CRA EXPLORATION PTY. LIMITED

A.C.N.: 000 057 125

ZEEHAN No. 2 EL34/88. REPORT ON EXPLORATION FOR THE FIFTH YEAR OF TENURE. 9/11/92 TO 9/11/93.

AUTHOR: R.G. Parkinson

DATE: November, 1993

LICENCE HOLDER: CRA EXPLORATION PTY. LIMITED
ALLEGIANCE MINING N.L.

SUBMITTED TO: T. W. Dickson

ACCEPTED BY:

COPIES TO: MINERAL RESOURCES TASMANIA
CRAE CANBERRA
CRAE PRESTON (x 2)
ALLEGIANCE MINING N.L.

CRAE Report No. 19285

CONTENTS

1. SUMMARY

CRA Exploration Pty. Limited (CRAE) is exploring EL34/88 for stratiform/stratabound carbonate-hosted Zn-Pb and surficial secondary Zn-Pb deposits derived from the decomposition of Ordovician Gordon Limestone.

One primary carbonate-hosted Zn-Pb target was selected for work during 1993; Firewood Siding.

Significantly elevated Zn-Pb up to 1.39% Zn and 1.09% Pb are developed at or near the Gordon Limestone - Crotty Quartzite contact from the N side of the Firewood Siding Fault to the axis of the antiform, a distance of 800m. Arsenic values are strongly enhanced and Fe is subtly elevated coincident with Zn-Pb.

The elevated Zn-Pb values suggests the presence of underlying mineralisation, possibly with the Firewood Siding Fault having acted as a feeder to bring metal-rich fluids into the limestone -quartzite stratigraphic trapsite. Arsenic-Fe anomalism coincident with elevated Zn-Pb may be indicative of a geochemical alteration halo around primary mineralisation. Arsenic-Fe-Zn (Mn) are locally enriched in the alteration zones at the Navan and Reocin carbonate-hosted deposits. Manganese has not been analysed for at Firewood Siding prospect.

Sample depths in the area of detailed 1993 sampling are commonly over 10m, with some holes penetrating beyond 20m without reaching bedrock. Unconsolidated residuum is implied to be well developed, and potentially enriched in base-metals, in this part of Firewood Siding prospect.

At Firewood Siding both primary and near-surface residual Zn-Pb mineralisation may be developed near the Gordon Limestone - Crotty Quartzite contact. Air-core drilling of the contact to test for residuals is warranted and diamond drilling is required to test for primary stratabound deposits beneath the best surface geochemical indications.

In addition, other areas of Gordon Limestone within EL34/88 are prospective for primary and residual Zn-Pb deposits. Regional air-core traverses should initially target the Professor Range area.

2. INTRODUCTION

EL34/88 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. CRA Exploration Pty. Limited entered into a joint venture agreement with Major to explore EL34/88, commencing on 23rd April 1991. At the time of writing, Major Mining Ltd was in the process of divesting its interest in the joint venture to Allegiance Mining NL, with the exploration tenements being transferred to CRAE (90%) and Allegiance (10%) as tenants in common.

2EL34/88 covers 68 sqkm located S of Zeehan on the Tasmanian W coast (Plan Tv431). During the period under review, the fifth year of tenure, CRAE has a statutary obligation to expend $68000. This report details all exploration activities conducted within EL34/88 by CRAE during 1993.

CRAE's principal commodity of interest in the Zeehan area is Zn-Pb. CRAE is investigating potential for carbonate-hosted Zn-Pb deposits within Ordovician Gordon Limestone and secondary surficial mineralisation derived from the decomposition of mineralised carbonate. One target was selected for fieldwork during 1993; Firewood Siding (Plan Tv443). Activities were confined to ground wacker geochemical sampling.

3. CONCLUSIONS

Significantly elevated Zn-Pb values were recorded in wacker bedrock samples from near the Gordon Limestone - Crotty Quartzite N of the Firewood Siding Fault. This suggests the presence of underlying mineralisation, possibly with the fault having acted as a feeder to bring metal-rich fluids into the limestone - quartzite stratigraphic trapsite.

Arsenic-Fe anomalism coincident with elevated Zn-Pb may be indicative of a geochemical alteration halo around primary mineralisation. Arsenic-Fe-Zn (-Mn) are locally enriched in the alteration zones at Navan and Reocin.

Sample depths in the area of detailed 1993 sampling are commonly over 10m, with some holes penetrating beyond 20m without reaching bedrock. Unconsolidated residuum is implied to be well developed, and potentially enriched in base-metals, in this part of Firewood Siding prospect.

4. RECOMMENDATIONS

Results indicate both primary and near-surface residual Zn-Pb mineralisation may be developed at or near the Gordon Limestone - Crotty Quartzite contact. Air-core drilling of the contact to test for residuals is warranted in 1994. Diamond drilling is required to test for primary stratabound deposits beneath the best surface geochemical indications.

In addition, other areas of Gordon Limestone within EL34/88 are prospective for primary and residual Zn-Pb deposits. Regional air-core traverses at 200m x 25m spacing is warranted, initially targetting the Professor Range area.

5. REGIONAL GEOLOGY

Zeehan and it's surrounding districts have seen almost continuous sedimentation, igneous activity and deformation from the Late Proterozoic to the Quaternary. Consequently the picture of geological evolution is a complex one. Recent mapping by the Tas Dept of Mines is helping to solve old puzzles, but also continues to open new cans of worms. Corbett (1989) gives a good summary of possible tectonic models to account for the early palaeozoic geology of NW Tasmania. Some interesting new concepts are summarised informally in Turner (1992). For CRAE staff, Parkinson (1992a) attempts to pull together a few loose threads. Regional geology is summarised on Plan Tv628.

The Rocky Cape Association forms basement in NW Tasmania. This association is not represented on the Zeehan 1:63360 sheet. In the late Precambrian, around 700Ma, a shallow basin was forming in the stretched intracratonic area between the Rocky Cape and Tyennan Regions. Coarse clastic sediments (conglomerates and sandstones) of the Forest Conglomerate, Donaldson Fm and base of the Timbs Gp were deposited.

Turbidite sequences of interbedded sands and silts of upper Donaldson Fm, Timbs Gp and Oonah Fm were laid down as the intracratonic basin deepened.

As the rift phase drew to a close, sag phase Black River Dolomite, Savage Dolomite, ?Timbs Gp magnesite horizons, and Success Creek Gp limestones were deposited. Rift tholeiites and associated sediments of the Smithton Volcanics, Bernafai Volcanics, Timbs Gp and Crimson Creek Fm erupted over the now filled basin.

During the mid to late Cambrian, an arc-continent collision caused overthrusting of ultramafic-mafic rocks and related sediments, possibly from a subduction complex some distance E of the Tyennan Block. The gabbros and basalts between Trial Harbour and Zeehan are of Boninitic composition - present understandings of basalt chemistry require that these Boninites derive from a fore-arc wedge (Brown and Jenner, 1989).

Post-collision extension tectonics then produced troughs into which the Dundas Gp sediments and Mount Read Volcanics were deposited. A local metamorphic event dated at 500Ma (Penguin Orogeny), possibly contemporaneous with eruption of the MRV, affected the rift sediments in the area of the present-day Arthur Lineament. This event probably affected the formations over a broader area than seen today.

Latest Cambrian to Ordovician times saw tectonic uplift of the Tyennan Block. Rapid stripping of this nucleus produced the coarse clastics of the Owen Conglomerate and correlates. As the rate of erosion slowed, sequences became finer (e.g. Moina Sandstone). Finally, in a short period of quiessence, limestones of the Gordon Group were deposited.

A second phase of uplift introduced sands and silts into a shallow marine environment to form the Eldon Group. This event took place from the early Silurian until the early Devonian, when the first rumblings of the Tabberabberan Orogeny were being felt.

Earliest of events forming part of the Tabberabberan Orogeny was a period of thrusting, possibly induced by compressive stresses caused by the rising plutons of the Heemskirk, Meredith and Housetop Granites.

To the NW of the granites, this compression thrust imbricate slices of the Timbs Gp over one another to produce the rapid, apparently quantum jumps in metamorphic grade seen in the Arthur Lineament. To the S, the Tenth Legion Thrust within the EL area is the clearest evidence of the early Devonian thrust event (Findlay and Brown, 1992). Other thrusts are likely to have developed, perhaps along the Little Henty and Firewood Siding Faults, to "poke the tongue" of Zeehan area geology southward into the Henty Basin.

Continued Tabberabberan deformation folded the Zeehan Basin formations about NNW-trending axes.

Geological events subsequent to the Tabberabberan Orogeny do not capture the imagination of mineral explorers. Terrestrial sedimentation continued in the Permian. Jurassic dolerite sills intruded the Zeehan area. Tertiary basalts flooded much of NW Tasmania, with remnants preserved near Granville Harbour.

Tertiary and Quaternary erosion and deposition continue to modify the ancient landsurface.

6. MINERALISATION

Several periods, styles and commodities of mineralisation are recognised in the Zeehan area. In summary these are:-

PERIOD	STYLE	EXAMPLE
Proterozoic	Stratiform syn-depositional pyrite in black shale.	Oonah Fm
Cambrian	Stratiform? magmatic Ni-sulphides in ultramafics	Cuni
Ordovician	Stratabound sphalerite-galena in limestone.	Oceana
Devonian	Stratabound replacement cassiterite-pyrrhotite in carbonates	Renison Bell
Devonian	Discordant lode-style pyrite-galena-sphalerite	Spray, Comstock
Devonian	Discordant vein-style pyrite-galena-sphalerite	Comet
Devonian	Skarn magnetite (+sphalerite-cassiterite)	Saint Dizier
Quaternary	Residual Pb-Zn in surficial decarbonated limestone	Myrtle, Grieves

Historically it has been the lode and vein-style Pb-Ag mineralisation of the Zeehan and Dundas fields that have dominated interest. Lode-style mineralisation at Zeehan is usually hosted within graphitic shears in Oonah or Crimson Creek Fms. These deposits are high grade, but narrow (typically 0.3m) and with short strike and depth extent (usually less than 100m). In the context of modern large-scale mining practises, it is unlikely that such a target could be of economic interest on its own.
In the last 20 years or so, replacement-style Sn deposits have been given considerable attention. West Tasmania is well endowed with these deposits, which include Renison Bell, Queen Hill, Mt Bischoff and Cleveland. At Renison Bell, most ore occurs as massive pyrrhotite replacement of carbonate horizons, although a substantial quantity of ore occurs within the Federal-Bassett feeder zone. Source of the mineralisation is believed to be from Sn-rich fluids emanating from the underlying Devonian granite. A pre-mining resource is estimated at 42Mt @ 1.1% Sn (Collins, 1989).

Queen Hill is similar in style to Renison Bell, with a resource of 4Mt @1% Sn. Given the world oversupply of Sn, and the inherent low grade and metallurgical difficulties of these deposits, a replacement style Sn deposit is probably not a valid exploration target for a company without an existing Sn portfolio.

Magnetite skarn deposits such as Saint Dizier and Tenth legion have formed in carbonate lithologies adjacent to the Heemskirk Granite. St Dizier contains 5Mt @ 0.5% Sn, whilst the skarn at Tenth Legion contains low percent levels of Zn as sphalerite. These deposits are possibly of interest due to their multi-commodity nature and simple metallurgy.

Nickel mineralisation as magmatic segregations within the ultramafics appears to be insignificant in quantity, although the grade of individual occurrences sounds impressive. Deposits are generally less than 50m long and of the order of 1m wide, with several percent of Ni and Cu (Blissett, 1962). Although some drilling has been carried out, there is no clear understanding of the geometry of the deposits with depth. This style of mineralisation should be considered incompletely explored.

Stratabound Pb-Zn in limestone is exemplified by the Oceana deposit where Amoco outlined a resource of 4Mt @ 19.4% Pb, 4% Zn and 106 ppm Ag (Taylor and Mathison, 1990). Mineralisation is described as syndiagenetic replacement, broadly equivalent to Irish-type deposits. Indications of other stratabound carbonate-hosted Pb-Zn mineralisation is recorded in Amoco-EZ diamond drilling from Myrtle and Grieves prospects. Despite intensive but fruitless exploration by Amoco-EZ, the Gordon Limestone still holds excellent potential for significant base-metal discoveries.

Perhaps more significaant than potential within the limestone is near-surface enrichment of Pb-Zn by the dissolution of the carbonate. This decarbonatisation has left a layer of black sulphidic pug sitting above fresh limestone, beneath a veneer of glacial gravels. Zinc and Pb have been retained and concentrated in this pug layer. The black pug is extensively developed over virtually all areas of near-surface Gordon Limestone. Potential of this target is untested to date, but will be evaluated by CRAE in the course of these investigations.

Stratiform syngenetic pyrite is present in Proterozoic black shale in the Zeehan area. To date however, no economic occurrences of Proterozoic black shale-hosted base-metal deposits are known in Tasmania. Clear similarities can be drawn between Zeehan and the Mt Isa and Lawn Hill areas, and on that basis the potential for discovery of another Century-type deposit is high.

The best reference for brief descriptions of all deposits on the Zeehan field, although somewhat dated now, is Blissett (1962). Early Geological Survey bulletins from between 1890 and 1910 are important historical references.

7. PREVIOUS EXPLORATION BY COMPETITORS

Relevant exploration activities by competitors prior to the granting of EL34/88 are summarised in Kratochvil (1991) and Summons (1991). Of particular significance to CRAE's activities is the exploration program on EL4/78 by Amoco, followed by EZ in joint venture, best summarised by Mathison and Taylor (1987).

During the period 1978-1987, Amoco-EZ, collected a large body of data over the Gordon Limestone as part of their Zn-Pb exploration activities on EL4/78. Amoco-EZ focussed on an Irish-type exploration model, based on their success in delineating the sub-economic Oceana deposit. Data amassed by the joint venture includes:-

- geological mapping
- wacker geochemistry
- ground magnetics
- gravity
- IP and EM surveys
- drilling logs and assays

Although the program was unsuccessful in delineating a bedrock carbonate-hosted resource (apart from the sub-economic Oceana deposit), numerous drill-holes intercepted sub-economic and patchy Zn-Pb mineralisation.

It also became clear that significant enrichment of Pb and Zn was occurring in the decarbonated black pug developing in the weathering profile above the limestone. After so many frustrating years of searching for the hardrock source to these anomalies, Amoco-EZ failed to perceive the black pug as a target in itself.

8. EXPLORATION BY MAJOR MINING LTD / CRAE PRIOR TO 9/11/92

Year 1,
Year 2: Activities by Major Mining prior to CRAE's involvement are detailed in the relevant statutary reports. Field activities included a gradient array IP survey covering a small part of the Badger River area targetted by CRAE this year.

Year 3: Exploration by CRAE on EL34/88 prior to 9/11/91 focussed on a compilation and review of existing open-file data (Kratochvil, 1991). Emphasis was placed on identifying areas of limestone not explored in detail by Amoco-EZ. CRAE's initial exploration strategy aimed to test two underexplored blocks of Ordovician limestone, the Fen Creek and Mclean Creek areas. This approach was abandoned this year when it was realised there were more prospective targets with considerably easier access in the Badger River valley.

Year 4: CRAE's exploration strategy in 1992 aimed to test for primary carbonate mineralisation in Gordon Limestone where the unit was cut by the Firewood Siding Fault (Parkinson, 1992b). Incomplete Amoco-EZ bedrock sampling returned up to 1.45% Zn in this area. The Firewood Siding Fault may have been a conduit for metal-rich fluids passing into the limestone, and as such the area of the fault/limestone contact is a prime focus for exploration.

Bedrock wacker sampling, dipole-dipole IP surveys, ground magnetometer traverses and reinterpretation of existing gravity data were completed. Line 9600E, between 5225N and 5400N showed over 0.1% Zn, up to 0.47% Pb and 0.32% Zn. Amoco-EZ produced 1.45% Zn from sampling in this vicinity. IP surveys identified several anomalies but it is unclear how they relate to known structure and stratigraphy. A circular gravity feature remains unexplained.

9. EXPLORATION ACTIVITIES FOR THE PERIOD 9/11/92 TO 9/11/93

9.1 Exploration Philosophy

CRAE's principal commodity of interest in the Zeehan area is Zn-Pb. CRAE is investigating potential for carbonate-hosted Zn-Pb deposits within Ordovician Gordon Limestone and secondary surficial mineralisation derived from the decomposition of mineralised carbonate. One target was selected for fieldwork during 1993; Firewood Siding. Activities included ground wacker geochemical sampling.

9.2 Firewood Siding Prospect

9.2.1 Introduction

Firewood Siding prospect is 12km S of Zeehan, straddling the Zeehan-Strahan road (Plan Tv443). The prospect was formerly named Badger River, but the title was changed to avoid ambiguity with the large Amoco Badger River grid, of which the prospect forms only a small part.

The target was selected based on the presence of a major plumbing system, the Firewood Siding Fault, intersecting the limestone. Incomplete Amoco-EZ bedrock sampling returned up to 1.45% Zn, but no follow-up was initiated. The Firewood Siding Fault may have been a conduit for metal-rich fluids passing into the limestone, and as such the area of the fault/limestone contact is a prime focus for exploration.

Bedrock wacker sampling was completed in an effort to identify primary carbonate-hosted mineralisation. The locations of CRAE and competitor grids over the prospect are shown on plan Tv449.

9.2.2 Geology

Firewood Siding prospect sits in a N-plunging antiform (Plan Tv618). The fold core is Moina Sandstone, overlain by Gordon Limestone followed by Crotty Quartzite and subsequent younger lithologies. Variations in apparent thickness of the Gordon Limestone around the fold suggest steep dips on the W limb, flattenning on the NE limb.

The Firewood Siding Fault, a major NW-trending structure, cuts the antiform. Movement on this fault has been as recent as Jurassic, and may well have been active since Cambrian times. The Eden Fault, a N-trending structure, cuts the axis of the antiform. This fault is most clearly seen on aerial photographs displacing the Crotty Quartzite.

Permian sediments abut the W side of the Eden Fault, S of the Firewood Siding Fault. Quaternary gravels obscure the limestone, which has eroded to form the Badger River valley between the plateaux of Moina Sandstone and Crotty Quartzite.

9.2.3 Wacker Bedrock Geochemistry

Bedrock wacker sampling was completed at 50m x 25m spacing. In all, 89 samples were collected during 1993. Samples were submitted to Analabs, Burnie for aqua regia - perchloric acid digest followed by AAS analysis of Ag-As-Cu-Pb-Zn-Fe. Ledgers and results are listed in Appendix 1. Sample locations, depth, Zn and Pb geochemistry are presented on plans Tv624 to Tv627.

Significantly elevated Zn-Pb up to 1.39% Zn and 1.09% Pb are developed at or near the Gordon Limestone - Crotty Quartzite contact from the N side of the Firewood Siding Fault to the axis of the antiform, a distance of 800m. Twenty-one samples out of 89 returned over 0.1% Zn. Arsenic values are also strongly enhanced coincident with the high Zn-Pb, up to 530ppm. Iron shows a more subtle elevation with Zn-Pb. The As-Fe association suggests a geochemical alteration halo may be developed around underlying mineralisation. Arsenic-Fe-Zn (-Mn) are locally enriched in the alteration zones at Navan and Reocin. Manganese has not been analysed for at Firewood Siding prospect.

Sample depths in the area of detailed 1993 sampling are commonly over 10m, with some holes penetrating beyond 20m without reaching bedrock. This suggests unconsolidated residuum may be well developed in this part of Firewood Siding prospect. Deepest samples are not necessarily coincident with highest base-metal assays.

9.2.4 Proposed Exploration During 1994

Results indicate potential for both primary and near-surface residual Zn-Pb mineralisation to be developed at or near the Gordon Limestone - Crotty Quartzite contact. Air-core drilling of the contact to test for residuals is warranted in 1994. Diamond drilling is required to test for primary stratabound deposits beneath the best surface geochemical indications.

10. ENVIRONMENT AND REHABILITATION

Activities causing disturbance were confined to cutting of gridlines in accordance with the Mineral Exploration Code of Practise. Cut vegetation will naturally regenerate.

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Turner, N.J. (ed) 1992 Corinna 1:50000 geological map. Field guide to selected rock exposures. *Rep. Div Mines Miner. Resour. Tasm.* 1992/06.

KEYWORDS

Tasmania, Ordovician, Gordon Limestone, Wacker Sampling, Zinc, Lead.

LOCATION

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

LIST OF DPOs

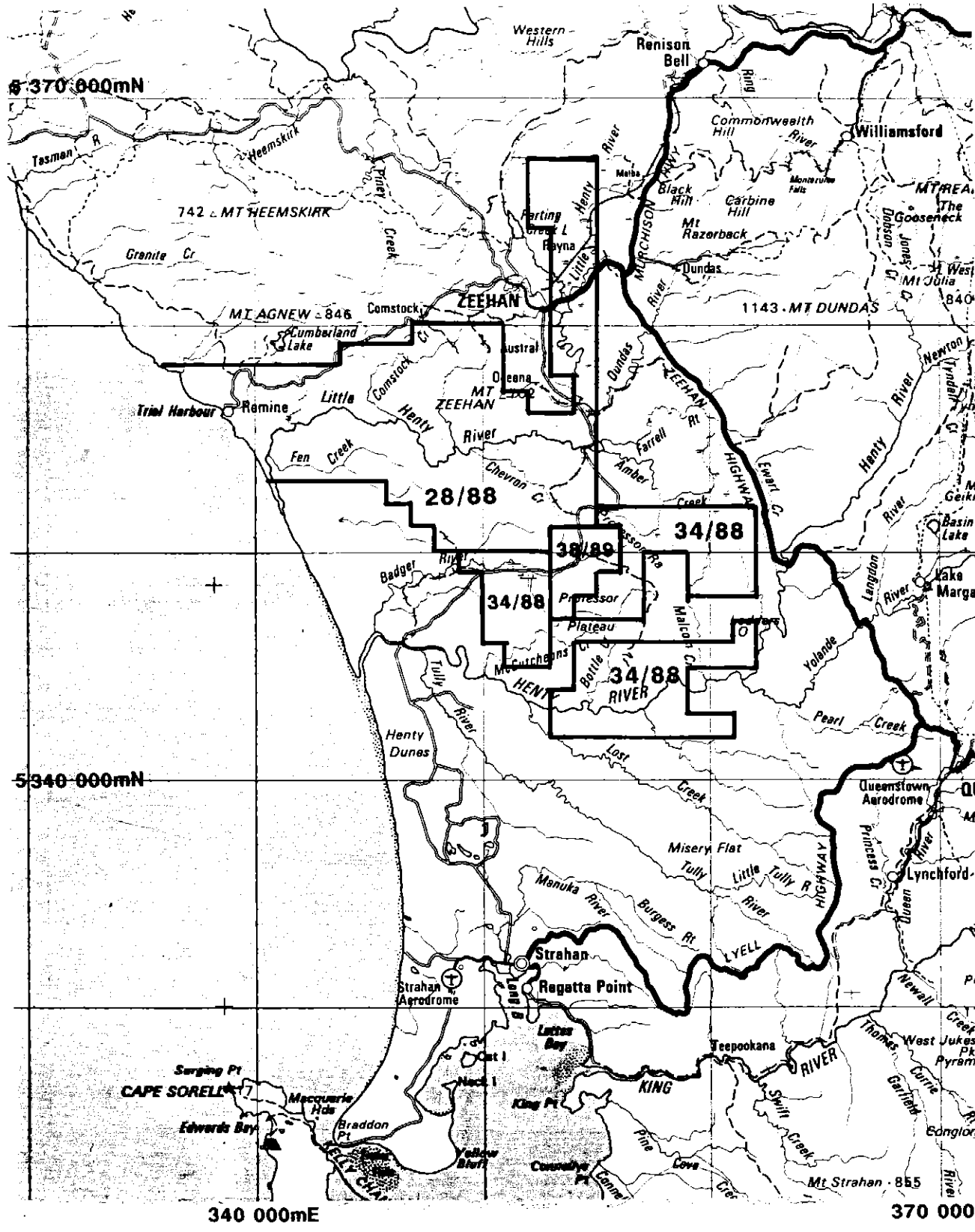
71545

LIST OF PLANS

Plan no.:	Title:	Scale:
Tv 431	Zeehan Area West Tasmania Joint Venture Tenement Plan	1:10,000
Tv 443	Zeehan Area Grid & Prospect Location Plan	1:50,000
Tv 628	Zeehan Project - Regional Geology	1:100,000
Tv 449	Zeehan No. 2 EL 34/88 Badger River Prospect - Grid Locations	1:10,000
Tv 618	Zeehan No. 2 EL 34/88 Firewood Siding Geological Plan	1:10,000
Tv 624	Zeehan No. 2 EL 34/88 Firewood Siding Wacker Sample Locations 1993 Samples	1:5,000
Tv 625	Zeehan No. 2 EL 34/88 and EL 28/88 Firewood Siding Wacker Geochemistry - Depth	1:10,000
Tv 626	Zeehan No. 2 EL 34/88 and EL 28/88 Firewood Siding Wacker Geochemistry - Zinc	1:10,000
Tv 627	Zeehan No. 2 EL 34/88 and EL 28/88 Firewood Siding Wacker Geochemistry - Lead	1:10,000

LIST OF APPENDICES

Appendix 1: CRAE Wacker Sampling Ledgers and Geochemistry



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ZEEHAN JOINT VENTURES

LOCALITY DIAGRAM

Ref.: SK 55 - 5	Scale: 1:250 000
Author: T. Summons	Report No.: 19285
Drawn: R.Travierso	Plan No.: TV 431

Nov.1991

T-Q Tertiary, Quaternary

P-J Permo-Carboniferous beds and Jurassic dolerite

+ + Devonian granite

S-D Siluro-Devonian Eldon Group

Ogl Ordovician Gordon Gp Limestone

Upper Cambrian-Lower Ordovician Owen Conglomerate and correlates

Middle - Upper Cambrian Dundas Gp

Quartzwacke sequence at Farrell Rivulet

Mafic volcanics

Ultramafic-mafic complexes & gabbros

Crimson Creek Formation

Success Creek Group

Precambrian

0 5 Km

Lake Pieman
S-D
Ogl
RENISON BELL
Colebrook Hill
5370
Serpentine Hill
CUNI
ROSEBERY FAULT
Moores Pimple
DUNDAS
ZEEHAN
Misery Hill
Mt Dundas
5360
McIvor Hill
LITTLE HENTY FAULT
FIREWOOD SIDING FAULT
Professor Range
HENTY BRIDGE
5TH HENTY FAULT
5350
Henty R.
The Sisters
WESTERN SEQUENCE
SOUTHERN OCEAN
350
360
370

93-3520.1

5 cm

9906016

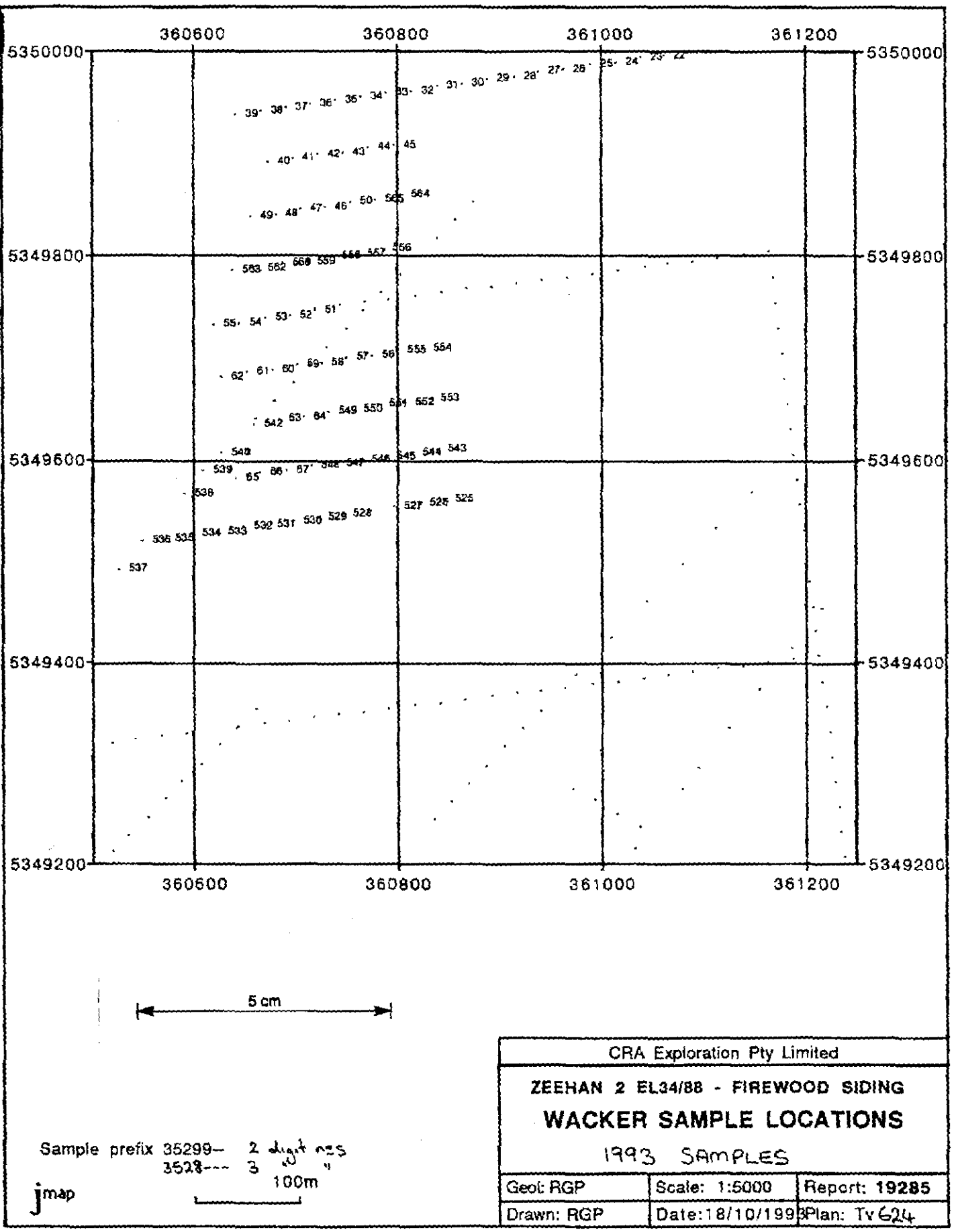
CRA EXPLORATION PTY. LIMITED

ZEEHAN PROJECT

REGIONAL GEOLOGY

Ref.: SK55-5	Scale: 1:100 000
Author: RGP	Report No.: 19285
Drawn: RGP	Plan No.: Tv628

956017



Sample prefix 35299— 2 digit nos
3528--- 3 " "

100m

jmap

CRA Exploration Pty Limited		
ZEEHAN 2 EL34/88 - FIREWOOD SIDING **WACKER SAMPLE LOCATIONS** 1993 SAMPLES		
Geol: RGP	Scale: 1:5000	Report: **19285**
Drawn: RGP	Date: 18/10/199	Plan: Tv624

360500 361000 361500 362000 362500

5350500 5350000 5349500 5349000 5348500 5348000

-2 2-4 4-8 8-12

12-16 16-20 20-24 24-28 +28

956018

5 cm

All EZ [illegible] RAE samples

jmap 100m

CRA Exploration Pty Limited

EL34/88 and EL28/88 - FIREWOOD SIDING

WACKER GEOCHEMISTRY - DEPTH

Geol: RGP	Scale: 1:10000	Report: **19285**
Drawn: RGP	Date: 18/10/1993	Plan: Tv625

360 000mE
5350 000mN
61
62
63
49
48
60000E
60200E
60400E
60600E
9600E
10 000E
10 400E
10 800E
11 200E
44800N
45000N
45200N
45400N
5200N
44400N
44600N
5000N
4800N
44200N
44000N
43800N
6090OE
River
Badger
HENTY
ROAD
B27
5 cm
93-3520.
AMG North
Mag. North
Grid Magnetic Convergence 11.8°
0 500 1000 1500
metres
CRAE Grid EL 34/88
Major Mining Grid EL 34/88
Amoco/EZ Grid EL 4/78

CRA EXPLORATION PTY. LIMITED

ZEEHAN No.2 EL 34/88
Badger River Prospect
Grid Locations

956019

Ref.: SJ55-5, 7914, 3634	File: Zeehan2\badgrids
Scale: 1: 10 000	Date: April 1992
Author: Rob Parkinson	Report No.: 19285
Drawn: R Travierso	Plan No.: Tv 449

360 000mE

61

62

63

51

5350 000mN

49

48

Sk

Sa

Sc

Og

P

Om

Firewood Siding Fault

River

Badger

HENTY ROAD

B27

5 cm

Fault

P Permian Cover

Sk Keel Quartzite

Sa Amber Slate

Sc Crotty Quartzite

Og Gordon Limestone

▽ ?Limestone Breccia

Om Moina Sandstone

AMG North

Mag. North

Grid Magnetic Convergence 11.8°

93-3520.

0 500 1000 1500

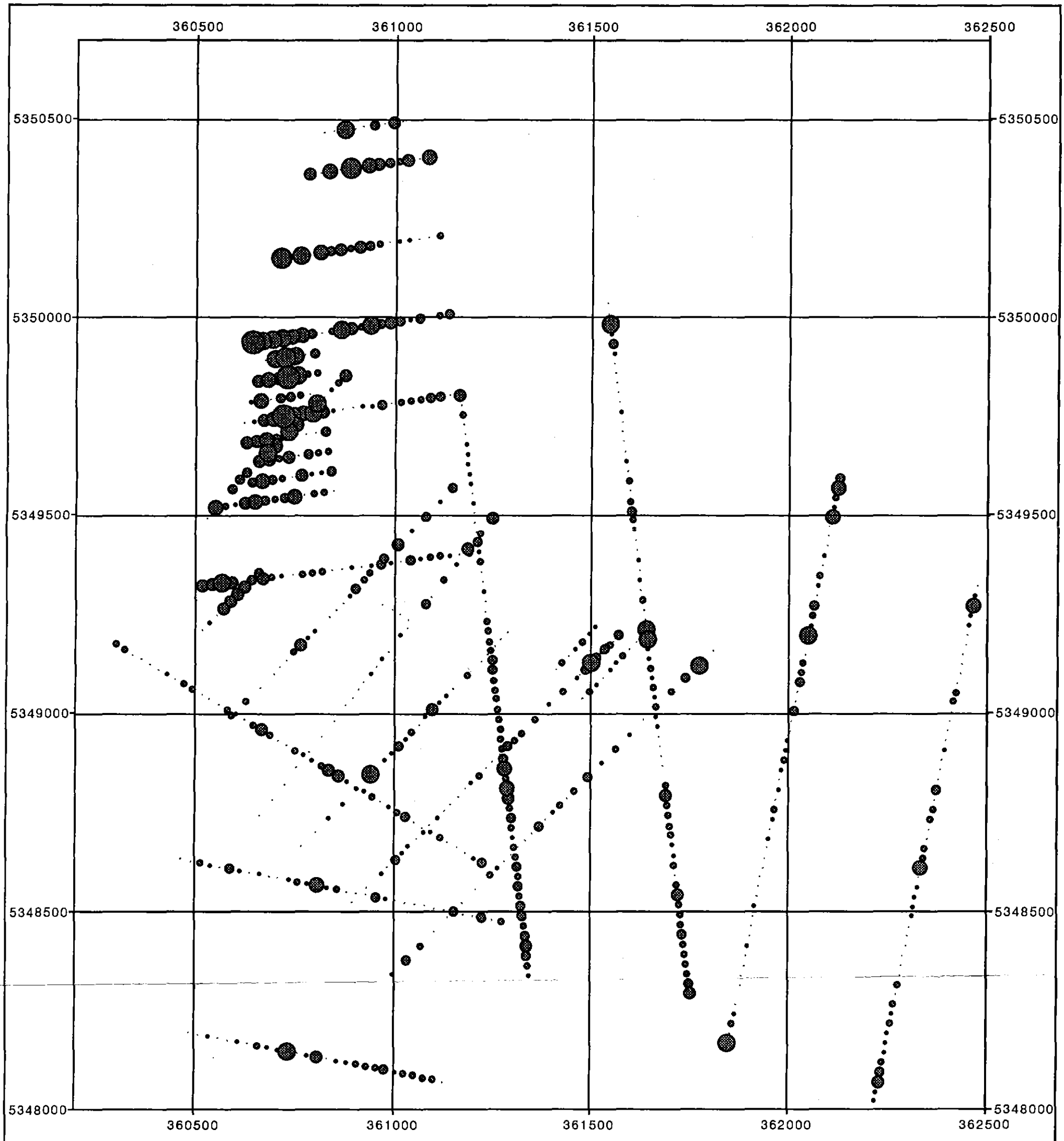
95620 metres

CRA EXPLORATION PTY. LIMITED

ZEEHAN No.2 EL 34/88
Firewood Siding Prospect
GEOLOGICAL PLAN

Ref.: SJ55-5, 7914, 3634	File: ZEEHAN2\618
Scale: 1 : 10 000	Date: October 1993
Author: Rob Parkinson	Report No.: 19285
Drawn: R. Travierso	Plan No.: Tv 618

93-3520



956021

5 cm

All EZ and CRAE samples

jmap

100m

CRA Exploration Pty Limited

EL34/88 and EL28/88 - FIREWOOD SIDING

WACKER GEOCHEMISTRY - ZINC

Geol: RGP	Scale: 1:10000	Report: **19285**
Drawn: RGP	Date: 18/10/199	Plan: Tv 626

360 000mE
5 370 000mN
370 000mE
380 000mE
5 370 000mN
340 000mE
5 360 000mN
350 000mE
5 360 000mN
5 350 000mN
340 000mE
5 350 000mN
5 340 000mN
350 000mE
360 000mE
370 000mE
380 000mE
5 340 000mN

EL 28/88
Sassafrass Grid
EL 43/92
ZEEHAN
Black Jacks Grid
North Austral Grid
Agnew Grid
Stonehenge Grid
Austral Grid
Mariposa Grid
Nubeena Grid
Avebury Grid
Oceana Grid
Bannockburn Grid
Remine
Trial Harbour Grid
Pyramid Grid
Leatherwood Grid
EL 45/92
S O U T H E R N
EL 33/89 (Relinquished)
Myrtle and Myrtle Extended Grid
Laurel Grid
Professor Range Grid
King Billy Grid
Amber Creek Grid
EL 38/89
Firewood Siding Grid
Grieves Grid
EL 34/88
Baura Grid
EL 34/88
Rose Valley Grid
EL 34/88
O C E A N
5 cm
Queenstown Aerodrome

956022

93-3520.

** NOTE **
Contiguous grids are internally consistent, however the relative position of groups of grids may vary.

0 1 2 3 4kilometres

North

CRA EXPLORATION PTY. LIMITED

ZEEHAN AREA
Western Tasmania
Grid & Prospect Location Plan

Ref.: SK55 – 5	File: ZEEHAN\443
Scale: 1 : 50000	Date: November 1993
Author: T.W. Dickson	Report No.: 19285
Drawn: R. Travierso	Plan No.: Tv 443

360500 361000 361500 362000 362500

5350500 5350000 5349500 5349000 5348500 5348000

-50 50-100 100-200 200-500

500-1000 1000-2000 2000-5000 5000-10000 +10000

5 cm

All EZ and CRAE samples

jmap 100m

956023

CRA Exploration Pty Limited

EL34/88 and EL28/88 - FIREWOOD SIDING

WACKER GEOCHEMISTRY - LEAD

Geol: RGP	Scale: 1:10000	Report: **19285**
Drawn: RGP	Date: 18/10/1993	Plan: Tv627

APPENDIX 1

CRAE WACKER SAMPLING LEDGERS AND GEOCHEMISTRY

956025

ROCKCHIP AND DRILLING CODES 17/2/93

BMR LITH

Rock code as per published geological map
For time designation use:-

Q	Quaternary	M	Permian	P	Proterozoic
T	Tertiary	C	Carboniferous	A	Archaean
		S	Silurian		
K	Cretaceous	D	Devonian		
R	Triassic	O	Ordovician		
J	Jurassic	E	Cambrian		

FIELD ID

Field term for rock type
Broad groupings are:-

S	Sedimentary	I	Intrusive	C	Surficial
M	Metamorphic	E	Extrusive	O	Others

SEDIMENTARY

Scg	Conglomerate	Sls	Limestone	Sw	Wacke
Sss	Sandstone	Sch	Chert	Sag	Agglomerate/mixtite
Ssi	Siltstone	Slf	BIF		
Ssh	Shale				
Sbs	Black shale	Sbx	Breccia		

METAMORPHIC

Msl	Slate	Mq	*Quartzite*	Mmg	*Migmatite*
Mph	Phyllite	Mm	Marble		
Msc	Schist	Ma	Amphibolite		
Mbs	Graphitic schist	Mcs	*Calcsilicate*	Msk	Skarn
Mgn	Gneiss	Mh	Hornfels		

INTRUSIVE IGNEOUS

If	Felsic undiff.	Ii	Intermed undiff.	Iu	Ultramafic
Ifp	*Felsic porphyry*	Iip	*Intermed porph*	Ius	Serpentinite
Iap	Aplite	Im	Mafic undiff.		
Igr	Granite	Ido	Dolerite	Ipg	Pegmatite
Igd	*Granodiorite*	Igb	*Gabbro*		

EXTRUSIVE IGNEOUS

Ery	Rhyolite	Ean	Andesite	Et	Tuff undiff
Edc	Dacite	Eb	Basalt	Eft	*Felsic tuff*
				Emt	Mafic tuff

SURFICIAL (COVER) MATERIAL

Ca	*Alluvium*	Clt	Laterite	Csg	Gossan
Cco	Colluvium	Cso	Pisolites		
Cs	Sand	Cst	Ironstone	Ccy	Clay
Cbs	Black soil	Csl	Silcrete		
Cg	Gravel	Cct	Calcrete	Cv	Vegetation/peat

OTHERS

Ovq	Vein quartz	Omy	Mylonite	Oms	Massive sulphide
Ovc	Vein carbonate	Obx	Breccia		
Ovs	Vein sulphide	Of	Fault gouge	Ox	Unknown

TEXTURAL CODES

WEATHERING/SURFICIAL FEATURES

We	Weathered	Fe	Ferruginous
Bl	Bleached	Fo	*Fe ox in fract*
Le	Leached		

MINERALISATION/ALTERATION FEATURES

Gs	Gossanous	Vs	*Vein sulphide*	Al	Altered
Vn	Veined	Ds	Disseminated	Si	Silicified
Di	Disseminated	Fs	Fracture sulph		
		Bs	*Banded sulph*		

GEOLOGICAL FEATURES

Bd	Bedded	Fr	*Fractured*	Po	Porphyritic
Bn	Banded	Ib	Interbedded	Sc	Schistose
Bx	*Brecciated*	Lm	*Laminated*	Sh	Sheared
Fi	Fissile (slatey)	Ma	Massive	Vu	Vuggy

DIAGNOSTIC MINERALOGY

PRIMARY MINERALISATION

Ga	Galena	Py	Pyrite	Ni	Ni sulphides
So	Sphalerite	Po	Pyrrhotite		
Cp	Chalcopyrite	Su	Unknown sulph		

SECONDARY MINERALISATION

Ls	Lead secondaries	Cs	Copper sec.	Ns	Ni secondaries
Zs	Zinc "	Us	Uranium "		

ALTERATION/DIAGNOSTIC MINERALS

Cy	Clay	He	Haematite	Gt	Garnet
Ep	Epidote	Mt	Magnetite	Ky	Kyanite
Cb	Carbonate	Js	Jarosite	To	Tourmaline
Sd	Siderite	Mn	Manganese mins		

COLOUR CODES

L	Light	A	Banded	M	Mottled
D	Dark				
N	Black	P	Purple	V	Green
G	Grey	R	Red	K	*Pink*
B	Brown	O	Orange	E	Blue
W	White	Y	Yellow	S	Silver

FIREWOOD SIDING WACKER SAMPLING LEDGERS AND GEOCHEMISTRY											
Results in ppm except Fe (in %).			DPO 71545								
SAMPNO	LOCALE	LOCALN	AMGE	AMGN	DEPTH	BEDROCK?	BMRLITH	FIELDID	TEXTURE	ALT/MIN	COLOUR
3528525	60400	44450	360846	5349563	2.2	Y	Og	Sls			G
3528526	60400	44425	360821	5349559	2.1	Y	Og	Sls			LG
3528527	60400	44400	360796	5349556	1.9	Y	Og	Sls	Al?	Sd	MBG
3528528	60400	44350	360747	5349549	15	N	Q	Ccy			DG
3528529	60400	44325	360722	5349545	22	Y	Og	Sls			LGDG
3528530	60400	44300	360697	5349542	11.5	Y	Og	Sls			G
3528531	60400	44275	360672	5349538	10	Y	Og	Sls			G
3528532	60400	44250	360648	5349535	7	Y	Og	Sls	Al?	Sd	YB
3528533	60400	44225	360623	5349531	11.5	Y	Og	Sls			DG
3528534	60400	44200	360598	5349528	15	Y	Og	Sls	Vn	Cc	DG
3528535	60400	44175	360573	5349524	17	Y	Og	Sls			DG
3528536	60400	44150	360549	5349521	18	Y	Og	Sls	Al?	Sd	DGB
3528537	60425	44125	360527	5349493	0	?	Sc	Mq	BlWe		G
3528538	60360	44200	360592	5349567	14	Y	Og	SlsSsh			DG
3528539	60340	44220	360610	5349590	15	Y	Og	SlsSsh			DG
3528540	60325	44240	360627	5349608	2	N	Q	CcyCg			DB
3528541	60325	44240	360627	5349608	30	N	Og?	Ccy			OB
3528542	60300	44275	360658	5349637	15.5	N	Q?	Os			G
3528543	60350	44450	360839	5349612	8.5	Y	Og	Sls			G
3528544	60350	44425	360814	5349609	1.5	Y	Og	Sls			G
3528545	60350	44400	360789	5349605	13.5	Y	Og	Sls	Ds	Py	G
3528546	60350	44375	360764	5349602	35	Y	Og	Sls			G
3528547	60350	44350	360740	5349598	1	Y	Og	Sls	VuDi	Sd?	G
3528548	60350	44325	360715	5349595	25.5	?	Og	SlsCcy			DG
3528549	60300	44350	360733	5349648	20	Y	Og	Sls			G
3528550	60300	44375	360757	5349651	14	Y	Og	Sls			G
3528551	60300	44400	360782	5349655	26	N	Og?	Ccy			W
3528552	60300	44425	360807	5349658	2.5	Y	Og	Sls	Vn	Sd	G
3528553	60300	44450	360832	5349662	11	Y	Og	Sls	Al?	Sd	G
3528554	60250	44450	360825	5349711	14	Y	Og	Sls	Al?	Sd	YG
3528555	60250	44425	360800	5349708	29	N	Og?	Ccy			WLG
3528556	60150	44425	360786	5349807	3	N	Q	Cg			GB
3528557	60150	44400	360761	5349803	17	Y	Og	Sls			G
3528558	60150	44375	360737	5349800	9.5	Y	Og	Sls			G
3528559	60150	44350	360712	5349796	14	Y	Og	Sls	Vn	Cc	G
3528560	60150	44325	360687	5349793	1.4	N	Q	Cg			LB
3528561	60150	44325	360687	5349793	12	Y	Og	SlsCcy	Fx?		GW
3528562	60150	44300	360662	5349789	18	N	Q	Ccy	Ds	Py	N
3528563	60150	44275	360638	5349786	19	N	Q	Ccy			LB
3528564	60100	44450	360804	5349860	9.5	Y	Og	Sls			G
3528565	60100	44425	360779	5349856	21	N	Q	Ccy	Ds	Sp?Ga	DG
3529921	60000	44750	361087	5350000	19.2	Y	Og	Sls	Vn	Cc	G
3529922	60000	44725	361062	5349997	12.5	Y	Og	Sls	Vn	Cc	G
3529923	60000	44700	361038	5349994	27	Y	Og	Sls			G
3529924	60000	44675	361013	5349990	9	Y	Og	Sls	Vn	Cc	G
3529925	60000	44650	360988	5349987	25	?	Og?	SlsCcy			G
3529926	60000	44625	360983	5349983	19.5	Y	Og	Sls			WG
3529927	60000	44600	360938	5349980	11.5	N	Q	Ccy			G
3529928	60000	44575	360914	5349976	22.5	Y	Og	Sls			G
3529929	60000	44550	360889	5349973	6	Y	Og	Sls			LGDG
3529930	60000	44525	360864	5349969	6.5	Y	Og	Sls			LGDG
3529931	60000	44500	360839	5349966	3.5	N	Q	Ccy			LBLG
3529932	60000	44475	360815	5349962	13	?	Og?	Sls?			WG
3529933	60000	44450	360790	5349959	13.5	?	Og?	Sls?	Ds	Py	DG
3529934	60000	44425	360765	5349955	18	Y	Og	Sls			G
3529935	60000	44400	360740	5349952	14	Y	Og	Sls			G
3529936	60000	44375	360716	5349948	11.8	?	Og?	Sls?			DGDB
3529937	60000	44350	360691	5349945	8.5	Y	Og	Sls			DG
3529938	60000	44325	360666	5349941	11.2	N	Q	Ccy			LB
3529939	60000	44300	360641	5349938	12.5	Y	Og	Sls			G
3529940	60050	44325	360673	5349892	4.5	Y	Og	Sls			B
3529941	60050	44350	360698	5349895	16.8	Y	Og	Sls	Ds	Py	DG
3529942	60050	44375	360723	5349899	19	N	Q	Ccy			LBN
3529943	60050	44400	360747	5349902	11.5	Y	Og	Sls			G
3529944	60050	44425	360772	5349906	12.9	Y	Og	Sls			G
3529945	60050	44450	360797	5349909	9	Y	Og	Sls			G

FIREWOOD SIDING WACKER SAMPLING LEDGERS AND GEOCHEMISTRY							
Results in ppm except Fe (in %).							
SAMPNO	Ag	As	Cu	Fe%	Pb	Zn	COMMENTS
3528525	-1	3	8	0.25	11	29	
3528526	-1	7	5	0.36	196	192	
3528527	-1	15	4	0.74	53	173	
3528528	-1	400	28	8.22	235	1372	
3528529	-1	18	5	0.58	81	305	
3528530	-1	2	3	0.55	32	144	
3528531	-1	9	5	0.68	51	231	
3528532	-1	5	8	1.08	619	1571	
3528533	-1	11	4	0.65	141	693	
3528534	-1	7	5	0.62	17	93	
3528535	-1	12	8	1.21	22	113	
3528536	-1	13	5	0.88	109	1239	CRA 1992 grid 9600E 5035N.
3528537	-1	1	8	0.25	12	25	Subcrop? 9600E 5000N.
3528538	-1	37	25	1.15	151	478	CRA 1992 grid 9600E 5100N.
3528539	-1	12	5	0.65	39	214	CRA 1992 grid 9600E 5125N.
3528540	-1	-1	4	0.1	63	8	Not bottom of hole, tight gravel. 9600E 5150N
3528541	-1	13	38	0.76	162	355	Ran out of rods.
3528542	-1	9	6	0.45	106	731	CRA 1992 grid 9600E 5185N.
3528543	-1	14	4	0.58	79	255	
3528544	-1	6	4	0.46	17	71	
3528545	-1	16	4	0.72	43	96	
3528546	-1	52	47	1.96	126	626	
3528547	-1	-1	5	0.57	59	17	Prominent small N-S ridge
3528548	-1	26	7	1.49	19	146	
3528549	-1	16	5	1.13	176	593	
3528550	-1	2	13	0.51	22	42	
3528551	-1	8	26	0.77	54	422	
3528552	-1	18	5	0.83	52	183	
3528553	-1	8	4	0.41	58	165	
3528554	-1	4	7	0.62	135	309	
3528555	-1	2	16	0.61	87	27	
3528556	-1	2	4	0.41	57	13	CRA 1992 grid 9600E 5415N = 60150E 44445N.
3528557	-1	15	3	0.67	32	102	Prominent small N-S ridge at 44430N.
3528558	-1	10	5	0.83	175	202	
3528559	-1	4	4	0.53	141	344	
3528560	-1	2	3	0.24	15	11	
3528561	-1	2	8	0.41	300	39	
3528562	-1	41	36	2.65	1034	1313	
3528563	-1	16	19	0.52	1327	77	
3528564	-1	1	3	0.53	18	120	
3528565	-1	8	25	0.79	1163	125	Sp or sid?
3529921	-1	15	2	0.95	9	32	Logged by Mike.
3529922	-1	45	7	1.59	55	220	Logged by Mike.
3529923	-1	3	2	0.69	10	55	Logged by Mike.
3529924	-1	38	8	2.84	19	232	Logged by Mike.
3529925	-1	21	23	1.78	395	836	Logged by Mike.
3529926	-1	20	7	1.15	236	281	Logged by Mike.
3529927	2	10	33	1.23	477	2346	Logged by Mike.
3529928	-1	6	6	2.32	36	110	Logged by Mike.
3529929	-1	6	22	1.25	403	722	Logged by Mike.
3529930	-1	34	21	1.83	229	2825	Logged by Mike.
3529931	1	4	23	0.55	372	146	Logged by Mike.
3529932	-1	4	2	0.41	10	35	Logged by Mike.
3529933	-1	5	7	0.96	123	271	Logged by Mike.
3529934	-1	420	4	1.98	208	1230	Logged by Mike.
3529935	-1	4	2	0.98	411	1219	Logged by Mike.
3529936	-1	44	15	0.9	232	2044	Logged by Mike.
3529937	-1	400	22	1.38	1648	4151	Logged by Mike.
3529938	-1	310	91	0.46	1584	4362	Logged by Mike.
3529939	1	500	37	3.99	2200	10600	Logged by Mike.
3529940	-1	1	3	0.29	4	18	Logged by Mike.
3529941	-1	37	16	1.36	552	2207	Logged by Mike.
3529942	1	530	67	1.72	6900	8400	Logged by Mike.
3529943	1	30	65	0.99	3330	2041	Logged by Mike.
3529944	-1	10	6	0.99	23	28	Logged by Mike.
3529945	-1	13	2	0.79	10	252	Logged by Mike.

SAMPNO	LOCALE	LOCALN	AMGE	AMGN	DEPTH	BEDROCK?	BMRLITH	FIELDID	TEXTURE	ALT/MIN	COLOUR
3529946	60100	44375	360730	5349849	21	Y	Og	Sls	Ds	Py	DG
3529947	60100	44350	360705	5349846	14.8	N	Q	Ccy	Ds	Py	DGN
3529948	60100	44325	360680	5349842	18	Y	Og	Sls			G
3529949	60100	44300	360655	5349839	13	N	Q	Ccy			LBLG
3529950	60100	44400	360754	5349853	22	Y	Og	Sls			G
3529951	60200	44350	360719	5349747	21.5	N	Q	Ccy			G
3529952	60200	44325	360694	5349743	17	N	Q	Ccy			G
3529953	60200	44300	360669	5349740	25.5	N	Q	Ccy			G
3529954	60200	44275	360644	5349736	12	Y	Sc	Mq			WLG
3529955	60200	44250	360620	5349733	4.5	Y	Sc	Mq			WLG
3529956	60250	44400	360775	5349704	6	Y	Og	Sls			LGLB
3529957	60250	44375	360750	5349701	27	Y	Og	Sls			LGW
3529958	60250	44350	360726	5349697	16	Y	Og	Sls			LGW
3529959	60250	44325	360701	5349694	17	Y	Og	Sls			LGW
3529960	60250	44300	360676	5349690	13	Y	Og	Sls			LGW
3529961	60250	44275	360651	5349687	13	Y	Og	Sls	Ds	Py	LGDG
3529962	60250	44250	360627	5349683	10	Y	Sc	Mq			WLG
3529963	60300	44300	360683	5349641	10	Y	Og	Sls			G
3529964	60300	44325	360708	5349644	18.4	Y	Og	Sls			G
3529965	60350	44250	360641	5349584	7.8	Y	Og	Sls			AWDG
3529966	60350	44275	360665	5349588	11.5	Y	Og	Sls			G
3529967	60350	44300	360690	5349591	12.2	Y	Og	Sls			WG
	60400	44375	360771	5349552	30						

SAMPNO	Ag	As	Cu	Fe%	Pb	Zn	COMMENTS
3529946	5	350	97	1.03	8500	13900	Logged by Mike.
3529947	-1	43	26	1.42	99	570	Logged by Mike.
3529948	-1	41	9	1.63	212	1181	Logged by Mike.
3529949	-1	46	32	5.7	170	642	Logged by Mike.
3529950	1	290	23	1.69	945	3804	Logged by Mike.
3529951	-1	5	4	0.72	50	122	Logged by Mike.
3529952	6	39	333	1.24	10900	1403	Logged by Mike.
3529953	1	28	71	1.51	769	658	Logged by Mike.
3529954	-1	7	12	0.77	929	53	Logged by Mike.
3529955	-1	2	4	0.34	6	10	Logged by Mike.
3529956	-1	6	6	0.39	259	17	Logged by Mike.
3529957	-1	3	-2	0.36	7	22	Logged by Mike.
3529958	-1	11	2	0.59	39	193	Logged by Mike.
3529959	-1	16	9	0.75	292	478	Logged by Mike.
3529960	1	25	14	1.4	1661	1601	Logged by Mike.
3529961	-1	63	38	1.56	191	820	Logged by Mike.
3529962	1	29	143	0.62	1969	560	Logged by Mike.
3529963	-1	8	3	0.83	195	871	Logged by Mike.
3529964	-1	1	6	0.58	35	199	Logged by Mike.
3529965	-1	6	2	0.47	80	250	Logged by Mike.
3529966	-1	8	10	0.82	272	1273	Logged by Mike.
3529967	-1	4	4	0.37	122	455	Logged by Mike.
							No sample.