PAN D'OR MINING N.L.

PROGRESS REPORT

EXPLORATION LICENCE 1337

OONAGALABI PROSPECT

HARTS RANGE, NORTHERN TERRITORY

BY

I.R.F. MacCULLOCH

GENERAL MANAGER - BASE METALS

SF 53-14

DECEMBER, 1981

TABLE OF CONTENTS

<u>PLATES</u>

<u>APPENDIX I</u>	INTERPRETATION REPORT, IP/RESISTIVITY SURVEY OONAGALABI PROSPECT, HARTS RANGE NORTHERN TERRITORY, FOR PAN D'OR MINING N.L. BY GEOTERREX PTY. LTD.,
<u>APPENDIX II</u>	DRILL LOG AND ASSAY RESULTS NT - 00N - 1 - 81, (D.D.H.)

SUMMARY AND CONCLUSIONS

The Oonagalabi prospect has as its initial potential the possibility of proving a large low grade copper-zinc-gold-silver prospect. There is an indication of an open pittable potential as demonstrated by the consistent grades encountered near the surface. The latest phase of exploration confirmed that mineralisation in several different horizons, occurs in a discreet zone which varies from about 100 m to 150 m in thickness. The proposed location of this unit would be down dip and northwards from the outcropping mineralisation.

Exploration licence 1337 protects the zone of interest. It is held by Kinex Pty. Ltd. and covers an area of 37 sq. km. Pan D'Or Mining N.L. can acquire 100% equity by making payments totalling $200,000 with a 5% free carried interest to the vendor.

The Arunta Complex forms the Proterozoic basement of highly metamorphosed sedimentary and intermediate to basic igneous rocks. The dominant structural feature is a slightly folded east-west trending anticline with monoclinal development on the limbs. Gentle cross folding is evident. Mineralisation is copper-zinc-gold-silver and occurs in calc amphibolites, forsteritic-marble with associated garnet $\pm$ magnetite quartzite.

Drilling during 1981 failed to reach previously intersected units. This was brought about by equipment failure, a considerable delay in drilling rig delivery and unavoidable prior scheduled commitments. However, weakly disseminated pyrite mineralisation was encountered above the postulated zone of base metal mineralisation.

Geophysical results and the detailed geological mapping has widened the potential of the prospect. It is evident that the prospect has only been partly tested by drilling and that a potential exists for increasing the low grade component as well as locating the postulated higher grade content.

.../2

In conclusion it is felt that the programmes to date have succeeded in achieving a solid understanding of the prospect geology and geophysics but the drilling to date has not explored the down dip open ended potential as indicated by the coincident geology and geophysics.

RECOMMENDATIONS

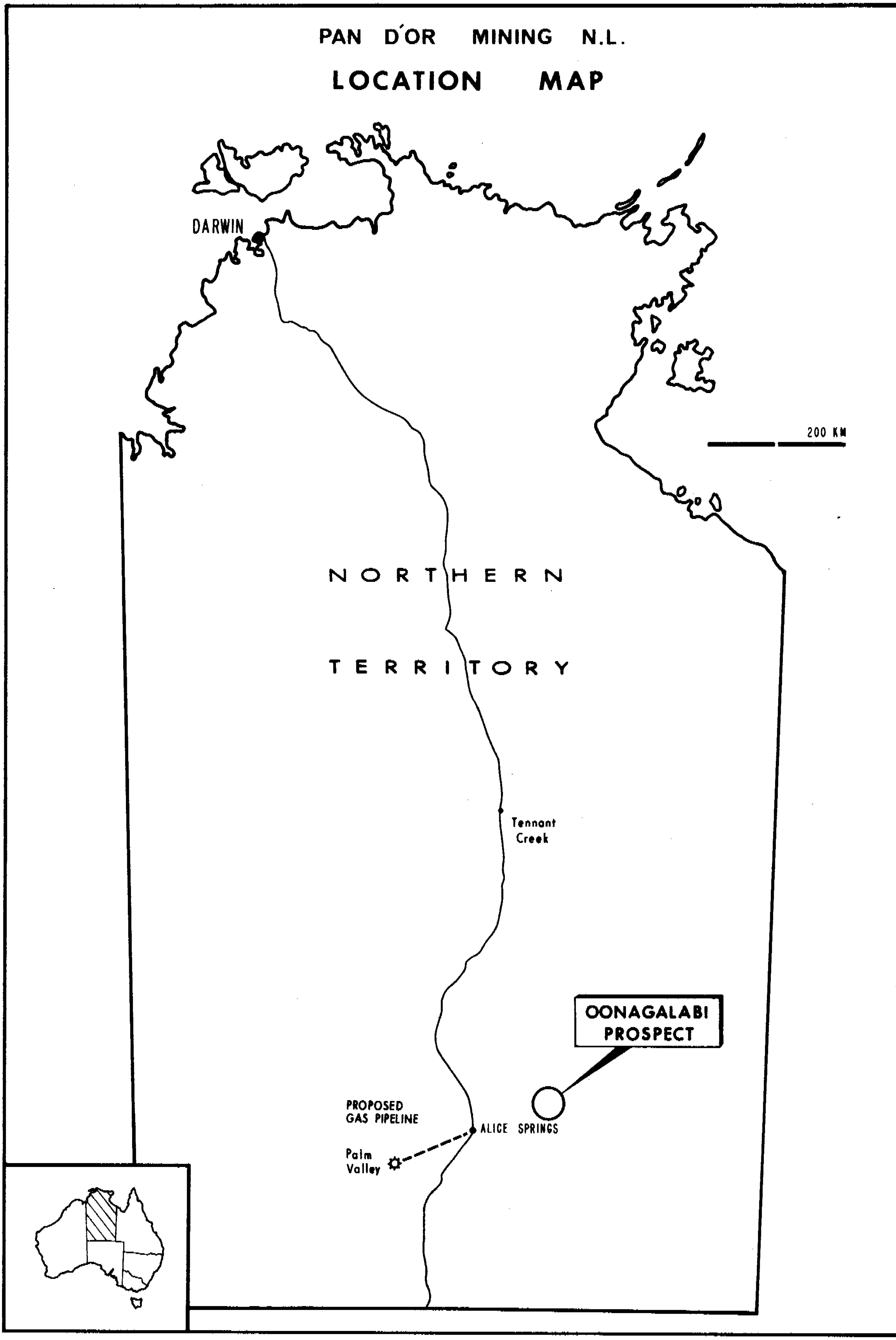
It is recommended that a stratigraphic/mineralisation drilling programme be implemented to test the geophysical/geological responses.

LOCATION AND ACCESS

The Oonagalabi prospect is located approximately 135 kilometres east northeast of Alice Springs in the eastern part of the Harts Range, Northern Territory. Property access is via the Blackfellow Bones Bore turnoff (east of Ongeva Creek crossing on Plenty Highway) and along a bulldozed track for some 55 kilometres south east from the turnoff. (See Map 1 & 2)

Access is light truck and above with heavy equipment requiring either four wheel drive capacity or towing assistance. A re-routing of the track would solve this problem.

The flow of water from several holes is of the order of 200 - 300 gph with PDH F producing drinkable water.


PAN D'OR MINING N.L.
LOCATION MAP
DARWIN
200 KM
NORTHERN
TERRITORY
Tennant Creek
OONAGALABI PROSPECT
PROPOSED GAS PIPELINE
ALICE SPRINGS
Palm Valley

MAP 1

DESCRIPTION OF THE AREA

The area surrounding the prospect is fairly rugged and vehicular access is restricted mainly to the bulldozed tracks.

The average rainfall is of the order of 30 cm. Water for production purposes would be gained by either damming in the Harts Range, Hale River 20 km to the south or by seeking underground in the Hale River Basin.

Large reserves of natural gas are proven at Palm Valley 455 km southward of Oonagalabi (the power station at Alice Springs is to be gas fired). The standard gauge railway is being extended to Darwin from Alice Springs which would place a railhead approximately 150 km west of Oonagalabi. Subsidised back loading rates make the freight route south via Port Pirie more attractive than that through Darwin.

.../6

This flattening out of the unit downdip to the north is not evident on lines 4400 E and 4900 E.

Note the abrupt change in the character of the high chargeability zone on the southern end of the lines between lines 4900 E and 5300 E. Possibly one of the two sources in this unit may be absent on line 5300 E on the unit thins and is buried at greater depth.

Respectfully submitted,

GEOTERREX PTY LIMITED

A. M. Lynch

A. M. LYNCH

Geophysicist.

Figure 1.

See image file
Attached.

Figure 2.

See image file
Attached.

TENURE

Exploration licence 1337 was granted to Kinex Pty. Ltd. on October 28, 1977 for a period of 5 years. The original tenement cover was 317 square kilometres. It was reduced by 50% to 151 square kilometres on October 28, 1979. The area has been reduced by 50% per annum since that time. Until recently on expiry of the five years, the ground must be protected by mining claims or leases. Since the granting of the title the Department of Mineral Resources and Energy has extended the period of five years to that of six years prior to smaller area title coverage being required.

.../8

HISTORY AND PREVIOUS EXPLORATION

Copper mineralisation was apparently discovered in the Oonagalabi area in the 1930's. There is no record of work until 1970 when Russgar Minerals N.L. was floated to explore for minerals in the Harts Range area. Russgar acquired six exploration licences, having a total area of 2,400 square kilometres.

Mineralisation was then located at Oonagalabi, Mount Riddock and Virginia in 1970 by prospectors employed by Russgar and ground work was subsequently concentrated on the Oonagalabi prospect.

Russgar then conducted a regional magnetic-radiometric survey over the tenements. The aeromagnetic programme over the prospect outlined two elliptical anomalies in an en-echelon pattern. The northeastern anomaly correlates with the north west flank of the Oonagalabi mineralisation and the southwestern anomaly lies northwest of the southern explosure of mineralised Oonagalabi Formation.

A VLF-EM survey conducted over the main mineralised zone indicated a conductive sheet striking northeast and dipping northwest correlating with the northwestern limb of the Oonagalabi anticline. Traverses over the southwestern mineralised zone indicated a north-westerly dipping conductive zone.

The ground magnetic survey showed several northeasterly trending anomalies, the most significant of which suggests a north westerly dipping sheet correlating with the mineralisation intersected in PDH-L.

A single resistivity traverse over the prospect suggested a lower resistivitity for the mineralised members. The programme was also subjected to detailed geologic mapping, random rockchip sampling, systematic costean sampling, petrological examination and statistical treatment of geochemical results. Russgar also conducted a regional geochemical, mapping and prospecting programme throughout the Harts Range tenements with emphasis on assessing the potential of Oonagalabi type equivalents.

.../9

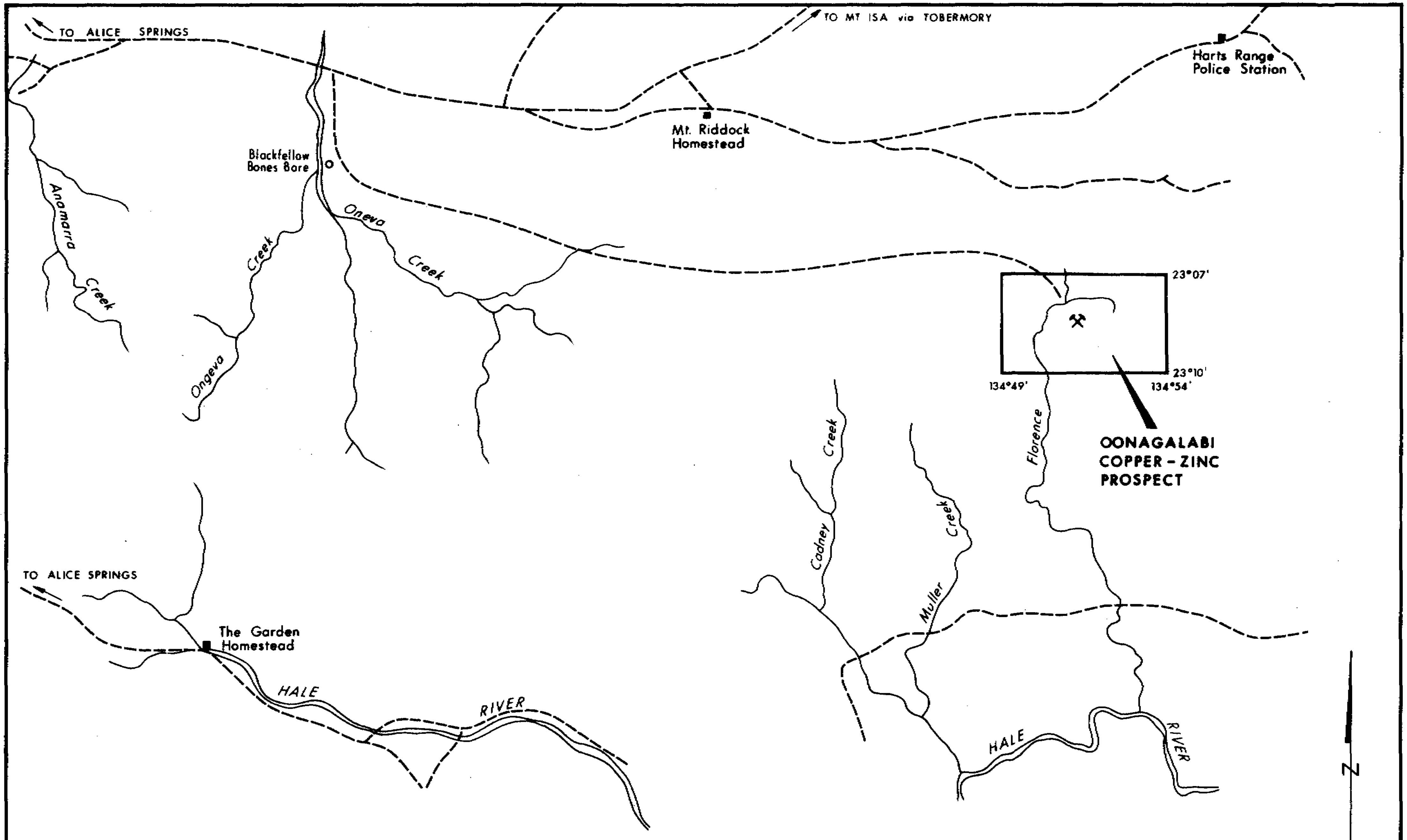
Down-the-hole hammer percussion drilling completed consisted of 641 metres of 14 vertical holes plus 41 metres in one abandoned hole. The drilling indicated only partial sulfide oxidation and probable lack of supergene enrichment. The best intersection was 35 metres of 1.1% copper and 1.7% zinc and high gold ranging from 0.5 - 1.5g/tonne in PDH-L in unoxidized amphibole quartz diopside schist.

The Russgar tenements were then farmed-out to Geopeko, who conducted a very limited I.P. Survey using gradient and dipole-dipole array at 25 metres separation. This survey indicated a resistivity low over PDH-L and chargeability highs some 75 metres to the east and west. From these data, Geopeko geologists re-interpreted the geology and the prospective mineralised zone was suggested to be refolded to the east. Percussion chips from the mineralised zone of PDH-L were relogged and the hostrock described as the amphibole quartz diopside schist and not the fosterite marble, as previously thought. Geopeko then terminated the agreement, having indicated one week earlier that they were planning an intensive exploration programme.

Russgar Minerals was subsequently liquidated and the tenements were not renewed. Kinex Pty. Ltd., a family company held by two former employees of Russgar, then obtained a smaller tenement embracing the Oonagalabi prospect.

Amoco contracted a photo-interpretation study in 1974, which outlined a number of color anomalies. These were ground checked by an Amoco prospector and rockchips assaying up to 34% zinc obtained from a second zone to the south-west of the known mineralisation.

.../10



HARTS RANGE AREA N.T. – MINING TENEMENT MAP

0 5 10 15 20 KM

SCALE 1:250000

REF SF 53-14 BMR GEOLOGICAL SERIES

MAP 2

WORK CONDUCTED BY AMOCO

Gridding

A total of 16.5 line kilometres of gridding was completed on the property. Lines were spaced at 100 metre intervals with stations every 20 metres.

Soil Geochemistry

Approximately 400 hand augen samples were collected from the grid. Samples were taken from the C-horizon at an average depth of 0.3 metres, seived to minus 200 mesh and analysed by A.A.S. techniques for copper, lead, zinc and silver.

Geophysical Surveys

Magnetics:
A ground magnetic survey was completed over the gridded area and results were plotted and computer contoured at 1:2,500 scale.

Gravity:
A small gravity test survey was run over 3 line kilometres of the grid to evaluate the suitability of the technique in this rugged terrain. However, the results of the survey indicated that the topographic variations were too severe to interpret the data obtained.

Induced Polarization Survey:
As the results of a previous geophysical test survey conducted by Geopeko Pty. Ltd. indicated that the zones of known mineralisation responded to electrical methods, a 10 line kilometre gradient array induced polarization survey was subsequently carried out by Amoco. The survey defined two trends with chargeabilities up to 35 milliseconds over a strike length of one kilometre.

../11

Geological Mapping

The Oonagalabi prospect was remapped on a scale of 1:2,500.

Drilling

Percussion Drilling:
Four percussion holes totalling 534 metres were drilled on the Oonagalabi grid. All holes intersected visible copper-zinc mineralisation, however, two holes were terminated short of the target horizon and one hole was abandoned within the target zone. Percussion chips were sampled and logged at two metre intervals and assayed by AAS technique for copper, lead, zinc and silver. Twenty-one mineralised samples were also analysed for tungsten. Significant intersections are listed in Table 1.

TABLE 1 SIGNIFICANT PERCUSSION DRILL HOLE INTERSECTIONS

HOLE		INTERVAL (m)	WIDTH (m)	COPPER ASSAY %	ZINC ASSAY %
RPO-1		16-32	16	0.25	0.14
RPO-2		100-12	12	0.54	0.40
		126-162	36	0.46	1.10
	inc.	152-162	10	0.80	2.53
RPO-3		118-130	12	0.19	0.23
RPO-4		No significant results			

Diamond Drilling

Two diamond drillholes totalling 369 metres were completed. Sphalerite-chalcopyrite-(galena) mineralisation was intersected in highly metamorphosed calc-silicate rocks. Significant intersections are listed in Table 2. Mineralised intervals were split and one half analysed by AAS techniques for copper, lead, zinc, silver and gold.

.../12

TABLE 2 - SIGNIFICANT DIAMOND DRILL HOLE INTERSECTIONS

HOLE	INTERVAL	METRES	ZINC (PERCENT)	COPPER (PERCENT)
ONT-79-1	68-75	12	2.39	1.13
including	68-72	4	3.32	0.73
	73-75	2	1.33	2.12
	92-95	3	2.51	0.35
ONT-79-2	200-220	20	1.71	0.24
including	204-206	2	2.73	-
	213-219	6	3.27	0.47

Hole: ONT-79-1
Co-ordinates: 4920N:4700E
Declination: 60°
Bearing: 142° (Grid South)
Length: 127 m

This was sited to test an "anomalous" zinc-copper (lead-silver) geochemistry and a chargeability high.

The hole passed through felsic gneisses; amphibolite; mineralised amphibole gneiss and calcite-diopside-amphibole gneiss. Significant mineralized intersections are listed in Table 1.

Hole: ONT-79-2
Co-ordinates: 4980N:5100E
Declination: 60°
Bearing: 142°M (Grid South)
Length: 240.8m

This was drilled to test the thickness and grade of mineralisation intersected in RPO-2, which was terminated in mineralisation. ONT-79-2 passed through felsic gneiss; mineralised amphibole schist and gneiss, mineralised marble, garnet quartzite and amphibolite.

The drill hole had been tentatively interpreted by Amoco as passing through an overturned syncline. Re-examination of the core suggests that the mineralisation is contained in a series of repetitive beds. The mineralised basal intersection has been faulted off at 219.5 metres.

Amoco also conducted a stream geochemical programme but the results were indicative of the effects of mechanical weathering which on eroding, outcropping mineralisation produced a result downstream. Outcrop distribution is better than 80%.

There is no correlation between the Amoco gold assays and those obtained by Russgar in equivalent lithologies and mineralisation. It is suggested that the attack method used by the Amoco laboratory was inadequate to release the gold (thought to be held in the sulphides) for Assay by AAS. The order of magnitude difference is 10 to 100 in intersections of equivalent base metal ratios behaviour.

Amoco Minerals withdrew from the option agreement with Kinex Pty. Ltd. in October, 1980.

WORK CONDUCTED BY PAN D'OR MINING N.L.

An option was entered into with Kinex to acquire Oonagalabi on June 29, 1981.

	Commenced	Completed
Grid extension & Connection	July 20, 1981	July 31, 1981
Geological mapping	July 20, 1981	Aug. 3, 1981
Bulldozing	July 13, 1981	Aug. 19, 1981
Geophysical survey	July 24, 1981	Aug. 6, 1981
Drilling	Aug. 19, 1981	Sept. 6, 1981
Reporting and assaying core inspection, sampling etc.,		Nov. 20, 1981

Cost overruns were occurred due to late arrival of the drilling rig.

.../14

Grid Extension and Correction

The Amoco grid was extended to line 6100 N and 1500 N and an access track put along the base line. Side access was provided in the case of difficult terrain to allow easier access for the geophysical crew. Unfortunately, time was lost because of the inaccuracy of the earlier gridding, thereby resulting in unnecessary duplication.

Geological Mapping

The geological mapping was designed to provide a greater understanding of the environment of the mineralisation of the Oonagalabi prospect and to provide more detailed surface information to allow stronger emphasis to be placed on the cross sections interpretation. (Enclosures Map 3, figures 1-8 inclusive) In addition, interpretation of enhanced satellite imagery suggested that a source area may exist to the south east. Accordingly traverses were run to determine the validity of the concept. Geological work was conducted by I. MacCulloch, K. Nielsen, A.N. Yeates (seconded from Bureau of Geology and Geophysics) R.N. Yeates and A. Wygralak.

Geophysics

Due to the disseminated sulphide mineralisation being discovered both at the surface and from the drilling an Induced Polarisation and apparent resistivity survey was run with a 100 metre dipole-dipole assay. The survey was conducted by Geoterrex Pty. Ltd., Artarmon, N.S.W. and their interpretation study is attached (Appendix I)

plotted at 5040N on Map3.

NB.!

5080N on logs

Drilling

The very late arrival of the drilling rig, commitments in the Darwin region and mechanical failure caused the premature termination of the 180m hole drilled vertically at 5180 N and 4400 E. Recovery was good though penetration with NQ was at times difficult.

<u>Assaying</u>

Incipient but weak mineralisation core (mainly pyrite) was split and sent for assay by AAS at Australian Laboratory Services Pty. Ltd., Brisbane. The results are included in Appendix II.

.../16

REGIONAL GEOLOGY

The Harts Range is located with the Arunta Complex which forms the Proterozoic basement in the southern half of the Northern Territory. Shaw R.D. et al (1979), places the Oonagalabi prospect in the early Proterozoic, Division I, Strangways Metamorphic Complex Bingitina Metamorphics which comprise quartzofelspathic gneiss, mafic granulite, biotite gneiss (feldspar and minor garnet augen textures common), amphibolite, hornblende - or clinopyroxene bearing quartz plagioclase, garnet-biotite gneiss, megacrystic-feldspar gneiss some muscovite/phlogopite, anthophyllite - cummingtonite gedrite, calc silicates and marbles with diopside and/or forsterite rocks.

Detailed regional mapping by MacCulloch, Yeates & Nielsen has demonstrated that three main and two minor units occur at Oonagalabi (see map No 3).

These units comprise quartz, minor felspathic biotite and hornblende gneiss interbedded with amphibolite as the basal unit. Conformably overlying this unit is one comprised of biotite-feldspar-garnet-quartz gneiss to schistose texture, bedding well preserved, some augen of plagioclase, microcline and garnet as inclusions - in places internally deformed and exhibiting non penetrative structures - amphibolite. Within this unit occurs mineralised anthophyllite -cummingtonite schists interfaced with calcic amphiboles - phlogopite quartz (mineralised), variable ratios of Mg:Ca Al silicates, amphibolite - marbles with fosterite, diopside (also mineralised) garnet $\pm$ diopside-quartzites.

This unit is unconformably overlain by amphibolite with plagioclase minor garnet and quartz. At the base of this unit is a calcareous/ diopside quartz with interbeds of carbonatites (fluorite and zircon present ?)

It should be noted at this stage the evolution of the stratigraphic classification is somewhat different to that originally proposed by Joklik (1955), viz Shaw R.D. et al., 1979.

It appears from the regional mapping the biotite gneiss units (including the mineralised sequence) is quite lithologically internally complex though the upper and lower boundaries are quite well defined. This unit is characterised by a conformable sequence of a wide variety of calc silicates, carbonates, quartzites (B.I.F.?) amphibolites, repetitive bedding, relatively minor non penetrative deformation and rapid termination of bedding along strike. In other words, a sequence which has an intermediate composition source of volcanogenic affiliation in that there is an alternation at will of felsic to mafic products combined with a carbonate exhalative component (in part indicated by the presence of carbonatites and in part indicated by forsterite-diopside-marbles).

The satellite imagery (Plate 3) assists in the correlation of the respective units. It can be seen that Unit 1 (Map 3) actually represents the oldest units present while Unit 2 (which includes Oonagalabi) is quite controlled to the East and West but dips northwards under unit 3a. As well the imagery indicates that the oldest unit overlies an igneous complex occurring to the East and South of Oonagalabi. Traverses in that area have revealed the existence of gneissic granites. Further the imagery seems to suggest that there is preserved a major rift running initially North-South, trending to the North-West before heading South again.

There is some conflict of opinion as to the genesis of the rocks associated with the Oonagalabi Prospect. Though Nielsen (1971), felt that there was the possibility of contact metamorphism being a feature, Karajalainen and Joyce, (1980) were in close agreement with Nielsen when they interpreted the sequence as being that of "a metamorphosed stratabound copper-zinc deposit within lithology similar to that hosting the Broken Hill deposits."

.../18

These interpretations are at considerable variance from Warren (1974) who suggested a syngenetic origin by weathering of pre-existing rock together with simultaneous precipitation of base metals from groundwater in the weathering profile i.e. not unlike mid Tertiary conditions in Inland Australia. Stewart and Warren, 1977 are, however, of the opinion that "in the absence of igneous rocks..... a sedimentary origin is suggested possibly as a marine sequence of shale overlain by bituminous and metalliferous evaporitic dolomite and chert, the whole subsequently metamorphosed".

From the evidence gathered during 1981 it would seem that the refinement on Karajalainen and Joyce's 1980 interpretation is that the rock types are perhaps lower in free silica, iron and manganese than at Broken Hill. Therefore it would appear the interpretation of intermediate volcanogenic association is readily sustainable as applied to the sequence of rocks at Oonagalabi.

There are persistent but unconfirmed reports of diamonds being recovered in this general area. These reports emanate from long standing residents of the region. Pyrope garnet has been identified at Oonagalabi in two locations.

PROSPECT GEOLOGY

The prospect geology has been described in detail by Karajalainen & Joyce (1980) and Nielsen (1971). The petrology to assist in the determination of the prospect geology was undertaken by E.C. Leitch, A. Whittle, Amdel, Central Mineralogical Services and Lowder Geosciences. (Map 4a & b)

Interpretation of the cross sections, relogging the cores and rechecking of the internal behaviour of the mineralised sequence has established the following points.

1) Mineralisation occurs within a stratigraphically controlled zone of about 100-150 metres in thickness with a 3 km strike length.

2) Within this sequence mineralised beds especially Ca-amphibolites often attain 25-35 m in thickness.

3) There appears to be repetition of the mineralising cycle. The re-interpretation of Amoco's ONT-79-2 suggests repetition rather than a tight refolded sequence.

4) Though there is no marker bed until the calc quartzite (Map 3) is attained, there is strong evidence to suggest that the biotite gneiss with plagioclase augen may be indicative of a pyroclastic phase (Plate I). The mineralised sequence lies below this discontinuous unit.

5) Garnet (± magnetite) (B.I.F.?) quartzite though not prolific in outcrop, is always closely associated with mineralisation.

6) The drill hole (DDH-1/NT OON-81-1) intersected incipient pyrite mineralisation stratigraphically above mineralisation. Also noticeable was the very fine felsic schist (possibly a finely bedded felsic tuff?) appearing close to mineralisation. This schist has very poor outcrop expression and is susceptible to internal deformation and slump structure. (Plate II)

.../20

7) The units containing mineralisation, are as previously mentioned repetitive, but these units also are not discreet. It is possible to find anthophyllite pockets in the Ca amphibole sequence and vice versa. Anthophyllite units are also known to occur low in the sequence, but are generally being recognised as the most recent host in the area for base metal mineralisation. Marbles also occur mainly in the Ca amphibolite sequence but also occur as isolated pockets in the anthophyllite unit. (Map 4a & b)

Summarising, the surface extent of the mineralisation (outcrops occur over a distance of 3 km, the width of the zone 100-150m with individual beds of mineralisation attaining 30+m within the zone) and its potential down dip facies changes indicates that there is a significant development of a large mineralised system.

GEOLOGICAL SETTING AND EXPLORATION POTENTIAL

From the investigations carried out to date it would appear that the mineralisation at Oonagalabi lies in an intermediate-andesitic composition volcangenic sequence highlighted by alternating felsic and mafic units with an exhalative carbonate component. Mineralisation so far encountered is disseminated though there are occasional glimpses in the core especially ONT 79-1 and on the surface near PDH L in the gossans that there is a more massive form of mineralisation developed. The mineralisation in ONT 79-1 also shows signs of forming a conductor which may create a "wire effect" should the percentage of sulphides rise above known levels.

The geophysical report from Geoterrex draws attention to the fact that there are up to seven different classes of responses evident in the geophysical survey. While the higher chargeability responses are closely (line 4400 cross section No. 3 ') allied to known disseminated sulphides there is some confusion as to the precise influence of apparent resistivity. It is generally conceded that highly conductive results can be due to porosity contrasts, clays, a saline water table, carbonaceous shales, graphite, conductive overburden and/or massive sulphides. The problem is that here the rocks seem to be of equal porosity, clays (as a consequence of alteration) are very rarely developed, water is drinkable from the bores eg PDH G, carbonaceous shales/graphites haven't been identified either during this field season or by the BMR in past field seasons since 1955 in this area, there is no overburden (outcrop is 80%±) and sulphides developed may not be classified in general as massive though there are indications of this in isolated occurrences.

However, it is common for this class of deposit to have a massive sulphide component which is not outcropping (e.g. Scuddles and Golden Grove where grade is being encountered at considerable depths). The slump textures at Oonagalabi indicate that down slope movement has taken place, that the fine grained beds are incompetent and as common in sulphide bodies of any size, this slumping is in close proximity to the sulphide body.

.../22

Consequently, it is reasonable to presume that the potential location for the higher sulphide component is down dip. The mineralisation encountered to date represents the disseminated halo or "tail" of the more massive sulphide component which has moved down slope during preconsolidation phase. (Broken Hill cf ore body deformation with that of the uniformity of the surrounding high grade metamorphosed stratigraphy).

I.R.F. MACCULLOCH
PAN D'OR MINING N.L.

SYDNEY DECEMBER, 1981

REFERENCES

JOKLIK, G.F., 1955

The Geology and Mica-Fields of the Harts Range, Central Australia. Bureau of Mineral Resources, Australia - Bulletin 26.

KARAJALAINEN H. and JOYCE P. 1980

1979 Annual Report, Oonagalabi Project, EL 1337, Northern Territory Project A 78-58 Report 167 (Unpublished Amoco Minerals Australia Pty. Ltd.,)

NIELSEN K.I., 1971

Oonagalabi Copper-Zinc Prospect Report by Russgar Staff October, 1971 on the completion of the Stage I exploration programme (Unpublished Russgar Minerals N.L.)

SHAW R.D. et al., 1979

Preliminary to second edition Geological Map Alice Springs, SF 53-14. B.M.R. 1:250,000 series.

STEWART A.J. and WARREN R.G., 1977

The Mineral Potential of the Arunta Block Central Australia. B.M.R. Journal of Australian Geology and Geophysics, 2 1977, 21-34.

WARREN R.G., 1974

Genesis of the Oonagalabi Group of Deposits, Arunta Complex, Central Australia, M.Sc. Thesis, University of London (Unpublished)

APPENDIX I

INTERPRETATION REPORT

IP/RESISTIVITY SURVEY

OONAGALABI PROSPECT

HARTS RANGE
NORTHERN TERRITORY

FOR

PAN D'OR MINING N.L.

BY

GEOTERREX PTY LTD

AUGUST, 1981 JOB 85-1340

AREA 1: Lines 2700 E & 3700 E.

There are a number of geological units that are defined by a characteristic resistivity/chargeability response and which are common to both lines:

LINE 2700 E

Unit A - Between 5450 - 5550 N
Slight resistivity low
Strong chargeability low
Depth of burial shallow, probably less than half a dipole.

Unit B - Between 5200 N - 5400 N
Very strong resistivity high
Relatively strong chargeability high
Depth of burial very shallow, probably at or near surface.

Unit C - Between 5200 N - 5300 N
Relatively strong resistivity low
Pronounced chargeability low
Depth of burial possibly in the order of 100-150 m.

Unit D - Between 5050 N - 5150 N
Slight resistivity low
Slight chargeability low
Depth of burial shallow, probably less than half a dipole.

Unit E - Between 4900 N - 5000 N
Strong resistivity low
No anomalous chargeability
Depth of burial shallow, probably less than half a dipole.

Unit F - Between 4800 N - 4900 N
Slight resistivity high
Slight chargeability high
Depth of burial shallow, probably about half a dipole.

Unit G - Possibly between 4250 N - 4350 N
Resistivity low
Very weak chargeability high
Depth unknown, insufficient information

LINE 3700 E

Unit A - Between 5300 N - 5500 N
Very strong resistivity low
Strong chargeability low
Depth of burial shallow, probably near surface to half a dipole depth.

Unit B - Between 5100 N - 5200 N
Strong resistivity high
Very local chargeability high
Depth very shallow, probably superficial.

Unit C - Not evident, though there is a suggestion it may occur at about 5150 N at a depth of about 100 metres.

Unit D - Between 4950 N - 5050 N
Resistivity low
No associated chargeability response anomalous to background
Depth of burial shallow, probably less than half a dipole.

Unit E - Doesn't appear to be present, though it may not be distinguishable from Unit D.

Unit F - Between 4650 N - 4750 N
Resistivity high
Slight chargeability high
Depth of burial shallow, probably less than half a dipole.

Unit G - Possibly between 4350 N - 4500 N
Relatively strong resistivity low
Negligible anomalous chargeability
Depth of burial shallow to near surface.

Comments on Lines 2700 E and 3700 E.

On line 2700 E Units B and E have similar characteristics to zones of interest described on lines further east in Area 2.

Unit B is probably a quartz-rich or silicified horizon containing a small percentage of disseminated sulphides. Its depth extent on line 2700 E may be in the order of 100 metres, whereas on line 3700 E this unit is of very limited size, possibly extending only a few metres in depth.

The conductive zone that defines Unit E on line 2700 E has considerable depth extent and should be investigated to determine the nature of this conductor. If this unit dips to the north it may be responsible for the existence of Unit C which appears to be a low resistivity body at depth.

The nature of the low resistivity material in Unit A on line 3700 E should be examined. It is a broad shallow body with considerable depth extent.

Units B and E should be tested with shallow vertical holes at 5300 N and 4975 N respectively on line 2700 E.

AREA 2: Lines 4400 E,4700 E,4900 E,5300 E,5500 E, 5700 E. These lines were surveyed using a dipole spacing of 100 metres. Line 5500 E was also covered with a 50 metre dipole spread across the zone of low resistivity.

The following description will detail the different resistivity/chargeability units for each line. There will be no implication that a unit on one line will correlate to a unit on another line unless it is specificly stated so.

LINE 4400 E

Unit 1 - Between 5200 N - 5500 N
Strong resistivity low
Low chargeability
Depth of burial shallow, possibly dipping at a shallow angle to the north.

Unit 2 - Between 5100 N - 5200 N
Strong resistivity high
Slight resistivity high
Depth of burial very shallow, probably superficial.

Unit 3 - Between 4600 N - 4900 N
Complex resistivity pattern
High chargeability
Suggests more than one source, or a single folded body.
Depth of burial shallow, say about ½ dipole.

LINE 4700 E

Unit 1 - Between 5450 N - 5550 N
Strong resistivity low
No anomalous chargeability
Depth of burial between half to one dipole

Unit 2 - Between 5300 N - 5400 N
Strong resistivity low
Very slight chargeability high
Depth of burial shallow, less than half a dipole.

Unit 3 - Between 4700 N - 4950 N
Weak Resistivity low
Strong chargeability high
More than one source in this zone
One source evident at surface near 4850 N
Other source at depth, possibly beneath 5000 N at half to one dipole depth.
General dip of these sources is to the north, where the unit appears to be sub-horizontal up to about 5300 N at a depth of about two dipoles.

Unit 4 - Between approximately 4500 N - 4600 N.
Insufficient information on the end of the line.
High resistivity.
Slightly higher chargeability (than Unit 3).

Unit 5 - Between 5200 N - 5300 N
Medium resistivity
Low chargeability
Depth of burial in the order of half a dipole.

LINE 4900 E

Unit 1 - Between 5300 N - 5400 N
Strong low resistivity
Very slight chargeability high
Depth of burial shallow, probably less than half a dipole to near surface
Probably corresponds to Unit 2 Line 4700 E.

Unit 2 - Between 5150 N - 5250 N
Medium resistivity
Low chargeability
Depth of burial shallow, less than half a dipole
Probably corresponds to Unit 5 Line 4700 E.

Unit 3 - Between 4900 N - at least 4700 N.
Insufficient data.
Complex resistivity signature, possibly suggesting more than one source.
Very high chargeability
Probably shallow depth of burial
Most probably corresponds to Unit 3 Line 4700 E.

LINE 5300 E

Unit 1 - Between 5300 N - 5400 N
High resistivity
Weak chargeability high
Depth of burial near surface

Unit 2 Between 5200 N - 5300 N
Medium resistivity
Low chargeability
Depth of burial in the order of half a dipole

Unit 3 - Between 5000 N - 5100 N
Very strong resistivity low
Weak chargeability high
Depth of burial near surface
Probably corresponds to Unit 1 Line 4900 E.

Unit 4 - Between 4800 N - 4900 N
Strong resistivity high
Medium chargeability high
Depth of burial ½ to 1 dipole from surface
Possibly a continuation at depth of Unit 3 Line 4900 E.

Unit 5 - Between 4700 N - 4800 N
Slight resistivity low
Chargeability is complex, there possibly being more than one source.
Probably corresponds to Unit 3 Line 4900 E.

Unit 6 - South of 4700 N
Very high resistivity unit
Possibly medium chargeability
Depth of burial near surface

Unit 7 - Between approximately 5400 N - 5500 N
Weak resistivity low
No anomalous chargeability
Shallow-near surface depth of burial.

LINE 5500 E (100 metre dipole)

Unit 1 - Between 5400 N - 5500 N
Weak resistivity low
No anomalous chargeability signature
Shallow depth of burial, may only be a superficial unit.
Probably corresponds to Unit 7 Line 5300 E.

Unit 2 - Between 5200 N - 5300 N
Strong resistivity high
Possibly there is a weak chargeability high
Depth of burial in the order of half a dipole to one dipole
Probably corresponds to Unit 1 Line 5300 E

Unit 3 - Between about 4900 N - 5100 N
Strong resistivity low
Very weak chargeability high and low
Depth of burial shallow, to half a dipole
May correspond to Unit 3 Line 5300 E.

Unit 4 - South of about 4700 N
Slight resistivity low
Medium chargeability
Probably corresponds to Unit 5 Line 5300 E.

LINE 5500 E (50 metre dipole)

Unit 1 - Between 4950 N - 5100 N
Strong resistivity low
Low chargeability
Depth of burial shallow to very near surface.

Unit 2 - Between 4850 N - 4900 N
Resistivity low
No anomalous chargeability
Depth of burial about half a dipole.

These two units together constitute Unit 3 Line 5500 E (100 metre dipole).

Unit 3 - Between 5100 N - 5150 N
Medium resistivity
Slight chargeability high
Depth of burial less than half a dipole.

LINE 5700 E

Unit 1 - Between 5300 N - 5400 N
Resistivity low
No anomalous chargeability
Depth of burial shallow, less than half a dipole
Probably corresponds to Unit 1 Line 5500 E (100 metre dipole).

Unit 2 - Between 5150 N - 5250 N
Resistivity high
Very weak chargeability high
Depth of burial about half a dipole
Probably corresponds to Unit 2 Line 5500 E (100 metre dipole).

Unit 3 - Between 4750 N - 5000 N
Strong resistivity low
Strong chargeability low
Shallow depth of burial
May possibly consist of two sources
Probably corresponds to Unit 3 Line 5500 E (100 metre dipole).

Unit 4 - South of 4600 N
Medium resistivity high
Medium chargeability high
Probably corresponds to Unit 4 Line 5500 E (100 metre dipole).

COMMENTS

The unit defined by a strong resistivity low which is common to lines 5300 E, 5500 E and 5700 E near the base line, and to lines 4400 E, 4700 E and 4900 E near 5300 N, is an interesting target. This unit is probably responsible for the INPUT anomalies detected on an earlier survey.

As it occurs very near surface a shallow vertical drill hole on line 5500 E at 5025 N should test the source of this anomaly.

The other major zone that should be tested occurs on the southern ends of lines 4400 E, 4700 E and 4900 E. This zone is broadly defined by a chargeability high greater than 20 m.secs and a complex pattern of high and low resistivity. Most likely two sources are present throughout this "unit" as is evident from the outcrops on line 4700 E.

On line 4700 E it appears that this unit dips to the north, and probably exists as a series of folds on a broad horizon at about 150-200 metres below the surface to about 5300 N. A deep drill hole inclined towards the south collared at about 5150 N should test this horizon.

PDM

PAN D'OR MINING N.L.

DRILL LOG CON-D-81-1 HOLE No. DDH-1 Page 4 OF 5

PROJECT	No.	ELEVATION m	COMMENCED 20/8 1981
PROSPECT CONAGALABI		DIP COLLAR VERT (90°)	COMPLETED
CO-ORDINATES 4400 mN	5080 mE	CORE SIZE NQ	TOTAL LTH 180.2 m
BEARING TN MN GN		LOGGED BY R.J.Y.& R.K.L.	

BORE HOLE SURVEY				INSTRUMENT				
Depth (m)	Dip	Bearing	Depth (m)	Dip	Bearing	Depth (m)	Dip	Bearing

METERAGE From	METERAGE To	DESCRIPTION	MINERALIZATION %	SAMPLE NUMBER	METERAGE From	METERAGE To	Length	Cu	Pb	Zn	Ag	Au
81.48	82.73	Amphibolite										
		- garnetiferous										
82.73	111.20	Biotite Amphibole Gneiss										
		minor quartz and feldspars mixed										
		amphibole then biotite rich bands										
		with biotite rich bands with garnets										
		90.40 - 90.96 Amphiboles dominant										
		Mineralisation - Extremely fine										
		grained and pyrite (?)	< 1%									
111.20	114.20	Amphibolite										
		minor quartz and felspar										
114.20	120.20	Biotite Amphibolite Gneiss										
		minor quartz and felspar										
		fractures filled by feldspars										
		and diopside										
120.20	123.20	Amphibolite + minor quartz and garnets										
123.20	126.20	Biotite Amphibolite Gneiss		0-27	126.2	127.2		60	35	140	1	0.1
		Amphiboles dominant with minor		0-26	128.2	129.2		70	20	110	2	0.1
		garnets in biotite segregations		0-25	130.2	131.2		80	25	100	3	0.1
		Diopside present, weakly disseminated		0-24	132.2	133.2		65	20	120	2	0.1
		mineralisation of pyrite		0-23	134.2	135.2		70	15	110	1	0.1
		and minor pyrrhotite.		0-22	136.2	137.2		100	20	130	2	0.1
				0-21	138.2	139.2		45	35	110	2	0.1
126.20	134.13	Amphibolite		0-20	140.2	141.2		25	30	100	2	0.1
		Diopside minor garnets and quartz	< 1%	0-19	142.2	143.2		30	30	100	2	0.1
				0-18	144.2	145.2		50	160	100	3	0.1
134.13	135.20	Amphibole dominant, minor quartz and		0-17	146.2	147.2		70	20	100	2	0.1
		diopside fractures filled by feldspar	< 1%	0-16	148.2	149.2		40	35	125	2	0.1
				0-15	150.2	151.2		80	20	120	2	0.1
135.20	138.20	Amphibolite,		0-14	152.2	153.2		60	20	140	2	0.1
		minor quartz and feldspar forming		0-13	154.2	155.2		60	30	120	3	0.1
		gniessic texture very minor garnets		0-12	156.2	157.2		50	30	125	2	0.1
				0-11	158.2	159.2		80	45	100	2	0.1
138.20	153.20	Amphibolite Biotite Gneiss		0-10	160.2	161.2		50	25	100	3	0.1
		- garnets Diopside	< 1%	0-09	162.2	163.2		70	20	130	2	0.1
		- feldspar filled fractures		0-08	164.2	165.2		30	20	75	2	0.1
				0-07	166.2	167.2		50	20	100	3	0.1
153.20	162.20	Amphibolite		0-06	168.2	169.2		50	25	100	1	0.1
		- diopside minor quartz and		0-05	170.2	171.2		65	55	130	2	0.1
		- feldspar - tiny fractures		0-04	172.2	173.2		50	30	105	2	0.1
				0-03	174.2	175.2		40	40	80	4	0.1
				0-02	176.2	177.2		40	35	100	3	0.1

APPENDIX II

DRILL LOG

AND ASSAY RESULTS

1 9 8 1

PROGRAMME

OONAGALABI PROSPECT

<u>HARTS RANGE</u> <u>NORTHERN TERRITORY</u>

PAN D'OR MINING N.L.

PDM

DRILL LOG CON-D-81-1 HOLE No. DDH-1

PROJECT	No.	ELEVATION m	COMMENCED 20/8 1981		
PROSPECT CONAGALABI		DIP COLLAR VERT (90°)	COMPLETED		
CO-ORDINATES 4400 mN	5080 mE	CORE SIZE NQ	TOTAL LTH 180.2 m		
BEARING TN MN GN		LOGGED BY R.J.Y. & R.K.L.			

BORE HOLE SURVEY Depth (m)	Dip	Bearing	Depth (m)	Dip	INSTRUMENT Bearing	Depth (m)	Dip	Bearing

METERAGE From	To	DESCRIPTION	MINERALIZATION %	SAMPLE NUMBER	METERAGE From	To	Length	ASSAYS Cu	Pb	Zn	Ag	Au
153.20	162.20	Amphibolite		0-01	178.2	179.2		75	50	105	2	0.1
		Diopside rich 157.45 159.20										
		minor quartz and felspar and garnets										
		chlorite as well (?)										
		weakly disseminated pyrite	< 1%									
162.20	171.2	Biotite Amphibole gneiss										
		- diopside minor quartz and feldspar										
		form gniessic textures										
		- fractures filled by feldspars										
		pyrite,										
171.12	172.80	Quartz, Feldspar Biotite Gneiss										
		with Amphiboles with diopside	< 1%									
		no fractures or visible										
		mineralisation.										
172.80	180.20	Amphibolite										
		minor quartz and felspar minor										
		diopside,	< 1%									
		Fractures filled by epidote diopside										
		with pyrite, steeply dipping										
		carbonate vein at 179.35 development										
		of phlogopite pronounced.										

PAN D'OR MINING N.L.

PDM

DRILL LOG OON-D-81-1 HOLE No. DDH-1 Page 1 OF 5

PROJECT	No.	ELEVATION	m	COMMENCED	20/8 1981
PROSPECT	OONAGALABI	DIP COLLAR	VERT (90°)	COMPLETED	
CO-ORDINATES	4400 mN 5080 mE	CORE SIZE	NQ	TOTAL LTH	180.2 m
BEARING	TN MN GN	LOGGED BY	R.J.Y. & R.K.L.		

BORE HOLE SURVEY Depth (m)	Dip	Bearing	INSTRUMENT Depth (m)	Dip	Bearing	Depth (m)	Dip	Bearing

METERAGE From	To	DESCRIPTION	MINERALIZATION %	SAMPLE NUMBER	METERAGE From	To	Length	ASSAYS Cu	Pb	Zn	Ag		
0.00	3.00	COLLAR											
3.00	5.52	Biotite Gneiss											
		-garnetiferous (red) in biotite rich											
		segregations; pale pink to white											
		quartz - feldspar to dark grey biotite											
		some fracturing; slump texture											
		developed occasionally,											
5.52	9.32	Quartz-Feldspar-Biotite Gneiss -											
		garnetiferous in biotite rich											
		segregations; secondary olive-green											
		epidote associated with minor											
		faulting and fracturing pale pink/											
		white to grey											
9.32	10.01	Augen Biotite Gneiss - garnetiferous;											
		quartz augens to 2 cm diameter;											
		dark grey matrix predominantly											
		biotite; no fracturing											
10.01	13.70	Biotite Gneiss											
		-garnetiferous biotite segregations;											
		minor quartz and feldspar; pink to											
		dark grey; no fracturing; minor											
		augen developed to 10.50m;											
		alternating bedding developed 12.9 to											
		13.7											
13.70	14.49	Amphibolite											
		- dark green hornblende; mildy											
		garnetiferous; subordinate quartz-											
		feldspar; contacts distinct,											
		massive texture developed,											
14.49	26.81	Biotite Gneiss	Chalcopyrite <1%										
		mildly garnetiferous; quartz-feldspar											
		bands numerous subordinate to biotite											
		augen developed in places; from 22.0m											
		to 22.1m amphibolite band; faulting											
		and fracturing from 22.24 with associa-											
		ted breccia, slicks, pyrite and											
		marcasite (displacement unknown)											
		Disseminated pyrite and chalcopryite in											
		a zone of altered biotite/plogopite											
		and amphibole from 22.1m to 26.81m											
		This zone contains the fracturing/											
		faulting; slumping is developed in											

PDM **PAN D'OR MINING N.L.**

1981 **DRILL LOG** OON-D-81-1 **HOLE No.** DDH-1 **Page** 2 **OF** 5

PROJECT **No.**	**ELEVATION** m	**COMMENCED** 20/8	
PROSPECT OONAGALABI	**DIP COLLAR** VERT (90°)	**COMPLETED**	
CO-ORDINATES 4400 **mN** 5080 **mE**	**CORE SIZE** NQ	**TOTAL LTH** 180.2m	
BEARING **TN** **MN** **GN**	**LOGGED BY** R.J.Y. & R.K.L.		

BORE HOLE SURVEY					INSTRUMENT			
Depth (m)	Dip	Bearing	Depth (m)	Dip	Bearing	Depth (m)	Dip	Bearing

METERAGE From	METERAGE To	DESCRIPTION	MINERALIZATION %	SAMPLE NUMBER	METERAGE From	METERAGE To	Length	ASSAYS Cu	Pb	Zn	Ag
		places; blue-green quartz occurs									
		along shears and may be due to									
		traces of lead or zinc in the lattice.									
		Quartz augens are present within									
		the zone (1cm-1mm diameter) often									
		taking on a clastic appearance.									
26.81	28.40	Quartz-Feldspar-Biotite Gneiss,									
		- contains garnets 2m in diameter									
		approx 5%; minor slumping is evident									
		in some QF rich segregations; minor									
		augen is also developed (5mm-3cm)									
28.40	29.70	Biotite-Amphibole Gneiss									
		- an odd assemblage of minor quartz									
		-feldspar associated with biotite and									
		an unidentifiable amphibole(s)									
		finely bedded biotite gneiss with									
		segregations rich in amphibole.									
29.70	32.98	Augen Biotite Gneiss									
		- garnetiferous- quartz augens to									
		5mm - minor quartz and feldspar.									
		Fractures filled by feldspar, often									
		characterised by fine bedding									
32.98	38.40	Biotite Gneiss									
		- slightly garnetiferous - minor									
		quartz, feldspar banding.									
		- bands of amphibolite to 10 m thick									
		near 36.4 m, well developed									
		alternating beds of felsic over mafic									
		minor augen development,									
38.40	39.18	Biotite Gneiss Augens									
		-minor augens (to 2cm) blue to green									
		- slick chaliopyrite with									
		disseminated pyrite associated with									
		minor fracturing and possible									
		slumping,									
39.18	40.23	Amphibolite									
		- become garnetiferous , trace pyrite									
		and chalcopyrite, with minor quartz									
		and feldspar.									

PAN D'OR MINING N.L.

PROJECT No.	ELEVATION m	COMMENCED 1981 20/8	
PROSPECT OONAGALABI	DIP COLLAR VERT (90°)	COMPLETED	
CO-ORDINATES mN mE	CORE SIZE NQ	TOTAL LTH 180.2 m	
BEARING TN MN GN	LOGGED BY R.J.Y. & R.K.L.		

BORE HOLE SURVEY Depth (m)	Dip	Bearing	INSTRUMENT Depth (m)	Dip	Bearing	Depth (m)	Dip	Bearing

METERAGE From	To	DESCRIPTION	MINERALIZATION %	SAMPLE NUMBER	METERAGE From	To	Length	ASSAYS Cu	Pb	Zn	Ag		
40.23	41.12	Quartz Felspar Biotite Gneiss - garnetiferous, alternating band thin to very thin of felspathic rich against biotite rich rocks, minor slumping											
41.12	47.53	Augen Biotite Gneiss - felspathic augens to 1 cm - garnetiferous - minor amphibolite to 4cm thick at 43.70											
47.53	61.76	Biotite Gneiss - slightly garnetiferous with a 1cm to 2cm band at 47.84m garnet hornblend, minor inclusions of hornblende 50.5cm in size alternating bedding quite pronounced in places, minor slump textures developed., - Amphibolite bands (to 3cm) from 52.2 onwards to 53.0											
55.87	58.83	Amphiboles ≃ Biotite with minor quartz augens											
58.83	58.89	Quartz and Feldspar filled fault to (slump) with pale olive epidotes with minor pyrite developed in the vein.											
61.76	62.57	Quartz Feldspar Biotite Gneiss fine grained predominantly biotite Hornblende> feldspar massive texture course grained											
64.50	66.32	Quartz Felspar Biotite Gneiss quartz felspar subordinate, fine grained irregular contacts bedding down to < 1 cm in thickness											
66.32	81.48	Biotite Gneiss minor quartz feldspar bands 68.27 68.94 garnetiferous occasionally amphibole rich amphibole Gneiss, minor faulting 69.00-70.25 77.18-77.90 fault filled by carbonates with associated pyrite	<1%										

Image 1.

See image file Attached.

Image 2.

See image file
Attached.

Image 3.

See image file
Attached.

Image 4.

See image file Attached.

Image 5.

See image file
Attached.

Image 6.

See image file
Attached.

Image 7.

See image file
Attached.

Image 8.

See image file Attached.

Image 9.

See image file Attached.

Image 10.

See image file
Attached.

Image 11.

See image file
Attached.

PLATE I. BIOTITE – PLAGIOCLASE – QUARTZ GNEISS WITH PLAGIOCLASE AUGEN CONTAINING INCLUSIONS OF GARNET AND BIOTITE.

PLATE II. BIOTITE – PLAGIOCLASE – QUARTZ – MINOR GARNET GNEISS SHOWING SLUMPING TEXTURES (NON-PENETRATIVE STRUCTURAL FEATURES.)

PLATE III

SATELLITE IMAGERY - FALSE COLOUR ENHANCEMENT-HARTS RANGE, NOTE CIRCULAR FEATURE EAST OF OONAGALABI WITH 'RIFT' VISIBLE

Scale 1:250,000