Dresser Mine

M45/650/651 & M45/395

Haoma Mining

Prepared October 13, 2009

1.0 Introduction:

Haoma mining has a substantial barite resource at the old Dresser Mine (M45/395) and North Pole. Dresser produced 128,977 tonnes of barite from the Dresser mine (MC 45/1522) between 1976 and 1990. Carpentaria carried out exploration work on the North Pole lease.

Dresser (1974) have quoted a resource of 3.5 million tonnes at an SG =4.27 for the Dresser mine based on three drilling programmes. A resource of 250,000 tonnes has been quoted for the North Pole area.

Haoma is interested in a joint venture or selling a crushed product prior to beneficiation.

2.0 Location

The prospects are situated 120 kilometres south-east of Port Hedland and 40 kilometres west of Marble bar (Figure 1)

3.0 Geology

Origin of the barite has been well documented with the latest research done by Nijman et al, 1997.

The research shows the barite to have formed in a back arc basin environment as silicified sinters and sedimentary or early diagenetic evaporites / exhalites.

Precipitation of the evaporites was controlled by synsedimentary growth faults with the thickness and concentration of the barite being greatest in proximity to these major structures (Figures 2 and 3). As well, thickness distribution also coincides with major fault blocks sited between these faults e.g Dresser prospect (see Figure 3 longsection).

4.0 Details

4.1 Dresser

Recent samples of Barite ore taken from around the mine area assayed between 94% to 97% Barite. A sample from the ore stockpile assayed only 75%. A detailed analysis compared to specifications for drilling mud barite is shown in table 1.

An inspection of the previous open pits and ore stockpiles indicated that dilution with chert occurring outside the ore zone was excessive. Haoma believes selective mining of the deposit would produce a significantly higher grade ore and possibly reduce the need for beneficiation on some parts of the ore body.

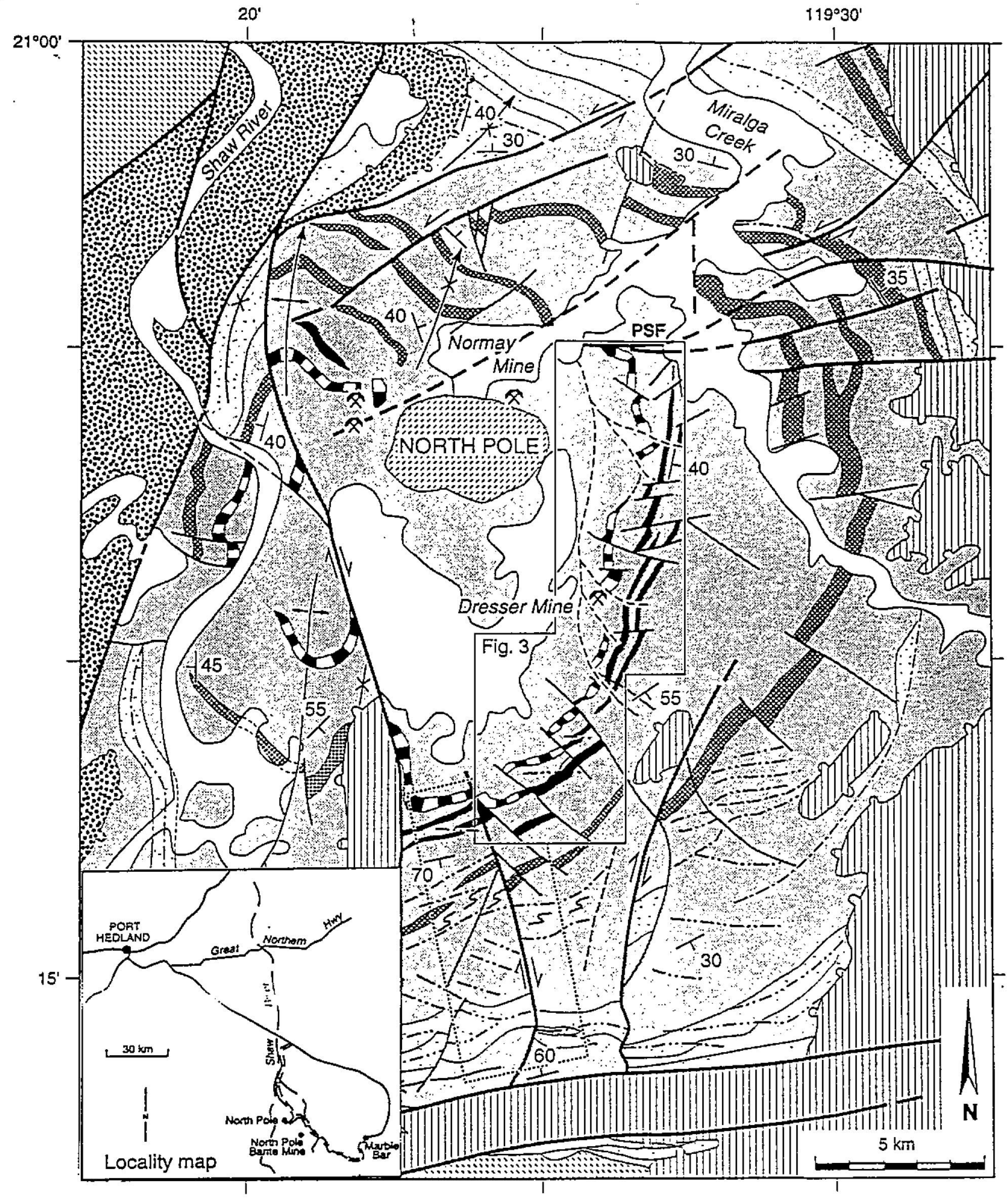
A sample of the ore-body on the Dresser lease is enclosed with label DR.

4.2 North Pole

Surface sampling of the North Pole area showed rock chip sample assays to assay from 95% to 97% Barium Sulphate.

Drilling by Carpentaria intersected barite between 85% to 91% Barium Sulphate with an SG between 4.1 to 4.29. Details of results shown in Appendix 1.

A sample of a barite outcrop located at coordinates 746987 East and 7665171 North is enclosed with label NP.



DEFORMATION

- post-2.8 Ga fault
- pre-2.8 Ga radial fault
- D_2 compressional fault & lineament
- D_2 shear zone
- D_1 tensional, growth faults
- other tectonic discontinuity
- PSF Panorama Station Fault
- fold axes (D_2 ?)

STRATIGRAPHY

- Fortescue Group <2.8 Ga
- Gorge Creek Group (3.3-2.8 Ga)
- Duffer Subgroup
- Unnamed chert/sst.
- North Pole Chert
- *chert-barite unit*

Warrawoona Group (3.5-3.3 Ga)

- unconformity

BATHOLITHS

- North Pole
- Shaw (S) Carlindi (NW)

Figure 1: Location and geology of the North Pole area (after Nijman et al, 1997).

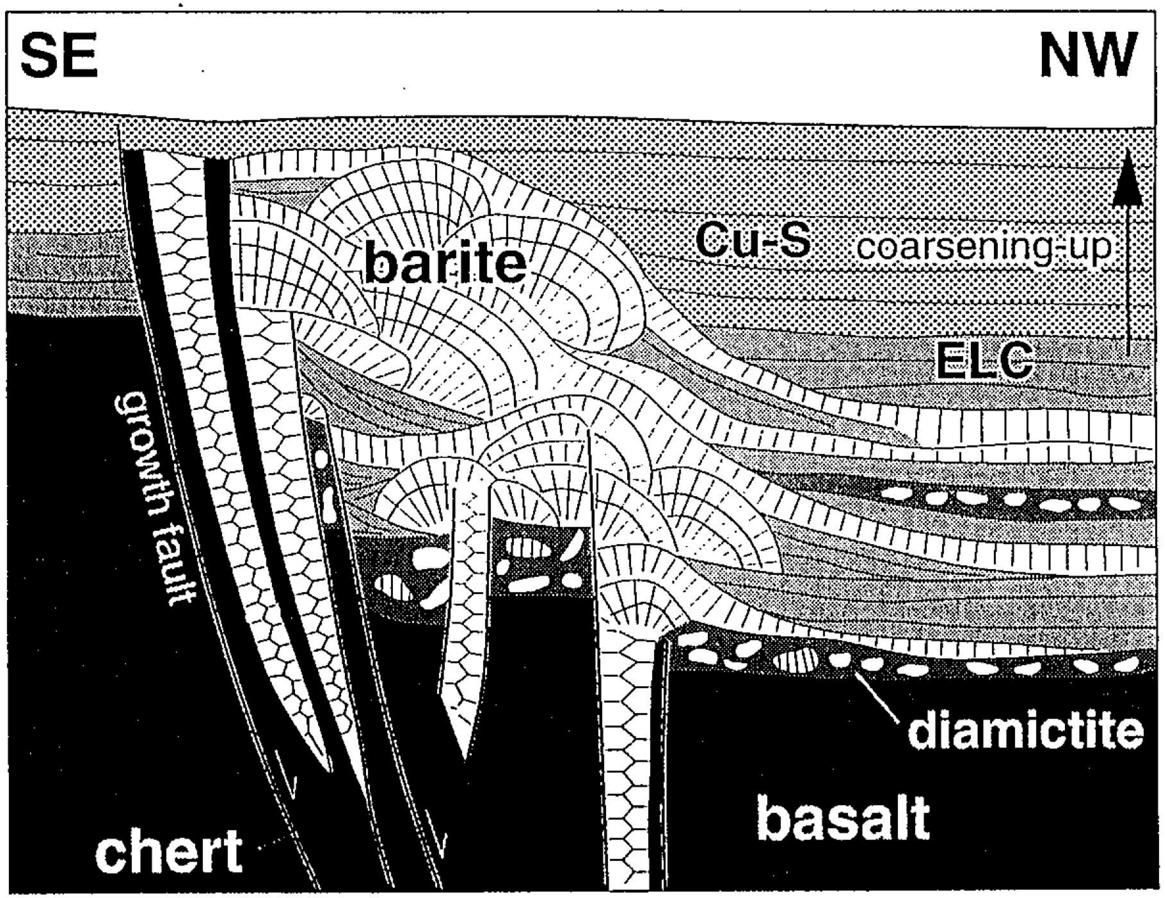


Figure 2: Schematic diagram showing growth faults controlling Barite distribution (after Nijman et al, 1970)

TABLE 1

DRESSER BARITE SAMPLES

1. Precious and Base Metal Analysis

Sample Number	Description	Au ppm (Fire Assay) ppm	Ag ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	As ppm	Cr ppm
D1	Black iron rich rock with sulphides	<0.01	2	50	9	55	56	8	60	220
D2	Gossan material	<0.01	<1	237	<5	885	211	124	33	51
D3	Barite rock	<0.01	<1	<5	<5	32	<5	<5	14	18
D4	Barite rock	<0.01	<1	<5	<5	16	6	<5	16	10
D5	Barite rock	<0.01	<1	<5	<5	127	<5	<5	17	14
D6	Barite rock iron stained	<0.01	<1	5	<5	17	16	<5	10	<10
D7	Stockpile	<0.01	<1	15	<5	157	21	<5	23	135

2. Barite Purity Analysis

Sample Number	Description	$BaSO_4$ %	Hg ppm	Cd ppm	SiO_2 %	Water Soluble Alkaline Earth as Ca (%)	Carbonate %	Sulphide Sulphur %	SG
D3	Barite rock	94.2	<0.1	0.1	5.7	0.07	<0.1	<0.1	4.1
D4	Barite rock	94.5	0.1	<0.1	5.23	0.08	<0.1	<0.1	4.14
D5	Barite rock	97.3	0.1	0.2	1.41	0.07	<0.1	<0.1	4.2
D6	Barite rock iron stained	96.9	0.3	<0.1	3.28	0.07	0.01	<0.1	4.16
D7	Stockpile	72.9	0.7	0.4	20.35	0.09	0.03	<0.1	3.59
	Specification	90	<1	<3	<2%	0.025	0.25	<0.05	>=4.2

TABLE 2 Surface Barite Samples North Pole

SURFACE ROCK-CHIPS
(EX LEOPOLD MIN.)

(ANALYTICAL REP.L.P. 2/175B
SUPERVISE - SHEEN LABS.13.10.

Sample No.	$BaSO_4$	Fluoride
1	98.7%	40 ppm
2	99.0%	

SURFACE ROCK-CHIPS
BULK SAMPLE ALONG
BULLDOZE COSTEANS

(AMDEL REP. ANP.142/15)

Sample No.	$BaSO_4$	Total Water Solubles	Density at 25°
QI 9045	97.4%	0.040	4.41
QI 9046	97.0%	0.035	4.41
QI 9047	96.6%	0.035	4.37
QI 9048	97.2%	0.025	4.42
QI 9049	95.4%	0.035	4.38
QI 9050	96.4%	0.055	4.35

Technical Paper on North Pole Barite

P.B. Abeysinghe and J.M. Fetherston. Barite and Flourite in Western Australia. Chapter Barite in Western Australia. North Pole p25 - p28

North Pole

Location: Lat. 21°09'14"S, Long. 119°26'05"E (A)

Historical background

The North Pole prospects are situated 120 km southeast of Port Hedland and 40 km west of Marble Bar. The presence of a large deposit of barite southeast of North Pole Mining Centre was first reported by Blatchford (1912), and at the time he suggested that exploitation of the deposit was uneconomic due to limited demand and accessibility. In 1959, Stan Hilditch pegged several claims at North Pole. These tenements along with more ground were acquired by Associated Minerals in 1966. In 1970 this company produced 528 t of barite valued at S6240 from Mineral Claim 45/1102. In 1972, Dresser Australia Pty Ltd optioned barite claims totalling 914 ha from Associated Minerals and carried out exploration work leading to identification of substantial reserves (Dresser Minerals, 1973).

During the period 1976 to 1990, Dresser produced 128 977 t of barite valued at $6.1 million from Mineral Claim 45/1522 (Tables 6 and 7).

A number of prospects situated approximately 6 km west of the northern Dresser claims originally held by Metals Investments Pty Ltd in 1967 were transferred to Leopold Minerals NL in 1970. After preliminary exploratory work, Leopold Minerals entered into a joint venture agreement in 1974 with Carpentaria Exploration Company to carry out more exploratory work involving mapping, soil sampling and percussion drilling. Although Carpentaria's main aim was to explore for base metals, they did some assessment of a roughly circular barite deposit adjacent to a biotite–adamellite batholith occupying the core of a dome (Carpentaria Exploration Company, 1975).

Geology

The regional geology of the area around North Pole is given on Figure 6. The main lithologic units in the area are Archaean basaltic and ultramafic rocks, and granitic rocks composed of mainly fine to coarse, even-grained biotite adamellite and biotite granodiorite. Hickman (1973) suggested that the regional Archaean succession enveloping the granite is over 15 km in true thickness.

Erosion of the major, 35 km wide structural unit, the North Pole Dome, has exposed the granite rocks. The prospect area is within the eastern flank of this dome.

The barite prospects consist of a sequence of lower greenschist-facies Archaean basic and acidic volcanics. quartzite (meta-chert) and minor dolomite, pyroxenite calc-schist and carbonate rock of the Warrawoona Group, intruded by granite and dolerite. Stratigraphically, the area occurs close to the base of the Warrawoona Group and apparently straddles the contact between the Talga Talga and Salgash Subgroups (Hickman and Lipple, 1978). Stratigraphic correlations indicate the barite host forms part of the Duffer Formation which has been dated at 3.5 Ga (Sargeant, 1979).

The stratigraphic succession in the barite-mineralized area (Getty Oil Development Company Limited, 1977; Hickman, 1973), is summarized below:

- Basalt, partly pillowed, which has been intruded by ultramafic sills and the North Pole Adamellite (youngest).
- Basic to intermediate volcanics that are extensively altered and commonly pillowed, especially towards the top of the unit.
- Chert and barite (5–50 m thick) and interbedded cherty conglomerate and tuffaceous sandstone.
- Basalt, often pillowed and variolitic, forming the base of the Salgash Subgroup. (oldest)

The widespread occurrence of undeformed pillow structures in mafic lava suggests deposition in a sub-aqueous environment, and that its present thickness closely approximates its original thickness (Hickman, 1973). Hickman also suggested that bedded chert within the succession may have been formed by chemical precipitation. According to Turner and Verhoogen (1960), thick beds of chert commonly found within this type of sequence are derived from late magmatic silica-rich emanations. Alternatively, Hickman (1973) suggested that chert may have originated from the weathering of volcanic ash or by the replacement of pre-existing sedimentary units.

Dunlop and Buick (1981) later interpreted the chert–barite unit to represent sediments containing large amounts of volcanic epiclastic material with a mafic provenance. They suggested that chert and barite were deposited in a shallow water environment with periodic exposure to the atmosphere as evidenced by the presence of littoral structures, stromatolites, evaporitic gypsum casts, and desiccation phenomena.

Structure

The North Pole area is structurally a dome, measuring about 35 km in diameter, and surrounded by deep synclinal greenstone belts. The axis of the dome is slightly elongate about a north-northeast to south-southwest direction with an anticlinal extension towards the southwest where there are chert boxworks. Rocks in the area have been extensively disrupted by normal faulting which, in the area of the barite mineralization, generally dips 10° to 60° easterly. Faults tend to be steeper in the southern parts of the prospect.

The regional distribution of the barite deposits is stratigraphically controlled, but structural features govern their size, shape and lateral distribution along strike. Individual barite prospects are contained within a box-work pattern of ramifying cherts which form a rugged range of hills more than 100 m above the surrounding countryside. Many of the barite deposits occupy veins within the dome fracture system. Hickman (1973) suggested that the fracture system related to the dome was formed by tensional stress either during or shortly after uplift.

Interlayered barite and chert beds contain tight to isoclinal folds with local mesoscopic thrusting. Cleavage planes within barite are commonly slightly crenulated, revealing the presence of deformation subsequent to recrystallization. Hickman (1973) considered that structural features such as the weakly developed bedding plane schistosity in some of the mafic lavas, and a subvertical strain-slip cleavage disposed radially about the eastern and southern domal flanks, could have been formed by circumferential compression associated with upwards movements in the centre of the fold.

Mineralization

Hickman (1973) considered that all North Pole barite deposits are situated close to and generally underneath the lowest thick-bedded chert unit of the succession. Getty Oil Development Company Limited (1977) suggested that chert and barite veins were extensive in the basic to intermediate unit and in a zone of basalt immediately below it. Chloritization and silicification of host rocks is associated with the vein system while widespread carbonate alteration is thought to be unrelated to the veining.

Barite deposits are largest at fracture intersections and in regions of minor flexure, with widths of 20 to 50 m or more. Depending on local structural control, deposits are lenticular, tabular, wedge shaped or sigmoidal. In contrast, barite deposits within 'S-chert' (sedimentary chert) occur in tabular masses and are stratigraphically controlled by, and closely interbedded with, sedimentary chert. In general, these constitute thinner bodies, but are more predictable at depth.

Mineralization within the Dresser leases extends for over 8 km in a belt up to 0.5 km wide. The Dresser mine is situated it the southern end of the belt, while smaller, undeveloped prospects are in the north. Within the belt, barite is interlayered with chert, either in subvertical vein-like structures or in beds which appear to be a part of the succession (Hickman, 1973). Pale blue-grey, coarsely crystalline barite occurs in discrete layers about 10–20 cm thick. Sargeant and Sampson (1980) divided the barite–chert host into three zones (+50%, 10–50% and no barite) depending on the amount of barite.

Barite mineralization within Carpentaria Exploration Company leases also occurs underneath the lowest thick-bedded chert unit of the succession. Detailed mapping in these prospects indicates that barite was emplaced as a discordant vein (Carpentaria Exploration Company, 1975), with a maximum true thickness of 3 to 12 m. At the surface, the barite is colourless to white, coarsely crystalline, and with minor iron oxide staining and secondary silicification along fracture planes. Small pods of ferruginous gossan, common within the barite, are marked by the occurrence of malachite, anomalous Zn and Ag values, and conspicuously low Pb values.

Origin

Hickman (1973) suggested an Archaean age for the barite deposits because they are strongly folded and injected by tectonically controlled Archaean 'T-chert'. After discussing the following three possible origins, Hickman concluded that the deposits were probably sedimentary in origin.

1. Formation by the replacement of pre-existing sediments
2. Precipitation from hydrothermal solutions
3. Deposition as bedded sedimentary barite

The replacement origin was discarded because of the absence of relics of the protolith. The following arguments were given to rule out a hydrothermal origin;

1. The occurrence of barite as concordant layers with chert and surrounding lavas in less deformed areas.
2. The occurrence of barite deposits in a single stratigraphic level for 8 km along strike.
3. The bedded form of the barite layers and the absence of wedging out or crosscutting of these layers.
4. Monomineralic nature of the barite deposits.
5. Absence of accompanying sulfide mineralization.
6. Absence of wallrock alteration.
7. The emission of a strong fetid odour on breaking and crushing barite, which is a characteristic of certain bedded barite deposits.
8. The common association of barite–chert in sedimentary barite deposits.

In addition, Hickman (1973) noted that the joints and fracture system formed during uplift of the North Pole dome were locally invaded by diapiric folds in bedded barite.

According to Sargeant (1979), there is convincing textural evidence that the barite deposits formed by diagenetic replacement of an original evaporative calcium sulfate–carbonate sequence. Sargeant and Sampson (1980) endorsed the views of Hickman (1973) on the origin of the barite–chert horizons after detailed mapping in the area and inferred that the mode of deposition of the barite together with gypsum was due to normal exhalative chemical deposition. Furthermore they suggested that the T-cherts would represent a favourable in-basinal environment for the deposition of a sulfate facies. They also raised the possibility that the finely disseminated galena and sphalerite in the system might indicate the occurrence of a massive sulfide deposit down dip from thick barite horizons. Lead isotope data on galena associated with barite gave ages of around 3.4 Ga, comparable to the known age of the host Duffer Formation (Richards et al., 1981).

Grade, reserves and resources

Analyses of five barite samples from workings in the Dresser leases indicate that BaO% ranges from 52.48 (79.86% $BaSO_4$) to 64.76 (98.55% $BaSO_4$) (Table 9), and SiO_2 content from 0.83 to 15.30%. High silica in some samples is due to contamination with chert. Trace element data indicate high concentrations of Sr, V and Ce.

Although a resource of several million tonnes has been estimated for the North Pole deposit, the published total inferred resource for all Dresser leases is 500 000 t (Australian Mining, 1983; Hickman, 1983).

Barite samples from costeans in the Carpentaria Exploration Company leases assay 95.4% to 97.4% $BaSO_4$, with specific gravity varying from 4.35 to 4.42 (van Toll, 1981). Drill core samples had generally lower grades of between 65.5% and 88.2% $BaSO_4$ with some associated witherite, calcite and silica. The specific gravity of these samples was lower, varying from 3.86 to 4.27. Carpentaria Exploration Company (1975) concluded that material of this nature would require beneficiation before shipment, although none of the impurities was deleterious. The inferred reserves, assuming a maximum mining depth of 30 m, was 150 000 t with a possible extension of mineralization to the north with an additional 50 000 t to 100 000 t. Tests have proved that the ore from this deposit can be beneficiated to drilling mud grade specifications.

The North Pole deposit is considered to be the largest yet discovered in Australia and is strategically situated to supply the needs for oil exploration activities on the North West Shelf and also for export markets in southeast Asia.

APPENDIX 1

Drilling Results - North Pole
Barite Prospect

DIAMOND DRILL CORE SAMPLING (C.E.C.45A)

NAME NORTH POLE P.H.1	BEARING –	STARTED	PREPARED BY		CHECKER
LEVEL BARYTES PROSPECT	INCLINE VERTICAL				
MINE	LENGTH 13.0m	18.10.74	ASSAY		
NORTHING 12450ft	ROD SIZE PERCUSSION 115 mm	FINISHED	CALCS.		
~~EASTING~~ WESTING 3253	CORE RECOVERY % 100	18.10.74			
COLLAR R.L.	CORE SHED INDEX		TABS.		

Date	Metres ~~Footage~~ From	To	Length Ft.	Core Recovery Ft.	Core Recovery %	Sample No.	Assay No.	% Core Analyses BaSO4	SP.G	Water Soluble Cr.	Progressive Totals Ft. x Grade
	0	2	2	2	100	QI.8201		89.8	4.29	0.035	
	2	4	2	2	"	8202		75.6	3.96	0.045	
	4	6	2	2	"	8203		ND	ND	ND	
	6	8	2	2	"	8204		47.8	3.44	0.045	
	8	10	2	2	"	8205		ND	ND	ND	
	10	12	2	2	"	8206		ND	ND	ND	
	12	13	1	1	"	8207		ND	ND	ND	

DIAMOND DRILL CORE SAMPLING (C.E.C.45A)

NAME	NORTH POLE P.D.H.2	BEARING	GRID 180°
LEVEL	BARYTES PROSPECT	INCLINE	- 60°
MINE		LENGTH	23.5m
NORTHING	12623	ROD SIZE	NQ
~~XXXXXX~~ WESTING	3260	CORE RECOVERY %	100
COLLAR R.L.		CORE SHED INDEX	

STARTED	PREPARED BY	CHECKER
19.10.74	ASSAY	
FINISHED	CALCS.	
22.10.74	TABS.	

Date	~~Footage~~ Metres From	To	Length Ft.	Core Recovery Ft.	Core Recovery %	Sample No.	Assay No.	Core Analyses p.p.m. Cu	Pb	Zn	Ag		BaSo4	Sp.Gr	Water Soluble	Progressive Totals Ft. x Grade	From
	0	2	2	2	100	QI 8208		385	35	325	1.5						
	2	4	2	2	100	8209		530	40	490	1.5						
	4	5	1	1	100	8210											
	5.15	6	0.85	0.85	100	8211		195	30	750	1.5						
	6	6.9	0.90	0.90	100	8212		110	40	4000	1.0						
	6.9	9.9	3.0	3.0	100	8213		280	50	3900	2.0		34.4	3.40	0.108		
	9.9	12.4	2.5	2.5	100	8214		155	15	475	1.0						
	12.4	19.0	6.6	6.6	100	8215		105	20	165	1.5						
	19.0	19.3	0.3	0.3	100	8216		210	25	115	1.5						
	19.3	21.7	2.4	2.4	100	8217		30	25	135	1.5						
	21.7	23.5	1.8	1.8	100	8218		195	20	75	1.0						

DIAMOND DRILL CORE SAMPLING (C.E.C.45A)

NAME NORTH POLE P.D.H.3	BEARING 225° GRID	STARTED 23.10.74	PREPARED BY
LEVEL BARYTES DEPOSIT	INCLINE -50°		ASSAY
MINE	LENGTH 35.2m		
NORTHING 12588	ROD SIZE NQ	FINISHED 25.10.74	CALCS.
XXXXXX WESTING 3456	CORE RECOVERY % 100		
COLLAR R.L.	CORE SHED INDEX		TABS.

Date	Footage From	Footage To	Length Ft.	Core Recovery Ft.	Core Recovery %	Sample No.	Assay No.	Cu	Pb	Zn	Ag		BaSO$_4$	Sp.Gr.	Water Soluble	Progressive Totals Ft. x Grade			
	0	2	2	2	100	QI 8219		165	60	115	2.5								
	2	4	2	2	100	8220		155	35	125	2.0								
	4	6	2	2	100	8221		135	35	115	2.0								
	6	8	2	2	100	8222		110	25	115	2.0								
	8	9	1	1	100	8223		85	60	85	2.0								
	9	10.2	1.2	1.2	100	QI 8236		240	25	120	1.5								
	10.2	10.5	0.3	0.3	100	8237		6150	35	520	3.0								
	10.5	12.0	1.5	1.5	100	8238		250	35	120	2.0								
	12.0	13.5	1.5	1.5	100	8239		265	25	105	115								
	13.5	15.4	1.9	1.9	100	8240		160	30	160	2.0								
	15.4	17.4	2.0	2.0	100	8241		155	25	355	1.5								
	17.4	19.65	2.25	2.25	100	8242		350	50	1050	3.0								
	19.65	20.2	0.55	0.55	100	8243		1450	45	3.2%	5.0								
	20.2	21.3	1.1	1.1	100	8244		30	10	240	1.0								
	21.3	23.0	1.7	1.7	100	8245		30	25	400	2.0								
	23	25	2	2	100	8246		35	15	60	6.0								
	25	27.95	2.95	2.95	100	8247		40	15	70	1.5								
	27.95	32.55	4.6	4.6	100	8248		75	10	70	1.0		85.0	4.19	0.055				
	32.55	35.2	2.55	2.65	100	8249		30	20	95	1.0								

Core Analyses: ppm (Cu, Pb, Zn, Ag); % (BaSO$_4$). CHECKED. Fro[m]

DIAMOND DRILL CORE SAMPLING (C.E.C.45A)

NAME NORTH POLE P.D.H.4	BEARING GRID NORTH	STARTED 25.10.74	PREPARED BY	CHECKER
LEVEL BARYTES DEPOSIT	INCLINE -50°		ASSAY	
MINE	LENGTH 46.9m	FINISHED 27.10.74		
NORTHING 12200	ROD SIZE NQ		CALCS.	
~~EASTING~~ WESTING 3260	CORE RECOVERY %			
COLLAR R.L.	CORE SHED INDEX		TADS.	

Date	Footage		Length	Core Recovery		Sample	Assay	PPm CORE ANALYSES %								PROGRESSIVE TOTALS Ft. x Grade				
	From	To	Ft.	Ft.	%	No.	No.	Cu	Pb	Zn	Ag		BaSO4	SP.GR.	Water Soluble					From
	0	2	2	2	100	QI 8224		35	20	85	105									
	2	4	2	2	100	8225		65	35	145	2.0									
	4	6	2	2	100	8226		95	30	240	2.0									
	6	8	2	2	100	8227		75	25	100	1.5									
	8	10	2	2	100	8228		60	10	120	2.0									
	10	12	2	2	100	8229		15	10	85	1.5									
	12	14	2	2	100	8230		95	10	70	1.0									
	14	16	2	2	100	8231		55	20	95	1.5									
	16	18	2	2	100	8232		50	10	75	1.0									
	18	20	2	2	100	8233		85	20	125	1.5									
	20	22	2	2	100	8234		80	20	105	1.5									
	22	23	1	1	100	8235		65	25	110	1.0									
	23	24.35	1.35	1.35	100	QI 8250		55	25	150	2.0									
	24.35	25.7	1.35	1.35	100	51		445	40	515	2.5									
	25.7	26.65	0.95	0.95	100	52							54.6	3.66	0.044					
	26.65	29.6	2.95	2.95	100	53							80.4	4.05	0.035					
	29.6	31.4	1.8	1.8	100	54														
	31.4	34.8	3.4	3.4	100	55							85.2	4.11	0.035					
	24.8	38.0	3.2	3.2	100	56							91.2	4.26	0.035					
	38.0	41.0	3.0	3.0	100	57		110	20	435	2.0									
	41.0	44.0	3.0	3.0	100	58		45	15	90	1.5									
	44	46.9	2.9	2.9	100	59		30	20	70	1.0									