

# Open File Envelope

## No. 11,922

**EL 4250**

**BARATTA HILL**

**COMBINED FIRST ANNUAL / FINAL REPORT  
AT LICENCE SURRENDER FOR THE PERIOD  
16/4/2009 TO 20/9/2009**

Submitted by  
Helix Resources Ltd  
2009

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**Government of South Australia**  
**Primary Industries and Resources SA**

# **Helix Resources Limited**

*A.C.N. 009 138 738 Incorporated in Western Australia*



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**Final Annual Technical Report  
For the Period Ending 20<sup>th</sup> September 2009  
For  
EL4250  
Baratta  
South Australia**

**C. Johnson**

**September 2009**

**Project:** Baratta Project

**Prospect:**

**State:** South Australia

**Country:** Australia

**Tenement:** EL 4250

**Organisation:** Helix Resources Limited

**Report Title:** Final Annual Technical Report for Period Ending 20<sup>th</sup> September 2009 on EL250, Baratta, South Australia.

**Author:** Johnson, C.

**Pages:** 12

**Key Words:** Holowilena, Holowilena South, Baratta, Bibliando, Adelaidean Geosyncline, Falling Diapir, Gold, Base Metals, Sturtian Glacials.

**Commodities:** Au, Ag, Cu, Pb, Zn

**Nearest Town:** Cradock

**1:250k Map No:** SI 54-1, SH 54-13

**1:250k Map Name:** Orroroo, Parachilna

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## EXECUTIVE SUMMARY

EL 4250 is located approximately 45km ENE of the township of Cradock. The tenement straddles the boundary between the Orroroo 1:250K sheet to the south and Parachilna Sheet to the north.

Access to the tenement is on gravel roads and station tracks off the Barrier Highway from Yunta via Baratta Station or from Cradock. Helix Resources acquired the tenement as part of their broader Adelaidean exploration strategy principally exploring for sediment hosted Cu and epithermal to mesothermal lode Au.

Several small workings for copper and gold are present near the margins of the Baratta tenement however none are known within the project.

Helix completed **a review of historical data** for the area and identified a small area of anomalous stream sediment results on the central western margin of the tenement. Also of note was the inconsistency of position within Adelaidean stratigraphy both between map sheets and recorded by several of the previous explorers in the region. **A compilation map and interpretation was made from the existing data and state geophysical data sets.** This map led to the conclusion that the central portion of the Baratta tenement could represent the core of a falling diapir. As a result **a 3 day field mapping and prospecting visit** was made to the area with the aims of assessing the style of diapirism and identifying if a large mineralised system could be present (if poorly exposed) for further exploration.

A small diapir breccia vein associated with conjugate joint slip was identified in the area of stream sediment anomalism along with weakly developed low temperature carbonate sulphide veins. Also in this general vicinity were several brittle sandstone units which contained ferruginous quartz veins weakly anomalous in gold and arsenic. The style of diapirism exposed in the tenement

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appeared to be largely fluid through-flow dominated and would broadly support the model of an unbreached falling diapir geometry. The low temperature style of veining and alteration along with the generally metal poor alteration associated with fluid “leakage” and the likelihood that access with regard to topography for drilling would be extremely difficult, resulted in the decision to relinquish the tenement.

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## **1. INTRODUCTION**

### **1.1. Location and Access**

EL 4250 is located approximately 45km ENE of the township of Cradock. The tenement straddles the boundary between the Orroroo 1:250K sheet to the south and Parachilna Sheet to the north (**Figure 1**). The tenement covers portions of Holowilena, Holowilena South, Baratta and Bibliando Stations.

Access to the tenement is on gravel roads and station tracks off the Barrier Highway from Yunta via Baratta Station or from Cradock.





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## **1.2. Exploration Rationale**

Helix Resources acquired the tenement as part of their broader Adelaidean exploration strategy. This strategy is focussed principally on sediment hosted Cu with interest in epithermal to mesothermal lode Au and bulk tonnage targets also considered.

Helix Resources was encouraged by macro-scale features, which highlight the region as having potential for significant mineralisation. The large right hand bend of the Adelaidean stratigraphy associated with the Nackara Arc along with the associated fold interference developed by interaction between the Nackara Arm and Central Flinders Zone as well as probable reactivation of basement structures led to an interest in the Baratta area. Additional features of interest were the proximity to the basal Tapley Hill Formation unconformity. Proximity to the Worumba Diapir and the Bibliando Dome as representatives of mineralised falling diapir geometry and possible unbreached diapir positions respectively were considered positive indicators for the broader region.

## **2. GEOLOGY**

### **2.1. Geology**

EL 4250 is located in the transition between the Central and Nackara Arms of the Adelaidean fold belt. The Adelaidean Geosyncline sediments vary in age from 850 to 570 Ma. These include, from oldest to youngest, the Callanna, Burra, Umberatana, and Wilpena Groups. The Adelaidean sediments in the area are mostly members of the upper to middle glacial sequences of the Sturtian Series. The Tapley Hill Formation is the lithology represented in the tenement area.

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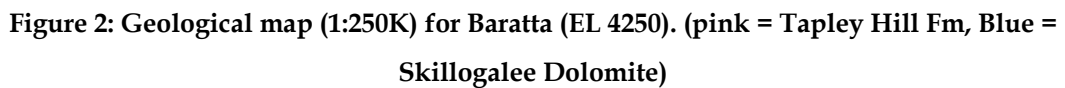
## **2.2. Structure**

The fold and fault patterns in the region are broadly the result of the Delamerian Orogeny (450 – 500 Ma).

## **2.3. Mineralisation**

No historic prospects occur directly within EL4250, however a considerable amount of shallow “recent” alluvial/colluvial cover is present in the area along with the possibility that remnants of Permian glacigene are present in some locations.

Several mineralisation styles occur in the area and based on along strike position, stratigraphic position, structural features (faults and diapirs) as well as a small amount of previous regional geochemistry it is likely that discordant and stratabound sediment hosted mineralisation styles are present on EL4250.



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### **3. WORK COMPLETED**

Helix conducted a review of previous exploration in the region, a compilation/reconciliation of geology maps and a 3 day on ground mapping and prospecting assessment of the project. As part of the field assessment 6 rock chip samples were collected and assayed.

#### **3.1. Review of Previous Exploration**

The majority of historical exploration work in the area did not cover EL4250 with any significant “on ground” work. Areas of historic focus were located off the tenement to the south west around Matt Whim and extending to the area of several magnetic geophysical features and historic prospects further south west from there (Appendix 3). The other area of significant historic focus was the Baratta Pb, Ag, Zn field which includes the Eukaby and Crusader Cross mine areas to the ENE/NE of EL4250.

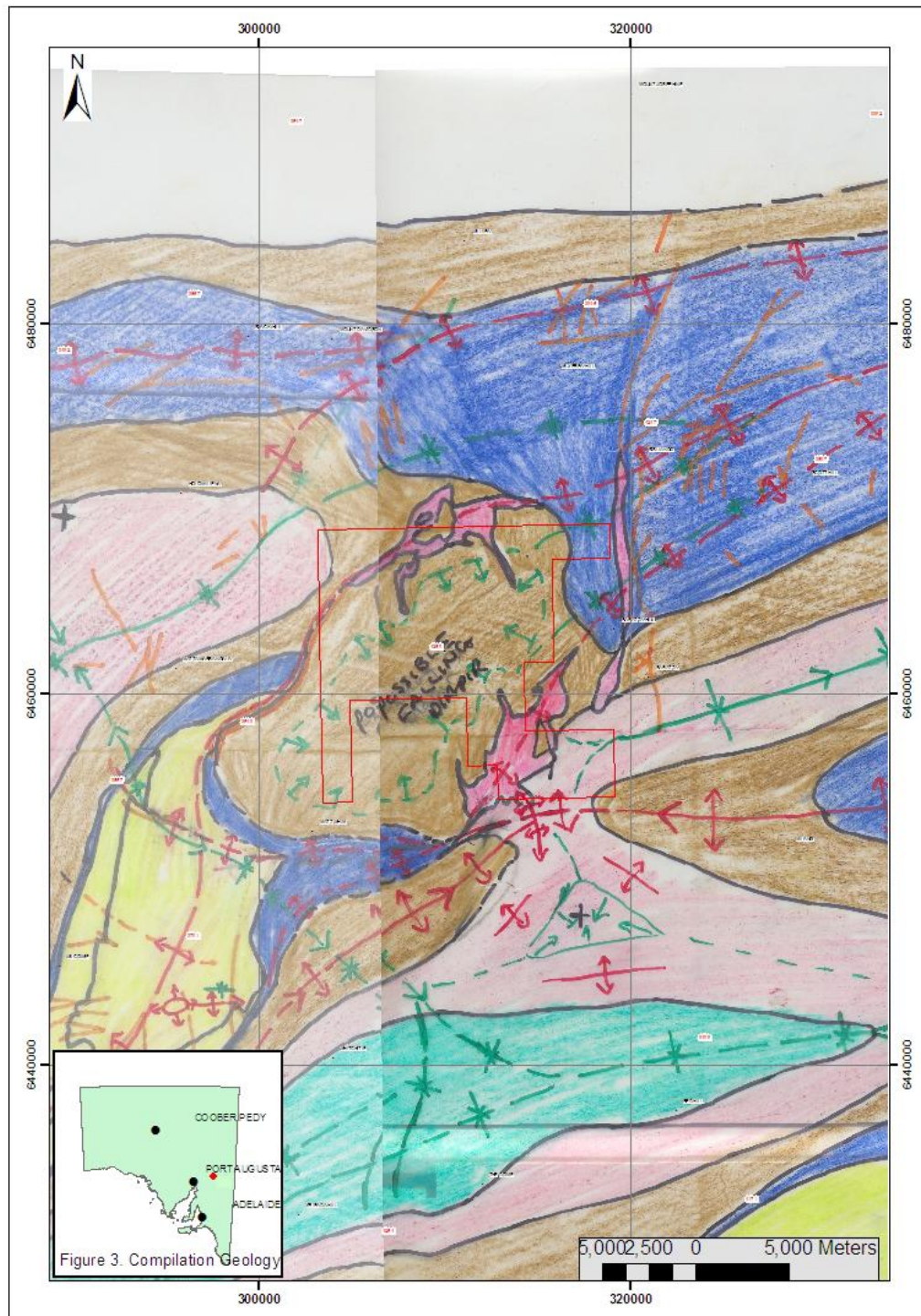
A small number of stream sediment geochemical samples indicated that one untested geochemical target was present in the central western portion of the tenement along Holowilena Creek. This coincided with a structure that hosts a historic Au and Cu mine/prospect further to the west.

#### **3.2. Compilation Mapping**

During review of geological mapping in the area it was noted that the two generations of mapping conducted between the Orroroo and Parachilna 1:250K geological map sheets have resulted in an apparent mismatch in the stratigraphic position exposed (Figure 3). When incorporated with other confusions in stratigraphic levels made by previous explorers in the Baratta area with regard to the Tarcowie Siltstone and the Tapley Hill Formation it was clear that there was some value in attempting to resolve this and the overall fold patterns in the area. This attempt resulted in the conclusion that the roof



zone to a falling diapir may be present. The resulting concave slab of Tapley Hill Formation dominated sediments central to the tenement may have focussed fluid back toward the outer edges of the slab to produce the diapir breccia pattern observed in the 250K mapping.



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**Figure 3: Geological Compilation Map for Baratta (EL 4250). Brown = Tapley Hill Fm, Blue = glacial till sequences.**

### **3.3. On Ground Prospecting – Mapping and Rock Chip Sampling**

Prospecting work focussed on resolving the geological mismatch seen in the 250K mapping and locating and identifying the style of alteration and or mineralisation associated with the rim of the proposed concave slab of Tapley Hill Formation. A total of 6 rock chip samples were collected.

The area of anomalous stream sediment sampling was traversed resulting in the identification of a small discordant sand dyke associated with diapirism along with low temperature carbonate veins with trace sulphide mineralisation nearby. Samples from both of these locations yielded generally poor results with only weakly elevated Mo results.

A sample from a strongly veined massive sandstone unit in the Holowilena Creek area yielded anomalous results for gold and arsenic with the discordant Qz-He veining dying out rapidly in the surrounding ductile units.

Inspection of outcropping breccia units indicated that these broadly cut stratigraphy at high angles with sharp contacts and were dominated by sand sized detritus. Through-flow lamination was strongly evident in the high topographic relief margins to the breccias and lacked indications for significant amounts of metal sulphide or oxide mineralisation.

Poor outcrop in the central portions of the tenement would at least geomorphically support a model for a preserved roof to a diapir like fluid migration feature.



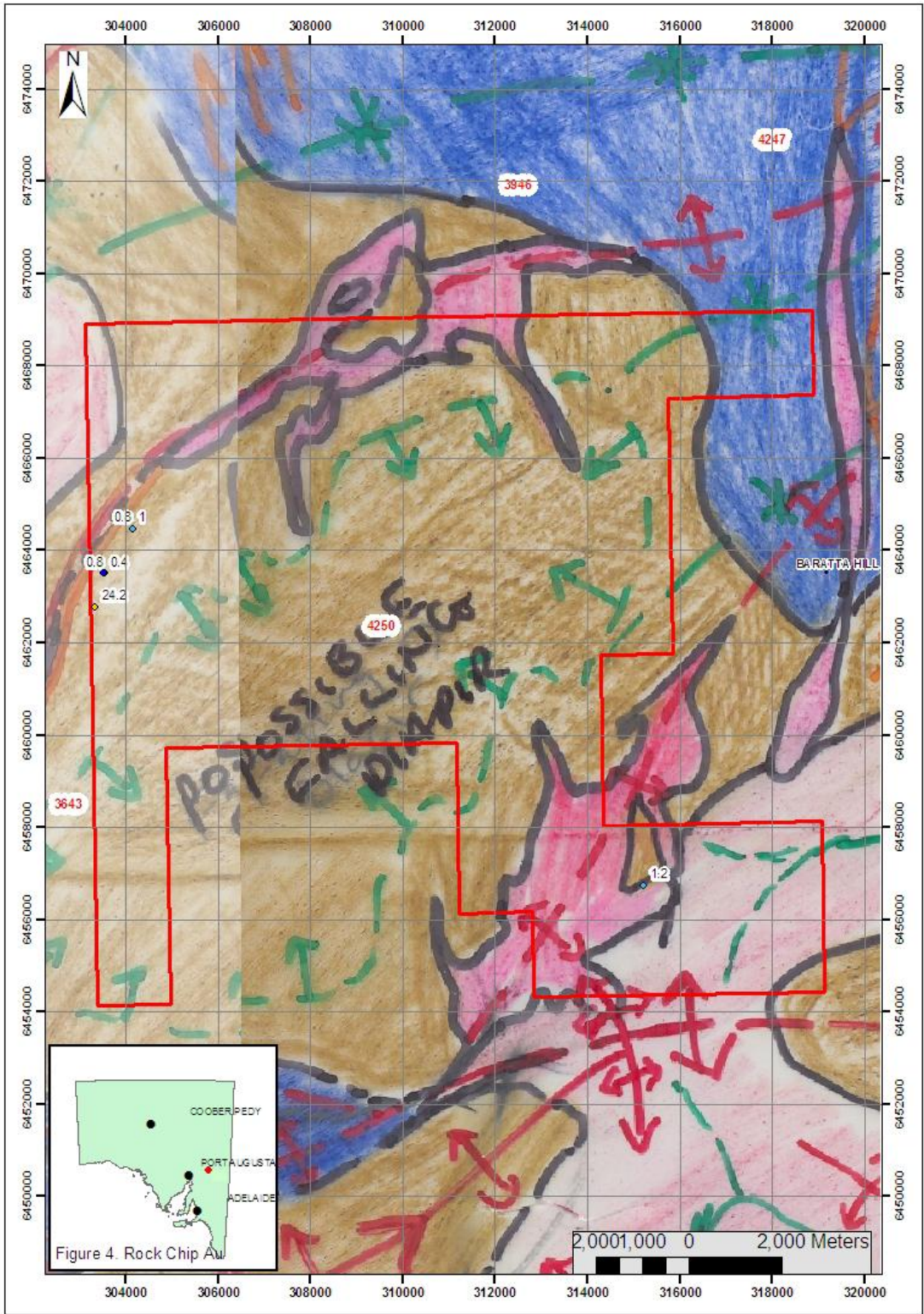


Figure 4: Rock Chip Sample Locations Showing Maximum Gold Assays (ppb).

#### **4. CONCLUSIONS AND RECOMMENDATIONS**

The features observed on EL4250 broadly support a model for a falling diapir type structure in the area. Substantial fluid through-flow has occurred at the margins of the possible roof to this structure but generally appears to be metal poor. There is an absence of any obvious regional to local scale geophysical targets in the regional data which would justify drill testing for project advancement. Geophysical surveys of detailed airborne magnetics, gravity, IP in combination or isolation would be required over a large area in an attempt to generate a focus for drill targeting. The landscape in the most immediately promising areas visited as part of the on-ground assessment is located within extremely rugged topography.

On the basis of the above observations Helix elected to relinquish EL4250.



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## 5. EXPENDITURE

### *Form 5 Expenditure*

#### *EL4250*

*Grant Date 16 April 2009*

*Total Expenditure to 22/09/2009*

#### **MINERAL - EXPLORATION ACTIVITIES**

Employee Costs	8,908
Tenement Costs (excl Rent,Rates and App'n Fees)	554
Exploration Costs	298
Assay	123
Travel	152
Vehicles	102
Other	42
	<b>10,179</b>

#### **ANNUAL TENEMENT RENT AND RATES**

Rent	1,216
	1,216

#### **ADMINISTRATION OVERHEADS**

Overheads	1,881
Total	13,276
Add GST on Rent	122

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**Claimable Expenditure 13,398**

## **APPENDICES**

Appendix 1: Rock chip data

Appendix 2: Baratta Area Previous Exploration Summary

H1000 SITE\_ID ORIGINAL\_ EASTING ORIGINAL\_ NORTHING ORIGINAL\_ HEIGHT SAMPLE\_ MEDIUM REMARKS

H1001 metres metres metres

H1002

H1003

H1004

5 5 100

D 240908 303528 6463500 500 ROCK coares calcite veins pink and white calcites with 1cm internal zone from wallrock containing trace sulphides: pyrite and

D 240909 303524 6463499 500 ROCK coarse calcite veined dolomite/limestone bed

D 240910 304137 6464468 500 ROCK incipient bx vein in shale at along strike trend of sand dyke Qz and He/Mt mixed micaceous iron and wallrock bx vein at margin of sand dyke

D 240911 304139 6464470 500 ROCK

D 240912 303334 6462767 500 ROCK stockwork qv and He/Mt veined coarse sandstone unit siliceous and Fe gossanous boulders in creek possible fault - insufficient O C to interpret

D 240913 315225 6456738 500 ROCK

EOF

LAB\_JOB\_NO

Ars Au Au2 Au3 Cu Mo Pb Zn

ppm ppb ppb ppb ppm ppm ppm ppm

AR102 AR002 AR002 AR002 AR102 AR102 AR102 AR102

0.2 0.2 0.2 0.2 0.5 0.1 1 1

0.2 0.2 0.2 0.2 0.5 0.1 1 1

u158393 7 0.8 23.5 0.2 7 6

u158393 15.2 0.4 -0.2 0.2 17 2.2 18 18

u158393 6.8 1 26.5 0.6 3 34

u158393 23 0.8 5 2.8 2 9

u158393 6 24.2 23.2 24.4 10.5 1 7 12

u158393 58.6 1.2 1 1 19 4.1 3 53



## Helix Resources Limited

A.C.N. 009 138 738 Incorporated in Western Australia

# Memo

To: Mick Wilson  
From: Craig Johnson  
CC:  
Date:  
Re: Baratta Hill Tenement EL4250

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## SUMMARY:

### Summary of Previous Work

The majority of exploration work completed historically in the area does not cover EL4250 with any significant "on ground" work. Areas of historic focus were located to the south west around Matt Whim and extending to the area of several magnetic geophysical features and historic prospects further south west from there. The other area of significant historic focus was the Baratta Pb, Ag, Zn field which includes the Eukaby and Crusader Cross mine areas to the ENE/NE of EL4250.

Several mineralisation styles occur in the area and based on along strike position, stratigraphic position, structural features (faults and diapirs) as well as a small amount of previous regional geochemistry it is likely that discordant and stratabound sediment hosted mineralisation styles are present on EL4250 for commodities including Cu, Ag, Pb, Zn, Au.

No historic prospects occur directly within EL4250, however a considerable amount of shallow "recent" alluvial/colluvial cover is present in the area along with the possibility that remnants of Permian glacigene are present in some locations.

One geochemical target has been identified from previous work along Holowilena Creek. And this coincides with a structure that hosts and/or may control the occurrence of Au and Cu mineralisation elsewhere. This location presents an area which requires immediate on-ground inspection.



Analysis of the geology of the area and compilation of disparate information between the Ororroo and Parachilna map sheets has resulted in an interpretation that the central portion of the EL4250 represents a falling diapir geometry with a “raft” of Tapley Hill Fm preserved on top ringed by breccia and faults. In addition the fold interference patterns associated with the major NW striking flexure of the Adelaidean basin lend some support to an association of structures at the Waukaringa Gold Field and the development of structure within EL4250 which also has associated Au mineralisation. Further inspection for possible Au mineralisation should be pursued in this location.

As is the case for much of the Adelaidean sedimentary sequence, the specific units that host mineralisation and that are present in the area in general have been and could still be considered to be of some contention.



## PROJECT REVIEW:

### Geology

The area is dominated by “Sturtian” sediments largely considered of glacial origin. These units comprise of boulder tillites, siltstones, arenites and minor haematitic siltstones and sandstones. The Tapley Hill Formation unconformably overlies this package and is represented by a series of sandstones and siltstones that are commonly dolomitic.

Multiple zones of “diapir” breccia are present. The diapiric breccias dominantly strike north-northeast and north-south in discordant fashion. Concordant occurrences are also known at Baratta Copper Mine (the location of this mine is unclear?).

The fold style in the area is transitional between arcuate folding associated with the influence of the Nakara Arm of the Adelaide Geosyncline and the dome and basin style folding associated with the Central Flinders Zone.

On the macro scale the dominant trend is for structure and lithology to strike NE to ENE. The predominant plunge of these folds has been quoted and mapped as being to the WSW to SW. Anticlines have been described as being asymmetric with south limbs steeper than northern limb. A NNW over SSE transport direction has been inferred from this feature. Fold axial plane cleavage dips north. The main faults are NNE striking with small displacements of N block east (dextral) cited.

The area is considered to be associated with a probable basement high often referred to as the Bibliando Dome.

### Mineralisation

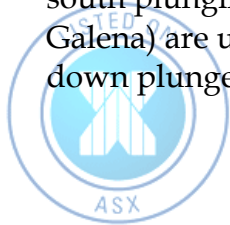
Total Au production for the Adelaidean up to recent time is quoted at 180,000 ounces. About 90% of this came from the Nackara Arc located further south-east. Only a very minor amount of Gold, Copper and other Base Metals have been recovered from the Baratta Field. Specular haematite occurrences are noted in association with “diapirs”.

Prospects located in the region near to EL4250 include:

***Baratta (includes Eukaby, Crusader Cross etc) Ag, Pb Mine.***

Total production of 2000t of metallic Pb

Mineralisation strikes 7km in a corridor ~1km wide. A structural model of ~10-15 degree south plunging ore shoots is described. These individual shoots (as qtz breccia veins with Galena) are usually <1m thick and 10's of metres high but have a “remarkable” continuity down plunge. The veins have not been found in economic accumulations where the shoot



occurrence and proximity across strike is close enough for amalgamation into a single larger scale operation.

The mineralisation is hosted on the north limb of a syncline. The host geology is said by most workers to be the Tapley Hill Fm. That being said, Forwood (1972) indicated that there was a common confusion at Baratta Ag, Pb mines with regard to the host unit. Forwood indicates the Tindelpina Shale to Mt Caernarvon Greywacke position whilst several others explorers quote the host as Tarcowie siltstone.

3 vein styles noted

- bedding trend parallel with drag folds (Ga)
- offset and crosscut set 1. Carry qtz, limonite, +/- Ga
- mainly barren milky white in joint planes

#### ***Baratta Copper Mine.***

160t ore at 20% Cu. Very long strike of mineralisation ie >1km but narrow single lodes 0.6-1.2m principally known in oxide and carbonate ores (siderite/quartz veins). Stratabound copper with persistence for 9.2km strike as a narrow qtz-siderite layer in "Wilyerpa Fm".

#### ***Red Hill Mine Copper.***

Small pits and shafts over 500m strike. Mineralisation is as encrustations of malachite and azurite and rare cuprite nodules in a shear at low angle to "Tapley Hill" slates. There is bleaching and kaolinisation of rocks which is largely attributed to hydrothermal alteration.

Copper staining on joints is noted up to 4m from main vein/zone. Multiple veins/zones are noted are on the scale of <1m veins. Spoil and dozer cut samples assayed 0.1 to 1.5% Cu.

#### ***Anesburys Claim.***

Located ~ 2.5km on bearing of 310° from Bagalow Station. Mineralisation is as fissure veins ~25cm wide and ~160m strike with carbonate fill. The veins have a ~NS strike and dip ~70° to west. Samples taken from ore are 6-8% Cu.

### **PREVIOUS EXPLORERS:**

#### **WMC - EL310 1976-1978**

Chasing Olympic Dam style targets covered top 2km NS and 15km EW strip of HLX tenement.

#### **Work Completed:**

Reconnaissance

Ground Mag (120km)

Gravity (120km) 100m station spacings

Stratigraphic DD hole:

BTD1 completed to 562.3m, Location: general 330500E/6479200N (not on HLX tens)



Drilled siltstones and fine grained quartzite in rocks said to be stratigraphically below the Wilyerpa Fm. No base metal intercepts or values were quoted or considered of significance by WMC.

They state that they did not intercept the source of the magnetic and gravity responses they were targeting.

### **BHP Minerals EL971 1982-1983**

Chasing Olympic Dam style targets - covered eastern 11km NS from north by 8km EW

#### **Work Completed:**

1:50K mapping  
Gravity anomaly modelling

The main work was located to the NE at the Baratta Mine area.

WMC petro report from BTD1 quoted as containing siltstone and granite glacial erratics with pre sedimentation sulphide mineralisation? Referred to as porphyry Cu style (Bi, Kspar, rutile) and weak post sedimentation bedding plane veinlet sulphides in siltstone (Py, Po, Cpy, Ga at 525.4m). Sulphide remobilisation was evident including pyrrhotite porphyroblasts. Biotite alteration was developed in nose of microfold.

### **BHP Minerals EL2085 1995-1997**

Covered west ½ of HLX tenement

Target -Copper in Neoproterozoic Rocks specifically stratiform Cu oxide and sulphide assoc with diapirs esp supergene blankets on Callanna rafts under recent cover

#### **Work Completed:**

Literature Review  
Airborne TEM 270 line kM 500m line space EW lines  
Ground Magnetics 52 line Km  
Ground EM on three targets  
Geochemical Sampling – none in HLX area  
Data Interpretation  
3 anomalies generated in TEM

Anomaly	Easting AMG	Northing AMG	Comments CJ
W17	297200	6449700	NW fault awarm trace
W18	300280	6449700	Old Cu mine Prospects nnw of Red Hill Mine
W38	296200	6452750	NW fault swarm trace





4 Areas of mag anomalies covered by ground mag with modelled depths at 15-95m. None in HLX tens

Site #	Body #	Easting	Northing	Depth (m)	Susceptibility	Comments
Site 1	Body1	300765	6448100	16	0.031	Fe alteration holowilena style
	Body2	300930	6448100	16	0.04	"
	Body3	300870	6448100	13	0.05	"
	Body4	300825	6448100	13	0.043	"
Site 2	Body1	298245	6450810	65	0.28	Poss MD?
	Body2	302810	6450810	65	0.26	Fe alteration holowilena style
Site 3	Body1	297000	6453910	96	0.37	Poss MD
Site 4	Body1	296490	6458850	50	0.04	Fe alteration holowilena style

Geochem elevated over or adjacent to 3 of 4 mag anomalies

Drilled 1 RC hole (WR97001) over W18 anomaly intersecting black carbonaceous dolomitic siltstone with "uniformly low" results.

#### **Swan Resources EL 690 ~1980**

Dominantly explored for diamonds but others styles stated as considered. SW corner of HLX EL

Dolerites identified in area.

Most work of little relevance to HLX targeting

#### **Cominco SML102**

Explored for diamonds. Eastern half of HLX EL.

#### **Work Completed:**

IP surveys completed

Soil sampling 39 samples

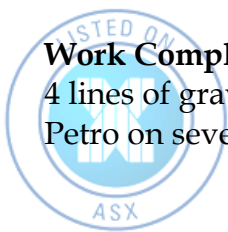
#### **North Broken Hill Ltd SML 603 and 719 1971-1972**

Eukaby and Crusader mine areas.

#### **Work Completed:**

4 lines of gravity on vein extensions

Petro on several ddh drilled DDH.EU1 – 8+



Noted poor across strike freq of veins for bulk tonnage styles

### **Cominco SML147 1967**

Eastern half of HLX tenement.

#### **Work Completed:**

Geochem auger sampling – abandoned as could not penetrate river gravels

Geological mapping

Geophysical surveys IP

Drilling -

3 diamond holes at 2 IP targets with no significant mineralisation encountered. The hole did contain pyrite which was considered to have produced the IP effect targeted.

Hole 1. ~175m depth 55°/332°

Pyrite up to 2% dissem, Ga in qz veins (up to 20% Ga in a south dipping vein) increasingly carbonaceous lithology with depth.

Hole 2 ~160m depth 52°/332°

Carbonaceous sandstone and turbidites down into ripple marked sandstones. Trace pyrite cubes.

Hole 3 ~75m depth 48°/332°

Leached and oxidised siltstones and sandstones of pale green, brown and grey grading through purple to carbonaceous shales at depth. Iron oxide filled angular cavities ex pyrite?. Sulphides developed in carbonaceous shales up to 3% to end of hole.

### **EL2265 Mawson and Lynas 1997-1998**

Eastern half of HLX tens

Various models incl telfer, OD, Cloncurry, BHT/Cannington, IR. Got excited by thrust ramp models.

#### **Work Completed:**

Reconnaissance and prospect review work by Vearncombe and associates of a generally "goldcentric" structural controlled nature.

Geophysical interpretation

Minor geochem

Vearncombe noted that stockworks in fold noses offered the a possibility for getting a larger rock mass mineralised than the long strike extent narrow single veins typical of gold mineralisation in the region.

### **SML328 MV Wright 1970**

Tenement location wraps around north and western edges of HLX tenement.

#### **Work Completed:**



Copper, lead, zinc geochemistry producing an anomaly in stream sediment and rock chip sampling.

Ground magnetics considered to have no meaningful results.

Noted that shear planes and bedded shear planes at or near top of "Sturtian" contain widespread Cu mineralisation.

Rock types described as cherty limestones, quartzites and shales striking WSW-ENE and dipping steeply SE, said to represent the east limb of an anticline plunging SW.

Minor NS trending shears are noted in the area.

Geochemistry was traced to a low hill of brecciated shale and manganiferous limonite. Indicated that the best geochemistry results were located on the easternmost of two NS trending shears at the point it hit the breccia zone.

Samples from shallow prospect pits returned 0.29% Cu, 0.18% Zn and 0.43% Pb though described as having no visible mineralisation.

Stream geochemistry also identified an anomalous Cu value along the road from Matt Whim to Windowarta Hut. Anomalous Cu was also noted near Holowilena Creek on fault and near west edge of tenement

#### **Utah Development Co EL94 1973-1975**

##### **Work Completed:**

Review/research

3 hole program planned – no idea of if this was even done?

#### **EZ EL1435 1987-1988**

Targeted based on magnetic anomaly looking for Jurassic? carbonatite mineralisation models P, Nb, Ce, Sr

##### **Work Completed:**

Ground magnetics over the ~NNW trending magnetic anomaly and modelled it with a suggested dimension of 50-100m width and up to 5km strike possible steep east dip.

Considered that this was sourced by iron alteration of style like Holowilena ironstone.

Signature and orientation look like dolerite to me but may have been drilled and proven as ironstone by later workers?.

