R97/01057

REPORT OF MINERAL EXPLORATION

Geo Developments P/L

ACN 066 233 136

EL 2223

Geo Developments Pty Ltd

For the twelve months ending: 25/10/97

Prepared by Dr D.T. MILLER

SUMMARY REPORT OF MINERAL EXPLORATION

Exploration Licence Number:	**2223**
For twelve months ending:	**25/10/97**
Operator/Manager:	**Geo Developments Pty Ltd**
Minerals sought:	**ALL except opal**
Prepared by:	**Dr David T. Miller**
Date:	**15 December, 1997**
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SUMMARY OF OPERATIONS

Exploration activities on EL 2223 during the past twelve months have included geological mapping, sampling and detailed investigations of mining activities at the Prince Alfred mine site. Inspections of the Prince Alfred mine in relation to Heritage and environmental issues have also been conducted.

As a result of preliminary research exploration, emphasis has been placed on stratiform base metal occurrences and gold mineralisation associated with the Burra and Umberatana Group sediments.

The information recovered from old records reveals several periods of active mining operations at and around the Prince Alfred Mine. The period of most interest occurred between 1968 and 1980. Minerals Mining and Metallurgy Ltd held mining licences (ML 4332, 4333) at the old Prince Alfred mine. Records recovered so far indicate that the mine included a crushing - milling plant, a concentrator, oxidation plant and deposition tanks. The site included a number of buildings including housing for several staff. Operations at the mine ceased in 1974 with the plant placed on care and maintenance. The MESA records discuss dismantling buildings and processing infrastructure in the latter part of the 70's. Correspondence between the operator and MESA indicated a protracted situation regarding the rehabilitation of the site.

We are persevering with the historical research of the Prince Alfred mine site because our company is considering the merits of this site for ore processing and the potential for further mining activity. It is reported that the original mining operations(1868 - 1907) produced a considerable volume of mine tailings, much of which was used to infill the mine stopes. Our assays of this material indicates an average grade of 1.2% Cu. Our initial laboratory tests indicate that this material could be easily processed to win the copper metal. The economics of this idea is difficult to assess without determining the amount and accessibility of the tailings within the mine workings. Minerals Mining and Metallurgy Ltd exploited the tailings stock piled on the surface near the mine but didn't appear to have attempted to access the old stope fill. We have determined that two heaps of fine tailings left at the mine site are re-processed tailings from the MM&M work in the 1970's. These tailings contain approx. 1% copper and may be suitable for further processing.

Our investigations have also revealed some 20 exploration drill holes located around the old Prince Alfred mine site. It was only by chance that a poor quality map of the drill holes was located in correspondence between the operator and MESA (MESA Doc 95 re SML 401). The existence of these drill holes is not recorded on the Minerals Index map and at this time no logs or reference to this drilling program has been located in exploration licence records for Minerals Mining and Metallurgy Ltd. Several sample bags of drill chips from this drill program are located in a small adit beneath the old mine pump house. It is obvious that people visiting the mine site have destroyed the samples.

Recent field trips to the area have been successful in locating three drill holes referred to in ENV-1395 as Wilcowie 1, 2 & 3. There is a small adit at this location with some very rich copper carbonate minerals.

A report has been submitted to the Senior Environmental Officer at MESA regarding the breach in the old (viz 1900) tailings dam wall. A plan and photo showing the breach and the geochemical dispersal train from the dam was submitted with the report and are included in an appendix to this 12 monthly report. Mr Elliott (Senior Environmental Officer - MESA) has assessed our report and forwarded it to the 'Mining Branch - MESA'. We also sent additional information to Mr Matthews in the mining section. A phone conversation with Mr Matthews indicated that Mr Talbot at the Peterborough office was making preliminary investigations. We arranged to meet Mt Talbot at the Prince Alfred mine in early July. Our inspection of the mine with Mr Talbot revealed that the tailings dams (two of them) from MM&M were also breached and in very poor condition. We also discussed the open shafts and poor stability of the old mine workings, as well as, the amount of rubbish still remaining from the 1970's mine operations.

Geological mapping has been conducted north and south of the old mine site. Samples of rock, soil and water (bore water) have been collected and submitted for analysis. Tables 1 and 2 summarise the results. Preliminary geological maps and plans are included in this report.

Details of archaeological interest at the Prince Alfred mine site are being documented and new findings have been submitted to the State Heritage Branch of DENR. We have informed them of a small cemetery located 500m north of the mine. Two grave stones are preserved at the cemetery. Some 10 buildings from the 1900's mining period are in various states of decay. A sizeable village for mine workers obviously occupied this location.

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1. Field operations

ACTIVITY	DESCRIPTION	DAYS
Site inspections:	Access, owner contact	4
Geological mapping:	preliminary mapping	18
Geochemistry:	Sample collection, analysis	3
Geophysics:		0
Environmental mapping:		2
Trenching:		0
Drilling:		0

TOTAL **27 days**

2. Data analysis

ACTIVITY	DESCRIPTION
Geochemistry	Prepared 32 samples for analysis
Geology	Structural and geological map preparation
Geophysics	Nil
Trenching	Nil
Drilling	Nil
Environment	report on breached tailings dams at Prince Alfred Mine

EXPENDITURE

Expenditure for period 25 October 1996 to 24 October, 1997:	**$28 645.16**
Expenditure for period 25 October 1997 to 24 October, 1998:	$0.00
Total expenditure to October 24, 1997:	**$28 645.16**

PROJECT EXPENDITURE - for the 12 month period **October 24, 1997**

Geological and geophysical costs

Sample analysis - Amdel	**$381.26**
Equipment (including sample bags, survey pegs)	**$35.00**
Drilling	**$00.00**
Trenching	**$00.00**

Logistics

Professional labour	
Data processing, analysis, interpretation, report preparation	
@ \$50-00/hr for 113.0 hrs; @ \$60-00 hr for 44 hr	\$5650.00
	\$2640.00
Operations supervision (geological, geophysical, earthworks, drilling) @ \$70-00/hr for 90.0 hrs; @ \$80-00/hr for 120 hr	\$6300.00
	\$9600.00
Other labour	
Field assistant @ \$40-00/hr for 0.0 hrs	\$0.00
Sample preparation @ \$25/hr for 6.0 hrs; @\$35-00/hr for 2 hr	\$150.00
	\$70.00
Aboriginal site inspection	\$0.00
Vehicle (field trips 2450 km @ \$0.56/km)	\$1372.00
Report preparation	\$69.75
Title searches, SAMREF	\$142.75
Camp costs	\$512.88
Public liability Insurance	\$0.00

Administration costs

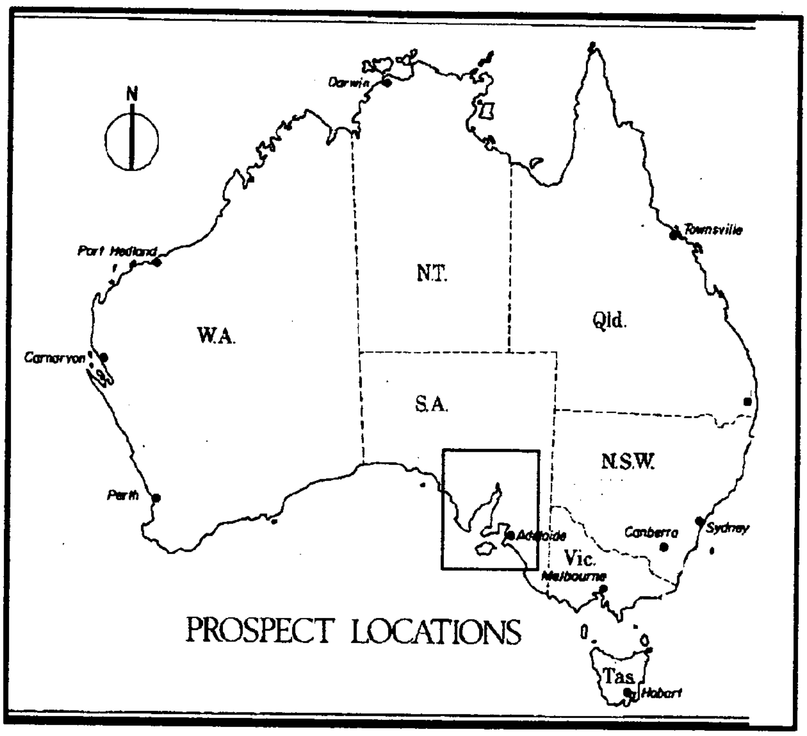
EL application (EL2164 & 2223)	\$306.00
EL rent - 25 October 1997	\$222.00
EL rent 25 October 1997 to 25 October 1998	\$399.55
EL stamp duty	\$20.00
EL registration charges	\$18.00
Mineral claim registration	\$0.00
Office (maximum of 10% of exploration budget per 12 months) (phone, fax, printer, paper, ink, drafting material, stationary-general etc)	\$756.00
TOTAL	\$28 645.19

1 INTRODUCTION

This report details exploration work conducted on EL 2223 located 70 km north of Orroroo (Figure 1) along the eastern side of the Flinders Ranges. The exploration area is situated within the tectonic province referred to as the Adelaide Geosyncline or Delamerian Fold Thrust Belt. The Tenement resides on the western edge of a sub-province known as the Nackara Arc.

The Tenement is situated on the north-central portion of the Orroroo 1:250 000 map, with the Tenement lying between latitudes 32^0 02' and 32^0 11' S, and longitudes 138^0 43' and 138^0 48' E. The Tenement covers an area of 131 km^2. The nearest towns are Carrieton approx. 40 km to the southwest and Orroroo approx. 70 km to the south.

The topographic relief is hilly with scrubby vegetation mainly confined to the eastern side of the Tenement.



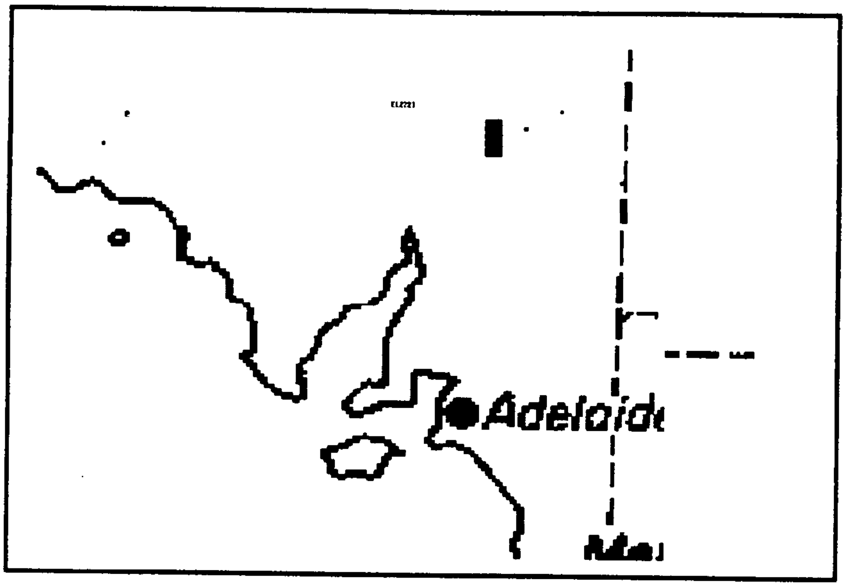
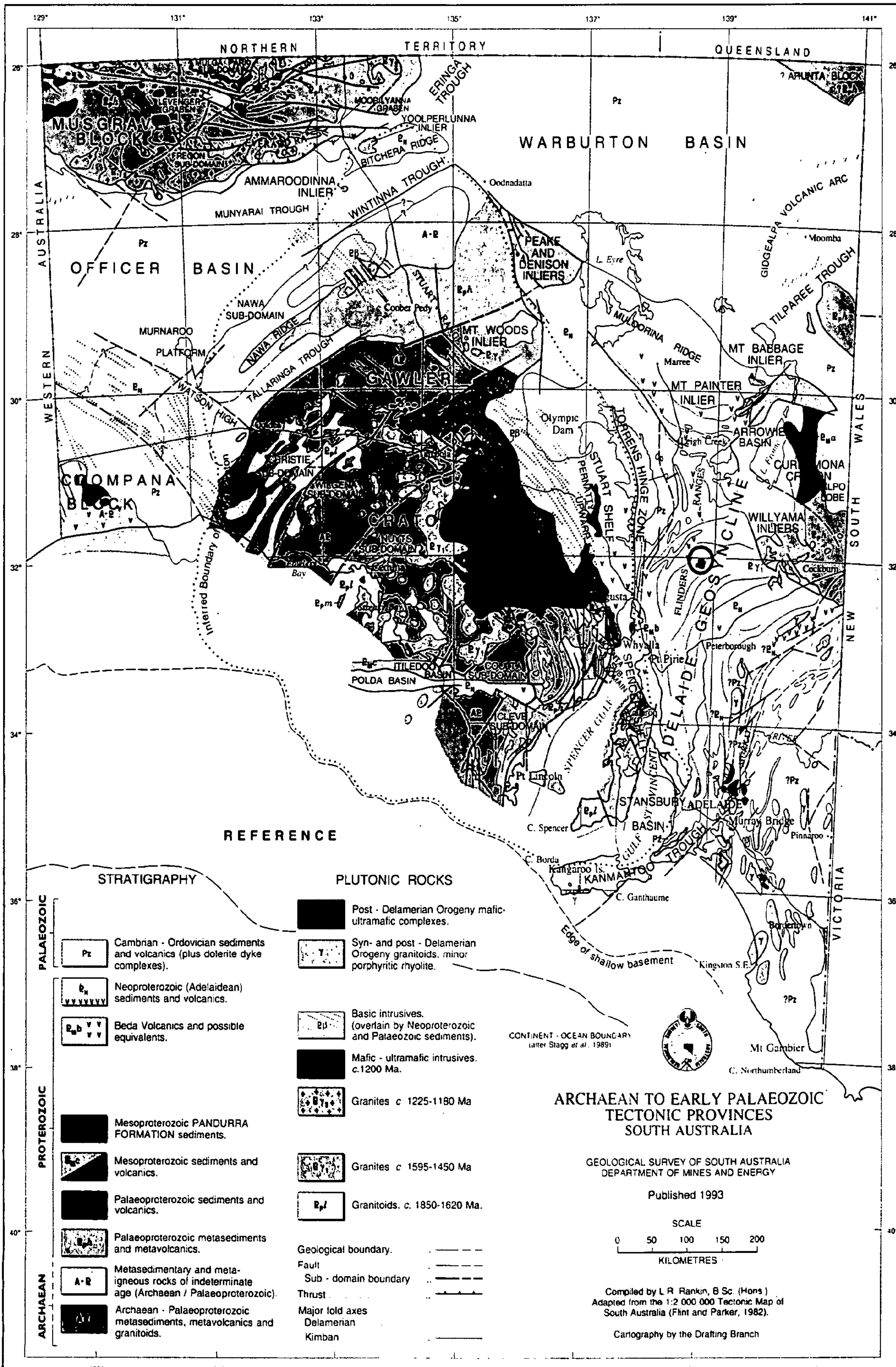


Figure 1



NORTHERN TERRITORY
QUEENSLAND
WESTERN AUSTRALIA
NEW SOUTH WALES
VICTORIA
MUSGRAVE BLOCK
WARBURTON BASIN
OFFICER BASIN
COOMPANA BLOCK
GAWLER CRATON
ADELAIDE GEOSYNCLINE
STUART SHELF
TORRENS HINGE ZONE
ARROWIE BASIN
WILLYAMA INLIERS
MT PAINTER INLIER
MT BABBAGE INLIER
PEAKE AND DENISON INLIERS
MT WOODS INLIER
AMMAROODINNA INLIER
MUNYARAI TROUGH
WINTINNA TROUGH
ERINGA TROUGH
TALLARINGA TROUGH
TILPAREE TROUGH
GIDGEALPA VOLCANIC ARC
NAWA RIDGE
NAWA SUB-DOMAIN
MURNAROO PLATFORM
WATSON HIGH
POLDA BASIN
STANSBURY BASIN
KANMANTOO TROUGH
Inferred Boundary of Gawler Craton
Edge of shallow basement
CONTINENT - OCEAN BOUNDARY (after Stagg et al. 1989)
REFERENCE
STRATIGRAPHY
PALAEOZOIC
Cambrian - Ordovician sediments and volcanics (plus dolerite dyke complexes).
PROTEROZOIC
Neoproterozoic (Adelaidean) sediments and volcanics.
Beda Volcanics and possible equivalents.
Mesoproterozoic PANDURRA FORMATION sediments.
Mesoproterozoic sediments and volcanics.
Palaeoproterozoic sediments and volcanics.
Palaeoproterozoic metasediments and metavolcanics.
ARCHAEAN
Metasedimentary and meta-igneous rocks of indeterminate age (Archaean / Palaeoproterozoic).
Archaean - Palaeoproterozoic metasediments, metavolcanics and granitoids.
PLUTONIC ROCKS
Post - Delamerian Orogeny mafic-ultramafic complexes.
Syn- and post - Delamerian Orogeny granitoids, minor porphyritic rhyolite.
Basic intrusives. (overlain by Neoproterozoic and Palaeozoic sediments).
Mafic - ultramafic intrusives. c.1200 Ma.
Granites c 1225-1180 Ma
Granites c 1595-1450 Ma
Granitoids. c. 1850-1620 Ma.
Geological boundary.
Fault
Sub - domain boundary
Thrust
Major fold axes
Delamerian
Kimban
ARCHAEAN TO EARLY PALAEOZOIC TECTONIC PROVINCES SOUTH AUSTRALIA
GEOLOGICAL SURVEY OF SOUTH AUSTRALIA DEPARTMENT OF MINES AND ENERGY
Published 1993
SCALE
0 50 100 150 200
KILOMETRES
Compiled by L R Rankin, B Sc. (Hons)
Adapted from the 1:2 000 000 Tectonic Map of South Australia (Flint and Parker, 1982).
Cartography by the Drafting Branch

Figure 2

2. Geology

2.1 Regional geologic setting

2.1.1 Regional geology

EL 2223 lies within a region of deformation located in eastern South Australia (Figure 2). The region of deformation encompasses the present day Mount Lofty, Flinders, Peake and Denison Ranges and the Olary Province, Figure 3. The belt of deformation forms a continuous highland chain that is mainly meridional but with arcuate segments and branches, and covers an area of approximately 180 000 km^2.

Mawson (1939) recognised that the strata of this region were deposited in a late Precambrian Basin, referred to as the Adelaide Geosyncline (Sprigg, 1952). Recently the term Adelaide Fold Belt has been adopted (Scheibner, 1974; Plummer, 1978; Jenkins, 1990; and Mancktelow, 1990). Preiss (1987) has alternatively referred to the deformed region as the Delamerian Fold Belt, since the geographic term "Adelaide" is pre-occupied with the sedimentary basin.

The strata preserved in the Delamerian Fold Belt represent a sequence of sediments deposited in rifted troughs and in later zones of broad regional subsidence (Preiss, 1990). These Neoproterozoic deposits are collectively known as the "Adelaidean System". Deposition possibly commenced between 1100 and 800 million years ago (Preiss, 1987). Post Adelaidean strata are far less extensive within and adjacent to the Fold Belt. The Palaeozoic Era is represented by Lower and Middle Cambrian sequences outcropping in the south eastern and northern parts of the Fold Belt. These rocks represent the last depositional phase before the onset of major orogenic events during the late Cambrian and Ordovician periods (Parkin et al, 1966; Preiss, 1987). Less extensive deposits of Permian, Mesozoic and Cainozoic sediments are preserved within basins on the Delamerian Fold Belt. Sediments of Triassic, Tertiary and Quaternary age have been identified in small basins on and adjacent to the Fold Belt.

Litho-stratigraphic nomenclature used to describe the strata preserved within the Delamerian Fold Belt are now generally accepted (Preiss, 1987). The major successions have been given supergroup status. The Warrina and Heysen Supergroups are of Neoproterozoic age and the Moralana Supergroup of Cambrian age.

Thomson (1970) recognised three principal structural and tectono-stratigraphic zones (Figure 4), the Stuart Shelf, the Torrens Hinge Zone and the Delamerian Fold Belt[1]. The Torrens Hinge Zone separates deformed Adelaidean strata from thin undeformed Adelaidean strata on the Stuart Shelf. This zone represents a topographically and structurally depressed zone suggested by Thomson (1970) to be related to Cainozoic graben structures.

The Adelaidean sequences of the Stuart Shelf rest unconformably on the Gawler Craton (Parker and Lemon; Preiss, 1987). This province displays a history of Archaean, Palaeoproterozoic and Mesoproterozoic orogenic evolution (Rutland et al, 1981; Parker and

[1] **Thomson (1970) refers to the Delamerian Fold Belt as the Adelaide Geosyncline.**

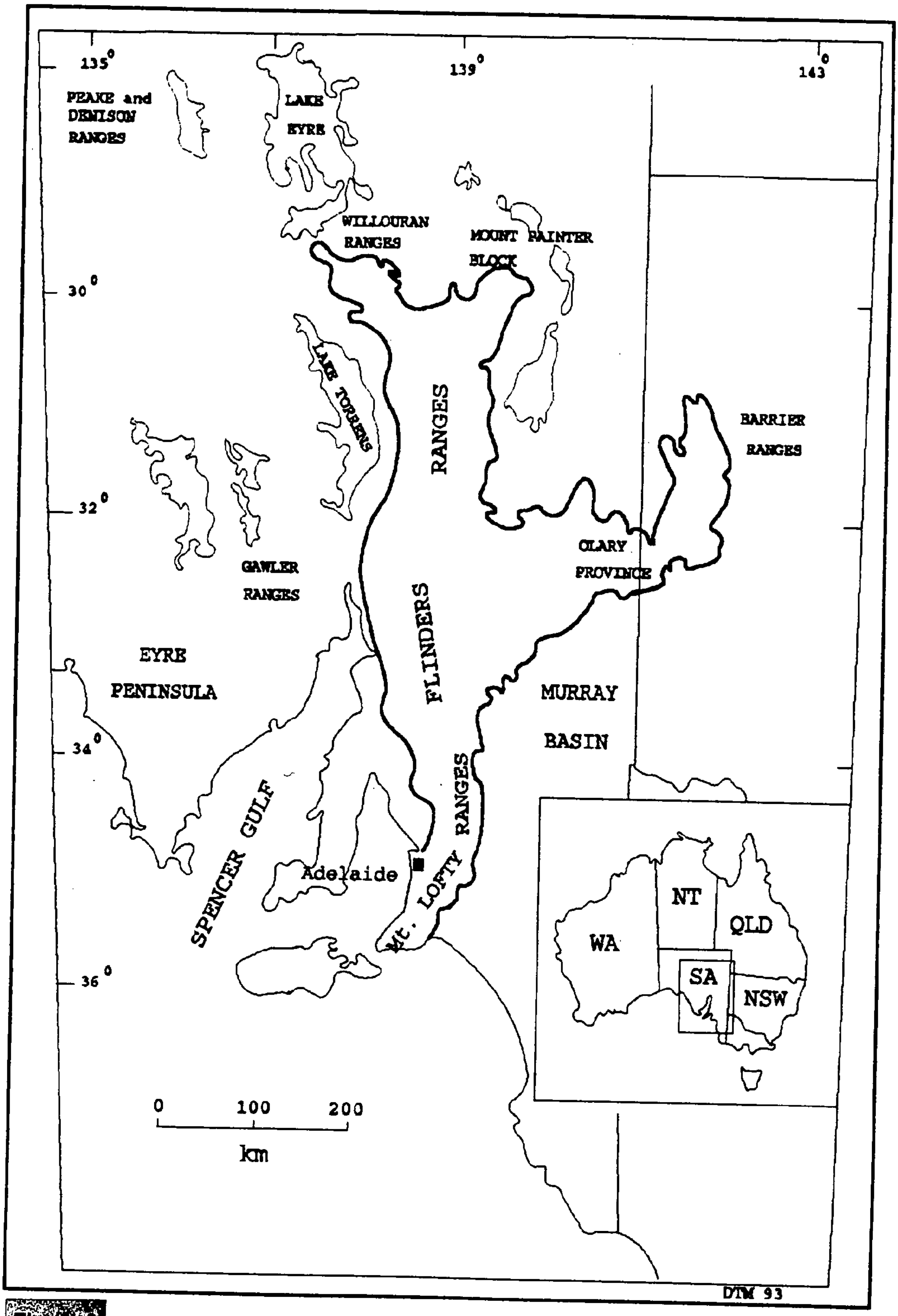


Figure 3 The location of major geographic features within and surrounding the Delamerian Fold Belt.

Lemon, 1982; Preiss, 1987). The Gawler Craton (Figure 4) extends north-west of Eyre Peninsula. A similar region of pre-Adelaidean geology, the Curnamona Craton (Preiss, 1987), is found to the north east of the Fold Belt. Several inliers of pre-Adelaidean age are located in the southern and northern regions of the Fold Belt (Rutland et al, 1981; Preiss, 1987).

The Delamerian Fold Belt can be divided into several subsidiary structural provinces. The subdivisions in Figure 5, have been based on the provinces defined by Thomson (1970) and Rutland et al (1981).

The South Flinders Zone and the Nackara Arc represent a west-east transition from tight upright folding and low grade metamorphism into arcuate folds, penetrative cleavage and metamorphic textures (Bell, 1978; McKirdy et al, 1975). The Outer Nackara Arc exposes an extensive area of lower Adelaidean stratigraphy bounded by syn- and post-tectonic granites along the eastern margin.

Within the South, Central and Northern Flinders Zones occurrences of irregular structures (Mount, 1975) composed of brecciated blocks of sedimentary, igneous and infrequent metamorphic rocks can be found, (Figure 5).

Numerous descriptions of the morphology and possible origins of these structures have been documented by Webb(1962), Coats(1965), Dalgarno and Johnson(1968), Mount(1975), Haines(1987) and Lemon(1985). The feasible mechanisms for emplacement range from carbonatitic intrusions, structurally deformed horst blocks to regional slumps and diapirism (Lemon, 1985). Lemon (1985) suggested that diapirism associated with faulting produced the numerous domal structures and associated swarms of radiating faults in the Central Flinders Zone. Haines (1987) suggested that rapid facies and thickness changes between the Central and Northern Zones are consistent with a tectonically controlled hinge or "shelf edge" and in part is responsible for the development of diapiric structures.

Several large Cainozoic basins are situated in the South Flinders Zone and Outer Nackara Arc.

Metamorphic grade increases eastwards across the Fold Belt. Rocks along the eastern margin reach upper amphibolite facies (Offler and Fleming, 1968; Mancktelow, 1990) and are associated with post- and syn-tectonic granitoids.

2.1.2 Deformation of the Adelaide Geosyncline[2]

The Adelaidean and Cambrian strata of the Fold Belt are considered to have been principally deformed during the Cambro-Ordovician Period approximately 500 million years ago. This tectonic event is referred to as the Delamerian Orogeny (Thomson, 1969). The Delamerian Orogeny subjected strata of the Adelaide Geosyncline to at least one major meridional north-south phase of folding and faulting. The strata also experienced low grade metamorphism not exceeding Green-schist facies. Zones of intrusive granite and mafic igneous rocks, for example along the eastern side of the Fold Belt, have been tentatively interpreted to be associated with the Delamerian Orogeny (Preiss, 1987).

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[2] **Adelaide Geosyncline refers to the depositional basin for the Adelaidean and Cambrian sediments.**

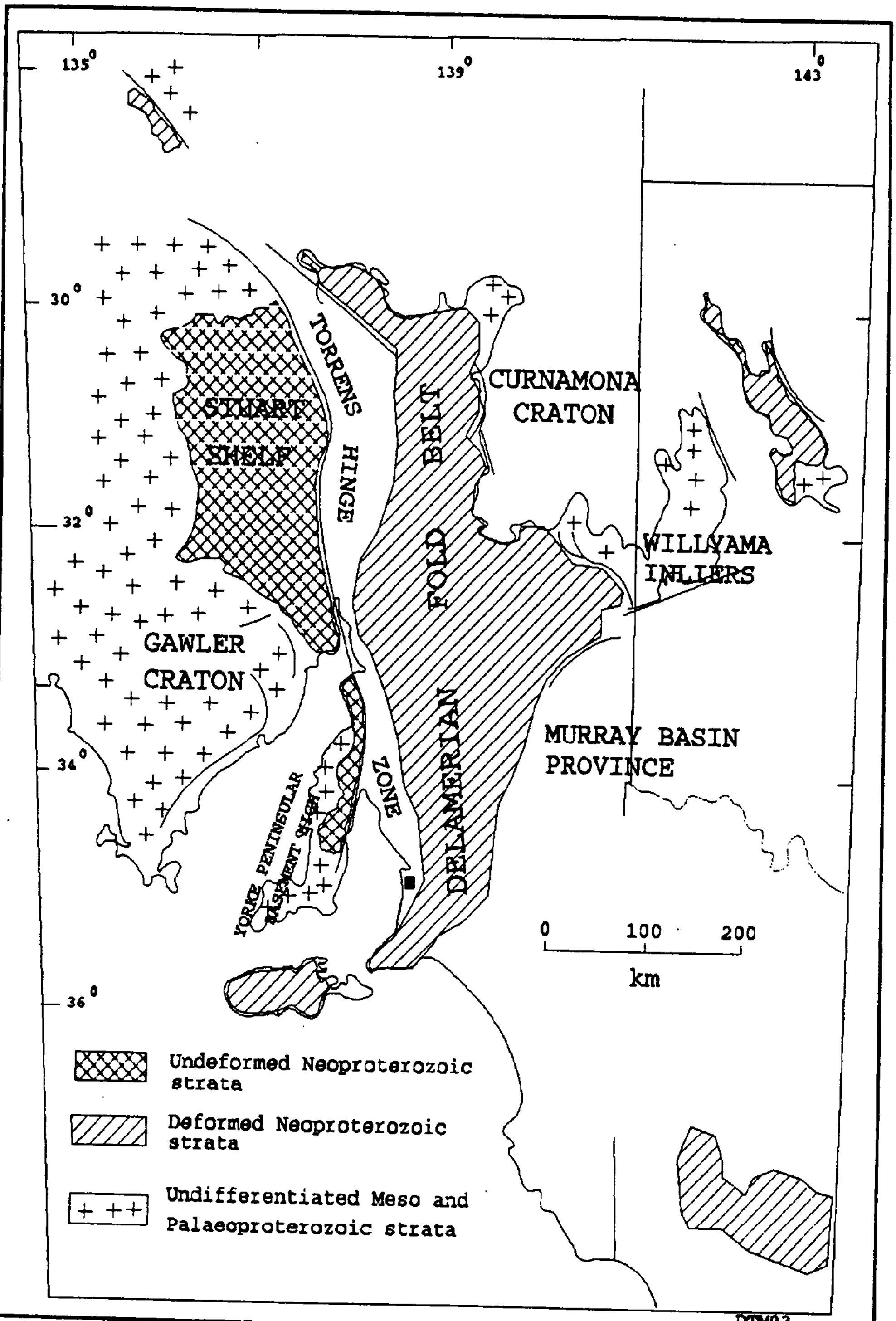

Figure 4 The Delamerian Fold Belt and associated geologic provinces.

Rejuvenation of some Delamerian structures during the Mesozoic and Cainozoic periods have been proposed as the mechanism for the subsequent uplift of the Flinders and Mount Lofty Ranges and the formation of surrounding basins.
Current seismicity, principally within the Flinders Ranges indicates that this portion of the Delamerian Fold Belt is still tectonically active (Greenhalgh et al, 1988).

2.1.3 Stratigraphy

The Neoproterozoic and Palaeozoic sedimentary succession preserved in the Delamerian Fold Belt and Stuart Shelf lies unconformably on Archaean to Palaeoproterozoic metamorphic complexes (pE) and Mesoproterozoic granites, volcanics (Pv) and sediments (Pm).

The Adelaidean and Cambrian age deposits (Figure 6), are formally subdivided into the Warrina, Heysen and Moralana Supergroups (Preiss, 1982). The geology within the Tenement primarily belongs to the Heysen Supergroup with most of the exposed rocks identified as those of the lower Umberatana Group.

2.1.3.1 The Warrina Supergroup

The Warrina Supergroup, formed during the first stages of Adelaidean deposition (Preiss, 1990), is subdivided into the Callanna and Burra Groups.

The lower Callanna Group, referred to as the Arkaroola Subgroup, records the oldest rocks assigned to the Adelaidean System (Preiss, 1990). These are relatively coarse, well-sorted siliciclastic rocks overlain by carbonate dominated units. The Backy Point Beds (150 m thick , located on the south east Stuart Shelf), are the oldest unit (Mason et al, 1978). The quartz rich Cutana Beds in the Willyama Inliers are considered to be an equivalent (Preiss, 1987).

The only significant volcanic units within the Arkaroola Subgroup are referred to as the Wooltana Volcanics (Thomson, 1966b). Equivalents have been identified in the Peake and Denison Ranges, Barrier Ranges and Willouran Ranges (Figure 3). Preiss (1990) has tentatively correlated the Wooltana Volcanics with the Beda Volcanics on the Stuart Shelf and the Boucaut Volcanics in the Willyama Inliers. The Beda Volcanics and the associated Backy Point Beds thicken from the Gawler Craton towards the western edge of the Fold Belt. A known thickness of 500 to 600 metres occurs along the eastern edge of the Stuart Shelf (Cowley, 1991). The identification of basalts at Depot Creek (Preiss and Faulkner, 1984) along the western edge of the Fold Belt tentatively supports the contention that the Beda Volcanics may extend across the Torrens Hinge Zone (Mason et al, 1978).

The Arkaroola Subgroup is overlain by a thick evaporitic, mixed carbonate and clastic sequence of the Curdimurka Subgroup (Preiss, 1990). The Curdimurka Subgroup does not extend throughout the Delamerian Fold Belt and is absent from the Stuart Shelf, Fleurieu Arc and the Willyama Inliers.

An occurrence of probable disrupted Callanna Group (Pc) similar to mapped Callanna Group in "diapirs" within the Flinders Ranges (Figure 3.4) is located in the Tenement. The disrupted Callanna Group typically contains xenoclasts and rafts of Arkaroola (Wooltana Volcanics) and Curdimurka Subgroups. The chaotic nature of these sequences and the affiliation with interpreted `diapiric' structures and faults (Lemon, 1985) supports Preiss's (1990) contention that a major decollement occurs at this stratigraphic level.

The Burra Group is generally observed to be unconformable with pre-Adelaidean basement and disrupted Callanna Group. The poor exposure of this unconformity has led Preiss (1990) to conclude that a decollement zone also occurs at this stratigraphic level. The Burra Group does not have stratigraphic equivalents on the Stuart Shelf. Outcrop is confined (Preiss, 1990) to a region between the Torrens Hinge Zone and the Willyama Inliers to the east.

The Burra Group is composed of an alternation of siltstone, shale, sandstone and dolostones. The only lithologic horizon that may be consistently mapped within the Burra Group across the South Flinders Zone is the Skillogalee Dolomite. For the purposes of this report the Burra Group has been divided into the upper (Pb) and lower (Po) Burra Group. The lower and upper Burra Group boundary lies between the Skillogalee Dolomite and the underlying Yednalue and Bungaree Quartzite. The lower Burra Group along the western edge of the deformed Fold Belt is represented by the Emeroo Subgroup. This Subgroup varies in thickness from 240 metres at Depot Creek (Preiss and Sweet, 1966) to 1000 metres at Wilkatana to the north (Preiss, 1987).
Deeply eroded anticlinoria along the eastern side of the study area expose large areas of upper Burra Group. The upper Burra Group is unconformable with the underlying Callanna Group (Binks, 1971; Androvich, 1992; Waclawik, 1992). The absence of lower Burra Group in the east suggests that these lithologies are possibly confined to the western side of the Fold Belt. Local stratigraphic type sections (Preiss, 1987) and thickness calculations within the study area indicate that the lower Burra Group increases from 600 metres to approximately 1500 metres between the Torrens Hinge Zone and the Nackara Arc (Figure 5).

The upper Burra Group is composed of an alternation of shales, dolomites and sandstones. The Undalya Quartzite and its equivalents above the Skillogalee Dolomite obtain a maximum thickness of 750 metres (Preiss, 1987). The stratigraphically higher shales of the Saddleworth and Mintaro Formations crop out over much of the eastern portion of the study area. The thicknesses of these formations are variable but estimates from type sections and direct map measurements suggest a maximum thickness of 2500 metres and a minimum thickness of 1000 metres.

2.1.3.2 The Heysen Supergroup

The Heysen Supergroup is composed of the Umberatana and Wilpena Groups. The Umberatana Group has been divided, in this report, into lower, middle and upper units. The boundaries are defined by laterally equivalent formations that can be recognised over the entire South Flinders Zone.

The lower Umberatana Group (Pu) is composed of the Pualco Tillite, Benda Siltstone, Wilyerpa Formation and the Appila Tillite. The Tillite, now believed to be lateral equivalents (W.V. Preiss, pers. comm., 1992), can be traced E-W across the Flinders Ranges. The thickness increases from approximately 150 m in the west to as much as 500 m within the Nackara Arc (Preiss, 1987). Equivalent stratigraphy has been intersected on the Stuart Shelf in drill hole WMC NDH 1 (Preiss, 1987) where the Tillite is only 53 metres thick.

The Wilyerpa Formation overlies and inter-tongues with the Appila Tillite and has an extremely variable thickness (W.V. Preiss, pers. comm. 1992). It is persistent across the central and south eastern Delamerian Fold Belt.

The extensive and uniform Tapley Hill Formation (Pf) represents the middle Umberatana Group and is found through-out the Delamerian Fold Belt (Preiss, 1987). It is the first formation of the Adelaidean System to transgress significantly onto the Stuart Shelf. Its lithologic characteristics make an ideal stratigraphic marker for structural interpretation. The thickness of the Tapley Hill Formation increases rapidly eastwards from 200 metres on the Stuart Shelf to a fairly consistent 1500 metres across the region including the Tenement.

The geology of the upper Umberatana Group (Ph) is variable with numerous individual formations recognised (Preiss, 1987). Strata such as the Etina Formation, Tarcowie Siltstone and the Elatina Formation do not persist regionally and hence the lithologies of the Umberatana Group, above the Tapley Hill Formation, have been grouped together for clarity. The Elatina Formation and it's Stuart Shelf equivalents, including the Whyalla Sandstone, form an extensive lithology that covers much of the South Flinders Zone and Nackara Arc. The Grampus Quartzite and an unnamed siltstone of the Yerelina Subgroup represent the upper most strata of the Umberatana Group (Preiss, 1987, 1990). Thickness estimates indicate that the upper Umberatana Group varies from 100 to 2000 metres across the Flinders Ranges within the broad region of the Tenement.

The Wilpena Group forms the upper part of the Heysen Supergroup. This stratigraphy is not continuous across the Flinders Ranges. The Wilpena Group is conspicuous by its absent in the Outer Nackara Arc. This is possibly due to the dominance of deeply eroded anticlinoria or it may suggest little or no deposition of the Wilpena Group in this region.

The lower Wilpena Group (Pw), known as the Brachina Subgroup (Plummer, 1978), has recently been referred to as the Sandison Subgroup (Dyson, 1992a). It is composed of a series of siltstone and sandstone sequences. The upper most quartzite units are commonly called the ABC Range Quartzite (Mawson, 1939). The lateral equivalent of the Sandison Subgroup in the Nackara Arc is known as the Ulupa Siltstone; a formation composed of siltstone and minor fine sandstone. Several formations are recognised as lateral equivalents of the Sandison Subgroup on the Stuart Shelf. The lower shale units are referred to as the Tregolana or Woomera Shale Members (Preiss, 1987). The upper sandy strata are known as the Simmens or Arcoona Quartzite, and the Corraberra Sandstone Member, depending on the geographic location. The Tent Hill Formation represents the upper most Sandison Subgroup equivalent. The Sandison Subgroup and its equivalents thicken eastwards from 200 metres to 3000 metres.

The upper Wilpena Group (Pp) is composed of a sequence of siltstones, shales and carbonates gradational into sandstones and quartzites of the Pound Subgroup. The transition from the Sandison Subgroup is marked by shales and siltstones of the Bunyeroo Formation. This unit, where exposed, has a thickness of approximately 400 to 1000 metres (Preiss, 1987). The Bunyeroo Formation has been found within the Torrens Hinge Zone in Wilkatanna Bore

1 (Preiss, 1987). The Yarloo Shale is the lateral equivalent on the Stuart Shelf and overlies the Tent Hill Formation.

The calcareous Wonoka Formation, not identified on the Stuart Shelf, extends across the study area. Its thickness is variable but tends to have an average thickness of 300 to 400 metres. The sandstones and quartzites of the overlying Pound Subgroup also crop-out east of the Torrens Hinge Zone but thin rapidly towards the east. No equivalent has been identified on the Stuart Shelf (Preiss, 1987). The upper Wilpena Group attains a maximum thickness of approximately 2000 metres within the south Flinders Zone and thins to 1000 metres in the Inner Nackara Arc.

2.1.3.3 The Moralana Supergroup

The Moralana Supergroup is unconformable on the underlying Wilpena Group. This boundary marks the end of Precambrian deposition (Preiss, 1990). The sediments of the Hawker Group (Eh) represent the lowest member of the Moralana Supergroup. Carbonates dominate this stratigraphic level with common fossiliferous horizons. Cambrian strata predominantly outcrop in the northern Flinders Ranges and northern Stuart Shelf. Cambrian rocks in the vicinity of the Great Gladstone Tenement are restricted to a very small region to the north.

2.1.4 Structure

The Tenement resides along the zone between the Southern Flinders and Nackara Arc Zone (Figure 5) defined by Rutland et al (1981).

The folds in the South Flinders Zone lose the open character of the Central Flinders Zone and become upright, to slightly over-turned (Preiss, 1987). The western edge of the Southern Flinders Zone is composed of an approximately 20 kilometre wide region of north-south elongate domes and basins predominantly of Umberatana Group. The wavelength of these folds is considerably shorter than the general regional wave length observed to the south-east.

The eastern extent of the South Flinders Zone is located along the western side of the Walloway Basin. Partially exposed anticlines along this boundary are associated with N to NW trending faults and possible diapiric activity (Finlayson, 1980). Several major faults cut obliquely across N-S fold structures (Webb, 1962; Rowlands, 1972) and are typically associated with fold noses and diapiric structures (Rowlands, 1972; Binks, 1971).

The eastern side of the South Flinders Zone is transitional into the Nackara Arc. The Nackara Arc exposes broad, open, parallel synclines and tight anticlines. The axial traces of the folds trend closer to the NE (Mann et al, 1986) than the folds in the South Flinders Zone. Individual fold axes are typically long (50 to 200 km), symmetrical and parallel (Mount, 1975). The folds are double plunging and the Burra Group is well exposed in anticlinal cores. Parts of the Paratoo and Nackara Anticlines are overturned to the north-west.
Evidence of disharmonic folding is observed in adjacent competent and incompetent units (Binks, 1971).

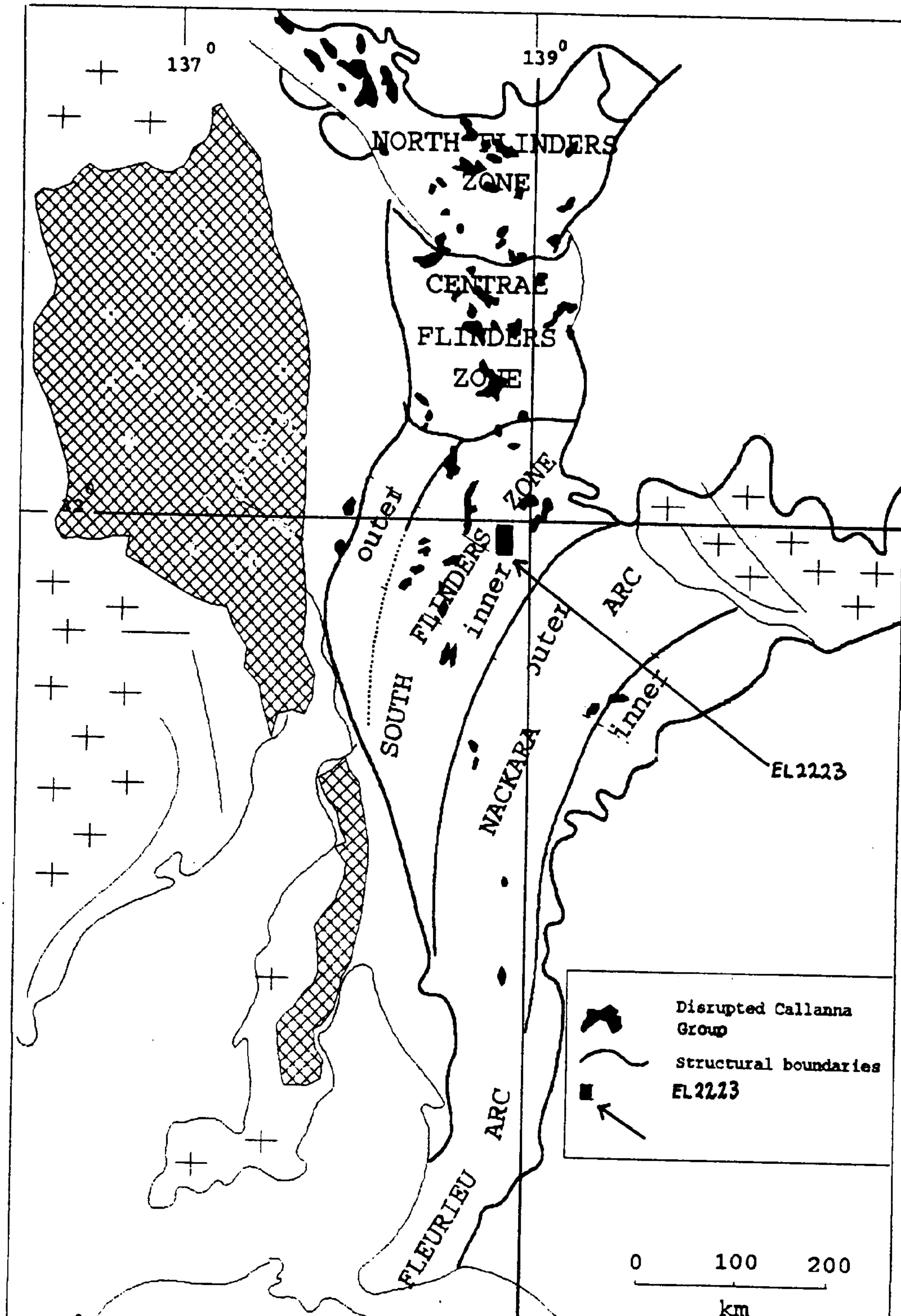

Figure 5 Structural subdivisions within the deformed Delamerian Fold Belt.

This region contains the greatest proportion of exposed lower Adelaidean strata. The fold style tends to be broader in this region. Synclines have a wavelength of 10 to 20 kilometres. The orientations of the principal fold axes progressively swing further towards the NE, reflecting the curvature of the Nackara Arc.

A regional NE striking axial plane cleavage is clearly observable in the Burra and Umberatana Groups (Bell, 1978). The cleavage is typically steep and tends to fan across the fold structures. Cleavage and joints are also strongly developed in the shale units of the Wilpena Group, a characteristic that is far less dominant in the western portions of the study area.

The orientation of the principal fold axis of the Mount Grainger anticline-syncline pair is similar to the NNE trend observed in the South Flinders Zone and the northern Fleurieu Arc. Folds to the north and north-east are orientated consistently to the NE. The change in fold axis orientation has been attributed to over-printing of two fold events (Preiss, 1987).

Binks (1971) has noted a structural corridor that runs through the southern end of the Walloway Basin, Carrieton Anticline and north to the Worumba Diapir (refer to Orroroo 1:250 000 geology sheet). The zone links N-S faults and diapiric structures.

Mount (1975) has suggested that overturning of the Paratoo and Nackara Anticlines indicates over-thrusting from the southeast.

Faults in the Mount Grainger complex are associated with brecciated Callanna Group (Binks, 1971).

The geological structure along the eastern side of the Nackara Arc is poorly exposed and is more complex than the areas to the west. The exposed geology is primarily lower Adelaidean Burra and Umberatana Groups. The fold structures are very broad. The textures of the rocks in this area tend to have a well-developed schistosity and/or a strongly penetrative cleavage striking north-south.

Slaty cleavage is well developed across the Nackara Arc and is strongly developed in all fine grained rocks (Bell, 1978; Preiss, 1987). The cleavage through the Nackara Arc strikes north-easterly. The cleavage commonly dips to the east at low to moderate angles (Bell, 1978) but is also observed to dip to the west in many locations (Preiss, 1987). This author has found that documented cleavage measurements are inadequate to determine a regional bias for the cleavage dip.

A strong angular unconformity exists between the Burra Group and Umberatana Groups in several locations. This relationship is best developed in the Carrieton and Yednalue Anticlines.

2.1.5 Diapirs

It is common for anticlinal structures within the Delamerian Fold Belt to have complex cores containing rafts of exotic blocks including lithologies derived from the crystalline basement. The geology of these disrupted and structural complex cores contain material derived from the lower Neoproterozoic Callanna Group lithologies. Structures interpreted as diapirs are scattered through out the Flinders ranges. The majority lie within the central and northern Flinders Zones (Figure 5).

Small zones of brecciated Callanna Group (Mount, 1975; Lemon, 85) outcrop along the western edge of the Flinders Ranges, the east side of the Willochra Basin (Round Hill), in the Carrieton area and the western side of the Walloway Basin (Binks, 1971; Finlayson, 1980; Preiss, 1987).

The core of the major south-plunging Carrieton Anticline exposes Burra Group and disrupted Callanna Group (Binks, 1971; Androvich, 1992; Waclawic, 1992). The core is intensely deformed with disharmonic and overturned folds (Androvich, 1992). The northern extension of the Anticline is involved with an elongate, narrow zone of brecciated Appila Tillite. Androvich (1992) and Waclawik (1992) have suggested the zone was created by faulting only and have found no conclusive evidence to support diapiric activity. A similar observation was made by Binks (1971) within the Oladdie Diapir farther to the east. Binks found a complex core of brecciated quartzite, similar to the surrounding strata. The absence of carbonate matrix or volcanic clasts suggests localised brecciation associated with faulting opposed to a diapiric intrusion (Rowlands and Kitch, 1976).

Disrupted Callanna Group also appears in the cores of the Grainger and Paratoo Anticlines along the western side of the Nackara Arc. These disrupted zones are associated with several faults in the fold core complexes. Plugs and/or rafts of quartz porphyrites, aplites, basalts and trachytic andesites have been located in the Paratoo and Mount Grainger Diapirs (Pickard, 1969; Binks, 1971).

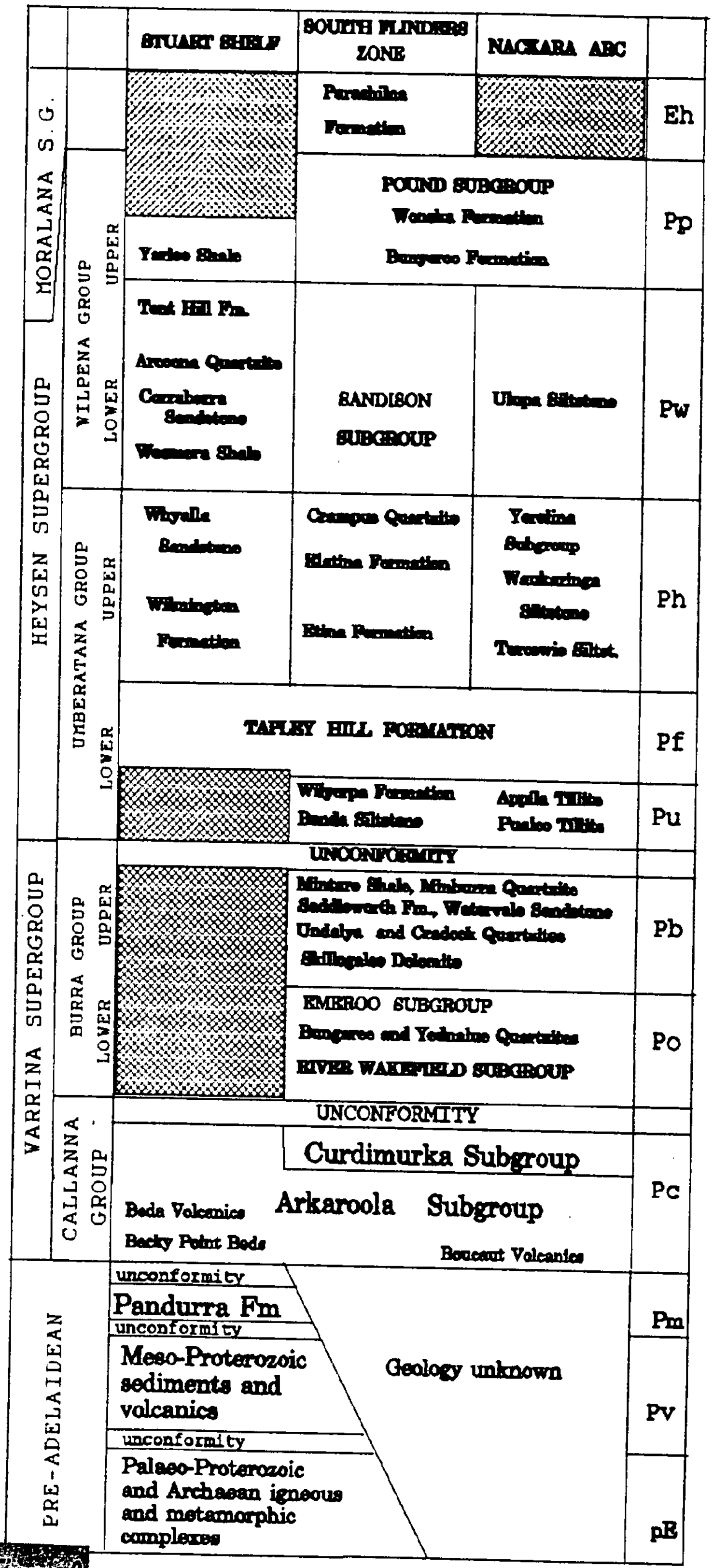

Figure 6 A simplified stratigraphic column showing the variations in stratigraphy across the study area.

2.2 Geology - Prince Alfred Mine area

2.2.1 Introduction

An extensive literature search has revealed a lack of detailed geology and structural analysis for the region around the Tenement. Earliest geological mapping in the area of the Tenement was conducted by Howchin (1928), Segnit (1939) and Mawson (1942). The only regional structural studies found within and adjacent to the Tenement were conducted by Webb (1962), Binks (1971) and Bell (1978). Detailed mapping was conducted around the Prince Alfred Mine by Wade and Wegner (1954) and a drilling program by Nixon (1960).

The Tenement straddles the western edge of the Yednalue Anticline and includes numerous old copper diggings located above the unconformable boundary between the Burra and Umberatana Groups.

The Yednalue Anticline is a broad structure plunging gently to the southwest. The limbs of the fold are steep. The western limb contains several major northeasterly trending faults confined to the Burra Group strata. The faults are truncated by the unconformably overlying Umberatana Group. Much of the mineralisation is concentrated along bedding within the lower parts of the Umberatana Group Tapley Hill Formation. At the Prince Alfred mine site the mineralised lode is associated with thin bands of calcareous grit stone and a persistent band of siderite within laminated calcareous siltstones. Wade and Wegner (1954) have suggested that mineralisation is associated with faulting.

Mineralisation within the Tenement consists of sideritic copper ore (with azurite and malachite) and primary sulphide minerals such as chalcopyrite and bornite. It was also suggested by Wade and Wegener that the Prince Alfred deposit was a product of secondary enrichment of primary low grade sulphides.

Recent work on the Tenement shows that copper mineralisation, although patchy, is persistent along strike and appears to be related to a narrow band of siderite in the lower part of the Tapley Hill Formation. Mineralisation in the old mine workings show that the mineral concentrations are confined to this stratigraphic level and suggest a stratigraphically confined deposit.

2.2.2 Exploration Model

The mineralisation within the Tenement is currently considered to be part of a stratiform deposit associated with a sideritic band within the lower section of the Tapley Hill Formation. Zones of ore have possibly resulted from secondary enrichment of low grade sulphides within the sediments of the lower Tapley Hill Formation. The process of enrichment is possibly related to mineral rich hydrothermal fluids active during the Delamerian Orogeny or simply to meteoric waters circulating through the many fractures within the Yednalue Anticline.

The location of mineral concentrations within the lower Tapley Hill Formation which occur along strike from fault structures within the underlying Burra Group, suggests that mineral rich fluids may have migrated from older sequences of rocks located within the core of the Yednalue Anticline. The presence of 'diapiric' material within the Yednalue fold core provides some justification for this model.

3. GEOCHEMISTRY

3.1 Introduction

Geochemical aspects of exploration on the Tenement has been two-fold. Archival data has been re-examined to locate favourable target areas.

A pilot program of soil/calcrete sampling has been initiated in an effort to assess the Appila Tillite and Tapley Hill Formation for gold. Preliminary results are presented in this report. Gold values to 5 ppb (Table 4) have been identified in a fractured zone adjacent to the old Egmont Mine (See enclosed geology map) and anomalous values of copper were located in a fracture and mineralised sandstone just below the Umberatana - Burra Group unconformity (copper appears to be associated with heamatite viening).

3.2 Assessment of the Prince Alfred Mine site

Considerable time has been spent examining the tailings heaps at the old Prince Alfred mine site. Samples were taken from each of the heaps and submitted to Amdel for analysis. The results clearly showed that the tailings contain 1 to 1.5 % copper. The slag remaining from smelting operations last century assayed at 1.5%.

Time was also devoted to checking ground water and performing some initial tests for levels of contaminants associated with the previous mine workings.

Samples from lithologies adjacent to the mine were also examined to obtain back ground levels and to test for zones with anomalous levels of copper.

The results are presented in Tables 1, 2 and 3, the locations of samples are indicated on the enclosed geology map.

3.3 Reassessment of stream sediment data - Cams Leases P/L

Research into past exploration around the Prince Alfred mine site uncovered several stream sediment surveys conducted by Cams Leases P/L (ENV). This data has been re-examined and contoured (Figure 7) in an attempt to establish anomalous areas of copper mineralisation. A contour interval of 10 ppm was adopted and a threshold of 40 ppm was used to identify several areas of elevated copper. The anomalous zones are summarised on Figure 8.

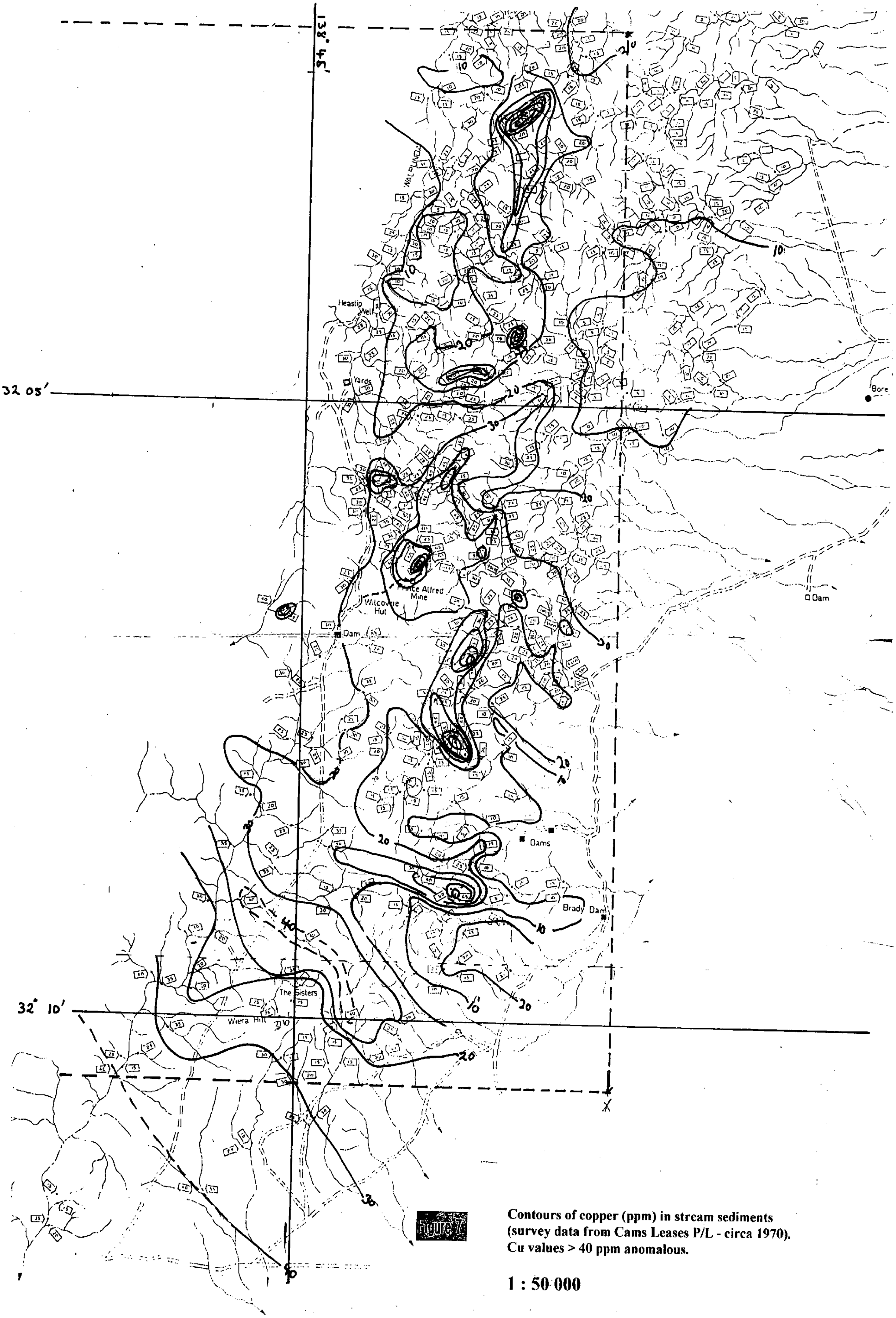

Figure 7

Contours of copper (ppm) in stream sediments (survey data from Cams Leases P/L - circa 1970). Cu values > 40 ppm anomalous.

1 : 50 000

Exploration targets based on re-examination of 1970's stream sediment data.

1 : 50 000

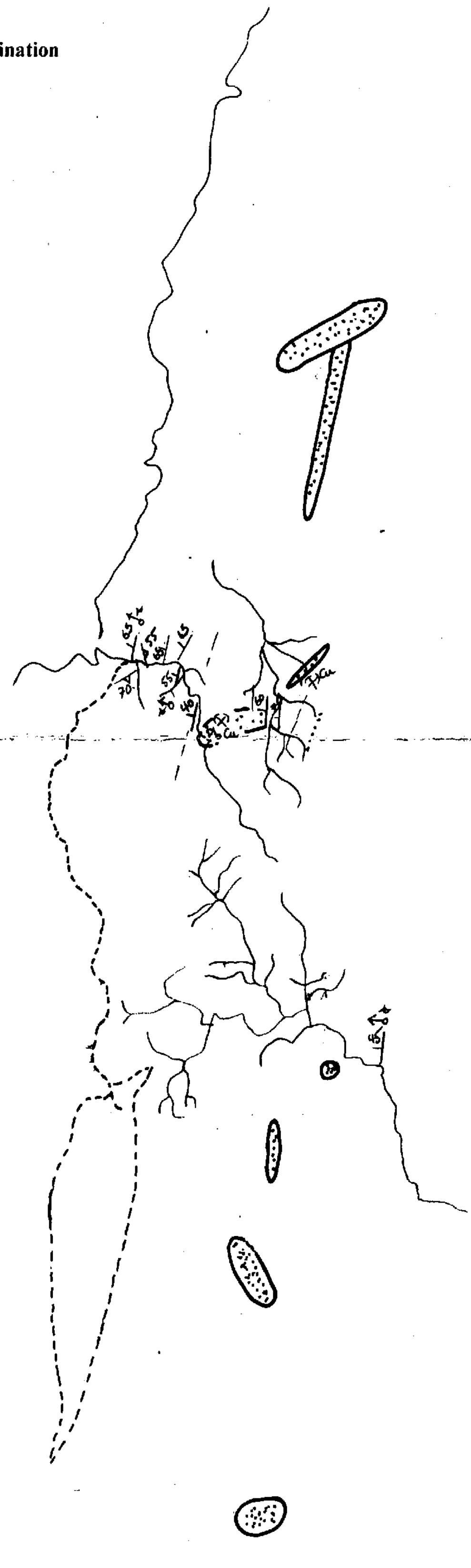

Figure 8

SAMPLE	Cu	Pb	Zn	Ag	Mn	Ni	As	Cd	Fe	Mg	Au
PA-SLAG01	1.2%	<0.005 %	0.045 %	<2	---	130	300	<10	19.7 %	3.15 %	< 0.01
PA-TAIL01	3400	34	110	1.5	760	38	n/a	n/a	n/a	n/a	< 0.01
PA-TAIL02	1.23%	22	130	3.0	1500	42	n/a	n/a	n/a	n/a	< 0.01
PA-OREGRAB	1.76%	4	61	3.5	820	29	n/a	n/a	n/a	n/a	< 0.01
PA-COSH01	1.69%	30	150	4.0	2000	49	n/a	n/a	n/a	n/a	< 0.01
PA-CONH02	1.20%	18	98	2.5	1800	36	n/a	n/a	n/a	n/a	< 0.01
PA-TANK01	4.8%	<0.005 %	0.015 %	25	n/a	50	350	15	8.8 %	1.09 %	n/a
PA-TANK02	12.7%	<0.005 %	0.020 %	32	n/a	50	550	<10	11.8 %	530	n/a
PABORE01	0.24	0.03	8.2	<0.01	n/a	n/a	<0.1	n/a	n/a	n/a	n/a
	mg/L	mg/L	mg/L	mg/L			mg/L				

TABLE 2 all values in ppm unless stated otherwise

ROCK SAMPLE	Cu	Pb	Zn	Ag	Ce	Nb	Ni	Y	Au
PA-893459	35	25	50	< 1	165	20	43	27	< 0.01
PA-896446	37	10	12	< 1	110	< 5	28	19	< 0.01
PA-896452	34	15	7	< 1	80	< 5	26	16	0.70 ppb
WATER SAMPLE									
PAW-892430	0.12	< 0.005		<0.005					
PAW-862444	0.034	<0.005		< 0.005					
	mg/L	mg/L	mg/L	mg/L					

TABLE 3 all values in ppm unless stated otherwise

Sample	Au (ppb)	Cu (ppm)
PA 88404190	2	11
PA 88454190	<1	11
PA 88504190	1	14
PA 88554190	1	18
PA 88604190	<1	13
PA 88654190	1	9
PA 88704190	<1	12
PA 88754190	3	17
PA 88804190	5	12
PA 889436	2	19
PA 888435	1	17
PA 887435	3	26
PA 886435	3	24
PA REDHEAP	12	8.15%
PA 888424A	3	1700
PA 888424B	1	97
PA 881418	<1	20

TABLE 4

4 Heritage and Environmental Issues at the Prince Alfred Mine site

An environmental problem was revealed during the assessment of old stream sediment data taken in the area including the Prince Alfred mine (Figure 9). Inspection of the tailings dams at the old Prince Alfred mine site reveal that the original 1900's dam wall had been breach and the dams constructed by MM&M during the 1970's had failed. Cams leases survey clearly shows that mine waste has and is continuing to be dispersed down the natural water courses originating (heading) in the old mine site.

The details of these finding were submitted to the Environment section of the mines Department and the site has been inspected by a mines inspector (Mr P. Talbot) from the Peterborough Office. We have not been informed of progress to date.

A quantity of old mining equipment and rubbish has been left at the site, the rubbish mainly associated with the work conducted during the 1970's. Photo's recording the mine site are included in this report.

The Prince Alfred mine and the 1900' miners village to the north of the mine, have been inspected by the State Heritage Department. They have been recommended to be considered for inclusion on the State Heritage Register. Our company has submitted details of an old cemetery and have registered our interest as a party to any discussions on the future of the old mine.

A search through old mine photo's held at MESA was successful in locating a photo of the mine prior to 1950, as well as, several photos of the mine workings during the dismantling of MM&M operation during the 1970's. Copies of the photos located at MESA and those taken recently by the author are submitted with this report with descriptions detailed in Table 5. The photos show the changes that have occured at the mine site and record valuable comparative information.

Figure 9

Plot of stream sediment data (Cams Leases P/L - circa 1970) showing extremely elevated Cu values in the main water course draining the Prince Alfred mine site. High levels of Cu etc are derived from breached tailings dams.

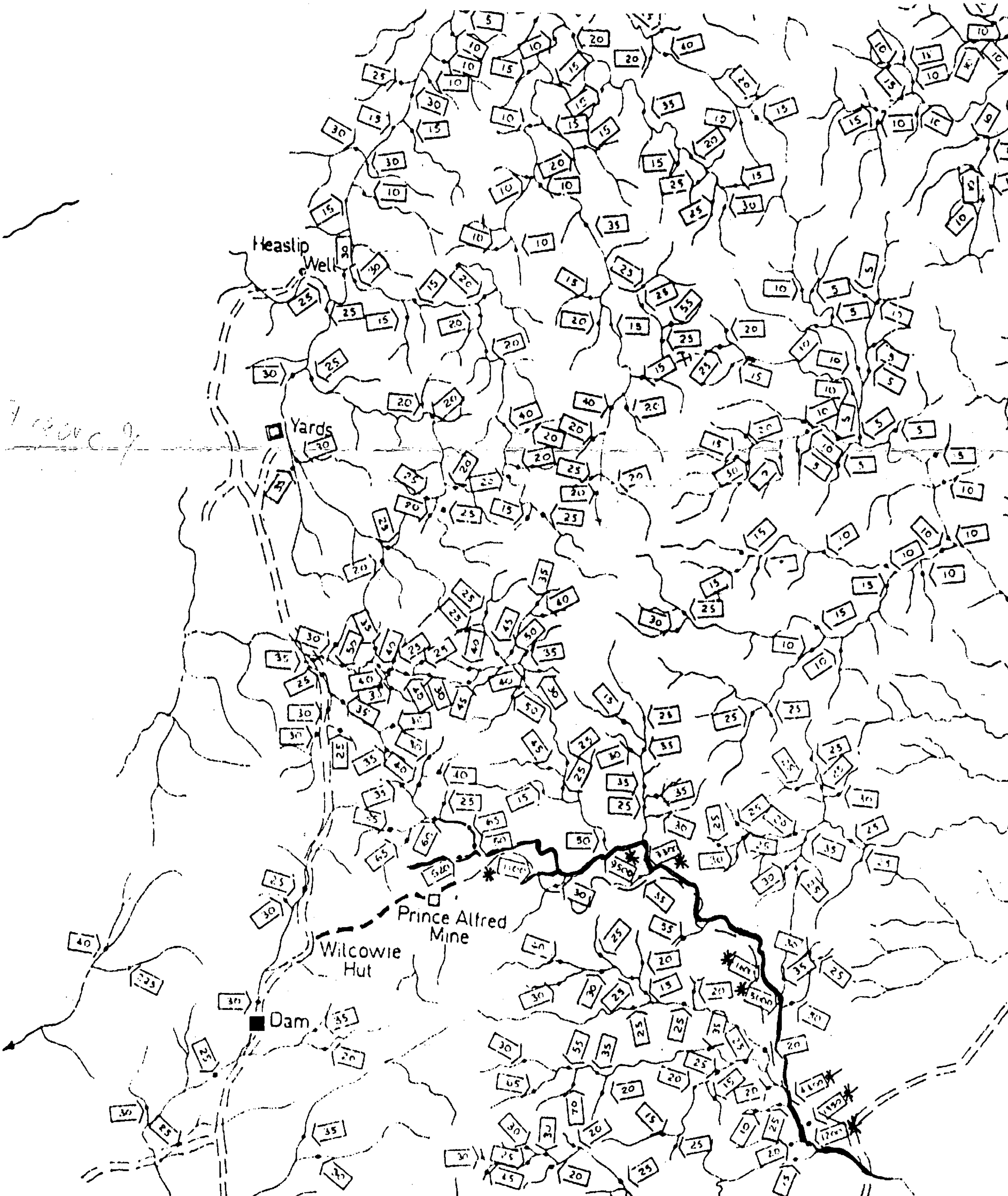

Photo Number	Description
1	Water storage tanks - 1970's
2	Jack pumps - 1970's
3	Copper deposition tank with part of the concentrating equipment
4	View of the southern tailings dam (1970's) and obvious breach
5	View to the west of 1970' foundations for processing plant
6	View to the south showing scrap steel and remnants of 1770's smelting plant
7	Breach in the 1900's tailings dam
8	View to the south from the tailings dam to the old mine showing piles of 1900's jig fines.
9	View of 1900's pump - engine house and chimney
10	Central main shaft
11	View to the northeast of old mine around 1950 - MESA Photo
12	View of the old mine workings looking north, the poppet head on the main shaft still intact. No date but likely to be between 1920 to 1940?
13	Old 1940's stove used as a detonator box by MM&M in the 1970's
14	View to the north at old copper digging east of Heaslip well north of the Prince Alfred Mine
15	View to the southeast of 1900's engine house and chimney
16	View to the west showing scattered rubbish and the deterioration of the chimney - MESA photo 1979
Plate 3	Panoramic view of the Prince Alfred Mine site - 1996
Plate 4	View of the old processing plant foundations - 1996
Plate 5	View to the west showing rubbish left in the late 1970's. Most of this was removed at the request of the then mines inspector Rex Barton - MESA Photo
Plate 6	View to the northwest showing buildings etc before final clean up of MM&M 1970' operation
Plate 7	Pumps used in the concentrating and processing plant by MM&M in 1970's - MESA Photo 1979 -NB pumps etc taken in early 1980's
Plate 8	View to the north showing the old mine late 1970's - MESA photo

TABLE 5

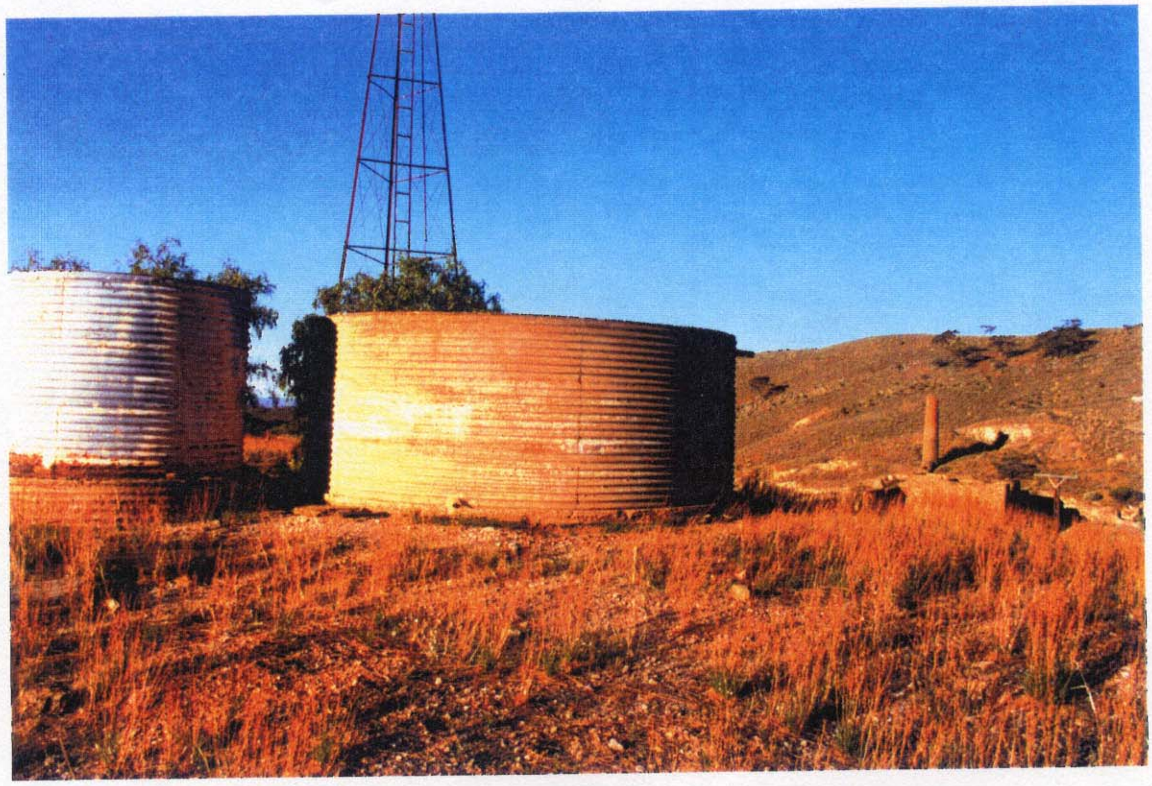

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11

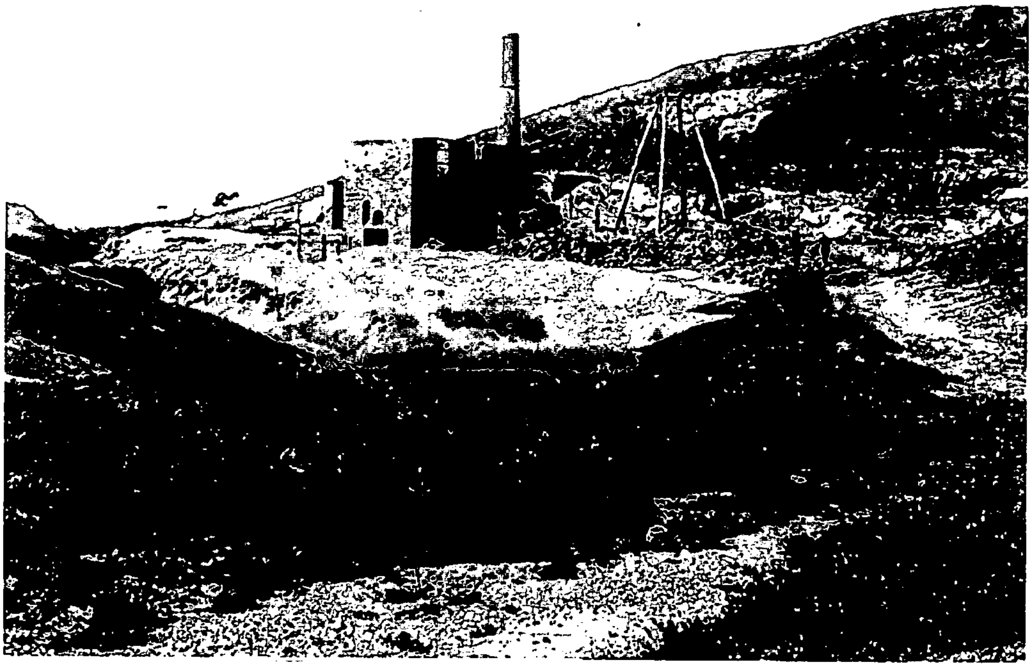

Figure 12

Figure 13

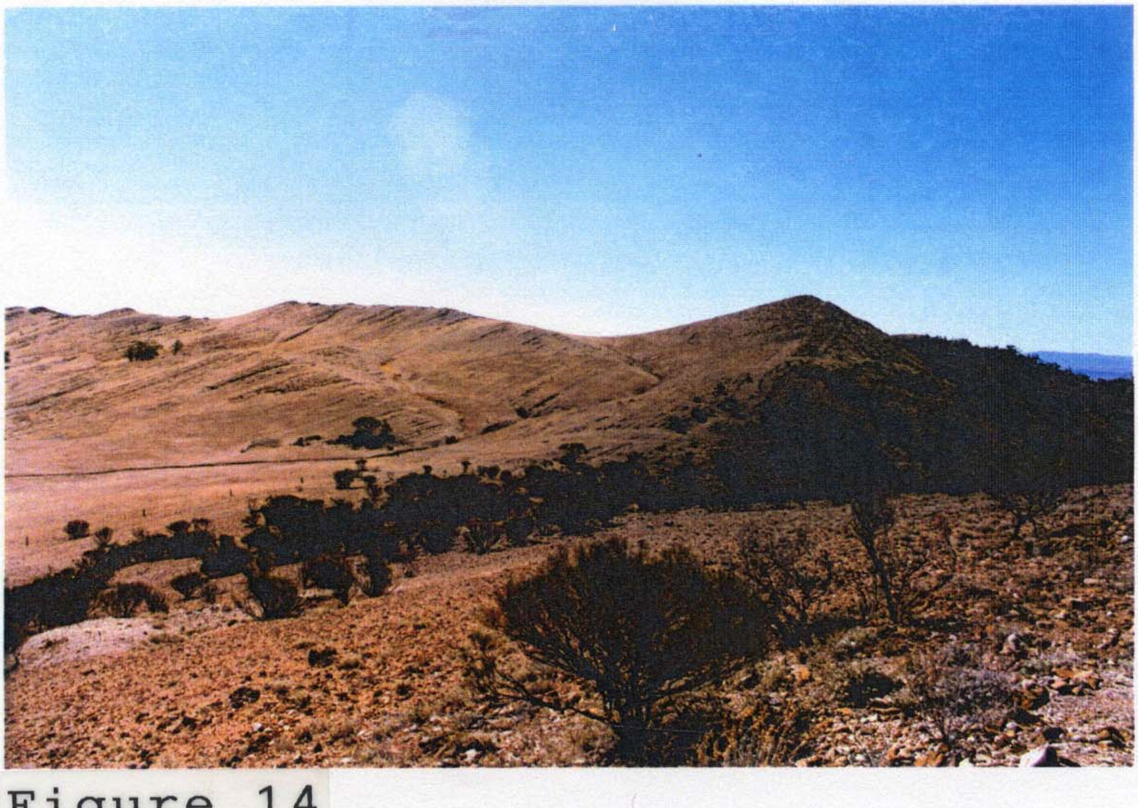

Figure 14

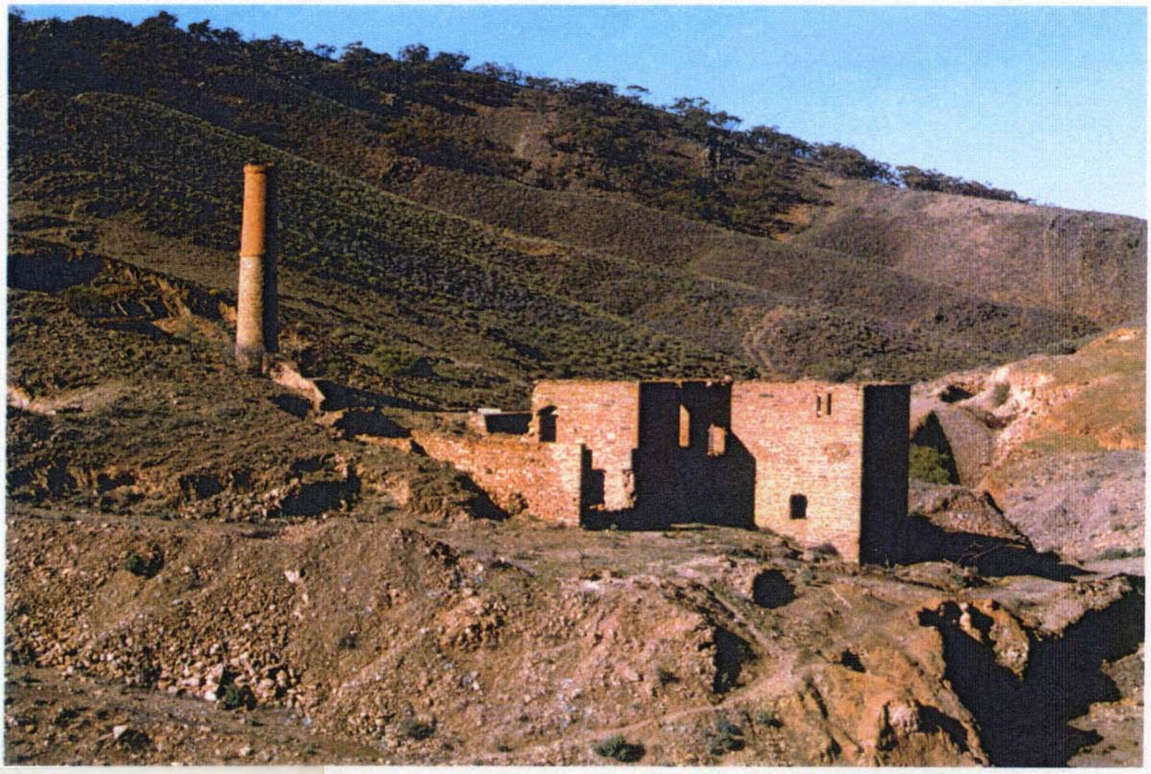

Figure 15

Figure 16

Plate 3

Plate 4

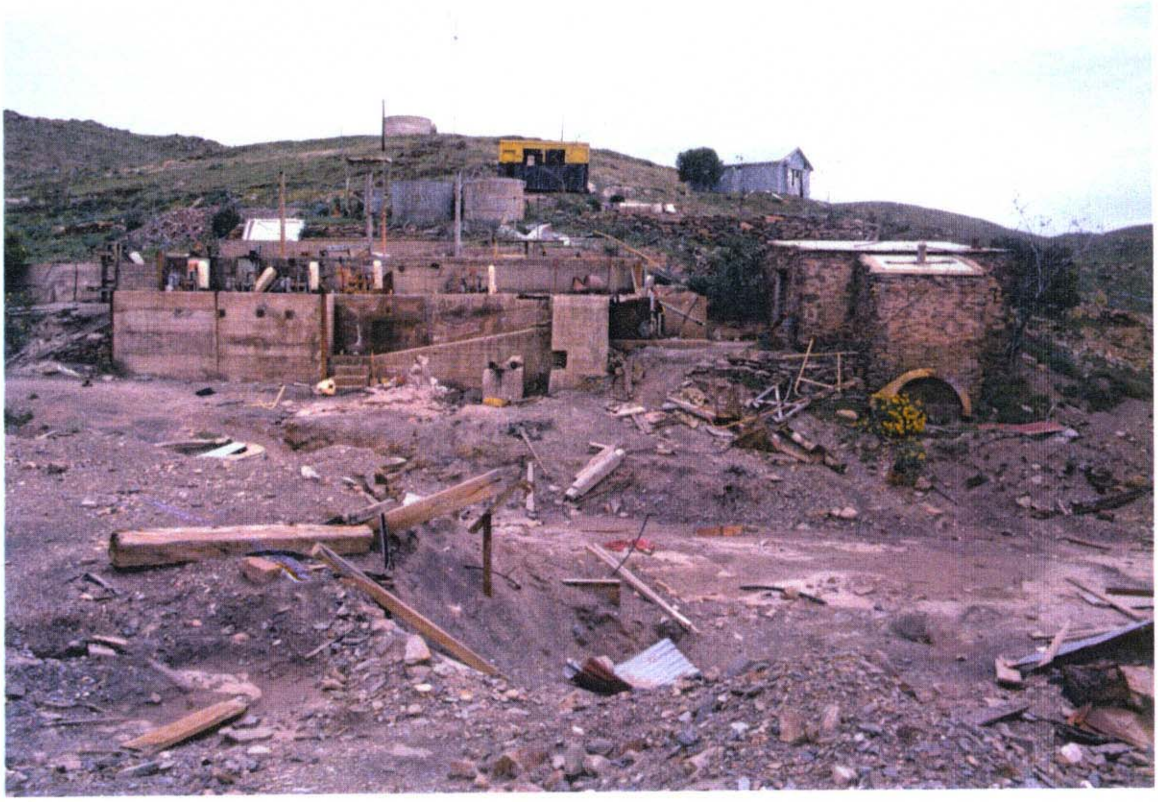

Plate 5

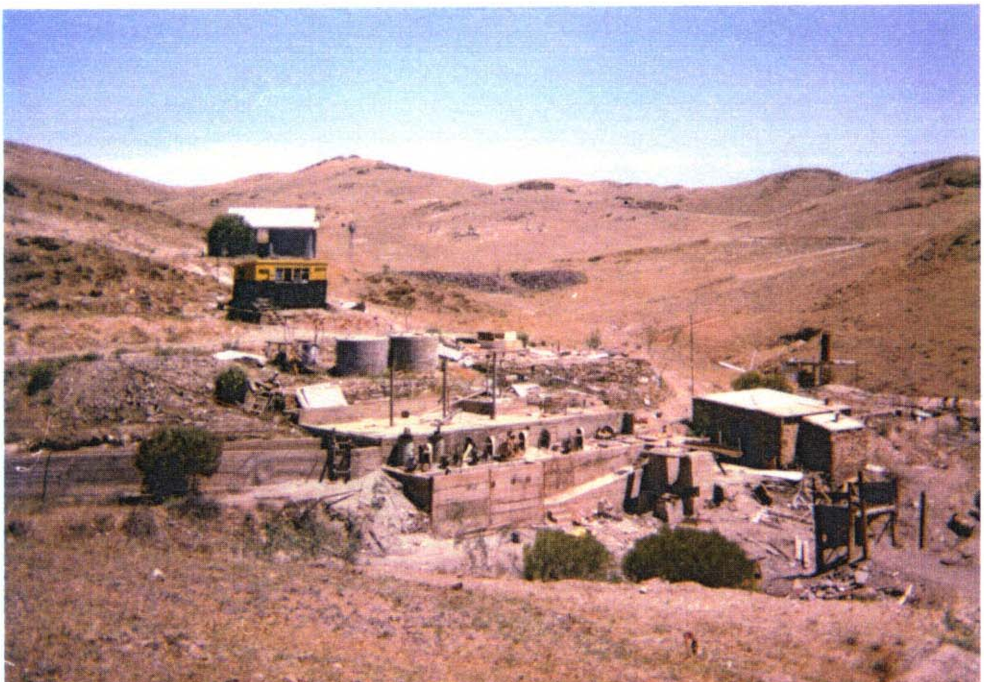

Plate 6

Plate 7

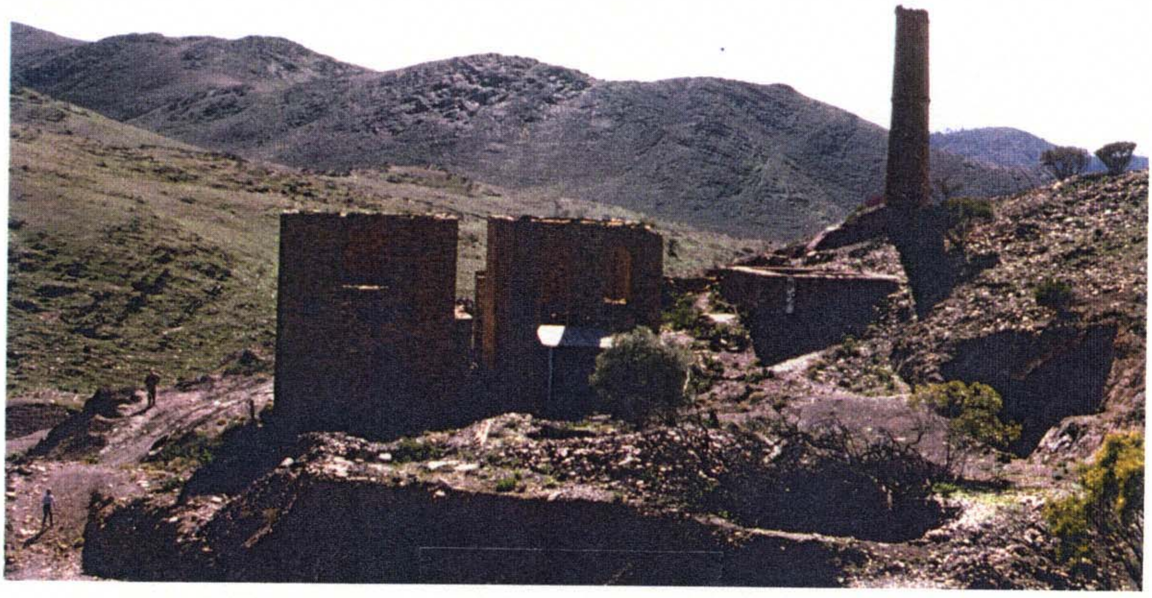

Plate 8

5 MINING ARCHAEOLOGY -
PRINCE ALFRED MINE CHRONOLOGY

DATE	REFERENCES	DETAILS
1866-1868	**Records of mines summary card, Report Wade and Wegener 195?**	Discovery of mine, mining application. Prince Alfred Copper Mining and Smelting Co. Ltd.
1872	**Records of mines summary card**	Mattawarangala Company working south of Prince Alfred mine
1874	**Report Wade and Wegener 195?**	Prince Alfred Copper Mining and Smelting Co. Ltd. could not continue business, voluntary wind up
1889 - 1890	**Report Wade and Wegener 195?**	Limited operations in progress - New prince Alfred Copper Mining Company NL
1898 - 1899	**Report Wade and Wegener 195?** **Records of mines summary card**	Prince Alfred Copper Mining Company formed Prince Alfred Copper Mining Co treated 1000t of ore produced 51 t Cu ?%, 18 men; No. 1 shaft to 50ft, erecting poppet legs, ; Mine under water at 50ft level
1900	**Records of mines summary card**	Miscellaneous Lease granted to farmer - Section 87
1901	**Records of mines summary card**	700t raised, 495 treated 68t 20% Cu produced 11 - 14 men; mine unwatered, lode 30ft wide at 170ft level-faulted below this level; concentrating plant and machinery installed; Grade 0.7% from tailings
1902	**Records of mines summary card**	1412t raised, 1212 treated 153t 20% Cu produced 19 - 9 men
1904	"	66 and 50 tons of 21% and 18% concentrate produced; work at 90 and 170ft levels
1905	"	85 tons of 18% concentrate produced
1906	"	129 and 82 tons of 18% and 16% concentrate produced
1907	"	207 and 55 tons of 24% and 20% concentrate produced Company working at a loss
1908	**Records of mines summary card**	Company exemption from working
1909	**Records of mines summary card**	Prince Alfred Copper Mining Co ceased to exist
1922	**Records of mines summary card**	Miscellaneous lease - pastoral
1940	**Records of mines summary card**	Miscellaneous lease - 42 year pastoral lease
1952	**Wade and Wegener**	Mapping at the Prince Alfred site and recommendation for drilling
1959	**Records of mines summary card**	Survey indicated low Cu values and limited extent of the ore body, ? whether further work warranted
1960	**Nixon - diamond drilling - Prince Alfred Copper Mine**	3 drillholes were placed to investigate the possibility of further copper ore below the old mine workings

1965 July	**DOC 1133/65, 1296/65, 1297/65**	Martin Parry of Peterborough -MC's 4862, 4863 & 4864 under MR 12221, 12214 &12212 returns of 31/12/65, 30/06/66
1965 August	**DOC 1296**	Baynes and Parry application for amalgamation of claims (20/8/65) 4862, 4863, 4864; granted to 26/8/67 Application and granting of 1 month suspension of works to 26/9/65 (for finishing assembly of equipment.
1965 Sept	**DOC 1134/65**	G. Baynes of Peterborough working with Parry
1965 October	**DOC 1297**	Parry and Baynes 2 month suspension from works to 12 Dec 1965, lack of finance and time; using air comp. and J. hammer to collect samples
1966 June/ July	**Doc 1133, 1134**	MC 4863 expired Parry and Baynes MC 4862 expired MC 4864 cancelled
1966 August	**DOC 1217/66** **DOC 1628/66**	Electrowinning P/L (c/o 7 Pitman Av Woodville west) pegged (09/08/66) 3 MC's 5008, 5009 5010 over old MC's (MR 3165, 3164, 3167) granted 29/08/66; former MC's 4862, 4863 4864 3 month suspension to work granted to 21/01/67 while McPar Geophysics complete geochem and geophy surveys.
1966 Dec.	**Records of mines summary card** **Mining register Vol 14 Claim no 4986 to 5135** **DM 383/68, 242/68; DOC 1966/66**	Cams leases P/L, SML 141 - excluded MC's 5008 - 10 MC's 5008, 5009 & 5010 transferred to P. Taylor c/o Aust. Blue metal P/L 23/12/1966
1967	**DOC 1966/66**	Letter from solicitors to Warden re ownership of 5008, 5009, 5010
1968 Jan	**DOC 1628/66**	Application to suspend work 15/01/68 granted to 15/02/68 - P. Taylor, for feasibility study on ore treatment, selection of plant site, water for treatment.
1968 Feb	**Mining register Vol 14 Claim no 4986 to 5135 DM 383/68, 242/68**	MC's 5008, 5009 & 5010 transferred to W. Parkinson 26/02/1968
1968	**Records of mines summary card**	Geochemical and IP anomalies identified south of mine
1968 March	**DOC 383/68**	May pegged claim over part of Parkinsons 5008 - 10 on 12/03/68; Warden orders Parkinson to cease work 14/03/68

1968 May	**DOC 383 re Plaint 677**	Plaint May-Parkinson (08/05/68) re incorrect pegging and maintenance of claims of MC 5008-5010 - May wins Plaint; MC's cancelled 14/05/1968 Parkinson writes to Warden re ownership and removal of mine dump materials which were claimed to be raised by P. Taylor and in process of being purchased by Parkinson. Warden suggests no record of any material being raised by Electrowinning and hence nothing to be purchased. No further action taken.
1968 Nov.	**ENV 1098**	Cams Leases applies for and granted SML 141A formerly part of SML 141 (dropped)
1969 June	**ENV 1098**	Cams Leases SML 141A exploration with Trans Australian Explorations P/L. Soil geochem and IP conducted south and east of Prince Alfred workings
1969 July	**Record of mines Summary cards**	240 tons raised, 100 shipped
1969 Aug	**Record of mines Summary cards**	16 tons rich ore shipped to Pt Augusta
1969 Sept	**Record of mines Summary cards**	100 tons of ore bagged (200 bags)
1969 Oct	**Record of mines Summary cards**	78 tons of ore bagged (157 bags)
1969 Dec	**Record of mines Summary cards**	1/2 yearly meeting reports 229 and 365 tons of ore shipped to Pt Adelaide
1970 Feb	**Record of mines Summary cards**	15 tons of ore ready ** Harry Rademaker stated only 87 tons ore shipped out during operations - July 1997***
1970	**Metals, reclamation and mining P/L (Minerals mining and metallurgy Ltd) DME 95/70 DME 85/70, ENV 1395**	Application for SML, reference to testing ore from Anesbury and lone pine leases for custom milling; back by Kia Ora Gold corporation
1970 Feb	"	McPar Geophysics agree to undertake exploration program
1970 Aug	"	SML 401 Headquarters established at prince Alfred including lab, house, mess, AA machine for stream sed. and drill sample analysis. Idea of mineralisation originating in diapir and moving along faults Dewatering work for access to old mine workings- main shaft
1970 Dec	"	Road making and 3 holes drilled at Willcowie, 6 staff housed at mine

1971 Feb	"	stream sed. sampling; water boreholes drilled in and outside P.A. mineral claims to supply water from milling and drinking; discussion on proving up other resources on SML 401 for beneficiation at P.A. concentrator. Application for extension to SML 401. processing of sulphide rich low grade copper tailings and dumps discarded by earlier mining and milling activities Company floated - Minerals Mining and Metallurgy; absorbed the previous P/L (Metals reclamation and Mining p/l)
1971 July	"	Concentrator placed on 'care and maintenance' pending installation of further bank of flotation cells to separate oxidised Cu fraction (motivated by falling Cu prices). 24 4" percussion drillholes drilled
1973 Oct		Renewal of original mining licence MC 5252, 5253, 5254, 5696 and 5697 granted and commenced as ML 4332, 4333, 4334, 4335 and 4336 on 3/12/1973
1974 Nov	**MESA DOC 827/73**	Surrender of ML 4334, 4335, 4336 - no ore found and company increasing commitment to Broken Hill
1974	**MINING RETURN**	NIL RETURN LODGED discussions with a SA group re mining of areas an reopening the concentrator
1975 Jun		ML 4334, 4335 and 4336 expired 10/06/75
1978 Aug	**MESA DOC 827/73**	Rex Barton - mines inspector indicated leases a 'bloody shambles'
1978 Nov/ Dec	**MESA DOC 827/73**	Form of surrender for ML 4333 and 4332 submitted
1979 Sept	**MESA DOC 827/73**	ML 4332 and 4333 deleted from rent list
1979 Oct	**MESA DOC 827/73**	Scrap metal and other machinery sold to L. Clarke for $10.00
1980 May	**MESA DOC 827/73**	No evidence of scrap removal
1980 Jun	**MESA DOC 827/73**	Letter for renewal of mining lease sent to MM&M, letter also sent re scattered rubbish at the mine site needs to be cleaned up immediately
1980 July	**MESA DOC 827/73**	Letter to MESA from MM&M stating sending team from Port Pirie to clean up; clean up completed to MESA satisfaction - most rubbish stacked in holes and buried
1980 Sept	**MESA DOC 827/73**	MM&M inform MESA that they will not be renewing mining lease
1980 Dec	**MESA DOC 827/73**	ML 4332 and 4333 expired 02/12/80

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REFERENCE
UMBERATANA GROUP
TARCOWIE SILTSTONE - Well bedded siltstone and sandy siltstone
UROONDA SILTSTONE MEMBER - Poorly bedded siltstone and fine grained sandstone
YANKANINNA SILTSTONE MEMBER - Boldly outcropping siltstone, frequently calcareous
TAPLEY HILL FORMATION - Flaggy, well laminated blue-grey siltstone
TINDELPINA SHALE MEMBER - Carbonaceous and pyritic shale with thin dolomite interbeda near the base
YUDNAMUTANA SUB GROUP
APILLA TILLITE - Massive boulder tillite with interbedded siltstone and sandstone
HOLOWILENA IRONSTONE - Lenticular hematite and magnetite siltstone
SKILLOGALEE DOLOMITE - Mainly dark grey dolomite, chert and magnesite conglomerate
RHYNIE SANDSTONE - Pale grey, pinkish, medium grained felspathic quartzite with minor siltstones
RIVER WAKEFIELD GROUP
UPPER SILTSTONES - Fissile, sericitic, argillaceous siltstones and limestones with thin nodular magnesite horizons
ANESBURY DOLOMITE - Massive dark grey and green lenticular dolomite. Facies change to fissile argillaceous siltstones
LOWER SILTSTONES - Yellow and grey sericitic argillaceous siltstones. Thin limestones and dolomitic silts.
UPPER ARENITE - Grey sandstones and carbonaceous siltstones. Lenticular dolomite
UNNAMED ARENITE - Grey medium grained felspathic sandstone with possible volcaniclastic component
HANGINGWALL OCHREOUS SILTSTONES - Grey carbonaceous clays and siltstones. Massive dolomitic limestones
UPPER VOLCANICLASTIC ARENITE - Mg to fg flaggy calcareous felspathic sandston
UPPER CHERT HORIZON - Intraformational black chert conglomerates and silty dolomites
LOWER VOLCANICLASTIC ARENITE - Mg to c.g calcareous crossbedded sandstone.
LOWER CHERT HORIZON - Black chert; intraformational chert conglomerate; grey siltstones
HANGINGWALL MARKER ARENITE - Massive re-crystallised arkosic and dolomitic sandstone
UNNAMED - Flaggy dolomitic siltstones and sandy dolomite
UNNAMED - Flaggy black and greenish dolomitic limestones and arenaceous dolomites
UPPER MINERALISED SEQUENCE - Dolomitic carbonaceous siltstones and sandstones with varying carbonaceous content
FOOTWALL ARENITES - Felspathic gritty quartzites
LOWER MINERALISED SEQUENCE - Predominantly black graphitic dolomitic siltstones and calc arenites
Rock Sample — PA213467
Water Sample — PAW621431
Stream Sed. Sample — >40ppm
PA898457
PA893459
PASLAG01
PAC00H02
PATAUK01/
PATTAUK02
PAORGRAD/
PAREDHEAP
PAC00H01
PATAZL02
PATAZL01
PABORE01
PA896452
6445000N
PA896446
x PAW862444
PA887435
PA881436
PA886435
PA888435
PAW892430
PA888424A
PA888424B
PA889423
PA884419 + PA888419
PA881418
6440000mN
289000mE
9252-1
GEOLOGY
scale 1 : 12 500
EL 2223 -
PRINCE ALFRED
DATE: 06/11/97
Geology:
Dr D.T. MILLER
CLIENT:
Geo-Developments P/L
Drafting:
D.T. Miller

APPENDIX 1

Rock sample description

A brief description of selected rock samples collected within the Tenement for geochemical analysis are given below. Sample locations are indicated on the accompanying geology map.

Sample identification	Description
PA 893459	dark grey, finely laminated shale with a well developed closely spaced cleavage (schistosity) containing weathered pyrite crystals along bedding surfaces
PA 896446	Appila Tillite - conglomerate composed of poorly sorted subangular to rounded clasts ranging from coarse sand to pebbles. The clasts are predominantly carbonate, ironstone and erratic pegmatite, granodiorite and quartzite
PA 896452	diamictite? gravel - grit bed of the lower Umberatana Group; moderately to well sorted subangular grains of carbonate and quartz supported in a calcareous matrix. Abundant 0.5 - 1 mm pyrite crystals
PA 898487	calcareous siltstone with calcite veins containing copper carbonate and euhedral crystals of galena (1 - 5 cm^3)
PA 889423	Egmont mine - numerous limonite pseudomorphs after pyrite, crystal size 3 to 20 mm

Table 1 Selected rock samples

APPENDIX 2

DRILL HOLE DATA - PRINCE ALFRED MINE SITE

6633 MW 6

CO. GRANVILLE. BORE NO. 11.

LOG OF BORE

Depth from	Depth to	Nature of Strata
0	2'	Weathered brown slaty dolomite.
2'	37'4"	Massive blue dolomitic slate. Laminated beds make an angle of 71 deg. to the length of core. Calcite veins strike parallel to the bedding and make an angle of 49 deg. to the length of core. Another group of narrower calcite veins dips parallel or sub-parallel to the length of core.
37'4"	38'	Weathered breccia zone.
38'	102'6"	Laminated and massive blue dolomitic rock with calcite veins. Calcite veins carrying sulphides occur at 85'5"., 99'8" and 100'9" parallel to the beds which make an angle of 80 deg. to the length of core.
102'6"	156'9"	Rock type similar to above with pyrite scattered throughout the rock as fine grains. At 138' a narrow grit bed 1" thick.
156'9"	157'9"	Grit bed with scattered sulphides occuring as grains in the matrix.
157'9"	179'6"	Blue-grey dolomitic flaggy and laminated slates withfine-grained pyrite scattered through the rock and concentrated in calcite veins. At 177'6" laminated beds show slump structures. Calcite veins carrying pyrite occur 161'9"., 163' and 177'6". Veins vary in width from 1/10th" to 1".
179'6"	185'	Grit beds carrying sulphides of iron and copper scattered as grains in matrix, Laminated blue slatey dolomitic beds occur between 179'6" - 180'. 180'6" - 181'., 184'3" - 185'.
185'	196'	Massive blue dolomitic slate. Beds make an angle of 70 deg. to the length of core. At 188' a ½" calcite vein carrying pyrite cuts across the bedding making an angle of 40 deg. to the length of the core.
		END OF BORE 196'.
		LOGGED BY L.G.B. NIXON.

Micro Film No.

10M—1.60 6226

6633 MW 7

CO. GRANVILLE. BORE NO. 12.

LOG OF BORE

Depth from	Depth to	Nature of Strata
0	87'	Massive blue dolomitic slate showing laminated bedding which makes an angle of 85 deg. to the length of the core. Calcite veins carrying pyrite occupy fractures in the rock.
87'	121'10"	Laminated blue dolomitic beds make an angle of 84½ deg. to the length of the core.
121'10"	122'2"	Calcite vein parallel to the bedding makes an angle of 85 deg. to the length of the core. Quartz occurs in the central portion of the calcite vein.
122'2"	168'	Massive blue dolomite with laminated bedding and with calcite veins carrying sulphides and quartz parallel to the bedding which makes an angle of 84 deg. to the length of the core. Calcite-quartz veins occur at 128'2" (½" wide), 128'1" (1" wide), 140' (2" wide), 146'10" (1" wide), 156'10" (1½" wide).
168'	169'2"	Coarse sandy rock carrying disseminated sulphide.
169'2"	192'3"	Broken blue dolomitic rock cemented with calcite.
192'3"	192'11"	Sheared grit with pebbles orientated to make an angle of 20 deg. to the length of the core.
192'11"	197'8"	Grit and breccia cemented with calcite.
197'8"	198'1"	Steeply dipping laminated dolomitic slates showing slump structures.
198'1"	208'4"	Brecciated laminated dolomitic slates cemented with calcite.
208'4"	228'6"	Massive laminated blue dolomitic rock. Beds make an angle of 76 deg. to the length of the core. Calcite veins parallel to the beds occur at 208'4" (2" thick), 209'2" (3" thick).
228'6"	231'	Coarse sandy beds with disseminated sulphides.
231'	233'8"	Light-grey cross-bedded laminated slates.
233'8"	243'	Coarse grit and breccia for the first inch then medium-grained grits grading to coarse grits at depth. Sulphides disseminated throughout the grit beds. Fine-grained pyrite occupies narrow fractures in the rock.

Micro Film No.

10M—1.60 6326

6633 mw7

CO. GRANVILLE. BORE NO. 12.

LOG OF BORE

Depth from	Depth to	Nature of Strata
243	450'	Laminated blue-grey dolomitic slate with fine-grained pyrite disseminated throughout the rock with calcite veins, parallel to the beds carrying pyrite. Calcite veins occur at 253' (½") 254' (½") 264' (½"), 286'9" (1"), 269'3" (1½") 270' (2"), 272' (1"), 284'8" (4"), 298' (1"), 301'6" (1"), 383'6" (¾"). Cross-bedding was noted at 334' and slumping at 403'. Beds make an angle of 73 deg. to the lenth of core.

END OF BORE 450'.

LOGGED BY L.G.B. NIXON.

Details of Core Recovery.

Ft.	in	Ft.	in	Recovery Ft.	Recovery in.
Surface		87	0	78	5
87	0	121	10	34	9
121	10	122	2	0	4
122	2	124	8	2	0
124	8	168	0	31	6
168	0	169	2	1	2
169	2	192	3	9	1
192	3	192	11	0	8
192	11	197	8	3	2
197	8	198	1	0	5
198	1	208	4	5	1
208	4	228	6	8	9
228	6	231	0	1	0
231	0	233	8	1	8
233	8	243	0	9	0
243	0	336	6	66	6
336	6	339	0	5	6
339	0	343	2	3	5
343	2	346	6	3	11
346	6	351	0	2	7
351	0	359	2	7	9½
359	2	387	9	21	7½

Ft	in	Ft	in.	Recovery Ft.	Recovery in.
387	9	413	5	22	7
413	5	444	2	25	10½
444	2	450	0	5	2½
TOTAL				352	0 =
				78.3%	

Micro Film No.

10M—1.60 6325

6633 MW8

CO. GRANVILLE. BORE NO. 13.

LOG OF BORE

Depth from	Depth to	Nature of Strata
0	11'	Blue-grey laminated dolomitic slates weathered for about 3' from surface.
11'	36'6"	Laminated grey slates weathered to brown clay between 11'-18'., 22' - 36'6". Beds make an angle of 73 deg. to the length of the core. Brecciation occurs at approximately 26'. That is probably the major northerly trending fault.
36'6"	50'	Brown arkosic sandstone.

END OF BORE 50'.

LOGGED BY L.G.B. NIXON.

Details of Core Recovery.

Recovery.

Ft.	in.	Ft.	in	Ft.	in.
Surface		11	0	5	0
11	0	36	6	7	9
36	6	50	0	5	4

TOTAL 18 1 = 36%.

Micro Film No.

10M-1.60 5325

UNIT NUMBER
6633 [illegible]

Not to be removed from Records Room

BORE RECORDS—MINERAL DRILLING

D.M.—C 73

DEPARTMENT OF MINES

092970
Reg.

Card No. 1

CO. GRANVILLE.

Hundred ..... Section ..... Lease, etc., No. 1719 ..... Bore No. 13

Project ..... D.M. 1130/52 ..... Bore Serial No. 6/61.

Collar Co-ords. 1390N - 1430E ..... R.L. ..... Grid.

Direction 090° N. Angle 50° Depth 50' Plan Ref. ..... Drillers G. SPELDEWINDE.

Date hole commenced 30/5/60 Date completed 4/7/60 Logged by LG.B. NIXON. Date

Object To test a gossan outcrop occuring on a major north-south trending fault to the east of the mine.

Result

LOG : Comprises

ASSAYS Ref. Mining Review No. 113.

Checked [illegible]

13.

MW 8633

6633/1 434

SCHEDULE EIGHT - FORM FOUR
GOVERNMENT OF SOUTH AUSTRALIA
Water Resources Act, 1976

DRILLERS WELL CONSTRUCTION REPORT

1. PERMIT No. 19772 A   Official Well No.

2. LOCATION OF WELL:
Hundred or Part ... No. M'CULLOCH
Section 5 ... Lot No. ... Site No.
Name of Property

As the person responsible for the work carried out on this well I advise that it has been completed as described below.

Name of Driller L. THOMAS ... Licence No. 2/29
Name of plant operator if under supervision...

Permit holder or land occupier ... BENNETT + F...
Postal Address ... BOX 144
ORRORCC ... Postcode 5431

5. SUMMARY

Date work commenced 15-5-87. ... Date completed 1-6-87
Work carried out New well ✓, Existing well, deepen ☐, enlarge ☐, rehabilitate ☐, backfill ☐ (tick appropriate boxes)
Final Depth 100.6 m Final standing water level — m Final yield — l/sec.
Was well abandoned? BACKFILL If yes, state method

6. DRILLING DETAILS If not a drilled well please complete paragraphs 6.2, 9, 10, 11, 12 and 13 as necessary

6.1 CONSTRUCTION DETAILS

From (m)	To (m)	Diam. (mm)	Drilling Method Cable Tool, Rotary Auger, Etc.	Fluid Used (Air, Water, Mud Type)
0	100.6	175	~~[illegible]~~	
			ROT.	AIR.

6.2 WATER CUTS (measurements from natural surface to nearest 0.1 m)

Date	Water Cut From (m)	Water Cut To (m)	Standing Level (m)	Estimated Yield l/sec.	Hole Depth at Test (m)	Casing at Test (m)	Test Method	Salinity mg/l or Taste
—								

7. CASING LEFT IN WELL

7.1 Dimensions From (m)	To (m)	Internal Diam.	7.2 Type Swell Joint, Welded Collar, Steel, Plastic, Etc.	7.3 Casing Shoe Yes	No	Diam. (mm)	Cemented Yes	No	7.4 Casing Pressure Cemented Yes	No	From (m)	To (m)	Cement (bags)	Water (litres)	Other Additives
—				☐	☐		☐	☐	☐	☐					

8. CONSTRUCTION AT PRODUCTION LEVEL

8.1 Method
☑ Open Hole
☐ Screen(s) ☐ Slotted Casing
☐ Other, give details

8.2 SCREEN OR SLOTTED CASING (*If variable aperture screen used give limits)

Type	From (m)	To (m)	Aperture* (mm)	Inner Diam. (mm)	Outer Diam. (mm)	Material	Trade Name	Completion of Base

8.3 LINER SEAL (packer)

Material	Depth (m)	Diam. (mm)

8.4 GRAVEL PACKING

Method of Placement	Gravel Passing Mesh Size	From (m)	To (m)

9. IF NOT A DRILLED WELL (i.e. hand dug, etc.)

Method	Depth (m)	Length (m)	Width (m)	Diam. (m)	Lining Material	From (m)	To (m)

10. DEVELOPMENT State methods and times taken

NO WATER

11. PUMP TEST (measurements from natural surface to nearest 0.1 m)

Interval Tested From (m)	To (m)	Water Level Stabilised at End?	Test Method	Depth of Pump (m)	Discharge Rate l/sec.	Method of Measuring Discharge	No. of Hours Pumped	Draw Down (m)

13. FORMATION LOG

From (m)	To (m)	Description of Material
0	2	TOP SOIL
2	42.6	YELLOW SHALE.
42.6	68	BLUE SLATE.
68	71	YELLOW "
71	74	BLUE "
~~69.2~~		
74	69.2	GREY "
69.2	100.6	BLACK "

12. SAMPLES
The provisions of the Water Resources Act and Regulations thereto require that strata and water samples must be obtained. If any samples have not been obtained state reasons:—

Signature of Licensed Driller ... L. Thomas ... Date / /

Driller to forward this Copy, within 14 days of completion to:
The Director of Mines,
Department of Mines,
191 Greenhill Road,
Parkside, S.A. 5063

Summary of Latest Water Information for Drillholes

Unit No	Cl	Max Drill Depth (m)	Orig Drill Date	Curr Drill Depth (m)	Curr Drill Date	Hundred	Section	SWL (m)	SWL Date	Well Yield (Gal/hr)	Well Yield Date	TDS (mg/l)	Sampl Date	pH	Permit	Cased To (m)	Full Chem Anal	Dril Log	Geol Log	Gphys Log	Aban Bckf Coll Plug
6633 4 173	WW	36.00	12/78	36.00	12/78	WIRREANDA	S 8	16.50	12/78	197.97	12/78	11318	12/78	6.80	3386		U	Y	U	U	BKF
6633 4 174	WW	32.10	12/78	32.10	12/78	WIRREANDA	S 9	24.37	03/80	182.13	03/80	4956	03/80		3386	32.00	U	Y	U	U	OPR
6633 4 175	WW	44.50		44.50	05/55	WIRREANDA	S 51	38.40	05/55	498.89	05/55	1060	05/55				U	U	U	U	OPR
6633 4 176	WW	12.00	05/54	12.00	05/54	WIRREANDA	S 30			182.13	01/80						U	U	U	U	OPR
6633 4 177	WW	26.58	01/00	26.58	03/80	WIRREANDA	S 52	21.90	03/80	229.65	03/80						U	U	U	U	
6633 4 178	MW	58.52	01/59	58.52	01/59	WIRREANDA	S 104	11.28	01/59			3920	01/59				Y	U	Y	U	
6633 4 179	WW	8.75		8.75	06/80	YEDNALUE	S 16	5.95	06/80	364.27	06/80	2647	06/80				U	U	U	U	OPR
6633 4 180	WW	14.00		14.00	06/80	YEDNALUE	S 26			459.29	01/80	3862	03/60				Y	U	U	U	OPR
6633 4 181	WW	27.00	05/55	27.00	05/55	YEDNALUE	S 50			182.13	01/80						U	U	U	U	OPR
6633 4 182	WW	36.58		36.58	01/80	UROONDA	S 109	20.23	03/80								U	U	U	U	OPR
6633 4 183	WW	21.34		21.34	01/60	UROONDA	S 79	23.20	03/80	229.65	03/80	3074	03/80				U	U	U	U	OPR
6633 4 184	WW	65.53		65.53		UROONDA	S 128										U	U	U	U	ABD
6633 4 185	WW	124.97		124.97	06/56	UROONDA	S 142	13.00	06/80	403.86	01/56	2425	06/56			134.00	U	U	U	U	
6633 4 186	WW	60.96	08/44	60.96	08/44	UROONDA	S 74	13.72	08/44	7.92	08/44	5651	09/44			7.32	Y	U	Y	U	
6633 4 187	WW	20.75		20.75	06/80	UROONDA	S 68	16.65	06/80	182.13	06/80						U	U	U	U	OPR
6633 4 188	WW	109.00		109.00		UROONDA	S 154										U	U	U	U	ABD
6633 4 189	WW	21.34		21.34		UROONDA	S 155			47.51							U	U	U	U	
6633 4 190	WW	6.10		6.10		UROONDA	S 164			71.27							U	U	U	U	

Summary of Latest Water Information for Drillholes

Unit No	Cl	Max Drill Depth (m)	Orig Drill Date	Curr Drill Depth (m)	Curr Drill Date	Hundred	Section	SWL (m)	SWL Date	Well Yield (Gal/hr)	Well Yield Date	TDS (mg/l)	Sampl Date	pH	Permit	Cased To (m)	Full Chem Anal	Dril Log	Geol Log	Gphys Log	Aban Bckf Coll Plug
6633 4 191	WW	49.68		49.68	03/54	UROONDA	S 42	36.58	03/54	641.43	03/54	8037	03/54			5.49	U	U	U	U	
6633 4 192	WW	7.55		7.55	06/80	EURILPA	S 165	6.30	06/80	134.62	06/80	2561	06/80				U	U	U	U	
6633 4 193	WW					EURILPA	S 163										U	U	U	U	
6633 4 194	WW					EURILPA	S 109										U	U	U	U	
6633 4 195	WW	46.63		46.63	02/51	EURILPA	S 40	18.29	02/51	332.59	02/51	3926	03/80			24.38	U	U	U	U	
6633 4 196	WW	35.05		35.05	05/50	EURILPA	S 40	18.29	05/50	696.86	01/60	3201	05/50			24.38	U	U	U	U	
6633 4 197	WW	28.96		28.96		EURILPA	S 40										U	U	U	U	
6633 4 198	WW	36.58		36.58	05/50	EURILPA	S 64	24.38	05/50	419.70	05/50	4111	05/50			6.40	U	U	U	U	
6633 4 199	WW	5.85		5.85	07/80	EURILPA	S 303	0.85	07/80								U	U	U	U	
6633 4 200	WW	50.29		50.29	09/54	EURILPA	S 46	36.58	09/54	221.73	09/54	1496	09/54			6.10	U	U	U	U	OPR
6633 4 201	WW	65.53		65.53	02/51	EURILPA	S 305	57.91	02/51	546.40	02/51	1099	03/54			6.40	U	U	U	U	OPR
6633 4 202	WW	1.40		1.40	07/80	EURILPA	S 296									1.40	U	U	U	U	ABD
6633 4 203	WW					EURILPA	S 310	5.85	07/80			2476	07/80	7.90			Y	U	U	U	
6633 4 204	WW	88.70		88.70		EURILPA	S 58	4.04	07/80								U	Y	U	U	OPR
6633 4 270	WW	10.60		10.60	05/80	WIRREANDA	S 72	8.40	05/80							2.00	U	U	U	U	ABD
6633 4 271	WW	11.05		11.05	05/80	WIRREANDA	S 75	6.45	05/80	229.65	05/80	4250	05/80				U	U	U	U	OPR
6633 4 272	WW	15.00		15.00	01/80	WIRREANDA	S 74	9.50	05/80	229.65	05/80	3850	05/80				U	U	U	U	OPR
6633 4 273	WW	5.40		5.40	05/80	WIRREANDA	S 77	3.80	05/80	324.67	05/80	5698	05/80				U	U	U	U	OPR

Summary of Latest Water Information for Drillholes

Unit No			Cl	Max Drill Depth (m)	Orig Drill Date	Curr Drill Depth (m)	Curr Drill Date	Hundred	Section	SWL (m)	SWL Date	Well Yield (Gal/hr)	Well Yield Date	TDS (mg/l)	Sampl Date	pH	Permit	Cased To (m)	Full Chem Anal	Dril Log	Geol Log	Gphys Log	Aban Bckf Coll Plug
6633	4	274	WW	20.65		20.65	03/80	WIRREANDA	S 126	17.70	03/80	229.65	03/80	4088	03/80			1.00	U	U	U	U	OPR
6633	4	275	WW	17.80		17.80	05/80	WIRREANDA	S 110	15.50	05/80	229.65	05/80	5964	05/80			0.50	U	U	U	U	OPR
6633	4	276	WW	15.00		15.00	01/80	WIRREANDA	S 103	12.00	03/80	229.65	03/80	4687	03/80				U	U	U	U	OPR
6633	4	277	WW	31.35		31.35	05/80	WIRREANDA	S 54	30.10	05/80								U	U	U	U	ABD
6633	4	278	WW	32.00	01/63	32.00	01/63	WIRREANDA	S 54	30.27	05/80	71.27	05/80	3401	05/80				U	U	U	U	OPR
6633	4	279	WW	9.00		9.00	01/80	WIRREANDA	S 105	8.09	03/80	229.65	03/80	2018	03/80				U	U	U	U	OPR
6633	4	280	WW	20.70		20.70	01/80	WIRREANDA	S 114	10.20	05/80	166.30	05/80	2647	03/80				U	U	U	U	OPR
6633	4	281	WW	38.10		38.10	01/80	WIRREANDA	S 26	13.39	03/80	229.65	03/80	4407	03/80				U	U	U	U	OPR
6633	4	282	WW	12.00		12.00	01/80	WIRREANDA	S 27	8.26	03/80	229.65	03/80	4687	03/80				U	U	U	U	OPR
6633	4	283	WW	45.00		45.00	01/80	WIRREANDA	S 33	13.69	03/80	229.65	03/80	2909	03/80				U	U	U	U	OPR
6633	4	284	WW					WIRREANDA	S 28			364.27	01/80	5450	06/80				U	U	U	U	
6633	4	285	WW	16.10		16.10	03/80	WIRREANDA	S 8	15.00	03/80			3850	03/80				U	U	U	U	OPR
6633	4	287	WW	15.78		15.78	06/80	WIRREANDA	S 34	9.08	06/80								U	U	U	U	ABD
6633	4	288	WW	37.00		37.00	01/80	WIRREANDA	S 18			324.67	01/80						U	U	U	U	BKF
6633	4	289	WW					WIRREANDA	S 18			324.67	01/80						U	U	U	U	BKF
6633	4	290	WW	21.00	05/55	21.00	05/55	WIRREANDA	S 32	8.06	03/80	958.18	03/80	2909	03/80				U	U	U	U	OPR
6633	4	291	WW					UROONDA	S 103	20.15	03/80	229.65	03/80	6053	03/80				U	U	U	U	OPR
6633	4	292	WW	18.44		18.44	06/80	UROONDA	S 86	12.17	06/80								U	U	U	U	ABD

Summary of Latest Water Information for Drillholes

Unit No	Cl	Max Drill Depth (m)	Orig Drill Date	Curr Drill Depth (m)	Curr Drill Date	Hundred	Section	SWL (m)	SWL Date	Well Yield (Gal/hr)	Well Yield Date	TDS (mg/l)	Sampl Date	pH	Permit	Cased To (m)	Full Chem Anal	Dril Log	Geol Log	Gphys Log	Aban Bckf Coll Plug
6633 4 293	WW	14.50	01/20	14.50	06/80	UROONDA	S 106	12.70	06/80	166.30	06/80					1.70	U	U	U	U	
6633 4 294	WW	65.50	01/50	65.50	01/50	UROONDA	S 84	26.68	06/80	229.65	06/80	7521	06/80				U	U	U	U	OPR
6633 4 295	WW	23.45		23.45	06/80	UROONDA	S 84	14.60	06/80							4.00	U	U	U	U	ABD
6633 4 296	WW					UROONDA	S 154			55.43	01/50						U	U	U	U	BKF
6633 4 297	WW	30.00	04/70	30.00	04/70	UROONDA	S 68	22.81	06/80	918.59	06/80	1462	06/80				U	U	U	U	OPR
6633 4 298	WW					UROONDA	S 110	21.57	03/80	229.65	03/80	4956	03/80				U	U	U	U	OPR
6633 4 299	WW	34.77		34.77	03/80	UROONDA	S 79	28.76	03/80								U	U	U	U	
6633 4 300	WW					UROONDA	S 72	23.07	03/80	229.65	03/80	1557	03/80				U	U	U	U	OPR
6633 4 301	WW	19.51		19.51	01/80	UROONDA	S 72	11.58	03/80			3781	03/80				U	U	U	U	OPR
6633 4 302	WW					UROONDA	S 65			134.62	01/80	3401	03/80				U	U	U	U	OPR
6633 4 303	WW	18.40		18.40	03/80	UROONDA	S 169	16.00	05/80			3241	05/80			2.00	U	U	U	U	ABD
6633 4 304	WW					UROONDA	S 176	23.16	05/80	63.35	05/80	2199	05/80				U	U	U	U	OPR
6633 4 305	WW	42.67		42.67	01/80	UROONDA	S 41	36.38	03/80	229.65	03/80	5698	03/80				U	U	U	U	OPR
6633 4 306	WW	8.40		8.40	05/80	UROONDA	S 47	8.00	05/80	63.35	05/80	1928	05/80				U	U	U	U	OPR
6633 4 307	WW					YEDNALUE	S 1	10.28	03/80	229.65	03/80	910	03/80				U	U	U	U	OPR
6633 4 308	WW	70.10		70.10	01/80	YEDNALUE	S 2	62.09	03/80	229.65	03/80	1742	03/80				U	U	U	U	OPR
6633 4 309	WW	38.10		38.10	01/80	YEDNALUE	S 2	19.35	03/80	229.65	03/80	1462	03/80				U	U	U	U	OPR
6633 4 310	WW					YEDNALUE	S 2			277.16	01/80	1183	03/80				U	U	U	U	OPR

Summary of Latest Water Information for Drillholes

Unit No	Cl	Max Drill Depth (m)	Orig Drill Date	Curr Drill Depth (m)	Curr Drill Date	Hundred	Section	SWL (m)	SWL Date	Well Yield (Gal/hr)	Well Yield Date	TDS (mg/l)	Sampl Date	pH	Permit	Cased To (m)	Full Chem Anal	Dril Log	Geol Log	Gphys Log	Aban Bckf Coll Plug
6633 4 311	WW	106.68		106.68	01/80	YEDNALUE	S 43	78.41	03/80	229.65	03/80	888	03/80				U	U	U	U	OPR
6633 4 312	WW					YEDNALUE	S 60	59.67	03/80	229.65	03/80	1832	03/80				U	U	U	U	OPR
6633 4 313	WW	27.10		27.10	03/80	YEDNALUE	S 59	16.35	03/80								U	U	U	U	
6633 4 314	WW	40.23		40.23	01/80	YEDNALUE	S 52	29.23	03/80	237.57	03/80	3321	03/80				U	U	U	U	OPR
6633 4 315	WW	64.01		64.01	01/80	YEDNALUE	S 51	28.28	03/80	182.13	03/80	7703	03/80				U	U	U	U	OPR
6633 4 316	WW	43.28		43.28	01/80	YEDNALUE	S 50			459.29	01/80	1928	03/80				U	U	U	U	OPR
6633 4 317	WW	30.00		30.00	01/80	YEDNALUE	S 38	54.15	03/80	229.65	03/80	966	03/80				U	U	U	U	OPR
6633 4 318	WW	90.00		90.00	01/80	YEDNALUE	S 39	72.91	05/80	918.59	05/80						U	U	U	U	
6633 4 319	WW					YEDNALUE	S 39			7.92	01/80	1278	03/80				U	U	U	U	OPR
6633 4 320	WW	2.03		2.03	03/80	YEDNALUE	S 39	0.77	03/80			1278	03/80				U	U	U	U	OPR
6633 4 321	WW	1.20		1.20	03/80	YEDNALUE	S 39	0.90	03/80								U	U	U	U	
6633 4 322	WW	24.00		24.00	01/80	YEDNALUE	S 44			71.27	01/80	1557	03/80				U	U	U	U	OPR
6633 4 323	WW	2.60		2.60	03/80	YEDNALUE	S 3	0.60	03/80	229.65	03/80	1373	03/80				U	U	U	U	OPR
6633 4 324	WW	30.00	01/30	30.00	01/30	YEDNALUE	S 15	10.02	06/80	364.27	06/80	2114	06/80				U	U	U	U	OPR
6633 4 325	WW					YEDNALUE	S 22	4.65	03/80	229.65	03/80	1557	03/80				U	U	U	U	OPR
6633 4 326	WW	24.00	01/60	24.00	01/60	YEDNALUE	S 21	8.07	03/80	2565.72	03/80	1742	03/80				U	U	U	U	OPR
6633 4 327	WW	13.20		13.20	06/80	YEDNALUE	S 9	10.30	06/80								U	U	U	U	ABD
6633 4 328	WW	18.00		18.00	01/80	YEDNALUE	S 9	11.02	06/80	134.62	06/80	4332	06/80				U	U	U	U	OPR

Summary of Latest Water Information for Drillholes

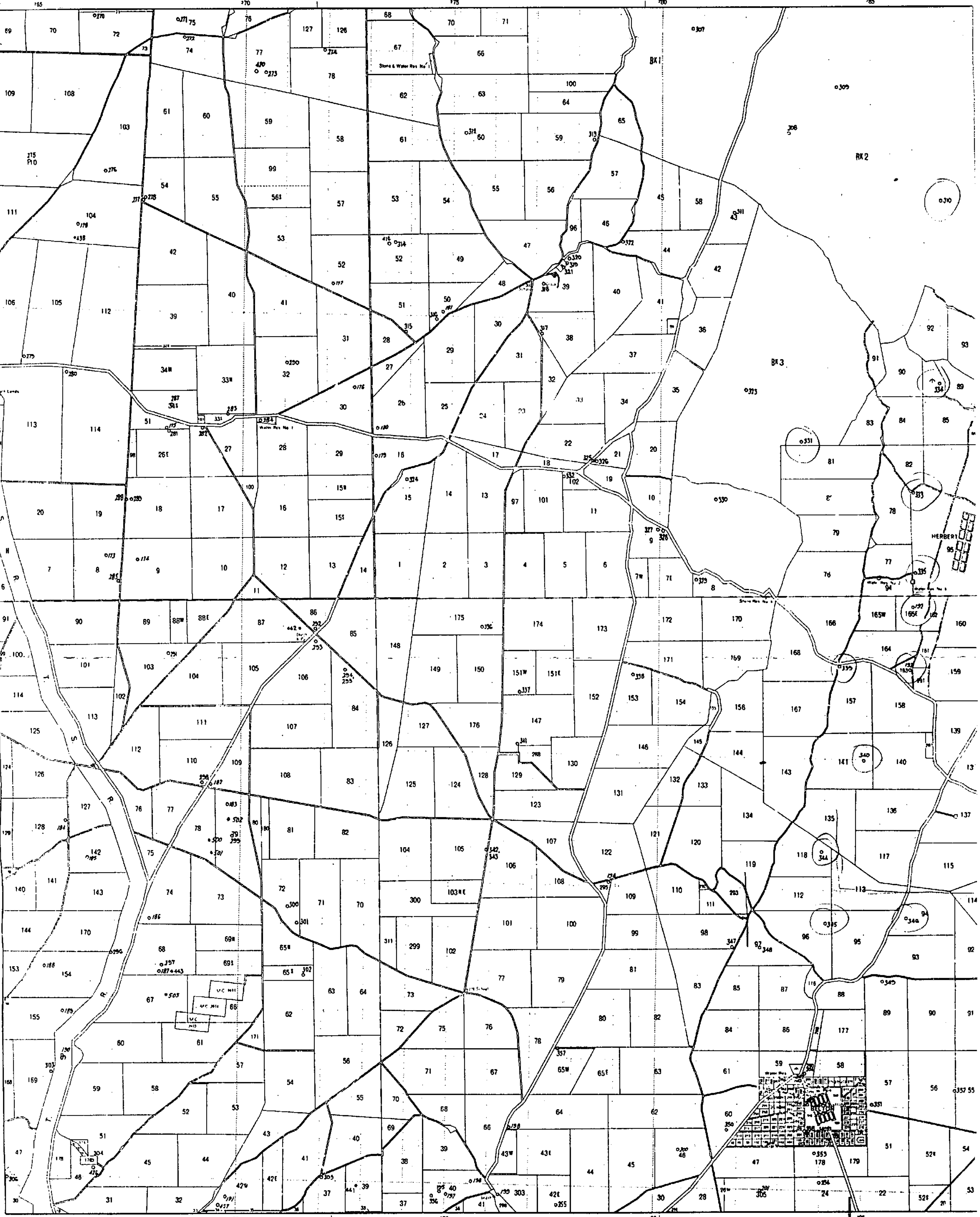
Unit No	Cl	Max Drill Depth (m)	Orig Drill Date	Curr Drill Depth (m)	Curr Drill Date	Hundred	Section	SWL (m)	SWL Date	Well Yield (Gal/hr)	Well Yield Date	TDS (mg/l)	Sampl Date	pH	Permit	Cased To (m)	Full Chem Anal	Dril Log	Geol Log	Gphys Log	Aban Bckf Coll Plug
6633 4 329	WW	20.70		20.70	01/80	YEDNALUE	S 8	8.59	06/80	182.13	06/80	3706	06/80				U	U	U	U	OPR
6633 4 330	WW					YEDNALUE	B 3					5787	03/80				U	U	U	U	OPR
6633 4 331	WW					YEDNALUE	S 3			15.84	01/80	2114	03/80				U	U	U	U	OPR
6633 4 332	WW	13.00		13.00	03/80	YEDNALUE	S 102	6.02	03/80	229.65	03/80	2018	03/80				U	U	U	U	OPR
6633 4 333	WW					YEDNALUE	S 82										U	U	U	U	
6633 4 334	WW					YEDNALUE	S 89			182.13	01/80	1742	03/80				U	U	U	U	OPR
6633 4 335	WW	30.00		30.00	01/80	YEDNALUE	S 95	4.91	03/80	229.65	03/80	1077	03/80				U	U	U	U	OPR
6633 4 336	WW	35.10		35.10	01/80	YEDNALUE	S 175	14.67	06/80	182.13	06/80	3476	06/80				U	U	U	U	OPR
6633 4 337	WW	21.00		21.00	01/80	YEDNALUE	S 151	9.76	06/80	918.59	06/80	5121	06/80				U	U	U	U	OPR
6633 4 338	WW	60.00		60.00	01/80	EURILPA	S 153	21.97	06/80	134.62	06/80						U	U	U	U	
6633 4 339	WW	11.00		11.00	06/80	EURILPA	S 157	1.75	06/80	182.13	06/80	4874	06/80				U	U	U	U	OPR
6633 4 340	WW	9.00		9.00	06/80	EURILPA	S 141	1.80	06/80	95.03	06/80	2476	06/80				U	U	U	U	OPR
6633 4 341	WW	22.70		22.70	07/80	EURILPA	S 147	14.00	07/80			5285	07/80			2.00	U	U	U	U	OPR
6633 4 342	WW					EURILPA	S 105	22.39	05/80	197.97	05/80	5368	05/80				U	U	U	U	OPR
6633 4 343	WW	34.10		34.10	05/80	EURILPA	S 105	22.90	05/80								U	U	U	U	ABD
6633 4 344	WW	16.40		16.40	07/80	EURILPA	S 118	11.15	07/80	7.92	07/80	1832	07/80			2.90	U	U	U	U	
6633 4 345	WW					EURILPA	S 96			823.56	01/80	2199	08/80				U	U	U	U	OPR
6633 4 346	WW	59.04		59.04	06/80	EURILPA	S 94	15.94	06/80	182.13	06/80						U	U	U	U	ABD

Summary of Latest Water Information for Drillholes

Unit No			Cl	Max Drill Depth (m)	Orig Drill Date	Curr Drill Depth (m)	Curr Drill Date	Hundred	Section	SWL (m)	SWL Date	Well Yield (Gal/hr)	Well Yield Date	TDS (mg/l)	Sampl Date	pH	Permit	Cased To (m)	Full Chem Anal	Dril Log	Geol Log	Gphys Log	Aban Bckf Coll Plug
6633	4	347	WW					EURILPA	S 98	8.64	03/80			3631	03/80				U	U	U	U	OPR
6633	4	348	WW	11.09		11.09	08/80	EURILPA	S 97	6.42	08/80	182.13	08/80	5787	08/80			3.10	U	U	U	U	OPR
6633	4	349	WW	17.30		17.30	07/80	EURILPA	S 89	12.30	07/80			3401	07/80				U	U	U	U	
6633	4	350	WW	49.00	01/45	49.00	01/45	EURILPA	S 60	38.58	07/80	229.65	07/80	3631	07/80				U	U	U	U	OPR
6633	4	351	WW	36.20		36.20	07/80	EURILPA	S 57	27.70	07/80			2647	07/80				U	U	U	U	
6633	4	352	WW	67.00		67.00	01/80	EURILPA	S 56			459.29	01/80	1742	07/80				U	U	U	U	OPR
6633	4	353	WW	48.50		48.50	01/80	EURILPA	S 178			1464.99	01/80	1928	07/80				U	U	U	U	OPR
6633	4	354	WW	103.00		103.00	01/80	EURILPA	S 24			134.62	01/80	1010	01/80			103.02	U	U	U	U	
6633	4	355	WW	30.00		30.00	01/80	EURILPA	S 42	22.60	07/80	229.65	07/80	8708	07/80				U	U	U	U	OPR
6633	4	356	WW	27.00		27.00	03/80	EURILPA	S 40	12.26	03/80			4687	03/80				U	U	U	U	OPR
6633	4	357	WW	27.00		27.00	01/80	EURILPA	S 80	26.98	07/80			2909	07/80				U	U	U	U	OPR
6633	4	358	WW	5.13		5.13	07/80	EURILPA	S 206	4.02	07/80			2738	07/80			3.00	U	U	U	U	OPR
6633	4	416	WW	35.90	02/84	35.90	02/84	YEDNALUE	S 52	31.00	02/84	593.92	02/84				14028	9.90	U	Y	U	U	OPR
6633	4	420	WW	32.00	02/85	32.00	02/85	WIRREANDA	S 77	5.70	02/85	593.92	02/85	5574	02/85	7.40	16010	11.80	U	Y	U	U	OPR
6633	4	426	WW	58.80	03/86	58.80	03/86	UROONDA	S 46								17581		U	Y	U	U	BKF
6633	4	427	WW	70.10	04/86	70.10	04/86	UROONDA	S 32	26.20	04/86	300.92	04/86				17581	70.10	U	Y	U	U	
6633	4	438	WW	23.30	02/88	23.30	02/88	WIRREANDA	S 104	16.00	10/88	395.94	02/88	3544	10/88	7.60	20694	23.30	U	Y	U	U	OPR
6633	4	441	WW	58.50	12/88	58.50	12/88	UROONDA	S 39	37.70	03/89	498.89	12/88	4703	03/89		21424	32.30	U	Y	U	U	OPR

Summary of Latest Water Information for Drillholes

Unit No	Cl	Max Drill Depth (m)	Orig Drill Date	Curr Drill Depth (m)	Curr Drill Date	Hundred	Section	SWL (m)	SWL Date	Well Yield (Gal/hr)	Well Yield Date	TDS (mg/l)	Sampl Date	pH	Permit	Cased To (m)	Full Chem Anal	Dril Log	Geol Log	Gphys Log	Aban Bckf Coll Plug
6633 4 442	WW	43.20	12/88	43.20	12/88	UROONDA	S 87	15.20	03/89	118.78	12/88	5990	03/89		21696	12.90	U	Y	U	U	OPR
6633 4 443	WW	36.30	12/87	36.30	12/87	UROONDA	S 68	24.20	12/87	791.89	12/87	1647	12/87	7.80	94849	32.00	U	Y	U	U	OPR
6633 0 4 500	WW	56.30	11/95	0.00	11/95	UROONDA	S 78 F								36313 A		U	Y	U	U	ABD BKF
6633 0 4 501	WW	79.20	11/95	0.00	11/95	UROONDA	S 78 F								36313 B		U	Y	U	U	ABD BKF
6633 0 4 502	WW	94.40	11/95	94.40	11/95	UROONDA	S 79 F	25.20	11/95	79.19	11/95	1278	11/95	7.50	36313 C	32.00	U	Y	U	U	
6633 0 4 503	WW	64.00	01/96	64.00	01/96	UROONDA	S 67 F	25.20	01/96	1797.59	01/96	1922	01/96	7.70	36739	64.00	U	Y	U	U	



1:10000 ENLARGEMENTS

1	2	3	4	5
10	9	8	7	6
11	IV 12	13	14	15
20	19	18	17	16
21	22	23	24	25

DEPARTMENT OF MINES AND ENERGY

SCALE 1:50 000

INDEX TO HUNDREDS AND ADJOINING SHEETS