rock was subsequently metasomatically altered and recrystallised to an albite-prehnite-amphibole assemblage, with minor titanite. The presence of significant titanite may be indicative that the original sediment had a rather mafic provenance. Growth of prehnite (including that in a large replacive patch) post-dated foliation development and there was late emplacement of several thin planar prehnite veins.

5473326 TS:

Summary: Calc-silicate rock, possibly a metamorphosed and metasomatised calcareous sediment or of mafic igneous composition. The rock is dominated by tremolite/actinolite, with extensive metasomatic patches and veins containing K-feldspar, carbonate, vesuvianite and epidote. The patches and veins appears to be retrograde.

Handspecimen: Drill core appears to be composed of a deformed, fine grained, greenish-grey calc-silicate rock. It is locally layered and clearly somewhat sheared, with anastomosing thin zones of darker green material. The rock may be rich in amphibole, but possibly also contains carbonate. Irregular patches of K-feldspar are evident from staining of the section offcut with sodium cobaltinitrite. The sample is essentially non-magnetic.

Thin Section:

a) Primary mineralogy and textures: In thin section, no definitive relict textures or minerals are apparent and the rock is a fine to medium grained metamorphic aggregate rich in calc-silicates, with extensive development of metasomatic patches of calc-silicates, carbonate and K-feldspar. A weak anastomosing shear fabric is present and portions of the sample retain a weak foliation. However, the deformation features may have been overprinted by subsequent metamorphic grain growth.

b) Alteration and structure: The rock is the product of metamorphism of a precursor rich in Ca and Mg, with the imposed effects of hydrous retrograde alteration. The sample is dominated by fine grained granular to prismatic colourless to pale green amphibole (probably tremolite/actinolite), with local gradations into fine to medium grained inequigranular domains of K-feldspar and carbonate. Both of these mineralogical types contain disseminated fine grained titanite and the latter mineral is concentrated along former shear planes. The rock has been metasomatically altered with emplacement of numerous irregular veins and patches up to several millimetres across containing generally medium grained minerals (grainsize 0.2 -1.5 mm). Three main assemblages are present in the metasomatic aggregates and include K-feldspar, with associated acicular amphibole and local epidote; vesuvianite with minor epidote and amphibole; and carbonate, associated with K-feldspar and amphibole. These three assemblages are gradational into each other. Carbonate also appears to be a later retrograde phase and texturally replaces some of the silicate assemblage.

c) Mineragraphy and paragenesis: A trace of sphalerite (one grain about 0.1 mm across) has been observed in association with a metasomatic patch of K-feldspar and carbonate.

Mineral Mode: Approximate modal proportions are: amphibole (tremolite/actinolite) 50%, carbonate 20%, K-feldspar 15%, epidote 9%, vesuvianite 5% and titanite 1%.

Interpretation and Comments: The sample is a calc-silicate rock, but original parentage is obscure due to lack of relict minerals or textures. The rock could represent a metamorphosed and metasomatised calcareous sediment or perhaps a mafic igneous composition. It is unlikely to be of ultramafic origin due to the lack of relict chromite. The rock was probably sheared prior to metamorphic recrystallisation, with the latter process resulting in the development of an amphibole-rich assemblage, with some carbonate and K-feldspar. Subsequently, there appears to have been extensive retrograde metasomatic emplacement of patches and veins of K-feldspar, amphibole, carbonate, epidote and vesuvianite. A trace of sphalerite is associated with the metasomatic patches.

5473327 TS:

Summary: Strongly deformed ?metasedimentary rock possibly originally a feldspathic calcareous siltstone. The rock has a strong foliation and in places has been tectonically brecciated, perhaps due to competency contrasts during shearing. Alteration occurred during deformation to produce an assemblage with varying amounts of amphibole, K-feldspar, albite and minor titanite. This deformed assemblage was later overprinted by metasomatic patches and veins containing K-feldspar, epidote, prehnite, amphibole and carbonate.

Handspecimen: Drill core is composed of a fine to medium grained, greenish-grey rock rich in calc-silicates (e.g. amphibole, epidote), but also containing irregular patches of K-feldspar, as indicated by staining of the section offcut with sodium cobaltinitrite. In places the sample is banded (?foliated) and also brecciated, with darker-coloured patches (?amphibole-rich) enclosed in a paler-coloured matrix. The rock is cut by a few late-stage sub-planar veins of a white ?calc-silicate mineral. The sample is essentially non-magnetic.

Thin Section:

a) Primary mineralogy and textures: In thin section, the rock displays a strong relict tectonic fabric. The sample could represent a sheared breccia, but more likely it is the result of progressive brecciation developing during shearing due to competency contrasts. There appears to have been partial tectonic mixing of foliated masses of fine grained feldspathic rock and fine grained amphibole-rich rock, with the latter type showing textural evidence of having replaced the feldspathic rock. It is possible that the original rock was a type of fine grained sediment, e.g. a feldspathic, calcareous siltstone (probably with a rather mafic provenance), which was deformed and altered. The deformed rock has been subsequently overprinted by metasomatic patches and veins.

b) Alteration and structure: There appears to have been two events of strong alteration imposed on the original sedimentary rock. The first may have been coeval with strong shearing and caused replacement by an assemblage of fine grained K-feldspar, albite, amphibole and minor titanite, and in places mostly by amphibole, with a little titanite. These assemblages are foliated and the amphibole-rich components may have progressively acted as more competent material during shearing, resulting in them becoming more brecciated (i.e. becoming breccia fragments). Foliation planes are commonly defined by trails of fine grained titanite. The amphibole in the foliated and brecciated rock is colourless to pale green and may be tremolite/actinolite in composition. The second type of alteration overprints the foliation and tectonic breccia textures. It is represented by foliation-parallel and cross-cutting irregular veins and patches of medium to coarse metasomatic minerals. These masses contain one or more of the phases K-feldspar, epidote, prehnite, amphibole and carbonate, with grain growth being random and clearly post-deformation. The sample has been cut by a few late-stage sub-planar veins up to 0.2 mm wide containing prehnite, plus a little quartz and K-feldspar.

c) Mineragraphy and paragenesis: The sample contains traces of sparsely disseminated fine grained pyrite and ?sphalerite in the deformed and strongly altered ?metasediment.

Mineral Mode: Approximate modal proportions are: amphibole 40%, K-feldspar 20%, albite 15%, prehnite and epidote each 10%, carbonate 3%, titanite 1% and traces of quartz, pyrite and ?sphalerite.

Interpretation and Comments: Due to strong deformation and alteration effects it is not possible to unequivocally assign a parent rock type for this sample. On balance, interpretation of the relict foliated domains and from bulk compositional considerations, it is possible that the sample represents a former feldspathic and calcareous siltstone, which enjoyed strong shearing attending initial alteration, followed by later, post-deformation metasomatic veining and replacement. Progressive alteration during deformation led to amphibole-rich domains being formed which may have been more competent and thus developed into brecciated zones. Post-deformation metasomatic assemblages are dominated by non-deformed K-feldspar, epidote, prehnite, amphibole and carbonate. The metasomatic event may be related to thermal metamorphism and hydrothermal fluid flux through the previously deformed rock.

5473328 TS:

Summary: Metamorphosed dolerite, now composed of abundant fine grained phlogopite-biotite with altered (probably albitised) plagioclase and recrystallised quartz veins containing phlogopite and amphibole. The rock was probably initially altered to a sericite (-chlorite) assemblage with some quartz veining along fractures, but it was subsequently thermally metamorphosed to yield the currently observed composition.

Handspecimen: Drill core is composed of a dark grey-brown, rather massive rock, possibly of metamorphosed mafic igneous composition, or maybe a psammopelitic metasediment. The dark brownish colour is likely to be due to abundant fine grained metamorphic biotite. The sample is moderately fractured, with several pale bluish-grey veins up to 3 mm wide being apparent. These may contain quartz or feldspar. Staining of the section offcut with sodium cobaltinitrite revealed that minor fine grained K-feldspar is present in the sample. The rock is essentially non-magnetic.

Thin Section:

a) Primary mineralogy and textures: In thin section, the sample retains a moderately to well preserved relict igneous texture. It was evidently a medium grained mafic rock, with abundant elongate and granular crystals of plagioclase up to 2.5 mm in length. These were intergrown with an interstitial ferromagnesian phase (probably clinopyroxene) and with accessory FeTi oxide and a trace of apatite. The FeTi oxide phase is non-magnetic and may be ilmenite. The relict textures imply that the rock was originally a dolerite, but most igneous minerals have since been altered.

b) Alteration and structure: The rock has been strongly altered, veined and subsequently metamorphosed. In places, there is good preservation of primary igneous texture, but along some fractures there are intense alteration zones where primary texture is largely obliterated. Original plagioclase has been replaced by albite and variably flecked with a pale orange, fine grained mica, probably phlogopite. In zones of intense alteration, plagioclase outlines are obscured and there has been more thorough recrystallisation to fine grained phlogopite, albite and K-feldspar. The former ferromagnesian phase in the rock has been completely replaced by fine grained mica aggregates and a trace of leucoxene. The mica ranges from pale orange to orange-brown, with the deeper colour being found around relict grains of FeTi oxide. The mica is therefore considered to range from phlogopite to biotite with acquisition of Fe to make biotite being from the adjacent FeTi oxide grains. The sample has been moderately fractured, ranging from fine scale crackling to several throughgoing vein masses up to 3 mm wide. It appears as though fracturing occurred early, prior to later metamorphism and that several fractures contained early quartz veins. Other fractures may have been dominated by phases such as sericite and chlorite. However, the rock was metamorphosed after fracturing and vein emplacement, leading to recrystallisation and reaction of vein contents. Quartz has been recrystallised and has been partly replaced by fine grained phlogopite and scattered sprays of a pale green amphibole (e.g. actinolite). Other recrystallised fractures contain abundant fine grained phlogopite, but a few also contain a little albite and K-feldspar.

c) Mineragraphy and paragenesis: No sulphide minerals have been recognised in the sample.

Mineral Mode: Approximate modal proportions are: plagioclase (probably albitic) 50%, phlogopite-biotite 40%, FeTi oxide and quartz each 3%, K-feldspar 2%, amphibole 1% and traces of leucoxene and apatite.

Interpretation and Comments: From the relict texture and the present metamorphic mineral assemblage, it is interpreted that the original rock was a medium grained mafic type, e.g. a dolerite. It was composed of dominant plagioclase and clinopyroxene, with accessory FeTi oxide. The rock was fractured and altered, with emplacement of quartz veins and development of sericite (and possibly chlorite). Subsequently, it was thermally metamorphosed, with reaction of sericite and chlorite to phlogopite-biotite and

replacement of all former igneous clinopyroxene and plagioclase by a metamorphic plagioclase-phlogopite/biotite assemblage. Former veins were recrystallised, with formation of phlogopite and amphibole. The rock represents the product of early phyllic-type hydrothermal alteration on a mafic host, with a subsequent thermal metamorphic overprint.

5473329 TS:

Summary: Rather magnetite-rich serpentinite formed from an olivine-rich precursor ultramafic rock. It is possible that the ultramafic underwent thermal metamorphism prior to complete serpentinisation as relict chromite grains have been variably replaced by magnetite. Disseminated sulphides occur in the serpentinite and are dominated by pyrite, with traces of galena, sphalerite and ?gersdorffite. Original pyrrhotite or pentlandite in the ultramafic may have been replaced by pyrite.

Handspecimen: Drill core is composed of a fine grained black serpentinite. It evidently contains relatively abundant magnetite as the sample is strongly magnetic. There are also scattered grains of a bright creamy sulphide (probably pyrite) up to 2.5 mm across.

Thin Section:

a) Primary mineralogy and textures: In the section, the rock is a serpentinite showing some preservation of relict textures after former olivine grains. Textures are not diagnostic to discern whether olivine was of primary igneous derivation or whether it was metamorphic. The rock also contains disseminated fractured subhedral grains of dark red-brown chromite up to 0.3 mm across. This mineral is most likely a relict igneous phase.

b) Alteration and structure: The original ultramafic rock has been serpentinised, with replacement of former olivine by serpentine, magnetite and minor carbonate. Two types of serpentine occur as replacements of olivine, and a third type occurs as large clear "pools" in-between the regions containing relict textures after olivine. Pseudomorphic-textured areas contain fine grained crystalline colourless serpentine (lizardite or antigorite) and within the pseudomorphs after olivine, a brownish-green serpentine phase, possibly lizardite. The clear "pools" of serpentine are composed of sub-radiating semi-fibrous fine grained masses of probable chrysotile up to several millimetres across. Pseudomorphic-textured areas contain disseminated to semi-massive aggregates of fine grained granular magnetite as well as minor carbonate (probably magnesite). Both magnetite and the carbonate phase have a maximum grain size of about 0.2 mm. Relict chromite has been partly to completely replaced by magnetite plus traces of pyrite. Sulphides are irregularly distributed throughout, in aggregates up to 2.5 mm across.

c) Mineralogy and paragenesis: The sample contains minor relict chromite, partly replaced by magnetite, as well as irregular masses of disseminated to semi-massive magnetite. Sulphides are sparsely and irregularly distributed, commonly occurring in the clear serpentine "pools", but also in pseudomorphs after olivine and as possible replacements of magnetite. Pyrite is the dominant sulphide, forming anhedral masses up to 2.5 mm across. It is possible that pyrite may be partly replaced after former FeNi sulphides such as pyrrhotite and pentlandite. Tiny traces of galena, sphalerite and ?gersdorffite are enclosed in serpentine.

Mineral Mode: Approximate modal proportions are: serpentine 85%, magnetite 10%, pyrite 3%, carbonate 2% and traces of galena, sphalerite and ?gersdorffite.

Interpretation and Comments: The original rock was an olivine-rich peridotite or dunite containing sparse chromite grains. It could have been metamorphosed prior to serpentinisation, with considerable replacement of chromite by magnetite. Subsequently, the rock was completely serpentinised, with development of chrysotile and ?lizardite, with rather abundant magnetite and a little carbonate. Possible former pyrrhotite and pentlandite were altered to pyrite and magnetite has also been slightly sulphidised to form pyrite. Traces of galena, sphalerite and ?gersdorffite occur in the serpentinite and it is probable that S and traces of Pb, Zn and ?As were introduced into the ultramafic during or following serpentinisation.

5473330 TS:

Summary: Metamorphosed altered ultramafic rock, now dominated by an assemblage of clinopyroxene (diopside), talc and carbonate, with a little chlorite and antigorite. It is possible that the original ultramafic underwent Ca-metasomatism in a rodingitic environment and was subsequently thermally metamorphosed. There has since been minor carbonate retrogression of clinopyroxene.

Handspecimen: Drill core is composed of a white to pale green fine grained rock, probably rich in carbonate, calc-silicates and talc (as the sample has a somewhat greasy feel). It contains sparsely scattered grains of a black, non-magnetic oxide mineral up to 1 mm across.

Thin Section:

a) Primary mineralogy and textures: In thin section, no definitive relict textures are preserved due to strong alteration and recrystallisation. However, the rock does contain scattered grains of fractured relict chromite up to 0.5 mm across. These are dark red-brown in colour and indicate that the rock was originally an ultramafic.

b) Alteration and structure: The rock has been strongly altered and metamorphosed. It is rich in fine to medium grained granular to prismatic colourless clinopyroxene. This phase is probably diopside in composition and has a typical grainsize range of 0.05-0.6 mm. There are several large patches up to 10 mm across composed of fine grained platy to sub-radiating talc, in which there are scattered inclusions of clinopyroxene (partly retrogressed to carbonate), carbonate porphyroblasts, and minor colourless chlorite and antigorite. In much of the sample, clinopyroxene is enclosed within medium to coarse grained poikiloblastic carbonate and in places this carbonate grades into large clear masses up to several millimetres across. Relict chromite grains are commonly enclosed in carbonate, as is clinopyroxene, minor chlorite and a trace of green garnet, probably uvarovite. It is considered that the carbonate is likely to be dolomite or magnesite in composition. The rock has been weakly fractured, with emplacement of a few anastomosing veins of medium grained carbonate up to 3 mm wide. In the veins, carbonate has been deformed, indicating that there has been some shearing of the rock following vein emplacement.

c) Mineragraphy and paragenesis: Scattered grains of relict chromite are preserved in the sample, but no sulphide minerals have been recognised.

Mineral Mode: Approximate modal proportions are: clinopyroxene (probably diopside) 40%, carbonate 35%, talc 22%, chromite, chlorite and antigorite each 1% and a trace of garnet.

Interpretation and Comments: The rock was evidently an ultramafic originally, as indicated by the presence of relict chromite. It is interpreted that the rock underwent strong Ca-metasomatism, perhaps in a rodingitic alteration setting (i.e. between the ultramafic and adjacent rock type(s)). It may have developed a low grade assemblage involving phases such as carbonate, chlorite and antigorite. However, the altered ultramafic was then subjected to thermal metamorphism to develop a clinopyroxene-carbonate-talc assemblage, with minor chlorite and antigorite. Following metamorphism, there has been slight retrogressive alteration of clinopyroxene to carbonate.

5473331 TS:

Summary: Serpentinite derived from a dunitic or olivine-rich peridotite precursor. The rock retains a little relict chromite. The serpentinite is dominated by antigorite and also contains a little amphibole, suggestive that thermal metamorphism has occurred following serpentinisation. Chromite has been partly replaced by magnetite. The rock has been cut by post-metamorphic veins of chrysotile, followed by thin veinlets of pyrite and of carbonate.

Handspecimen: Drill core is composed of a fine grained dark greenish-black serpentinite with several prominent sub-planar veins of fibrous chrysotile (asbestos) up to 4 mm wide. The sample is strongly magnetic, signifying the presence of appreciable amounts of fine grained disseminated magnetite. The sample also contains a trace of disseminated and fracture-controlled brassy sulphide, possibly pyrite.

Thin Section:

a) Primary mineralogy and textures: In the section, the serpentinite retains patches with relict textures after formerly abundant olivine, and possible minor pyroxene. These may define a relict cumulate texture. The rock also contains a few relict fractured grains of chromite up to 1 mm across. The relict textures and presence of chromite imply that the rock was formerly dunitic or an olivine-rich peridotite.

b) Alteration and structure: The rock has been completely serpentinised and appears to have been subjected to metamorphism following serpentinisation. All former olivine and pyroxene have been replaced by fine grained serpentine (antigorite and probably some lizardite), with fine grained disseminations and local aggregates of granular magnetite. Larger magnetite aggregates are up to 1.5 mm across and many have textures indicative of replacement of former chromite. In fact, most relict chromite is strongly replaced by magnetite, in places with traces of pyrite along thin fractures. The rock contains a few small aggregates of carbonate in which traces of fine grained pyrite are common. Several large irregular clear zones up to 8 mm across, in-between domains with relict textures after olivine, are composed of fine grained antigorite, locally with needles of colourless amphibole up to 1 mm in length. The amphibole has straight extinction under crossed polars and may be anthophyllite. The serpentinite has been moderately fractured and there has been emplacement of three types of vein fillings. The earliest vein type is dominated by fibrous chrysotile and is up to 3 mm wide. These have been cut by thin anastomosing to sub-planar veins of pyrite up to 0.04 mm wide. In turn, both of these vein types have been cut by carbonate veins up to 0.2 mm wide.

c) Mineragraphy and paragenesis: The rock contains a few grains of relict chromite up to 1 mm across, but chromite has been partly to completely replaced by magnetite. Considerable disseminated magnetite occurs irregularly in the sample and may be the result of serpentinisation. Traces of disseminated pyrite are enclosed in carbonate and serpentine and pyrite veins cut the rock, including the chrysotile veins. The pyrite veins contain traces of pyrrhotite. A trace of a white, fine grained metallic phase (?awaruite) occurs rarely in serpentine.

Mineral Mode: Approximate modal proportions are: serpentine (antigorite and lizardite) 80%, serpentine (chrysotile) 10%, magnetite 6%, carbonate, amphibole and pyrite each 1% and traces of chromite, pyrrhotite and ?awaruite.

Interpretation and Comments: The original rock was a dunite or olivine-rich peridotite, with minor accessory chromite. It appears to have been serpentinised and subsequently metamorphosed, with development of an antigorite-rich assemblage, with disseminated magnetite and a little anthophyllite in large antigorite-rich patches. Post-metamorphic fractures are occupied by early chrysotile, followed by thin veins of pyrite, then carbonate. A trace of pyrite is disseminated in the serpentinite.

5473333 TS:

Summary: Metamorphosed medium grained lithic-feldspar-quartz sandstone. The rock was weakly foliated, fractured and probably altered prior to thermal metamorphism, which resulted in extensive development of amphibole (including in replacive patches and veins) and minor sericite, epidote, tourmaline, chlorite, magnetite and titanite. A few thin post-metamorphic veins containing epidote, albite and K-feldspar have been emplaced.

Handspecimen: The sample is a medium grained, green-grey, rather massive rock, with several patches and veins of dark green amphibole. It may be a lithic sandstone of mafic provenance, or possibly a mafic igneous rock. There are a few thin later veins of a white mineral (?feldspar). The sample is moderately magnetic and probably contains minor disseminated magnetite. Staining of the section offcut with sodium cobaltinitrite indicated that minor K-feldspar is present. Exterior surfaces of the rock are goethite-stained as a result of weathering.

Thin Section:

a) Primary mineralogy and textures: In thin section, it is evident that the rock is a weakly foliated, metamorphosed sandstone. Relict clastic texture is well preserved and the rock is composed of detrital lithic, feldspar, quartz and magnetite grains which are angular to sub-rounded in outline and up to 1 mm across. Lithic grains dominate and include former fine grained mafic material (e.g. altered basalt) and fine grained metasediment (now sericite, quartz, feldspar). Detrital feldspar grains include both plagioclase and K-feldspar. The matrix surrounding the detrital grains was fine grained, but has been entirely recrystallised. At one end of the section, there is a sharp transition from sandstone into fine grained foliated siltstone.

b) Alteration and structure: The sandstone has been weakly foliated, but a stronger foliation is apparent in the siltstone. Foliation is mainly defined by preferred orientation of elongate relict detrital grains. Foliation was developed prior to a thermal metamorphic event as subsequent growth of metamorphic minerals (dominantly amphibole) displays random grain orientation. The rock has been recrystallised with strong development of fine to medium grained prismatic green amphibole (possibly actinolite). Amphibole has developed from former mafic detrital grains, in the matrix and as extensive replacive patches and veins up to several millimetres across. Apart from amphibole, there has also been formation during metamorphism of sericite, green tourmaline, chlorite, magnetite and titanite, and local epidote grains are found in some of the amphibole-rich patches. Chlorite is more abundant in the foliated siltstone component of the sample. Following metamorphic recrystallisation, the rock was weakly fractured, with emplacement of a few thin veins containing albite, K-feldspar and epidote. Slight goethite staining occur in places in the sample and is a result of weathering.

c) Mineragraphy and paragenesis: No sulphide minerals have been recognised in the sample.

Mineral Mode: Approximate modal proportions are: plagioclase (probably albitic) and amphibole each 35%, quartz 8%, K-feldspar and sericite each 5%, tourmaline and chlorite each 3%, epidote, magnetite and titanite each 2% and a trace of goethite.

Interpretation and Comments: The sample represents a metamorphosed medium grained lithic-feldspar-quartz sandstone. It probably had a mafic-dominated provenance, but with some fine grained sedimentary and quartzose input. The sandstone was weakly foliated and fractured, possibly partly altered and then thermally metamorphosed. Strong development of amphibole ensued, including in replacive patches and veins, but there was also formation of sericite, chlorite, tourmaline, epidote, magnetite and titanite. The presence of tourmaline could imply introduction of B into the rock from an external hydrothermal source. Following metamorphism, there was late emplacement of a few thin veins containing albite, K-feldspar and epidote.

5473334 TS:

Summary: Metamorphosed bedded siltstone, with finer grained and coarser grained components. The finer grained siltstone is moderately foliated. Thermal metamorphism has caused development of extensive fine grained biotite and there may have been minor metasomatic introduction of B and S to form tourmaline and pyrite.

Handspecimen: The sample is a dark grey metamorphosed siltstone, with a few intercalated masses of more sandy-textured sediment. The dark colour of the rock may be due to development of fine grained metamorphic biotite and also possibly due to finely dispersed graphite. The sample is weakly magnetic and also contains traces of irregularly distributed fine grained pyrite. Staining of the section offcut with sodium cobaltinitrite revealed that fine grained K-feldspar is present in minor amounts.

Thin Section:

a) Primary mineralogy and textures: In thin section, it is evident that the rock is a bedded siltstone which displays possible soft-sedimentary structures and overprinting tectonic effects, shown by the development of two foliations. The rock has also been metamorphosed. Much of the sample is composed of a foliated, fine grained siltstone with only a few tiny relict detrital grains. However, this rock type encloses, and is intercalated with, coarser grained siltstone in which there are abundant angular to sub-rounded detrital grains up to 0.3 mm across set in a fine grained, recrystallised matrix. The coarser intercalations are up to a few millimetres across and may be the result of a more sandy sediment being incorporated into a more muddy sediment whilst in an unconsolidated state. Detrital grains in the siltstone are dominated by quartz, but there are also minor feldspars and traces of muscovite and zircon. The matrix material, and the finer grained siltstone in general, are composed of fine grained recrystallised quartz, feldspars, muscovite, biotite, with irregularly distributed pyrite and traces of magnetite, tourmaline and ?graphite.

b) Alteration and structure: The rock has been deformed, with development of two foliations, and the subsequent imposition of a thermal metamorphic event. Foliation development was prior to thermal metamorphism as metamorphic biotite grains have random orientation. Foliation is most noticeable in the finer siltstone, where a moderate crenulation cleavage is found at a low angle to primary bedding. This moderate foliation is cut by a very weak crenulation cleavage. Metamorphic effects in the sample are mostly manifest in the formation of extensive fine grained orange-brown biotite, most abundant in recrystallised matrix material. Metamorphic-textured greenish tourmaline is a common accessory phase in the coarser siltstone, where it is generally intergrown with pyrite. A trace of goethite staining occurs in the sample as a result of incipient weathering.

c) Mineragraphy and paragenesis: Pyrite is irregularly distributed in the sample and mostly occurs in the coarser siltstone where it is commonly strongly disseminated and associated with tourmaline.

Mineral Mode: Approximate modal proportions are: quartz 50%, biotite 20%, feldspars (including K-feldspar) 15%, muscovite 10%, tourmaline and pyrite each 2% and traces of magnetite, ?graphite, zircon and goethite.

Interpretation and Comments: The sample was originally a bedded fine grained siltstone in which there were a few intercalations of coarser siltstone, possibly resulting from soft-sediment slumping. The rock was deformed, with a moderate foliation being formed in the finer siltstone. Thermal metamorphism ensued, being mainly manifest by recrystallisation, development of fine grained biotite and crystallisation of minor tourmaline and pyrite in the coarser siltstone. It could be implied that S and B were metasomatically introduced into the rock during metamorphism.

Appendix 4

Various Technical Memoranda

FILE: T.A.S.
EL 28/88 TECHNICAL



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Memo to: Torbjorn von Strokirch
From: Tim Green
Date: 31st April 1997

Re: Avebury Drilling

This memorandum details results of the 1996/97 drilling programme at the Avebury prospect, part of Zeehan 1, EL 28/88 located on the west coast of Tasmania, near Zeehan. Results from previous exploration programmes at Avebury are also discussed, with much of this information being largely a compilation of data and interpretation presented in Parkinson (1992; 1993; 1994), Aravanis (1994) and Tear and Tesselaar (1996). Petrological analysis of drill core was carried out by Paul Ashley at the University of New England (Ashley 1997a; 1997b).

Introduction:

EL 28/88 was granted to Major Mining Limited on 23rd November 1987. CRA Exploration entered into a joint venture agreement with Major Mining on 23rd April 1991. Major Mining subsequently divested its interests to Allegiance Mining NL, with tenements transferred to CRAE (90%) and Allegiance (10%), in January 1994.

EL 22/88 now covers 64km², having been reduced from 129km² on 9th December, 1993. CRA Exploration has been exploring the area around Zeehan for stratiform shale-hosted Zn-Pb. Similarities with the Lawn Hill area in northern Queensland have been noted, and the Zeehan area is seen as prospective for hosting Century-style lead-zinc deposits. Secondary targets include skarn type Pb-Zn deposits within the Ordovician Gordon Limestone, peripheral to the Heemskirk Granite, and nickel associated with ultramafics.

The Avebury prospect occurs in the northern part of the central block of EL 28/88, immediately to the east of Comstock Creek (Figure 1). Regional stream sediment sampling indicated creeks draining the area between McLean and Comstock Creeks to be anomalous in Pb-Zn. Exploration prior to the 1996/97 programme has largely been focused on delineating a significant Pb-Zn geochemical anomaly and interpreting and modelling the source of a discrete magnetic anomaly.

Exploration in the Avebury area has been focused on identifying an RTZ-CRA size base metal skarn deposit, associated with the Gordon Limestone, around the periphery of the Heemskirk Granite. Further soil (C-horizon) sampling was undertaken during 1996, and a three hole diamond drilling programme was completed in the early part of 1997.

Geology

Outcrop over the Avebury grid is generally poor. The majority of the grid appears to be underlain by mafic rocks, which have undergone fairly intense chloritisation, and siltstones and psammitic rocks which are likely to be equivalents of the Crimson Creek formation. In the lower reaches of Comstock Creek (southeast portion of the current grid), these rocks have undergone intense silicification, and are largely dominated by grey cherts, and younger, relatively unaltered basalts.

The Southern slopes comprise Owen Conglomerate. The contact with the Gordon Limestone to the south is poorly understood, though appears to be fault-bounded. Crotty Quartzite overlies the Gordon Limestone further south. The Pre-Cambrian Oonah Formation appears to be thrust over the Crimson Creek equivalents in the eastern part of the Avebury Grid.

Geochemistry

In 1992 C-horizon soil sampling was completed over most of the Avebury grid at 200m x 25m intervals. Samples were assayed for Cu, Pb, Zn, Ag and As. A 400m x 300m zone in the centre of the grid was identified as anomalous in Pb-Zn-Cu-As with peak values of 1300ppm Pb, 1150ppm Zn and 450ppm Cu, and appeared to be confined to mafic lithologies.

Infill C-horizon soil sampling was completed over the centre of the Avebury grid over a 600m x 600m area at 50m x 25m intervals during 1993. Results indicated the central area was characterised by high background levels of Pb-Zn-Fe. A WNW trending zone of Pb-Zn exceeding 1900ppm Zn and 1700ppm Pb was delineated, occurring within a less well-defined zone elevated in Zn-Pb-Fe-Mn-As-Ni, with a peak Ni value of 7300ppm. Magnetite grains found in the north of the geochemical grid were thought to be indicative of a magnetite skarn.

Further soil sampling was carried out during the 1994 programme, over a 2km N-S line, cut primarily for a ground magnetic traverse. Samples were assayed for Cu, Pb, Zn, Ag, As, Mn and Fe. Cu-Pb-Zn-Fe values were low over Crotty Quartzite, Gordon Limestone and Owen Conglomerate. There was a sharp increase over Cambrian lithologies, but a reduced response over thrust outliers of the Pre-Cambrian Oonah Formation.

Soil sampling carried out during the 1996 exploration programme was confined to the western end of the "dumbbell-shaped" magnetic anomaly. 150 hand-augered C-horizon soil samples were collected over 200m x 50m intervals. Pb-Zn values are generally low compared with the central part of the grid, however peak values of 1410ppm Zn and 896ppm Pb were returned. The

southwestern corner of the grid appears to be anomalous in Cr with an approximately E-W trending zone (in excess of 500ppm) Cr remaining unclosed to the east and west. The same area is also anomalous in Ni, though the majority of samples returned values less than 200ppm Ni.

Magnetic Modelling

Airborne magnetics flown over the Avebury prospect identified a high amplitude linear anomaly, over which the Avebury grid is located. Modelling was made difficult due to the E-W orientation of the survey lines, but indicated an E-W trending body, approximately 100m deep, and with dimensions of 1000m x 600m x 400m. A magnetic susceptibility of between 12000 and 20000 x 10⁻⁵ SI is consistent with a mafic - ultramafic source containing about 5% magnetite.

During 1994 a single 2km N-S trending line (356000E) was cut, to enable the completion of a ground magnetometer survey. This line is located some 500m east of the main anomaly, however modelling carried out suggested a 350m wide "dyke", approximately 140m beneath the surface. Susceptibility values applied to the model lie in the "common" range for an ultramafic, and the lower range for magnetite skarns (Aravanis, 1994). An additional one or two N-S magnetometer traverses were recommended in order to conduct further modelling.

In March 1995, a helimag survey flown by UTS, included the Avebury grid. A "dumbbell-shaped" anomaly was identified, approximately 1000m x 300m, beneath over-thrust Cambrian sediments. The source was believed to be less than 100m in width, and lie 30 to 100m beneath the surface. Further modelling by Doe (1996) indicated the body is variable in width and/or depth, and is dipping steeply southwards. A single line of ground magnetics along planned drill sections was recommended prior to the commencement of drilling. Tesselaar suggested the eastern anomaly dips steeply to the north, while the western anomaly has a steep southerly dip.

Diamond Drilling

A three hole diamond drilling programme was conducted during the latter part of 1996 and early 1997. Three diamond holes were drilled, totalling 791m. The aim of the drilling programme was to intersect skarn related base metal and/or gold mineralisation associated with the tightly folded Ordovician Gordon limestone believed to underlie over-thrust Cambrian and Proterozoic rocks, close to the periphery of the Heemskirk Granite. The location of these holes relative to the magnetic anomaly is illustrated in Figure 2.

DD96ZA1

DD96ZA1 is located in the western part of the grid (354793E, 5357206N), and was drilled into the western centre of the magnetic anomaly. It was oriented 65° towards 360 (AMG), and was drilled to a depth of 284.5m.

The geology of ZA1 is illustrated in Figure 3. The first 90m of the hole are dominated by metasedimentary rocks believed to be equivalents of the Crimson Creek Formation. Petrological analysis indicates these sedimentary rocks had a rather mafic provenance.

Below this, the hole intersected serpentinite and altered ultramafics. These rocks have been metamorphosed, and largely been completely serpentinitised. The dominant serpentine mineral appears to be lizardite, but antigorite is also locally present. Magnetite is believed to have formed as the result of serpentinitisation. Alteration of these ultramafics has been so intense, that they are virtually unrecognisable. They are often light (white to cream) in colour, and have the appearance of limestones. Many contain subordinate carbonate either as a retrogressive metamorphic phase, or as late stage veins. The ultramafic rocks are interpreted as having originated as dunitic or olivine-rich peridotites. The presence of relict chromite, is an indication of an ultramafic origin, rather than metamorphism / metasomatism of a sedimentary rock (Ashley 1997a). The rocks intersected in this hole have been metamorphosed to hornblende hornfels facies, with an earlier regional metamorphic event, having a contact metamorphic overprint.

Several of the ultramafics contain significant amounts of sulphides (and arsenides). There are traces of niccolite and gersdorffite. Pyrite is common as aggregates sometimes associated with magnetite. Two samples sent in for petrological analysis contained millerite, the amount of which thought to be indicative of Ni grades up to 0.5 to 1%. It is possible that the ultramafics contained traces of disseminated pentlandite and pyrrhotite, now replaced by pyrite.

The core was halved, and samples were sent to Analabs, Burnie. A summary of assay results is below:

- Ni values were generally around background levels expected for an ultramafic (<2000ppm). Two zones returned:
 - 8m at 0.61% from 151.6m (including 2.4m at 1.44% Ni);
 - 10m at 0.34% from 188.5m.
- Zn values were very disappointing with a highest assay of 2.5m at 2200ppm in silicified metasiltstones, overlying the ultramafic unit.
- A highest Pb value of 1.7m at 1180ppm was returned.
- A highest Au assay of 2.1m at 51ppb was returned, with Pt and Pd generally below detection.
- Silicified chloritic metasiltstones above the altered ultramafic were elevated in Ba, averaging 62.25m at 1700ppm Ba.
- Cr assays in the ultramafic were generally <2000ppm with a highest assay of 340ppm Cr over 0.5m.

Samples from ZA1 were not assayed for Sulphur. The results were generally disappointing, with Ni generally only around background levels (<1500ppm Ni) expected for an ultramafic, and no significant base metal mineralisation intersected. It should be noted, however, that this hole was located some 800m to the west of the main Pb-Zn anomaly, which is associated with the eastern centre of the magnetic anomaly.

DD96ZA2

DD96ZA2 was drilled into the western part of the main Pb-Zn geochemical anomaly (355609E, 5357297N), associated with the eastern centre of the magnetic anomaly. The hole was oriented at 50° towards 360 (AMG) and was drilled to a depth of 255.5m.

Unlike ZA1, DD96ZA2 intersected bands of serpentinite and altered ultramafics within often highly silicified siltstone and mudstones. The first 60m of the hole were dominated by porphyritic volcanics, largely fine-grained andesites. Approximately 10m of intensely altered ultramafics were intersected below this, comprising 75% quartz, 10% chlorite and 4% carbonate. This particular unit returned the highest Ni values, and contained 3% niccolite, 3% gersdorffite and 2% chromite, among other trace sulphides. This was underlain by a tremolite-rich ultramafic containing minor sulphides. Below this the ultramafics were dominated by serpentinite, containing two 1m wide magnetite-rich bands (up to 40% magnetite), also associated with elevated Ni.

A second "band" of serpentinite and associated calc-silicate was intersected around 165m, enveloped by metamorphosed siltstone. The ultramafic rocks are interpreted to have originally been dunites or olivine-rich peridotites, and all samples sent for petrological analysis contained relict chromite.

The Crimson Creek Formation rocks have been metamorphosed to lower greenschist facies and are weakly deformed. The ultramafic rocks were probably serpentinitised at this stage and have undergone subsequent rodingitic / blackwall alteration near the contacts with the Crimson Creek Formation sedimentary rocks (Ashley 1997b).

Rocks from the Crimson Creek Formation are not significantly mineralised. The ultramafic rocks contain locally abundant magnetite (most likely to be the result of serpentinitisation). The presence of niccolite, gersdorffite and pyrrhotite in one sample sent for petrological analysis could be indicative of grades of up to several % Ni. Disseminated pyrite and sphalerite are also present.

Core from ZA2 was halved and sent for assay to Amdel Laboratories, Adelaide (following poor turnaround experienced through Analabs). Below is a summary of results received:

- Ni values were generally around background levels expected for an ultramafic (<2000ppm). A 3.85m zone returned 1.67% Ni on a weighted average basis, from 68.85m, including 1.15m at 1.83% Ni, 1.0m at 2.08% Ni and 1.7m at 0.70% Ni. Other elevated Ni assays included:
2.6m at 0.59% Ni from 90.5m;

2.3m at 0.89% Ni from 102.1m;
 1.4m at 0.56% Ni from 104.4m;
 2.2m at 0.57% Ni from 183.1m and
 1.1m at 0.98% Ni from 189.6m.

- Zn values were very disappointing with a highest assay of 1.15m at 9100ppm from 68.85m associated with the highest Ni values. Zn assays were generally less than 350ppm Zn.
- A highest Pb value of 1.15m at 2450ppm from 68.85m was returned, again from the zone returning the highest Ni assays. Pb values were generally less than 100ppm.
- Cr assays in the ultramafic were generally less than 1000ppm with highest assays of 1.15m at 1.27% Cr from 68.85m and 1.0m at 1.37% Cr from 70m. Again these results were returned from the zone containing the highest Ni values.
- Au, Pd and Pt values were generally negligible.

No significant base-metal mineralisation was intersected, apart from one zone associated with the highest Ni values. All samples were assayed for sulphur. Sample preparation for approximately half the samples (generally the mineralised ones) was carried out at Analabs Burnie, however all assays were carried out at Amdel Laboratories, Adelaide.

DD97ZA3

DD97ZA3 was drilled in the centre of the main geochemical anomaly (355790E, 5357060N). The hole was oriented at 50° towards 005 and was drilled to a depth of 256m.

The geology of the hole is illustrated in Figure 3. The top 30m comprise a weathered zone of ferruginous siltstone, overlying approximately 90m of chlorite altered volcanics, probably andesite. A 22m zone of calc-silicates and magnetite-rich serpentinites was intersected from 121m. Above and below this siltstones and mudstones (often banded), have been intensely silicified. Minor Ni mineralisation with the altered ultramafic unit generally occurs within the calc-silicates, close to the margins of the serpentinite.

A zone of intensely deformed meta-sedimentary rocks occurs below 240m and contains significant sulphide mineralisation and an associated elevated Cu response. Many of these sulphides appear to have been replaced, largely by pyrite, with some minor chalcopyrite evident.

Half drillcore was sent to Amdel Laboratories, Adelaide. Results are summarised below.

Best nickel results were recorded in a zone of altered ultramafic and included:

- 0.4m at 1.09% from 185.6m;
- 0.7m at 1.12% from 189.3m.

Insignificant lead and zinc assays were returned, with results generally below 200ppm Pb and 500ppm Zn. Best assays were 0.6m at 3650ppm Pb from 138.0m, and 0.55m at 6550ppm Zn from 137.45m (both assays from within chloritic metasediment). A 0.9m zone within highly deformed metasediments returned 0.295% Cu from 248.0m.

Discussion

The aim of the drilling programme was to test a discrete magnetic anomaly and associated geochemical anomaly located at Avebury, in order to identify a possible RTZ-CRA size skarn associated base-metal \pm gold orebody. The magnetic anomaly itself, appears to be associated with magnetite-rich layers from within an altered ultramafic. Drilling failed to intersect any significant lead-zinc mineralisation, associated with the geochemical anomaly, however some minor, though potentially significant nickel mineralisation was identified from within the ultramafics. Best Ni results were recorded from DD97ZA2 which returned 3.85m at 1.67% Ni from 68.85m (including 1.0m at 2.08% Ni).

The source of the magnetic anomaly at Avebury appears to be magnetite-rich layers from within an ultramafic. All three holes failed to intersect Gordon Limestone, however, such a target potentially exists at depth. On the other hand the Pb-Zn geochemical anomaly in the centre of the Avebury grid appears to be the result of surface enrichment due to the weathering of chloritic metasedimentary rocks.

The ultramafic body was seen to thicken from east to west, with the largest intersection occurring in ZA1 (and remaining unclosed at depth). Thinner ultramafic bands intersected in ZA2 and ZA3 may be sills associated with the main body. It would appear that the main ultramafic body underlies the western centre of the "dumbbell-shaped" magnetic anomaly. Petrological analysis indicated the presence of Ni bearing minerals such as millerite (NiS), gersdorffite (NiAsS) and niccolite (NiAs). The presence of minerals such as millerite with high Ni contents (64.67% Ni), could possibly indicate the presence of a potential low sulphide-bearing nickel deposit associated with the ultramafic units.

A similar style of mineralisation associated with an ultramafic body was the focus of exploration by CRAE during 1992 and 1993, at Trial Harbour. Serpentine development was seen as a key requirement in ultramafic bodies containing disseminated, low sulphur Ni mineralisation. At Trial Harbour, however the surface geochemical anomaly was found to be the result of surface enrichment of Ni in silicates, with no significant Ni-bearing sulphides.

Samples from DD96ZA2 and DD97ZA3 were assayed for sulphur, in order to determine whether or not anomalous nickel was contained within sulphides or within the silicate lattice of the ultramafic rocks. Elevated sulphur (and arsenic) accompanies the best Ni assays from ZA2 (2.15m at 1.95% Ni from 68.85m), indicating that Ni is contained within sulphides and/or arsenides. Sulphur assays from this zone returned 2.15m at 1.53% S from 68.85m). A simplistic approach in determining the amount of Ni present on a 100% sulphide basis (including arsenides), is to recalculate the amount of Ni present (in this case approximately 127.45%), and then estimate

the amount and type of sulphide present, and the amount of Ni each species holds (as not all S will be tied up with Ni).

Modal proportions of the sulphide species present, from a petrology sample taken at 70m were niccolite 3%, gersdorffite 3% and pyrrhotite 1%, with trace sphalerite, galena, chalcopyrite and pyrite. The approximate amounts of Ni contained within niccolite, gersdorffite and pyrrhotite are 43.92%, 35.42% and 0% respectively. Hence on a 100% sulphide basis the Ni content would be approximately 41.7% for this particular sample (representing an upper limit on the likely primary grade). This is obviously very high and is in no way representative of the ultramafic body as a whole (especially in view of the pyrite aggregates seen in ZA1 and in other samples from ZA2), however it does point to the potential of finding significant low-sulphur mineralisation in the Avebury area.

Other credits in a deposit of this nature could be Co and PGEs (Dave Andrews, pers. comm.). Pt and Pd values were generally insignificant in all three holes, while Co assays were generally less than 100ppm, with a highest assay of 1m at 1500ppm Co from 70m in ZA2.

The sulphide mineralisation intersected in ZA1, ZA2 and ZA3 is closely associated with high and indeed variable magnetite contents within the serpentinite (Rebek, 1997). These magnetite-rich zones appear to have been subjected to repeated mobilisation, and these re-mobilised zones perhaps offer the best targets for locating significant Ni-sulphide mineralisation. Such zones may be likely to occur near the margins, and at the contacts of the ultramafic body, and possibly further ground magnetic traverses would help in better defining these zones.

It is intended to carry out conductivity measurements on the mineralised drill core, in order to attempt to characterise these zones to assess the use of EM techniques as potential tools to locate further nickel mineralisation (Torbjorn von Strokirch, pers. comm.). At the time of writing such an analysis had not been undertaken, and its merits as a potential tool for defining further drill targets in the Avebury area will be the subject of a later memo.

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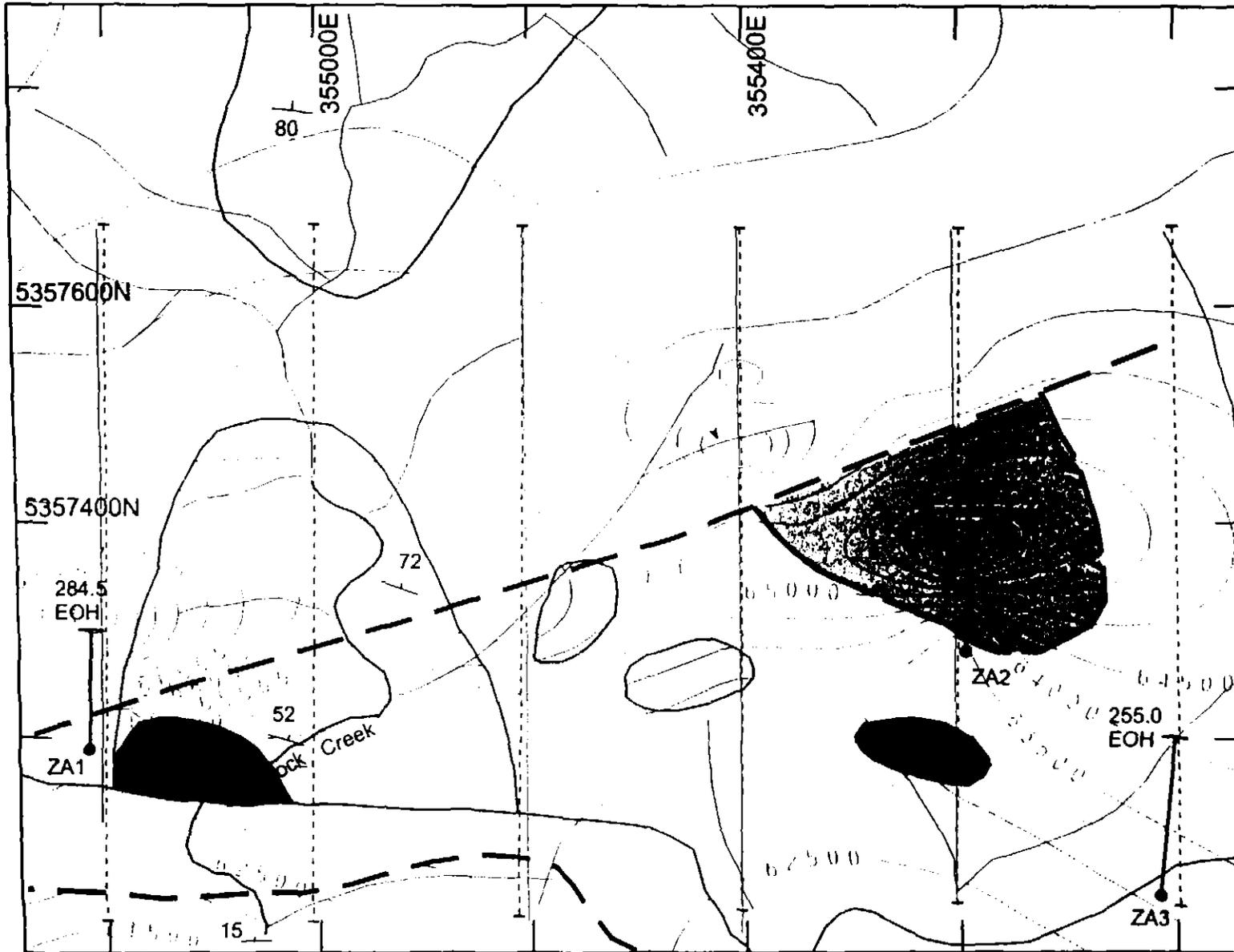
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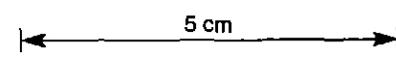
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Arbury Prospect West Drillhole Locations And Aeromagnetic Contours

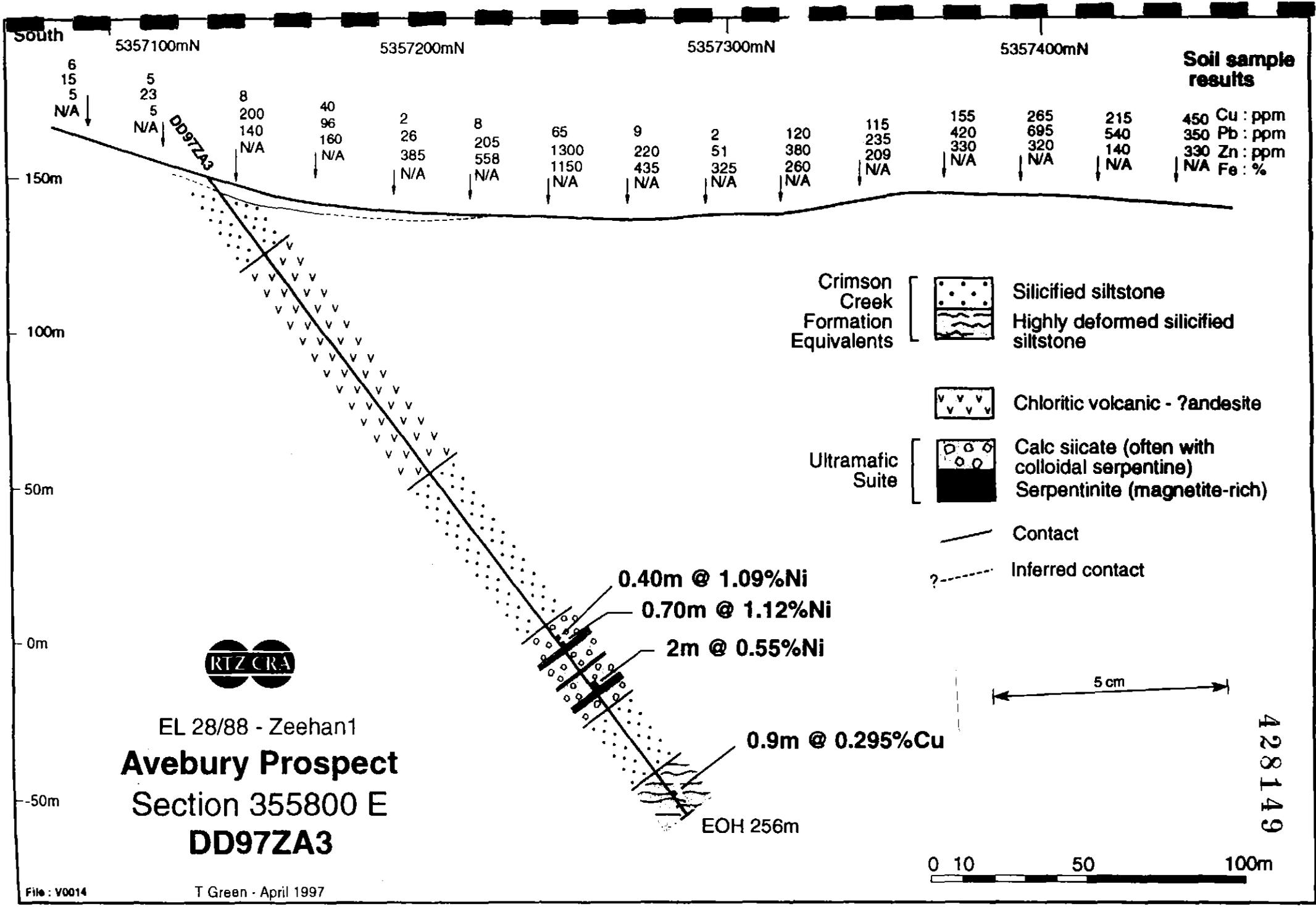


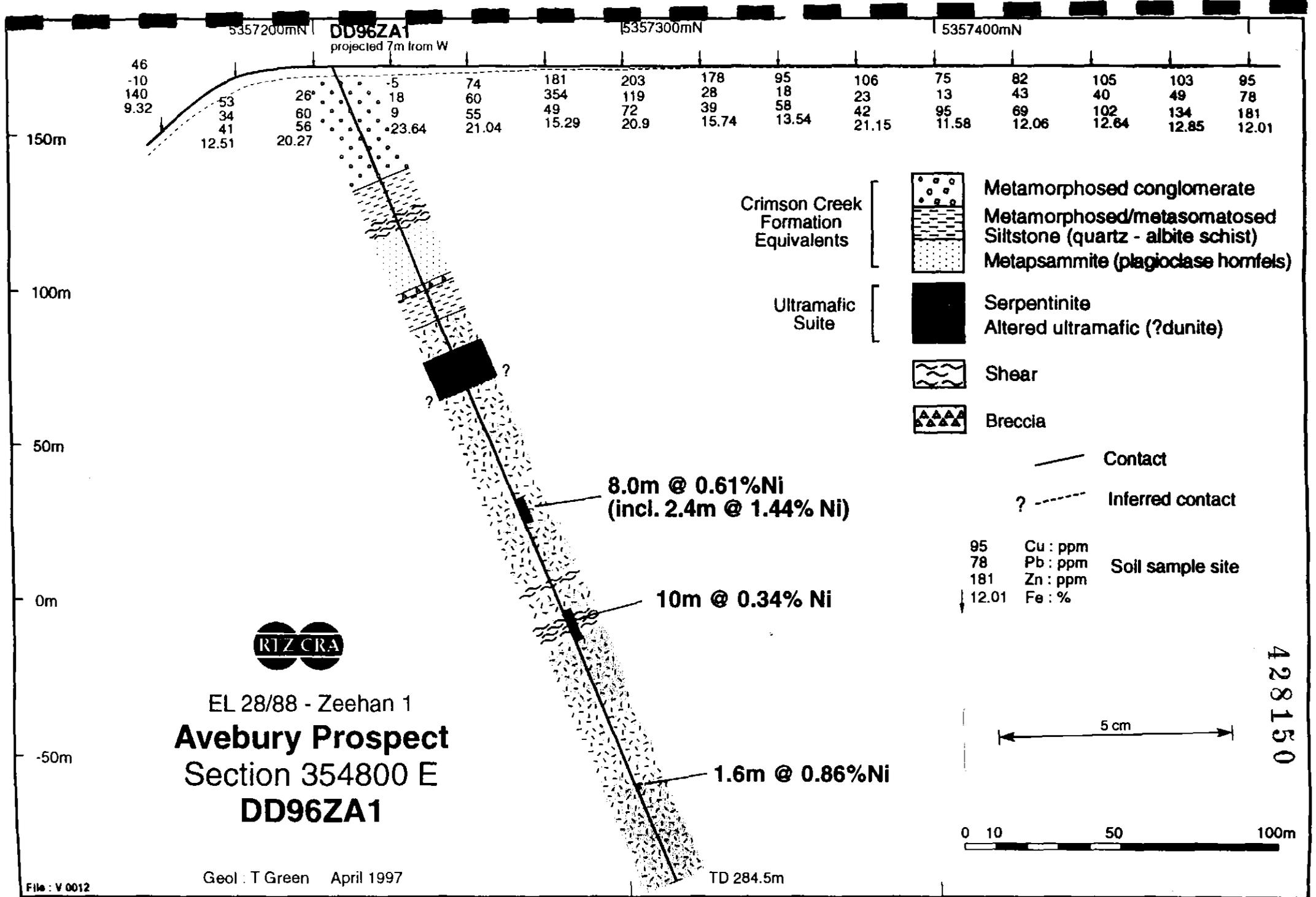
- DEVONIAN**
-  Massive quartz
 -  Laminated siltstone
 -  Siltstone, pebble conglomerates chert
- CAMBRIAN**
-  Serpentinite
- PRE CAMBRIAN**
-  Vesicular lavas siltstone, quartz
-  Low angle thrust
-  Bedding right way up



Tnc/NW 4-2-87 T0028.cdr

428148



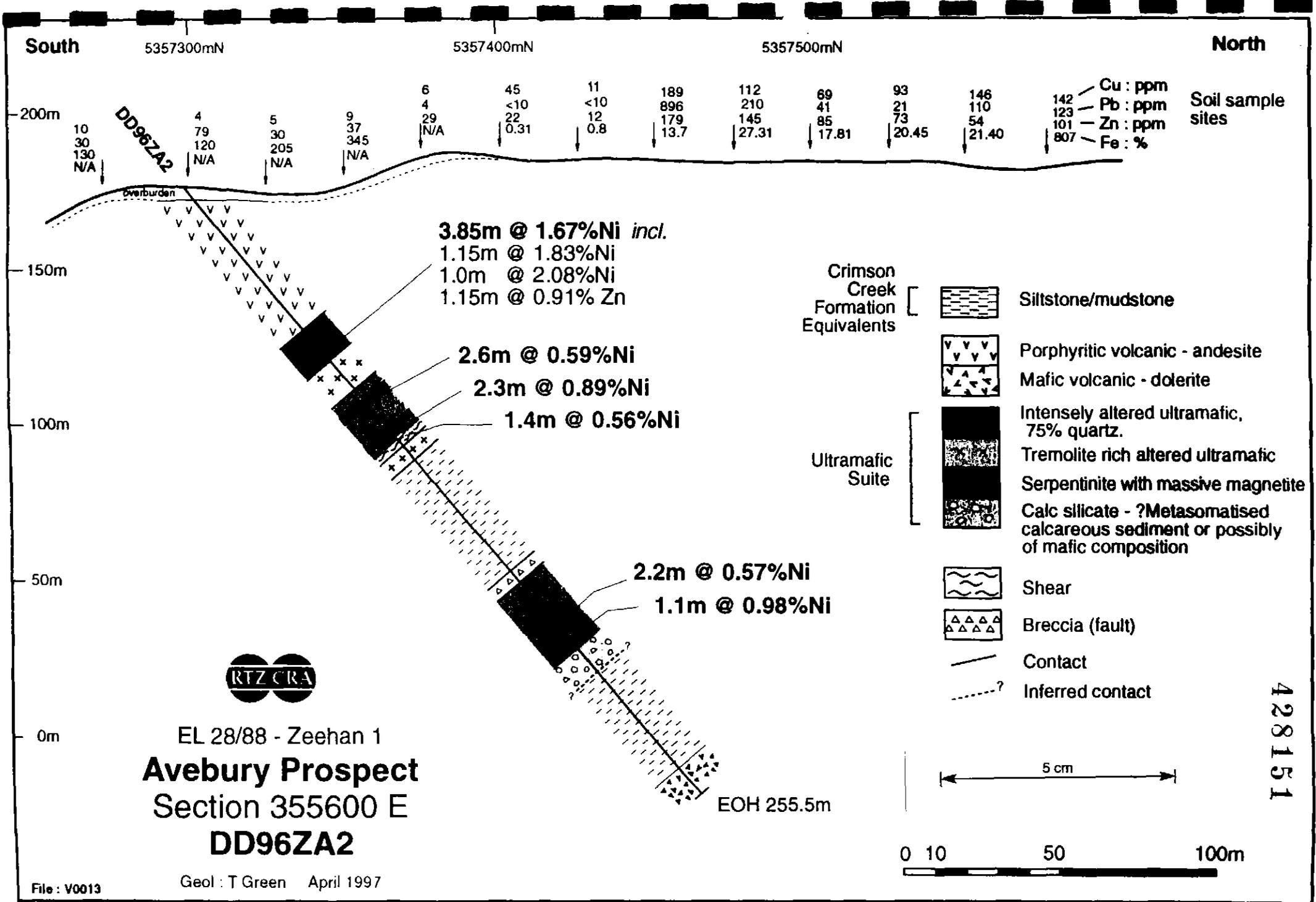


RTZ CRA
 EL 28/88 - Zeehan 1
Avebury Prospect
 Section 354800 E
DD96ZA1

Geol: T Green April 1997

TD 284.5m

428150





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1 Balfour
2 Zeehan
3 RTR mines

MEMORANDUM

428152

Date: 5 March 1997

Memorandum to: Tim McConachy

Copy to: Kevin Tuckwell
Torbjorn von Strokirch
Graeme Broadbent
Tim Green
Simon Tear

From: Jacob Rebek

Azbury

Diamond holes ZA1, ZA2 and ZA3 have re-opened *the issue of nickel-copper sulphide search* in serpentinites and other ultramafic - mafic rocks in Tasmania.

The original nickel-copper sulphide initiative was based on a visit to Honeymoon Well in about 1992. When they saw how excited the West Australian nickel specialists get when they see a bit of sulphide, geologists familiar with Tasmania thought that assessment of known nickel-copper sulphide occurrences like Melba Flat, Hazelwood or Trial Harbour may be a simple and inexpensive way to find a new nickel-copper sulphide ore body.

The specialists did not show much interest in the Tasmanian nickel-copper sulphide occurrences; they saw them as too small, too much shearing, not in the most favourable rock type, not in a favourable geotectonic setting.

It was interesting to hear that the specialists now consider the famous komatiite hosted sulphide occurrences of Yilgarn to be too small, with too much shearing, not in a geotectonic setting for Rio Tinto size ore bodies.

The key point emphasised at the recent Alice Springs nickel-copper sulphide workshop was the nickel and copper content of sulphides; if on 100% sulphide basis the nickel content is only 1%, that is the upper limit on the likely primary grade. Even the famous Voisey Bay Ovoid Zone only carries 4% Ni on 100% sulphide basin.

By remobilisation nickel and copper sulphides may be able to segregate from pyrrhotite, however the specialists we met at Alice Springs seem to stick to the primary magnetic model; they may think that subsequent remobilisations and modifications somehow "spoil" the original (=primary magmatic) mineralisation; they were not willing to discuss effects of remobilisation and modification.

The sulphide mineralisation intersected in ZA1, ZA2 and ZA3 seems to be related to intrusive bodies of serpentinite characterised by high and variable *magnetite* content which probably explains the bulk of the *magnetic target*.

The magnetite is clearly visible in the serpentinite; there are indications of repeated mobility of magnetite precursor; in black serpentinite magnetite is relatively evenly distributed; by successive remobilisations in certain parts of the serpentinite mass (which are characterised by more pale colours, ranging to very pale) the magnetite precursor was concentrated into magnetite rich masses with irregular outlines; even though one is almost certainly dealing with "alteration" of serpentinite and "remobilisation" of magnetite precursors, the texture of the altered remobilised masses is still magmatic, with globules of magnetite mixed with globules (often amoeba shaped) of paler serpentine in matrix of darker serpentine or other silicate, giving it a "mottled" appearance.

Toward the contact with Cambrian fine grained sediments the degree of remobilisation of magnetite precursors and the "mottling" in serpentinite increases. Near the contact the colour of serpentinite is not much different from the colour of the sediment.

The sediment is softened and chaotically ("soft sediment style") disrupted and brecciated, with dykes of the order of 1 to 30m of serpentinite injected far into the sediment; "mini-dykes" (1mm to 10cm wide) of greenish silicate material occur in brecciated Cambrian sediment in the contact zone but they may not be directly derived from serpentinite.

Both the serpentinite and the Cambrian sediment look quite messy for tens of metres from the contact but there is some predictability.

The most visually apparent example of remobilised irregular masses with 10 to 50% of magnetite occurs in ZA3 between 205 and 208.5m, within what may be a dyke or projection of serpentinite which starts at 118 and ends at 210m; this serpentinite is quite pale and mostly non-magnetic based on hand magnet (the magnetic susceptibility log is still being prepared and will be a very useful source of information on remobilisation of magnetite and alteration).

One of the most visually apparent sulphide concentrations occurs in immediate vicinity of this irregular magnetite rich mass, for example in massive pale serpentine devoid of magnetite just a few centimetres away from the sharp contact with a magnetite rich mass at about 205m. There are other intriguing colloform banded sulphidic zones around 194m and between 188 and 190m, in the same body of altered serpentinite.

It would appear that alteration of serpentinite and remobilisation of magnetite is accompanied by remobilisation of sulphides.

By comparison (and by contrast) in the dark to black serpentinite in hole ZA1, say around 155m (with assays of 0.38, 1.44 and 0.3% Ni over intervals of 1.7m, 2.4m and 2.0m respectively - with an amazingly low 10ppm Cu), magnetite seems to be still relatively evenly dispersed throughout and even the sulphides only show very modest degree of remobilisation into strings of immiscible small globules with a vague sense of direction of the flow of "the soup".

There are other sulphidic globule concentrations at 113.8m, at 185m (3m x 0.67% Ni), from 198.8 to 203.5m (0.4 to 0.5% Ni) and at 247m (1.6m x 0.86% Ni).

Detailed studies of sulphidic intervals are required to get at least enough estimates of the nickel content on 100% sulphide basis, and relative amounts of nickel tied up in serpentinite and in sulphides, the sulphide species; correlation between the sulphide content and the magnetic susceptibility log, and correlation between colour/mottling in serpentinite and sulphide content.

Due to segregation during remobilisations the earlier sulphidic concentrations in black serpentinite are likely to be of roughly the same composition; the greater the number of remobilisations the more variable the composition of sulphide intersections on 100% sulphide basis is likely to be. The same may be the case with alteration.

One of the most remobilised and altered sulphidic intersections may be that in the intensely disrupted and brecciated Cambrian sediment from 247.8 to 248.9m and 252.5 to 254.3m in hole ZA3, where a variety of sulphides including chalcopyrite are concentrated in the matrix of the breccia.

The sulphides remobilised across the contact in to the sediment may represent an interesting target (like at Sudbury).

Tim's logging was very helpful in the attempts to come to terms with somewhat unfamiliar and complex geology of the ZA1, ZA2, ZA3 area. In addition to features mentioned above, he pointed out many other features of interest, for example an increase in degree of "soft sediment style" disruption and brecciation due to mass mobility of the Cambrian sediment pile down the hole in ZA3; with a change to a finer grained to aphanitic (=00ZY) sediment at about 119m, the degree and complexity of disruption increases and reaches its maximum from 247m onward, including two intervals with relatively good sulphide concentrations discussed above.

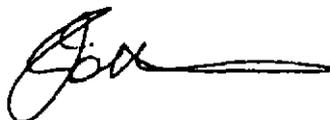
There are many geological issues related to nickel and copper sulphides (plus sphalerite) concentration and remobilisation to be studied before one can make conclusions about the potential.

While the mineralisation may not meet the expectations based on rigid nickel-copper sulphide models like Kambalda, Mt Keith - Honeymoon Well, Voisey Bay, Sudbury, Norilsk - Talmalch, the nickel content on 100% sulphide basis may be very high and remobilised sulphidic masses may become predictable with better understanding of local geological setting and processes.

Nickel specialists would probably downgrade the prospect because they do not understand the capability of processes of successive remobilisations into "structurally" controlled positions and the structural specialists would probably get frightened off by the complexity of chaotic disruption, and brecciation such as seen in holes ZA1, ZA2 and ZA3 (including "intraformational conglomerates" - ie. Breccias which have been reworked so that fragments become rounded - in the top of hole ZA1).

The field team will have to create their own 3D geological ore body concepts; the three drill holes provide a great basis for the studies of nickel sulphide potential of the West Coast of Tasmania.

Regards



for Jacob Rebek

PS: Core from diamond holes drilled at Tenth Legion prospect north-west of ~~Av~~^Wbury may be interesting because it intersected magnetite-sulphide concentration on-off sediment style disruption and brecciation zones; some high zinc values were obtained. Trial Harbour core from serpentinite would be interesting for comparison also.



CRA EXPLORATION PTY. LIMITED A.C.N. 000 057 125

New South Wales District - Eastern Region

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Orange, NSW, 2800

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MEMORANDUM

To: T McConachy

From: T Doe

Date: 4 June, 1996

Subject: Modelling of Avebury Aeromagnetic Anomaly

- Zeehan 1

Summary The aeromagnetic contour plan over the Avebury prospect some 7 km SW of Zeehan, Tasmania shows an elongate, twin-centred, E-W striking + 5000nT anomaly

The anomaly has been modelled using data along two lines using the Geosoft Inversion programme.

A strongly magnetic source 1 km long buried between 30 and 100m and dipping steeply south is indicated.

The width of the source is uncertain but probably less than 100m or so.

In the absence of remanence magnetic susceptibilities in excess of $30\,000 \cdot 10^{-5}$ SI are expected.

Such values equate to 10% or so magnetite content.

The geological explanation for the anomaly is speculative but banded-iron formations and magnetite quartzites match the geophysical character.

Jim 11/6
Copy to Sarah Russell
Simon Tear
+ note

Details The CRAE 1995 helicopter airborne magnetic survey shows a very strong +5000nT magnetic anomaly some 7 km SW of Zeehan.

Inspection of the contour diagram (Plan Tv 1061) shows the anomaly is elongate in an east-west direction, has a length of over 1km and has two main centres.

The geosoft magnetic inversion programme was used to model the profiles on lines 10870 and 10770 which pass over the western and eastern centres respectively.

The strike limited tabular option (tabular 2) was chosen as being the most appropriate model.

The inversion assumes that the causative body is a uniformly magnetised, magnetically homogeneous parallelepiped with horizontal upper and lower surfaces. Remanence was assumed to be nil.

Plans Tv 1062 and Tv 1063 show the results. The fits are considered good.

Results are tabulated on Table 1.

Experimentation with other inversion options (ie tabular and ribbon) yielded only unimportant variations in modelled parameters.

Discussion In the absence of remanence the Avebury aeromagnetic anomaly is interpreted as being caused by a source that is:

- strongly magnetic
- buried between 30m and 100m
- 1km or so long
- less than 100m wide
- dipping steeply southwards
- variable in width
 - and/or depth
 - and/or magnetic susceptibility

Geologically it could be a magnetite quartzite or a banded iron unit.

In the presence of remanence:

- magnetite content could be lower
- a pyrrhotitic source becomes a possibility
- dip and location could be different
- depth and (horizontal) width remain unchanged.

Geologically then, in this case, it could be an extensive sulphides system with, if ore minerals are present, a CRA size potential.

Now Plan Tv 443 indicates that , in the past, a grid was established over the anomaly.

Plan Tv 761, however, indicates that no drilling has been done here.

The economic significance of the magnetic anomaly appears, then, to be untested

Drillholes to test the source could be designed just using inversion models derived from the aeromagnetic data.

A single line of ground magnetics along each planned drill section should be considered before drilling begins as a check.

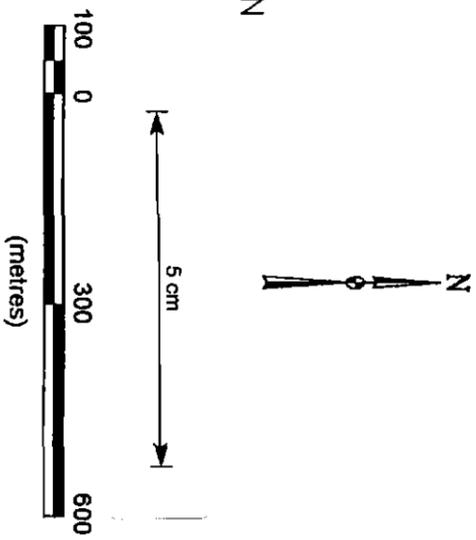
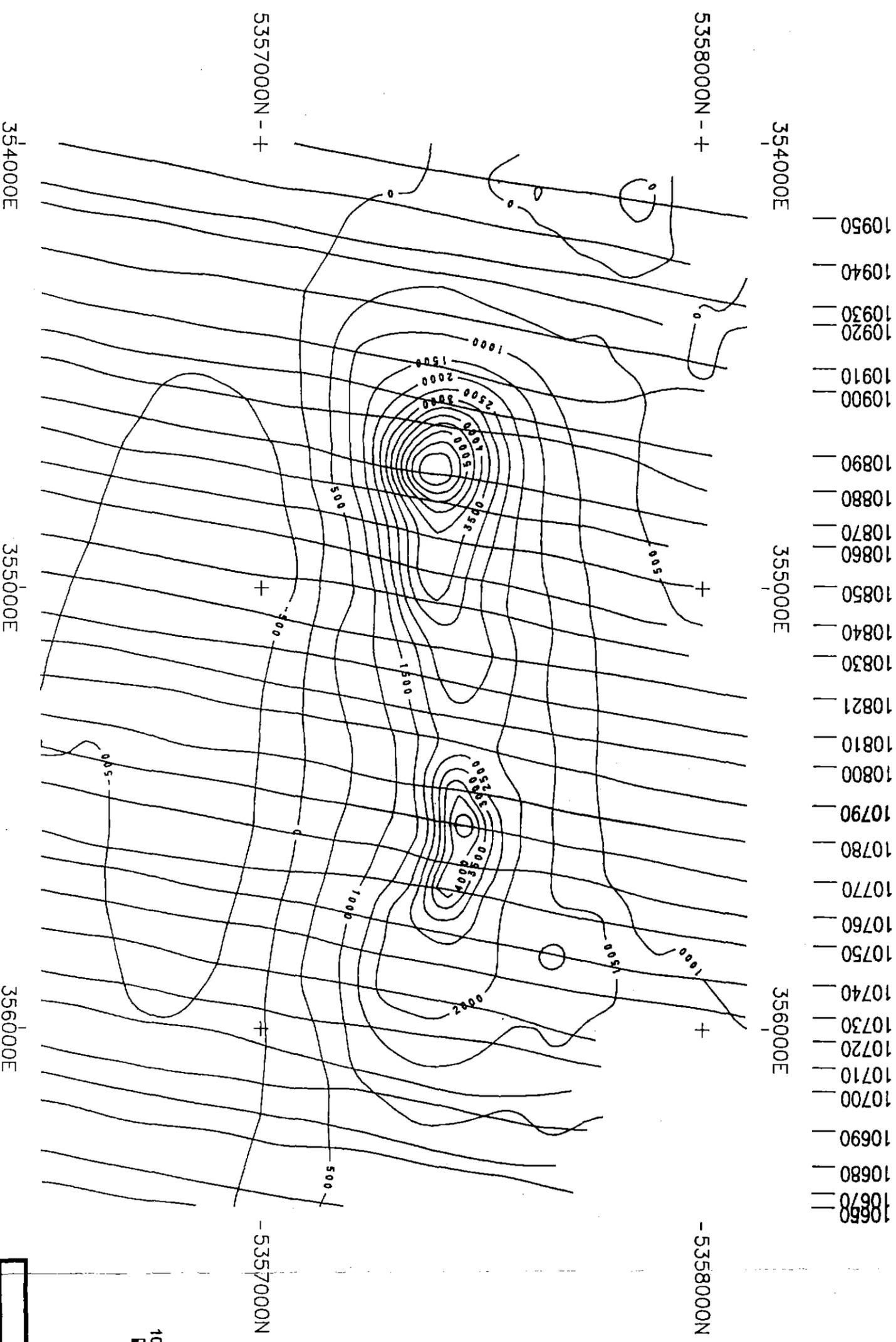
Magnetic susceptibility measurements would need to be taken to determine whether or not the drill test was adequate.

Regards

Tony Doe

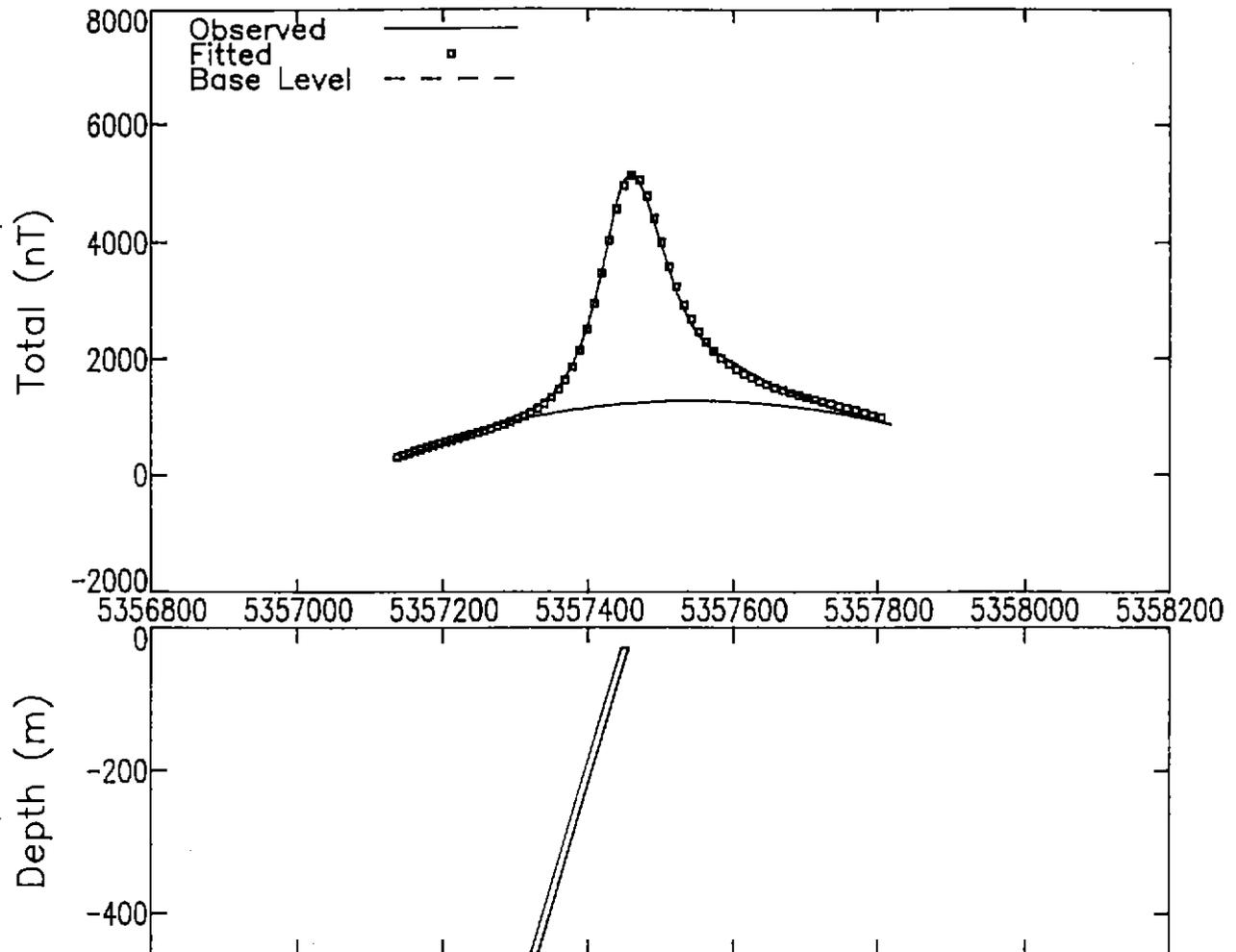
Table 1 - Modelled Results

| Anomaly Name | Avebury | |
|----------------------|--------------------------|--------------------------|
| | Western | Eastern |
| Centre | | |
| Line# | 10870 | 10770 |
| Strike | set 80° AMG | set 90° AMG |
| Length | set 400m | set 200m |
| Position of centre | 354 740 E 5 357 375 N | 355 540 E 5 357 450 N |
| Depth | 98m | 30m |
| Depth extent | large | large |
| Width | <100m | <70m |
| Dip | 72°S | 74° S |
| Susceptibility.width | 130 SI.m | 30 SI m |
| Remanence | set nil | set nil |



CRA EXPLORATION PTY LIMITED
 EL28/88 ZEEHAN 1
 Avebury Aeromagnetic Anomaly
 AEROMAGNETIC CONTOURS

| | |
|-----------------|--------------------------|
| Author: T. Doe | Ref.: SK55-05 Queensland |
| Drawn: T. Doe | File Name: |
| Date: May 1998 | Report No.: |
| Scale: 1:10 000 | Plan No.: T/1081 |



MODEL PARAMETERS:

| | | |
|----------------|---|----------------------------|
| Model Type | | Tabular2 |
| Depth | F | 30.4 m |
| Half Width | X | 5.00 m |
| Half Length | X | 100 m |
| Offset | X | 0 m |
| Dip | F | 106 deg |
| Thickness | X | 5000 m |
| Susceptibility | F | 0.239 emu |
| Remnance Ratio | X | 0 |
| Remnance Incl | X | 0 deg |
| Remnance Decl | X | 0 deg |
| Main Position | F | 5357450 m |
| Cross Position | X | 355538.7 m |
| Base Level | F | 1200.523 nT |
| Base Slope | F | 1.015814 nT/m |
| Base Curvature | X | -0.00534 nT/m ² |

(F-fitted, X-fixed, L-limit)

GEOMAGNETIC FIELD:

| | |
|----------------|----------|
| Field Strength | 63000 nT |
| Inclination | -72 deg |
| Declination | 12 deg |

COORDINATES:

| | |
|-----------------|--------|
| Sensor Height | 30 m |
| Strike Perp | 0 deg |
| Line Direction | 10 deg |
| Main Direction | 0 deg |
| Main Offset | |
| Cross Direction | 90 deg |
| Cross Offset | |

CRA EXPLORATION PTY. LIMITED

EL28/88 ZEEHAN 1
Avebury Aeromagnetic Anomaly

MAGMOD INVERSION ON LINE 10770
assuming a 2D tabular source

Author: T. Doe

Ref.: SK55-05 Queenstown

Drawn: T. Doe

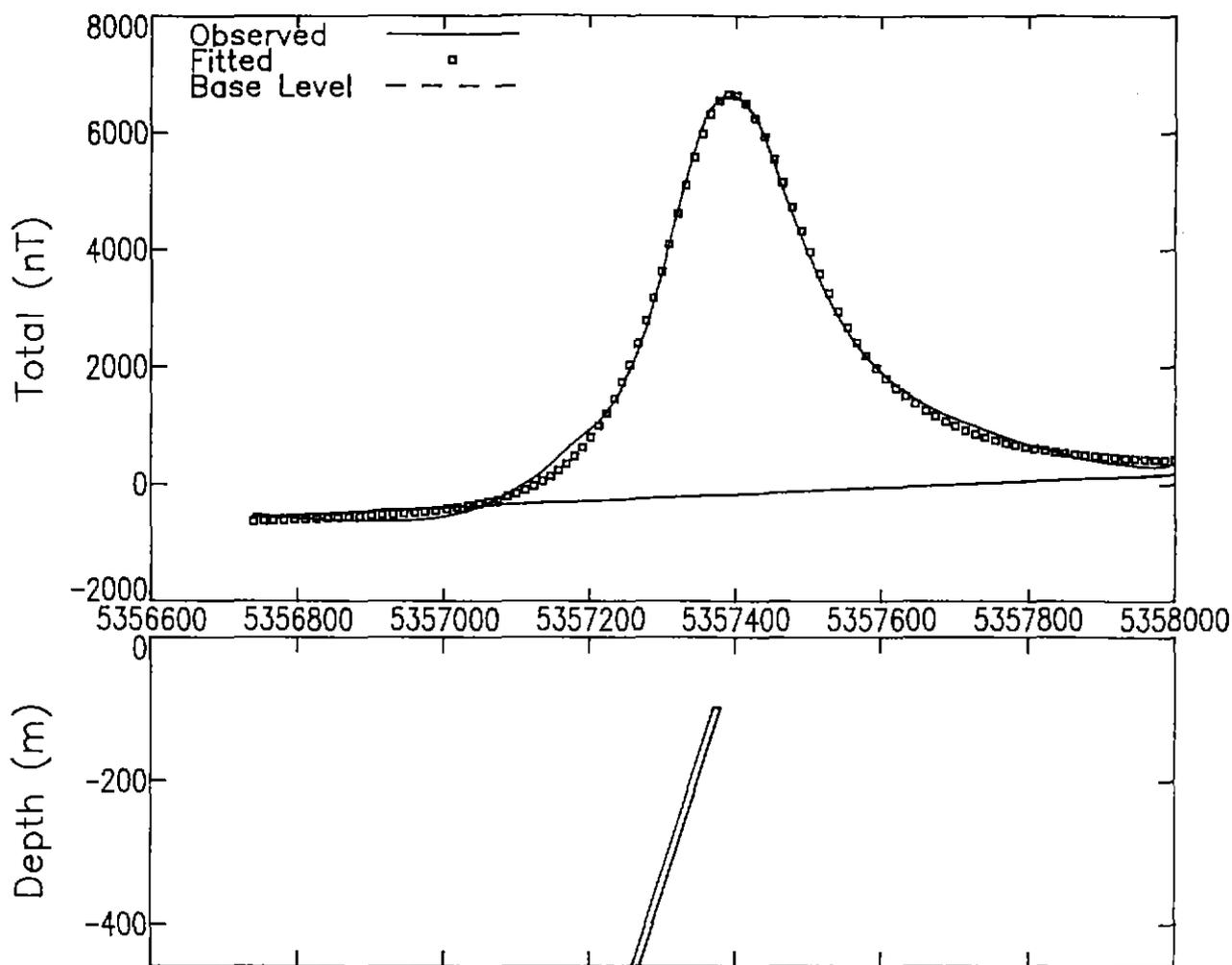
File Name:

Date: May 1996

Report No.:

Scale:

Plan No.: Tv1063



MODEL PARAMETERS:

| | | |
|----------------|---|---------------------|
| Model Type | | Tabular2 |
| Depth | F | 98.1 m |
| Half Width | X | 5.00 m |
| Half Length | X | 200 m |
| Offset | X | 0 m |
| Dip | F | 108 deg |
| Thickness | X | 5000 m |
| Susceptibility | F | 0.901 emu |
| Remnance Ratio | X | 0 |
| Remnance Incl | X | 0 deg |
| Remnance Decl | X | 0 deg |
| Main Position | F | 5357375 m |
| Cross Position | X | 354738.9 m |
| Base Level | F | -193.5465 nT |
| Base Slope | F | .5653281 nT/m |
| Base Curvature | X | 0 nT/m ² |

(F-fitted, X-fixed, L-limit)

GEOMAGNETIC FIELD:

| | |
|----------------|----------|
| Field Strength | 63000 nT |
| Inclination | -72 deg |
| Declination | 12 deg |

COORDINATES:

| | |
|-----------------|---------|
| Sensor Height | 30 m |
| Strike Perp | 350 deg |
| Line Direction | 11 deg |
| Main Direction | 0 deg |
| Main Offset | |
| Cross Direction | 90 deg |
| Cross Offset | |

CRA EXPLORATION PTY. LIMITED

EL28/88 ZEEHAN 1
Avebury Aeromagnetic Anomaly

MAGMOD INVERSION ON LINE 10870
assuming a 2D tabular source

Author: T. Doe

Ref.: SK55-05 Queenstown

Drawn: T. Doe

File Name:

Date: May 1996

Report No.:

Scale:

Plan No.: Tv1062



CRA Exploration Pty. Limited

ACN 000 057 125

Eastern Region

Internal Memorandum

To: Tim McConachy
From: Torbjorn von Strokirch
Date: 11 December 1996

Avebury Prospect Drilling

Drilling is planned for the magnetic anomaly at the Avebury prospect. The anomaly appears to be made up of two bodies end to end. Four sites have been selected to give two scissors of the two main magnetic zones.

Proposed Avebury Drill Holes

| Drillhole | Easting | Northing | Azimuth | Dip | Depth | |
|-----------|---------|----------|---------|-----|-------|--------------------|
| T | 354800 | 5357225 | 0 | 65 | 350 | |
| U | 354800 | 5357450 | 180 | 60 | 350 | — 354793E 5357206N |
| V | 355600 | 5357300 | 0 | 50 | 350 | |
| W | 355600 | 5357475 | 180 | 50 | 350 | |

New Coordinates

All coordinates refer to local grid
 Depths are based on two holes being drilled

The plan is to drill at site T first. If hole T intersects a magnetic body dipping in the modelled direction then V will be the next hole.

If T does not intersect any significantly magnetic source then we will scissor the magnetic anomaly with a hole sited at U.

Because of the imprecise nature of the exercise we are remaining flexible. The number of holes and number of metres drilled will depend in part on the results and stratigraphy intersected in the first hole. Only one pad has been cut to minimise environmental disturbance though all sites have been inspected by a government inspector.

Schematic sections are attached.

Torbjorn

Appendix 5

Environmental Data



Eastern Region

Internal Memorandum

To: Tim Green Andrew Nisbet
Brett Thomas Max Harvey

Copy: Tim McConachy *Tim*

From: Torbjorn von Strokirch

Date: 17 January 1997

→ File Archiving
(Tim)
zeeman 1

Handling Chrysotile Asbestos

Chrysotile asbestos was logged in DD96ZA1. As you can read in the accompanying note from Honeymoon Well, chrysotile is of the serpentine family which is less dangerous to the health than asbestos of the amphibole family. Notwithstanding this, CRAE's Honeymoon Well project team take considerable steps to ensure that individuals are protected against any possible harmful effects of asbestos.

I have been informed that dangers at Honeymoon Well are considered small, core is laid out in the open and tests have never given any indication of excess fibres. The main issue is considered to be with core cutting when it is critical to keep all core and areas where sludge may be accumulating wet. All sludge should be disposed of and everything should be cleaned thoroughly.

The main thing is to ensure that all efforts are made to avoid inhaling asbestos and the best way at this stage is by following the Honeymoon Well guidelines.

Torbjorn von Strokirch

428166

CRA EXPLORATION PTY LIMITED

Australian Company Number 000 057 125



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FACSIMILE TRANSMISSION

Date: 17 January 1997
To: Jim Knox - Bundoora
Fax Number: (03) 92301177
From: Steve Lawrence
Copy: NA Ref: F028SDL97
Number of Pages: 5 (inclusive of cover page) File: 1.2
Subject: Asbestos

Jim

Please find attached the information from the Honeymoon Well Induction Manual regarding asbestos.

If I locate more detailed information I will advise.

Cheers,

A handwritten signature in cursive script that reads 'Steve Lawrence'.

Steve Lawrence
Superintendent Administration
Southern District

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ASBESTOS ON SITE

Introduction

The only form of asbestos recognised to date at HMW is chrysotile and that this only occurs in very small amounts in a relatively small portion of the core that is drilled. However, as the chrysotile is difficult to identify, all core and RC samples must be handled as if they contain asbestos.

General Information

Asbestos is a general term which applies to a range of minerals in two particular mineral groups, i.e. the Serpentine and Amphibole Groups.

Asbestos minerals can be easily separated into very thin, long fibres which are strong and heat resistant. These properties have enabled asbestos to be used in a wide range of industrial applications such as insulation, asbestos cement products and brake linings in vehicles.

While it is not important to know the technical differences between the two forms of these minerals it is important to realise the health risks of asbestiform minerals are far greater than those for the minerals in the massive form.

Amphibole and Serpentine minerals are commonly found throughout the world and are major components of the rocks found in the gold and nickel areas of Western Australia. Fortunately only under rare circumstances are these minerals found to be asbestiform as they are usually found in the far less hazardous massive form.

When the minerals are found in the asbestiform habit it is often in very thin veinlets which are so small that they go unnoticed. The main types of asbestos minerals found in gold and nickel mines in Western Australia are

Chrysotile (white asbestos)

Actinolite

Anthophyllite

Tremolite

It is extremely unlikely that crocidolite (blue asbestos) or amosite (brown asbestos) will be found in the gold and nickel deposits.

It is extremely unlikely that crocidolite (blue asbestos) or amosite (brown asbestos) will be found in the gold and nickel deposits.

Chrysotile is part of the Serpentine Group of minerals whereas actinolite, anthophyllite and tremolite are in the Amphibole Group. This distinction is very important when considering health affects because amphibole asbestos is significantly more potent than serpentine asbestos in the induction of cancer.

Asbestos can only become a hazard if very small fibres which are too small to see are broken from the mineral dry out and are released into the air and then breathed into the lungs by the worker. Asbestos minerals do not easily give off fibres. The mineral must be crushed or pulled apart to release the fibres.

Therefore the safest way to treat asbestos-containing material is to keep it wet and dispose of it or enclose it before it dries out. The following work place guidelines should keep the potential hazard well below acceptable levels.

Worksafe Australia has set a number of limits for asbestos fibres breathed in from the air on a working shift. The HMW Site has concentrations well below these limits and a policy to maintain a very low level of exposure to employees. Asbestos testing reports are available in the office for personnel to view if they wish.

The exposure standards are designed so that no measurable health affects will be seen in workers who spend their entire life breathing air contaminated by the number of fibres set by Worksafe Exposure Standard and these Australian Standards are the strictest in the world.

The three main affects of inhaling asbestos fibres are;

Asbestosis which is a scarring of the lung tissue. This disease may occur 5 to 15 years after exposure to excessive airborne asbestos fibre.

Lung Cancer which may occur after 20 or more years of occupational exposure to excessive asbestos fibre concentration. Cigarette smoking greatly increases the risk of contracting lung cancer by people with heavy exposure to airborne asbestos fibres.

Mesthelioma which is cancer of the lining of the chest cavity. This disease may occur between 15 and 50 years after the first exposure to excessive levels of airborne asbestos fibres.

Safe Working Requirements For Asbestos On Site

Core Cutting Facility

- Respirators of class M and safety glasses or other approved Personnel Protective Equipment should be worn at all times by personnel cutting drill core.
- Disposable overalls when used should be placed in the appropriate bin clearly marked Asbestos, which should have a lid, and these should be buried in the designated waste disposal area clearly marked.
- If ordinary working clothes are used to cut core they should be laundered at the core cutting laundry before bringing them back to camp.
- Personnel cutting core should make arrangements to have their lunches delivered to the lunch room and will shower there prior to returning to camp of an evening or to perform other tasks outside the core cutting facilities.
- The core cutting shed should be thoroughly washed out and the waste bins emptied at the end of each day's work

Precollar/RC Sampling and Logging

- Geologists and/or field assistants who get their boots or hands and arms soiled with drill spoil should wash them at the core cutting shed prior to coming back to the office and/or mess.

Core Shed

- All personnel sweeping the shed floor or handling core trays inside the core shed should wear dust masks unless air monitoring indicates that this is no longer required.

Drilling Operations

When RC drilling, samples below 40m should be drilled wet to minimise dust (chrysolite is unlikely to occur above 40m).

Any drill spoil from the RC precollar not put into sample bags should be shovelled into the sump before it dries out.

When coring, all drill cuttings must go into the sump. They should be shovelled out of the channel and left in the sump to be buried at a later date. If a sump is full of cuttings you should request a new sump be dug as soon as possible to contain all spillage.

Clothes and boots that have been contaminated with possibly asbestos-containing material should be washed either at the drill site or at the driller's ablution area before returning to the accommodation or messing areas. A boot washer has been placed outside the ablution block for this purpose.

Other Drilling Guidelines

Precollar samples should be placed well away from any wet areas in rows of 10 or 20 samples. There should be a 50cm gap between every second row to allow easy access for sampling and logging.

Full core trays should be placed in an area that is easily accessible to the geologist's vehicle and in such a position that they don't have to create a new track to get to them.

When filling in your drill plod make note of things like the depth of 50mm PVC casing to the hole, lost circulation zones, etc.

Any person interested in further information should speak to Wayne Wright or one of the geologists on site.

Results from annual monitoring completed by independent external consultants are held on site and are available for reading.

Additional reports on asbestos, its distribution throughout Western Australia and the long term effects on health are available from the Site Manager.

Drill Site Environment Monitoring Sheet

Drilling

Hole No: DD962A1

Water Delivery: N/A Carted Piped or pumped

Water Source: Dam River/Creek Reticulated Bore Shaft 428172

Ground Water: Dry Wet Flowing whilst drilling: Flowing when completed:

First water at (m): Water table at (m):

Ground Water Quality: Fresh Brackish Salty Very salty Unknown

Analysed: Yes No Details: DPO:

Minimization Measures: Biodegradable drill fluids Duck boards Bunds Ground sheets

Comments:
 (including sump checks and fuel storage)

Rehabilitation

Hole backfilled: Yes No Backfilled with: Depth (m):

Hole plugged: Yes No Plug type: Depth (m):

Hole capped: Yes No Cap type: Depth (cms):

Hole sealed if flowing: N/A Yes No Details:

| | N/A | Waste / Sludge removed | Landform restored | Topsoil replaced | Site ripped | Revegetated |
|---------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Access Track: | <input type="checkbox"/> |
| Drill pad | <input type="checkbox"/> |
| Sump/s | <input type="checkbox"/> |

Details of Revegetation:

| Date | Species | Details (seed/seedlings, quantity etc) |
|------|---------|--|
| | | |

Comments:

Post Drilling Monitoring & Photography

| Date | Comments (include weed control) | Recorded by |
|-----------|---------------------------------|-------------|
| 1 month: | | |
| 6 month: | | |
| 12 month: | | |

Sign Off & Approvals

Geotech. or Rehab. Officer:..... Date:.....

Responsible Geologist:..... Date:.....

Landowner:..... Date:.....



Drill Site Environment Monitoring Sheet

Drill Hole & Site Details

Hole No: DD967A2

Location: Tasmania Proposal No: 4196
Avelbury
20010
(1997) AMG North: 5357297
AMG Zone: 55

EL No. & Name: 28/98 ZEEHAN 1
AMG East: 355609 R.L.:
Mapsheet/s: 1:25000 TRIAL

Landowner:

Property:

Tenure: Freehold Leasehold Crown Land Other:

Topography: Flat Undulating Steep Very Steep

Vegetation: None Grassland Scrub Open Forest Dense Forest

Land Use: Grazing Cropping Forestry Mining Road/rail
 Recreation Residential Wilderness Heritage Conservation

Existing Disturbance Ref. to Environs: Undisturbed Minor Moderate Very disturbed

Soil Description: Soil pH: Soil salinity: Topsoil depth:

Photo taken: BT Date: 7/1/97 Ref. Point: Mid of pad looking SW
Bearing to Ref. Point: Distance:

Comments: Helicopter Support Rig.

Notifications & Approvals Prior to Drilling

Department of Industry, Safety and Mines Notification Date: 18/11/96 Reference:
Landowner Access Arrangement Date: Valid till:
Government Authority Approval Date: 27/11/96

Land Tenure Check List

Exempted areas: Yes N/A Reserved Land: Yes N/A State Forest: Yes N/A
Aboriginal culture / relics: Yes N/A Sensitive areas: Yes N/A Water licence: Yes N/A
Endangered species: Yes N/A

Access & Site Preparation

Access track: Old track Cross country, compaction only Distance: 1 km m
 Vegetation cleared - line cutting Area: m x m
 Topsoil removed & stockpiled Area: m x m
 Track excavated / formed Area: m x m

Drill pad: N/A Vegetation cleared Area: m x m
 Topsoil removed & stockpiled Area: m x m
 Pad excavated / levelled Area: m x m

Sumps: N/A Vegetation cleared Number:
 Topsoil removed & stockpiled Number:
 Sumps excavated Number:

Comments: Above ground sumps - 3 in series used. Water source not properly evaluated - required additional pump and tank plan in later. - ~~to~~ is actually a reliable creek due south - should have been checked.

Drill Site Environment Monitoring Sheet

Drilling

Hole No: DD967A2

428174

Water Delivery: N/A Carted Piped or pumped

Water Source: Dam River/Creek Reticulated Bore Shaft

Ground Water: Dry Wet Flowing whilst drilling: Flowing when completed:

First water at (m): Water table at (m):

Ground Water Quality: Fresh Brackish Salty Very salty Unknown

Analysed: Yes No Details: DPO:

Minimization Measures: Biodegradable drill fluids Duck boards Bunds Ground sheets

Comments:
(including sump checks and fuel storage)

Rehabilitation

Hole backfilled: Yes No Backfilled with: Depth (m):

Hole plugged: Yes No Plug type: Depth (m):

Hole capped: Yes No Cap type: Depth (cms):

Hole sealed if flowing: N/A Yes No Details:

| | N/A | Waste / Sludge removed | Landform restored | Topsoil replaced | Site ripped | Revegetated |
|---------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Access Track: | <input type="checkbox"/> |
| Drill pad | <input type="checkbox"/> |
| Sump/s | <input type="checkbox"/> |

Details of Revegetation:

| Date | Species | Details (seed/seedlings, quantity etc) |
|------|---------|--|
| | | |

Comments:

Post Drilling Monitoring & Photography

| Date | Comments (include weed control) | Recorded by |
|-----------|---------------------------------|-------------|
| 1 month: | | |
| 6 month: | | |
| 12 month: | | |

Sign Off & Approvals

Geotech. or Rehab. Officer:..... Date:.....

Responsible Geologist:..... Date:.....

Landowner:..... Date:.....



Drill Site Environment Monitoring Sheet

Drill Hole & Site Details

Hole No: DD97ZA3

Location: AVEBURY TAS Proposal No:
AMG North:
AMG Zone:

EL No. & Name: 28/88 ZEEHAN 1
AMG East: R.L.:
Mapsheet/s: 1:50 000 ZEEHAN

Landowner:

Property:

Tenure: Freehold Leasehold Crown Land Other:

Topography: Flat Undulating Steep Very Steep

Vegetation: None Grassland Scrub Open Forest Dense Forest

Land Use: Grazing Cropping Forestry Mining Road/rail
 Recreation Residential Wilderness Heritage Conservation

Existing Disturbance Rel. to Environs: Undisturbed Minor Moderate Very disturbed

Soil Description: Soil pH: Soil salinity: Topsoil depth: 3m

Photo taken: Date: 15/1/97 Ref. Point:
Bearing to Ref. Point: Distance:

Comments: Water return O.K. More mucking required under pump. No guard ore pump.

Notifications & Approvals Prior to Drilling

Department of Industry, Safety and Mines Notification Date: Reference:
Landowner Access Arrangement Date: Valid till:
Government Authority Approval Date:

Land Tenure Check List

Exempted areas: Yes N/A Reserved Land: Yes N/A State Forest: Yes N/A
Aboriginal culture / relics: Yes N/A Sensitive areas: Yes N/A Water licence: Yes N/A
Endangered species: Yes N/A

Access & Site Preparation

Access track: Old track Cross country, compaction only Distance:m
Previous grid line Vegetation cleared Area:m xm
 Topsoil removed & stockpiled Area:m xm
 Track excavated / formed Area:m xm
Drill pad: N/A Vegetation cleared Area: ~ 20 m x 30 m
 Topsoil removed & stockpiled Area:m xm
 Pad excavated / levelled Area:m xm
Sumps: N/A Vegetation cleared Number:
Above ground Topsoil removed & stockpiled Number:
 Sump/s excavated Number:

Comments: Above ground sump. Chainsaws used to clear pad.

