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1. INTRODUCTION

Retention Licence 8809 (Oceana) covers five km², and is located south of the township of Zeehan in Western Tasmania (Figure 1). Title to the tenement is held by Arimco Mining Pty Ltd. Hercules Resources Pty Ltd (Formally Mancala Pty Ltd) hold an option to purchase the tenement until September 1999.

This report covers the period from September 1997 to September 1998. Work conducted during this period included:

- Negotiations and ratification of the Option to Purchase

- A limited field work program

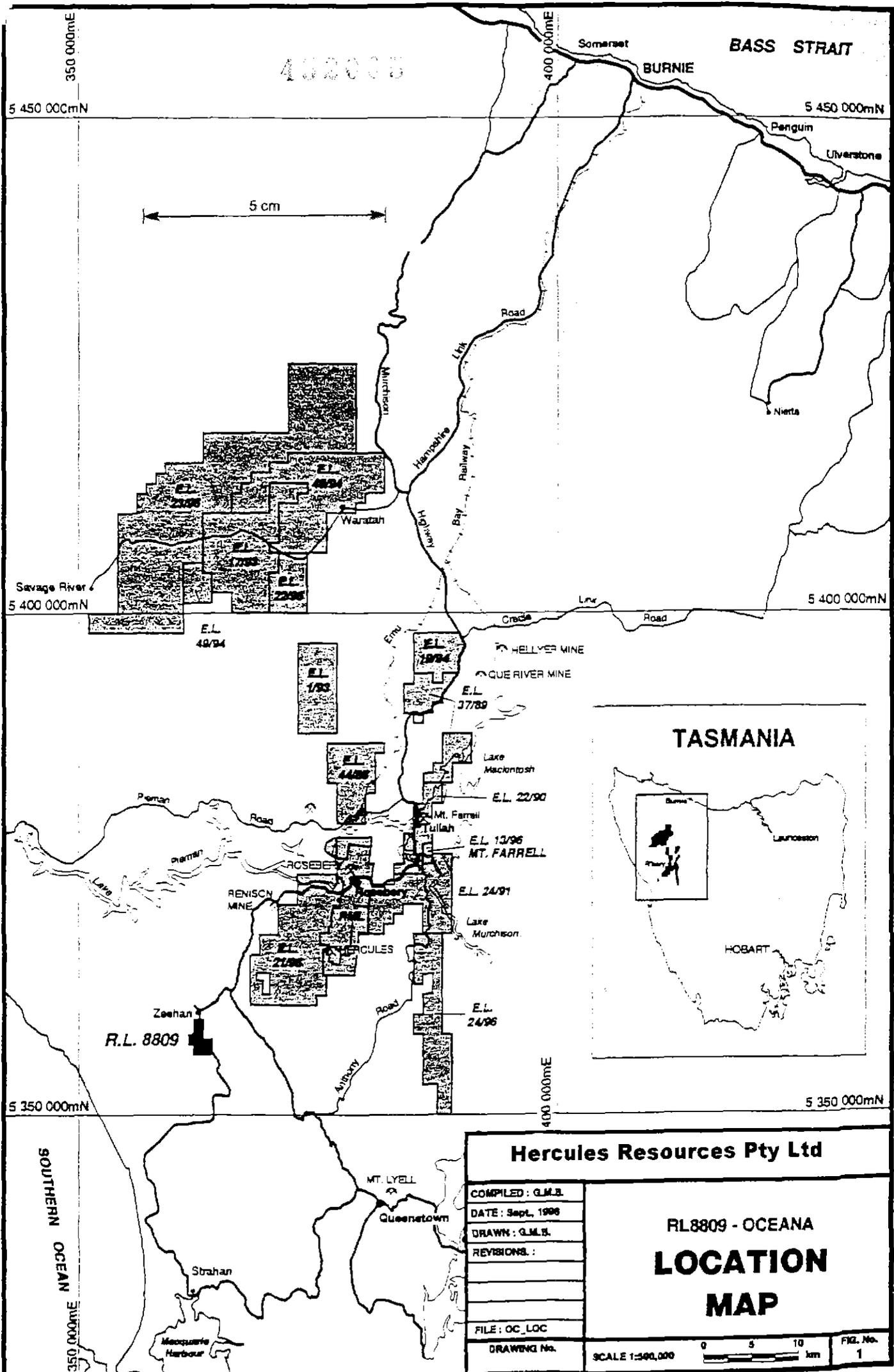
- A detailed review of modern and historical data

- A pre-resource estimate of potential mineralisation to 50m depth

- A proposed work program to define a shallow indicated resource

Access to the Oceana RL is via the sealed, all weather Zeehan to Strahan road. Deeply weathered Gordon Limestone hosts the mineralisation and forms a marshy swamp between prominent ridges of Moina Sandstone and Zeehan Conglomerate to the west and Crotty Quartzite to the east.

The Oceana orebody has been previously estimated to consist of 2.5 million tonnes at 2.6% Zn, 7.5% Pb and 51 g/t Ag. The status of the mineralisation has been reported to be that of an indicated resource.



350 000mE
5 450 000mN

402000

400 000mE
5 450 000mN

5 cm

Savage River
5 400 000mN

5 400 000mN

5 350 000mN

5 350 000mN

SOUTHERN OCEAN
350 000 05C

Hercules Resources Pty Ltd

COMPILED : G.M.B.
DATE : Sept, 1988
DRAWN : G.M.B.
REVISIONS :
FILE : OC_LOC
DRAWING No.

**RL8809 - OCEANA
LOCATION
MAP**

SCALE 1:500,000



FIG. No.
1

Figure 1

2. TENURE

Retention Licence 8809 (Oceana) was granted to Cyprus Gold Australia Corporation on 14th October 1998 for a period of two years. Cyprus had previously extensively explored EL 4/78 from which RL was retained. The EL 7/78 was relinquished on the 14th July 1988.

On the 23rd of October 1990 title to the RL was transferred to Hudspeth and Company and subsequently to Arimco Mining Pty Ltd on 24th August 1991 following a certified change in company name.

On the 14th of May 1992 Pasminco Australia Limited entered into a joint venture with Arimco, whereby Pasminco Exploration Limited would manage and operate the joint venture to explore for base metals on the Licence. Under the terms of the Joint Venture Agreement Pasminco would have the right to earn 65% interest in the tenement by spending \$2.0 million within nine years, with \$1.0 million expenditure within the first five years.

During the 1994-1995 licence year a Joint Venture Agreement was signed between Pasminco, Arimco and Porthill Resources Limited. The Agreement covered an area around the Oceana Mine to a depth of 200m and allowed Porthill to earn 51% equity in the tenement by expending \$1.5 million exploring for shallow potentially open-cuttable resources by December 1996. This agreement has subsequently lapsed.

During the 1996-1997 licence year the Joint Venture Agreement between Arimco and Pasminco was terminated with Arimco retaining 100% equity in the licence.

On the 17th of September 1997 Mancala Pty Ltd (now Hercules Resources Pty Ltd by certified name change) signed a Option to Purchase Agreement with Arimco which is valid until 14th of October 1999. Under the terms of the Agreement, Mancala would assess the economic potential of the tenement over the agreement period and would be able to exercise the option at any time during the period.

The licence covers an area of 5.5 km² (Figure 2). Excluded from the tenement is 1.1 km² of mining leases and 0.2 km² of Crown Reserves. The land tenure of the tenement is classified as unallocated Crown Land designated as Multiple Use Forest Land and Private Property. A portion of the eastern side of the tenement is included on the interim list of the Register of the National Estate as part of the Zeehan Smelters Geological Monuments.

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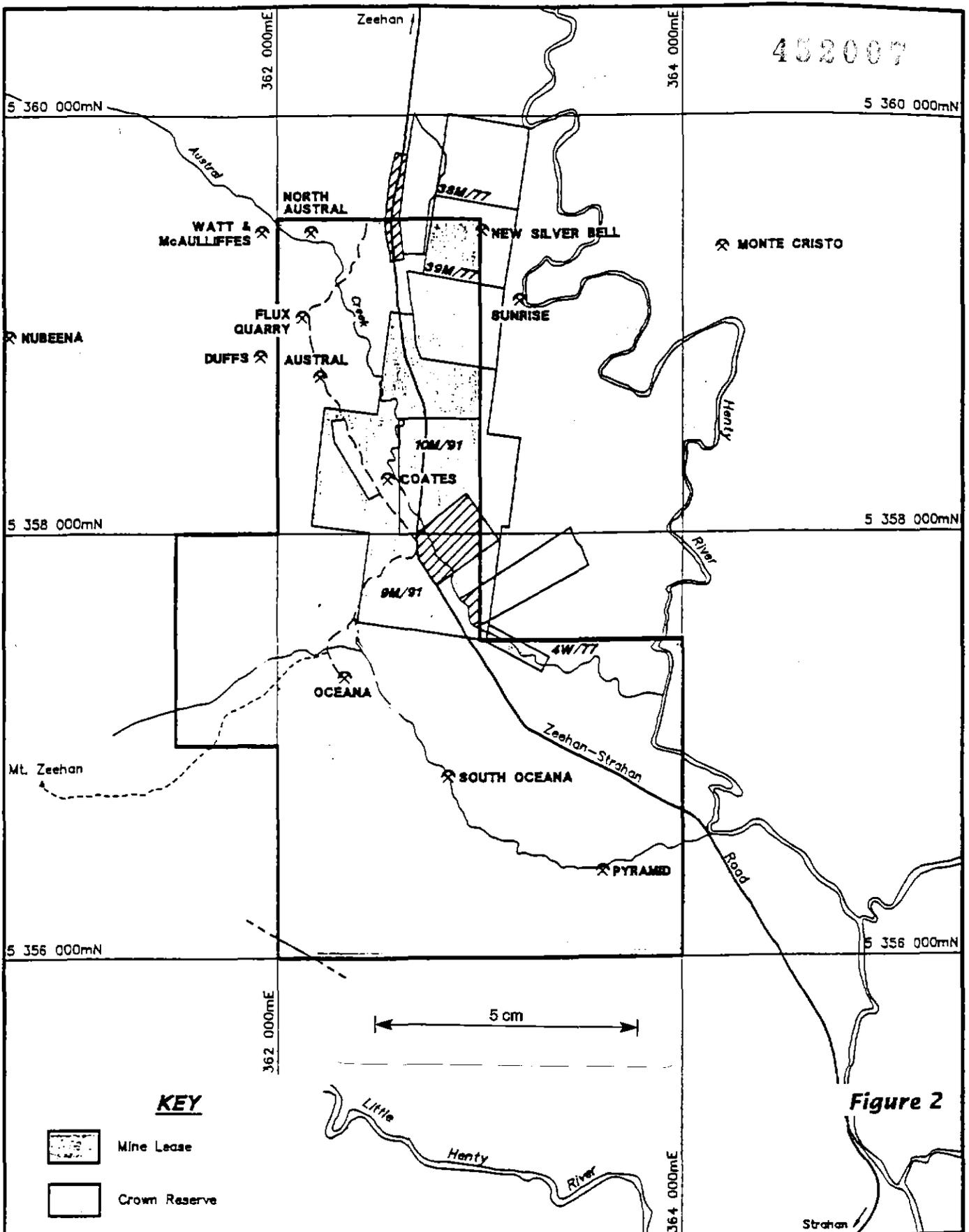


Figure 2

KEY

-  Mine Lease
-  Crown Reserve
-  Multiple Use Forest
-  Private Freehold Land
-  Unallocated Crown Land (within EL only)
-  National Estate Interim Listing

NOTE :
Land tenure is shown within RL8809 only

Hercules Resources Pty Ltd

COMPILED : G.M.B.
 DATE : Sept. 1995
 DRAWN : P.G.R.
 REVISIONS :

R.L. 8809 - OCEANA JV

LAND TENURE

FILE : 25_OCLTN
 DRAWING No. 311-GN-003

SCALE 1:25,000

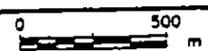


FIG. No. 2

3. PREVIOUS EXPLORATION AND MINING

A detailed and comprehensive review of previous mining and exploration on RL 8809 has been compiled by Cordery 1998 (included here as Appendix 1).

4. REGIONAL, LOCAL GEOLOGY AND MINERALISATION

The regional geology of the area has been described in Blissett (1962), Taylor (1983) and Jones (1988). A full account of the local geology and mineralisation is present in Cordery 1998 (included here as Appendix 1).

5. WORK COMPLETED

The rationale of Mancala to enter into a Option Agreement with Arimco was to ascertain the likely potential of shallow (surface to 50m) mineralisation existing within the tenement. It was envisaged that shallow relatively low grade mineralisation could be economically extracted and if metallurgically suitable, sold to the Pasminco Concentrator at Rosebery.

To assist with this objective, the geological consultant Geoff Cordery was engaged to conduct the work. His brief was to gather all available information (both historical and recent) upon mining and previous exploration for the area, inspect the area and provide an estimate of the tonnage and grade of shallow mineralisation. It was also required that an exploration program be detailed and costed which would upgrade the status of any defined mineralisation. The results of the consultants work are included herein as appendix 1.

In the latter stage of the reporting period Mancala (with the assistance of the TDR) instigated discussions with Oncore Metals Pty Ltd, who have an active interest in the Zeehan Smelter Dumps, just east of the tenement.

6. CONCLUSIONS AND RECOMMENDATIONS

Shallow, potentially open cuttable mineralisation on the Retention Licence has been identified as an along strike continuation and within pillars of the Oceana Mine. There appear to be two semi-continuous zones of mineralisation, ranging in thickness from 2 to 10 metres. The zone extends north of the Main Oceana shaft for 280 metres along strike. (See Appendix 1).

From limited drilling and trenching a pre-resource estimate (to 50m depth) for the mineralisation has been calculated to consist of 135,000 tonnes at 12.0% Pb, 2.8% Zn and 68g/t Ag (cut off of 2.0m true width and greater than 10% Pb+Zn). It has been estimated to bring this mineralisation into a indicated resource category and to conduct a pre-feasibility study some \$320,000 of expenditure would be required.

Preliminary modeling of potential revenue the pre-resource mineralisation would generate, indicates that, even with favourable metallurgical characteristics (considered unlikely) that a small open cut mining operation would not be cash positive given current metal prices and anticipated trading terms with a concentrator.

Initial calculations suggest that a doubling of the zinc grade or a significant increase (+50%) in metal prices would be required to sustain a economic small scale, shallow mining operation at Oceana.

Given probable poor metallurgical recoveries, poor ground conditions, probable high water inflows, low grades and a limited resource base Hercules Resources does not consider the expenditure to further define the pre-resource mineralisation justifiable.

Dragon Resources and Pyrosmelt NL and later Oncore Metals Pty Ltd have raised the possibility of constructing a 100,000 tonne per annum smelter on the site of the Zeehan Smelter Slags. To further this project additional feed is required to lengthen the life of the operation.

Hercules Resources Pty Ltd has approached Oncore Metals Pty Ltd raising the possibility that either the shallow or deep Oceana resources may be appropriate additional feed stocks. Oncore have indicated a significant lead time prior to smelter construction and that the grade of the resources are probably not economic at current or future anticipated metal prices.

Hercules Resources Pty Ltd will conduct no further assessment of the mineralisation at Oceana and plans not to exercise the Option to Purchase Agreement with Arimco.

7. ENVIRONMENTAL REHABILITATION

No environmental disturbance has occurred through the actions of Hercules Resources Pty Ltd (formally Mancala Pty Ltd).

8. EXPENDITURE

Expenditure Statement for the period 1/9/97 to 31/8/98

Personnel Costs	\$2,200
Travel and Accommodation	\$186
Geological Consultants	\$7,330
Vehicles and Equipment	\$486
Tenement Fees	\$1,150
Option Costs	\$5,800
Office Running Costs	\$1,330
Administration Fee (10%)	\$1,796
Total Expenditure	\$20,278

9. REFERENCES

- Bilsset, A.H. 1962. One Mile geological map series. K/55-5-50. Zeehan. Explanatory Rep. Geol. Surv. Tas.
- Cordery, G.R. 1998. RL 8809 Oceana, Zeehan Tasmania. Project Review and Resource Potential. Unpubl. Manca Report No. Oceana498.doc, May 1998.
- Jones, P.A. 1988. Geological Report Retention Licence Application Oceana-Austral, Zeehan Tasmania. Unpubl. Cyprus Report No. 574, May 1988.
- Taylor, S. 1983. Review of Amoco Exploration of Gordon Limestone in EL 7/78 and Assessment of Pb-Zn Potential of the Gordon Limestone In West-Central Tasmania. Unpubl. EZ Report, March 1983.

APPENDIX 1

RL – 8809 OCEANA
ZEEHAN TASMANIA

PROJECT REVIEW &
RESOURCE POTENTIAL
MAY 1998

Geoff Cordery

452013

MANCALA PTY LTD.

RL - 8809 OCEANA

ZEEHAN TASMANIA

**PROJECT REVIEW &
RESOURCE POTENTIAL**

MAY 1998

Prepared By: Geoffrey R. Cordery
Date: 19th May 1998
Report Number: Oceana498.doc
Submitted To: Tim Akerman, Mancala Pty Ltd
Distribution: Mancala Pty Ltd, Launceston

**Geoff Cordery
Stanley, Tasmania.**

EXECUTIVE SUMMARY

The Oceana Project is located on the West Coast of Tasmania, approximately two kilometres south of the township of Zeehan. The project is within Retention Lease RL 8809 which covers an area of 7.5 square kilometres. There are two significant historic mines and numerous areas of prospecting activity within the RL. The largest mine, the Oceana has produced in excess of 15,000 tonnes of lead and 0.5 million ounces of silver during two phases of mining since its discovery in 1887. There has been considerable exploration for lead, silver and zinc mineralisation hosted by the Gordon Limestone. This work has identified significant shallow and deep mineralisation adjacent to the Oceana mine and outlined numerous areas of highly anomalous lead and zinc in weathered rock at the Austral and other prospects within the R.L. This report summarises available mining and exploration results and assesses the potential for shallow open cut resources at the Oceana Prospect.

Potentially economic, shallow mineralisation at Oceana consists of along strike extensions and pillars remaining above previously stoped ore. Two sub-parallel galena rich lodes are known from limited drilling and trenching. These appear to be semi-continuous along strike, have a thickness of between 2 and 10 metres and can be traced for approximately 280 metres along strike. The lodes are structurally controlled, occupying shears within the Gordon Limestone, and have been offset by later faults. The host rocks and mineralisation are deeply weathered to form sticky clays and partially oxidised, vein and disseminated galena and sphalerite in decomposing, rubbly limestone.

Two estimates of pre resource mineralisation have been determined for the Oceana Prospect to depths of 50 and 25 metres. A sectional method has been used and has included mineralisation with a minimum width of 2 metres and minimum grade of 10% combined Pb + Zn. Allowance has been made for estimates of previous mining. A conservative tonnage factor of 2.7 has been used and the volumes of crude open cuts have been determined to provide indicative waste : ore ratios.

Estimate of Oceana Pre Resource Mineralisation

Depth	Volume	Tonnes	Pb	Zn	Ag	W:O
(m)	(cubic m)	(SG = 2.7)	(%)	(%)	(Oz/t)	
50m	50,000	135,000	12.0	2.8	2.2	10:1
25m	31,000	83,000	12.6	2.5	2.6	5:1

The resource estimate should be used with caution. The estimate is based on very limited information, being only 8 costean and 8 drill intersections. The quality of sampling and assaying is unknown and the metallurgy of the mineralisation is poorly understood. The extent of previous mining is uncertain.

Potential remains to increase the open cut resource at Oceana, and to define additional resources within the RL. An outline for a work program and its approximate cost has been included. Recommended work includes metallurgical test-work; logging and sampling of available drill core; check sampling and assaying; detailed surface mapping; compilation of historic mine records; and additional drilling & costeaning.

1 Introduction

1.1 Location & Access

The Oceana Project is located on the West Coast of Tasmania, approximately two kilometres south of the township of Zeehan and immediately west of the Zeehan – Strahan road (Figure 1). The main prospective areas are located at an elevation of approximately 200 metres above sea level on the lower slopes of broad valleys. Surrounding ridges rise to 700 metres at Mount Zeehan, immediately west of the Oceana Prospect. The valleys include extensive areas of swamp and button-grass plain developed over deeply weathered limestone. The prospect areas are covered by sparse to dense scrubby regrowth with denser scrub and forest in some valleys.

Access is via the sealed Zeehan – Strahan road and numerous four wheel drive tracks to and within individual prospects. The main access tracks are elevated on the side of the valley, avoiding the swampy areas and should be accessible all year. Locally the tracks are overgrown and deeply eroded on steeper slopes, and some creek crossings are not useable. Some track reconstruction with a bulldozer will be required if access for drilling rigs and regular field work are planned.

1.2 Tenure

Retention Lease RL 8809 covers 7.5 square kilometres and was granted on 14th October 1988 to Cyprus Gold Australia Corp (later Arimco Mining Pty Ltd) and covers a retained portion of EL-4/78, which was relinquished on 14th July 1988.

The RL was transferred to Hudspeth & Co Pty Ltd 23rd October 1990, then transferred back to Arimco Mining Pty Ltd on 24th August 1991.

Areas excluded from the RL total 1.1 square kilometres and include: Mining & Water Leases 60M/77 & 4W/77 held by EZ / Pasminco; Mining Lease 39M/77 held by JNR Enraught – Mooney; and Crown Reserve of 0.2 sq km (Figure 2).

Land ownership types include Crown Land, Private property, Timber reserve and an area on the Interim List of the Register of the National Estate (Smelters site)

1.3 Mining History

There are two significant historic mines and numerous areas of prospecting activity within the RL. The largest mine, the Oceana has produced in excess of 15,000 tonnes of lead and 0.5 million ounces of silver during two phases of mining since its discovery in 1887.

1.3.1 Oceana Mine

At Oceana, prospecting trenching started in 1890 and by 1893 a shaft had been sunk by the Oceana Silver Mining Company to 44 metres (145 feet) with 215 m of drives developed along the lode at 10m and 24m depth. Only 1,016 tonnes of ore were recorded to be produced, largely oxidised and from development, before the main

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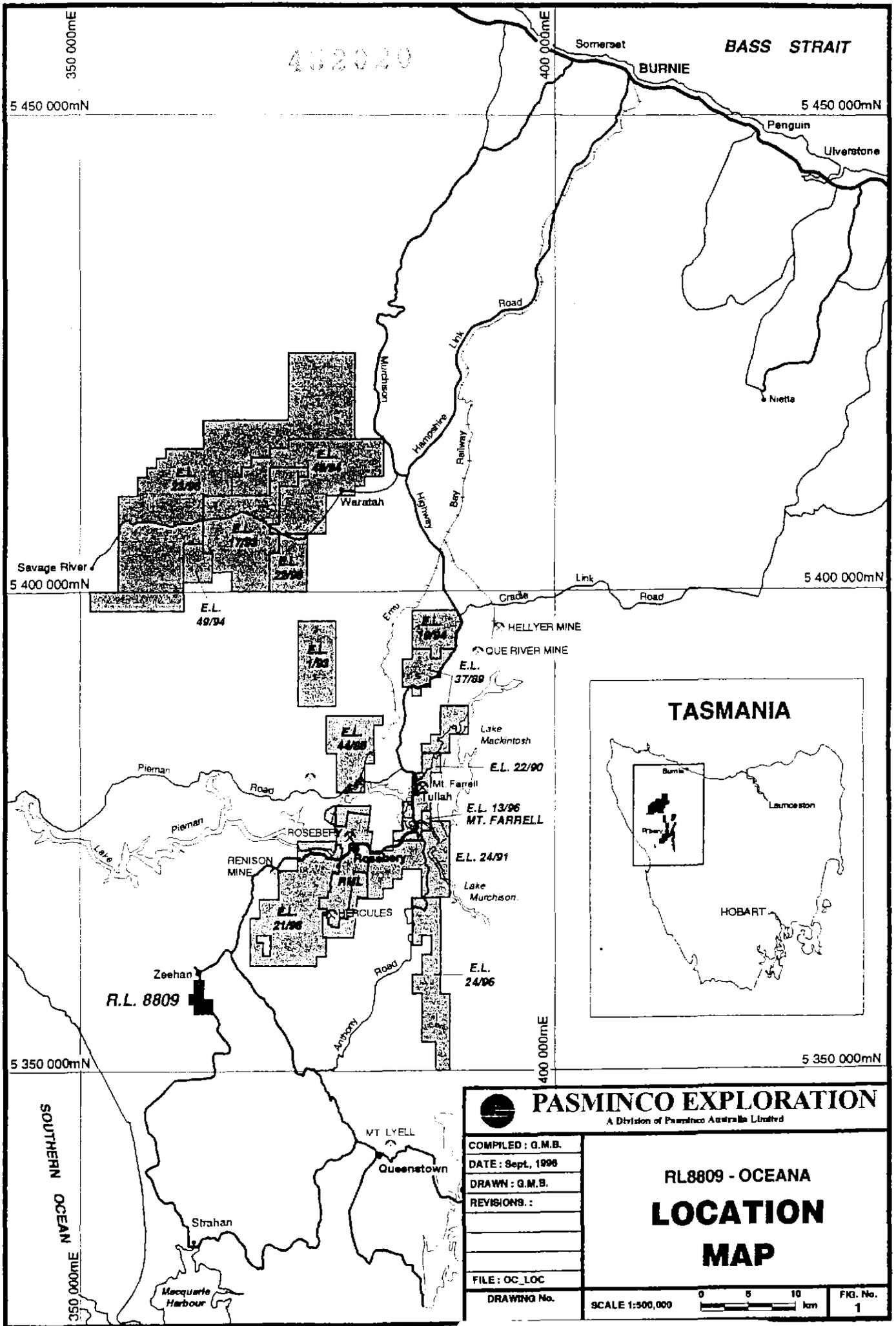
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APPENDIX – B OCEANA METALLURGICAL TEST RESULTS

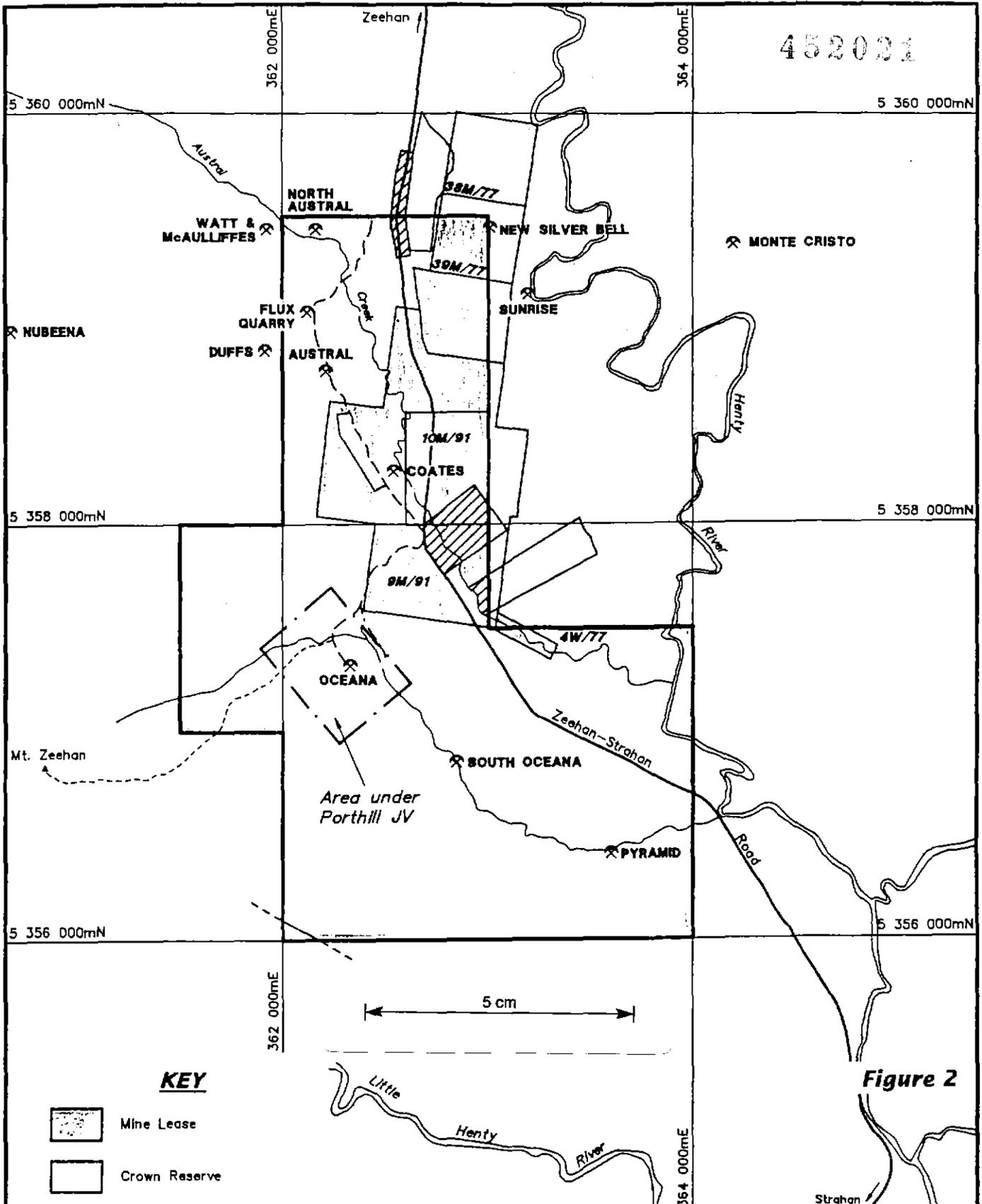


PASMINGO EXPLORATION A Division of Pasmingo Australia Limited	
COMPILED : G.M.B.	RL8809 - OCEANA LOCATION MAP
DATE : Sept, 1998	
DRAWN : G.M.B.	
REVISIONS :	
FILE : OC_LOC	
DRAWING No.	SCALE 1:500,000
	0 5 10 km
	FIG. No. 1

5 cm

Figure 1

452021



KEY

-  Mine Lease
-  Crown Reserve
-  Multiple Use Forest
-  Private Freehold Land
-  Unallocated Crown Land (within EL only)
-  National Estate Interim Listing

NOTE :
Land tenure is shown within RL8809 only

Figure 2

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : G.M.B.
 DATE : Sept. 1995
 DRAWN : P.G.R.
 REVISIONS :

R.L. 8809 - OCEANA JV

LAND TENURE

FILE : 25_OCLTN
 DRAWING No. 311-GN-003

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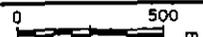


FIG. No. 2

shaft collapsed and the mine was abandoned. Production stopping from these early workings appears to be minimal. All underground development was north of the

shaft with two small open-cuts, Hall's and Fox's, dug south of the shaft. There is no record of production available for these open-cuts, though from observations on the ground the tonnes removed appear to be small.

Table - 1 Oceana Mine - Historic Production.

Period	Ore (tonnes)	Recovered Grade		Metal Produced	
		Pb (%)	Ag (g / t)	Pb (tonne)	Ag (oz Tr)
1890 - '93	1,016	(est)39	(est)445	396	14,537
1896 - '25	569	(est)47	(est)525	(est)271	(est)9,645
1954 - '60	130,236	(est)11	(est)128	14,473	537,725
Total	131,821	11.5	132	15,140	561,907

Note: (est) = estimated; source Blissett (1962)

In 1950, Zeehan Mines Pty Ltd was formed jointly between North Broken Hill and South Broken Hill Pty Ltd to re-open the Oceana Mine. Development commenced in 1952 and production in 1954. The main shaft (No 6) is a 3.7 metre (12 foot) diameter circular shaft to 61m and a four compartment rectangular shaft to 197m and was sunk in the hanging wall of the orebody. The first 30m of the shaft are in "weak, partly decomposed limestone". Levels were developed at 46m (No 1, 150 ft); 92m (No 2, 300 ft); 128m (No 3, 420 ft); 137m (No 4, 450 ft, sump); 165m (No 5, 540 ft); & 195m (No 6, 640 ft). Cross-cuts to the orebody were developed west of the shaft for 37 metres on No 1 level and reducing to 24 metres on No 6 level. All exploratory development was to the north from the shaft and halted at a major fault due to bad ground and high water inflows.

Mining was by flat back, cut and fill stopes, with mined stopes back-filled with de-slimed mill tailings. The irregular shape of the orebodies and unstable stope margins apparently required extensive use of timber for support. Zeehan Mines used a mining cut-off grade of 11% Pb; minimum stope width of 1.2 metres (4 feet); and tonnage factor of 3.6 tonnes per cubic metre (10 cu feet per ton).

Water inflow was a problem, with the lower two levels of the mine flooded and parts of the mine requiring sealing off by 1960 to reduce water inflow. Jack (1960) reported that the mine was pumping 5.5 litres per second (2.5 million gallons or 11.3 mega-litres per day) in 1960.

The mine closed in 1960 due to low metal prices and high water inflows and is now flooded to within a few metres of the shaft collar.

1.3.2 Austral Valley Mines.

The Austral Valley area was prospected in 1887 with some adits driven into the western side of the valley. Higher grade lodes were small and scattered and there was high water inflows, resulting in little production. A flux quarry was developed to supply the nearby smelter, with 4,290 tonnes of flux (ironstone?), 875 tonnes of

galena ore, 100 tonnes of sphalerite ore and 9 tonnes of pyrite mined between 1907 and 1913. Production was estimated at 5,265 tonnes of "ore" at 15% Pb and 195 g/t Ag, producing 810 tonnes of lead and 33,000 ounces of silver.

1.4 Previous Exploration

Earliest prospecting of the field was in the 1880's when some trenching, adits and shafts with limited horizontal development were dug at the Oceana, South Oceana, Pyramid, Austral, North Austral and Coates prospects. Systematic, exploration commenced in 1946 with diamond drilling and geophysical surveys of a number of prospects by North and South Broken Hill Companies, resulting in the definition of reserves at Oceana and subsequent mining. The results of this early exploration are poorly documented and no original records of this period have been reviewed.

Modern, systematic exploration commenced in 1978 with extensive work undertaken by Amoco / Cyprus and EZ on EL 4/78 until 1988. Between 1988 and 1996, Cyprus / Hudspeth / Arimco and EZ / Pasminco have explored RL 8809. Curtis (1981), Taylor (1983), Jones (1988) and Saxon (1985) contain good summaries of previous exploration work. All available reports have been reviewed.

Exploration has concentrated on areas of known mineralisation at Oceana and Austral Valley with limited work at South Oceana, Pyramid and areas of Gordon Limestone east of the above prospects. The main targets have been carbonate-hosted lead - zinc mineralisation with Irish and Mississippi Valley models being used.

A total of 148 diamond holes have been drilled producing an estimated 12 km of core. A summary of all holes drilled is contained in Table 2. Drilling has been difficult due to poor ground conditions and many holes appear to have poor core recovery. Drill logs are not available for earlier drilling, though logs for all recent holes have been compiled for this study. The logs are severely lacking in detail of rock quality and core recovery information, which are required to determine sampling reliability and engineering parameters. The amount of core preserved and its condition and storage location is unknown at this stage.

Table - 2 RL 8809 - Drilling Summary.

Prospect	Company	Drilling		Comment
		holes	metres	
Oceana	NBH / Zeehan Mines	39	>3,208	surface
	Zeehan Mines	58	?	underground
	Amoco - Cyprus	13	3,756	ZT-79-1 to ZT-83-14
	Pasminco	1	236	OP-2
Austral	Zeehan Mines	7	?	
	Amoco - Cyprus	11	2,314	ZT-79A-1 to ZT-81A-10
	Pasminco	3	647	OP-4 to OP-6
	Pasminco	111	1,550	Shallow aircore holes
South Oceana	Zeehan Mines	9	?	
	Pasminco	1	280	OP-1
Pyramid	Zeehan Mines	5	?	
	Pasminco	1	425	OP-3

Grids have been established over the Oceana and Austral prospects and have been used for mapping and locating geochemical and geophysical surveys. Base lines are oriented with grid North being 318° (true) at Oceana and 339° (true) at Austral. The grids are currently in a poor state of repair.

Surface geology and cultural features around the Oceana and Austral prospects have been mapped and presented at 1:2,500 scale by Amoco Minerals (Jones 1983). Field inspection shows the surface mapping to be incomplete and does not include more recent tracks and drill hole locations. The geological mapping appears to be largely interpretative. Fact / outcrop mapping is not available and maps lack detail in the areas with potential resources.

Surface sampling has been hampered by a 1 to 7 metres thick veneer of transported gravel and clay deposited over the prospective limestone. Excavator trenching has been used in the Oceana, Austral and South Oceana areas to expose bedrock for sampling and geological mapping. All costean logs have been copied for use in this study and have provided good information. Elsewhere, grid based sampling of weathered rock below the cover has been achieved using auger and aircore drilling. This has been successful in identifying numerous geochemical anomalies. There has been limited sampling of surface outcrops and mine dumps.

Many geophysical techniques have been trialed at Oceana and Austral with limited success. Direct measurement techniques such as gravity and magnetics have been more successful than electrical methods in identifying known mineralisation. Bishop (1983) has reviewed previous geophysical surveys and concludes that mineralisation is difficult to detect with surface electrical methods. Surveys of use to continuing exploration include gravity (Amoco 1981 & Pasminco 1993); grid based ground magnetics (Jones 1979 and 1982); heli magnetics (Quayle 1993); and gradient array IP (Jones 1979).

2 Mineralisation

2.1 Geological Setting

The Ordovician Gordon Limestone hosts all known mineralisation within the RL. The Gordon Limestone consists of a sequence of intercalated dolomitic, carbonaceous siltstones, and calcite-cemented siltstone, sandstone and conglomerate with significant bioclastic and terrigenous components. An oxygen rich, shallow "off-reef basinal" depositional environment has been interpreted by Quayle (1993). There is a significant diagenetic dolomitic overprint (Saxon 1995) and localised, structurally controlled hydrothermal alteration. Alteration includes siderite, calcite and galena - sphalerite veining and replacement.

The limestone unit is approximately 350m thick and conformable with the underlying Moina Sandstone and Mt Zeehan Conglomerate and overlying Crotty Sandstone sequences. Figure 3 shows a simplified geological map of the RL. The Gordon Limestone strikes north-westerly and dips steeply ($80 - 88^\circ$) to the north-east. It has been extensively disrupted by faulting with the most common orientations being north-east and easterly trending steep, dextral strike slip faults and north-westerly trending strike parallel dip slip and low angle thrust faults.

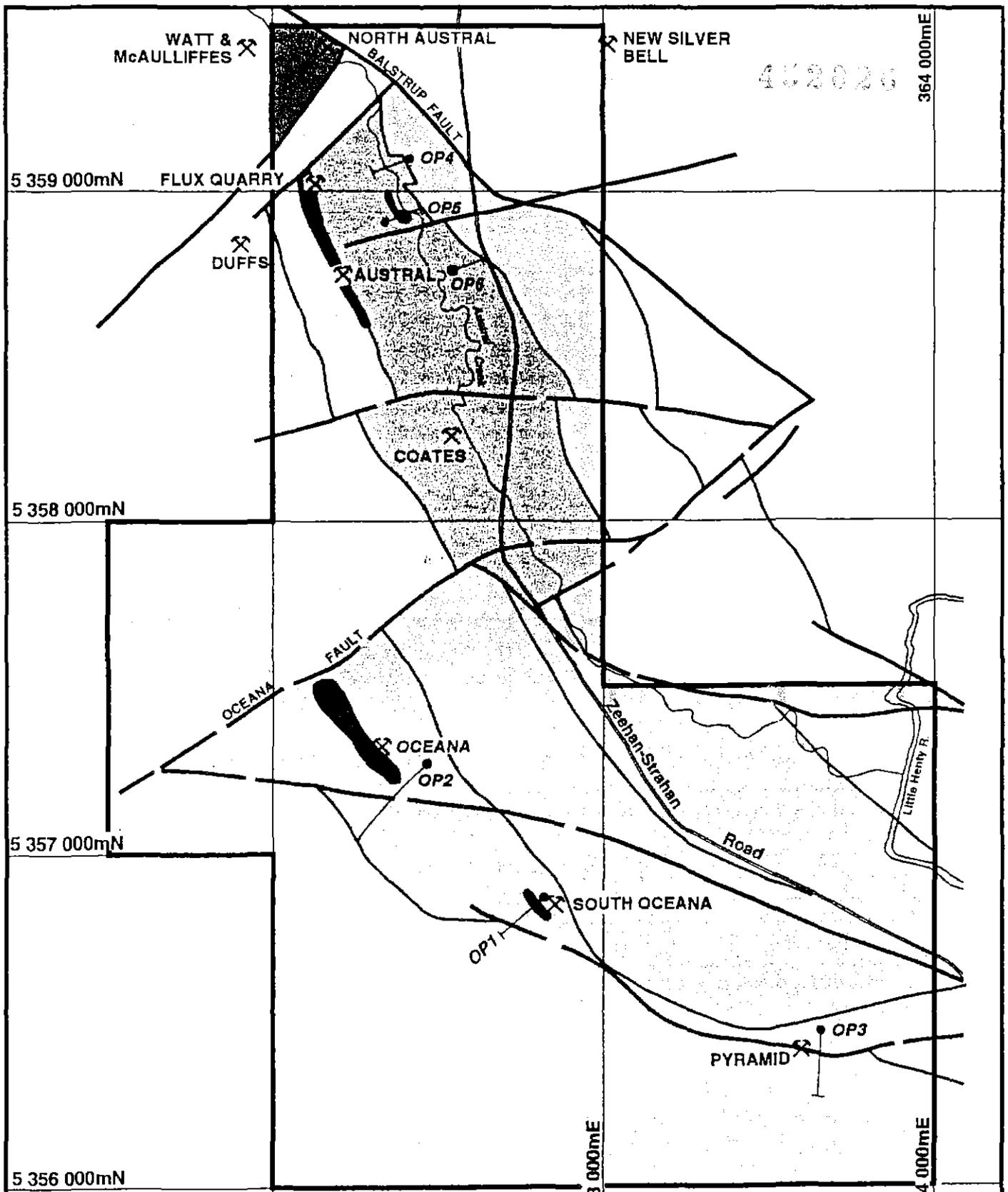
The limestone sequence is now deeply weathered and forms a black, puggy clay to depths of 10 to over 100 metres. The fresher limestone is cavernous due to structurally controlled solution cavities. Limestone is poorly exposed and its preferential weathering has resulted in almost enclosed valleys and swamps at Oceana, and Austral. These valleys are surrounded by more resistant siliclastic units which now form the prominent ridge of Mt Zeehan to the west (Owen Conglomerate equivalent rocks) and rounded ridges of Crotty Sandstone to the east. Scree and glacial deposits derived from these higher quartz rich ridges now form a 1 to 10m thick blanket of boulders, gravel, sand and clay over much of the prospective limestone.

2.2 Oceana Prospect

Known mineralisation at Oceana can be divided into three domains, being, the orebodies that have been mined to date and un-mined extensions of mineralisation along strike to the north and south. Available descriptions of the mineralisation are limited, with the most comprehensive being Jack (1960) who inspected and reported on the Oceana mine before it was closed and flooded.

2.2.1 Oceana Mine

Ore mined at Oceana consist of two parallel galena lodes controlled by shears within a broader zone of intense shearing and local brecciation (Jack 1960). Known mineralisation is lead rich consisting of galena with minor amounts of sphalerite and traces of pyrite and chalcopyrite. The galena is argentiferous. Oxidation has locally produced secondary cerussite and minor secondary zinc minerals in iron and manganese rich gossans and black, puggy decomposed limestone. These secondary minerals locally occur in close association with primary sulphides due to the presence of abundant carbonates in the host rocks. There is evidence for near surface metal depletion and supergene enrichment at depths between 70 and 120



LEGEND

-  Florence Quartzite
Bell Shale
-  Crotty Quartzite, Amber
Slate, Keel Quartzite
-  Gordon Limestone
-  Crimson Creek Formation
-  Moina Sandstone,
Mt. Zeehan Conglomerate



PASMINCO EXPLORATION

A Division of Pasminco Australia Limited

COMPLETED : M.S.S.

DATE : Sept., 1996

DRAWN : G.M.B.

REF. :

FILE : 25_SGEOL

DRAWING No.
311-GL-045

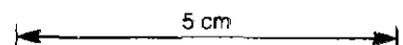
Figure 4
R.L. 8809 - OCEANA 3

**SIMPLIFIED
GEOLOGY**

SCALE 1:1750



FIG. No.



metres. Mineralisation styles include thick veins / lodes, disseminations and vein stockworks.

The host shear in the immediate mine area ranges from a few centimetres to 20 metres in width and contains extensive siderite veining and alteration. Jack (1960) notes that the limestone in the host shear is darker and contains more calcite veining than hanging-wall rocks. The shear zone and galena lodes strike approximately 330° and dip at 85° to the north-east. The shearing is pre ore (Jack 1960), with mineralisation concentrated along the two most prominent shears and erratically along weaker shears in the hanging-wall and foot-wall. Mineralisation has also selectively replaced "crushed rock" and occurs in some oblique "tension fractures" between the two main lodes / shears (Jack 1960).

The two lodes that have been mined range from the minimum stope width of 1.2 metres up to 10 metres wide over a strike length of 80 metres. The two lodes are 5 to 10 metres apart with the intervening rocks containing low metal values except where oblique tension veins or breccias between the lodes are mineralised. Where the intervening rocks are sufficiently mineralised the two orebodies have been mined as one stope, this is the case in the southern ends of the first, second and third level stopes. The mined lodes appear to form two, stacked shoots with a vertical extent of 180 metres and steep pitch of 85° to the south. The shoots are reported by Jack (1960) to be faulted off or taper out at the bottom of the mine (No 6 level), although there is no drilling information to support this.

The mine produced approximately 132,000 tonnes of ore grading 11.5% lead and 4.2 ounces per tonne silver. The zinc grade for the mine is unknown. Underground mining by Zeehan Mines was to an 11% Pb lower cut-off grade. Grade distribution within the mine is unknown and the only available assay information is from drilling by Zeehan Mines prior to mining. Surface information is available from more recent costeaning by Amoco. Table 3 summarises significant drill and costean intersections from the mine area.

Table - 3 Significant Mineralised Intersections, Oceana Mine area.

Hole ID	Sect	From	To	Int dh	Pb (%)	Zn (%)	Ag (Oz/t)	Depth (m)	Note
28	3,450	<i>14.0</i>	<i>14.6</i>	0.6	23.0	3.7	8.2	10	Mined
28	3,450	<i>32.0</i>	<i>36.2</i>	4.2	15.7	0.9	5.7	30	Mined
41	3,450	<i>105.0</i>	<i>105.7</i>	0.7	29.0	1.2	9.5	95	Mined
60	3,450	<i>24.0</i>	<i>27.5</i>	3.5	12.2	2.3	3.7	25	Mined
Costean	3,450	1382	1386	4	16.39	0.3	4.8	2	East Zone
2	3,500	<i>125.3</i>	<i>132.6</i>	7.3	38.9	1.6	14.0	110	Mined
25	3,500	<i>101.0</i>	<i>109.8</i>	8.8	12.8	0.6	5.5	100	Mined
26	3,500	<i>55.0</i>	<i>58.8</i>	3.8	11.4	0.5	6.4	40	Mined
61	3,500	<i>150.0</i>	<i>152.2</i>	2.2	10.9	2.7	2.9	145	Mined
Costean	3,500	1366	1370	4	21.3	0.8	4.2	2	West Zone
Costean	3,500	1379	1383	4	24.6	1.1	11.6	2	East Zone

Sect = section northing on mine grid; Int dh = down hole interval in metres; Depth = approximate vertical depth of intersection below surface; numbers in italics are estimated.

Little is known of other potentially valuable elements associated with the Pb - Ag - Zn mineralisation. The only samples that have been analysed for trace elements, and reported, are gossan samples from the Oceana line of lode. The gossan samples

contained no significant gold or copper, had high concentration of Mn and background levels of Ba, As, Sn and W. The average result of four samples was 8 % Pb, 1.8% Zn, 85 ppm Ag, 235 ppm Cu, <0.008 ppm Au, 35% Fe, 5.3 % Mn, 75 ppm Ba, 6 ppm As, 20 ppm Sn and 4 ppm W.

Alteration associated with galena mineralisation includes replacement of dolomitised (diagenetic) limestone by siderite and intense siderite +/- ankerite veining (Saxon 1994). Siderite replacement destroys primary sedimentary textures, including fossils. Galena and sphalerite in turn replace siderite and limestone. Visible alteration forms a symmetrical halo around sulphide mineralisation and has sharp contacts. Post mineralisation calcite veins cut sulphides and siderite. Minor, fine grained disseminated pyrite is common throughout the limestone sequence and locally replaces fossils in the limestone. Pyrite is believed to be diagenetic.

Mineralisation has a narrow geochemical halo with work by Saxon (1995) demonstrating a symmetrical 10 metre wide halo of anomalous Pb, Zn, Cd and Hg either side of a 2 metre interval of 23% combined Pb + Zn. The hole tested was ZT-80-7 which was drilled south of the Oceana mine. Anomalous cutoff values were determined to be 200 ppm Zn and 60 ppm Pb in un-oxidised limestone and independent of lithology.

Post mineralisation faulting controls the extent of known mineralisation and locally disrupts the orebodies. The two principal disruptive fault orientations recorded in the mine are northerly and north-easterly (north-east and east on mine grid). Actual fault locations, geometry, and displacements are poorly understood due to a lack of detailed mapping and core logging. A mine inspection by Jack (1960) describes post ore faults which cause flexures in the ore bodies and beds near the fault due to drag along the fault planes. These faults do not contain any mineralisation and are flattish thrust faults which trend a few degrees west of north, dip at 30 to 40° to the west and are over-thrust to the east. One such fault seen by Jack above the second level stopes has displaced the ore 10 to 12 metres to the east and gives the orebody a flexed appearance in cross section. Similar thrusts are recorded in the back of the first level stopes and at the bottom of the shaft. Other faults recorded by Jack include north-easterly and east of south-easterly orientations, which parallel mapped regional faults.

Saxon (1994) describes the two mineralised zones at Oceana as being stratabound, carbonate replacive and developed at the top and base of a grainstone and rudstone limestone unit. This coarse grained, sedimentary brecciated unit is inferred to have had a high primary porosity which controlled mineralising fluid flow and metal deposition.

Taylor (1983), and Saxon (1994) liken the mineralisation at Oceana to Irish style carbonate hosted lead - silver deposits and cites Silvermines as an example. With this model they have interpreted the mine area to be stratabound, syndiagenetic mineralisation, with extensions north of the Mine Fault being epigenetic mineralisation. This is contradictory to the observations of Jack (1960) who regards the mineralisation to be wholly epigenetic.

2.2.2 Un-mined Strike Extensions

Mineralisation is known to extend along strike north and south of the mine. The northern extension has been the focus of most exploration and appears to be similar

to the mine area in geology and geometry and forms a large portion of the potential resource described later in this report. The southern extension is less well explored, with only a few intersections to date.

Early attempts at exploration of the northern extension by Zeehan Mines using underground development were hampered by poor ground conditions due to faults and high water ingress. Only the first level reached this mineralisation and a cross-cut ends within a broad zone averaging approximately 5.5% lead (Jack 1960). No individual assays are available and higher grade intervals may be present. Most information on this extension is from sparse drilling and costean sampling. Significant intersections are listed in Table 4.

The northern extension of mineralisation has a strike length of approximately 120 metres and consists of at least one persistent high grade and a second erratic, lower grade sub-parallel sheet of galena mineralisation. Grade appears to be similar to that in the Oceana mine although it may be slightly more zinc rich. Mineralisation north of Oceana is reported to be coarser grained than that in the mine.

Curtis (1981) has inferred a steeply dipping dextral fault (the Mine Fault) with a northerly orientation that offsets the northern extension of mineralisation approximately 30 metres to the east from the mined orebodies. This inferred fault is in a similar position to the fault mapped by Jack on the first level, though is implied by Curtis to be much steeper than measured by Jack. The offset of the mineralised zone can be equally well explained by the existence of another north-easterly striking, steeply dipping dextral fault parallel to the Oceana Fault. This strike is near parallel to the drilling section orientation.

The northern extension of mineralisation is terminated to the north by the Oceana fault. This is a well defined, steeply dipping fault with approximately 700 metres of dextral movement that has displaced the Gordon Limestone to the east and introduced Mount Zeehan Conglomerate. This dextral displacement along north-easterly oriented, steeply dipping faults is repeated throughout the RL with similar movements apparent in the Austral Valley. It is interesting to note that the best mineralisation appears to be developed near to these major north-easterly faults.

Table - 4 Significant Mineralised Intersections, Northern Oceana Extension.

Hole ID	Sect	From	To	Int dh	Pb (%)	Zn (%)	Ag (Oz/t)	Depth (m)	Note
ZT-80-9	3,600	18.0	19.0	1.0	5.9	19.0	1.4	15	Oblique int.
ZT-82-11	3,600	57.0	59.5	2.5	13.0	1.3	1.6	40	Poor recov.
ZT-82-12	3,600	373.0	376.0	3.0	15.0	0.2	3.4	310	
ZT-W2	3,600	8.0	14.0	>6	16.2	3.0	1.0	12	Winkie hole
Costean	3,625	1402	1406	4	12.1	0.9	1.9	2	West Zone
Costean	3,625	1414	1420	6	12.4	2.9	2.2	2	East Zone
ZT-79-2	3,700	96.0	122.0	26.0	22.3	11.7	6.5	95	East Zone
ZT-80-9	3,700	172.0	183.0	11.0	12.9	2.6	2.9	130	Oblique int.
ZT-82-13	3,700	273.0	283.0	10.0	14.0	0.9	4.2	220	West Zone
Costean	3,700	1462	1472	>10	11.4	3.7	1.0	2	

Sect = section northing on mine grid; Int dh = down hole interval in metres; Depth = approximate vertical depth of intersection below surface.

The southerly extension of mineralisation is under explored and poorly understood. Intersections to date suggest a similar tabular geometry to the mine area with the

two zones of the mine merging to form a singular zone to the south. Lead grades appear to be similar to those to the north, though zinc grade may be relatively higher. Significant intersections are listed in table 5.

Table - 5 Significant Mineralised Intersections, Southern Oceana Extension.

Hole ID	Sect	From	To	Int dh	Pb (%)	Zn (%)	Ag (Oz/t)	Depth (m)	Note
Costean	2,750	1437	1439	2	14.9	0.8	2.3	2	
Costean	2,850	1438	1440	2	33.8	8.5	9.7	2	
ZT-80-7	3,400	167.0	169.0	2.0	12.0	11.0	2.3	110	West Zone
ZT-80-4	3,400	250.0	258.0	8.0	15.0	5.4	3.6	235	West Zone
ZT-80-4	3,400	304.0	307.0	3.0	36.0	3.2	17.1	280	East Zone

Sect = section northing on mine grid; Int dh = down hole interval in metres; Depth = approximate vertical depth of intersection below surface.

2.3 Austral & Flux Quarry Prospect

Mineralisation at the Austral prospect consists of a prominent series of ironstone outcrops and poddy galena lodes stretched over a strike length of 1.5 kilometres along the western side of the Austral Valley. This is the western edge of a block of Gordon Limestone at its contact with the stratigraphically lower Moina Sandstone. Numerous historic prospecting pits and adits have tested the mineralisation and ironstone outcrops. Ironstone and sulphides occur in both the limestone / dolomite of the Gordon Limestone and underlying sandstone. Exposures of mineralisation from recent exploration give an indication of metal values. Significant intersections are listed in Table 6.

Table - 6 Significant Mineralised Intersections, Austral – Flux Quarry Prospect.

Hole ID	Sect	From	To	Int dh	Pb (%)	Zn (%)	Ag (Oz/t)	Depth (m)	Note
ZT-81A-7	730	124	125	1	10.6	0.3	1.3		Smelter area
ZT-81A-8	1,030	12	13	1	3.3	5.3	0.7		Coates mine
Costean D	1,490	1171	1175	2	19.4	0.0	0.3	3	
Costean F	1,550	1148	1150	2	8.7	0.9	3.3	1	
Costean H	1,660	1112	1114	2	7.8	17.5	1.7	1	
ZT-81A-6	1,700	74	75	1	15.9	6.0	4.8		Austral mine
80	1,870	?	?	18.3	7.4	?	?	15	Flux Quarry
81	1,900	?	?	33	12.0	3.5	?	20	Flux Quarry
Rock sample	550N	1440E	# 36235		9.3	1.0	1.5		Smelters area "ore" sample
Rock sample	1030N	1285E	# 21933		13.6	13.0	3.7		Coates mine "ore" sample
Rock sample	1585N	1144E	# 21938		9.9	0.9	5.2		Austral mine "ore" sample

Sect = section northing on mine grid; From & To intervals for costeans are grid Eastings; Int dh = down hole interval in metres; Depth = approximate vertical depth of intersection below surface.

Recorded historic production from the Austral mine and Flux Quarry (ironstone?) has been estimated at 5,265 tonnes of "ore" at 15% Pb and 195 g/t Ag, producing 810 tonnes of lead and 33,000 ounces of silver. Zinc contents are unknown.

The ironstones contain anomalous base metal values and their origin is uncertain. They are massive to vuggy and concretionary and may be secondary deposits concentrated in permeable faults and joints. Metal values may in part be scavenged from groundwater. Oxidation on the Gordon Limestone – Moina Sandstone contact is very deep, locally reaching 250 metres depth.

Sulphide mineralisation appears to be poddy and with limited strike extent. Where described it consists of disseminated or vein, coarse-grained argentiferous galena with subordinate sphalerite and minor pyrite. Locally sphalerite is more abundant. Mineralisation is associated with siderite replacement and veining.

Most exploration has concentrated on exposed rocks on the western side of the Austral Valley. The large area of Gordon Limestone that is masked by deeply weathered clay and swamps within the valley remain under explored. Pasminco drilled 111 shallow, vertical aircore holes along grid lines (Saxon 1995) and identified two large and numerous smaller, significant lead and zinc in weathered bedrock anomalies located to the east of the Austral - Flux Quarry workings. Values ranged to a peak of 3.1% Pb and 4.5% Zn in black, puggy decomposed limestone. Limited petrology and metallurgical testing of a sample from Austral by Pasminco (1996) described a mineralised sample as "plastic, black decomposed limestone with an average of 3% combined Pb + Zn". The Zinc occurs as very fine grained (0.038 – 0.1mm) sphalerite and zincian-siderite. This mineralisation requires further exploration.

2.4 South Oceana Prospect

There is little information on the mineralisation at South Oceana. Prospecting has included a single historic shaft, numerous pits, three costeans dug by Amoco and 10 diamond drillholes. Drilling of South Oceana include 9 holes by Zeehan Mines for which no record could be found and a single hole, OP-1 drilled by Pasminco which failed to reach its target. Quayle (1993) interprets the mineralisation to be approximately 350 metre below surface on the section drilled.

Table - 7 Significant Mineralised Intersections, South Oceana Prospect.

Hole ID	Sect	From	To	Int	Pb (%)	Zn (%)	Ag (Oz/t)	Depth (m)	Note
Costean	2750	1437	1439	2	14.9	0.8	2.3	2	Min dolomite
Costean	2795	1436	1438	2	5.86	0.54	1.7	2	Min dolomite
Costean	2850	1438	1440	2	33.8	8.46	9.7	2	Min dolomite

Sect = section northing on mine grid; From & To intervals for costeans are grid Eastings; Int = interval in metres; Depth = approximate vertical depth of intersection below surface.

2.5 Pyramid Prospect

Mineralisation at the Pyramid Prospect consists of epigenetic galena and pyrite in completely weathered limestone, near the faulted contact between Gordon Limestone and the Moina Sandstone (Taylor 1984). There are numerous historic prospecting pits and a shaft and costeaning has exposed 6 metres of 7.2% Pb, 2.1 % Zn and 2 Oz/t Ag in black puggy clay. Six diamond holes have been drilled, five of which were drilled by Zeehan Mines and have no records. Pasminco's hole OP-3 was drilled below the workings and failed to locate any significant mineralisation.

3 Open Cut Resource Potential

3.1 Previous Resource Studies

Previous resources have only been estimated for the Oceana Mine area. Cyprus (1988) and Pasminco (1994) have attempted resource estimations and these are summarised in Table 8. The most recent estimate is reported by Pasminco (1995) who combined estimates undertaken by previous explorers for different portions of the system. Parameters include a 5% Pb + Zn lower cut-off grade, an SG of 4.0 and include areas north and south / below the mined areas from surface to 300 metres depth. Figure 4 illustrates the location of Inferred resources and potential as proposed by Pasminco.

Table - 8 Previous Global Resource Estimates, Oceana Mine area.

Company	Tonnes	Pb (%)	Zn (%)	Ag (Oz/t)	Notes
Cyprus (1988)	2,465,000	9.4	4.0	2.4	Inferred category, includes mineralisation north and below the old mine
Pasminco (1994)	2,485,000	7.5	2.6	1.6	

Note that these resource estimates are based on very limited & sparse drilling information with unknown core sample and assay quality. No mining parameters appear to have been used and the cut-off grade used would appear low for such a small, new underground mine.

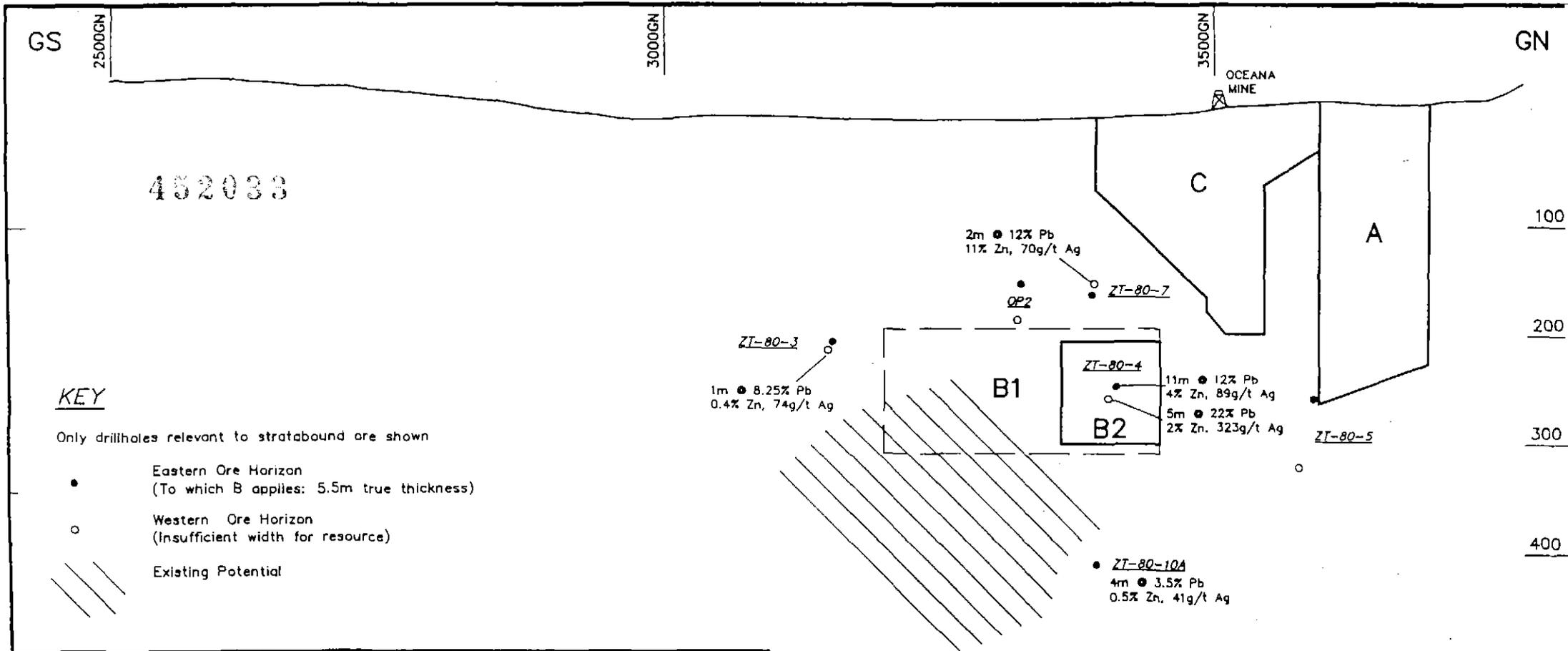
Pasminco have cast doubt on the above estimates as they now feel that an alternative interpretation with respect to the orientation of the mineralisation may be applicable (Arimco 1996).

Curtis (1981) has reviewed data available at the time in an attempt to determine the geometry and controls of mineralisation at Oceana. He produced a series of fifteen, 25 metre spaced sections between 3,700N and 3,400N and fourteen, 25 metre spaced level plans from surface (1,200m RL) to 900m RL (RL = True RL +1,000m). He has included all available drilling results (including 39 holes drilled by North Broken Hill / Zeehan Mines and the first 8 Amoco holes) and outlines of underground development. Curtis did not attempt a resource estimate. His drill sections and level plans have been used for this current study.

3.2 Oceana Mine Area

3.2.1 Introduction

The following estimate of resource potential is based on information available at the time of reporting. All company exploration reports available at the Mineral Resources Tasmania Library in Hobart and from Mancala's office in Launceston have been reviewed and relevant information has been used in this estimate. The site has been visited to ascertain site access and conditions and to assess reliability



4
Figure X

INFERRED RESOURCE

Using SG = 4 Cut off = 5% Pb + Zn

		tonnes	Pb %	Zn %	Ag g/t
A	CYPRUS 1988	2,297,000	7.1	2.5	48
B1	EZ 1983	750,000	12	4	89
B2	PASMINCO 1994	188,000	12	4	89
	TOTAL (1994)	2,485,000	7.5	2.6	51
C	PRODUCTION AND DETAILED PRE-1960 DRILLING				

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : P.M.Q.
DATE : Oct., 1992
DRAWN : G.M.B.
REFERENCE :
REVISIONS : M.S.S.
Modified Sept., 1994
File No:5, RESPOT

RL8809 - OCEANA
LOCATION OF
INFERRED RESOURCE
AND POTENTIAL

DRAWING No
311-GL-014

SCALE 1:5000

0 100 m

FIG. No.

of available geological and site mapping. Only the Oceana Prospect has sufficient information to allow estimation of resource potential.

The brief for this work was to determine potential for a small open cut mining operation which could produce a plus 10% combined Pb + Zn product which could be trucked and toll treated. Minimum mineable tonnage would need to be in the order of 50 thousand tonnes of "ore" and with a low strip ratio.

3.2.2 Resource Estimation Methodology

A sectional method has been used to estimate resource potential. Available drill and costean logs have been reviewed and all mineralised intersections of greater than 2 metres width and greater than 10% combined Pb + Zn within approximately 100 metres of the surface have been recorded. These are listed in Table 9.

Drill sections generated by Curtis (1981) have been enlarged to a scale of 1:1,000 and additional drillholes and costean intersections have been added. These sections are spaced at 25 metre intervals and show drillhole traces, surface profile and underground development from the Oceana Mine and some of the earlier mines. Mineralised zones and geological features as interpreted by Curtis are also shown and have been used for this interpretation where appropriate.

Blocks of mineralisation with greater than 2 metres width and average grade greater than or approaching 10% combined Pb + Zn were outlined on the sections which had sufficient information. The geometry of blocks on sections has been limited to simple parallelograms due to the limited information. Two mineralised zones are present on most sections.

Areas of blocks were determined on sections by multiplying their height by their mean width and average grade was calculated using intersection length weighted mean for the block. Sectional areas for mineralised blocks were determined to 25 and 50 metre depths below mean surface with allowance for an average of 2 metres of overburden.

Volumes were calculated by multiplying the sectional area of the block by one half the distance to the next sectional with sufficient information on either side. The northern block was projected to the well defined, cross cutting Oceana Fault and the southern-most block by a half sectional interval of 12.5 metres to the south.

The portion of individual sectional blocks that have been mined by previous operations has been estimated from a long section prepared by Amoco (Jones 1983). This shows near surface stopes and open cuts from older mining and stopes mined by Zeehan Mines. In the immediate mine area (sections 3,450; 3,475; and 3,500N) the long section shows a 15 to 25 metre high pillar remaining. When estimating the volume of ore removed by previous stoping, it has been assumed that the two lodes were stoped to their full widths with no remnants left on stope walls.

Volumes were added and overall average grade was calculated using volume weighting.

The volume of two crude open cuts was determined, one to 50 metres and another to 25 metres depth. The open cut was only estimated to 28 metres depth over the stoped sections for the 50 metre resource. Open cut volumes were estimated by multiplying the sectional areas of a simple triangular profile by the entire strike

length of the deposit. The "ore" volume was subtracted from the total sectional pit volume to give a "waste" volume. A waste : ore ratio was determined using the resultant volumes.

3.2.3 Available Data & Data Quality

The resource estimate is based on limited data. There are few drill intersections within the top 50 metres of the potential resource and many sections do not have any information. Costean data has been used where available and provides a large proportion of intersections for the estimate. Intersections used for the estimate are listed in Table 9.

Sampling and assay quality are unknown, as no check sampling or check assaying has been reported. Core recoveries from drilling appear to have been poor to locally non-existent. The influence of core recoveries on sample quality is unknown and may up or down-grade mineralised intersections.

The volume of ore mined to date has been estimated from available plans and sections, which are of unknown accuracy. It is unknown whether there has been any non-recorded mining of near surface zones by prospectors or tributers.

Table - 9 Oceana Drill & Costean Intersections Used In Resource Estimate

Section	Hole ID	Zone	From	To	Int dh	Pb	Zn	Ag	Depth	
3,425	No intersections > 2m @ > 10% Pb + Zn									
3,450	28	E	14.0	14.6	0.6	23.0	3.7	8.2	10	
3,450	28	W	32.0	36.2	4.2	15.7	0.9	5.7	27	
3,450	60	W	24.0	27.5	3.5	12.2	2.3	3.7	21	
3,450	Costean	E	1382	1386	4	16.4	0.3	4.8	2	
3,450	Costean	W	Mined							
3,475	27	E	26.0	42.8	16.8	5.8	0.5	1.9	24	
3,475	32	E	76	86	10	10.3	0.7	3.8	68	
3,500	26	E	49.0	50.5	1.5	16.4	0.4	6.3	34	
3,500	26	W	55.0	58.8	3.8	11.4	0.5	6.4	40	
3,500	Costean	E	1379	1383	4	24.6	1.12	11.6	2	
3,500	Costean	W	1366	1370	4	21.3	0.8	4.2	3	
3,525	No drilling or costean data									
3,550	No intersections > 2m @ > 10% Pb + Zn									
3,575	No drilling or costean data									
3,600	ZT-82-11	W	57	59.5	2.5	13.0	1.3	1.6	38	
3,600	ZT-W2	E	8	14	6.0	16.2	3.0	1.0	10	
3,625	Costean	E	1414	1420	6	12.4	2.9	2.2	2	
3,625	Costean	W	1402	1406	4	12.1	0.9	1.9	4	
3,650	Costean	E	1456	1458	2	4.6	6.7	1.7	4	
3,675	No drilling or costean data									
3,700	Costean	W	1462	1472	10	11.4	3.6	1.0	4	

3.2.4 Estimate of Oceana Pre Resource Mineralisation

The following parameters and assumptions have been used:

- Minimum mining width of 2 metres horizontal and minimum grade of 10% combined Pb + Zn;
- Previous mining is as shown on Amoco long section (Jones 1983);
- Mineralisation is continuous and extends between sections. Two parallel zones of mineralisation are evident on most sections, though correlation between sections is locally difficult. Alternative interpretations may be possible;
- Open cut volume has been determined for pits with 40° overall wall slope with no allowance for haul roads, pit ends or geological complexity such as faults;
- Tonnage factor (SG) of 2.7. This is the measured SG of country rocks and is likely to be conservative. SG used by Zeehan Mines was 3.6, though this was for primary sulphide ore. Oxidised ore is likely to have an SG between these two figures.

Two estimates of pre resource mineralisation have been determined for the Oceana Prospect to depths of 50 and 25 metres and for a strike length of approximately 280 metres between 3,715mN and 3,437mN (Oceana Grid). A sectional method has been used. Table 10 summarises the results and details are presented in Tables 11 & 12 and Appendix A. Sections are presented as Figures 6 to 18.

Table - 10 Estimate of Oceana Pre Resource Mineralisation

Depth (m)	Volume (cubic m)	Tonnes (SG = 2.7)	Pb (%)	Zn (%)	Ag (Oz/t)	W:O
50m	50,000	135,000	12.0	2.8	2.2	10:1
25m	31,000	83,000	12.6	2.5	2.6	5:1

Additional mineralised zones are known to exist within the proposed pit volume and have not been included in the above estimate due to lack of information. The SG used is conservative and likely tonnage of mineralisation and waste to ore ratio (based on tonnage) may be more favourable. Much of the pit volume is probably in relatively soft, weathered limestone and may be rippable and require minimal drill and blast, reducing mining costs.

The resource estimate should be used with the following cautions;

- The estimate is based on very limited information, being only 8 costean and 8 drill intersections. This has required mineralised zones to be projected over large distances along strike and down dip;
- The quality of sampling and assaying is unknown. No checks are available and metal values may be higher or lower than those stated;
- The metallurgy of the mineralisation is poorly understood. Much of the mineralisation appears to be oxidised or partially oxidised consisting of clays and weathered limestone / dolomite with some galena, sphalerite and secondary Pb and Zn minerals;
- The extent of previous mining is uncertain.

Table - 11 Oceana Pre-Resource Mineralisation Estimate, Surface to 50 m depth

Section (N)	East Zone				West Zone				Note
	Volume (cubic m)	Pb (%)	Zn (%)	Ag (Oz/t)	Volume (cubic m)	Pb (%)	Zn (%)	Ag (Oz/t)	
3,425	0				0				No mineralisation
3,450	1,400	17.2	0.7	5.2	1,200	14.1	1.5	4.8	Pillar
3,475	4,200	7.5	0.6	2.6	?	?	?	?	No info for W zone
3,500	1,950	22.3	0.9	10.1	2,100	16.5	0.6	5.3	Pillar
3,525	?	?	?	?	?	?	?	?	No information
3,550	0				0				< 10% Pb + Zn
3,575	?	?	?	?	?	?	?	?	No information
3,600	3,552	13.0	1.3	1.6	2,960	16.2	3.0	1.0	
3,625	7,200	12.4	2.9	2.2	1,800	12.1	0.9	1.9	Costean only
3,650	3,552	4.6	6.7	1.7	0				< 10% Pb + Zn for W
3,675	?	?	?	?	?	?	?	?	No information
3,700	20,160	11.4	3.6	1.0	0				< 10% Pb + Zn for W
Total	42,014	11.4	3.0	2.0	8,060	15.0	1.7	2.9	
Grand Total for East and West Zones					50,074	12.0	2.8	2.2	(cubic metres)

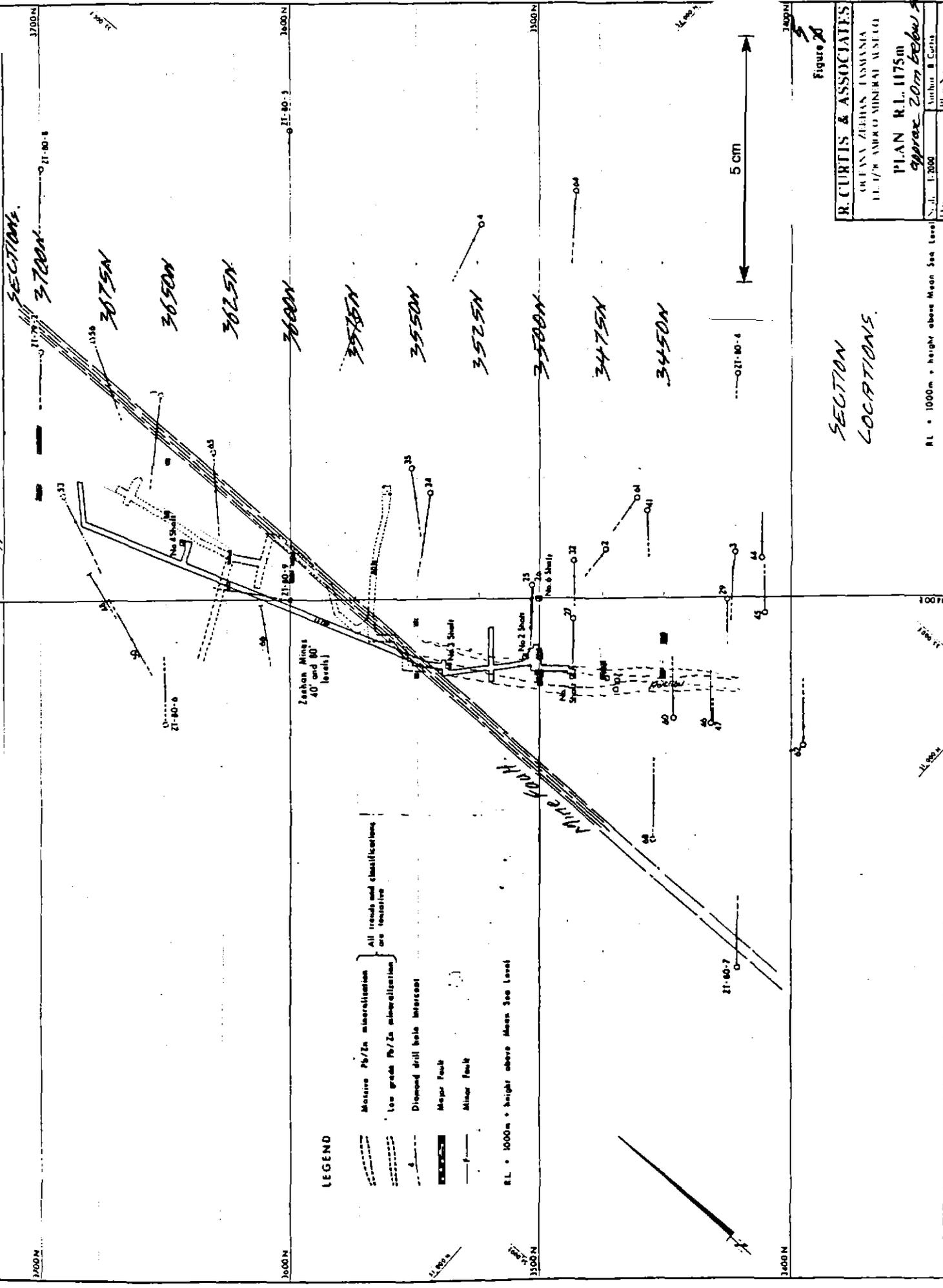
Table - 12 Oceana Pre-Resource Mineralisation Estimate, Surface to 25 m depth

Section (N)	East Zone				West Zone				Note
	Volume (cubic m)	Pb (%)	Zn (%)	Ag (Oz/t)	Volume (cubic m)	Pb (%)	Zn (%)	Ag (Oz/t)	
3,425	0				0				No mineralisation
3,450	1,150	17.2	0.7	5.2	1,200	14.1	1.5	4.8	Pillar
3,475	3,450	7.5	0.6	2.6	?	?	?	?	No info for W zone
3,500	1,950	22.3	0.9	10.1	2,100	16.5	0.6	5.3	Pillar
3,525	?	?	?	?	?	?	?	?	No information
3,550	0				0				< 10% Pb + Zn
3,575	?	?	?	?	?	?	?	?	No information
3,600	1,702	13.0	1.3	1.6	2,960	16.2	3.0	1.0	
3,625	3,450	12.4	2.9	2.2	1,800	12.1	0.9	1.9	Costean only
3,650	1,702	4.6	6.7	1.7	0				< 10% Pb + Zn for W
3,675	?	?	?	?	?	?	?	?	No information
3,700	9,660	11.4	3.6	1.0	0				< 10% Pb + Zn for W
Total	23,064	11.8	2.7	2.5	8,060	15.0	1.7	2.9	
Grand Total for East and West Zones					31,124	12.6	2.5	2.6	(cubic metres)

Approx. Orebody Bound

SECTIONS

SECTION LOCATIONS



LEGEND

- Massive Pb/Zn mineralization
- Low grade Pb/Zn mineralization
- Diamond drill hole intercept
- Major fault
- Minor fault

All trends and classifications are tentative

R.L. = 1000m + height above Mean Sea Level

Figure 2

R. CURTIS & ASSOCIATES
 GEORGE ZEBIAN TASHIMA
 11-17th AVENUE MINERAL AUST. CO.

PLAN R.L. 1175m
 approx. 20m below surface.

Scale: 1:2000
 Author: R. Curtis
 Title:

R.L. = 1000m + height above Mean Sea Level

THE OCEANA MINE

LONGITUDINAL SECTION

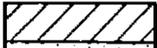
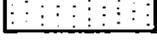
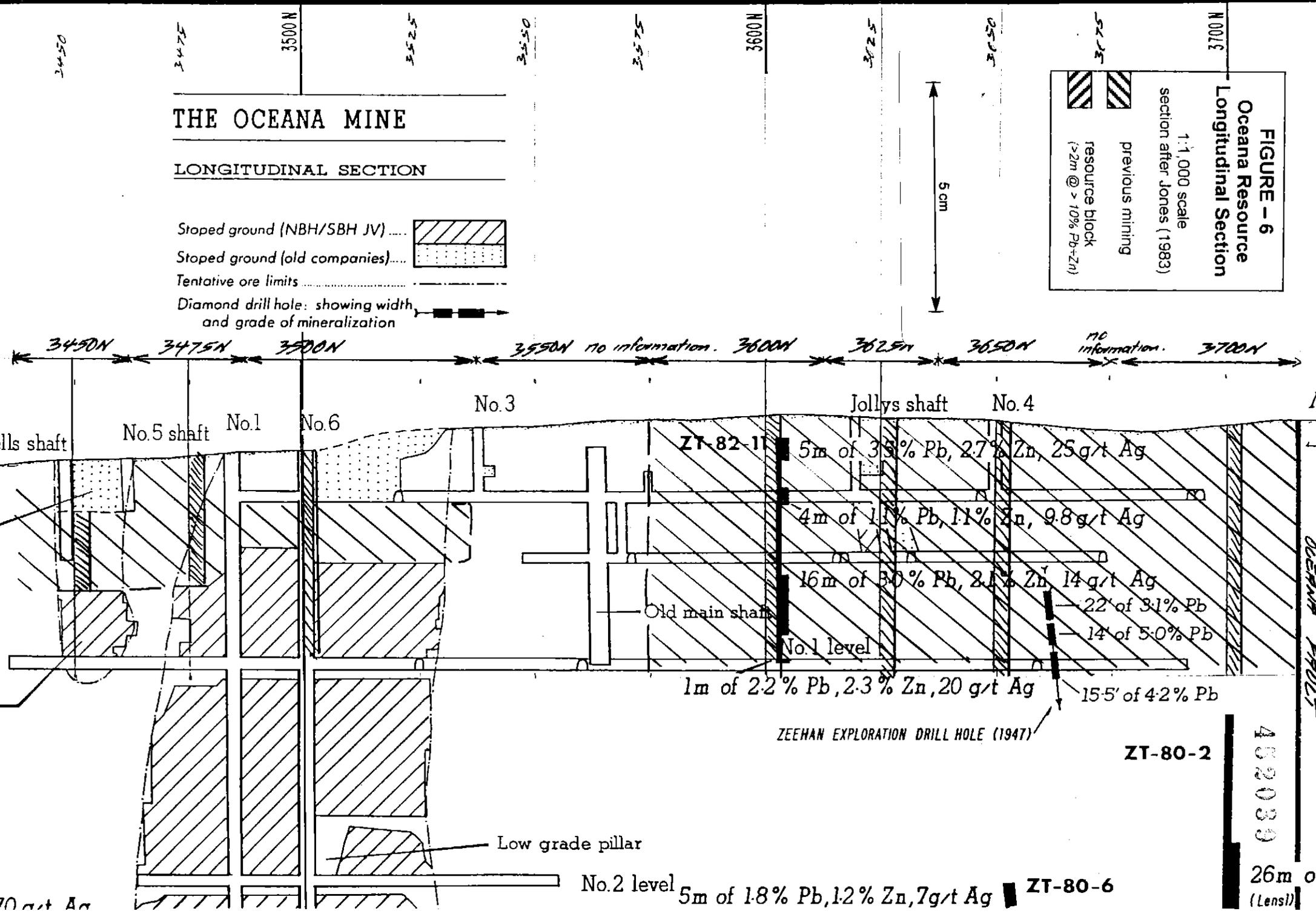
- Stoped ground (NBH/SBH JV) 
- Stoped ground (old companies)..... 
- Tentative ore limits 
- Diamond drill hole: showing width and grade of mineralization 

FIGURE - 6
Oceana Resource
Longitudinal Section

1:1,000 scale
 section after Jones (1983)

 previous mining
 resource block (>2m @ > 10% Pb+Zn)

5 cm



452040

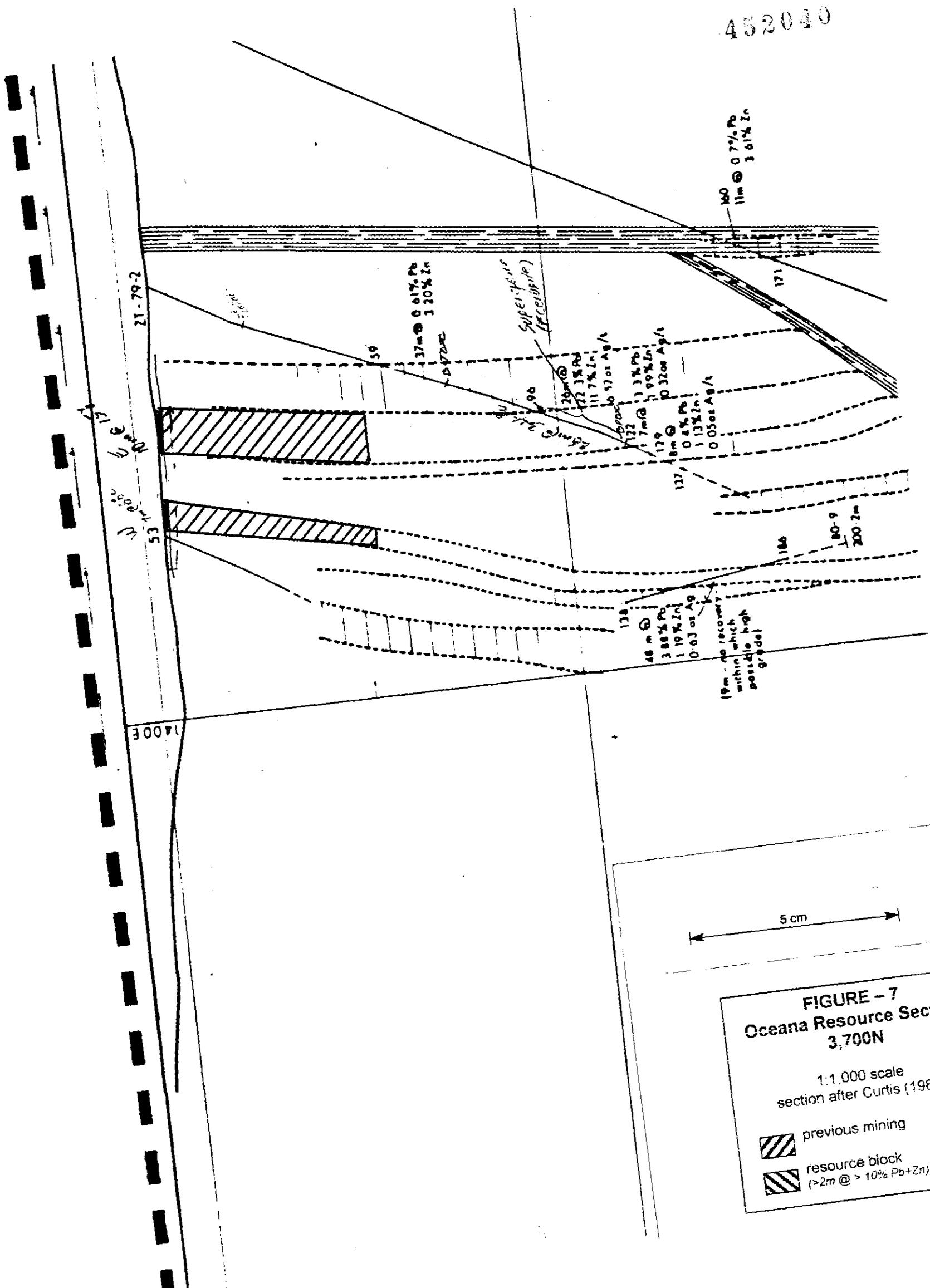
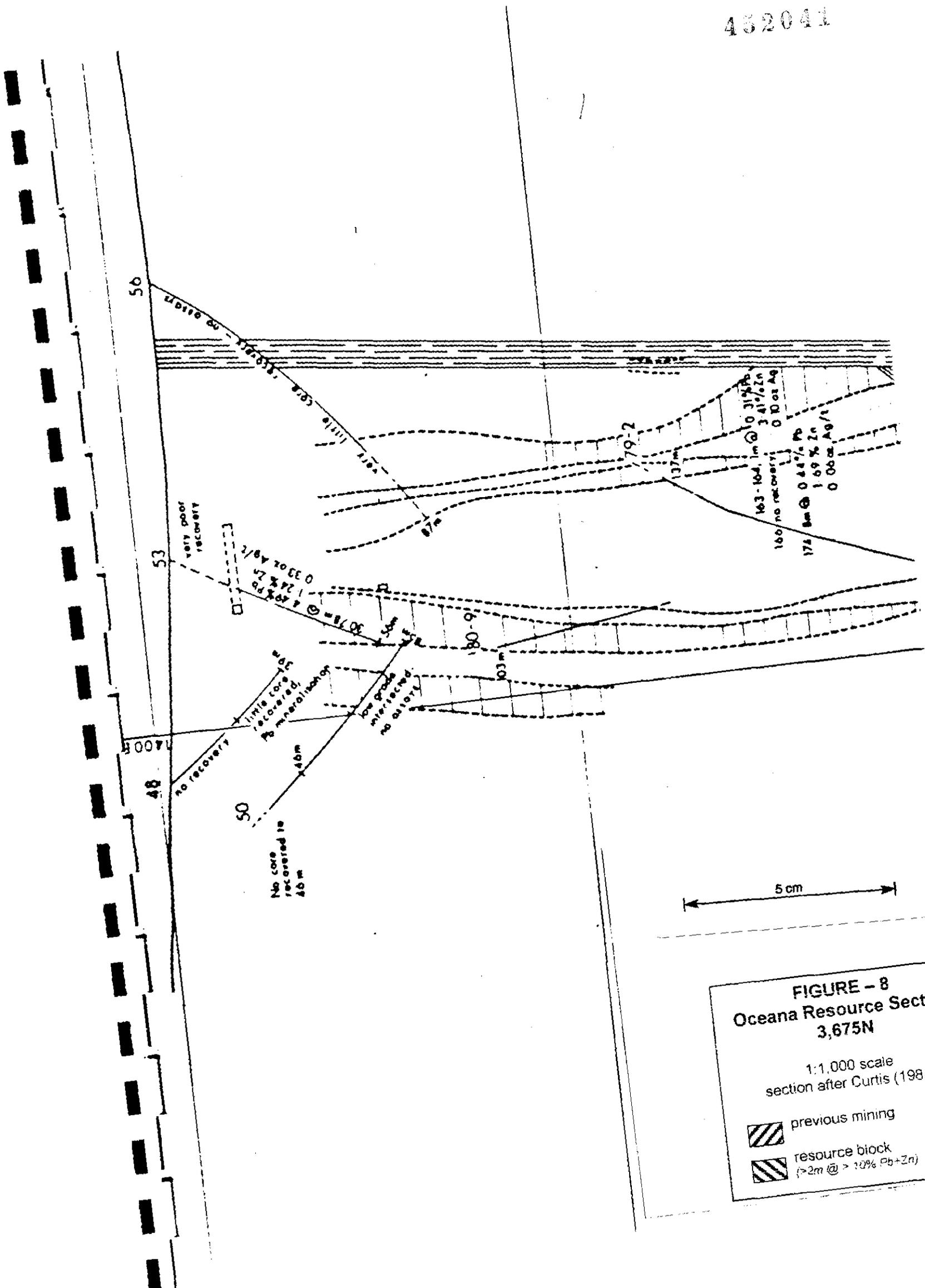


FIGURE - 7
Oceana Resource Section
3,700N

1:1,000 scale
 section after Curtis (1981)

-  previous mining
-  resource block
(>2m @ > 10% Pb+Zn)



5 cm

FIGURE - 8
Oceana Resource Section
3,675N

1:1,000 scale
section after Curtis (1981)

-  previous mining
-  resource block
(>2m @ > 10% Pb+Zn)

452043

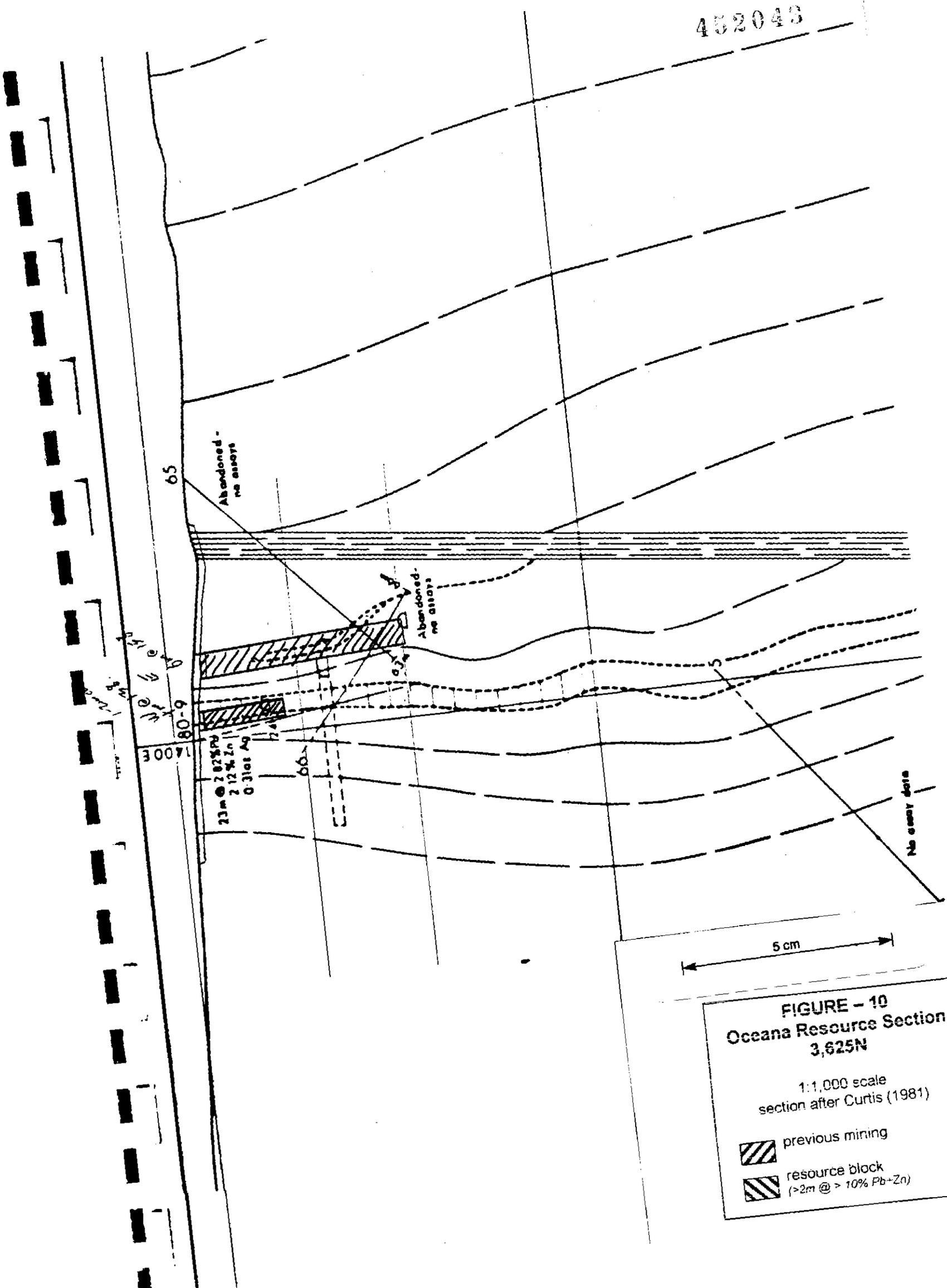


FIGURE - 10
Oceana Resource Section
3,625N

1:1,000 scale
section after Curtis (1981)

 previous mining

 resource block
(>2m @ > 10% Pb+Zn)

482044
Slumped Calcilutites

Calcilu

Sme 928 oblique

6m @ 1928

25%

50m

100% Pb
80% Zn

no assay data

Jolly's Shaft
80-9

1400E

66-2782-11
3.5m
Cover

Abandoned -
no assay data

Sme 9198

5 cm

FIGURE - 11
Oceana Resource Section
3,600N

1:1,000 scale
section after Curtis (1981)

-  previous mining
-  resource block
(>2m @ > 10% Pb+Zn)

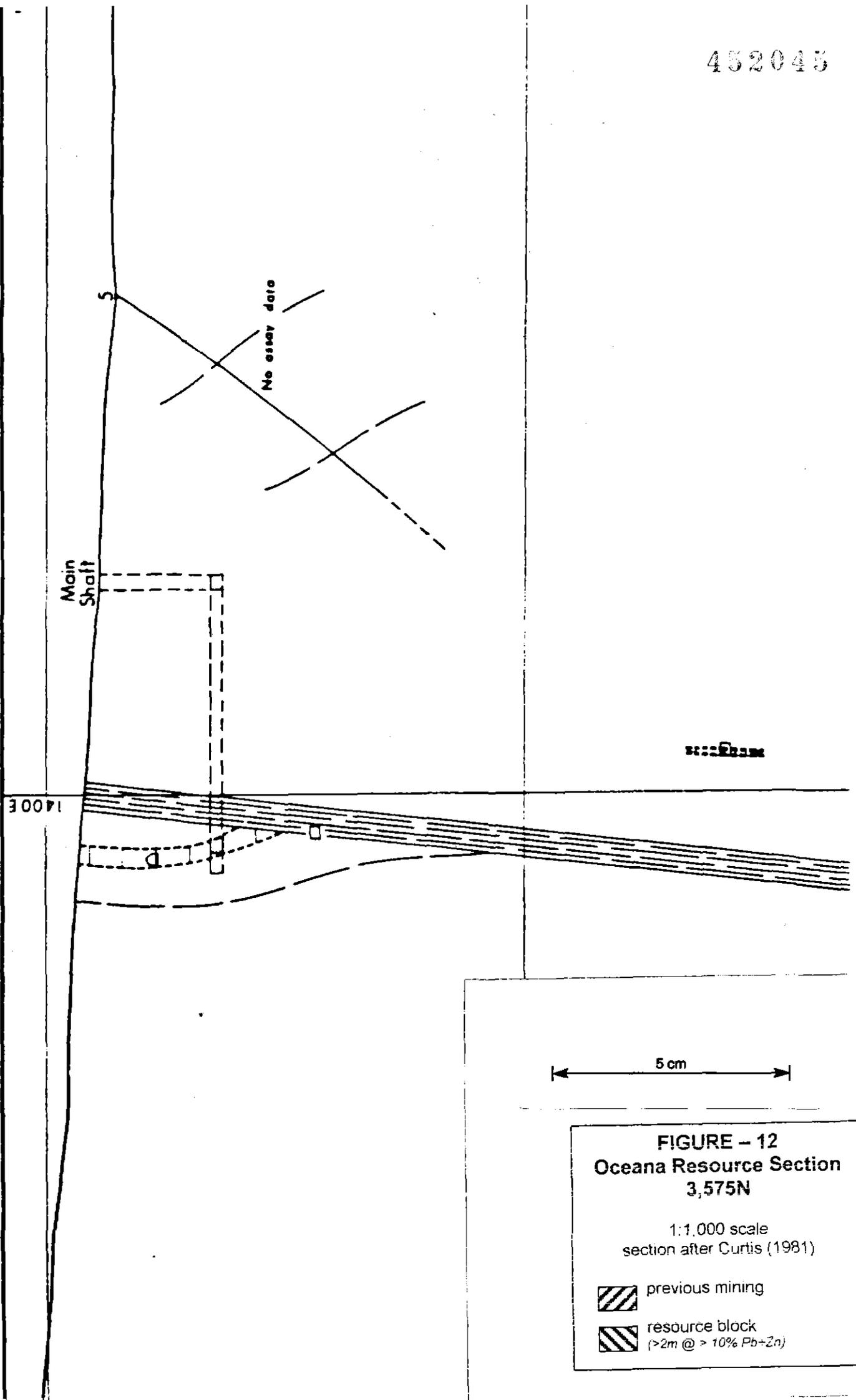


FIGURE - 12
Oceana Resource Section
3,575N

1:1,000 scale
section after Curtis (1981)

-  previous mining
-  resource block
(>2m @ > 10% Pb+Zn)

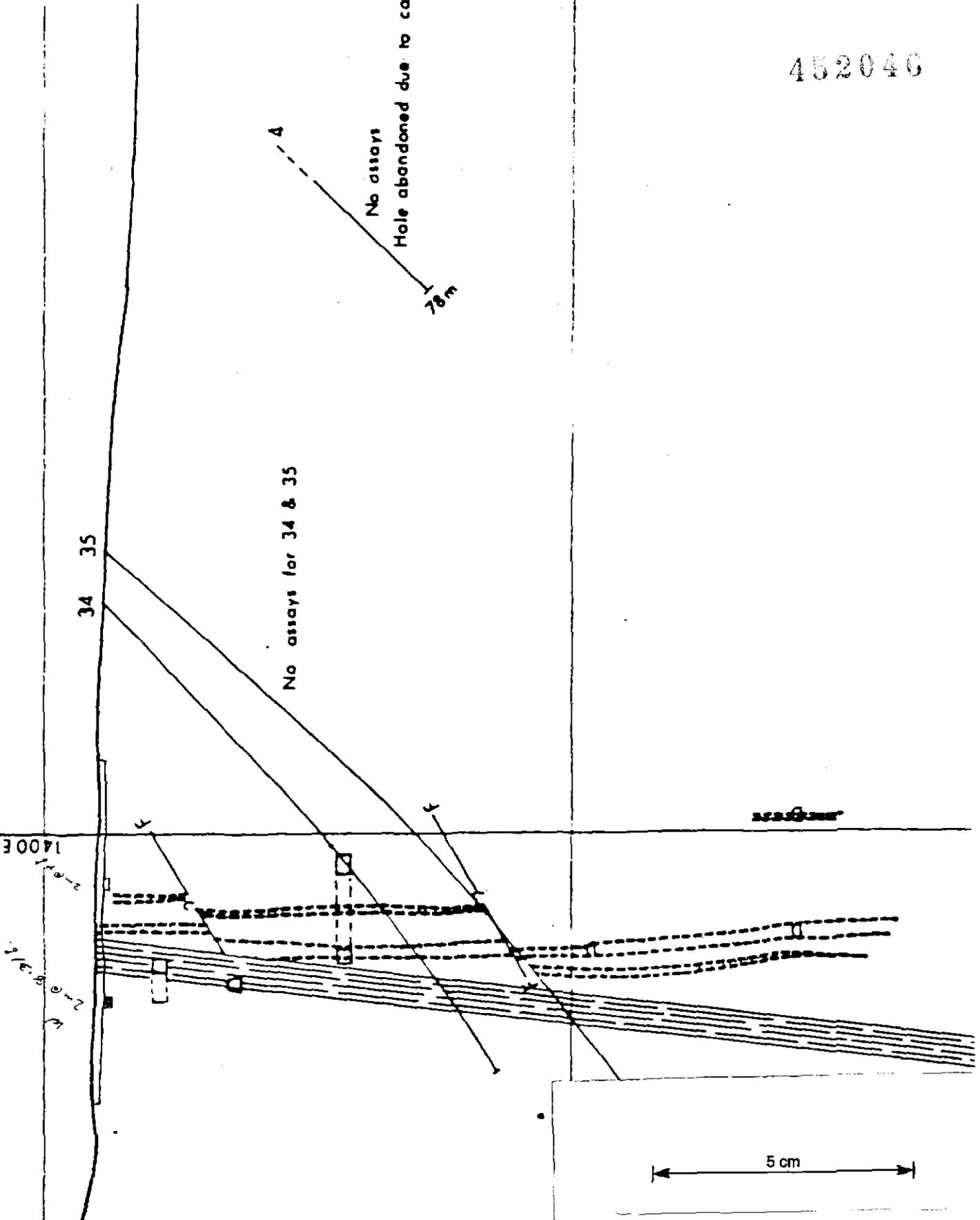


FIGURE - 13
Oceana Resource Section
3,550N

1:1,000 scale
 section after Curtis (1981)

 previous mining
 resource block
 (>2m @ > 10% Pb+Zn)

482047

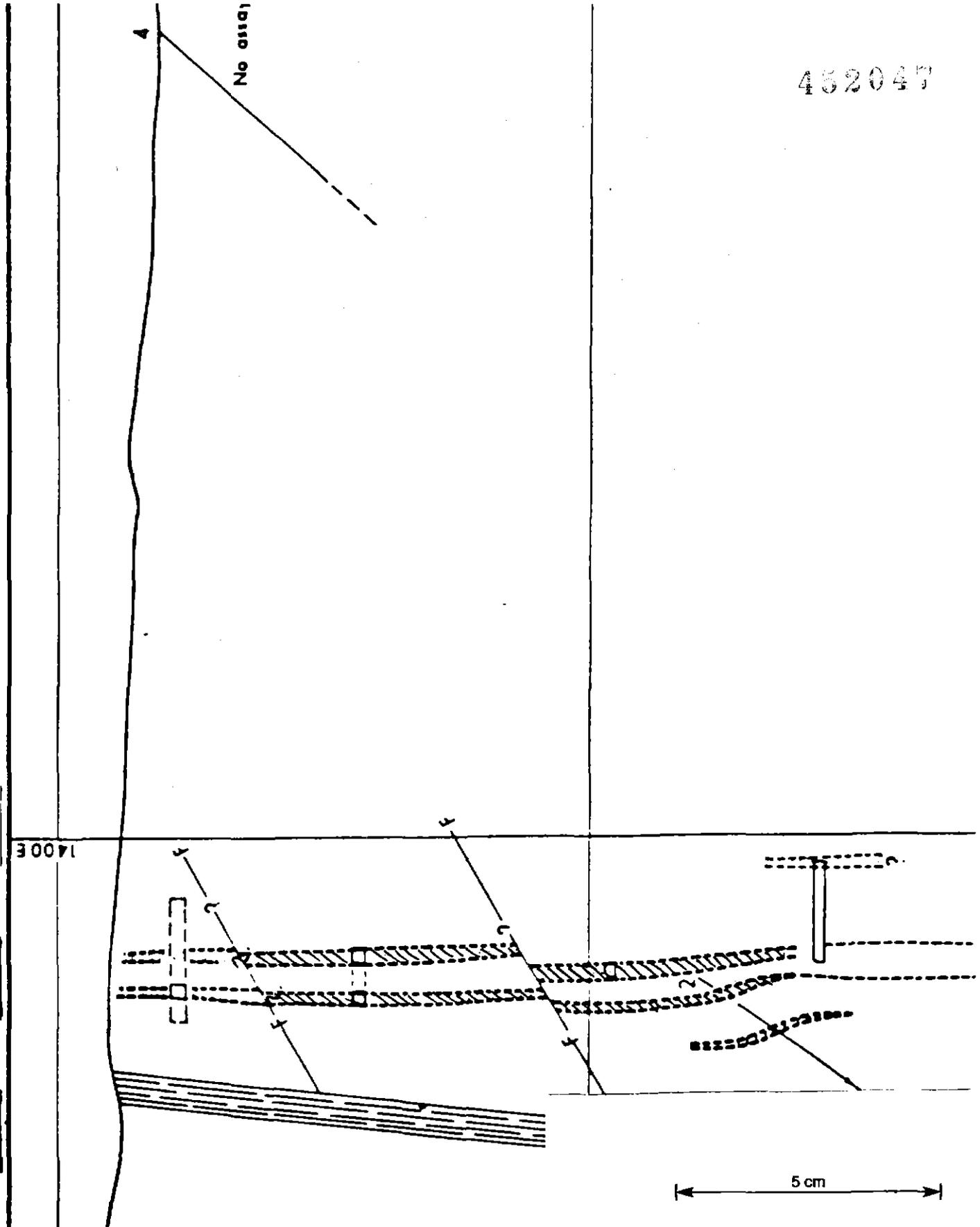


FIGURE - 14
Oceana Resource Section
3,525N

1:1,000 scale
section after Curtis (1981)

 previous mining

 resource block
(>2m @ >10% Pb+Zn)

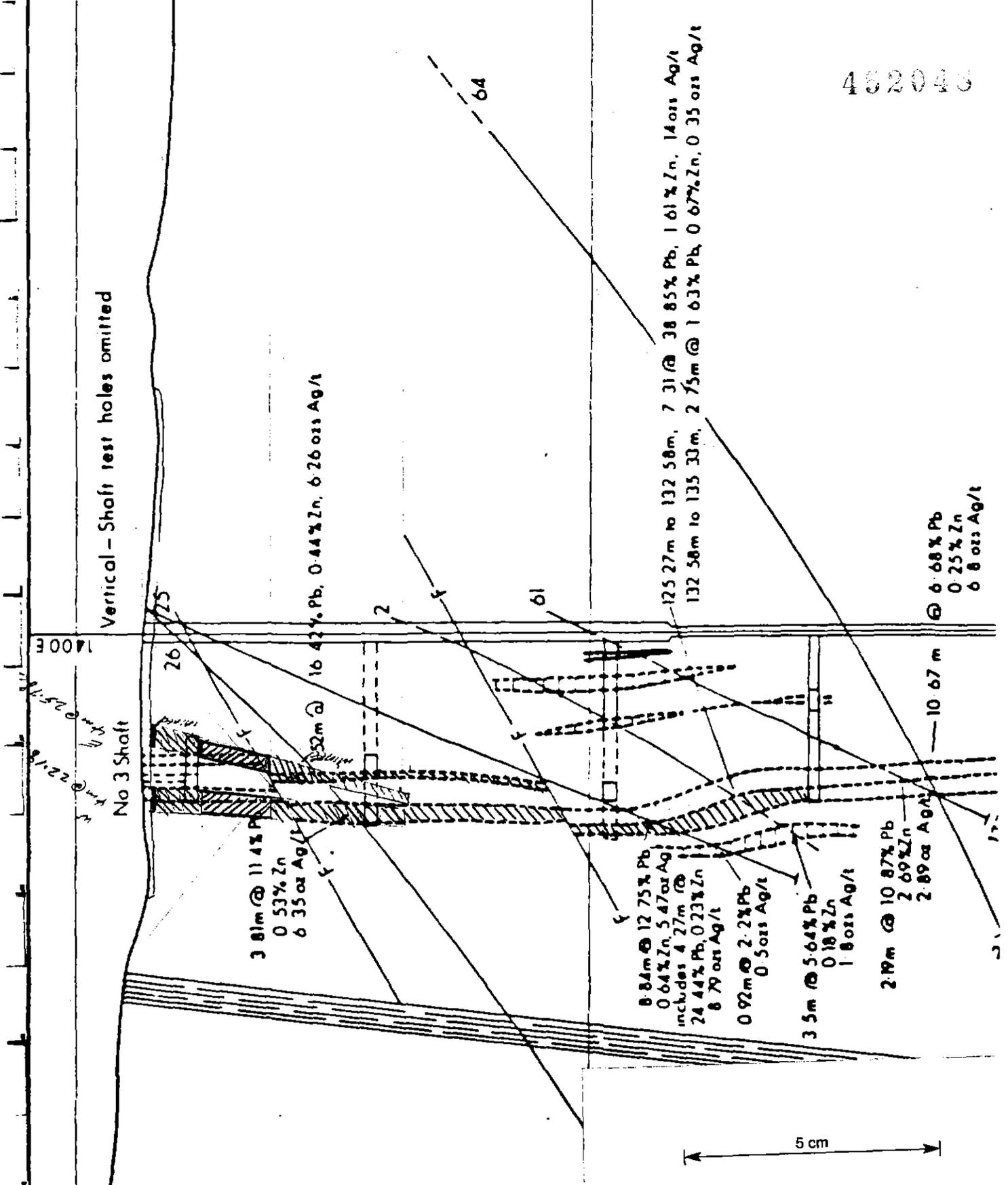


FIGURE - 15
Oceana Resource Section
3,500N

1:1,000 scale
 section after Curtis (1981)

 previous mining

 resource block
 (>2m @ > 10% Pb+Zn)

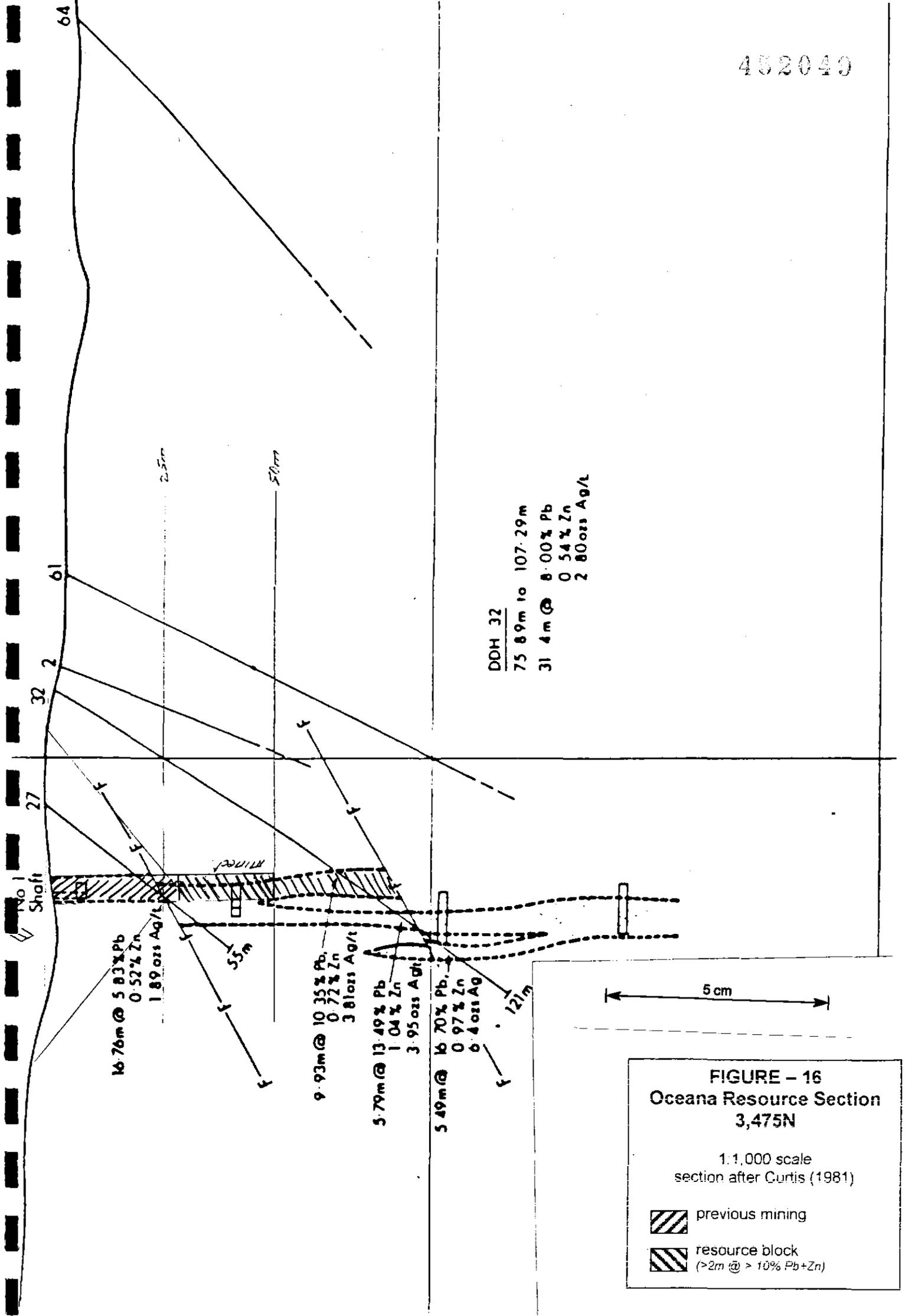
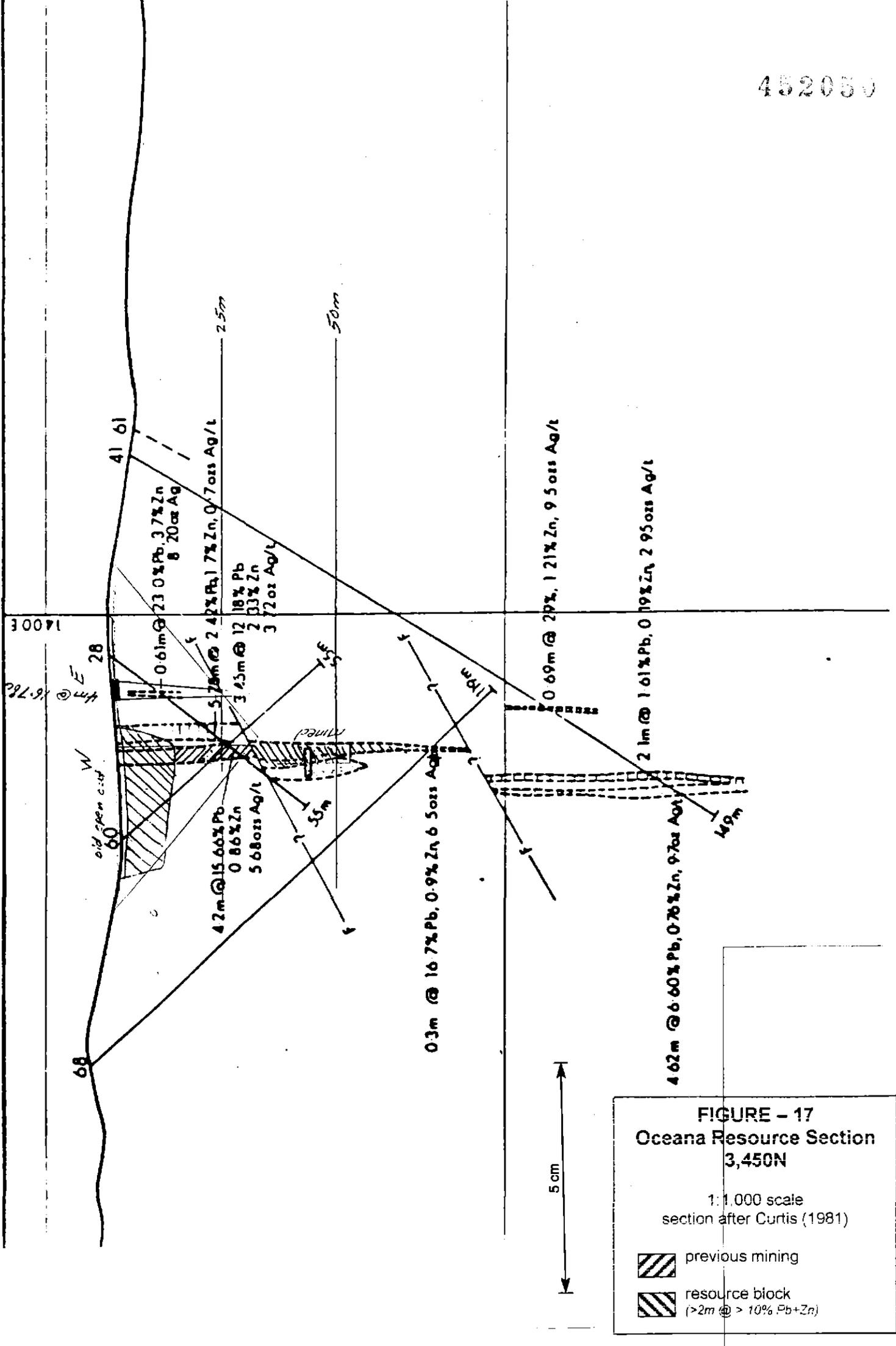


FIGURE - 16
Oceana Resource Section
3,475N

1:1,000 scale
 section after Curtis (1981)

- previous mining
- resource block (>2m @ > 10% Pb+Zn)



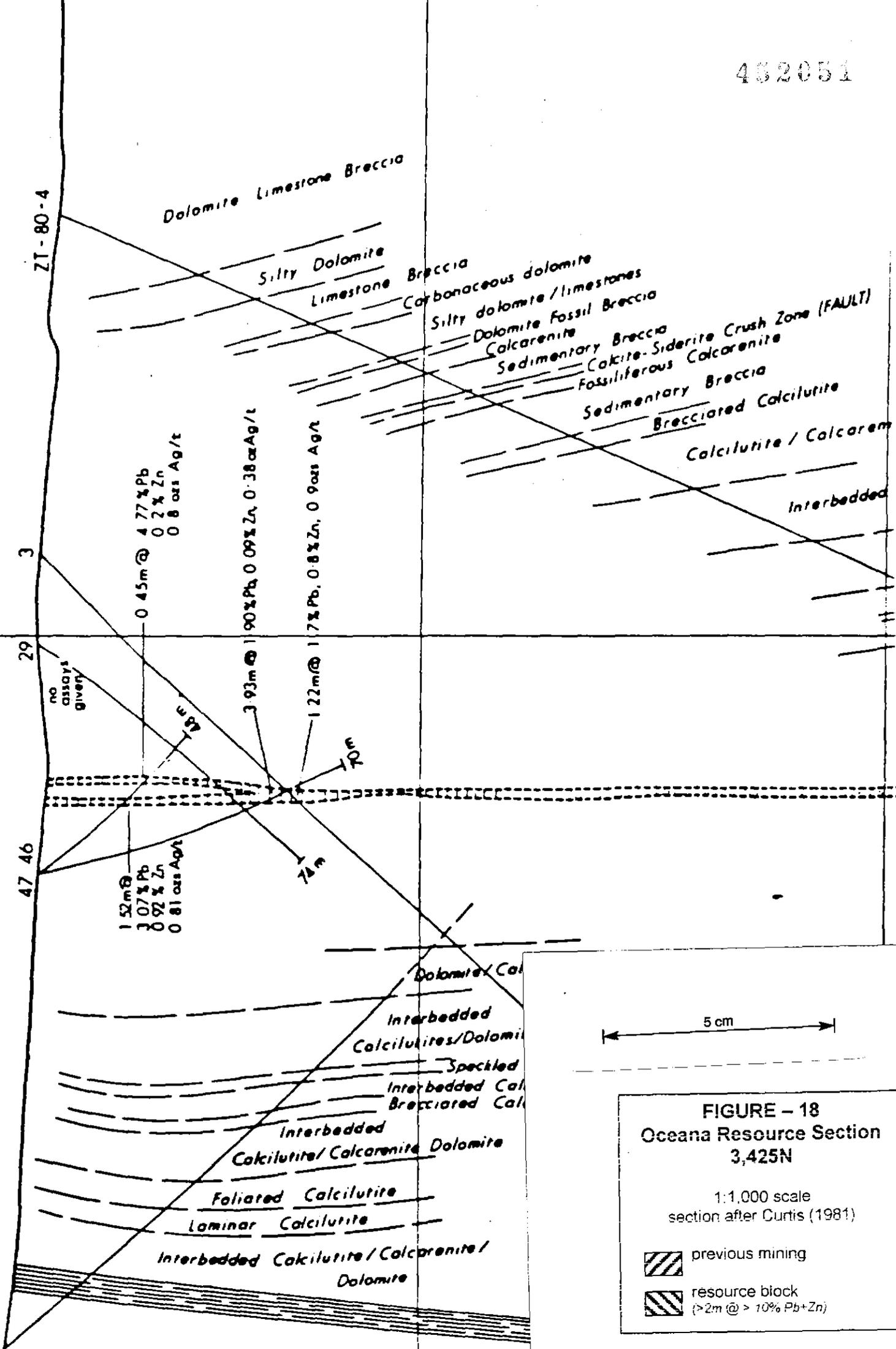


FIGURE - 18
Oceana Resource Section
3,425N

1:1,000 scale
 section after Curtis (1981)

 previous mining

 resource block
 (>2m @ > 10% Pb+Zn)

3.2.5 Metallurgy

From descriptions of drill core and costeans, the mineralisation at Oceana consists of black to mottled clays and Fe & Mn rich gossan near surface and decomposed siderite altered limestone / dolomite with disseminated and vein argentiferous - galena and subordinate sphalerite and pyrite at depth. The secondary lead mineral, cerrusite and possible secondary zinc minerals have also been reported. Most mineralisation could be described as partly oxidised galena with minor sphalerite and pyrite in a clay and carbonate gangue.

There has been no recorded metallurgical testing of samples from the potential Oceana resource. Three 50kg samples from the Austral prospect were tested by Pasminco (Gardner & Dibben 1996) and their description is similar to near surface Oceana mineralisation, though of considerably lower grade (1.2% Pb, 2.4% Zn). Samples were of puggy, weathered limestone collected using an excavator from the higher value aircore drilling anomalies east of the Austral mine. Testing was for gravity concentration only and no flotation was attempted. The samples were not considered representative of mineralisation due to their low grade. Sizing data showed the composite sample to comprise predominantly fine material with 75% passing 15µm. Approximately 75% of the metals were present in the minus 15µm size fraction. It was concluded that the fine grain size precludes the use of gravity separation for upgrading this mineralisation.

Three samples of primary sulphide mineralisation taken from Oceana drillcore have been tested at Roseberry (Ingham 1988). Testing was for the standard Roseberry flotation circuit. Two samples were from diamond hole ZT-79-2 (111 - 112 m, 25% Pb, 41% Zn head grade; & 125 - 126 m, 2% Pb, 2% Zn head grade) and represent the high grade mineralisation at the northern end of the Oceana deposit. This sample was partly oxidised and possibly supergene enriched. It produced a high grade concentrate though had high metal loss to the tail, possibly due to the partial oxidation. A third sample from ZT-80-4 (304 - 305m, 4% Pb, 10% Zn head grade) from south of Oceana gave good Pb & Ag recovery producing a high grade concentrate. The samples are not considered to be representative of Oceana due to their non typical grades. They are also considerably lower grade than typical Roseberry mill feed and with a lower proportion of zinc and copper.

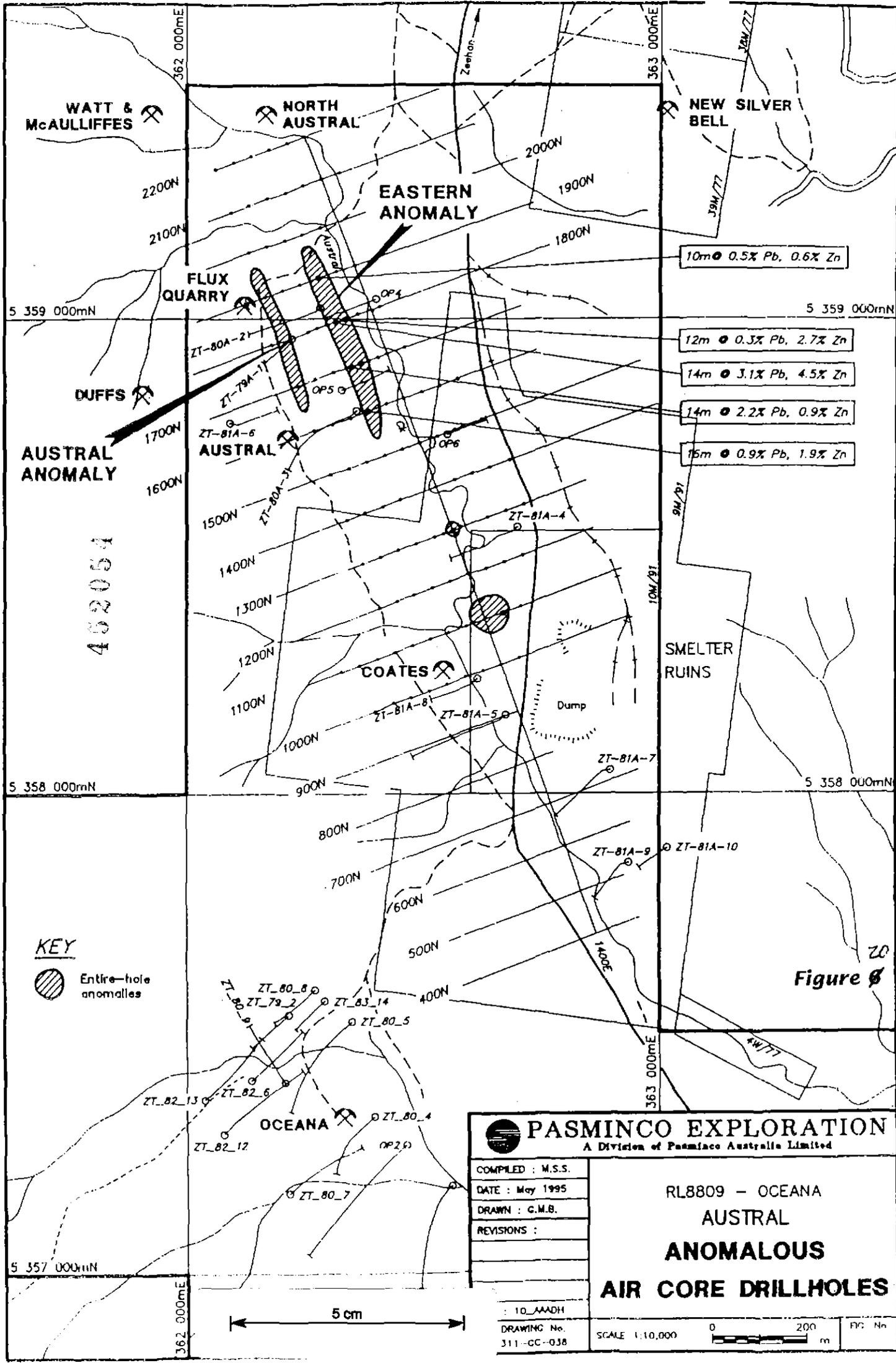
Two 50kg samples of primary sulphide mineralisation from Oceana were sent by Amoco to the US for testwork (Jones 1983), though no results were reported.

Copies of available metallurgical reports are contained in Appendix B.

3.3 Austral & Flux Quarry Area

There is insufficient information to allow estimation of a resource for the Austral - Flux Quarry area. A few, wide apart intersections of greater than 10% Pb + Zn of greater than 2 metres width have been reported from costeans and drill holes.

Potential exists for shallow, small tonnage, moderate grade Pb - Zn open cut resources in the Flux Quarry and Austral mine areas. Considerable exploration potential also remains and should be followed up.



10m ⌀ 0.5% Pb, 0.6% Zn

12m ⌀ 0.3% Pb, 2.7% Zn

14m ⌀ 3.1% Pb, 4.5% Zn

14m ⌀ 2.2% Pb, 0.9% Zn

15m ⌀ 0.9% Pb, 1.9% Zn

KEY
 Entire-hole anomalies

 A Division of Pasminco Australia Limited	
COMPILED : M.S.S. DATE : May 1995 DRAWN : C.M.B. REVISIONS :	RL8809 - OCEANA AUSTRAL ANOMALOUS AIR CORE DRILLHOLES
: 10_MADH DRAWING No. 311-CC-038	SCALE 1:10,000

Figure 6

4 Exploration Potential

4.1 Oceana

Potential remains at Oceana for strike extensions of known mineralisation to the south of the resource and for additional, parallel zones within the Gordon Limestone. Additional parallel zones have been located in drilling to date and are within the potential open cut volume. Potential also remains for higher grade or wider shoots of mineralisation within the known zones, especially in favourable structural positions. Any additional mineralisation within the open cut would enhance the economics of the project and should be a high priority of future work.

Supergene enrichment appears to be present and may account for the higher grades encountered at the northern end of the deposit in drill hole ZT-79-2 (26m @ 22% Pb, 11% Zn & 6 Oz/t Ag) which is approximately double the deposits global grade. Supergene enrichment may occur between 70 and 120 metres depth and could be a focus of further exploration.

The potential for additional mineralisation should be tested along the Gordon Limestone - Moina Sandstone contact, which is known to be mineralised elsewhere in the RL.

Unexplained Pb + Zn in soil anomalies remain to be tested to the north-east and west of the known mineralisation.

4.2 Austral Valley

Potential exists for shallow, small tonnage, moderate grade Pb - Zn open cut resources in the Flux Quarry and Austral mine areas. The wide spaced significant, shallow drill and costean intersections reported in the Austral and Flux Quarry areas should be followed up with additional drilling to determine resource potential.

Highly significant Pb & Zn values in bedrock obtained by aircore drilling by Pasmenco east of the known mineralisation must be followed up with systematic drill testing. Drilling should use angled holes (not vertical) as the target is probably steeply dipping and less than 10 metres wide. Potential exists for significant shallow resources in this area. All aircore anomalies and the numerous linear ground magnetic anomalies within the limestone and at its margins should be properly tested.

4.3 South Oceana & Pyramid Prospects

Potential remains for small shallow resources at the South Oceana and Pyramid prospects. Significant Amoco costean intersection at South Oceana (4 m @ 41% Pb + Zn) and Pyramid (6m @ 9% Pb + Zn) require drill testing. Low order soil anomalies also require further investigation.

5 Recommended Work

5.1 Oceana

The key issue to be addressed if the Oceana resource is to be exploited is metallurgy. The economics of the relatively small resource will probably require toll treatment at an established nearby plant. Further metallurgical work is required to test oxidised, part oxidised and un-oxidised samples representative of the Oceana open cut resource. Test work should include mineralogical work and testing for stand alone treatment and possible pre treatment for feed to other mills. Samples should be collected from new costeans and drilling and carefully stored (frozen or hermetically sealed) to prevent "post mining" oxidation prior to testing.

The Oceana resource will require further drilling and costeaning. Early drilling and costeaning should be designed to confirm the current interpretation, obtain samples for metallurgical testing, check sampling and to determine previous assay data quality. Various drilling methods should be trialed to determine the best sampling method at optimum cost. Combinations of rotary, aircore, face sampling percussion and large diameter diamond core drilling should be tried. Drilling will also be required to accurately locate areas of previous mining and to obtain geotechnical information. Access for early drilling may require minimal site preparation if holes can be sited along existing tracks, which parallel the strike of the mineralisation.

Considerable additional drilling will be required to allow the resource to be brought to indicated and measured categories for reporting and feasibility work.

The extent of previous mining is poorly understood. Mine plans and reports from the 1950's and 60's should be located if possible so as extent of stopes, location of development and grade distribution within the mine can be more accurately determined. This information will be used for more accurate resource estimates, planning of drilling and mine design. Any results of early drilling and underground sampling will also be important. The location of these records is unknown. Enquiries should be made at the Mines Department, Tasmanian Archives, North Broken Hill Co (Zeehan Mines) and Robin Curtis to locate these records. Other early references should also be reviewed. These include Loftus Hills (1947) & Garretty (1947) for details of early drilling and mine descriptions.

Available drill core should be inspected and selected holes relogged. Existing drill logs lack detail on rock quality for geotechnical work. Core recovery and RQD should be systematically determined and representative samples tested for SG, rock hardness and rock strength. Depths of oxidation also need to be determined. This information is not recorded in available logs and is required for determination of mineralisation types for metallurgical purposes. Core should also be selectively re-sampled to check on reported sampling and assays and to determine if any additional metals of value are present (eg Au, Ge, V, Cd).

The location of faults within the deposit is poorly understood. An understanding of the distribution, orientation, nature and movement of faults and shears will be important for mine design (especially pit wall stability) and interpretation of the distribution of mineralisation for more accurate resource estimation. Drill logs and available core should be reviewed to identify and locate faults and these should be accurately plotted on sections and plans.

All available data for the resource area should be accurately plotted on a consistent series of sections and plans at an appropriate scale (1:500). Detailed surface mapping is lacking, with the location of collapsed stopes, open cuts, some drillholes, rock outcrops and recent tracks not shown on available plans. Detailed surface mapping and surveying is required to accurately pick up detail. Contract conventional or GPS surveying is recommended. Enlargements of available detailed aerial photographs should be obtained and corrected orthophotos prepared as a base for mine design and continuing resource work and exploration.

The existing tracks and survey grid are in a poor state of repair. Tracks will require repair if regular access is required for further work. Only minor work is required by a small bulldozer or excavator. The grid needs to be re-established to allow further mapping and sampling. Grid lines should be cleared / re-cut and pegs replaced. Consideration should be given to changing the grid from 50 metre spaced lines to 40 metre spaced lines to allow more convenient division of section spacing when more detailed work on intermediate lines is required. Future resource drilling may require 20 and 10 metre spaced lines.

5.2 Austral

All available drilling, geological, geochemical and geophysical data requires plotting at a common scale. Cover thickness and depth of weathering from aircore data should be assessed to identify bedrock highs and lows that may be associated with mineralisation.

Potential exists for significant shallow Pb-Zn resources near the Flux Quarry, Austral Mine and in the Austral Valley east of the Flux Quarry. Drill testing of Pb & Zn in aircore drillhole anomalies should be a high priority. Angled aircore or face sampling percussion drilling is recommended, as it may be able to obtain better recoveries in the puggy and broken ground than previous diamond drilling. Additional, step-out drilling is required around existing intersections of shallow, greater than 10% Pb+Zn mineralisation near the Flux Quarry and Austral prospects.

5.3 Other Prospects

Anomalous costean and drilling results at the Pyramid and South Oceana prospects requires further testing with shallow drilling and additional costeans.

5.4 Work Program and Cost

The following is an indication of the costs and time required to bring the Oceana resource to an indicated resource category and to produce a pre-feasibility study. The costs and times are estimates only. The times overlap and are conservative, including waiting time etc. The progress and cost of the program will be dependent on results obtained along the way and corporate objectives.

Activity	Cost	Time
Locate & re-log available drill core	\$6,000	3 weeks
Check sampling; check & scan assaying; mineralogy of core samples	\$3,000	2 weeks
Locate & compile historic mining & drilling information	\$3,000	4 weeks
Track repair & drill site preparation	\$3,000	1 week
Grid re-establishment	\$5,000	2 weeks
Limited costeaning & trial drilling (250m) for metallurgical samples	\$35,000	2 weeks
Metallurgical test work	\$10,000	4 weeks
Surveying & base map preparation	\$7,000	1 week
Detailed surface mapping	\$4,000	2 weeks
Data input for plotting of drill sections & plans	\$3,000	2 weeks
Prepare detailed plans & sections	\$2,000	1 week
Data compilation & resource estimation	\$4,000	3 weeks
Decision Point	Sub total	\$85,000
Phase 1 resource drilling (1,500m) & costeaning	\$200,000	6 weeks
Pre feasibility study	\$35,000	4 weeks
Estimated total cost to pre-feasibility		\$320,000

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Note: numbers in brackets [] are TDR library report numbers.

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APPENDIX – A

**OCEANA RESOURCE
CALCULATIONS**

Oceana Prospect, Estimate of Resource potential

Surface to 50 metres vertical

Assumes mining as per Jones (1983)

Pre Resource Mineralisation

Section	Zone	Width	Height	Area	Inf	cu m	Pb	Zn	Ag	Ints	Comment
3400	E			0	0	0					No min
3425	E			0	0	0					No min
3450	E	2	28	56	25	1,400	17.2	0.7	5.2	2	pillar
3475	E	6	28	168	25	4,200	7.5	0.6	2.6	2	pillar
3500	E	3	13	39	50	1,950	22.3	0.9	10.1	2	pillar
3525	E			0		0				0	no info
3550	E			0	37	0				0	< 10% Pb+Zn
3575	E			0		0				0	no info
3600	E	2	48	96	37	3,552	13.0	1.3	1.6	1	
3625	E	6	48	288	25	7,200	12.4	2.9	2.2	1	costean
3650	E	2	48	96	37	3,552	4.6	6.7	1.7	1	costean
3675	E			0		0				0	no info
3700	E	10	48	480	42	20,160	11.4	3.6	1.0	1	
3400	W			0	0	0					
3425	W			0	0	0					
3450	W	3	16	48	25	1,200	14.1	1.5	4.8	2	pillar
3475	W			0	25	0				0	no info
3500	W	3	14	42	50	2,100	16.5	0.6	5.3	2	pillar
3525	W			0		0				0	no info
3550	W			0	37	0				0	< 10% Pb+Zn
3575	W			0		0				0	no info
3600	W	5	16	80	37	2,960	16.2	3.0	1.0	1	
3625	W	4	18	72	25	1,800	12.1	0.9	1.9	1	costean
3650	W			0	37	0				1	< 10% Pb+Zn
3675	W			0		0				0	no info
3700	W			0	42	0				0	< 10% Pb+Zn

Subtotal

E	4	37		278	42,014	11.4	3.0	2.0	10
W	4	16		278	8,060	15.0	1.7	2.9	7
Total	4	30			50,074	12.0	2.8	2.2	17

SG = 2.7 135,200 tonnes

Pit Volume

Section	Zone	Slope	Height	Area	Inf	cu m
3400	E+W			0		0
3425	E+W			0		0
3450	E+W	41	28	841	25	21,013
3475	E+W	41	28	841	25	21,013
3500	E+W	41	13	841	50	42,025
3525	E+W			0		0
3550	E+W	41		841	37	31,099
3575	E+W			0		0
3600	E+W	78	48	3042	37	112,554
3625	E+W	78	48	3042	25	76,050
3650	E+W	78	48	3042	37	112,554
3675	E+W			0		0
3700	E+W	78	48	3042	42	127,764

Total 544,071

Waste (cu m) = 493,997

Waste : Ore = 10

Oceana Prospect, Estimate of Resource potential

Surface to 25 metres vertical

Assumes mining as per Jones (1983)

Pre Resource Mineralisation

Section	Zone	Width	Height	Area	nfluenc	cu m	Pb	Zn	Ag	Ints	Comment
3400	E			0	0	0					No min
3425	E			0	0	0					No min
3450	E	2	23	46	25	1,150	17.2	0.7	5.2	2	pillar
3475	E	6	23	138	25	3,450	7.5	0.6	2.6	2	pillar
3500	E	3	13	39	50	1,950	22.3	0.9	10.1	2	pillar
3525	E			0		0				0	no info
3550	E			0	37	0				0	< 10% Pb+Zn
3575	E			0		0				0	no info
3600	E	2	23	46	37	1,702	13.0	1.3	1.6	1	
3625	E	6	23	138	25	3,450	12.4	2.9	2.2	1	costean
3650	E	2	23	46	37	1,702	4.6	6.7	1.7	1	costean
3675	E			0		0				0	no info
3700	E	10	23	230	42	9,660	11.4	3.6	1.0	1	
3400	W			0	0	0					
3425	W			0	0	0					
3450	W	3	16	48	25	1,200	14.1	1.5	4.8	2	pillar
3475	W			0	25	0				0	no info
3500	W	3	14	42	50	2,100	16.5	0.6	5.3	2	pillar
3525	W			0		0				0	no info
3550	W			0	37	0				0	< 10% Pb+Zn
3575	W			0		0				0	no info
3600	W	5	16	80	37	2,960	16.2	3.0	1.0	1	
3625	W	4	18	72	25	1,800	12.1	0.9	1.9	1	costean
3650	W			0	37	0				1	< 10% Pb+Zn
3675	W			0		0				0	no info
3700	W			0	42	0				0	< 10% Pb+Zn

Subtotal

E	4	22		278	23,064	11.8	2.7	2.5	10
W	4	16		278	8,060	15.0	1.7	2.9	7
Total	4	20			31,124	12.6	2.5	2.6	17

SG = 2.7 84,035 tonnes

Pit Volume

Section	Zone	Slope	Height	Area	Inf	cu m
3400	E+W		0	0		0
3425	E+W		0	0		0
3450	E+W	37	23	685	25	17,113
3475	E+W	37	23	685	25	17,113
3500	E+W	37	13	685	50	34,225
3525	E+W		0	0		0
3550	E+W	37	0	685	37	25,327
3575	E+W		0	0		0
3600	E+W	37	23	685	37	25,327
3625	E+W	37	23	685	25	17,113
3650	E+W	37	23	685	37	25,327
3675	E+W		0	0		0
3700	E+W	37	23	685	42	28,749

Total 190,291

Waste (cu m)= 159,167

Waste : Ore = 5

Oceana Prospect, Estimate of Resource potential

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Formulae

Area of resource block
Volume of resource block
Tonnage

Area = Width * Height
cu m = Area * Inf
Tonnes = cu m * SG

APPENDIX – B

**OCEANA
METALLURGICAL TEST
RESULTS**

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ARIMCO MINING PTY LIMITED

ACN 002 807 365

**PASMINCO EXPLORATION
OCEANA RL 8809
ANNUAL REPORT
FOR THE PERIOD ENDING AUGUST 1996**

Author: D G Gardner & S M Dibben
Date: September 1996
Report No.: TA-29
Submitted to: Regional Exploration Manager - Tasmania
Distribution: Tasmanian Development & Resources Industry Safety & Mines Division - Hobart
Pasminco Exploration - Burnie
- Melbourne
- Rosebery
Arimco Mining - Sydney
- Perth

Submitted by: *[Signature]*
Accepted by: *[Signature]*

**BURNIE
SEPTEMBER 1996**

5.3 Metallurgical Testing

To follow up the Austral air core program, 3 samples (approximately 50kg each) from the better areas of shallow mineralisation were taken for metallurgical testing (figure 7). Samples were taken using an excavator, immediately back filling the trench. Overburden is glacial sandstone deposits, thicknesses being: 2m(1800N/1340E), 2.6m(1800N/1320E), and 1.1m(1700N/1320E).

bag	line	mE	depth	comment
1	1800	1340	2-3m	plastic black decomposed limestone
2	1800	1340	2-3m	crumbly black/brown decomposed limestone
3	1800	1340	2-3m	crumbly black/brown decomposed limestone
4	1800	1340	2-3m	crumbly black/brown decomposed limestone
5	1800	1320	3+m	plastic black decomposed limestone
6	1800	1320	2-3m	plastic black decomposed limestone
7	1800	1320	4+m	saccharoidal black sulphidic limestone
8	1800	1320	4+m	saccharoidal black sulphidic limestone
9	1700	1320	1.5-2m	crumbly black/brown decomposed limestone
10	1700	1320	2.5-3m	sulphidic black plastic decomposed limestone
11	1700	1320	2.5-3m	sulphidic black plastic decomposed limestone
12	1700	1320	2.5-3m	sulphidic black plastic decomposed limestone

Analyses from air core drilling were

line	mE	Pb%	Zn%
1800	1320	0.36	4.35
1800	1340	9.5	6.87
1700	1320	9.8	0.65
		6.55	3.96

12 2.4 Bulk Sample

A report on Metallurgical Testing is enclosed in Appendix 4.

5.4 Downhole EM Survey OP4

The down hole EM survey (appendix 5) detected responses from casing left in the hole. No signatures that could be associated with mineralisation were observed.

METALLURGICAL EVALUATION OF OCEANA SAMPLES

Draft Report by Chris Mwaba, Pasminco Mining

Introduction

Twelve samples from the Oceana Pb/Ag Resource at Zeehan were received for metallurgical assessment. Based on information available, testwork was undertaken to determine the amenability of the material to a simple gravity upgrading process.

Upon receipt, each sample was assayed for base and precious metals. A composite/bulk sample was then made by simply combining the twelve individual samples. This composite sample was then sized by sieving and cyclosizing and each size fraction analysed for base and precious metals. Tables 1 and 2 show the assays obtained.

It is to be noted that because of the predominantly fine nature of the material, problems were encountered in sample preparation. For example, once dried, the material tends to cake/cement and thereafter needs breaking up, resulting in unintended crushing/size reduction of the original sample in the process.

Discussion

The Oceana deposit has been estimated to contain some 4M tonnes at 7.9% Pb, 2.1% Zn and 84g/t Ag. All the samples delivered to Rosebery were of substantially lower grade than the stated resource grade, apart from samples AS5 and AS6.

- The composite sample grade was 1.2% Pb and 2.4% Zn.
- Sizing data shows the composite sample to comprise predominantly fine material at 75% passing 15µm.
- In general, all the metals are evenly distributed throughout the size fractions. Of significance is the fact that approximately 75% of the metals are present in the - 15µm size fraction (Figure 1).

Conclusions

The predominantly fine nature of the material makes it unsuitable for simple gravity concentration techniques. In addition, the apparent even distribution of the metal values over the size range tested suggests that sizing separation techniques would also be inappropriate.

Because of its fine nature, material is unsuitable for treatment on the existing process at Rosebery as its introduction into the flotation circuit would lead to a variety of problems related to ultra-fine particle flotation, including slime-coating, which would have a deleterious impact on concentrate grades and metal recoveries. Previous flotation tests performed on samples from the Oceana resource showed the material to

be incompatible with typical Rosebery feed because of the observed poor recovery properties of the Oceana material.

There may be some merit in continuing testing but on higher grade feed sources. This would, however, greatly depend on the practical aspects of the anticipated grade control during ore extraction. Also, where coarser material (than that tested here) is to be treated, alternative size reduction techniques (eg attrition type processes) rather than the impact processes currently used at Rosebery might prove beneficial in enhancing concentration process performance. However, the economics of such treatment processes may very well prove to be unattractive.

Recommendation

Testing should be continued on less oxidised, higher grade samples. Mineralogical studies should also be conducted in order to establish the character of the ore and identify potential concentration processes.

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REVIEW OF E.Z. TESTWORK

Some very preliminary flotation tests were carried out by Electrolytic Zinc. The objective of the tests was restricted to checking the response of Oceana ore to the standard procedure used to test Rosebery and Que River ore.

Three samples were tested - high and low grade samples from the northern zone and a sample of lead ore from the southern zone.

The results are summarised in the table below.

E.Z. concluded that northern zone ore is probably incompatible with the present Rosebery feed, because of its poor recovery properties. However they acknowledged that the results obtained did not represent maximum recoveries or typical concentrate grades to be expected from the ore if it were treated separately using different conditions. They felt that southern zone ore is reasonably compatible, though its low zinc content makes it less attractive than the current feed which contains 12-14% Zn.

In reviewing the data it is noted that one of the northern zone samples is extremely high grade, while the other is very low grade. Thus neither of them are typical of the orebody. Another point is that E.Z. produced a copper concentrate according to their normal practice. The Oceana ore, however, only contains about one tenth or less copper, so that the production of a separate copper concentrate is inappropriate.

The data does not include anything on impurities.

Comments on the results for each sample are as follows:

Sample No. 21335, Hole 79-2, 111-112m (Northern Zone)

High grade lead and zinc concentrates were achieved, but losses to tailing were high, especially for zinc. E.Z. reported the material as being slightly oxidised and postulated that oxidation could be part of the reason for the high losses. If this is the case, sodium sulphide activation may be of benefit. Silver loss to tailing was similar to lead. No comparative silver data was given for Rosebery.

Sample No. 21349, Hole 79-2, 125-126m (Northern Zone)

Lead and zinc concentrate grades, in fact, matched Rosebery data, despite E.Z.'s statement to the contrary. However, losses of lead and zinc were very high. Silver content of tailing was low at 1 g/t.

Sample No. 21609, Hole 80-4, 304-305m (Southern Zone)

A good recovery of relatively high grade lead concentrate was achieved. Loss to tailing was acceptable. Silver recovery was also good. The zinc head grade is too low for the production of a separate zinc concentrate.

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Future metallurgical testwork should be undertaken on typical average grade northern zone material. If it is determined that a significant part of the zone is weathered, then two composites should be tested, weathered and unweathered. Once the best treatment conditions have been established, variations in response should then be examined by testing samples of various grades.

A similar approach will be necessary for southern zone ore if this is to be included in the reserves.

The testwork would typically examine such factors as grind size, flotation times, various reagent combinations including sodium sulphide activation, and the effect of concentrate regrind. Parallel mineralogical work will be essential.

SAMPLE	PRODUCT	WT %	ASSAY				RECOVERY			
			Pb	Zn	Cu	Ag	Pb	Zn	Cu	Ag
No. 21335 Hole 79-2 111-112 m High Grade North Zone	Cu Conc.	1.37	45.50	25.50	0.23	985	2.45	0.85	3.96	6.74
	Pb Conc.	25.44	67.70	12.20	0.07	451	67.70	7.55	22.40	57.31
	Zn Conc.	24.84	11.10	52.30	0.08	99	10.84	31.61	24.99	12.28
	Final Tail.	48.35	10.00	51.00	0.08	98	19.01	59.99	48.65	23.67
	Head Assay		25.44	41.0	0.08	200.2				
No. 21349 Hole 79-2 125-126 m Low Grade North Zone	Cu Conc.	1.20	11.00	4.70	0.08	99	7.48	2.45	4.11	21.16
	Pb Conc.	2.31	24.20	21.50	0.03	115	31.57	21.52	2.95	47.31
	Zn Conc.	2.78	5.10	26.00	0.11	30	8.01	31.33	13.03	14.85
	Final Tail.	93.71	1.00	1.10	0.02	1	52.94	44.69	79.91	16.68
	Head Assay		1.77	2.31	0.02	5.6				
No. 21609 Hole 80-4 304-305 m Lead ore South Zone	Cu Conc.	1.20	53.30	2.10	0.25	838	7.02	5.03	11.00	17.31
	Pb Conc.	7.63	70.00	1.60	0.03	396	58.84	24.45	8.43	52.02
	Zn Conc.	5.22	38.00	5.10	0.09	226	21.84	53.31	17.29	20.31
	Final Tail.	85.95	1.30	0.10	0.02	7	12.31	17.21	63.28	10.36
	Head Assay		9.08	0.50	0.03	58.1				
Rosebery Standard Test Rosebery Ore 77 % Que River Ore 23%	Cu Conc.	6.91	18.10	24.57	7.17		32.18	17.47	61.19	
	Pb Conc.	7.77	19.27	21.83	1.50		38.52	17.45	14.40	
	Zn Conc.	29.56	2.72	19.46	0.48		20.69	59.18	17.52	
	Final Tail.	55.76	0.60	1.03	0.10		8.61	5.91	6.89	
	Head Assay		3.89	9.72	0.81					

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CORE SAMPLES - GOLD AND SILVER DISTRIBUTION

	ASSAY			DISTRIBUTION	
	Wt	Ag	Au	Ag	Au
<u>No. 21335</u>					
Copper Conc	1.37	985	0.7	6.74	8.87
Lead Conc	25.44	451	0.1	57.31	23.48
Zinc Conc	24.84	99	0.1	12.28	22.92
Tail	48.35	98	0.1	23.67	44.73
Head	100.00	200.20	0.11	100.00	100.00
<u>No. 21349</u>					
Copper Conc	1.20	99	0.7	21.16	7.51
Lead Conc	2.31	115	0.3	47.31	6.17
Zinc Conc	2.78	30	0.1	14.85	2.50
Tail	93.78	<1*	<0.1	16.68	83.82
Head		5.61	0.11	100.00	100.00
<u>No. 21609</u>					
Copper Conc	1.20	838	0.8	17.31	8.86
Lead Conc	7.63	396	<0.1	52.02	7.00
Zinc Conc	5.22	226	0.1	20.31	4.80
Tail	85.95	7	<0.1	10.36	79.34
Head		58.08	0.11	100.00	100.00

* Assume <1 = 1 to calculate distribution

All assays in g/t

