EXPLORATION LICENCE 7858 "STRANGWAYS RANGE"

FINAL REPORT ON EXPLORATION
to 14th September 1994

Distribution:
- NTDME (1)
- ARL Adelaide (1)
- ARL Hawthorn (1)

Prepared By:

C A CURRAN
Office Administrator

Prepared and Issued By:

C G DROWN
Senior Geologist

October 1994

ARL Report No. Strangways Range 2
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1. **INTRODUCTION**

Exploration Licence 7858 was acquired to evaluate a base metal gossan and surrounds at the Edwards Creek prospect in the southern Arunta Block (Figure 1).

Following a geophysical programme, Aberfoyle Resources has decided that the opportunities and location of the licence fail to satisfy Aberfoyle's minimum target criteria in terms of size and potential, therefore Exploration Licence 7858 was relinquished on 1st September 1994.

This report details all exploration activities by Aberfoyle Resources Limited under the terms of tenure.

2. **TENURE**

Exploration Licence 7858 was granted to Aberfoyle Resources Limited for a period of six years on 15th September 1992, subject to compliance with the conditions. A twelve month renewal was granted with the second anniversary due on 15th September 1994. The licence was subsequently relinquished on 1st September 1994.

3. **REGIONAL EXPLORATION AND GEOLOGY**

The Strangways Range Complex of the Arunta Block is a 1800Ma metamorphic sequence comprising older volcanic-dominated mafic and felsic granulites, garnet gneisses and calcsilicates underlying cordierite-sillimanite gneisses and younger metapelites. The complex contains several stratiform lead zinc occurrences with metamorphosed volcanogenic characteristics similar to Broken Hill and referred to as Oonagalabi deposits by Warren and Shaw (1985).
Four APs are known to have straddled the area of EL 7858 prior to 1971 without the exploration activities being recorded. Most of the exploration since then has comprised drainage sampling for diamond indicators centred on the Mud Tank carbonatite complex; e.g. Stockdale (1974), CRAE (1983b) and Negri River (1985). Detailed aeromagnetics were only flown over the eastern edge of the licence area. Planet Mining (1973,1975) conducted coarse airborne magnetic and airborne geochemical (Airtrace) surveying. Weak Hg Pb Zn Cu Ni airborne anomalies were not verified or supported by geochemical and IP followup on the ground.

4. EDWARDS CREEK PROSPECT
Aberfoyle personnel made a brief impromptu visit to the Edwards Creek prospect while passing the area late in 1991 and observed the strong exposure of banded silicalimonite gossan with extensive staining by copper carbonates. The gossan appeared 20m wide and of significant strike length.

Subsequent enquiries revealed:-

- Warren and Shaw (1985) described the occurrence as an Oonagalabi-type deposit hosted by marbles and calcsilicates within a small fault block of felsic-mafic granulite rocks.

- The gossan was only tested by two shallow drillholes in 1980 (CRAE, 1983a)

- The prospective stratigraphic horizon was mapped by Warren and Shaw around a synclinal then anticlinal axis for at least 2.5km.

- The gossan and immediate surrounds were possibly covered by Mining Leases.
The opportunity was considered interesting enough to warrant further exploration and EL 7858 was applied for and granted.

Petrology and base metal and lead isotopic analyses supported the stratiform interpretation and anomalous nature of the gossan and its host rocks; i.e.:-

- The host has a garnet magnetite carbonate skarn character (Appendix 1).

- Three grab samples of the gossan assayed up to 1.1% Cu, 0.8% Pb, 1.8% Zn, 3ppm Ag, 0.32ppm Au and 0.9% Mn (Appendix 2).

- All three samples submitted for lead isotope analyses have a homogeneous signature identical to that of the Broken Hill-type deposits at Plenty River in the eastern Arunta Block (Appendix 3).

A search for information on the past exploration work at the prospect only located the drill logs and sections (CRAE, 1983a; Appendix 4). These are represented as Figures 3 and 4. The exact locations of the drill collars cannot be plotted but are approximately transferred from Warren and Shaw's map. This shows the two holes were drilled approximately 200m apart. The CRAE sections indicate the northern hole intersected 5m of gossan assaying up to 7.11% Cu, 0.26% Pb, 3.26% Zn, 60ppm Ag and 0.26ppm Au. The southern hole intersected 25m of "dirty marble with pyrite magnetite and minor garnet", "magnetite schist" and "pyritic schist" assaying up to 0.55% Cu, 0.57% Pb, 0.93% Zn, 29ppm Ag and 0.08ppm Au.
Five recent contiguous Mining Leases are recorded in the vicinity of the Edwards Creek prospect. ML(S) 37, 38, 39 and 40 expired on 31st December 1991 for which notice was gazetted on the 9th September 1992. This leaves one current lease ML(S) 70 in the name of Mr Bruce Fadelli. As CRAE had an agreement to drill the gossan within preceding lease ML 426H which was surrounded by ML(S) 70, it is presumed ML(S) 70 also surrounds the gossan. However, the current lease is unsurveyed and descriptions of the position of the datum peg common to all the leases places the lease approximately 3km east of the prospect as it has been plotted by the NTDME on the Laughlen 1:100,000 tenure plan. This has arisen from the use of an imprecise description of distances and bearings to the datum peg of the former ML 426 H; i.e. "3¼ miles southeast of where the Edwards Creek crosses the Beef Road" (Plenty Highway).

ML(S) 70 applies to an irregularly annular area with external dimensions of approximately 400m x 700m and internal excluded area of approximately 280m x 600m. The lease expires on 31st December 1997. The search extracts for all the mining leases are included as Appendix 5. No records of work under ML(S) 37, 38, 39 and 40 were found.

5. EDWARDS CREEK TEM SURVEY

A single loop, four line ground EM survey was carried out over the Edwards Creek gossan on November 5/6 1993. Equipment used included a Zonge GGT-10 transmitter, GDP-16 receiver and TEM-3 coils owned and operated by Aberfoyle Resources. The 800m x 400m loop was positioned such that the loop sides lay over the limbs of the host syncline, allowing adequate primary field coupling with vertical/near-vertical targets near the limbs of the syncline and with shallow-dipping targets in the keel of the fold. Lines were read both inside and outside the loop.
An operating frequency of 16Hz was selected, with both the vertical (HZ) and horizontal (HX) field components being recorded.

The data sections (Figures 1-8 as shown in Appendix 6) show a single significant response on line 5400N at approximately 5000E near the gossan position. The response is not present on adjacent lines. A computer plate model was generated to simulate the field data. The best fit model consisted of a sheet with top edge located at 4980E at a depth of 25m, dipping 60° to the east. The vertical component of this model is shown on Figure 9 in Appendix 6, for comparison.

A time constant of 1.8ms was calculated from the data. The power law decay constant was approximately 2.9, indicating the conductor is not a current gatherer.

6. EXPENDITURE
A total of $11,119.20 was expended on Exploration Licence 7858 during the term of tenure and a detailed table of expenditure appears in Table 1.
7. REFERENCES

CRAE 1983a Drill Hole Logs- Edwards Creek (ML 426H); NTDME CR83/80

CRAE 1983b Final Report on EL 3501; NTDME CR83/228

Negri River 1985 Final Report on EL 3496 and EL 3498; NTDME CR85/259

Planet Mining 1973 Annual Report on EL 637; NTDME CR73/238

Planet Mining 1975 Final Report on EL 637; NTDME CR75/135

Stockdale 1974 Final Report on ELs 811 and 812; NTDME CR74/98

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APPENDIX 1

PETROLOGICAL DESCRIPTIONS
MINERALOGICAL REPORT NO. 6007

December 23th, 1991

TO: Mr John Anderson
Aberfoyle Resources Ltd
92 Beulah Rd
NORWOOD SA 5067

YOUR REFERENCE: Order No. 12058

MATERIAL: Rock samples, Arunta, Oonagalabi Type, Stratabound, Zn, Pb, Cu deposits.

IDENTIFICATION: 402482 to 402486 (5 in all)

WORK REQUESTED: Thin and polished section preparation as requested, and description, including interpretation of possible gossanous characteristics.

SAMPLES & SECTIONS: Returned to you with this report.

PONTIFEX & ASSOCIATES PTY LTD
SUMMARY COMMENTS

The two gossanous samples 402482, 483 were examined in polished thin section. The secondary quartz micromosaic, and limonite in 402482 define a preexisting aggregate of coarse probable garnets (or possible olivine crystals). Also in this sample there is minor silicified boxwork after carbonate, and patchy limonite (±Mn-oxides) as replica after sulphides, mostly probable ex-pyrrhotite, but also probable sphalerite and galena. [These latter base-metal are interpreted partly subject to the anomalous geochemical values. Subsequently re-tested by John Anderson]. Oxidised magnetite, rarer malachite and apatite also occur in this rock.

Sample 402483 is dominated by poorly defined limonite areas, with a relict extremely fine carbonate texture (seen at x600 magnification, oil immersion). Limonite ± Mn-oxide, boxwork and replica after coarse pyrrhotite, probable sphalerite and galena are also scattered, and there is up to 10% oxidised magnetite.

The coarse granular fabric of the ex-probable-garnet in 402482, and the local ‘granuloblastic’ oxidised magnetite aggregate, (also the Mn-oxide) in both samples 402482 & 483, suggests a possible skarn assemblage; which incorporated ex-base metal sulphides. The fine carbonate, now limonitised, in 402483 may be an ex-Pb or Zn-rich species.

Sample 402484, which is reported to be along strike from the gossans has a relict schistose texture defined by Mn-oxide, and oriented Mg-rich chlorite, but this has been invaded and largely replaced by ‘secondary’ cherty quartz plus coarse carbonate. The quartz is locally microsparry surrounding vugs, this is not necessarily supergene, but rather, together with the carbonate, may have a metasomatic (?? or epithermal) genesis. [The quartz in 402482 has the same genesis].

Sample 402485 is a massive magnetite aggregate with minor interstitial tremolite (probably after pyroxene) and lesser quartz. This may be a meta, impure, BIF; (or possibly, if the quartz is secondary, it could be a cumulate layer within an ultramafic related to 402486).

Sample 402486 consists of a massive coarse, apparently primary igneous aggregate of clinopyroxene, incorporating subordinate serpentinised olivine. It is classified as a pyroxene-rich wehrlite.
INDIVIDUAL DESCRIPTIONS

402482. ‘gossan’ largely after a coarse granular (silicate-mineral) aggregate, which was probably garnet (but possibly olivine). Minor residual coarse single flakes of chlorite, rare apatite; also minor silicified microboxwork after carbonate. Limonite and/or Mn-O replica after sulphide including probable pyrrhotite, possible sphalerite ± associated magnetite. Trace fine malachite.

This rock is dominated by secondary very fine quartz and ubiquitous limonite staining. These components pseudomorphically replace a rather heterogeneous, preexisting granular aggregate most of silicate minerals with a grain size range of 1mm to 3mm, but includes minor, more intensely ferruginous exsulphide grains. Commonly the quartz is microsparry, more or less as encrustations (? along fractures), and locally enclosing very small vugs. Preserved textures suggest that the dominant former rock-forming mineral was probably garnet, but possibly olivine, now replaced by quartz, with original subhedral (subhedral) original grain outlines, also internal cleavage/microfractures, outlined by limonite. These components are locally continuous over 15mm to suggest pre-existing porphyroblasts (? or igneous oikocrysts), possibly of pyroxene. Minor flakes of chlorite (5%) to 1mm long, and rarer, smaller subrounded apatite grains are scattered, as the only residuals of the immediate pre-oxidised, silicified rock. Local fine boxwork with a regular micro-rhombic structure (incorporated within silica) is almost certainly after carbonate, and forms up to 7% of the whole rock.

More or less discrete irregular limonite replicas, and minor apparent Mn-oxide replicas, after grains to 3mm across are randomly scattered, and loosely clustered to form about 7% of the whole rock. These can be identified as other than ex-silicate (or carbonate), and almost containing ex-sulphide. The precise original sulphide species cannot be identified, however the abundance of random microtriangular pattern within the replica fabric, considered together with anomalous Zn values reported by John Anderson does suggest
original possible sphalerite. Trace very small malachite grains would contribute towards anomalous Cu values, but there is no basis on which to suggest an original Pb mineral.

At least a minor proportion of the ex-sulphide grains have internal fabric typical of lamellar-pyrrhotite. Minor small irregular grains oxidised magnetite are composite with, and partly rim some of the ex-sulphide grains.

402483. Siliceous (silicified) gossan, extensive patchy areas of limonite with an internal ultrafine fabric indicating ex-carbonate; scattered small patches of Mn-oxide, of martitised magnetite. Fairly extensive limonite replica after coarse ? pyrrhotite composite which replica after sulphide (probably including sphalerite and galena)

(Macroscopically), very dark grey to black, scattered irregular grains (and patches), up to 10mm maximum dimension, are seen in reflected light as original magnetite, (7-10%) now completely oxidised to hematite, variety magnetite. Scattered, small patches of manganese oxide (7-10%) are also black in hand specimen.

These components occur within a matrix of heterogeneous, massive (?silicified) earthy hematite and/or limonite, (± Mn-oxides), most of which (?40% of the whole sample) consists of extensive but irregular patches with an ultrafine rhombic fabric, diagnostic of original carbonate. Some manganese oxide have this fabric indicating that they also replace carbonate.

The remaining approximate 30-40% of the rock consist of poorly defined boxwork and replica textures, generally so chaotic that original mineral species are difficult to identify. These seem to include however, quite coarse and extensive areas of expyrrhotite, composite with other boxwork, surely after sulphide, and interpreted, partly subjective to the reported presence of anomalous base metal values, as sphalerite and galena. There are no textures particularly diagnostic of chalcopyrite, or of the silicate minerals seen in other samples.
Discontinuously lenticular layered coarse carbonate, through a cherty and locally vuggy siliceous matrix; also incorporating schistose serpentiferous chlorite; accessory Mn-oxides; trace fine malachite?

Fine cherty to granular, quartz mosaic forms 50-55% of this rock, vaguely layered and locally as microsparry quartz enclosing small irregular vuggy voids. Much coarser carbonate (40%), occurs in irregular lenses and discontinuous layers, through the quartz matrix, to 1mm size and rarely as infilling in some of the quartz crystalised vugs.

A schistosity is defined by flakes of oriented silica-rich magnesium chlorite (or serpentine) flakes, (optically negative), occasionally nucleated on more aluminess magnesianchlorite (optically positive).

Small irregular black patches of manganese-oxide are scattered, commonly along the local schistosity, but some are microcolloform and mixed with supergene carbonate. Rare small green grains of malachite are scattered.
Massive aggregate of fine to medium granular magnetite; subordinate intergranular tremolite (? after pyroxene), minor quartz, lesser malachite [probable Meta impure BIF].

At least 70% of this rock consists of massive, variably loose to more compact granular aggregate of subhedral to euhedral magnetite grains average individual size 1mm. This magnetite appears to be partly oxidised to hematite.

In spite of this dominant opaque oxide phase the rock was examined only in thin section (as requested), where by the interstitial/intergranular silicate-mineralogy is seen to consist of tremolite (20%) and quartz (5-7%).

The tremolite is locally optically continuous throughout adjacent intergranular areas for up to 10mm, and may represent preexisting porphyroblastic pyroxene. The quartz is relatively very fine granular (<1mm) but appears to be basically a ‘primary’ rock-forming mineral.

Accessory fine grains of malachite (1-2%) are scattered, and commonly associated with limonite, which suggest original fine in-situ sulphide (?chalcopyrite) completely oxidised. Rare irregular stringers of malachite, quartz and colorless carbonate cut the rock.
Partly serpentinised, pyroxene-rich, wehrlite.

Clinopyroxene grains to 15mm long form at least 70% of this rock, and these form a massive apparently primary igneous massive aggregate, incorporating subordinate grains of olivine to 4mm size, irregularly interstitial to the coarser pyroxene.

The olivine is extensively serpentinised, and there are veins of serpentine which extend into the pyroxene. Numerous sub-parallel micro-fractures are occupied by fine talc carbonate, serpentine and tremolite. Rare opaque oxides are scattered.

This sample is basically a peridotite, apparently a primary igneous intrusive, with the relative abundance of clinopyroxene and (serpentinised) olivine, indicative of a wehrlite.
APPENDIX 2

GEOCHEMICAL ANALYSES
SAMPLE LEDGER

EDWARDS CREEK PROSPECT
NORTHERN TERRITORY

GRAB ROCK SAMPLES

402487  Edwards Creek - marble fw to gossan.
402488  Edwards Creek - massive weakly malachite stained limonite? Slicified carbonate gossan.
402489  Edwards Creek - massive red brown hematitic? gossan.
402490  Edwards Creek - massive brown gossan with cerussitic? and limonitic mottling.
## ANALYTICAL REPORT No. 100980.35.07254

**INVOICE TO:**
Mr J Anderson  
Aberfoyle Resources Limited  
91 Beulah Road  
Norwood SA 5067

**ORDER No.** 12059  
**PROJECT**

**DATE RECEIVED:** 05/12/91  
**RESULTS REQUIRED:** ASAP

**No. OF PAGES OF RESULTS** 2  
**DATE REPORTED** 13/12/91  
**No. OF COPIES** 1  
**TOTAL No. OF SAMPLES** 10

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**REMARKS**

**RESULTS TO**
Mr J Anderson  
Aberfoyle Resources Limited  
91 Beulah Road  
Norwood SA 5067

**RESULTS TO**

**AUTHORISED OFFICER**
## Analytical Data

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- **Results in ppm unless otherwise specified.**
- **T** = element present, but concentration too low to measure.
- **X** = element concentration is below detection limit.
- **-=** element not determined.

**Authorised Officer:** D.K. Rawley
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**DETECTION** 5 0.01

**UNITS** FPM %

**METHOD** GA140 GA140

Results in ppm unless otherwise specified.

T = element present, but concentration too low to measure.

X = element concentration is below detection limit.

- = element not determined.

AUTHORIZED: D.K. Rowley
APPENDIX 3

LEAD ISOTOPE REPORT
REPORT TO ABERFOYLE RESOURCES LIMITED
ON THE Pb ISOTOPIC COMPOSITION OF
GOSSANS FROM THE EDWARDS CREEK PROSPECT,
ARUNTA INLIER, NORTHERN TERRITORY

SIROTOPE REPORT SR 214

JUDITH A. DEAN

4/07/92
1. AIM OF STUDY

The aim of this study has been to determine the Pb isotopic compositions of high-Pb gossans from the Edwards Creek prospect, Arunta Inlier, Northern Territory and to comment on the significance of these data. Edwards Creek is located ≈ 50 kms from Plenty River in "Broken Hill-type" rocks (J. Anderson, oral comm.). The prospect is described as being an Oonagalabi-type stratiform Cu-Pb-Zn-Ag-Au deposit (J. Anderson, writt. comm.). Gossans are massive to weakly banded marbles and calc-silicates in outcrop.

2. GEOLOGICAL BACKGROUND

The Arunta Block is described by Shaw (1990) as a structurally complex Proterozoic block of low to high grade metamorphics with abundant granite intrusions ranging from ≈ 1750 Ma to ≈ 930 Ma. Geochronological data for the Arunta are given by Collins and Shaw (1990) and Black and Shaw (1992). There are a number of mineral occurrences in the Arunta; however, the region as a whole remains unexploited.

Copper-Pb-Zn prospects occurring in quartzo-feldspathic gneisses and mafic granulites of the Strangways Metamorphic Complex of the central Arunta Block are grouped together as "Oonagalabi-type" deposits (Stewart and Warren, 1977), of which the Edwards Creek prospect, located some 90 km to the west of Oonagalabi, is included. The geology of Edwards Creek is described in Warren and Shaw (1985). These deposits are regarded as metamorphosed volcanogenic Cu-Pb-Zn bodies (Warren and Shaw, 1985).

The only Pb isotope data for the Arunta is from the Plenty River prospect (Dean, 1991a) ≈ 50 kms distant. Warren and Shaw (1985) suggest comparisons can be made between the Oonagalabi-type occurrences, and volcanogenic ore deposits such as Flin Flon in Canada and Nordic deposits of the Canadian Shield. They also suggest similarities with Broken Hill, New South Wales.

3. SAMPLES AND METHODS

Three high-Pb pulps were submitted by John Anderson. Lead contents ranged from 0.43 to 0.78%. A small amount of each pulp was digested in a hot 1:1 mixture of 7N HCl and 7N HNO acids in a teflon beaker. Lead was separated in anion exchange columns in dilute HBr acid solutions and purified by micro-electrodeposition techniques onto Pt electrodes.

Lead isotope ratios were determined on a VG ISOMASS 54E thermal ionization mass spectrometer run in fully automated mode. All results are normalised to the accepted values of international standard SRM 981 by applying a correction factor of +0.08% per atomic mass unit. Precision estimates, based on over 1300 analyses of standards and natural samples, are shown as error bars in the upper left hand corner of the accompanying Figures. Standard error ellipses for these data are also shown.
4. RESULTS

Lead isotope results are given in the Table and plotted in Figure 1 with reference to the average crustal Pb evolution curves, or growth curves, of Cumming and Richards (1975) and data from Plenty River (Dean, 1991a).

Data from this study fall in a restricted field which displays a $^{206}\text{Pb}/^{204}\text{Pb}$ range that is within experimental error. The data also are the same within experimental error as galenas from Plenty River area. Edwards Creek gives a Pb isotope model age of 1640 and 1720 Ma based on the Cumming and Richards (1975) and the Stacey and Kramers (1975) models respectively.

5. DISCUSSION

In the absence of Pb isotope data for the region, Edwards Creek and Plenty River are compared in Figure 2 to deposits which Warren and Shaw (1985) suggest as being similar to the Cu-Pb-Zn occurrences in the Strangways Metamorphic complex of the Arunta Block. These include deposits formed during Mid Proterozoic episodes of rifting and crustal growth such as:

1). Flin Flon - Snow Lake Belt. Deposits in this region are regarded as volcanogenic massive sulfides composed predominantly of pyrite and/or pyrrhotite with lesser amounts of Cu, Pb and Zn. They occur in volcanosedimentary sequences which have been regionally metamorphosed to greenschist - lower amphibolite grade. Lead isotope data, shown in Figure 2, yield model ages of $\approx 1750 - 1900$ Ma (Sangster, 1978; Cumming and Krstic, 1983) and have $^{207}\text{Pb}/^{204}\text{Pb}$ ratios which indicate derivation of Pb from a low $\mu$ (low U/Pb) source.

2). Finnish deposits such as Orijarvi and Vihanti of the main sulfide ore belt. These are located in schists of probable volcanic origin. Lead isotope data, shown in Figure 2, yield model ages of $\approx 1900 - 2000$ Ma (Vaasjoki, 1981). These data have $^{207}\text{Pb}/^{204}\text{Pb}$ ratios which plot below the Cumming and Richards (1975) growth curve (heavy dashed line Fig. 2) and between the mantle and orogene curves of the plumbotectonics model (Doe and Zartman, 1979). Vaasjoki (1981) suggests that the hydrothermal fluids were generated from melting of homogenized crustal material driven by mantle derived magmas.

3). Broken Hill. The Broken Hill Main Lode mineralization has a homogeneous isotopic composition (Richards, 1983; Gulson, 1984; Gulson et al., 1985; Perring and McNaughton, 1990). High-Pb mineralization associated with the metasediments and Potosi Gneiss (e.g. Pinnacles) is shown as 95% confidence ellipses centred on the Main Lode signature (Fig. 2). Epigenetic vein mineralization which probably formed during retrograde metamorphism in the Upper Proterozoic to Cambrian has considerably more radiogenic ratios.

4). Koongie Park, Halls Creek Mobil Zone. The Edwards Creek results are also compared with polymetallic volcanogenic base metal mineralization in the Koongie Park area, Northern
Territory (Dean, 1991b). These prospects occur in Early Proterozoic low-grade metasedimentary-volcanic sequences of the Halls Creek Province.

The Edwards Creek gossans from this study, and the Plenty River galenas, show isotopic similarities in $^{206}\text{Pb} / ^{204}\text{Pb}$ and $^{208}\text{Pb} / ^{204}\text{Pb}$ ratios to metamorphosed volcanogenic mineralization at Koongie Park. However, variations in the U/Pb characteristics of the source region of the Pb are indicated by the differences in $^{207}\text{Pb} / ^{204}\text{Pb}$; the Koongie Park data exhibiting a higher $\mu$ value. Similarities also exist between Broken Hill and the Arunta data. Differences in $^{206}\text{Pb} / ^{204}\text{Pb}$ ratio reflect the differences in age of the deposits.

In contrast, deposits in Proterozoic rifted environments in the Northern Hemisphere to which Oonagalabi-type mineralization has been compared, have considerably lower $\mu$ values than average crustal Pb, reflecting the much larger contribution of mantle-derived Pb in these deposits.

6. CONCLUSIONS

Data from the Edwards Creek and Plenty River prospects have Pb isotope characteristics which are compatible with deposition of sulfides from a major hydrothermal system in that they form a homogeneous group. The Pb isotope model ages are consistent with syngenetic mineralization of Middle Proterozoic age.

7. REFERENCES


Gulson, B.L. (1984). Uranium-lead and lead-lead investigations of minerals from the Broken Hill


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<tr>
<th>Sample</th>
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SAMPLE NUMBER PREFIXES REFER TO PLOTTED POINTS FIGURE 1
APPENDIX 4

CRAE DRILL LOGS
DRILL HOLE LOGS

- EDWARD CREEK -

ML 426 H

C R A E

CR 83/80
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**End of Hole 10.0m**

**Special Features**:
- 8.00 - 10.00: groundwater table encountered
- 8.00 - 10.00: slight variation in groundwater levels

**Assay Values**:
- 8.00 - 10.00: low grade with minor anomalies
- 8.00 - 10.00: high grade with major anomalies

**Summary and Special Comments**:
- 8.00 - 10.00: minor to moderate mineralization

Logged by [Name]
Date: [Date]
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**Summary and Special Comments:**

- Higher grade igneous rocks and alteration
- Whole rock samples

Logged by G.S.  Date: 3-1-87

Sheet: 1 of 3
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**Summary and Special Comments:**
- 40-60: Dark mud
- 60-70: Air stage banding with silt
- 70-100: Air stage banding and silt
- Lodged by G. F. Date 4-1-81
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**END OF HOE 119.89m.**

**SPECIAL COMMENTS:**

- Clayey silt with gravel and structure
- Penege of more parallel foliation
- Clayey silt with gravel and structure

Summary and Note:

- Dry silt with gravel and structure
APPENDIX 5

NTDME SEARCH EXTRACTS
Mineral Lease (Southern) : 37
Status: Granted Date: 07/12/71
Date and Time of Application: 05/10/70 16:00
Date Expires: 31/12/91
Survey Plan No: Not Surveyed
Area: Not available
Map Number(s): 76/2
Locality: LAUGHLEN
Name of Lease: Little White Dove
Purpose: copper
Holder Details
Current Holder(s) Shares Miner's Right ACN
FADELLI Bruce 100.00 3037 -
Applicant(s) Shares Miner's Right ACN
FADELLI Bruce 100.00 3037 -

Current balance of annual rent : -90.00

I hereby certify this to be an extract of the entry of Mineral Lease 37 in the Register of Mineral Leases.

Dated this 30th day of June, 1992.

[Signature]
Mining Registrar
THE FEDERAL TERRITORY OF AUSTRALIA

Mining Ordinance 1939-19

NOTICE OF APPLICATION FOR A LEASE

Notice is hereby given that 

Bruce Peter Padell

of 6 Warburton St., Alice Springs, N.T. the undersigned, has made application dated the first day of October 1970, for a lease under the provisions of the Mining Ordinance, 1939-19, of ground to be known as "Little White Dove" containing 20 acres, 0 roods, 0 perches and commencing: - at the Datum Peg no. ML 426H. Thence Proceeding 10 Chains West, Thence 10 Chains North, Thence 10 Chains East. Thence 20 Chains South to commencement point.

Dated at Alice Springs, this fourth day of October 1970.

Signature of Applicant(s) (or Agent) 

Bruce Peter Padell

Objections to the application above referred to must be lodged at the Warden's Office on or before the 15th day of November, 1970, and the hearing of the application will take place on the 26th day of November next.

Dated this 5th day of October, 1970.

Gold Field (or Mineral Field)
Mineral Lease (Southern): 38
Status: Granted Date: 07/12/71
Date and Time of Application: 05/10/70 16:00
Date Expires: 31/12/91
Survey Plan No: Not Surveyed
Area: Not available
Map Number(s): 76/2
Locality: LAUGHLEN
Name of Lease: Sitting Bull
Purpose: copper, nickel

Holder Details
Current Holder(s) Shares Miner's Right ACN
FADELLI Bruce 100.00 3037 -
Applicant(s) Shares Miner's Right ACN
FADELLI Bruce 100.00 3037 -

Current balance of annual rent: -120.00

I hereby certify this to be an extract of the entry of Mineral Lease 38 in the Register of Mineral Leases.

Dated this 30th day of June, 1992.

[Signature]
Mining Registrar
NOTICE OF APPLICATION FOR A LEASE

THE NORTHERN TERRITORY OF AUSTRALIA

Minning Ordinance 1939-49

NOTICE IS HEREBY GIVEN that

BRUCE PETER FADELLI

of 6 Warburton St, Alice Springs, has made application

dated the first day of October 1970, for a lease under the

provisions of the Mining Ordinance, 1939-49, of ground to be known as

"Sitting Bull"

containing 28.8 acres — rods — perches.

and commencing: — at Datum Peg, 25.24 Chains & Bearing 146 ° 18 '20"

from Datum Peg of M.R. 426 H, Thence 24 Chains North, Thence

12 Chains East, Thence 24 Chains South, Thence 12 Chains

West to Datum Peg.

Dated at Alice Springs, this fifth day of October 1970.

Signature of Applicant(s) (or Agent)

BRUCE P. FADELLI

OBJECTIONS to the application above referred to must be lodged at the Warden's

Office on or before the 4th day of November 1970

and the hearing of the application will take place on the 20th day of

November next.

Dated this 5th day of October 1970.
Northern Territory of Australia
Mining Act

SEARCH EXTRACT

Mineral Lease (Southern): 39
Status: Granted Date: 07/12/71
Date and Time of Application: 05/10/70 16:00
Date Expires: 31/12/91
Survey Plan No: Not Surveyed
Area: Not available
Map Number(s): 76/2
Locality: LAUGLEN
Name of Lease: Running Bear
Purpose: copper

Holder Details
Current Holder(s):
FADELLI Bruce
Shares 100.00
Miner's Right 3037
ACN -

Dated this 30th day of June, 1992.

Mining Registrar
NOTICE OF APPLICATION FOR A LEASE

No. MLS 339, ML 940H

NOTICE IS HEREBY GIVEN that

Bruce Peter Fadelli

of 6 Warburton St, Alice Springs, N.T., the undersigned, has made application dated the first day of October 1970, for a lease under the provisions of the Mining Ordinance, 1939-19, of ground to be known as "Running Bear" containing 10 acres — roods — perches

and commencing: — Datum Peg, 25.24 Chains, a Bearing 146° 18' 20" from Datum Peg of M.L. 426 H, Thence 7 Chains East, Thence 14 Chains South, Thence 7 Chains West, Thence 14 Chains North to Datum Peg.

Dated at Alice Springs, this fifth day of October 1970

Signature of Applicant(s) (or Agent) —

Bruce P Fadelli

OBJECTIONS to the application above referred to must be lodged at the Warden's Office on or before the fourth day of November 1970 and the hearing of the application will take place on the 16th day of November next.

Dated this fifth day of October 1970

[Signature]

Warden

Annexed Gold-Field (or Mineral Field)
Northern Territory of Australia
Mining Act

SEARCH EXTRACT

Mineral Lease (Southern): 40
Status: Granted Date: 07/12/71
Date and Time of Application: 05/10/70 16:00
Date Expires: 31/12/91
Survey Plan No: Not Surveyed
Area: Not available
Map Number(s): 76/2
Locality: LAUGHLEN
Name of Lease: Geronimo
Purpose: copper

Holder Details
Current Holder(s)
FADELLI Bruce
Applicant(s)
FADELLI Bruce

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Current balance of annual rent: -90.00

I hereby certify this to be an extract of the entry of Mineral Lease 40 in the
Register of Mineral Leases.

Dated this 30th day of June, 1992.

[Signature]
Mining Registrar
NOTICE OF APPLICATION FOR A LEASE

It is hereby given that

Bruce Peter Fadell

of 6 Ward Burton St, Alice Springs, N.T., the undersigned, has made application dated the First day of October 1970, for a lease under the provisions of the Mining Ordinance, 1939-19, of ground to be known as "GERONIMO"

containing 20 acres—roods—perches

and commanding:—At Datum Peg, bearing 153° 27' 10" & 31.31 chain from Datum Peg of M.L. 4264, thence 10 chains south, then 20 chains west, thence 10 chains north, thence 20 chains east to Datum Peg.

Dated at Alice Springs, this Fifth day of October 1970.

Signature of Applicant(s) (or Agent)

Bruce P. Fadell

OBJECTIONS to the application above referred to must be lodged at the Wardens' Office on or before the 4th day of November 1971, and the hearing of the application will take place on the 26th day of November next.

Dated this 5th day of October 1971.

Warden

Goldfield (or Mineral Field)
Mineral Lease (Southern): 70
Status: Granted Date: 11/03/77
Date and Time of Application: 21/02/72 10:30
Date Expires: 31/12/97
Survey Plan No: Not Surveyed
Area: Not available
Map Number(s): 76/2
Locality: LAUGHLEN
Name of Lease: The Firy Girdle
Purpose: Cu silver lead Zn nickel

Holder Details
Current Holder(s) FADELLI Bruce
Applicant(s) FADELLI Bruce

Shares Miner's Right ACN
100.00 3037 -
100.00 3037 -

Current balance of annual rent: -130.00

I hereby certify this to be an extract of the entry of Mineral Lease 70 in the Register of Mineral Leases.

Dated this 30th day of June, 1992.

[Signature]
Mining Registrar
**SCHEDULE**

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<td>&quot; 21 &quot; EAST</td>
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<td>M.L. 488 H</td>
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<td>M.L. 492 H</td>
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<td>REPRESSED</td>
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<td>&quot; 30 &quot; 187/10</td>
<td>AS SUGGESTED</td>
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<td>&quot; 13.6 &quot; 200/10</td>
<td>BY DIREC.</td>
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<td></td>
<td>&quot; 24.8 &quot; 80</td>
<td>OF MINES</td>
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</table>

**Total Number of Shares**: 96

Name by which lease is to be known: **THE F I R Y G I R D L E**

---

**SKETCH OF LAND APPLIED FOR**

---

*If the application is made by an Association or Company other than a Company registered in accordance with the laws in force in the Territory relating to Companies, the constitution of the Association or Company, the number of Shares, and the names of the Shareholders must be given.*

D.90102/70
**Bushby Park**

**Locality:**

The Datum Peg is situated approx. 8 miles South East of Yeppoon. The Edwardas Creek crosses the Dake Road running through Bushby Park at some stations. This crossing approx. 8.8 miles

**Appled for:** Surveyed. Received.

<table>
<thead>
<tr>
<th>Reg. No.</th>
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**Registered Lessees:**

<table>
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<tr>
<th>Name</th>
<th>No. of Shares</th>
<th>Registrar's Initials</th>
<th>Date</th>
<th>No. Transferee's Name</th>
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<tbody>
<tr>
<td>Higginson, Ian</td>
<td>9.6</td>
<td>C. H.</td>
<td>24/2</td>
<td>Francis Anthony Pownall</td>
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<tr>
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<td></td>
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<td>Pownall, Anthony</td>
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**FORFEITED EFFECTIVE 2/8/84**

**GAZETTE 645 DATED 1/1/84**

**Mining Registrar**

**DATE: 30/12/86**
### Application

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<th>Received</th>
<th>Recommended</th>
<th>Approved</th>
<th>Gazetted</th>
<th>To Whom Issued and Date of Issue</th>
<th>Term</th>
<th>Name of Lease</th>
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<td>9-9-20</td>
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### Exemptions

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<th>To</th>
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<th>Amount</th>
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<td>10-12-20</td>
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<td>65</td>
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<td>7/25</td>
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<td>4-5-80</td>
<td>1975</td>
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<td>12-5-81</td>
<td>1976</td>
<td>20</td>
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### Rent

- **Survey Fee**: £10/-
- **Paid On**: 406545

### Encumbrances, &c.

- **Plaint 4/70** Lodge 29-10-70
  - Dismissed 26-11-70
- **Plaint 1/71** Lodge 23-9-71
  - Hand 14-10-71
- Withdrawn by Consent

- **Plaint 4/71** with E.R.A. Lodge 21-7-71
  - Expired 30-6-72 Registrar 21-7-72
  - Approved 30-6-72 Registrar 21-7-72
APPENDIX 6

EDWARDS CREEK TEM SURVEY RESULTS
Figure 7