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SML 499

LAKE DUTTON

PROGRESS AND ANNUAL REPORTS TO LICENCE EXPIRY / RENEWAL FOR THE PERIOD 5/11/1970 TO 4/11/1971

Submitted by
Noranda Australia Ltd
1971

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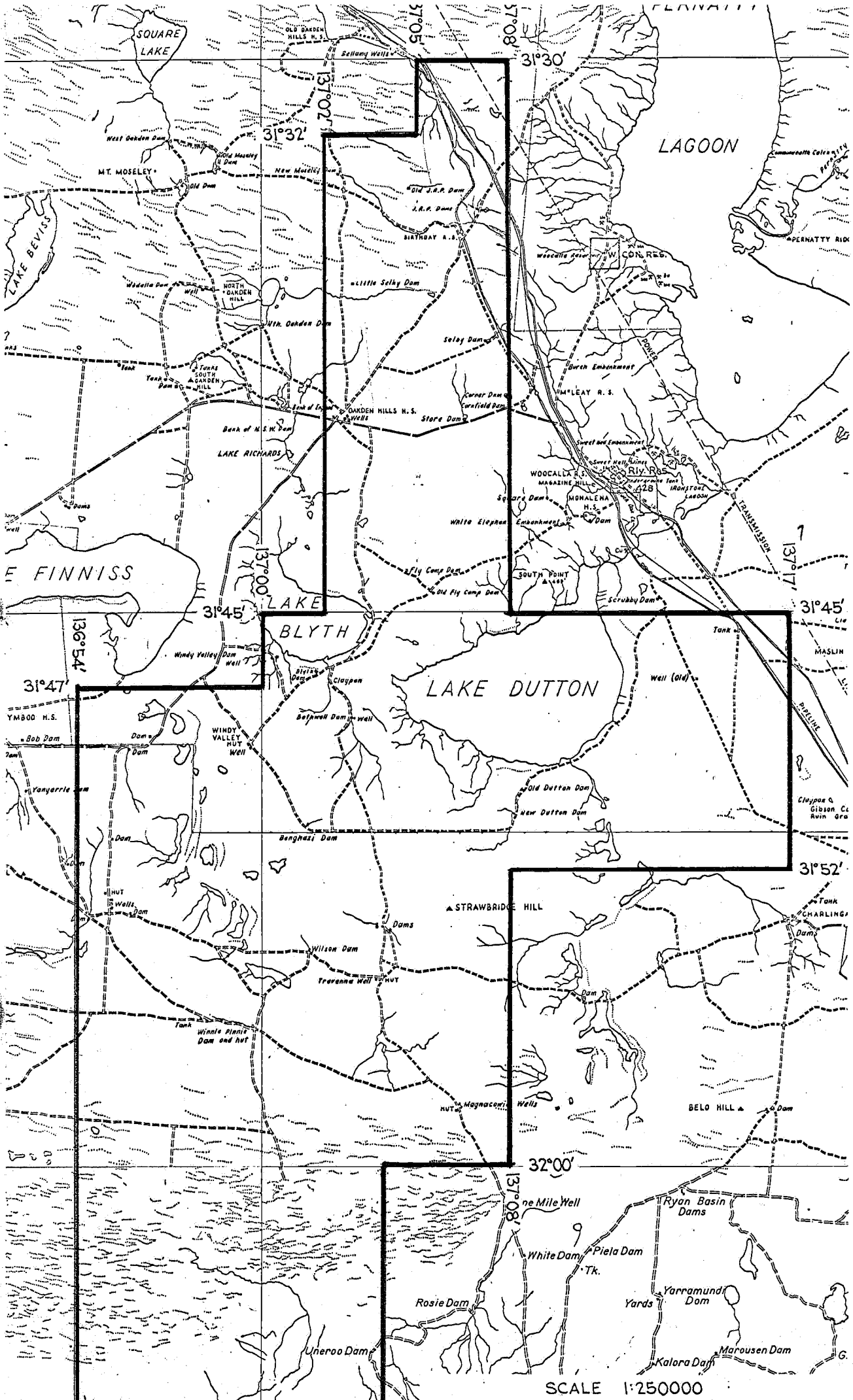
Government of South Australia
Primary Industries and Resources SA



SCALE 1:250000

NORANDA AUSTRALIA ~~LTD.~~

DOCKET D.M. 1159/70 AREA 519 SQ MILES

1:250000 PLANS . TORRENS

. PORT AUGUSTA

LOCALITY

S.M.L. No. 499 EXPIRY DATE 4.11.71

1541

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TENEMENT: S.M.L. 499

TENEMENT HOLDER: Noranda Australia Ltd.

NORANDA AUSTRALIA LIMITED

SPECIAL MINING LEASE NO. 499

LAKE DUTTON, SOUTH AUSTRALIA

Report for the three months ended February 5, 1971

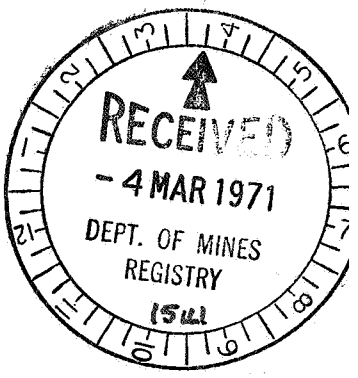
Special Mining Lease No. 499 covers an area of 519 square miles and was granted to Noranda Australia Ltd. on 5th November, 1970. One of the conditions under which the Special Mining Lease was granted specified that quarterly reports should be submitted for the periods ending February 5, May 5, August 5 and November 5. This report is for the quarter ending February 5, 1971.

Geological and geochemical surveys and a drilling programme were undertaken during the period of previous tenure.

During this previous investigation the grade of mineralisation discovered was disappointingly low but because of the widespread nature of the mineralisation the company believes that further exploration is justified.

The possibility of conducting extensive geophysical surveys in an attempt to locate areas of higher grade mineralisation was considered very carefully, but we finally decided on a further drilling programme as the best means of continuing the investigation.

Consequently, a programme was planned to drill a total of 8,000 feet aiming to provide additional stratigraphic and structural information as well as testing for base metal mineralisation.



Tenders were called for the drilling and it was found that the most suitable rig for the programme was that of the Drilling and Mechanical Division of the Department of Mines which however, would not be available till late February, 1971.

Arrangements have now been made with the Department of Mines for the commencement of a drilling programme.

NORANDA AUSTRALIA LIMITED

SPECIAL MINING LEASE NO. 499

LAKE DUTTON, SOUTH AUSTRALIA

Report for the three months ended May 5, 1971

Special Mining Lease No. 499 covers an area of 519 square miles and was granted to Noranda Australia Limited on November 5, 1970. One of the conditions under which the Special Mining Lease was granted specified that quarterly reports whould be submitted for the periods ending February 5, May 5, August 5 and November 5. This report is for the quarter ending May 5, 1971.

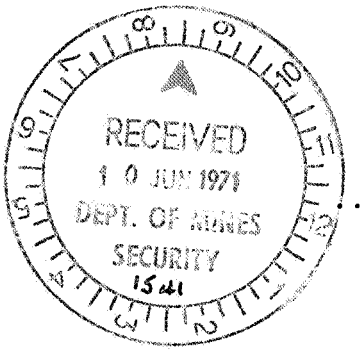
DRILLING

The diamond drilling programme is being operated by the Boring Branch of the South Australian Mines Department on behalf of Noranda Australia Limited.

Up to May 5, 1971, the following drilling had been completed within the Special Mining Lease:-

LD1 Latitude 31° 39' South 137° 6' East
Vertical Depth 308 feet

This hole was drilled with Department of Mines, Boring Branch, Failing WW 1 rig. Percussion technique was used to 87 feet, rotary with mud fluids from 87 feet to 264 feet, and the remainder of the hole was cored using a $2\frac{1}{2}$" diamond bit and core barrel. The shale at the target horizon proved harder and more lithified than anticipated and coring with this general purpose drill was slow.



.../2

LD2 Latitude 31° 44' South 137° 9' East
Vertical Depth 608 feet - attained exactly on May 5

This hole was commenced with the Failing WW1 rig as before, which drilled to 150 feet by percussion technique. Here shale was intersected and cored with the Failing to 365'9" depth.

At this stage, a departmental E1000 diamond drill replaced the Failing rig, the hole was cased, and coring continued using BQ wireline equipment to final depth at 608 feet.

LD3 Latitude 31° 46' South 137° 3' East
Vertical Depth to end of period 273 feet

This hole was commenced with the Failing WW1 rig, drilling ahead by percussion methods, while the diamond drill completed the coring of LD2. At 273 feet the Failing Rig was pulled off the hole, which will be completed by the diamond drill next period.

The positions of holes drilled or drilling to date are as follows:-

Hole 1 — 2 miles E.N.E. of Oakden Hills Station on an existing track. Grid position 137° 6' E 31° 39' S.

Hole 2 — 1.5 miles S.W. of the South Point Trig Station. Not on an existing track but vehicle movement proved satisfactory. Grid position 137° 9' E 31° 44' S.

Hole 3 — 2.8 miles S.W. of the Old Fly Camp Dam. On an existing track. Grid position 137° 3' E 31° 46' S.

Hole 4 — 1.2 miles West of Windy Valley Hut. 150 yards south of an existing track. Grid position 136° 58' E 31° 48' S.

GEOLOGY

On the completion of hole LD1 the information available indicated that the geology of this region was comparatively simple. Outcropping shale at the Greenfield Dam and the penetration of the shale at 264 feet in hole LD1, 3 miles west indicated that the shale was dipping west at a very gentle 1^{o}.

Before beginning hole LD2 a study was made of the surface geology to the east, and it was concluded that hole LD2 was being drilled in the middle of a half-mile wide zone consisting of three or possibly four north-east - south-west trending fault lines which could be followed on aerial photographs and could be detected on the surface by the presence of scarps, sandstone breccias, and vertical foliation in the hard outcropping Whyalla Sandstone.

The zone of faulting which can be followed to the south-west past sites three and four of the current programme could be considered similar to that zone lying to the north of Lake Dutton. This is most likely a graben which has formed the locus of the line of lakes (Lake Dutton, Lake Blythe and the low lying area to the south of Lake Finniss). The geology on the margins of this graben has been considerably complicated by the presence of faulting as indicated by the 422 feet of black shale penetrated in drill hole LD2.

Strong jointing has been noted in the black shale, particularly in the centre tilted unit. The two major joint patterns exhibited were found to form the locus of some mineral deposition. Mineralisation occurs as either thin calcite "skins" on the joint surfaces, or as a mixture of sulphides and calcite. It is suggested that mineralisation resulted from compaction pressures causing mobilization of nearby sulphides and carbonates with their re-deposition along these planes of least stress. Hydrothermal mineralisation originating from hot aqueous mineralised solutions emanating from nearby fault planes while faulting was active, could perhaps explain the presence of coarse crystalline galena observed in drill hole LD2.

Crystalline base metal minerals were observed to be associated with calcite veins. These appear to have affinities with the dolomitic shale bands rather than with the black shale. The presence of disseminated sphalerite too was seen to bear some relationship to the dolomite. Fragmental and crystalline pyrite are common within the black shale.

.../4

The black shale in drill holes LD1 and 2 was split and one-half was sent to commercial laboratories for analysis. Some of the results have been returned but the data for this section is not yet completed. However, in general, metal zoning was discernible.

Drill hole logs and sections are at present being compiled. It is proposed to forward copies of these when the programme is completed and a comprehensive report has been drawn up.

NORANDA AUSTRALIA LIMITED

SPECIAL MINING LEASE NO. 499

LAKE DUTTON, SOUTH AUSTRALIA

Report for the three months ended August 5, 1971

Special Mining Lease No. 499 covers an area of 519 quare miles and was granted to Noranda Australia Limited on November 5, 1970. One of the conditions under which the Special Mining Lease was granted specified that quarterly reports should be submitted for the periods ending February 5, May 5, August 5 and November 5. This report is for the quarter ending August 5, 1971.

DRILLING

The current drilling programme operated by the Boring Branch of the South Australian Mines Department has now been completed.

During the quarter ended August 5, 1971 the following drilling has been completed within the Special Mining Lease:-

LD3 Latitude 31° 46' South 137° 3' East
Vertical Depth 632 feet

Drilled by the Failing WW1 rig to 273 feet and then by diamond drill to completion.

LD4 Latitude 31° 48' South 136° 58' East
Vertical Depth 450 feet 2 inches

Drilled by the Department of Mines Failing WW1 to 200 feet and then by diamond drill to completion. A sixty foot side hole was drilled near this site to supply water to the diamond rig.

LD5 Latitude 31° 50' South 137° 8' East
Vertical Depth 274 feet 3 inches

Drilled by the Failing WW1 to 204 feet 6 inches and by diamond drill to completion.

LD6 Latitude 31° 48' South 137° 15' East
Vertical Depth 222 feet 4 inches

Drilled by the Failing WW1 to 177 feet and then by diamond drill to completion.

LD7 Latitude 31° 58' South 137° 6' East
Vertical Depth 247 feet

Drilled to completion by the Failing WW1 rig. No shale was encountered in this hole.

Drilling commenced on March 17, 1971 and was carried out continuously until June 13, 1971. Seven holes totalling 2,737 feet, of which 1,561 feet were drilled using a Failing WW1 combination rotary and percussion, truck mounted rig operated by the South Australian Department of Mines. The remaining 1,176 feet were cored by a Department of Mines E1000 diamond drill using BQ wireline equipment.

GEOLOGY

Only diamond drill holes LD1, 5 and 6 conformed to the pattern of previously determined geology in the region. Due to the known wavy nature of the Pandurra Sandstone surface the situation in hole LD7 where no shale was encountered had previously been considered.

The thickness of shale in holes LD2, 3 and 4 was unexpected and led to the hypothesis following extensive surface exploration and aerial photograph examination that a graben structure exists along an east-north-east - west-south-west zone occupied by the low lying region consisting of Lake Dutton and the region to the south of Lakes Blyth and Finniss. A cross-section through these three holes indicates the presence of a north-south trending structural depression, parallel to the Pernatty Culmination, within the Woocalla Shale with its axis close to LD3. (See plate 1)

Base metal mineralisation was observed to be confined to the dolomitic shale rather than the black shale. The quantity of dolomitic shale was seen to be at a maximum in the holes closest to the Pernatty Culmination (LD1, 2, 5, 6) and to be appreciably diminished in drill holes at a greater distance from the culmination (LD4).

In all holes containing shale, dolomitic shale was observed to increase in quantity in the bottom fifty feet. Holes LD5 and LD6 contained greater than 50% dolomitic shale throughout. Both these holes contained five to ten feet of pure dolomite above the Pandurra Sandstone contact. Drill holes LD2 and LD3 both contained ten to twenty feet zones of intensely dislocated dolomitic shale. This is considered to be the result of slumping of the dolomitic beds before compaction.

Three distinct structural units were observed in LD2. These units are bounded by zones of dislocated dolomitic shale. The centre unit exhibits a consistent bedding angle of 80^{o}. The upper and lower units contain less disturbed beds and demonstrate bedding angle of close to 90^{o}.

MINERALISATION

Drilling has not produced evidence that economic grades of lead, zinc or copper are present. However, the existence of lead and zinc trace mineralisation has been established over an extensive area. Geochemically anomalous levels of lead and zinc have been demonstrated to extend down to the Winnie Pinnie area in the south.

The association of galena and sphalerite in stratiform habit with shallow dolomitic bands within the black shale together with the concentration of base metal sulphides along a structural low point is suggestive of a primary sedimentary if not syngenetic origin. Drill holes LD2, 3 and 4 were drilled in line close to a fault. No evidence was found of any increase in geochemical levels of lead and zinc attributable to hydrothermal effects.

Several sections which can be drawn between drill holes sunk by Noranda in the Winnie Pinnie area in 1968, also delineate a structural depression along which base metal sulphides were concentrated. The axis of this depression is approximately along the line of holes W. P. 10, 19 and 20 (See plate 1). It is possible that this depression between LD2, 3 and 4 (See plate 2) forms a continuous elongated structure somewhere within which accumulations of economic grade sulphides may occur.

Drill hole logs and sections are currently being compiled. It is proposed to forward copies of these together with the tabulated geochemical averages on completion of the analytical work. Pictorial logs are enclosed with this report. (See plates 2 and 3).

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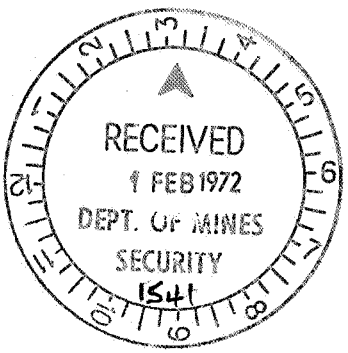
ANNUAL REPORT ON S. M. L. 499

LAKE DUTTON

SOUTH AUSTRALIA

Report No. 163 November, 1971



By:

A. THOMAS
C. DOUCH

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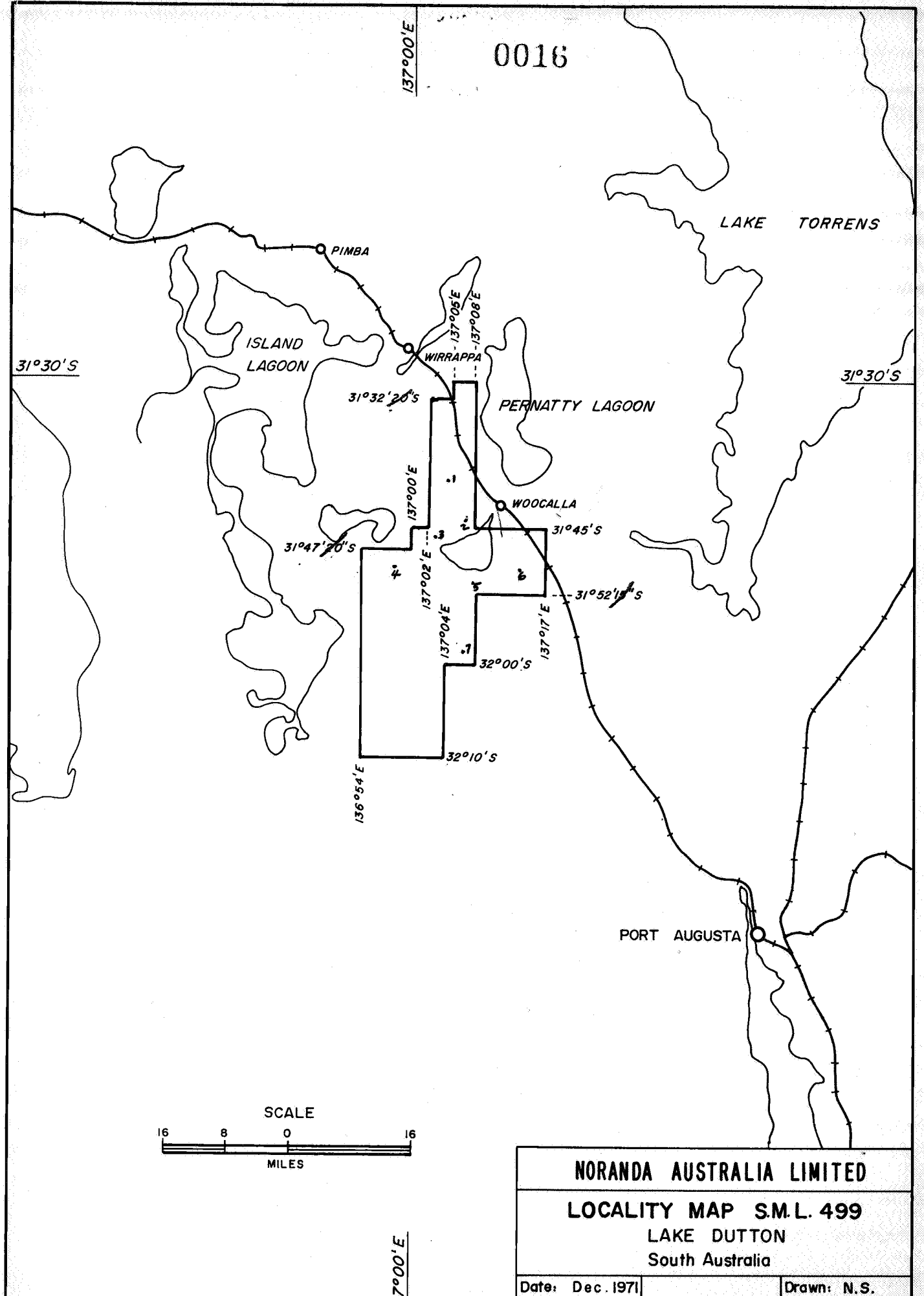

NORANDA AUSTRALIA LIMITED

LOCALITY MAP S.M.L. 499

LAKE DUTTON

South Australia

Date: Dec. 1971		Drawn: N.S.
Approved: T.A.R.		Dwg. No. 308-A-202

137°00'E

31° 30'S

31° 30'S

Birthday

LD1

"OAKDEN HILLS"

STUART HIGHWAY

Woocalla

LAKE FINNISS

LAKE BLYTH

Fly Camp Dam

LD2

Old Fly Camp Dam

LD3

Blyth Dam

LAKE DUTTON

Bothwell Dam

LD4

Windy Valley Well

LD6

INDIAN - PACIFIC RAILWAY

Benghazi Dam

LD5

Wilson Dam

Travenna Well

Winnie Pinnie Dam

Bookaloo

LD7

32° 0'S

32° 0'S

S.M.L. 499

137°00'E

"YUDNAPINNA"

LEGEND

Syncline

Inferred fault

1541-1

PLATE 1

NORANDA AUSTRALIA LTD.

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15 SEP 1971
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SECURITY
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SPECIAL MINING LEASE 499

LAKE DUTTON AREA

SOUTH AUSTRALIA

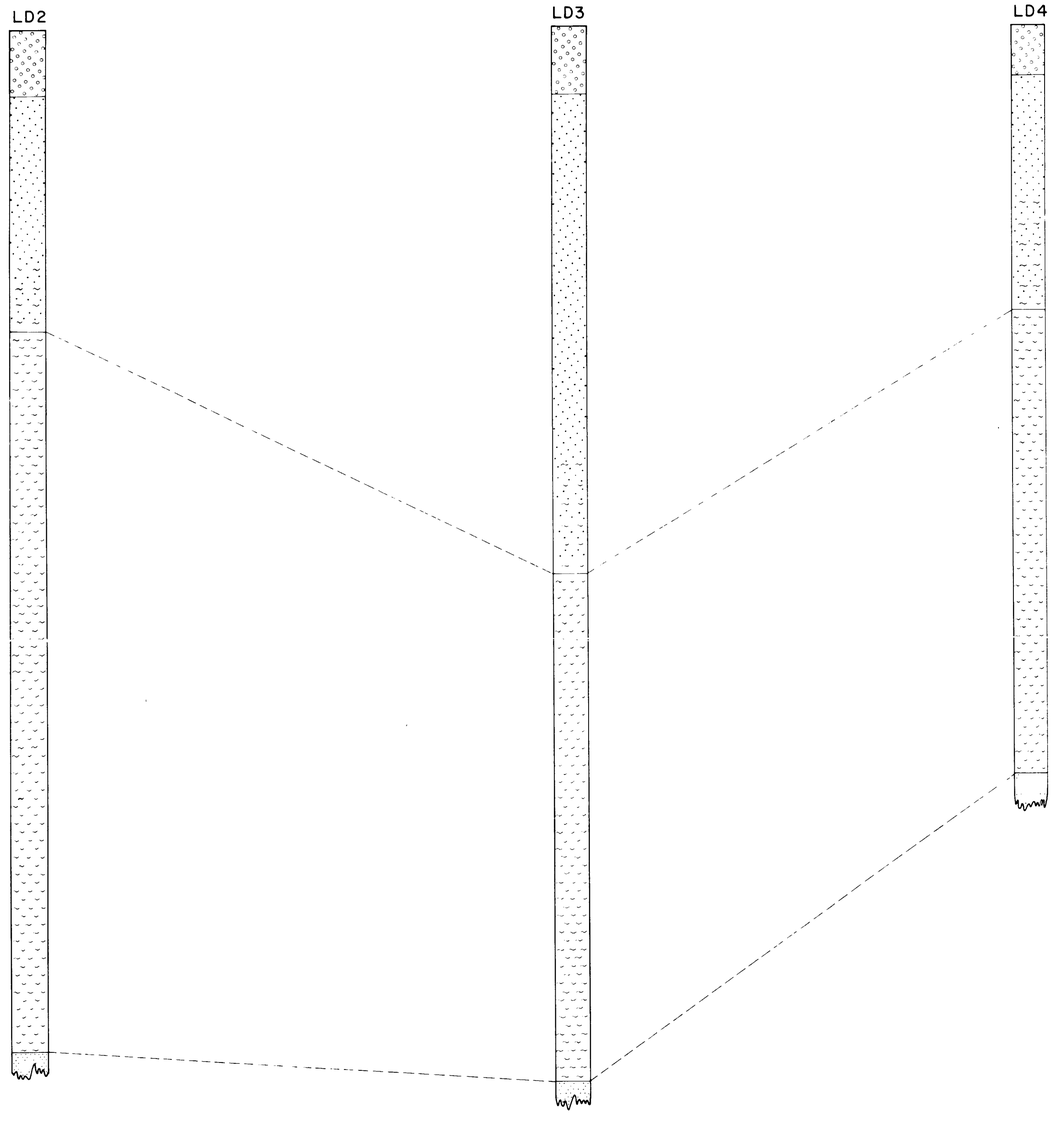
LOCATION OF DIAMOND DRILL HOLES AND STRUCTURAL ELEMENTS

SCALE : ONE INCH = TWO MILES

2 1 0 2 4 6

DATE : AUGUST, 1971	GEOLOGY : C. Douch	DRAWN : W.J.M.
APPROVED :	DRAWING Nº 308-C-208	

E.N.E.



W.S.W.

LEGEND

Loose surface deposits

Whyalla Sandstone

Shaley sandstone

Woolcalla Shale Facies

Pandura Sandstone

1541-2

PLATE 2

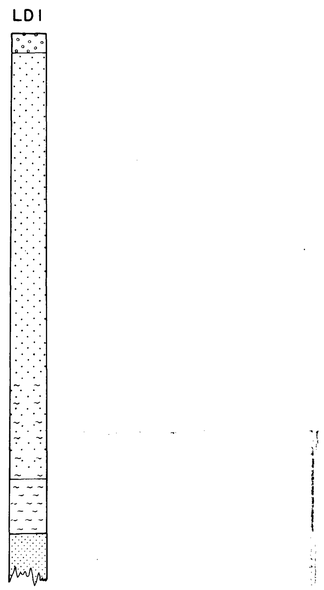
NORANDA AUSTRALIA LTD.

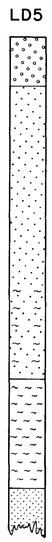
SPECIAL MINING LEASE 499
LAKE DUTTON AREA
SOUTH AUSTRALIA

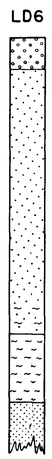
PICTORIAL LOG OF D.D.Hs L D 2 - 4

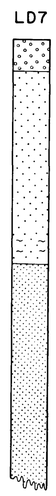
VERTICAL SCALE: ONE INCH = FIFTY FEET
HORIZONTAL SCALE ONE INCH = ONE MILE

DATE: AUGUST, 1971	GEOLOGY: C. Douch	DRAWN: W.J.M
APPROVED:		DRAWING Nº 308-C-206









LEGEND

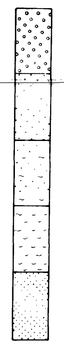
Loose surface deposits

Whyalla Sandstone

Shaley sandstone

Woolcalla Shale Facies

Pandura Sandstone



1541-3

PLATE 3

NORANDA AUSTRALIA LTD.

SPECIAL MINING LEASE 499

LAKE DUTTON AREA

SOUTH AUSTRALIA

PICTORIAL LOG OF D.D.Hs LD1, LD5–7

VERTICAL SCALE: ONE INCH = FIFTY FEET

HORIZONTAL SCALE: ONE INCH = ONE MILE

DATE: AUGUST, 1971	GEOLOGY: C. Douch	DRAWN: W.J.M.
APPROVED:		DRAWING Nº 308-C-207

1. OBJECTIVES

As a sequel to Noranda's 1968 drilling programme in the Winnie-Pinnie area, which delineated an area of anomalous base metal concentration, it was decided to conduct a programme of eight random drill holes over a widespread area but generally close to the Pernatty Culmination. The Pernatty Culmination had previously been recognised as a factor possibly controlling base metal deposition to the west. It was considered valuable to simultaneously test the hypothesis that the base metals may have originated from hydrothermal intrusion in the region of fault planes. To this end drill holes were sited close to presumed fault lineations.

Hole LD.8 was subsequently cancelled because of poor access into the area. A total of seven drill holes was thus completed.

2. CONCLUSIONS

2.1 Drilling was carried out during the first half of 1971 in a widespread and partially random programme in which one drill hole (LD. 3) to the south of Lake Blyth contained anomalous zinc values, possibly up to 1% Zinc over an 8 foot zone. The depth of this anomalous zone is about 600 feet. One percussion sample obtained at 260 foot depth, immediately above the shale horizon, at the base of the Whyalla Sandstone, analysed 0.46% Copper over 4'6 width.

2.2 Mineralisation consists of disseminated aggregates of zinc sulphide and microscopic traces of galena. Chalcopyrite was never observed, and the traces present are therefore considered to occur as submicroscopic chalcopyrite or as chalcocite. The primary host rock appears to be dolomitic shale rather than black shale.

2.3 It appears that the zinc mineralisation in LD. 3 is developed in a north-south elongated basin which may be continuous into the Winnie-Pinnie anomalous zone.

2.4 The grades of mineralisation obtained, while a little higher than geochemically anomalous in this syngenetic environment as sufficiently interesting to warrant further investigation.

3. RECOMMENDATIONS

In view of the indications of an elongated basin between the Winnie-Pinnie area and the region between Lakes Blyth and Dutton, it is recommended that a further programme of at least four drill holes be conducted. The drill holes would probably be best sited near the road by the Wilson, Bothwell and Benghazi Dams. At least one other hole should be sited near the north-east shore of Lake Blyth to test for a possible northerly extension of the zone of base metal sulphide concentration towards LD. 1. Within the confined area between Lake Blyth and Winnie-Pinnie seismographic techniques should be employed to determine the contours of the surface of the Pandurra Sandstone in order to site drill holes more accurately.

4. OTHER HOLES COMPLETED

4.1 LD. 4

Latitude 31° 48'S. 136° 58'E.
Vertical depth 450'2"

Drilled by the Department of Mines Failing WW 1 to 200 feet and thence by diamond drill to completion. A sixty foot side hole was drilled near this site to supply water to the diamond rig.

4.2 LD. 5

Latitude 31° 50'S. 137° 8'E.
Vertical depth 274'3"

Drilled by the Failing WW 1 to 204'6" and by diamond drill to completion.

4.3 LD. 6

Latitude 31° 48'S. 137° 15'E.
Vertical depth 222'4"

Drilled by the Failing WW 1 to 177 feet and thence by diamond drill to completion.

4.4 LD. 7

Latitude 31° 58'S. 137° 6'E.
Vertical depth 247'0"

Drilled to completion by the Failing WW 1 rig. No shale was encountered in this hole.

5. DRILLING PROGRAMME

Drilling commenced on March 17, 1971, and was carried out continuously until June 13, 1971. In all 7 holes were drilled totalling 2,737 feet, of which 1,561 feet were drilled using a Failing WW 1 combination rotary and percussion, truck mounted rig operated by the South Australian Department of Mines. The remaining 1,176 feet were cored by a Department of Mines E1000 diamond drill using BQ wireline equipment.

Coring of the target shale eliminated any possibility of sampling contamination and provided an opportunity to study the rock in its actual form.

Drilling was slowed to some extent in the most westerly holes by the necessity to transport water from the Woomera Pipeline. This could have been alleviated by employing a large water tanker for this task. At LD.4 a sixty foot side hole was drilled which supplied sufficient water to maintain drilling.

Core recovery was generally good; usually between 95% and 100%, because the shale encountered proved harder than expected. Hole LD.4 contained soft muddy shale in the upper part of the section and core recovery in this section was only 80% - 85%. This was the only hole in which soft shale was encountered.

6. GEOLOGY EXPOSED IN THE DRILL HOLES

Of the seven drill holes completed only holes LD. 1, 5 and 6 conformed to the pattern of previously known geology in the region. Because of the known wavy nature of the Pandurra Sandstone surface the situation in hole LD. 7 where no shale was encountered had previously been considered.

The great thickness of shale in holes LD. 2, 3 and 4 was unexpected and led to the hypothesis following extensive surface exploration and aerial photography examination, that a graben structure exists along an east-north-east - west-south-west zone occupied by the low lying region consisting of Lake Dutton and the region to the south of Lakes Blyth and Finniss.

Of the six drill holes containing shale base metal mineralisation was observed to be confined to dolomitic shale rather than black shale. The quantity of dolomitic shale was seen to be at a maximum in the holes closest to the Pernatty Culmination (LD. 1, 2, 5, 6) and to be appreciably diminished in drill holes at a greater distance from the culmination (LD. 4).

In all the holes containing shale, dolomitic shale was observed to increase in quantity in the bottom fifty feet. Holes LD. 5 and LD. 6 contained greater than 50% dolomitic shale throughout. Both these holes contained five to ten feet of pure dolomite above the Pandurra Sandstone contact. Drill holes LD. 2 and LD. 3 both contained 10 feet to 20 feet zones of intensely dislocated dolomitic shale. This is considered to be the result of slumping of the dolomitic beds before compaction.

Three distinct structural units were observed in LD. 2 and probably exist, though less apparent in LD. 3 and LD. 4. These units are bounded by zones of dislocated dolomitic shale. The centre unit shows a consistent bedding angle of 80°. The upper and lower units contain less disturbed beds and show a bedding angle close to 90°.

7. OBSERVED MINERALISATION

Where mineralisation has been observed it has normally been only in trace quantities. The zonation apparent in hole LD. 1 has been seen in all the drill holes with galena occupying a higher position, but generally overlapping to some extent the zone of observable sphalerite which generally occupies the lower section of the hole. Observable galena often occurs as coarse crystals occupying vuggy calcite veins as in the upper section of LD. 2 or as smears on joint surfaces, the most typical occurrence. Sphalerite generally occurs as disseminated blebs throughout the dolomitic shale and only rarely as coarse crystalline material in calcite veins. The most interesting mineralisation seen was in drill hole LD. 3 where the bottom 60 feet of shale contains disseminated sphalerite. LD. 4 and LD. 6 contained rich pyrite but no other mineralisation. LD. 5 showed a distinct zonation of galena and sphalerite but mineralisation was generally only in trace quantities.

8. GEOCHEMICAL ANALYSES

The diamond drill core was logged in great detail, and sampled in very short sections, so that no localised base metal values could be obscured by dilution in larger sample increments. This has led to the accummulation of an immense amount of analysis data, detailed study of which has not been completed.

All the split cores obtained were sent to Geochemical and Mineralogical Laboratories Pty. Ltd. in Sydney for analysis by A.A.S. All samples were prepared by initial pulverisation followed by digestion in 70% perchloric acid for three hours at 180°C.

No economic grades of copper, lead or zinc were obtained but one result of interest for copper was found in LD.1 at the top of the shale section, a percussion sample which analysed 0.46% Cu. over 4'6" width.

The greatest thickness of anomalous lead and zinc values occur in drill hole LD.3 at the base of the shale section.

9. TABULATION OF AVERAGE ANALYSES

The following tabulation delineates the broader geochemical grouping evident from the analysis results, which show the main trends developed. ~~The average values quoted have been obtained by Arithmetical averaging and inspection and have not been calculated on a weighted footage basis~~.

The following notes summarise the individual drill hole results.

TABULATION OF ~~APPROXIMATE~~ * GEOCHEMICAL AVERAGES

~~(* Weighted by footage)~~

Hole No.	From	To	Width	Cu ppm	Pb ppm	Zn ppm	Ag ppm
LD.1	(percussion sample)						
	260'0"	264'6"	4'6"	0.46	700	0.2	2
	(diamond core sample)						
	264'6"	276'2"	11'8"	810.0	127.3	444.4	
	276'2"	278'7"		background			
	278'7"	284'9"	6'2"	34.3	1143.2	743.2	
	284'9"	296'0"	11'3"	31.2	521.1	867.0	
	296'0"	298'6"	2'6"	45.9	272	1112.0	$2^1/2$
LD.2	179'6"	182'2"		background			4.5
	182'2"	188'3"	6'1"	498	142	384	4
	188'3"	194'8"	6'5"	89	177	494	3
	194'8"	201'8"	7'0"	38	965	794	3.4
	201'8"	221'10"		background			
	221'10"	227'6"	5'8"	27	364	747	2.3
	227'6"	310'2"		background			
	310'2"	318'11"	8'9"	48	57	347	0.8
	318'11"	410'8"		background			
	410'8"	423'0"	12'4"	42	81	555	1.2
	423'0"	443'8"		background			
	443'8"	449'11"	6'3"	38	96	672	1.4
	449'11"	557'5"		background			
	557'5"	567'8"	10'3"	34	201	463	2.9
	567'8"	572'10"	5'2"	32	190	823	2.9
	572'10"	574'10"	2'0"	37	3133	1283	2.9
	574'10"	584'0"		background			
	584'0"	592'0"	8'0"	56	878	132	3.2

Hole No.	From	To	Width	Cu ppm	Pb ppm	Zn ppm	Ag ppm
LD.2	592'0"	598'3"	6'3"	79	192	212	3.7
Contact Pandurra	598'3"	600'2"	1'11"	163	400	538	10.1
	600'2"	601'10"	1'8"	37	86	167	11.9
	601'10"	608'5"		background			
LD.3	324'8"	332'7"	7'11"	277	154	255	5.2
	332'7"	337'2"	4'7"	74	1272	873	4.6
	337'2"	343'6"	6'4"	37	595	766	2.9
	343'6"	353'4"		background			
	353'4"	384'9"	31'5"	47	268	740	2.1
	384'9"	388'1"	3'4"	163	501	1365	2
	388'1"	394'10"	6'9"	43	251	618	1.7
	394'10"	398'5"	3'7"	31	202	1219	1.8
	398'5"	406'9"		background			
	406'9"	412'4"	5'7"	37	141	1092	1.6
	412'4"	414'2"		background			
	414'2"	414'9"	7"	92	112	785	1.3
	414'9"	419'5"	4'8"	45	140	897	1.4
	419'5"	456'7"		background			1.0
	456'7"	457'4"	0'9"	60	230	0.4%	1.0
	457'4"	544'6"		background			
	544'6"	545'10"	1'4"	39	70	790	0.7
	545'10"	567'10"		background			
	567'10"	569'6"	1'8"	37	90	1428	1.0
	569'6"	587'10"		background			
	587'10"	588'4"	0'6"	40	110	1900	1.1
	588'4"	590'3"	1'11"	background			
	590'3"	591'10"	1'7"	53	150	1436	1.1
	591'10"	593'4"	1'6"	background			1.3

Hole No.	From	To	Width	Cu ppm	Pb ppm	Zn ppm	Ag ppm	
LD.3	593'4"	593'10"	0'6"	32	100	0.9%		
	593'10"	594'7"		background				
	594'7"	597'10"	3'3"	36	121	1171	1.5	
	597'10"	600'3"		background				
	600'3"	600'9"	6"	34	180	1300	1.9	
	600'9"	601'10"		background				
	601'10"	603'2"	1'4"	40	206	1525	2.5	
	603'2"	611'11"	8'9"	41	513	1111	3.8	
	611'11"	625'7"	13'8"	49	2164	4079	5.8	
	625'7"	627'10"	2'3"	492	2269	3380	8.8	
Contact Pandurra	627'10"	629'0"	1'2"	160	59	47	4.3	
	629'0"	631'11"	1'2"	background				
LD.4	200'0"	204'6"		background				
	204'6"	210'11"	6'5"	41	341	629		
	210'11"	217'0"	5'1"	background				
	217'0"	224'5"	7'5"	39	550	1291 *		(dolomitic)
	*(222'8"	223'9"	11"			0.31%)		
	224'5"	232'0"	7'7"	background				
	232'0"	246'8"	14'8"	36	331	1323		(gypsum)
	246'8"	252'10"	6'2"	34	378	633		
	252'10"	259'9"	6'11"	31	227	1264		(dolomitic)
	259'9"	264'6"		background				
	264'6"	277'5"	12'11"	53	276	1114		
	277'5"	281'6"		background				
	281'6"	290'6"	9'0"	37	308	1271		
	290'6"	298'7"	8'1"	28	102	490		
	298'7"	447'4"		background				

Hole No.	From	To	Width	Cu ppm	Pb ppm	Zn ppm	Ag ppm
LD. 5	205'4"	217'6"	12'2"	403	148	346	Slumped disrupted bedding
	217'6"	221'2"		background			
	221'2"	230'0"	8'10"	36	735	435	Dolomitic beds
	230'0"	238'5"		background			
	238'5"	242'1"	3'8"	32	797	227	"
	242'1"	244'4"		background			"
	244'4"	248'8"	4'4"	43	608	147	"
	248'8"	250'4"	1'8"	42	1250	205	"
	250'4"	254'0"		background			"
Pandurra Contact	254'0"	270'5"	16'5"	360	98	209	Slumped disrupted bedding
	270'5"	272'9"		background			
LD. 6	177'0"	181'0"	4'0"	501	background		Mass dolomitic shale
	181'0"	196'2"	15'2"	88	background		
	196'2"	210'4"	14'2"	432	background		
	210'4"	215'11"	5'7"	1224	background		
	215'11"	219'8"		background			
LD. 7 (Percussion sample) at contact	120'	140'	20'	1600	1750	145	Mixed silt and clay

10. NOTES ON GEOCHEMICAL RESULTS OF INDIVIDUAL DRILL HOLES

10.1 Hole No. LD.1

The shale section was 34 feet thick, and anomalous copper values occupied the top of the section where 11'8" from 264'6" to 276'2" averaged 800 ppm Copper. Immediately above the cored hole, a percussion sample analysed 4,600 ppm Copper from 260 to 264'6". At the base of the Whyalla Sandstone the change to black shale is a transitional one with 34 1/2 feet of sandy shale intersected from 230 feet to 264'6", where diamond drilling was started. From 250 feet much pyrite was observed, and it is possible that part of the mineralised section has not been adequately sampled. Within the black shale cores the highest lead values were 1300 ppm over 6'2" from 277'7" to 284'9", and zinc values were greatest between 284'9" and 298'6" at 1000 ppm.

Silver values were low in this hole - 2 ppm or less.

10.2 Hole No. LD.2

This hole intersected 420 feet of black shale.

Copper values were anomalous only at the top of the section over 6'1" from 182'2" to 188'3" at 400 ppm Cu and at the base over 1'11" from 598'3" to 600'2" where values attained 165 ppm. Background values for copper in the shale are from 30 to 40 ppm.

Lead values were variable, with a few locally anomalous sections, particularly from 194'8" to 201'8" (1000 ppm), 572'10" to 574'10" (2800 ppm), and from 584'0" to 592'0" (850 ppm). Background values for lead in the shale generally are less than 200 ppm.

Zinc values also fluctuated, without reaching very high levels. The background value for zinc in the shale is rather uncertain, probably between 200 and 400 ppm. The highest values were in the narrow section 572'10" to 574'10" (1300 ppm) associated with the high lead.

Silver values were around $4\frac{1}{2}$ to 5 ppm at the top of the section, decreased steadily to 1 ppm by 420 feet but came in strongly again at the disconformity to attain 11 ppm between 598'3" and 601'10".

10.3 Hole No. LD. 3

This was the most interesting hole, and intersected 305 feet of black shale with varying values for lead and zinc.

There was a weakly anomalous section from 324'8" to 332'7" - 7'9" of 200 ppm Cu.

Several narrow sections of relatively high Zinc content were obtained like:-

414'2" to 414'9"	-	7"	at	0.5% Zn
456'7" to 457'4"	-	9"	at	0.4% Zn
593'4" to 593'10"	-	6"	at	0.9% Zn
613'2" to 613'5"	-	3"	at	1% Zn
616'8" to 617'0"	-	4"	at	1% Zn

There was a gradual build up in lead and zinc, particularly zinc towards the base, and from 587'10" through to 627'10", out of 40 feet of section, 35'9" consists of bands containing zinc values above 1000 ppm. The best section was from 611'11" to 625'7" where 13'8" averaged 1800 ppm lead and 5000 ppm zinc, and included the two narrow bands quoted above of over one per cent Zinc.

Throughout this section traces of sphalerite were clearly visible in the cores, and were seen to be associated with narrow bands of dolomite interdigitating with more massive black fissile shale. The bulk of the mineralisation occurs within the dolomite with lesser amounts as smears on joints. Petrological examination has shown that the sphalerite is relatively rich in inclusions of dolomite and other clastic fragments, and this accounts for the relatively low analysis results from sections of core which on examination appear to be relatively well mineralised with sphalerite.

Silver values ranged from 5 ppm in the top of the section in the anomalous copper zone, through 1 to 2 ppm in the bulk of the shale section to from 3 to 10 ppm in the bottom mineralised dolomitic shale.

10.4 Hole No. LD. 4

This drill hole passed through 247'4" of black shale, but intersected basement Pandurra Sandstone 180 feet higher than in holes LD. 2 and LD. 3.

No anomalous copper was recorded. Several relatively narrow zones contained 1000 ppm zinc or better. These were generally sections with a weak dolomitic content, but in one section from 232'0" to 246'8" - 14'8" of 1000 ppm Zinc, the mineralisation appeared to be associated with a high gypsum content.

The higher geochemical levels were all recorded high in the section, and the base of the shale was devoid of interest. Some narrow dolomitic bands were recorded, but no mineralisation occurred in them.

10.5 Hole No. LD. 5

This hole intersected 67'6" of mixed shale and dolomite. Zinc values were nowhere above geochemical background, but several sections contained anomalous amounts of lead ranging from 600 to 1250 ppm, all of them associated with dolomitic sedimentation.

Anomalous copper values were contained in two zones, at the top of the section from 205'4" to 217'6" - 12'2" of 450 ppm Cu, and at the base from 254'0" to 270'5" - 16'5" of 360 ppm Cu. Both zones were characterised by slump structures and micro faulting of dolomitic beds.

10.6 Hole No. LD. 6

This hole also intersected two zones of anomalous copper apparently associated with more massive dolomite. The dolomitic shale section totalled 42'8" in thickness. From 177'0" to 181'0" - 4 feet analysed 400 ppm Cu, and from 210'4" to 215'11" - 5'7" analysed 1240 ppm Cu.

10.7 Hole No. LD. 7

This drill hole penetrated rapidly from Whyalla Sandstone directly into basement Pandurra, getting some mixed silt and clay at the boundary between 120 and 140 feet. Two percussion samples representing the 20 foot intervals contained copper values of 1400 and 1600 ppm Cu respectively.

Lead and zinc values were 1900 and 1600 ppm respectively, zinc at background level.

Silver was not determined in samples from drill holes LD. 4 onwards.

11. STRUCTURE

The recognition of a possible structural control in the deposition of base metal sulphides may assist in outlining areas of potential economic importance in the Lake Dutton area.

A series of east-north-east - west-south-west trending faults can be interpreted from aerial photographs bounding Lakes Blyth and Dutton to the south and north, and forming a series of offset graben structures, the downthrown sides of which form the sites of Lakes Dutton, Finniss and Blyth. Drill holes LD. 2, 3 and 4 of the current programme were sited on a line to the north of a fault line passing along the northern shores of Lake Dutton and the southern shore of Lake Blyth. A cross section through these three holes indicates that there is a structural depression and probably a syncline, within the Woocalla Shale with its axis close to drill hole LD. 3. This syncline appears to be a north-south trending structure parallel to the Pernatty Culmination, and probably originated as an elongated valley in the surface of the Pandurra Sandstone. It is significant that the greatest concentration of dolomitic shale and of base metal sulphides was found in drill hole LD. 3. As has previously been postulated the dolomitic shale and possibly the base metal sulphides had an origin closely associated with the Pernatty Culmination and it is likely that this denser material would be concentrated by gravity control along the axis of this syncline, immediately to the west of the Culmination. To some extent this was verified when little dolomite or observable base metal mineralisation was found in hole LD. 4, which is apparently to the west of the axis of the syncline where material contained in turbidity currents was unlikely to reach.

It was previously considered a possibility that the base metals may have originated from hydrothermal solutions percolating into higher strata above fault planes. To test this hypothesis holes LD. 2, 3 and 4 were deliberately sited close to a single fault line passing between Lakes Dutton and Blyth. The wide variation in base metal values obtained in each of these holes tends to refute this idea but does not disprove it. Alternatively the sedimentary texture closely associated with the base metal sulphides and the concentration of these sulphides along a structural low point indicate that this is primary sedimentary or syngenetic mineralisation.

Several sections which can be drawn between drill holes sunk by Noranda in the Winnie Pinnie area in 1968 also delineate a structural depression along which base metal sulphides were concentrated. The axis of this depression is approximately along the line of holes W. P. 10, 19 and 20. It is possible that this depression and the ore delineated between LD. 2, 3 and 4 form a continuous elongated structure somewhere within which accumulations of economic grade sulphides may occur.

Drill holes LD. 2, 3 and 4 were drilled close to a photo-lineament, where topographic differences suggest minor recurrent fault movements since Proterozoic times. No evidence was found of any increase in geochemical levels of lead and zinc, attributable to hydrothermal or other effects.

Depths of basement Pandurra Sandstone suggest that the most interesting results in LD. 3 may coincide with a shale filled depression in the basement, and this is the same effect as observed originally in the Winnie Pinnie locality. As shown on plate 1 this interpretation narrows down the general zone of interest to a corridor some six miles in width trending slightly east of north, from south of the Winnie Pinnie Dam area to the Birthday Gift siding.

Anywhere in this zone, except for the Pandurra inlier north of Trevenna outstation, there is a reasonable expectation of geochemically anomalous amounts of lead and zinc within the shale equivalent of the Woocalla Dolomite Formation.

Two factors appear to have some bearing on mineralisation, proximity to the keel of the basement depression, and the presence of interfingering dolomite and shale facies of sediments. Graben like movements on lineaments north and south of the lakes may have led to the deposition of great thicknesses of shale and dolomite in the trough occupied at surface by the present lake system.

12. GENERAL REVIEW OF PROGRAMME

No economic values have been obtained by the drill holes completed, but much has been added to the geological information on the area.

When the 1969 programme of percussion drilling was carried out in the Winnie Pinnie Dam locality, much trouble was experienced in recovering samples from the black muds, which were found to represent the Woocalla Dolomite Formation in that locality.

In this year's programme similar problems were anticipated at unknown depths when and if the horizon were located. Consequently a dual purpose percussion rotary rig capable of limited diamond coring was initially employed. Drilling commenced in the Oakden Hills area where the shale proved to be a dry compact fairly hard rock, and the Failing Rig was hard put to achieve more than a slow rate of diamond core penetration. When unexpectedly thick sections of shale in drill holes LD. 2 and LD. 3 were intersected, it became obvious that a diamond drill would be required, and this was introduced for the remainder of the holes which were percussion or rotary drilled from surface to the top of the shale, when cased off to be completed by diamond drill.

This procedure added considerably to the overall cost of the programme, and in retrospect, it can be seen that a single diamond drill would have completed the programme more economically. When compared with the Winnie Pinnie results, the best grades of lead and zinc are somewhat less than originally intersected, but this year the success in coring the material, has resulted in 100 per cent certainty about geological detail, and sample analyses.

Drilling has not produced evidence that economic grades of lead and zinc or perhaps copper occur within our Temporary Reserve. However the existence of trace mineralisation of lead and zinc has been established over an extensive area. The association of galena and sphalerite with tiny dolomitic bands within the black shale are suggestive of a very early if not syngenetic origin. Geochemically anomalous levels of lead and zinc have been demonstrated to extend from Winnie Pinnie in the south to Greenfields Dam in the north, a distance of 20 miles with a width of possibly several miles.

13. CONCLUSIONS

The existence of trace sulphides of lead and zinc of stratiform habit in dolomitic shales along a basement trough possibly up to 30 miles in length, indicates that this phenomenum is a feature of regional significance. No evidence has been found that the mineralisation may attain economic levels, but results have been such as to warrant further investigation.

These would take the form of a careful re-examination of drill cores in relation to geochemical values.

To determine the basement profile of the shale filled depression, it should now be possible, by correlation of measurements with completed drill holes, to carry out a combined seismic refraction and resistivity survey such as proposed by the Compagnie Generale de Geophysique in 1970. This would involve approximately 100 line miles of survey comprising about twelve cross sections of six miles length each, with a 30 mile connecting line down the strike of the zone. Such a survey may possibly also delineate the western margin of the Woocalla Dolomite if it extends southward along the western flank of the Pernatty axial culmination.

Assuming 2 miles average progress per day, the programme could occupy 50 working days or 8 weeks, at an overall cost of $300 per day - cost of the programme would, with ancillary costs, approximate to $25,000. This is the equivalent of about four 700 foot diamond drill holes, and appears therefore to be a justifiable approach at this stage of the programme. Hopefully it would indicate the deepest part of the shale filled depression, and its distance from the nearest massive dolomite to the east.

Targets could then be selected for further diamond drill holes.

0039

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21 JUN 1971

25 AUG 1971

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

10th June 1971.

The Director,
Geochemical and Mineralogical Laboratories Pty. Ltd.,
Box 9, P.O.,
RUSHCUTTERS BAY, N.S.W. 2011.

REPORT CMS 71/6/2

YOUR REFERENCE: D.B. No. 13848

DATE RECEIVED: 1st June 1971.

SAMPLE NO: 6012 — D.D.Drill Hole - L.D.3 613'3" - 613'5"

SUBMITTED BY: Miss P. Kremer

WORK REQUESTED: Ore-microscopy.

for

H.W. Fander, M.Sc.

Geochemical analysis :- Cu 38 ppm
Pb 1600 ppm
Zn > 1%
Ag 3.6 ppm.

CENTRAL MINERALOGICAL SERVICES 0040 Date: 10th June 1971

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
6012
Sphalerite Pyrite Galena

Job No. CMS 71/6/2 Date Received: 1/6/71

Reference D.B. 13848

Sample No. 6012

Nature of Sample: Core

DESCRIPTION SECTION No. 5918

a. Hand Specimen:

A grey bedded, dolomitic shale containing sulphides.

b. Microscopic:

The grey, well bedded sediment contains a high proportion of carbonate which is thought to be dolomite (the carbonate is not calcite).

A visual estimate of the percentage sphalerite present is 3-4% but firstly this estimation was carried out on two flat surfaces only and secondly the sphalerite is not evenly distributed through all beds.

The sphalerite has a very pale honey colour and therefore a low iron content. In polished section (P.S. 5918) sphalerite occurs as porphyroblastic grains ranging from 0.05 mm to 1 mm across with grains of 0.3 mm diameter being common. Rare inclusions of galena (<0.03 mm) are present in some grains and occasional grains of pyrite (0.015 mm) may also be incorporated in the sphalerite areas. Numerous very fine pyrite crystals are present throughout the rock and framboidal textures were observed, which suggest a primary sedimentary origin.

Inclusions of carbonate and silicates are extremely common in all sphalerite grains. These inclusions may be as small as 5μ or coarser than 0.25 mm and form more than 50% of the total area enveloped in sphalerite. (This would suggest that assays are going to give results much lower than expected from visual estimations). In addition to the rare galena inclusions, minute traces of

..2/.

SAMPLE REPORT JOB. NO. CMS 71/6/2 Sample No. 6012

b. Microscopic: (Continued)

chalcopyrite (5μ) were observed with some galena inclusions in occasional sphalerite grains.

It is fairly obvious from the textures that the numerous inclusions in the sphalerite are going to make metallurgical recovery difficult.

I.F. Scott, M.Sc.

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays	Geological Log	Angle to core	Survey Depth	Survey Bearing	Survey Inclination	Notes
0	7	7			5001		Unconsolidated gypseous sand. Some iron stained and rounded grains from Whyalla Sandstone. Manganese nodules common - about 10% volume.					
7	10	3			5002 5003		Whyalla Sandstone - some gypsum - rounded quartz grains up to $1\frac{1}{2}$ mm, some iron stain.					
10	20	10			5004 5005		Strongly iron stained grains from Whyalla Sandstone - 20% lithic nodules up to $\frac{1}{2}$ inch of cemented Whyalla grains - silt, clay matrix 40%					
20	30	10			5006 5007		White Whyalla Sandstone - iron stain very rare - Manganese nodules common					
30	40	10			5008		Whyalla Sandstone - 30% grains greater than 2mm diameter - mostly circular to sub rounded - few Manganese nodules, 10% clay sized particles. Much iron staining.					
40	50	10			5009 5010		Whyalla Sandstone. Very wide size distribution - 50% quartz silt, shaly fraction - 15%, no mineralization - 2% Manganese nodules					
50	60	10			5011 5012		20% large hard aggregates of Whyalla Sandstone up to $\frac{1}{2}$". Some hard rounded lithic fragments - Manganese common, 20% clay fraction					
60	69	9			5013 5014		Brown - red Whyalla Sandstone - iron stained quartz grains - clay matrix 20%, silt 30%					
69	80	11			5015 5016		Grey brown silty sand - 10% clay. Whyalla grains approximately 1mm 50%, silt 40%					
80	87	7			5017 5018		Grey shaly sand aggregating with ground water. Whyalla quartz grains iron stained effervescence with HNO_3 - indicates lime in matrix.					
87	99	12			5019 5022		Whyalla Sandstone, brown - red and aggregating, silt of quartz (50%), Manganese nodules rare but some Pyrite nodules					
99	105	6			5025 5026		Whyalla Sandstone. Some silicified aggregates up to $2\frac{1}{2}$" in diameter. Circular silt fraction 40% - pyrite nodules and silt sized and some Manganese silt					
105	110	5			5027		Whyalla. Silt 30%. Clay 20%. Slight iron stain - pyrite rare					
110	120	10			5028		Whyalla as above but quartz spheres becoming frosted pyrite grains up to 1mm infrequent.					
120	130	10			5029		Whyalla Sandstone as above - contains infrequent black, fillile fragments - probably Manganese but possibly shale.					

Drilled by S.A. Mines Dept. Type of Drilling Hammer & Fluid Rotary Hole Size % Recovery Surveyed by Instrument Used

Date Started 17th March, 1971. Date Completed 27th March, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.1 Location 4 miles E of Oakden Hills H.S. Depth of Hole 304' Co-ords.of Collar 137° 6'E, 31° 39'S. Bearing Vertical Inclination 90°

0042

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	ppm Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
130	140	10			5030					Whyalla Sandstone					
140	150	10			5031					Whyalla Sandstone - much iron staining - no pyrite					
150	160	10			5032					Whyalla Sandstone - strongly iron stained - a little pyrite					
160	164	4			5033	2	12	18	0.2	Whyalla Sandstone - grey/brown lithic sandstone - much pyrite					
164	170	6			5034	4	18	22	0.1	Whyalla Sandstone - grey - little iron staining - no pyrite					
170	176	6			5035	8	22	24	0.2	Whyalla Sandstone					
176	183	7			5036	4	18	22	0.4	Whyalla Sandstone					
183	190	7			5037	10	26	22	0.4	Whyalla Sandstone					
190	200	10			5038	6	14	62	0.2	Whyalla Sandstone					
200	210	10			5039	8	12	20	0.2	Whyalla Sandstone - average grain diameter 0.5mm lithic aggregate - limonite nodules common					
210	220	10			5040	8	14	18	0.2	Shaly Whyalla Sandstone - clay balls circulating - grey white					
220	230	10			5041	8	14	16	0.1	Shaly Sand. White - grey clay balls circulating - 60% sand, 40% clay.					
230	240	10			5042	26	20	24	0.2	Shaly sand. Some dark grey shale circulating 50% sand, 50% clay.					
240	250	10			5043	6	22	24	0.2	Sandy shale. Shale dark grey - black, sand 50%, shale 50%.					
250	260	10			5044	56	28	20	0.2	Sandy shale. Dark grey-black - much pyrite					
260	264'6"	4'6"			5045	4600	700	2000	4.8	Solid black shale at 262' - also some dolomite here - no sand.					
264'6"	264'11"	5"			5046	800	380	800	3	Dense, poorly fissile indurated mudstone, brecciated zones filled with calcite crystals - trace pyrite.					
264'11"	267'5"	2'6"	264'11" - 266'2"		5047	360	50	500	4	Dark grey-black dense fine grained, well bedded black shale.					
			266'2" - 267'5"		5048	600	150	800	4	Showing slump structures at 265'3", bedding Angle 90°. Thin seams and fractures of calcite - at 265'6" - with galena in small blebs. Disseminated fine granular pyrite and possible galena in shale.					
267'5"	268'3"	10"			5049	500	150	750	4	Dense black shale with frequent dolomite bands. 4 narrow bands of lighter dolomitic shale at 267'6", 267'10" ($\frac{1}{2}$"), 268'0" ($\frac{1}{4}$") and 268'1$\frac{1}{2}$" (1") - with associated concentration of pyrite and galena? Pyrite in thin tensional fractures bedding 90° throughout. Some minor slump structures in dolomite.					

Drilled by S.A. Mines Dept. Type of Drilling Fluid Hole Size % Recovery Surveyed by Instrument Used

Date Started 17th March, 1971. Date Completed 27th March, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD. 1 Location 4 miles E of Oakden Hills H.S. Depth of Hole 304' Co-ords.of Collar 137° 6'E. 31° 39'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	ppm Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
281'4"	281'7"	3"			5062	30	1600	400	< 2	Dense black fissile shale with only one 1/8" band of dolomite. Bedding 90°, efforvesces with HNO_3. No sulphides seen.					
281'7"	283'3"	1'8"			5063	20	780	750	< 2	About equal volume of alternating bands of dolomitic shale and black shale. Some intricate slump structures at 282'1" and a minor fault at 282'6". Microscopic pyrite throughout and some pale brown sphalerite blebs at 282'0".					
283'3"	284'2"	11"			5064	30	700	1200	< 2	Interbedded dolomitic shale and black shale with the latter predominating. Bedding 90°. Microscopic pyrite, but no other sulphides seen.					
284'2"	284'9"	7"			5065	65	1600	800	2	Dense fine grained, well laminated black shale. Bedding 90° microscopic pyrite throughout.					
284'9"	285'7"	10"			5066	40	700	650	< 2	Equal volumes of alternating dolomitic shale and black shale. Bedding 90°. Disseminated microscopic pyrite throughout. No other sulphides seen.					
285'7"	286'4"	9"			5067	35	660	1000	< 2	Predominantly fine grained, dense, finely laminated, black shale with 1 narrow dolomite band ½" wide, sparse fine disseminated pyrite. No other sulphides seen.					
286'4"	286'11"	7"			5068	30	640	800	< 2	Equal volumes of alternating dolomitic shale and black shale with irregular contacts. Bedding 90°. Some fine, microscopic pyrite and a few blebs of microscopic galena.					
286'11"	287'7"	8"			5069	40	880	1000	< 2	Predominantly fine grained, well laminated, black shale containing 2 ¼" bands of dolomitic shale. No mineralization apparent.					
287'7"	288'11"	1'4"			5070	30	470	1100	< 2	Equal volumes of well banded, alternating dolomitic and dark shales, showing some minor slump and faulting features. Bedding 90°. Disseminated pyrite throughout. Small flecks of pale brown sphalerite in black shale and some microscopic galena along bedding.					
288'11"	290'3"	1'4"			5071	30	380	700	< 2						
290'3"	291'3"	12"			5072	25	330	800	< 2						
291'3"	292'3"	12"			5073	25	250	750	< 2						
292'3"	293'2"	11"			5074	25	280	1400	< 2	Alternating black shale and dolomitic shale with black shale predominating. Well laminated. Minor disseminated microscopic pyrite - some small blebs of galena. Bedding 90°.					
293'2"	293'11"	9"			5075	30	390	1750	< 2	Massive black shale with few (10%) narrow bands of dolomitic shale. Bedding 90°. Very fine disseminated microscopic pyrite and some very fine galena.					
293'11"	296'0"	2'1"			5076	35	750	400	< 2	100% massive black shale. Well laminated. No efforvescence with HNO_3. Bedding 90°. Very finely disseminated pyrite. No other sulphides seen.					

Drilled by S.A. Mines Dept. Type of Drilling Fluid Hole Size % Recovery Surveyed by Instrument Used

Date Started 17th March, 1971. Date Completed 27th March, 1971. Logged by C. Douch Sampled By C.Douch Record Completed

No. of Hole LD.1 Location 4 miles N.E. of Oakden Hills H.S. Depth of Hole 304' Co-ords.of Collar 137° 6'E. 31° 39'S. Bearing Vertical Inclination 90°

0044

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	ppm Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
268'3"	268'8"	5"			5050	700	230	1000	2	Finely laminated dense black shale showing minor slump structures. Bedding at 90°. Some thin pyrite seams parallel to bedding. No sign of other sulphides. Dolomite absent but shale effervesces with HNO_3.					
268'8"	270'0"	1'4"			5051	600	50	70	< 2	Well laminated black shale with alternating narrow dolomite bands and wider black shale bands, bedding 90°					
270'0"	270'11"	11"			5052	1800	75	150	< 2	Pyrite along tensional cracks and disseminated in narrow bands of shale, due content difficult to estimate. Not greater than 1-2%.					
270'11"	271'3"	4"			5053	700	100	110	< 2	Finely laminated dense black shale with infrequent minor bands of dolomitic shale. Bedding 90°. Microscopic trace pyrite. Galena as very small disseminated blebs.					
271'3"	273'0"	1'9"			5054	500	100	250	< 2	Finely banded well laminated black shale with narrow dolomite band approaching 50% of core. 2" of near massive dolomite from 271'3", 271'5". Fine pyrite on cross fractures and vertical tensional cracks. Very fine disseminated pyrite in black shale.					
273'0"	274'6"	1'6"			5055	600	120	320	< 2	Dense, fine grained finely laminated black shale. Bedding 90° occasional flecks of calcite and some microscopic, framboidal pyrite.					
274'6"	276'2"	1'8"			5056	600	200	600	< 2	Shale effervesces with HNO_3 - occasional microscopic grains of galena?					
276'2"	276'8½"	6½"			5057	380	90	100	< 2	Well laminated dark shale with narrow dolomite bands. Bedding 90°. Finely disseminated microscopic pyrite on cross fractures. Intricate slump structures show cascading at 276'7" - 1" wide. Like Mt. Isa shale - contains finely divided pyrite and galena.					
276'8½"	277'11"	1'2½"			5058	110	120	70	< 2	Core slightly ground and fractured during drilling. Dense fine grained, well laminated black shale - appears slightly leached. Contains finely divided pyrite and very rare grains of galena. Bedding 90°, shale effervesces with HNO_3.					
277'11"	278'7"	8"			5059	90	540	290	3	Dense fine grained black shale with intermittant narrow bands of lighter dolomitic shale, bedding 90°. Microscopic pyrite					
278'7"	279'9"	1'2"			5060	50	1200	750	2	along bedding. No other sulphides seen.					
279'9"	281'4"	1'7"			5061	30	1500	500	< 2	Shale of mainly dolomitic bands interbedded with thick seams of black shale - Bedding 90°. Microscopic pyrite throughout shale - less in dolomite. Galena and pale brown sphalerite in a small calcite lens at 279'11" - possibly some chalcopyrite.					

Drilled by S.A. Mines Dept. Type of Drilling Fluid - Coring Hole Size % Recovery Surveyed by Instrument Used

Date Started 17th March, 1971. Date Completed 27th March, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.1 Location 4 miles NE of Oakden Hills H.S. Depth of Hole 304' Co-ords. of Collar 137° 6'E. 31° 39'S. Bearing Vertical Inclination 90°

0043

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays	Geological Log	Angle to core	Survey Depth	Survey Bearing	Survey Inclination	Notes
0	10	10			5083		Soil and loose gypseous sand. Spherical quartz grains. Frosted surface - red staining					
10	20	10			5084		Loose iron stained gypseous sand. Less iron stain than at surface - 40% grey-white quartz					
20	30	10			5085		Loose grey white gypseous sand - rare iron stain					
30	40	10			5086		Loose grey white gypseous sand - rare iron stain					
40	50	10			5087		Grey white - Whyalla Sandstone - little iron stain - no gypsum					
50	60	10			5088		Grey white Whyalla Sandstone - no iron stain					
60	70	10			5089		Whyalla Sandstone with 50% silt sized fraction grey white					
70	80	10			5090		Grey-buff Whyalla Sandstone, approximately 20% silt, Manganese nodules increased. Iron stain increased.					
80	90	10			5091		Grey-buff Whyalla. Manganese and iron increased - some chlorite					
90	100	10			5092		Grey-buff iron stained Whyalla Sandstone. Increase in grey clay, trace pyrite					
100	110	10			5093		Grey brown shaly Whyalla Sandstone, silt 20%, rare Manganese and iron nodules					
110	120	10			5094		Shaly (white grey) Whyalla Sandstone, rare chlorite staining (Cu?), no sulphides					
120	130	10			5095		Shaly Whyalla Sandstone, 30% white-grey clay					
130	140	10			5096		Shaly Whyalla Sandstone, 40-50% white-grey clay, trace pyrite					
140	150	10			5097		Sandy grey-buff shale					
150	155	5			5098		80% - grey-white shale with 20% Whyalla Sandstone grains, some black shale					
155	159'6"	4'6"			5099		Grey-black shale					
159'6"	161'	1'6"			5100		Homogen sandy grey shale. 20% bedded black shale flakes layered grey shale and Whyalla Sandstone					
161'0"	162'2½"	1'2½"			5101		Homogen sandy grey shale. 20% bedded black shale flakes layered grey shale and Whyalla Sandstone					

Drilled by S. A. Mines Dept. Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD. 2 Location 1.3 miles S.W. of South Point, Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0046

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
296'0"	296'4"	4"			5077	38	320	2200	2.9	Dense, massive, poorly laminated black shale showing no structure. Similar to shale at 264' - argillaceous. No pyrite seen, but possibly some pale brown sphalerite on tensional fracture surfaces - bedding 90°.					
296'4"	296'9"	5"			5078	34	220	680	2.7	Alternating black shale and dolomitic shale - bedding varies between 90° and 50°. Intense, minor slumping and faulting - bands of dolomite torn into boudinage. Zig Zag folding in dolomite at 296'7½". No pyrite but some microscopic galena in dolomitic shale. Black shale generally finely laminated - bedding 90°.					
296'9"	297'8"	11"			5079	62	250	1100	2.7	Well bedded, finely laminated alternating black shales and dolomitic shale - about equal valumes. Calcite along tensional cracks. Rare disseminated, microscopic pyrite but no other sulphides seen. Bedding 90°.					
297'8"	298'3"	7"			5080	38	190	900	2.6	Generally well bedded alternating black argillaceous shale and dolomitic shale. Dolomitic shale shows slumping features - disruped beds, boudinage and minor faulting. Some parts appear rather siliceous. No pyrite seen but some blebs of pale brown sphalerite in black shale. Bedding generally 90°.					
298'3"	298'6"	3"			5081	36	200	920	2.5	Utterly chaotic black shale - completely shattered, showing no original structure. Indicates presence of a fault plane at 90° to hole. Contains no visible sulphides but does contain grains of quartz of Pandurra Sandstone.					
298'6"	304'	5'6"			5082					Cutting sample. Pure Pandurra Sandstone penetrated from 298'6". This is of poorly size graded, angular, sub-rounded and rounded quartz grains, showing much red iron staining. Pandurra verified by using mud puncher at 304'.					

0047

Drilled by S.A. Mines Dept. Type of Drilling Diamond core. Hole Size % Recovery Surveyed by Instrument Used

Date Started 17th March, 1971. Date Completed 27th March, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.1 Location 4 miles N.E. of Oakden Hills H.S. Depth of Hole 304' Co-ords.of Collar 137° 6'E. 31° 39'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
169'1½"	169'4½"	3"			5123					As above but more sandy					
169'4½"	169'8½"	4"			5124					Slightly sandy homogeneous grey shale, black shale = 40% of rock					
169'8½"	170'0"	3½"			5125					Slightly sandy homogeneous grey shale - sand very coarse grained.					
170'0"	177'0"	7'			5126					Cuttings - mostly dark grey argillaceous shale					
177'0"	178'0"	1'			5127					Sandy black shale cuttings					
178'0"	179'6"	1'6"			5128	480				Sandy grey and black shale					
179'6"	180'0"	6"			5129	16	30	210	1.4	Sandy grey shale containing 50% grey shale chips and flakes aligned // to bedding. Bedding 90°. Massive black shale on last 1/8" pyrite					
180'0"	180'11"	11"			5130	130	98	330	6.0	Massive poorly fissile black shale containing chips of dolomite representing narrow smashed and cascaded bands in black shale. Massive pyrite skins along fractures. Trace disseminated galena					
180'11"	181'7"	8"			5131	84	110	200	7.0						
181'7"	182'2"	7"			5132	120	110	210	4.5	50.50 black massive poorly fissile well jointed black shale and shattered and slumped dolomitic shale without order. Massive galena skins of joint planes from 182'1" - 182'2". Massive and disseminated pyrite					
182'2"	182'9"	7"			5133	460	140	660	8.0	Massive black shale with wavy bedding. A single ½" dolomitic shale band at 182'3" shows "boudinage" and cascade features, possible disseminated galena in black shale					
182'9"	183'6"	9"			5134	260	130	320	5.5	Mostly grey dolomitic shale with occasional ½" bands of black shale. Dolomite shows intense dislocation, slumping cascading and pile up structures, bedding destroyed, pyrite on joints. Galena on joint 183'3½".					
183'6"	184'7"	1'1"			5135	940	100	320	4.3	50.50 alternate fissile black shale (bedding 90°) and 2" bands of smashed dolomitic shale and lenses of coarsely cryst. calcite with pyrite. Micro disseminated pyrite and galena? in black shale					
184'7"	185'0"	5"			5136	220	110	210	5.5	Massive well bedded fissile black shale with a single 1/8" band of dolomitic shale at 184'10", pyrite along bedding planes and micro disseminated pyrite and galena?					
185'0"	185'4"	4"			5137	600	50	140	3.3	Mainly massive dolomitic shale, showing obscure collapse and slump structures. Massive pyrite along vertical joint planes trace disseminated galena in dolomitic shale					

Drilled by S.A. Mines Dept Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0048

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays	Geological Log	Angle to core	Survey Depth	Survey Bearing	Survey Inclination	Notes
162'2½"	162'6½"	4"			5102		Alternating ½" bands of Whyalla Sandstone and white grey shales containing 20% black shale chips and flakes					
162'6½"	162'9"	2½"			5103		Strong banding of alternating grey shale and Whyalla Sandstone black shale chips and flakes throughout					
162'9"	162'11½"	2½"			5104		As above but with several solid 1/8" - ¼" bands of black shale					
162'11½"	163'4½"	5"			5105		Grey shale alternating with Whyalla Sandstone. 60% of grey shale bands is of black shale flakes					
163'4½"	163'7½"	3"			5106		As above					
163'7½"	163'10½"	3"			5107		As above but with 50% sandstone in alternating ½" bands					
163'10½"	164'1½"	3"			5108		½" bands of grey shale containing black shale chips, alternating with ½" bands of sandstone					
164'1½"	164'5"	3½"			5109		As above but with less sandstone					
164'5"	164'8"	3"			5110		Alternating ¼" bands of grey shale and ½" bands of shaly sand, few flakes of black shale					
164'8"	165'5"	9"			5111		As above but with 20% black mud in grey shale bands					
165'5"	165'11"	6"			5112		As above but with 30% black mud in grey shale bands					
165'11"	166'4½"	5½"			5113		60% rock is grey-white shale containing 30% black shale					
166'4½"	166'6½"	2"			5114		As above					
166'6½"	166'10½"	4"			5115		As above but sandstone makes up 50% of rock in alternating bands					
166'10½"	167'4½"	6'			5116		As above but grey-white shale = 70% of rock					
167'4½"	167'8"	3½"			5117		As above					
167'8"	168'1½"	5½"			5118		Near homogeneous sandy grey shale. Shale = 80% of rock, 10% black shale chips and flakes					
168'1½"	168'4½"	3"			5119		As above					
168'4½"	168'7½"	3"			5120		Alternating ½" bands sandy shale and black-grey shale					
168'7½"	168'10½"	3"			5121		Indistinct grey shale bands make up 80% of rock, black shale is 20% of grey shale bands					
168'10½"	169'1½"	3"			5122		As above. Black shale chips = 30% grey shale bands					

Drilled by S. A. Mines Dept. Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Sraarted 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD. 2 Location 1.3 miles S.W. of South Pt, Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E, 31° 44'S. Bearing Verticle Inclination 90°

0049

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
197'9"	198'8"	11"			5154	32	1000	1100	3.9	Alternating massive narrow black shale bands and 1" dolomite bands with disseminated micro sphalerite, pyrite and galena. Massive galena at 197'11" and as blebs throughout dolomite. Dolomite smashed at 198'3" - carries disseminated galena.					
198'8"	199'7"	11"			5155	22	1300	740	2.9	Alternating 2" bands of black shale, dolomitic shale with galena associated with calcite veins at 199'3". Calcite is pink large blebs sphalerite in black shale.					
199'7"	200'2"	7"			5156	60	2000	1200	3.4	Massive well laminated black shale showing few narrow bands of dolomite with disseminated galena and pyrite.					
200'2"	201'8"	1'6"			5157	24	660	270	2.9	Alternating bands of black shale and dolomitic shale showing Lead and Zinc in calcite veins and vughs. Small sphalerite blebs throughout. Galena in vein stock in dolomite.					
201'8"	202'8"	1'			5158	16	350	280	2.3	Massive black shale with no dolomite. Galena - sphalerite smears on bedding at 202'7".					
202'8"	203'3"	7"			5159	24	230	880	2.5	Alternating massive black shale and narrow diffuse bands dolomite, disseminated pyrite and galena and sphalerite in calcite blebs and veins.					
203'3"	204'0"	9"			5160	16	250	440	2.3	Massive well laminated fissile black shale with few narrow diffuse bands of dolomite, trace disseminated Galena? and pyrite.					
204'0"	205'0"	1'			5161	16	250	440	1.9	Uniform dense well laminated fissile black shale bedding 90° - showing rare disseminated and massive framboidal pyrite especially on bedding planes. No galena but possible minute blebs sphalerite throughout.					
205'0"	206'0"	1'			5162	28	200	500	2.0						
206'0"	207'0"	1'			5163	30	230	160	2.0						
207'0"	208'0"	1'			5164	56	290	140	2.3						
208'0"	209'0"	1'			5165	44	290	130	2.1						
209'0"	210'0"	1'			5166	40	190	200	2.0						
210'0"	211'0"	1'			5167	18	230	290	2.1						
211'0"	212'0"	1'			5168	100	240	400	2.0						
212'0"	213'0"	1'			5169	20	200	520	1.9						
213'0"	214'0"	1'			5170	30	240	380	2.1						
214'0"	215'0"	1'			5171	34	210	350	2.1	Uniform highly fissile, sometimes shattered, sometimes well bedded, massive black shale, bedding generally 90°. No mineralization at all observed. No dolomite, no calcite, no pyrite.					
215'0"	216'0"	1'			5172	18	240	430	2.0						
216'0"	217'6"	1'6"			5173	20	270	350	2.4						
217'6"	218'0½"	6½"			5174	18	280	560	2.8	Massive, fissile well laminated black shale, with no visible sulphides but possible micro disseminated pyrite, bedding 90°.					
218'0½"	219'7½"	1'7"			5175	18	250	640	2.5	Alternating 2" bands well laminated fissile black shale and ¼" - ½" bands dolomite containing pyrite bedding distorted in places but generally 90°. Many micro unconformities.					

Drilled by S.A. Mines Dept. Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971 Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0050

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
185'4"	185'11"	7"			5138	440	92	310	5.5	Alternating mainly black shale and piled up bands of dolomitic shale. Pyrite along dolomitic and black shale contacts, bedding generally 90° galena skins on joint surface at 185'7".					
185'11"	186'4"	5"			5139	220	110	360	3.5	Massive well laminated, fissile black shale, bedding 90° but tends to be wavy. Contains some ¼" blebs of pyrite - no other sulphides seen.					
186'4"	186'6"	2"			5140	410	300	390	3.6	Massive smashed and folded dolomitic shale with galena skins on joint planes					
186'6"	187'1"	7"			5141	1000	180	500	4.7	Massive well laminated, fissile, black shale with one thin smashed band of dolomitic shale - 30% altered - replaced by pyrite. Bedding wavy but generally around 60°. Possible micro, disseminated galena?. Several 1" blebs of coarse grained pyritic calcite.					
187'1"	188'0"	11"			5142	250	190	480	4.0						
188'0"	188'3"	3"			5143	110	350	340	6.5	Massive poorly laminated, fissile black shale, with infrequent chips and flakes of structureless dolomitic shale. No sulphides seen.					
188'3"	188'11"	8"			5144	64	120	300	3.1	Massive well bedded, fissile black shale with rare dolomitic shale bands. Massive pyrite skins along joints. Strong jointing at 10° and 100° may reflect angle of fore-set beds.					
188'11"	189'10"	11"			5145	120	130	700	3.0						
189'10"	190'11"	1'1"			5146	180	170	370	3.2						
190'11"	192'0"	1'1"			5147	56	110	960	2.8	Massive, poorly bedded, non fissile, black, argillaceous shale with frequent chaotic dolomitic shale bands. Bedding 90° - joints show pyrite skins.					
192'0"	192'11"	11"			5148	94	220	250	3.0	Massive, well laminated, fissile black shale with infrequent narrow dolomitic shale bands generally at 90° - well ordered micro disseminated pyrite. Possibly some galena.					
192'11"	193'10"	11"			5149	58	290	210	4.0						
193'10"	194'8"	10"			5150	30	200	560	3.3	Massive, poorly laminated fissile black shales, micro disseminated pyrite and galena in small blebs. Sphalerite and galena on joints at 194'0".					
194'8"	195'11"	1'3"			5151	56	860	1300	3.1	Alternating massive black shale and narrow bands of dolomitic shale with calcite veins carrying galena and sphalerite. Bedding 60° - 80°.					
195'11"	196'8"	9"			5152	38	450	230	4.2	Massive poorly bedded black shale, weakly fissile. A single dolomite band at 196'3½" carries galena and pyrite					
196'9"	197'9"	1'0"			5153	44	1000	900	3.9	Alternating 2" bands black shale and dolomite. Massive galena and sphalerite smears on joint surfaces especially in dolomite.					

0051

Drilled by S.A. Mines Dept. Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD. 2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag			Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
242'10"	243'7"	9"			5194	22	120	330	1.8			Alternating black and dolomitic shale in ½" - 1" bands-black shale in small intense folds, ¼" blebs of sphalerite in troughs especially at 243'5" and on joints as at 244'3" in calcite					
243'7"	244'8"	13"			5195	16	140	370	2.0								
244'8"	246'9"	2'1"			5196	40	130	280	1.7			Massive well laminated fissile black shale, bedding 90°. Thin diffuse bands dolomite, with tiny blebs of sphalerite and galena					
246'9"	247'6"	9"			5197	20	110	450	1.7			Alternating 1/8" bands well developed dolomite and ½" bands well laminated black shale. One large bleb sphalerite at 247'2".					
247'6"	248'4"	10"			5198	20	110	460	1.9			Alternating bands well laminated fissile black shale and ¼" bands dolomite. A few bleb sphalerite at 248'3½". Pyrite on bedding. No galena, bedding 90°.					
248'4"	248'7"	3"			5199	28	250	370	1.8			Alternating massive bands, well laminated fissile black shale and narrow diffuse bands of dolomite. Blebs of sphalerite at 248'4" on bedding plane, bedding 90°.					
248'7"	249'4"	9"			5200	28	250	460	2.0			Alternating 1" bands well laminated fissile black shale and narrow diffuse band dolomitic shale. ¼" blebs sphalerite especially at 284'9". No galena.					
249'4"	250'6"	1'2"			5201	30	110	370	1.7			Near complete black shale with few narrow weak bands dolomitic shale. Barren.					
250'6"	251'6"	1'			5202	52	180	380	1.7			Near solid black shale, few diffuse narrow bands dolomitic shale, ¼" wide. Framboidal pyrite on bedding, no other sulphides.					
251'6"	252'9"	1'3"			5203	44	140	1400	1.8			Alternating ¼" bands black shale and sharp fissile dolomitic shale showing boudinage structures and micro disconformities, large sphalerite blebs at 252'7". Minor faulting, bedding 90°.					
252'9"	253'4"	7"			5204	22	100	360	1.4			Massive well laminated black shale. No dolomitic shale. Massive pyrite on bedding. No other sulphides.					
253'4"	254'0"	8"			5205	20	90	380	1.5			Near massive black shale with infrequent diffuse dolomitic bands. Minor sphalerite in dolomite.					
254'0"	255'5"	1'5"			5206	40	110	360	1.6			Alternating 2" bands black shale and ¼" bands dolomitic shale showing boudinage and pyrite. Sphalerite blebs in dolomite, bedding 90°.					
255'5"	256'6"	1'1"			5207	34	100	660	1.8			Alternating 2" bands well laminated black shale and 2" bands dolomiiic shale with minor sphalerite throughout. Pyrite throughout.					
256'6"	257'6"	1'			5208	46	110	350	1.4			Fissile black shale. Sharp 1/8" bands dolomitic shale, bedding 90°, no mineralization.					

Drilled by S.A. Mines Dept. Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0052

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
219'7½"	221'10"	2'2½"			5176	26	410	190	2.8	Alternating sharp 1" bands fissile black shale and ½" - 1" bands dolomite showing 10-15% calcite veins with galena blebs - veins and sphalerite blebs	90°				0.5%? Zn.
211'10"	222'11"	1'1"			5177	36	580	1100	2.9	Alternating 2" bands dolomite and ¼" bands black shale. Rare galena. Considerable ¼" blebs sphalerite in black shale.	90°				
222'11"	224'0"	1'1"			5178	42	390	400	2.5	Massive black shale with diffuse dolomite bands with pile up cascade and diapiric structures. Pyrite in thin veins. No other sulphides.					
224'0"	225'0"	1'			5179	18	340	210	2.5	Alternating 2" bands wavy bedded fissile black shale and ½" bands of smashed up dolomite showing some pyrite. No other sulphides.					
225'0"	226'2"	1'2"			5180	24	270	1100	2.0	Massive well laminated fissile black shale with thin diffuse bands dolomite, bedding 90°. Trace galena and sphalerite.					
226'2"	227'6"	1'4"			5181	18	270	840	2.1	Massive black shale with a few sharp, narrow bands dolomite bedding 90°. Possible micro disseminated galena.					
227'6"	229'4"	1'10"			5182	78	600	260	2.5	Alternating 2" bands dolomite and fissile black shale. Calcite veins rare, but carry galena, sphalerite and pyrite. Dolomite completely smashed.					
229'4"	229'9"	5"			5183	24	340	74	2.5	Massive well laminated fissile black shale with one narrow weak dolomite band. Trace galena along joint surfaces.					
229'9"	231'7"	1'10"			5184	38	480	480	2.4	Alternating, 2" bands black shale and dolomite. Dolomite smashed bedding between 20° and 90°. Calcite veins and vugh in filling with galena and sphalerite and micro disseminated pyrite.					
231'7"	233'3"	1'8"			5185	16	680	210	2.1	As above					
233'3"	234'6"	1'3"			5186	16	290	340	2.2	Alternating well laminated fissile black shale and diffuse narrow bands dolomite. Only pyrite					
234'6"	235'8"	1'2"			5187	36	300	370	1.8	Near massive well laminated black shale with few diffuse and narrow bands of dolomite. Shows only a little trace pyrite					
235'8"	236'8"	1'			5188	42	220	200	1.8						
236'8"	237'6"	10"			5189	76	170	220	1.6						
237'6"	238'11"	1'5"			5190	54	150	260	1.8	Massive well laminated fissile black shale with no dolomite, small blebs framboidal pyrite. No Calcite. Some sphalerite on bedding plane at 240'2½".					
238'11"	240'4"	1'5"			5191	34	150	320	1.7						
240'4"	241'0"	8"			5192	24	130	360	1.9	Massive well bedded fissile black shale with 2 x ½" bands dolomite at 240'5" and 240'9", bedding 90°. No obvious sulphides.					
241'0"	242'10"	1'10"			5193	34	150	300	1.6	Massive well laminated, fissile black shale with blebs of pyrite on bedding, but no other sulphides, bedding 90°.					

Drilled by S.A. Mines Dept. Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0053

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
279'1"	280'9"	20"			5231)))	60	74	150	1.3	Continous fissile well bedded black shale with only infrequent very thin bands dolomitic shale, bedding 90°, no mineralisation.					
280'9"	281'0"	3"			5231)					Pale grey dolomitic shale. Some pyrite but no other mineralisation observed, bedding 90°.					
281'0"	281'9"	9"			5232	20	76	310	1.0	Alternating 1" - 2" bands of fissile black shale and sharp ¼" bands of dolomitic shale. No mineralisation observed.					
281'9"	282'7"	10"			5233	22	78	300	1.0	As before, but dolomitic bands more frequent, no mineralisation observed.					
282'7"	283'11"	16"			5234	44	140	1500	1.2	Alternating narrow bands of fissile dolomitic black shale and ½" - 1" bands dolomitic shale. Some small (1/16") pale brown sphalerite blebs in black shale. Also some pyrite.					
283'11"	284'10"	11"			5235	22	86	350	0.6	Alternating ½" bands fissile black shale and sharp 1/8" - ¼" bands of dolomitic shale, possible chalcopyrite disseminated in dolomite. Some sphalerite in black shale.					
284'10"	286'1"	15"			5236	28	100	180	0.9	Massive fissile black shale. No distinct dolomitic shale bands. Bedding 90°, some small sphalerite blebs in black shale.					
286'1"	286'6"	5"			5237	28	90	94	0.9	Alternating 1" bands fissile black shale and 1" sharp bands dolomitic shale showing pull-apart structures and slumping and minor associated sphalerite.					
286'6"	287'2"	8"			5238	36	72	270	0.6	Near massive fissile black shale with few narrow diffuse bands dolomitic shale. Black shale contains minor blebs and aggregates sphalerite.					
287'2"	287'9"	7"			5239	22	70	400	0.8	As before but thin dolomitic bands more frequent. Minor 1/16" blebs sphalerite in black shale.					
287'9"	288'0"	3"			5240	30	76	490	1.3	Massive pale grey dolomitic shale, poorly fissile, bedding 90°, no mineralisation.					
288'0"	289'5"	17"			5241	36	130	720	1.0	Alternating fissile black shale bands - 1/8" - ¼" bands diffuse dolomitic shale, blebs sphalerite in black shale, much pyrite and possible chalcopyrite.					
289'5"	290'2"	9"			5242	32	80	370	0.8	Fissile black shale with frequent sharp narrow bands of dolomitic shale with considerable pyrite on bedding. No other mineralisation observed.					
290'2"	291'8"	18"			5243	36	100	140	0.7	Massive fissile black shale. No dolomitic shale, bedding 90°, no mineralisation observed.					
291'8"	292'10"	14"			5244	32	80	310	1.0	Alternating bands 1", fissile black shale and ½" bands diffuse jointed dolomitic shale. Joints filled pyrite and on bedding blebs of sphalerite in black shale.					

Drilled by S.A. Mines Department. Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0054

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
257'6"	259'0"	1'6"			5209	28	90	230	1.5	Alternating 2" bands well laminated, fissile black shale and weak diffuse dolomitic shale, bedding 90°, no mineralization.					
259'0"	260'0"	1'			5210	36	90	210	1.4						
260'0"	261'1"	1'1"			5211	28	84	190	1.4	Massive fissile black shale, bedding 90°. Infrequent weak narrow bands dolomite. No mineralization.					
261'1"	262'5"	1'4"			5212	28	76	110	1.3	Massive fissile well laminated black shale. No dolomitic shale					
262'5"	263'5"	1'			5213	28	70	220	1.4	No mineralization, bedding 90°.					
263'5"	264'7"	1'2"			5214	56	64	200	1.4	Well laminated fissile black shale. Infrequent sharp "leached" bands dolomite, bedding 90°. No mineralization.					
264'7"	265'6"	11"			5215	44	60	150	1.3	Massive well laminated fissile black shale. No dolomitic shale. No mineralization, bedding 90°.					
265'6"	266'6"	1'			5216	26	66	140	1.3	Massive well laminated fissile black shale with infrequent 1/8" sharp bands "leached" dolomitic shale, bedding 90°, no mineralization.					
266'6"	267'6"	1'			5217	28	70	210	1.4						
267'6"	268'7"	1'1"			5218	26	66	200	1.4						
268'7"	269'8"	1'1"			5219	26	60	170	1.4						
269'8"	270'9"	1'1"			5220	30	62	190	1.4	Massive well laminated fissile black shale. Bedding 90°.					
270'9"	271'11"	1'2"			5221	30	74	210	1.3	Infrequent 1/8" bands of leached dolomitic shale. no					
271'11"	273'0"	1'1"			5222	32	76	210	1.3	mineralization.					
273'0"	274'0"	1'			5223	28	76	190	1.4						
274'0"	275'0"	1'			5224	28	70	240	1.4						
275'0"	276'0"	1'			5225	28	66	280	1.3						
276'0"	276'6"	6"			5226	22	64	310	1.3						
276'6"	277'5"	11"			5227	34	68	270	1.2	Fissile well laminated black shale with frequent diffuse dolomitic shale bands. Some pyrite on bedding and small blebs of sphalerite in black shale. Bedding 90°.					
277'5"	278'1"	8"			5228	20	60	150	1.4	Light grey fissile poorly bedded dolomitic shale with infrequent narrow bands of fissile black shale. Pyrite on 70° joints. No other sulphides, bedding 90°.					
278'1"	278'7"	6"			5229	42	76	250	1.1	Fissile well bedded black shale. Several sharp narrow bands dolomitic shale and infrequent narrow diffuse bands dolomitic shale. No sulphides, bedding 90°.					
278'7"	279'1"	6"			5230	42	100	160	1.0	Banded alternating fissile black shale and poorly fissile dolomitic shale, 1/4" calcite bleb with sphalerite and pyrite at 278'10". Infrequent minute sphalerite blebs in black shale, bedding 90°.					

Drilled by S.A. Mines Dept. Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0055

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
310'2"	311'4"	14"			5265	88	58	220	0.7	Massive fissile dolomitic black shale - no separation of 2 types, trace pyrite on bedding, bedding 90°.					
311'4"	312'3"	11"			5266	30	60	120	0.6						
312'3"	313'10"	19"			5267	46	58	320	0.7						
313'10"	314'0"	2"			5268	24	56	360	0.9	Pale grey dolomitic shale showing 1 massive 1/8" band framboidal pyrite at 313'11".					
314'0"	314'10"	10"			5269	84	60	410	0.7	Massive fissile black shale with frequent narrow and diffuse dolomitic shale bands throughout, 1 x 1/8" band pyrite with sphalerite at 314'1½", bedding 90°.					
314'10"	315'3"	5"			5270	70	56	1100	1.0	Fissile black shale with several ½" - 1" bands dolomitic shale with pyrite and sphalerite on 0° joints. Also sphalerite in blebs throughout black shale.					
315'3"	316'6"	15"			5271	28	58	300	0.8	Massive fissile black shale with infrequent narrow and diffuse dolomitic shale bands. No mineralisation observed, fractures irregular - poor jointing, bedding 90°.					
316'6"	317'4"	10"			5272	30	60	410	0.9	Alternating ½" - 1" bands dolomitic black shale and sharp ¼" - ½" bands dolomitic shale, 0° joints show some sphalerite associated with dolomitic bedding, showing some distortion.					
317'4"	317'7"	3"			5273	46	50	1300	1.4	Massive dolomitic shale with only 1 narrow band black shale 0° joints filled with sphalerite and calcite, bedding 90°.					
317'7"	318'11"	16"			5274	38	56	200	1.0	Alternating ½" - 1" bands fissile black shale and sharp 1/8" - ¼" bands dolomitic shale. Small blebs sphalerite in dolomite - much framboidal pyrite in bedding, bedding 90°.					
318'11"	320'10"	23"			5275	36	68	70	0.6	Massive fissile black shale. No dolomitic shale. No mineralisation observed, bedding 90° - 70°.					
320'10"	321'6"	8"			5276	40	36	58	1.0	Alternating fissile black shale and broken pulled apart sharp 1/8" band dolomitic shale bedding in dolomite much distorted, varies between 90° - 60°. No mineralisation observed.					
321'6"	322'4"	10"			5277	20	28	130	1.2	Alternating narrow bands fissile black shale and narrow sharp bands dolomitic shale, bedding even and between 90° - 80° no mineralisation.					
322'4"	323'5"	13"			5278	22	46	46	1.2	Complete mixture of black shale and broken, cascaded dolomitic shale fragments, bedding ? apparent between 60° and 90°, dolomite often porous - with some sphalerite and pyrite.					
323'5"	323'10"	5"			5279	52	46	34	1.2	Alternating dark grey dolomitic black shale and broken up, but still bedded, porous dolomitic shale, bedding 70°.					
323'10"	324'11"	13"			5280	34	56	60	0.8	Massive fissile black shale. No dolomitic shale, bedding 80°, no mineralisation.					

Drilled by S. A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD. 2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
292'10"	293'6"	8"			5245	26	72	250	0.9	Massive fissile black shale with no mineralisation observed, bedding 90°.					
293'6"	294'2"	8"			5246	38	70	580	1.0	Alternating 1" bands fissile black shale and ½" bands diffuse dolomitic shale. Pyrite and sphalerite on joints and bedding, possible chalcopyrite on joint planes.					
294'2"	295'1"	11"			5247	40	80	330	0.6	Massive fissile laminated black shale showing trace pyrite but					
295'1"	296'3"	4"			5248	34	80	150	0.6	no other mineralisation, bedding 90°.					
296'3"	296'6"	3"			5249	92	78	1300	1.1	Alternating 1" bands fissile black shale and ½" diffuse bands dolomitic shale. Showing trace sphalerite in black shale, also with pyrite on 0° joints.					
296'6"	297'3"	9"			5250	46	68	420	0.9	Alternating 1" bands fissile black shale and sharp 1/8" bands dolomitic shale and 1" bands dolomitic shale at 297'1" - 2" dolomite shows pull apart structures, sphalerite, possible chalcopyrite and trace galena in dolomite.					
297'3"	298'9"	18"			5251	56	68	150	0.7	Massive fissile black shale. No dolomite, bedding 90°. Considerable sphalerite on 30° joints, pyrite on bedding					
298'9"	299'3"	6"			5252	44	66	410	0.4	Alternating ½" bands fissile black shale and 1" bands diffuse dolomitic shale, common sphalerite in 0° calcite veins and pyrite also on bedding planes					
299'3"	300'4"	13"			5253	30	62	250	0.7	Massive well laminated fissile black shale with infrequent					
300'4"	301'6"	14"			5254	78	60	250	0.7	narrow and diffuse bands of dolomitic shale, bedding 90°.					
301'6"	302'8"	14"			5255	36	62	170	0.5	Very rare 1/16" blebs sphalerite in black shale and pyrite					
302'8"	304'1"	17"			5256	26	60	150	0.7						
304'1"	305'2"	13"			5257	22	58	150	0.7	Rare					
305'2"	306'0"	8"			5258	26	62	130	0.6						
306'0"	306'6"	6"			5259	64	56	320	1.0	Complete mixture of 90° bedded fissile black shale and slumped flakes and pulled apart sections of diffuse and dolomitic shale. Some chalcopyrite in black shale. No sphalerite observed.					
307'2"	308'0"	10"			5261	50	64	150	0.5	Massive fissile black shale, bedding 90°, no mineralisation observed. Infrequent narrow and diffuse dolomite bands					
306'6"	307'2"	8"			5260	26	60	130	0.5	Continuous fissile black shale with several pale grey dolomitic black shale zones. Massive pyrite on bedding. No other mineralisation observed.					
308'0"	308'5"	5"			5262	74	62	130	0.5	Massive fissile black shale, bedding 90°, no mineralisation					
308'5"	309'11"	18"			5263	26	60	130	0.8	observed. Infrequent narrow and diffuse dolomitic bands.					
309'11"	310'2"	3"			5264	30	64	120	0.8	Massive fissile black shale with 4 sharp narrow bands of dolomitic shale in last 1½" and 1 band at 309'11" - contain pyrite and trace sphalerite, bedding 90°.					

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Drilled by S. A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD. 2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
338'3"	338'7"	4"			5295	30	60	96	0.9	Near massive fissile black shale showing 1 ½" band diffuse dolomitic shale at 338'4½". Dolomitic shale sandy, bedding 90°.					
338'7"	339'3"	8"			5296	22	42	220	1.6	Complete mixture of black shale and sandy dolomitic fragments and flakes. Slumping evident, bedding 60°, much vein calcite, no mineralisation.					
339'3"	340'0"	9"			5297	30	60	140	1.1	Alternating 1" bands fissile black shale and 1/8" - ¼" bands diffuse dolomitic shale. Much framboidal pyrite in bedding, bedding < 90°.					
340'0"	341'10"	20"			5298	22	50	180	1.3	Alternating ½" bands fissile black shale and sharp ½" bands sandy dolomitic shale. Bedding distorted but generally 90°, no mineralisation.					
341'10"	342'3"	5"			5299	48	56	300	1.0	Near massive fissile black shale with infrequent narrow diffuse bands dolomitic shale, bedding <90°, pyrite in bedding and trace sphalerite in dolomite.					
342'3"	343'4"	13"			5300	36	62	74	0.8	Massive fissile black shale. No dolomite. Some pyrite on bedding, bedding < 90°.					
343'4"	344'4"	12"			5301	30	58	170	1.0	Massive fissile black shale with irregular ¼" bands sharp dolomitic shale with some pyrite on bedding, some distortion of beds, but generally 90°.					
344'4"	344'8"	4"			5302	38	56	150	1.3	Alternating 1" bands fissile black shale with ¼" bands dolomitic shale. Considerable pyrite in black shale, dolomite sandy, bedding < 90°.					
344'8"	345'0"	4"			5303	32	60	140	0.8	Massive fissile black shale with 3 1/8" bands diffuse dolomitic shale 1" apart, no mineralisation, bedding 90°.					
345'0"	345'10"	10"			5304	32	58	150	1.0	Alternating ½" - 1" bands fissile black shale and ¼" - ½" bands dolomitic shale. Some distortions in bedding but generally 90°, possible sphalerite in 0° joints.					
345'10"	346'6"	8"			5305	30	58	72	1.1	Alternating 1" bands dolomitic black shale and ½" - 1" bands dolomitic shale. Some sphalerite in 0° joints. Bedding 70°.					
346'6"	347'2"	8"			5306	30	60	64	1.0	Massive fissile black shale with few narrow and diffuse bands dolomitic shale. Much framboidal pyrite on bedding, bedding 90°.					
347'2"	349'1"	23"			5307	140	64	88	1.1	Massive fissile black shale. Some pyrite - no dolomitic shale, bedding 90°.					
349'1"	350'3"	14"			5308	32	52	150	1.2	Fissile black shale with few ½" diffuse bands dolomitic shale showing slight deformation. No mineralisation seen, bedding between 80° - 90°.					

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed .....

No. of Hole L.D. 2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0058

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
324'11"	326'6"	19"			5281	62	58	94	1.0	Alternating $\frac{1}{2}$" - 1" bands fissile black shale and sharp $\frac{1}{4}$" - $\frac{1}{2}$" bands dolomitic shale, dolomitic shale porous, no mineralisation bedding 90°.					
326'6"	327'6"	12"			5282	32	50	210	1.3	Highly fissile $\frac{1}{4}$" black shale bands alternating with $\frac{1}{4}$" porous dolomitic shale bands. Trace pyrite only, bedding 90°.					
327'6"	328'2"	8"			5283	30	52	250	1.2	Alternating 1" bands fissile black shale and $\frac{1}{4}$" bands dolomitic shale, trace pyrite and rare minute blebs sphalerite, bedding < 90°.					
328'2"	329'0"	10"			5284	36	60	140	0.9	Fissile black shale with infrequent narrow diffuse dolomitic shale bands and more frequent $\frac{1}{16}$" dolomitic bands inter-laminated with black shale. No mineralisation observed, bedding 90°.					
329'0"	330'1"	13"			5285	20	42	210	1.2	Alternating sharp $\frac{1}{2}$" dolomitic shale bands and $\frac{1}{2}$" fissile black shale bands. Dolomite shows some disruption. Disseminated pyrite and some sphalerite blebs, bedding 90°.					
330'1"	331'1"	12"			5286	32	58	150	1.0	Alternating broad bands fissile black shale and $\frac{1}{8}$" - $\frac{1}{4}$" bands dolomitic shale showing some disruption. Trace pyrite only, dolomite porous, bedding between 90° - 80°.					
331'1"	331'7"	6"			5287	68	72	110	0.8	Near massive fissile black shale with very diffuse < $\frac{1}{16}$" bands dolomitic shale throughout, bedding 90°.					
331'7"	332'3"	8"			5288	36	56	140	1.4	Alternating $\frac{1}{2}$" bands fissile black shale and $\frac{1}{2}$" bands dolomitic shale with near massive dolomitic shale in last 3". Much calcite on bedding, some pyrite.					
332'3"	333'4"	13"			5289	42	58	160	1.0	Near massive fissile black shale with infrequent narrow - diffuse sandy dolomitic shale bands. Some pyrite and trace sphalerite in dolomite, bedding 90°.					
333'4"	334'0"	8"			5290	28	50	190	1.2	1" bands massive fissile black shale separated by groups of $\frac{1}{8}$" sharp dolomitic shale bands, dolomite sandy, some pyrite bedding 90°.					
334'0"	335'3"	15"			5291	24	52	230	1.2	Alternating $\frac{1}{2}$" bands fissile dolomitic black shale and sharp $\frac{1}{4}$" bands dolomitic shale, considerable disseminated pyrite, bedding 90°.					
335'3"	336'6"	15"			5292	36	62	92	0.8	Near massive fissile black shale with few diffuse very sandy pyritic dolomitic shale bands, bedding 90°.					
336'6"	337'10"	16"			5293	42	62	130	0.8	Near massive fissile black shale with infrequent narrow and diffuse bands dolomitic shale, bedding 90°, trace pyrite.					
337'10"	338'3"	5"			5294	22	50	150	1.3	Alternating $\frac{1}{2}$" - 1" bands fissile black shale and 2" bands massive dolomitic shale, trace pyrite, bedding < 90°.					

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt, Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0059

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag			Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
363'8"	364'1"	5"			5324	38	58	130	1.0			Alternating 1" bands fissile black shale and groups of 2 or 3 1/8" bands dolomitic shale. Dolomitic shale sandy and contains pyrite, bedding 80°.					
364'1"	364'6"	5"			5325	32	56	110	0.9			Massive fissile black shale. Bedding 80°. No dolomitic shale, no mineralisation.					
364'6"	365'0"	6"			5326	24	52	120	1.3			Mixture of roughly bedded black shale and completely disrupted cascaded dolomitic shale fragments with trace sphalerite and large chunks crystalline calcite. Bedding? 80°.					
365'0"	365'9"	9"			5327	34	58	88	1.1			Massive black shale and few narrow and diffuse bands sandy dolomitic shale. Bedding 80°, no mineralisation.					
365'9"	367'6"	21"			5328	38	58	170	0.9			Fissile black shale, frequent bands dolomitic shale, 1" band dolomitic shale at 365'6" with filimentous vertical sphalerite veins, also small blebs sphalerite throughout dolomite.					
367'6"	368'3"	9"			5329	26	52	150	1.2			Alternating ½" bands porous pyritic dolomitic shale and ¼" to ½" bands pyritic black shale. Bedding 80°. Some sphalerite in dolomitic shale.					
368'3"	368'8"	5"			5330	28	56	88	1.0			Well laminated fissile black shale. Bedding 80°. 2 ½" bands sandy dolomite at 368'5" - 368'6½". Some pyrite only.					
368'8"	369'3"	7"			5331	26	52	78	1.3			Alternating ¼" bands sandy dolomitic shale and ¼" bands fissile black shale. Trace sphalerite blebs in black shale and pyrite on bedding plaines. Bedding 75 - 80°.					
369'3"	371'0"	9"			5332	40	60	56	0.8			Massive well bedded fissile black shale. No dolomitic shale. Pyrite on bedding. Bedding 80°.					
371'0"	371'6"	6"			5333	42	56	64	1.0			Alternating ¼" - ½" black shale bands and diffuse 1/16" - 1/8" dolomitic shale bands. Bedding 85°. Some disruption of dolomitic shale beds. No mineralisation.					
371'6"	373'0"	18"			5334	22	48	48	1.6			Alternating ¼" bands fissile black shale and sharp ¼" bands dolomitic shale, sphalerite in filimentous vertical veins and bleb in dolomitic shale, Bedding 75 - 80°. Considerable disruption of dolomitic shale.					
373'0"	373'9"	9"			5335	40	56	62	1.1			Massive fissile black shale with regular 1/8" bands dolomitic shale every ½" - 1". Dolomitic shale much disrupted. Small blebs sphalerite and pyrite in dolomitic shale. Bedding 80°.					
373'9"	375'2"	17"			5336	32	54	52	0.9			As above					
375'2"	375'5"	3"			5337	32	50	42	1.5			Massive disrupted dolomitic shale with infrequent 1/8" bands black shale. Dolomitic shale porous and unmineralised, bedding 80°.					

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD. 2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S Bearing Vertical Inclination 90°

0060

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag			Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
350'3"	351'5"	14"			5309	32	54	150	1.1			Fissile black shale with regular 1/8" - ½" bands dolomitic shale showing 0° veins sphalerite. Some pyrite in black shale, bedding 90°.					
351'5"	352'2"	9"			5310	32	54	140	1.2			Alternating fissile black shale and ¼" bands sandy dolomitic shale showing some disruption of bedding. Bedding between 80° - 90°, no mineralisation					
352'2"	352'9"	7"			5311	30	46	150	1.4			Alternating fissile black shale and sharp ¼" bands sandy dolomitic shale. Dolomite somewhat disrupted, bedding 70° - 90°. Trace sphalerite in black shale.					
352'9"	353'2"	5"			5312	30	50	160	1.4			As before but dolomitic shale very sandy - in ½" bands beds at 70°.					
353'2"	353'5"	3"			5313	70	56	140	0.9			Alternating 1" bands fissile black shale, 1/8" bands rather diffuse dolomitic shale, bedding 90°, no mineralisation.					
353'5"	354'4"	11"			5314	36	70	52	0.9			Massive fissile black shale. Bedding 70° pyrite on bedding, no dolomitic shale.					
354'4"	355'0"	8"			5315	48	30	140	1.2			Near massive fissile black shale with infrequent diffuse 1/8" bands dolomitic shale at 60°. Broken cascaded - large masses coarsely crystalline calcite, no mineralisation					
355'0"	356'3"	15"			5316	24	50	56	1.3			Alternating ½" bands black shale and ½" - 1" bands porous dolomitic shale at 60°. Some blebs crystalline calcite.					
356'3"	356'6"	3"			5317	44	64	54	0.9			Massive fissile black shale with 70° bedding. No dolomite, no mineralisation.					
356'6"	357'3"	9"			5318	44	66	58	0.9			Massive fissile black shale. Bedding 80°. No mineralisation, no dolomite.					
357'3"	358'1"	10"			5319	34	58	130	1.2			Alternating 1" bands fissile black shale and sharp ¼" bands dolomitic shale. Bedding 80°, framboidal pyrite on bedding.					
358'1"	359'6"	15"			5320	28	52	250	1.3			Massive bedded dolomitic shale alternating with frequent 1/8" and few ½" bands fissile black shale. Some calcite, pyrite and trace sphalerite, bedding 80°.					
359'6"	360'3"	9"			5321	40	56	130	0.9			Massive fissile black shale with few 1/8" diffuse bands dolomitic shale with trace sphalerite. Bedding 80°, pyrite in black shale.					
360'3"	362'2"	23"			5322	36	60	64	0.8			Massive fissile black shale. No dolomite, bedding 80°, framboidal pyrite on bedding.					
362'2"	363'8"	18"			5323	28	54	200	1.2			Alternating 1" - 2" bands fissile black shale and ½" - 1" bands distorted and porous dolomitic shale. Pyrite and trace sphalerite in black shale.					

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed .....

No. of Hole LD. 2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0061

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag			Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
389'4"	389'9"	5"			5352	-	-	-	-			Alternating $\frac{1}{2}$" - 1" bands wavy, distorted beds dolomitic shale. Bedding 70° and $\frac{1}{8}$ - $\frac{1}{2}$" bands fissile black shale. Some pyrite.					
389'9"	390'0"	3"			5353	30	60	100	1.0			Alternating fissile black shale in $\frac{1}{2}$" - $\frac{3}{4}$" bands and sharp $\frac{1}{16}$" - $\frac{1}{2}$" bands, dolomitic shale. Bedding 80°, no mineralisation.					
390'0"	390'6"	6"			5354	24	56	200	0.9			Three alternating 2" bands - 2 dolomitic shale and 1 fissile black shale, bedding 80°. Dendritic calcite on bedding planes, no sulphides.					
390'6"	391'1"	7"			5355	32	56	350	1.1			Alternating $\frac{1}{2}$" bands fissile black shale and $\frac{1}{4}$" bands sandy dolomitic shale. Calcite on joints. No sulphides, Bedding 80°.					
391'1"	391'10"	9"			5356	36	70	110	0.7			Massive fissile black shale. No dolomitic shale. No sulphides bedding 80°.					
391'10"	392'11"	13"			5357	38	64	290	0.8			Massive fissile black shale with $\frac{1}{4}$" bands sandy dolomitic shale every 2" - 3". Bedding 80°. No mineralisation observed.					
392'11"	395'2"	27"			5358	34	62	300	1.2			Alternating $\frac{1}{8}$" - 1" bands sandy dolomitic shale and $\frac{1}{4}$" - 1" bands fissile black shale. Bedding wavy 80°, pyrite on joints, some sphalerite in dolomitic shale.					
395'2"	396'6"	16"			5359	36	70	140	0.9			Massive fissile black shale with rare $\frac{1}{16}$" bands diffuse dolomitic shale. Some dendritic calcite on joints. Bedding 80°.					
396'6"	397'10"	16"			5360	30	60	190	1.1			Alternating 1" - 2" bands fissile black shale and sharp $\frac{1}{4}$" bands sandy dolomitic shale. Much pyrite on black shale bedding and 30° joints.					
397'10"	398'3"	5"			5361	30	54	290	1.4			Alternating 1" bands distorted and broken sandy dolomitic shale and 1" - 2" bands fissile black shale. Bedding 80°, no mineralisation.					
398'3"	399'0"	9"			5362	26	56	200	1.3			Alternating $\frac{1}{4}$" bands wavy sandy dolomitic shale and $\frac{1}{4}$" - $\frac{1}{2}$" bands fissile black shale. Pyrite in vugs in dolomitic shale. Bedding 80°.					
399'0"	399'11"	11"			5363	26	58	120	1.1			Massive fissile black shale with regular $\frac{1}{2}$" bands diffuse dolomitic shale decreasing in frequency with depth. No mineralisation, Bedding 80°.					
399'11"	400'7"	8"			5364	36	82	130	0.9			Massive fissile black shale containing irregular blocks and pieces of unbedded dolomitic shale. No mineralisation, bedding 80°.					
400'7"	401'0"	5"			5365	38	66	270	1.2			Regular 80° bedded fissile black shale and irregular distorted wavy bedded, sandy dolomitic shale. Pyrite on 30° joints in black shale. Trace sphalerite in dolomite.					

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size ____ % Recovery ____ Surveyed by ____ Instrument Used ____

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed ____

No. of Hole L.D. 2 Location 1.3 miles S.W. of South Pt, Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0062

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
375'5"	375'11"	6"			5338	26	54	50	1.0	Near massive fissile black shale with infrequent diffuse 1/16" - 1/8" bands porous and unmineralised dolomitic shale.					
375'11"	377'4"	17"			5339	30	52	92	1.2	Alternating ¼" - ½" bands fissile black shale and distorted 1/8" - ¼" bands wavy bedded, sandy dolomitic shale, bedding 80°.					
377'4"	379'4"	24"			5340	38	58	68	0.9	Near massive fissile black shale with infrequent diffuse ¼" bands sandy disrupted dolomitic shale. Massive pyrite on bedding, bedding 80°.					
379'4"	380'10"	18"			5341	32	52	140	0.9	Alternating 1" - 2" bands fissile black shale and 1/8" - ¼" bands well bedded sandy dolomitic shale. Sphalerite in vertical veins, bedding 75°.					
380'10"	381'4"	6"			5342	26	52	84	1.1	Alternating wavy ¼" bands fissile black shale and sharp ¼" - 1" bands sandy and wavy dolomitic shale. Pyrite on 10° joints. Bedding 80°.					
381'4"	382'2½"	10½"			5343	46	52	140	0.8	Massive well bedded fissile black shale with regular diffuse 1/8" bands sandy dolomitic shale every ½" - 1", disseminated pyrite in black shale. Trace sphalerite in dolomitic shale, bedding 80°.					
382'2½"	382'7"	4½"			5344	22	48	80	1.3	Alternating ½" - ¼" bands wavy fissile black shale and ¼" - 1" bands wavy, sandy, dolomitic shale. Some pyrite and calcite in dolomite, bedding 70°.					
382'7"	383'9"	14"			5345	34	64	56	0.8	Massive well bedded, fissile black shale. Trace pyrite - small blebs sphalerite along bedding. Bedding 80°.					
383'9"	384'2½"	5½"			5346	34	56	82	0.7	Alternating wavy bedded ¼" bands fissile black shale and ¼" bands disrupted dolomitic shale. Bedding 70°. Trace pyrite.					
384'2½"	385'4"	13½"			5347	36	56	130	0.9	Alternating 1 - 2" bands fissile black shale and frequent 1/8" - ¼" bands slightly wavy well bedded sandy dolomitic sh ale. Bedding 80°.					
385'4"	386'4"	12"			5348	28	52	150	1.2	Alternating ¼" bands fissile black shale and massive ½" bands disrupted sandy dolomitic shale with micro veins and blebs of sphalerite and trace pyrite.					
386'4"	387'1"	9"			5349	34	60	160	0.9	Massive fissile black shale with irregular sharp ¼" bands sandy dolomitic shale. Bedding 80°. No mineralisation.					
387'1"	388'1"	12"			5350	36	70	62	0.8	Massive fissile black shale with 1 sharp ¼" band dolomitic shale at 387'7". Bedding 80°. No mineralisation.					
388'1"	389'4"	15"			5351	28	60	170	0.9	Alternating regular ½" - 1" bands fissile black shale and sharp ¼" bands dolomitic shale singly or in groups of 3 - 4. Bedding wavy but generally 80°. No mineralisation.					

0063

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
414'6"	415'7"	13"			5380	60	96	500	0.9	Massive fissile black shale. Bedding 80°, no mineralisation.					
415'7"	416'11"	16"			5381	38	86	660	1.2	Alternating ¼" - 2" bands fissile black shale and irregular 1/8" - 2" bands sandy dolomitic shale. Pyrite in 0° veins and disseminated in black shale. Bedding 90°.					
416'11"	417'11"	12"			5382	78	100	550	1.0	Massive fissile black shale with few irregular sandy sphaleritic ¼" dolomitic shale bands. Bedding 90°.					
417'11"	419'7"	24"			5383	34	74	600	1.2	Alternating ½" bands fissile black shale and distorted ¼" bands sandy dolomitic shale. No mineralisation, bedding 85°.					
419'7"	420'5"	10"			5384	50	100	820	1.0	Massive fissile black shale. Bedding 90° containing fragments bedded sandy dolomitic shale. No mineralisation. Calcite veins on bedding.					
420'5"	421'10"	17"			5385	32	74	540	1.3	Alternating 1/8" - ¼" bands fissile black shale and 1/8" - ¼" bands of porous, pyritic dolomitic shale, Bedding 85°.					
421'10"	422'1"	3"			5386	60	140	150	1.0	Massive fissile black shale, Bedding 90°. No mineralisation.					
422'1"	423'0"	11"			5387	36	76	740	1.4	Alternating ½" - 1" bands fissile black shale and distorted 1/8" - ½" bands sandy sphaleritic, dolomitic shale. Some interdigitating of beds, Bedding wavy 80 - 85°					
423'0"	423'6"	6"			5388	44	82	270	1.2	Massive fissile black shale with 3-¼" bands dolomitic shale in middle. No mineralisation, bedding 80°.					
423'6"	424'5"	11"			5389	32	72	320	1.4	Alternating 1" bands fissile black shale and ½" distorted bands broken and wavy dolomitic shale. Strong 30° joints. No mineralisation, Bedding 80°.					
424'5"	425'5"	12"			5390	52	92	170	0.9	Massive fissile black shale. Some crystalline calcite. No other mineralisation. Bedding 80°.					
425'5"	426'3"	12"			5391	14	30	230	1.8	Massive unbedded porous calcitic dolomitic shale. Large calcite crystals. 2% disseminated pyrite. Strong 60° jointing.					
426'3"	427'1"	10"			5392	26	36	190	1.4	Delicate wavy interbedded and interdigitating slumped, micro-faulted 1/16" bands black shale and 1/8" bands dolomitic shale. Slickensiding on bedding planes, Bedding 70°.					
427'1"	427'9"	8"			5393	28	70	840	1.4	As above but bands wider. Interbedded 1/8" bands black shale and ½" bands dolomitic shale. Dolomite makes up 80% of section. Some sphalerite in dolomitic shale. Bedding 70°.					
427'9"	429'2"	17"			5394	34	78	740	1.3	Alternating ½" bands sandy distorted micro faulted sphaleritic dolomitic shale and 1/8" bands fissile black shale. Bedding 70°.					
429'2"	429'9"	7"			5395	18	56	680	1.6	Alternating 1" bands sandy sphaleritic pyritic dolomitic shale and 1/16" - 1/8" bands sphaleritic fissile black shale. Bedding 70°					

0064

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt, Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag			Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
401'0"	402'9"	21"			5366	30	70	230	1.1			Regular alternating $\frac{1}{2}$" bands fissile black shale and $\frac{1}{4}$" bands well bedded, sandy dolomitic shale. Bedding wavy, generally 80°.					
402'9"	403'8"	11"			5367	40	86	140	0.8			Massive fissile black shale with irregular widely spaced $\frac{1}{4}$" bands well bedded dolomitic shale. Bedding 80°. No mineralisation.					
403'8"	404'3"	7"			5368	32	72	120	1.1			Poorly bedded fissile black shale containing a roughly bedded assortment of broken pieces dolomitic shale. No mineralisation.					
404'3"	405'5"	14"			5369	38	74	150	1.0			Alternating well bedded fissile black shale and poorly but evenly bedded, somewhat broken, $\frac{1}{4}$" bands dolomitic shale. No mineralisation, bedding 80°.					
405'5"	406'0"	7"			5370	24	34	100	1.2			Unbedded zone of assorted smashed dolomitic shale fragments at all angles - very roughly bedded - a conglomerate? Massive crystalline calcite on 70° joints. Large calcite lined vughs. Structureless. Trace sphalerite in dolomite.					
406'0"	406'10"	10"			5371	40	72	220	1.1			Poorly bedded alternating $\frac{1}{2}$" bands smashed dolomitic shale and $\frac{1}{2}$" - 1" bands fissile black shale. Well developed 40° joints, no mineralisation, bedding 80°.					
406'10"	407'8"	10"			5372	40	92	290	1.0			Massive black shale with few narrow irregular diffuse sandy pyritic dolomitic shale bands - bedding 90°.					
407'8"	409'2"	18"			5373	32	70	320	1.2			Alternating well bedded 1" bands fissile black shale and $\frac{1}{8}$" - $\frac{1}{4}$" bands sandy calcitic, dolomitic shale. No mineralisation, Bedding 90°.					
409'2"	410'3"	11"			5374	30	66	310	1.3			Alternating 1" - 2" bands fissile black shale and $\frac{1}{2}$" - 1" bands sandy dolomitic shale with severallarge sphaleritic calcite blebs Bedding wavy - 80°.					
410'3"	410'8"	5"			5375	48	96	220	0.7			Massive fissile black shale. Calcite "skins" on bedding planes No other mineralisation, bedding 80°.					
410'8"	412'3"	19"			5376	40	60	440	1.2			Regular alternating well bedded $\frac{1}{2}$" bands fissile black shale and $\frac{1}{4}$" - $\frac{1}{2}$" bands sandy dolomitic shale containing sphalerite blebs. Bedding 80°.					
412'3"	412'8"	5"			5377	46	100	190	0.9			Massive well bedded fissile black shale. Bedding 90°. No mineralisation.					
412'8"	414'1"	17"			5378	30	64	500	1.2			Alternating $\frac{1}{4}$" - $\frac{1}{2}$" bands fissile black shale and irregular $\frac{1}{16}$" - $\frac{1}{4}$" bands, disrupted sandy dolomitic shale. No mineralisation. Bedding 80°.					
414'1"	414'6"	5"			5379	46	96	540	1.0			Massive fissile black shale containing bedded chips of broken ~~dolomitic shale with disseminated pyrite. Bedding 85°~~					

0065

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD. 2 Location 1.3 miles S.W. of South Pt, Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
439'6"	440'5"	11"			5412)	32	80	430	1.6	Alternating 1/8" - ¼" bands fissile black shale and 1/8" - 1" bands sandy pyritic sphaleritic dolomitic shale showing intricate faulting and folding structures. Sphalerite in 60° veins, Bedding 85°.					
440'5"	441'8"	15"			5413)	42	86	340	1.6						
441'8"	442'10"	14"			5414)	38	86	430	1.7						
442'10"	443'8"	10"			5415)	40	86	250	1.5						
443'8"	444'7"	11"			5416)	40	76	500	1.4						
444'7"	445'4"	9"			5417)	38	84	220	1.4						
445'4"	446'6"	14"			5418)	36	80	540	1.4						
446'6"	447'6"	12"			5419)	36	82	640	1.6						
447'6"	448'9"	15"			5420	46	160	820	1.2	Massive fissile black shale frequently minutely step-faulted - contains sphalerite in 0° veins. Infrequent narrow concordant 1/16" calcite veins. Bedding 85°.					
448'9"	449'11"	14"			5421)	34	82	1100	1.7	Alternating massive dolomitic black shale and diffuse, finely step faulted and fissured pyritic calcitic dolomitic shale. 0° sphaleritic calcite veins. Blebs sphalerite in black shale. Weak 30° joints.					
449'11"	450'7"	8"			5422)	26	50	400	1.6						
450'7"	451'0"	5"			5423)	36	88	320	1.0						
451'0"	452'4"	16"			5424)	40	92	260	0.9	Near massive fissile black shale. Unmineralised. Rare diffuse dolomitic zones. Bedding 90°. Generally unfolded.					
452'4"	453'6"	14"			5425)	38	86	240	0.9						
453'6"	454'10"	16"			5426)	40	88	300	0.6						
454'10"	455'10"	12"			5427)	38	82	760	0.8						
455'10"	457'4"	18"			5428)	46	96	410	1.2						
457'4"	457'9"	5"			5429)	40	86	340	1.5						
457'9"	459'4"	19"			5430)	40	82	380	1.4						
459'4"	460'4"	12"			5431)	44	86	420	1.4						
460'4"	461'11"	19"			5432	42	86	660	1.5	Massive well laminated fissile black shale showing rare 1" bands dolomitic black shale. Unmineralised. Bedding 90°.					
461'11"	462'7"	8"			5433	42	84	370	1.6	Alternating 1" bands dolomitic black shale and narrow zones lighter material grading into dolomitic shale. Bedding 85° - 90°.					
462'7"	463'8"	13"			5434	56	80	780	1.3	Massive well laminated fissile black shale with trace sphalerite as streaks on bedding planes. Bedding 90°.					
463'8"	464'4"	8"			5435	34	100	330	1.7	Alternating 1" bands fissile black shale and diffuse 1" zones dolomitic shale showing disseminated pyrite (2%), Bedding 80°.					
464'4"	464'11"	7"			5436	52	140	540	1.1	Massive fissile black shale. Unmineralised, Bedding 90°.					
464'11"	465'11"	12"			5437)	38	80	290	1.3	Alternating 1" - 2" bands dolomitic black shale and diffuse ¼" bands sandy dolomitic shale. Bedding 90°.					
465'11"	466'9"	10"			5438)	40	90	340	1.3						
466'9"	467'6"	9"			5439	40	86	240	1.5	Alternating 2" bands fissile black shale and ¼" - ½" bands unmineralised, sandy, dolomitic shale. Bedding 90°.					

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt, Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

9900

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
429'9"	430'4"	7"			5396	32	80	170	1.3	Alternating 1" bands delicately folded and microfaulted dolomitic shale and ½" bands fissile black shale, Bedding 75°.					
430'4"	430'10"	6"			5397	36	94	580	1.3	Alternating 1" bands fissile black shale containing fragments bedded dolomitic shale and 2" - 3" composite bands micro-faulted pyritic dolomitic shale, Bedding 75°.					
430'10"	431'5"	7"			5398	62	190	260	1.1	Massive unmineralised fissile black shale with infrequent interbedded calcite veins, Bedding 75°.					
431'5"	432'1"	8"			5399	34	84	160	1.2	Alternating ½" - 1" bands sandy pyritic pulled-apart dolomitic shale and ¼" - ½" bands interdigitating sphaleritic fissile black shale.					
432'1"	432'9"	8"			5400	30	64	56	1.6	Near massive tightly folded unmineralised dolomitic black shale separated by very thin laminae calcite or black shale, Bedding 80°.					
432'9"	433'6"	9"			5401	32	72	220	1.3	Alternating 1/8" bands tightly folded, interdigitating fissile black shale and 1/8" bands dolomitic shale, Bedding 70°.					
433'6"	433'9"	3"			5402	22	64	700	1.7	Near massive, bedded, unmineralised dolomitic shale with frequent 1/16" bands black shale. Bedding 70°.					
433'9"	435'3"	18"			5403	42	80	420	1.3	Alternating ½" - 1" bands sphaleritic fissile black shale and 1" bands sphaleritic dolomitic shale. Bedding 70°.					
435'3"	436'1"	10"			5404	48	94	160	1.2	Alternating strongly and tightly folded slumped 1" bands calcitic dolomitic shale and wavy bedded fissile black shale. Bedding ? 60°.					
436'1"	437'0"	11"			5405	38	86	480	1.3	Mixture of dolomitic shale fragments in black shale matrix. Massive slumping and tight folding. Strong 20° jointing.					
437'0"	437'3"	3"			5406	46	110	190	1.3	As above but less contorted. Bedding 50°.					
437'3"	437'7"	4"			5407	48	110	680	1.4	Massive folded black shale alternating with vughy blocks unbedded pyritic calcitic dolomitic shale.					
437'7"	437'10"	3"			5408	98	150	120	0.9	Massive pyritic black shale. Bedding 85°. Weak 45° jointing.					
437'10"	438'4"	6"			5409	52	120	740	1.2	Poorly bedded ½" bands unmineralised black shale, interdigitating with ½" bands wavy bedded broken dolomitic shale. Bedding 80°.					
438'4"	439'0"	8"			5410	30	82	490	1.8	Massive unbedded pyritic, calcitic sandy dolomitic shale, Strong 50° jointing? Bedding?					
439'0"	439'6"	6"			5411	80	200	210	1.0	Massive fissile black shale. Bedding 50°. Rare narrow bands concordant pyritic calcite.					

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole L.D.2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0067

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
498'5"	499'5"	12"			5472)	46	90	190	1.5	Uniform well laminated fissile black shale with regular indefinite zones of lighter colored dolomitic black shale and rare ½" bands sharply defined dolomitic shale. Pyrite on bedding planes of black shale. Bedding 90°.					
499'5"	500'6"	13"			5473)	34	82	270	1.4						
500'6"	501'6"	12"			5474)	38	86	180	1.4						
501'6"	502'8"	14"			5475)	83	86	190	1.4						
502'8"	503'4"	8"			5476)	40	92	170	1.3						
503'4"	504'3"	11"			5477	30	76	230	1.6	Massive fissile black shale with zones of lighter colored dolomitic material and 3 ½" bands dolomitic black shale between 503'7" and 503'10". Otherwise as above.					
504'3"	505'3"	12"			5478)	40	88	170	1.3	Uniform fissile black shale with few narrow or indefinite paler zones and rare sharp 1/8" bands dolomitic shale. Some pyrite on bedding of black shale. Bedding 90°.					
505'3"	506'7"	16"			5479)	36	88	150	1.3						
506'7"	506'11"	4"			5480	40	78	160	1.7	Alternating ½" bands fissile black shale separated by extremely narrow bands dolomitic shale. A 1½" section of unbedded homogeneous dolomitic shale from 506'7" - 506'8". Bedding 90°.					
506'11"	507'9"	10"			5481)	36	90	150	1.2	Massive fissile black shale with irregular, frequent, narrow zones dolomitic shale and few broader zones dolomitic shale. Pyrite on bedding planes of black shale. Bedding 90°.					
507'9"	508'5"	8"			5482)	38	90	130	1.3						
508'5"	508'8"	3"			5483	30	72	48	1.8	Near massive dolomitic shale. Bedding very poor, fissility poor. No mineralisation. Bedding ? 90°.					
508'8"	509'7"	11"			5484)	38	88	120	1.3	Near massive dolomitic black shale with frequent narrow zones paler dolomitic shale with indefinite boundaries. No mineralisation. Bedding 90°.					
509'7"	510'6"	11"			5485)	38	88	120	1.4						
510'6"	511'10"	16"			5486)	34	84	100	1.4						
511'10"	513'0"	14"			5487)	72	92	140	1.3						
513'0"	514'0"	12"			5488	28	82	98	1.6	Dolomitic black shale with paler dolomitic zones making up 60% of core as 1" zones, separated by ½" - 1" bands dolomitic black shale. No mineralisation. Bedding 90°.					
514'0"	515'0"	12"			5489)	32	88	110	1.4	Highly dolomitic rock in 2" - 3" zones separated by many ½" - 1" zones fissile black shale. Dolomite massive and unfissile. Bedding 80°. No mineralisation observed.					
515'0"	516'9"	21"			5490)	30	86	100	1.3						
516'9"	517'11"	14"			5491	26	42	200	2.2	Fragmented mass of black shale and dolomitic shale chips with probable affinities to 5490. No mineralisation observed.					

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0068

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays - Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
467'6"	468'1"	7"			5440	40	84	280	1.5	Massive dolomitic black shale. Unmineralised, Bedding 90°.					
468'1"	469'0"	11"			5441	40	86	300	0.9	Massive, fissile well laminated black shale with regular 1/8" - ½" zones of pale dolomitic black shale. Some coarse framboidal pyrite on bedding planes. No other sulphides. Bedding 85°.					
469'0"	469'10"	10"			5442	46	88	320	0.9						
469'10"	470'10"	12"			5443	40	80	260	1.3						
470'10"	471'9"	11"			5444	38	80	240	1.4						
471'9"	472'9"	12"			5445	40	76	220	1.3						
472'9"	473'9"	12"			5446	42	76	290	1.4						
473'9"	474'9"	12"			5447	42	76	260	1.3						
474'9"	475'9"	12"			5448	46	84	140	1.4						
475'9"	476'9"	12"			5449	44	84	150	1.4						
476'9"	478'5"	8"			5450	38	82	140	1.2						
478'5"	479'9"	16"			5451	40	88	130	1.2	Massive fissile well laminated black shale with zones of paler dolomitic black shale as above and rare 1/8" - ¼" bands sharply defined unmineralised dolomitic shale. Bedding angle 85°.					
479'9"	480'4"	7"			5452	34	88	240	1.2						
480'4"	481'3"	11"			5453	36	94	370	1.5						
481'3"	482'3"	12"			5454	34	94	370	1.7						
482'3"	483'4"	13"			5455	38	98	300	1.3						
483'4"	484'0"	8"			5456	30	102	76	1.7	Near massive pale dolomitic shale with groups of 5 or 6 1/8" bands black shale, spaced regularly every 3" - 4". No mineralisation observed. Bedding 85°.					
484'0"	485'0"	12"			5457	28	80	50	1.8						
485'0"	485'11"	11"			5458	24	82	42	2.0						
485'11"	486'3"	4"			5459	44	130	54	1.1	Massive well laminated fissile black shale. No dolomitic shale no mineralisation, Bedding 85°.					
486'3"	486'10"	7"			5460	20	56	100	2.2	Massive poorly bedded homogeneous dolomitic shale. Irregular darker zones at 80° probably indicate bedding. No mineralisation observed.					
486'10"	488'5"	19"			5461	38	90	82	1.5	Alternating regular 3" bands fissile black shale and sharp ¼" - ½" bands sandy dolomitic shale. No mineralisation. Bedding 85°.					
488'5"	489'5"	12"			5462	38	88	110	1.4	Uniform fissile black shale with frequent 1/16" - ½" bands, of diffuse dolomitic black shale and rare 1/8" - ¼" bands sharp dolomitic shale. Considerable coarse framboidal pyrite on bedding planes. No other mineralisation observed. Bedding 85°.					
489'5"	490'6"	13"			5463	46	88	180	1.6						
490'6"	491'8"	14"			5464	40	90	210	1.7						
491'8"	492'9"	13"			5465	40	82	220	1.4						
492'9"	493'10"	13"			5466	54	84	250	1.4						
493'10"	494'9"	11"			5467	38	82	220	1.0						
494'9"	495'10"	13"			5468	40	86	270	1.2						
495'10"	496'9"	11"			5469	38	82	230	1.0						
496'9"	497'8"	11"			5470	34	80	210	1.1						
497'8"	498'5"	10"			5471	42	86	190	1.4						

Drilled by S. A. Mines Department Type of Drilling Diamond core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed .....

No. of Hole LD. 2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords. of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

6900

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
544'4"	545'10"	18"			5519	48	58	96	1.6	Near massive poorly bedded poorly fissile dolomitic shale with few narrow darker bands dolomitic black shale. No mineralisation. Bedding 85°.					
545'1"	545'10"	9"			5520)	38	66	200	1.5	Alternating ¼" bands darker fissile black shale and lighter dolomitic black shale and dolomitic shale in 1" zones. Darker 1/16" bands dolomitic black shale throughout dolomitic shale. No mineralisation. Bedding 85° - 90°.					
545'10"	546'9"	11"			5521)	30	66	260	1.7						
546'9"	547'4"	7"			5522)	26	82	270	1.8						
547'4"	548'5"	13"			5523)	36	86	250	1.7						
548'5"	549'6"	13"			5524)	34	82	240	1.2	Banded alternating ½" zones non fissile dolomitic shale and 1/16" - ½" bands fissile black shale. No distinct boundaries. No mineralisation. Bedding 90°.					
549'6"	550'3"	9"			5525)	38	88	210	1.2						
550'3"	551'2"	11"			5526	32	70	120	1.4	Somewhat distorted wavy alternating zones dolomitic shale and bands of dolomitic black shale. No distinct bedding. No mineralisation.					
551'2"	552'5"	15"			5527	48	84	250	1.4	Banded alternating 1" bands dolomitic shale and 1" bands dolomitic black shale with 1/16" bands dolomitic shale throughout black shale. Bedding 90°. No mineralisation.					
552'5"	553'1"	8"			5528)	36	72	220	1.9	As in sample 5526 above. No mineralisation. Bedding ? 90°.					
553'1"	554'1"	12"			5529)	34	94	300	2.1						
554'1"	555'0"	11"			5530	28	72	200	1.8	As in sample 5527 above. Bedding 80°. Trace pyrite on bedding planes.					
555'0"	556'2"	14"			5531	30	64	260	2.3	Near homogeneous grey dolomitic shale. Massive, poorly bedded non fissile except for section 555'9" - 555'11" which shows some traces of darker bedding. Bedding 80°. No mineralisation.					
556'2"	557'5"	15"			5532)	32	88	240	2.2	Alternating narrow bands bedded poorly fissile dolomitic shale and ¼" - ½" bands fissile black shale with intermediate dolomitic black shale bands. No mineralisation. Bedding 80°.					
557'5"	558'5"	12"			5533)	22	160	430	2.5						
558'5"	560'1"	20"			5534	40	330	740	3.2	Wavy roughly bedded alternating black shale and dolomitic shale with much interdigitating of beds. Probable result of current action. Trace pyrite on bedding. Bedding? 80°.					
560'1"	561'2"	13"			5535)	34	220	490	3.0	Well bedded alternating fissile black shale, poorly fissile dolomitic black shale and non fissile dolomitic shale in 1/8" - ¼" units. Some pyrite and calcite on bedding. Bedding 75°.					
561'2"	562'2"	12"			5536)	28	260	320	3.0						
562'2"	563'5"	15"			5537)	38	240	440	3.1						
563'5"	564'5"	12"			5538	34	140	120	2.9	Near solid banded dolomitic shale with rare narrow bands darker dolomitic black shale. Bedding 75°. 0° - 30° calcite veins carry some sphalerite.					
564'5"	564'10"	5"			5539)	30	160	120	2.9	Banded alternating dolomitic and black shale. Some minor faulting and interdigitating of beds, Bedding 75°. Probable current bedding. No mineralisation.					
564'10"	565'10"	12"			5540)	44	200	240	3.1						

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt. Trig. Depth of Hole 600'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

00070

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
517'11"	518'8"	9"			5492)	38	96	380	1.6	Highly dolomitic non-fissile homogeneous zones with diffuse boundaries separated by few narrow black shale bands and many 1" dolomitic black shale bands indicated by slightly darker color. Rare strong 30° jointing often with calcite veins and rare calcite layers in bedding. No other mineralisation observed.					
518'8"	519'8"	12"			5493)	38	82	200	1.6						
519'8"	520'10"	14"			5494)	30	84	200	1.6						
520'10"	522'3"	17"			5495)	24	72	180	1.9						
522'3"	523'5"	14"			5496)	20	72	220	1.9						
523'5"	524'3"	10"			5497)	22	70	68	2.1						
524'3"	525'10"	19"			5498)	34	74	86	1.6						
525'10"	526'10"	12"			5499)	38	76	50	1.4						
526'10"	527'8"	10"			5500)	64	44	60	1.5						
527'8"	528'5"	9"			5501)	42	82	44	1.5						
528'5"	529'1"	8"			5502	50	80	50	1.3	Massive black fissile shale containing few narrow and diffuse dolomitic bands. No mineralisation observed. Bedding 90°.					
529'1"	529'10"	9"			5503)	32	70	48	1.7	Alternating highly dolomitic bands non fissile poorly bedded shale and narrow bands poorly fissile dolomitic black shale. No mineralisation observed. Bedding 90°.					
529'10"	531'0"	14"			5504)	42	86	52	1.4						
531'0"	531'8"	8"			5505	34	70	90	1.7	Banded massive dolomitic, non fissile, poorly bedded shale and ½" bands dolomitic black shale. No mineralisation. Bedding 90°.					
531'8"	532'2"	6"			5506	50	80	120	1.3	Fissile black shale with few narrow bands diffuse dolomitic shale. No mineralisation. Bedding 90°.					
532'2"	532'10"	8"			5507	28	64	36	1.6	1" zones dolomitic black shale, alternating with massive unbedded 1" - 2" bands dolomitic shale. No mineralisation.					
532'10"	534'1"	15"			5508	52	92	60	1.2	Massive laminated fissile black shale with rare narrow bands diffuse dolomitic shale. Bedding 80°. No mineralisation.					
534'1"	535'1"	12"			5509)	44	66	120	1.4	Well laminated banded alternating narrow bands non fissile dolomitic black shale and narrow bands fissile black shale. Bedding 85°. No mineralisation.					
535'1"	536'7"	18"			5510)	30	62	120	1.3						
536'7"	537'5"	10"			5511)	24	60	76	1.4						
537'5"	538'5"	12"			5512)	28	58	52	1.3						
538'5"	539'7"	14"			5513	36	70	52	1.4	Near homogeneous poorly fissile dolomitic black shale with few narrow bands black shale and dolomitic shale. No mineralisation. Bedding 85°.					
539'7"	540'5"	10"			5514	28	70	34	1.7	Near massive unbedded non fissile dolomitic shale with few narrow bands darker dolomitic black shale. No mineralisatinn. Bedding 80 - 85°.					
540'5"	541'7"	14"			5515)	54	84	50	1.4	Alternating zones massive non fissile dolomitic shale and darker dolomitic black shale with 1/16" - 1/8" bands dolomitic black shale throughout. No mineralisation. Bedding 85°.					
541'7"	542'8"	13"			5516)	40	72	48	1.4						
542'8"	543'1"	5"			5517)	30	66	50	1.4						
543'1"	544'4"	15"			5518)	42	72	98	1.4						

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3. miles S.W. of South Pt, Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0071

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag			Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
594'2"	595'3"	11"			5570	200	370	390	5.0			Poorly bedded massive dark dolomitic black shale. Bedding 80°. Thin calcite laminae on bedding.					
595'3"	596'4"	13"			5571)	98	160	410	3.7			Massive poorly bedded, poorly fissile dolomitic shale. Bedding 80°. Weak 60° jointing. No mineralisation.					
596'4"	598'3"	23"			5572)	42	120	80	3.9								
598'3"	599'3"	12"			5573	140	290	390	7.5			Massive poorly bedded non fissile dolomitic shale with rare narrow bands black shale. Bedding 85 - 90°. No mineralisation.					
599'3"	600'2"	11"			5574	190	520	700	13.0			Massive well bedded fissile black shale. Coarse framboidal pyrite on bedding. Bedding 90°.					
600'2"	601'4"	14"			5575	36	86	170	12.5			Massive fissile black shale with stringers of white quartz grains in upper section and 1" angular blocks of coarse grained quartzite in lower section. Also ½" blebs of dark colored pyrite.					
601'4"	601'10"	6"			5576	40	86	160	10.5			Massive sandy fissile black shale, pronounced 45° joints. Large pyrite blebs as before. Bedding 90°.					
601'10"	602'9"	11"			5577)	30	78	230	3.5			Pandurra sandstone. Perfect core showing reddish color in upper 2' changing to grey-white below this. Grains generally angular. Grain size varies from ¼ mm (uniform sandstone) to 4 or 5 mm (in a coarse porous sandstone). Calcite veins in upper 2' carry dark pyrite.					
602'9"	603'9"	12"			5578)	22	60	100	1.5								
603'9"	605'0"	15"			5579)	32	84	150	2.2								
605'0"	606'2"	14"			5580)	36	72	140	0.9								
606'2"	608'5"	27"			5581)	34	82	130	0.4								

0072

Drilled by S. A. Mines Department Type of Drilling Diamond core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed .....

No. of Hole LD. 2 Location 1, 3, miles S.W. of South Pt. Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
565'10"	566'4"	6"			5541	42	170	130	2.9	Near solid fissile black shale with above bedding features. No mineralisation. Bedding 75°.					
566'4"	567'8"	16"			5542	34	180	700	2.9	As in 5540 above. No mineralisation. Bedding 70°.					
567'8"	568'5"	9"			5543	28	140	900	3.0	Broken mass of black shale and dolomitic shale fragments, probably similar to 5540 above. No mineralisation.					
568'5"	569'3"	10"			5544	36	180	760	2.9	Alternating and interdigitating, current? bedded 2" band of black shale, dolomitic black shale and dolomitic shale. Trace disseminated pyrite and some calcite skins on bedding. Bedding 70°.					
569'3"	570'2"	11"			5545	24	160	920	2.6						
570'2"	571'11"	21"			5546	42	240	960	3.2						
571'11"	572'10"	11"			5547	22	180	460	2.7						
572'10"	574'0"	14"			5548	42	4800	1200	3.1	As above but bedding more wavy and distorted and alternating bands sharper. No mineralisation, Bedding wavy but generally 75°.					
574'0"	574'10"	10"			5549	30	800	1400	2.7						
574'10"	575'7"	9"			5550	18	230	60	2.6	Alternating 1" bands non fissile dolomitic shale grading through dolomitic black shale into ½" bands black shale. Sharp cut-off at base of black shale. Bedding 75°. No mineralisation.					
575'7"	576'5"	10"			5551	16	160	48	3.1						
576'5"	577'4"	11"			5552	12	170	46	2.6						
577'4"	578'5"	13"			5553	20	320	78	2.7						
578'5"	579'7"	14"			5554	18	260	40	2.7	Massive banded dolomitic shale with irregular diffuse darker bands. Bedding 75°. Large calcite blebs in 5559 carry 1/8" blebs Galena. Grading observed samples 5550 - 5553 no longer present.					
579'7"	580'8"	13"			5555	24	380	58	2.8						
580'8"	581'10"	14"			5556	54	580	58	2.8						
581'10"	583'0"	14"			5557	38	310	140	2.8						
583'0"	584'0"	12"			5558	24	430	82	3.1						
584'0"	584'10"	10"			5559	240	1400	130	2.9						
584'10"	585'11"	13"			5560	20	390	38	2.9						
585'11"	586'8"	9"			5561	44	1100	66	3.2						
586'8"	587'8"	12"			5562	30	640	64	2.9	Massive poorly bedded, poorly fissile, dolomitic shale, frequent ½" blebs barren crystalline calcite, strong 30° jointing. Trace pyrite in dolomite. Bedding 80°, rare 1/16" bands darker shale.					
587'8"	588'7"	11"			5563	22	620	52	3.2						
588'7"	589'8"	13"			5564	26	740	100	3.2						
589'8"	590'2"	6"			5565	48	1300	180	3.4						
590'2"	592'0"	22"			5566	52	940	290	3.1	Massive distorted fractured and jointed dolomitic shale. Strong 30° joints. Large 1" calcite blebs contain some pyrite. Bedding indistinguishable.					
592'0"	592'11"	11"			5567	42	210	120	2.9	Massive, poorly bedded, faintly structured dolomitic shale bedding indistinguishable. Strong 70° jointing? bedding. ½" calcite blebs barren.					
592'11"	593'11"	12"			5568	40	170	150	3.1						
593'11"	594'2"	3"			5569	60	140	180	3.5	Alternating wavy banded 1" bands dolomitic shale and 1/32" laminae of darker shale. Bedding varies between 70° - 85°. No mineralisation.					

Drilled by S.A. Mines Department Type of Drilling Diamond core Hole Size % Recovery Surveyed by Instrument Used

Date Started 29th March, 1971. Date Completed 5th May, 1971. Logged by C. Douch Sampled By C. Douch Record Completed

No. of Hole LD.2 Location 1.3 miles S.W. of South Pt, Trig. Depth of Hole 608'5" Co-ords.of Collar 137° 9'E. 31° 44'S. Bearing Vertical Inclination 90°

0073

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
210'0"	220'0"	10'			5603					Whyalla Sandstone					
220'0"	230'0"	10'			5604					Whyalla Sandstone. Much buff clay.					
230'0"	240'0"	10'			5605					Whyalla Sandstone.					
240'0"	250'0"	10'			5606					Whyalla Sandstone.					
250'0"	260'0"	10'			5607					Whyalla Sandstone.					
260'0"	270'0"	10'			5608					Whyalla Sandstone.	90°				
270'0"	278'5"	8'5"			5609					Whyalla Sandstone.					
278'5"	287'10"	9'5"	90%		5610					Whyalla Sandstone. Alternating beds silty clay - grey - white strcaks and bands of black shale. Chips dolomitic shale.					
287'10"	295'1"	7'3"	97%		5611					As above. Black shale more frequent. Narrow bands Pandurra?					
295'1"	305'3"	10'2"	100%		5612					Fine silty Whyalla Sandstone containing frequent bands black shaly material. High % clay and little sand sized material.					
305'3"	315'7"	10'4"	99%		5613					Grey shaly sandstone. Frequent bands black shaly material, 80% rock fine grey silty shale. Frequent dolomite chips.					
315'7"	324'1"	8'6"	100%		5614					Grey silty Whyalla Sandstone. Only thin bands coarse sandstone, mainly shaly silt. 10% black shaly - grey shale bands. Bedding 70°.					
324'1"	324'8"	7"			5615	24	60	160	2.6	~~Calcite veined~~, calcitic dolomitic shale. Very vughy, trace pyrite. No obvious bedding.					
324'8"	325'10"	14"			5616	130	190	260	7.5	Massive fissile black shale. Bedding 80°, rare disseminated galena.					
325'10"	326'9"	11"			5617	120	98	270	6.0	Massive fissile black shale, one 1½" band dolomitic shale in middle mixed pyrite sphalerite and galena on 10° joints in dolomite.					
326'9"	327'0"	3"			5618	340	250	1000	5.0	Massive bedded dolomitic shale. Bedding 80°, pyrite and rare galena in calcite veins and vughs.					
327'0"	327'11"	11"			5619	380	130	330	6.0	Massive fissile black shale with rare 1" bands dolomitic shale showing trace sphalerite and galena in calcite veins and trace disseminated ghlena in black shale. Bedding 90°.					
327'11"	328'10"	11"			5620	400	120	230	5.5						
328'10"	329'9"	11"			5621	360	80	230	4.4						
329'9"	330'10"	13"			5622	310	120	230	4.0						
330'10"	332'0"	14"			5623	260	180	150	4.3						

Drilled by S. A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0074

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays	Geological Log	Angle to core	Survey Depth	Survey Bearing	Survey Inclination	Notes
0'	10'0"	10'			5582		Surface deposits. Mixture of rounded iron stained quartz grains and fine gypsum.	0°				
10'0"	20'0"	10'			5583		Surface gypseous sand and gypsum in large lumps					
20'0"	34'0"	14'			5584		Grey only slightly stained gypseous sand, some limonite nodules					
34'0"	40'0"	6'			5585		Gypseous sand, cont., large silty quartz aggregates. Rare Mn nodules.					
40'0"	50'0"	10'			5586		Whyalla Sandstone. Rare Mn and Fe nodules. 20% clay fraction.					
50'0"	60'0"	10'			5587		Whyalla Sandstone cont. 30% buff-red clay.					
60'0"	70'0"	10'			5588		Clay and crystalline gypssum in Whyalla Sandstone. Clay gives sandstone a red coloration of Pandurra?					
70'0"	80'0"	10'			5589		Clayey Whyalla Sandstone. Red clay (Fe stain) crystalline gypsum.					
80'0"	90'0"	10'			5590		Fine buff colored Whyalla Sandstone, 30% light colored shale. Rare Mn nodules.					
90'0"	100'0"	10'			5591		Fine clayey Whyalla Sandstone as above. 1% Mn nodules.					
100'0"	110'0"	10'			5592		Very fine, silty Whyalla Sandstone. No large quartz spheres. Mn common.					
110'0"	120'0"	10'			5593		Whyalla Sandstone. 60% silty-clay fraction. Mn nodules common.					
120'0"	130'0"	10'			5594		Whyalla Sandstone. Mn nodules common. Fe stain on quartz common.					
130'0"	140'0"	10'			5595		Whyalla Sandstone. Much fe stain and Mn nodules.					
140'0"	150'0"	10'			5596		Whyalla Sandstone. Much Fe stain and Mn nodules.					
150'0"	159'0"	9'			5597		Silty buff Whyalla Sandstone.					
159'0"	170'0"	11'			5598		Fe stained Whyalla Sandstone.					
170'0"	180'0"	10'			5599		Whyalla Sandstone.					
180'0"	190'0"	10'			5600		Whyalla Sandstone.					
190'0"	200'0"	10'			5601		Whyalla Sandstone.					
200'0"	210'0"	10'			5602		Whyalla Sandstone.					

Drilled by S. A. Mines Department Type of Drilling Percussion Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed .....

No. of Hole LD. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

5200

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
359'0"	360'1"	13"			5652)	32	350	940	2.1	Hard poorly fissile dolomitic black shale. Bedding 90°.					
360'1"	360'9"	8"			5653)	40	280	780	2.1	Weak 30° joints. No mineralisation					
360'9"	361'6"	9"	100%		5654	26	310	680	2.1	Pure fissile black shale. Strong 45° joints. Bedding 90°. No mineralisation.					
361'6"	361'9"	3"	100%		5655	28	210	330	2.9	Massive non fissile dolomitic shale. Bedding 90°. 1% ? disseminated pyrite.					
361'9"	362'11"	14"	100%		5656)	30	250	700	2.0	Pure laminated, fissile black shale. Framboidal pyrite on					
362'11"	363'10"	11"	100%		5657)	40	310	680	2.1	bedding and disseminated pyrite. Bedding 85°					
363'10"	364'6"	8"	100%		5658	24	190	1200	2.4	Pure dolomitic shale, concordant calcite veins - no mineralisation, Bedding 90°.					
364'6"	365'6"	12"	100%		5659)	44	290	820	2.0	Fissile black shale. Rare, narrow bands dolomitic shale.					
365'6"	366'6"	12"	100%		5660)	52	330	740	2.1	Pyrite on 65° joints and concordant. Prominant 65° and 45° joints. Bedding 90°					
366'6"	367'9"	15"	100%		5661)	90	300	880	2.2	Solid poorly fissile dolomitic black shale. Prominant 45°					
367'9"	368'8"	11"	100%		5662)	46	230	880	1.9	joints, Bedding 90°. No mineralisation.					
368'8"	369'2"	6"	100%		5663)	18	200	580	2.2						
369'2"	369'8"	6"	100%		5664	46	140	290	2.7	Pure non-fissile dolomitic shale. Bedding 90°. Strong 50° jointing, no mineralisation.					
369'8"	370'3"	7"	100%		5665	22	270	640	2.4	Pure fissile black shale, bedding 90°. Some concordant pyrite.					
370'3"	370'6"	3"	100%		5666	64	150	430	3.2	Massive pure non-fissile dolomitic shale. Bedding 90°. No mineralisation.					
370'6"	371'7"	13"	100%		5667	20	220	780	2.1	Massive poorly fissile dolomitic black shale. Bedding 80°. No mineralisation.					
371'7"	371'10"	3"	100%		5668	24	190	1000	3.2	Massive non fissile dolomitic shale. Bedding 80°. No mineralisation.					
371'10"	372'9"	11"	100%		5669)	28	230	640	1.7	Pure fissile black shale. Bedding 80°. Rare framboidal pyrite					
372'9"	373'11"	14"	100%		5670)	34	270	740	2.3	on bedding planes.					
373'11"	374'10"	11"	100%		5671)	34	230	800	2.0						
374'10"	376'0"	14"	100%		5672)	40	260	660	2.1						
376'0"	377'0"	12"	100%		5673)	48	270	740	2.1	Massive fissile black shale. Some concordant pyrite,					
377'0"	377'6"	6"	100%		5674)	20	240	500	1.7	Bedding 80°.					
377'6"	377'9"	3"	100%		5675	70	220	1300	2.8	Pure poorly fissile dolomitic shale, filimentous 0° calcite veins, no metallisation. Bedding 80°.					

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD.3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0076

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
332'0"	332'7"	7"			5624	280	360	120	3.6	Alternating 2" - 3" bands fissile black shale and 1" - 2" bands dolomitic shale showing sphalerite and galena in 10° calcite veins and pyrite in black shale. Bedding 85° - 90°.					
332'7"	333'3"	8"			5625	110	1200	840	4.4						
333'3"	334'1"	10"			5626	66	1300	540	4.6						
334'1"	334'9"	8"			5627	78	1400	780	5.0	Massive fissile black shale with irregular ½" bands dolomitic shale showing 10° calcite veins. Trace galena and pyrite.					
334'9"	335'6"	9"			5628	82	1600	780	6.5						
335'6"	336'0"	6"			5629	60	1100	1300	3.9	Massive dolomitic shale showing disseminated galena and galena bearing 8° - 10° calcite veins. Bedding 80°.					
336'0"	337'2"	14"			5630	60	1100	1100	3.9	Massive black shale. No mineralisation. Bedding 80°.					
337'2"	338'3"	13"			5631	46	780	620	3.1	Massive fissile black shale showing trace disseminated pyrite Bedding 90°.					
338'3"	339'6"	15"			5632	54	740	800	3.3						
339'6"	341'0"	18"			5633	32	560	820	2.8						
341'0"	342'3"	15"			5634	26	430	840	2.8						
342'3"	343'6"	15"			5635	34	500	720	2.6						
343'6"	344'4"	10"			5636	74	680	310	2.3						
344'4"	345'0"	8"			5637	50	560	270	2.5						
345'0"	346'0"	12"	75%		5638	54	560	330	2.5	Massive fissile black shale with rare 1" dolomitic shale bands. Extremely jointed and fractured. Very strong 10° - 20° and 70° joint planes. Core tends to be very broken. Bedding undistorted between 70° - 80°. Mineralisation confined to pyrite.					
346'0"	347'0"	12"			5639	38	620	280	2.5						
347'0"	348'0"	12"			5640	32	780	360	2.4						
348'0"	349'0"	12"			5641	24	170	840	2.0						
349'0"	350'0"	12"			5642	38	280	500	2.9						
350'0"	351'4"	16"			5643	22	290	340	2.0						
351'4"	352'4"	12"	100%		5644	40	310	470	2.6	Dense well laminated pure fissile black shale. Bedding 85°. Some pyrite. Strong 40° jointing.					
352'4"	353'4"	12"			5645	34	290	470	2.4						
353'4"	354'0"	8"			5646	38	440	800	2.9	Dense non-fissile dolomitic shale. 40° calcite veins - no mineralisation. Strong 10° - 20° jointing. Bedding 90°.					
354'0"	355'4"	16"			5647	26	330	860	2.1	Dense pure fissile black shale. No mineralisation. Bedding 80°. Strong 50° jointing.					
355'4"	356'4"	12"	100%		5648	42	390	740	2.2	Massive hard poorly fissile dolomitic black shale. Weak 30° jointing. Pyrite on joint planes. Bedding 90°.					
356'4"	358'0"	20"	100%		5649	30	320	700	2.1	Massive black shale with frequent narrow bands dolomitic shale Strong 75° joints. Bedding 90°. No mineralisation.					
358'0"	358'5"	5"	100%		5650	60	170	2100	3.1	Massive, non-fissile dolomitic shale. Pyrite on 40° joint planes, Bedding 90°.					
358'5"	359'0"	7"	100%		5651	18	290	880	1.6	Dolomitic black shale. Hard - calcified. Bedding 90°. Weak 70° joints. No mineralisation.					

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD.3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0077

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
400'1"	400'3"	2"	100%		5701	26	150	500	2.3	Massive non fissile dolomitic shale with thin 20° calcite veins carrying trace sphalerite. Bedding 70° - 80°.					
400'3"	401'1"	10"	100%		5702)	34	190	500	2.0	Fissile black shale with rare narrow bands dolomitic shale. Bedding distorted between 40° and 80°. Concordant framboidal pyrite.					
401'1"	402'0"	11"	100%		5703)	30	170	380	2.1						
402'0"	402'6"	6"	100%		5704)	26	140	720	2.2						
402'6"	403'0"	6"	100%		5705)	32	190	1500	2.0						
403'0"	403'9"	9"	100%		5706)	26	200	340	3.0	Massive fissile black shale showing irregular $\frac{1}{4}$" - $\frac{1}{2}$" bands dolomitic shale, bedding considerably distorted, varies between 30° and 90°. Some dolomite contains disseminated sphalerite. Considerable interbedded pyrite.					
403'9"	404'5"	8"	100%		5707)	50	20	300	2.3						
404'5"	405'0"	7"	100%		5708)	66	160	860	1.8						
405'0"	405'6"	6"	100%		5709)	40	150	390	1.7						
405'6"	406'3"	9"	100%		5710)	72	280	290	1.6						
406'3"	406'9"	6"	100%		5711)	50	180	800	1.9	Massive fissile black shale showing frequent, irregular, narrow bands dolomitic shale containing rare disseminated sphalerite common interbedded pyrite in black shale. Rare galena with sphalerite. Bedding 75° - sometimes distorted.					
406'9"	407'3"	6"	100%		5712)	68	120	1200	1.8						
407'3"	407'11"	8"	100%		5713)	34	120	410	1.5						
407'11"	408'6"	7"	100%		5714)	34	98	1200	1.9						
408'6"	409'1"	6"	100%		5715)	28	120	1400	1.9						
409'1"	409'7"	6"	100%		5716)	30	130	1200	1.9						
409'7"	410'1"	6"	100%		5717)	40	110	800	1.9	Fissile black shale with several broad bands dolomitic shale. 0° calcite veins in dolomite bear sphalerite. Pyrite common on bedding. Bedding 75°.					
410'1"	410'8"	7"	100%		5718)	30	120	1200	1.8						
410'8"	411'3"	7"	100%		5719)	38	160	1100	1.8	Massive fissile black shale containing frequent narrow and distorted bands dolomitic shale with disseminated pyrite, sphalerite and galena. Sphalerite also in 0° veins. Bedding 75°.					
411'3"	411'11"	8"	100%		5720)	40	160	800	0.6						
411'11"	412'4"	5"	100%		5721)	38	320	2000	1.5						
412'4"	412'10"	6"	100%		5722)	28	120	740	1.3						
412'10"	413'3"	5"	100%		5723)	48	130	360	1.3						
413'3"	413'8"	5"	100%		5724)	26	120	490	0.8						
413'8"	414'2"	6"	100%		5725)	24	120	150	1.2	Fissile black shale containing frequent narrow bands of distorted and microfaulted dolomitic shale showing common 0° calcite veins with some sphalerite. Common pyrite in interbedded bands. Some sphalerite disseminated in dolomitic shale. Bedding distorted but generally 75°.					
414'2"	414'4"	2"	100%		5726)	240	120	>1%	1.8						
414'4"	414'9"	5"	100%		5727)	34	110	1100	1.2						
414'9"	415'3"	6"	100%		5728)	30	120	320	1.4						
415'3"	415'6"	3"	100%		5729)	88	210	290	1.9						
415'6"	415'9"	3"	100%		5730)	30	140	640	1.6						
415'9"	416'0"	3"	100%		5731)	82	190	480	2.0						
416'0"	416'5"	5"	100%		5732)	30	160	2200	1.5						

0078

Drilled by S. A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole L.D. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords. of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
377'9"	378'10"	13"	100%		5676)	36	240	620	1.6	Massive, pure well laminated, fissile black shale and framboidal pyrite on bedding. Bedding 80°.					
378'10"	379'10"	12"	100%		5677)	42	200	680	2.1						
379'10"	381'4"	18"	100%		5678)	22	200	560	1.4						
381'4"	381'8"	4"	100%		5679	24	150	400	3.1	Pure, massive non - fissile dolomitic shale. No mineralisation Bedding 80°.					
381'8"	382'5"	9"	100%		5680)	16	190	960	2.1	Massive, pure, fissile black shale. Weak 20° jointing containing framboidal pyrite. Pyrite also concordant, Bedding 80°. Some galena in pyrite.					
382'5"	383'7"	14"	100%		5681)	28	250	600	2.0						
383'7"	384'9"	14"	100%		5682)	40	350	360	2.0						
384'9"	385'10"	13"	100%		5683)	130	560	1400	2.0						
385'10"	386'8"	10"	100%		5684	300	490	1000	1.9	Massive fissile black shale. Narrow 10° pyrite veins also some small blebs sphalerite. Bedding 80°.					
386'8"	386'10"	2"	100%		5685	20	270	1200	3.0	Massive pure dolomitic shale. 0° calcite veins carry some sphalerite. Bedding 80°.					
386'10"	388'1"	15"	100%		5686)	120	490	1600	2.1						
388'1"	389'4"	15"	100%		5687)	34	290	380	1.7	Massive fissile black shale. Trace bedded pyrite. Bedding 80°.					
389'4"	390'10"	18"	100%		5688)	62	310	880	1.7						
390'10"	391'6"	8"	100%		5689)	60	250	270	1.6						
391'6"	391'10"	4"	100%		5690	22	190	1300	2.2	2" wide bands massive dolomitic shale separated by a 2" band dolomitic black shale. Trace sphalerite in 0° veins. Bedding 70°.					
391'10"	392'9"	11"	100%		5691	50	210	780	1.4	Massive fissile black shale. Rare concordant pyrite. Bedding 80°.					
392'9"	393'0"	3"	100%		5692	14	190	400	2.0	Massive non fissile dolomitic shale, narrow 10° calcite veins carry no sulphides. Bedding 80°.					
393'0"	394'0"	12"	100%		5693	38	240	400	2.0	Fissile black shale with infrequent ½" bands dolomitic shale showing trace concordant galena, also in 20° calcite bands.					
394'0"	394'10"	10"	100%		5694)	28	190	660	1.9	Massive fissile black shale. Bedding 75°. Common concordant framboidal pyrite.					
394'10"	396'0"	14"	100%		5695)	30	240	960	2.2						
396'0"	~~369~~ 396'7"	7"	100%		5696	32	220	1200	2.0	Alternating 2" bands fissile black shale (Bedding 80°) and 1" bands wavy and distorted dolomitic shale which has disrupted black shale bedding in places. Pyrite and trace sphalerite on 20° veins.					
396'7"	397'2"	7"	100%		5697)	32	180	1800	1.3	Massive fissile black shale with rare narrow bands distorted dolomitic shale showing trace sphalerite (disseminated). Bedding 80°.					
397'2"	398'5"	15"	100%		5698)	32	170	1200	1.7						
398'5"	399'10"	17"	100%		5699)	36	160	780	1.5						
399'10"	400'1"	3"	100%		5700)	40	250	340	1.8						

6200

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords. of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
439'2"	439'10"	8"	100%		5769)	68	86	140	0.9	Regularly laminated alternating $\frac{1}{4}$" bands fissile black shale $\frac{1}{16}$" - $\frac{1}{8}$" bands dolomitic shale showing trace sphalerite in vertical veins. Trace galena and common pyrite on 20° joint planes. Bedding 75°.					
439'10"	440'8"	10"	100%		5770)	36	70	140	1.1						
440'8"	441'3"	7"	100%		5771)	50	100	1400	1.3						
441'3"	441'11"	8"	100%		5772)	40	82	140	1.0						
441'11"	442'10"	11"	100%		5773)	36	82	350	1.0						
442'10"	443'7"	9"	100%		5774)	34	74	200	1.2						
443'7"	444'2"	7"	100%		5775)	36	74	180	0.8	Irregularly alternating laminated $\frac{1}{2}$" - 3" bands fissile black shale and $\frac{1}{8}$" - 1" band dolomitic shale. Showing trace sphalerite in 0° veins. Bedding 75°.					
444'2"	444'10"	8"	100%		5776)	68	80	230	0.7						
444'10"	445'9"	11"	100%		5777)	36	74	100	1.0						
445'9"	446'4"	7"	100%		5778)	34	88	120	1.0						
446'4"	447'9"	17"	100%		5779)	42	74	100	0.8						
447'9"	448'4"	7"	100%		5780)	44	70	98	0.7	Irregular alternating1" - 2" bands fissile black shale and $\frac{1}{4}$" multiple laminae of dolomitic shale showing considerable distortion, trace pyrite only. Bedding 80°.					
448'4"	448'9"	5"	100%		5781)	36	70	200	0.8						
448'9"	449'7"	10"	100%		5782)	42	66	500	0.9						
449'7"	450'5"	10"	100%		5783)	38	66	250	0.8	Alternating irregular $\frac{1}{2}$" - 2" bands fissile black shale and $\frac{1}{4}$" - 1" multiple bands dolomitic shale. Trace sphalerite in dolomitic shale - uncommon. Pyrite common in black shale. Bedding 80°.					
450'5"	451'5"	12"	100%		5784)	50	70	290	0.8						
451'5"	452'3"	10"	100%		5785)	30	68	270	1.1						
452'3"	453'0"	9"	100%		5786)	30	70	210	0.8	Massive fissile black shale containing rare narrow dolomitic bands. Strong 45° jointing. Planes show smeared pyrite and sphalerite. Bedding 80°.					
453'0"	453'9"	9"	100%		5787)	30	76	280	0.8						
453'9"	454'4"	7"	100%		5788)	40	68	200	1.1	Irregularly alternating 1" - 2" bands fissile black shale and $\frac{1}{2}$" - 1" bands broken and interdigitating dolomitic shale. Black shale bedding distorted - average 75°. Trace sphalerite in dolomite.					
454'4"	455'0"	8"	100%		5789)	28	70	230	1.2						
455'0"	455'8"	8"	100%		5790)	80	86	840	1.0	Massive black shale showing only rare narrow bands dolomitic shale. Possible fine disseminated galena? Bedding only slightly distorted, 80°.					
455'8"	456'7"	11"	100%		5791)	26	82	250	0.9						
456'7"	457'4"	9"	100%		5792	60	230	4000	1.0	Broken-up black shale containing bedded dolomitic shale bearing sphalerite. Black shale considerably pyritic.					
457'4"	458'1"	9"	100%		5793	32	64	170	1.1	Fissile black shale containing disrupted unbedded fragments of dolomitic shale. Strong barren 30° calcite veining. Trace sphalerite in dolomite.					

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole L.D. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0080

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Survey Bearing	Survey Inclination	Notes
416'5"	417'1"	8"	100%		5733	66	150	180	1.5						
417'1"	417'8"	7"	100%		5734	40	150	58	1.4	Massive fissile black shale showing infrequent ½" - 1" bands					
417'8"	418'5"	9"	100%		5735	48	120	1700	1.2	dolomitic shale containing 10° veins bearing calcite, sphalerite					
418'5"	419'0"	7"	100%		5736	24	90	350	1.1	and pyrite. Also strong 20° jointing shows pyrite and					
419'0"	419'5"	5"	100%		5737	44	150	2700	1.3	sphalerite surfaces. Bedding 75°.					
419'5"	419'9"	4"	100%		5738	150	180	160	1.2						
419'9"	420'5"	8"	100%		5739	28	170	230	1.1						
420'5"	420'11"	6"	100%		5740	30	82	360	1.0						
420'11"	421'7"	8"	100%		5741	26	94	320	1.1						
421'7"	422'3"	8"	100%		5742	28	90	110	1.4	Massive fissile black shale showing irregular, frequent broad					
422'3"	422'10"	7"	100%		5743	40	98	150	0.9	bands dolomitic shale showing rare disseminated pyrite					
422'10"	423'4"	6"	100%		5744	34	74	170	0.8	sphalerite and galena. Sphalerite and pyrite common on 20°					
423'4"	424'0"	8"	100%		5745	54	70	100	0.9	joint planes. Pyrite interbedded in black shale. Bedding 75°.					
424'0"	424'7"	7"	100%		5746	38	80	76	1.2						
424'7"	425'4"	9"	100%		5747	34	68	360	0.9						
425'4"	425'11"	7"			5748	70	80	440	1.1						
425'11"	426'6"	7"			5749	28	74	220	0.9						
426'6"	427'1"	7"			5750	50	72	220	0.8						
427'1"	427'7"	6"			5751	34	76	170	0.8						
427'7"	428'2"	7"			5752	36	74	200	0.9						
428'2"	428'7"	5"			5753	80	76	170	0.9	Massive fissile black shale with frequent irregular narrow bands					
428'7"	429'6"	11"			5754	42	68	110	0.9	dolomitic shale showing infrequent disseminated pyrite and					
429'6"	430'1"	7"			5755	140	74	220	1.0	sphalerite, also on 20° joints, bedding disrupted 75°.					
430'1"	430'9"	8"			5756	30	66	230	1.0						
430'9"	431'3"	6"			5757	32	74	250	0.8						
431'3"	431'10"	7"			5758	94	76	260	1.2						
431'10"	432'2"	4"			5759	32	70	120	0.9						
432'2"	433'0"	10"	100%		5760	40	70	200	1.0						
433'0"	433'8"	8"	100%		5761	24	62	260	1.1	Alternating 1" - 2" bands fissile black shale and 1/8" - ½"					
433'8"	434'3"	7"	100%		5762	32	82	160	1.0	irregular disrupted bands dolomitic shale containing rare					
434'3"	435'1"	10"	100%		5763	52	68	210	0.9	disseminated sphalerite and galena and common pyrite. Galena					
435'1"	335'11"	10"	100%		5764	34	180	180	0.8	and pyrite on 30° joint planes. Bedding 75°.					
435'11"	436'8"	9"	100%		5765	52	70	430	1.1	Alternating ¼" - ½" bands fissile black shale containing common					
436'8"	437'6"	10"	100%		5766	32	62	110	1.1	disseminated and bedded pyrite and regular 1/16" - 1/8" bands					
437'6"	438'3"	9"	100%		5767	48	88	290	1.2	dolomitic shale showing common 0° filimentous veins bearing					
										sphalerite, galena and pyrite disseminated in black shale -					
										trace only. Bedding 75°.					
438'3"	439'2"	11"	100%		5768	38	86	170	0.9	Massive poorly fissile black shale with 5 irregularly spaced					
										¼" bands dolomitic shale. No mineralisation. Bedding 75°.					

Drilled by S. A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
476'6"	477'7"	12"	100%		5818	28	62	94	0.7	Near pure massive black shale. Rare narrow bands dolomitic shale. Rare disseminated pyrite on 25° joints. Bedding 70°.					
477'7"	478'11"	14"	100%		5819	36	64	150	0.7						
478'11"	479'8"	9"	100%		5820	26	60	120	0.9	As in 5816 - 17. Irregular single or multiple 1/8" bands dolomitic shale alternating with ½" - 2" band fissile black shale. No mineralisation observed. Bedding 75°.					
479'8"	480'5"	9"	100%		5821	38	58	150	0.9						
480'5"	480'11"	6"	100%		5822	26	54	160	1.1						
480'11"	481'9"	10"	100%		5823	34	66	120	0.7	Pure weakly jointed fissile black shale. No mineralisation. Bedding 75°.					
481'9"	482'6"	9"	100%		5824	32	66	110	0.7						
482'6"	483'5"	11"	100%		5825	34	66	140	0.9	Regularly alternating 1" bands fissile black shale and 1/8" and ½" multiple bands dolomitic shale. Trace sphalerite in filimentous vertical veins. Bedding 75°.					
483'5"	484'1"	8"	100%		5826	26	62	130	1.0						
484'1"	484'11"	10"	100%		5827	24	56	100	1.1	Regularly alternating ¼" - ½" bands fissile black shale and 1/8" - ½" bands distorted dolomitic shale. No mineralization, bedding 75°.					
484'11"	486'0"	13"	100%		5828	36	70	140	0.7	Massive highly fissile weakly jointed black shale. Narrow streaks of dolomitic shale. No mineralisation. Bedding 75°.					
486'0"	486'9"	9"	100%		5829	38	70	210	0.9	Alternating regular ½" bands fissile black shale and 1/8" - ½" multiple and distorted dolomitic shale bands. Rare sphalerite in filimentous vertical veins. Trace concordant pyrite.					
486'9"	488'1"	16"	100%		5830	240	78	140	0.9						
488'1"	488'6"	5"	100%		5831	30	60	100	1.0	Irregularly alternating ¼" - 1" bands fissile black shale and 1/8" - ¼" bands dolomitic shale. No mineralisation. Bedding 75°.					
488'6"	489'4"	10"	100%		5832	38	72	110	0.7	Massive weakly jointed fissile black shale. No mineralization observed. Bedding 75°.					
489'4"	490'2"	10"	100%		5833	40	66	86	0.7						
490'2"	490'11"	9"	100%		5834	36	66	140	0.7	Massive black shale with irregular diffuse 1/8" bands dolomitic shale weak 80° joints. Bedding 75°. No mineralisation.					
490'11"	491'10"	11"	100%		5835	30	56	110	0.9	Alternating ¼" bands fissile black shale and ¼" bands non fissile dolomitic shale. Trace sphalerite in filimentous vertical veinlets, weak 80° joints. Bedding 75°.					
491'10"	492'5"	7"	100%		5836	32	54	96	0.9						

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 25th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords. of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

2800

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
458'1"	458'8"	7"	100%	5794	46	98	200	1.1	Strongly jointed fissile black shale, common interbedded pyrite-also disseminated. Bedding 70°.					
458'8"	459'6"	10"	100%	5795	36	34	150	0.9	Irregularly alternating ½" - 2" bands fissile black shale and ¼" bands dolomitic shale with trace disseminated galena. Bedding 75°.					
459'6"	460'0"	6"	100%	5796)	36	90	200	0.8	Massive fissile black shale with regular 1/16" - ¼" dolomitic					
460'0"	460'7"	7"	100%	5797)	32	98	230	1.1	bands every ½" - 1". Bedding 70°. Trace pyrite in black shale and very rare blebs sphalerite in dolomitic shale.					
460'7"	461'6"	11"	100%	5798	26	80	190	1.1	Alternating ¼" - ½" bands fissile black shale and ¼" - 1" multiple bands dolomitic shale - unmineralised - causes distortion in black shale, bedding 70°.					
461'6"	462'3"	9"	100%	5799)	42	76	160	0.8	Alternating 1" - 2" bands fissile black shale and groups of 2 or					
462'3"	462'10"	7"	100%	5800)	42	70	160	0.9	3 1/8" bands dolomitic shale. No mineralisation. Bedding 80°.					
462'10"	463'7"	9"	100%	5801)	36	62	110	0.8						
463'7"	464'7"	12"	100%	5802)	30	58	88	1.2	Alternating ¼" - ½" bands fissile black shale and ¼" - 1"					
464'7"	465'3"	8"	100%	5803)	84	60	340	1.0	multiple bands dolomitic shale - unmineralised - causes distortion in black shale, bedding 70°.					
465'3"	466'1"	10"	100%	5804)	44	68	280	0.6	Massive fissile black shale containing irregular (every 1" - 3")					
466'1"	466'11"	10"	100%	5805)	36	64	110	0.7	narrow and diffuse dolomitic shale laminae. Weak 30° jointing.					
466'11"	467'8"	9"	100%	5806)	44	52	170	0.7	Sparce disseminated pyrite in black shale. Bedding 75°.					
467'8"	468'3"	7"	100%	5807)	34	56	150	0.8						
468'3"	468'11"	8"	100%	5808)	32	54	220	0.9	Alternating ½" - 1" bands fissile black shale and ¼" - 1"					
468'11"	469'6"	7"	100%	5809)	28	56	240	1.3	multiple bands dolomitic shale - showing weak vertical joints possibly bearing some sphalerite. Bedding 75°.					
469'6"	470'6"	12"	97%	5810)	44	68	130	0.8	Massive fissile black shale containing irregular 1/16" - ½"					
470'6"	471'3"	9"	97%	5811)	36	680	110	0.8	bands distorted dolomitic shale. Common pyrite and rare					
471'3"	472'2"	11"	97%	5812)	30	62	86	0.9	disseminated galena on 20° joints. Bedding 75°.					
472'2"	473'0"	10"	97%	5813)	36	72	74	0.7	Massive fissile black shale with irregular, rare distorted 1/8"					
473'0"	473'9"	9"	97%	5814)	36	60	72	0.7	bands dolomitic shale. Rare concordant pyrite. Bedding 70° -					
473'9"	474'8"	11"	97%	5815)	30	58	170	0.8	75°.					
474'8"	475'7"	11"	100%	5816)	26	60	160	0.9	Alternating ½" - 1" bands fissile black shale and 1/8" - ½"					
475'7"	476'7"	12"	100%	5817)	24	52	110	1.1	single and multiple bands dolomitic shale. Pyrite on 80° joints. Bedding 75°.					

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 25th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD . 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0083

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
510'9"	511'5"	8"	100%	5856)	46	74	190	0.7	Highly jointed fissile black shale. Dominant 30° joints.					
511'5"	512'3"	10"	100%	5857)	46	72	160	0.7	No mineralisation. Bedding 75°.					
512'3"	512'9"	6"	96%	5858	36	68	110	0.8	Jointed fissile black shale. No mineralisation. Bedding 75°.					
512'9"	513'10"	13"	96%	5859	30	64	54	1.0	Massive black shale containing irregular 1" groups of 3 or 4 1/8" bands dolomitic shale. Trace disseminated pyrite. Bedding 75°.					
513'10"	514'8"	10"	96%	5860)	40	66	420	0.8	Highly jointed (30° and 80°) black shale, framboidal pyrite on					
514'8"	515'7"	11"	96%	5861)	40	70	120	0.9	80° joints. Bedding 75°. Possible disseminated galena in 5861.					
515'7"	516'11"	16"	96%	5862	32	66	210	0.8	Alternating 3" bands black shale - 2" multiple groups dolomitic shale. Weak 10° jointing contains pyrite. Bedding 75°.					
516'11"	517'7"	8"	96%	5863	30	60	90	1.2	As before but groups dolomitic shale separated by 1" bands black shale, considerably fractured, pyrite on 10° joints.					
517'7"	518'2"	7"	96%	5864	50	68	120	0.8	Massive fissile black shale containing inchly 1/16" - 1/8" diffuse bands dolomitic shale. Pyrite in vertical veins. Weak 70° joints. Bedding 75°.					
518'2"	519'3"	13"	96%	5865	38	70	72	0.8	Massive weakly jointed fissile black shale. 45° and 80° joints					
519'3"	520'2"	11"	96%	5866	40	76	110	0.8	contain some pyrite. Also some bedded pyrite, Bedding 75°.					
520'2"	521'1"	11"	96%	5867	30	60	54	0.8	Massive fissile black shale containing regular inchly 1/16" bands diffuse dolomitic shale. Rare pyrite on joints. Bedding 75°.					
521'1"	522'3"	14"	96%	5868	36	56	820	0.8	Shattered, highly jointed fragments of black shale and alternating 1/8" bands dolomitic shale. Contains considerable pyrite and trace sphalerite in calcite veins. No bedding apparent.					
522'3"	523'3"	12"	96%	5869	28	58	72	0.8	Massive fissile black shale. Weak 30° joints contain spots of galena. Bedding 75°.					
523'3"	524'7"	16"	96%	5870	28	60	110	0.9	Alternating 1" bands black shale and 1/4" - 1/2" bands dolomitic shale. Pyrite in vertical veins and concordant. Dolomite shows pull- aparts.					

Drilled by S. A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S. A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0084

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
492'5"	493'5"	12"	100%		5837	38	70	80	0.7	Solid fissile black shale. Irregular diffuse and few dolomitic shale bands. Highly jointed at 20° - 100° in 5837. Some pyrite. Bedding 75°.					
493'5"	494'3"	10"	100%		5838	130	74	78	0.7						
494'3"	495'1"	10"	100%		5839)	28	56	130	0.8	As above but dolomitic bands more frequent - one 1/8" band every inch. No mineralisation.					
495'1"	495'10"	9"	100%		5840)	26	58	130	0.8						
495'10"	496'6"	8"	100%		5841	24	56	640	0.9	Alternating ½" - 1" bands black shale and 1 wide groups of 3 or 4 ¼" dolomitic shale bands. Vertical veins of calcite? in dolomite.					
496'6"	497'9"	15"	100%		5842)	32	64	110	0.7	Massive weakly jointed fissile black shale. Rare narrow dolomitic zones. No mineralisation. Bedding 75°.					
497'9"	498'9"	12"			5843)	38	68	56	0.8						
498'9"	499'7"	10"			5844)	44	66	160	0.6						
499'7"	500'3"	8"			5845)	30	58	120	0.6	Alternating ½" - 1" bands fissile black shale and 1/8" and ½" multiple bands dolomitic shale, vertical calcite veinlets. Bedding 75°.					
500'3"	501'5"	14"			5846)	40	56	86	0.8						
501'5"	502'5"	12"			5847)	38	66	64	0.7	Massive pure fissile black shale. Rare narrow bands dolomitic shale. No mineralisation. Bedding 75°.					
502'5"	503'4"	11"			5848)	42	70	72	0.7						
503'4"	504'4"	12"			5849)	34	62	66	0.7						
504'4"	505'7"	15"	100%		5850	44	60	210	0.8	Massive fissile weakly jointed black shale with irregular ¼" bands distorted dolomitic shale. Trace disseminated pyrite, Bedding 75°.					
505'7"	506'5"	10"	100%		5851	36	64	100	0.8	Massive weakly jointed fissile black shale. Regular 1/16" - 1/8" bands dolomitic shale. No mineralisation. Bedding 75°.					
506'5"	507'5"	12"	100%		5852)	40	76	96	0.7	Massive weakly jointed black shale containing only irregular 1/16' - 1/8" diffuse bands dolomitic shale. No mineralisation. Bedding 75°.					
507'5"	508'5"	12"	100%		5853)	42	68	170	0.8						
508'5"	509'2"	9"	100%		5854	36	66	120	0.8	Fissile black shale containing regular 1/8" bands dolomitic shale every inch. Trace disseminated pyrite. Bedding 75°.					
509'2"	510'9"	19"	100%		5855	32	62	170	1.0	Highly jointed and shattered alternating ½" - 1" bands black shale and ¼" - ½" band dolomitic shale, dominant 10° joints. No mineralisation.					

0085

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971 Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag			Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
539'8"	540'2"	6"	100%		5890	34	82	110	0.9			Irregularly alternating $\frac{1}{4}$" - 1" bands black shale and $\frac{1}{4}$" bands dolomitic shale, trace disseminated sphalerite and pyrite in dolomitic shale. Bedding 75°.					
540'2"	540'10"	8"	100%		5891)	42	94	120	0.8			Massive fissile black shale containing few irregularly spaced $\frac{1}{4}$" - $\frac{1}{2}$" bands dolomitic shale. Pyrite on 20° joints. Much vein gypsum. Bedding 75° - 80°.					
540'10"	541'7"	9"	100%		5892)	38	80	120	0.8								
541'7"	542'1"	6"	100%		5893	28	72	44	0.9			Massive fissile black shale containing 2 1" bands dolomitic shale. No mineralisation. Weak 20° joints. Bedding 75°.					
542'1"	542'8"	7"	100%		5894)	34	80	60	0.8			Alternating 1" - 2" bands fissile black shale and irregular $\frac{1}{4}$" - $\frac{1}{2}$" bands pyritic dolomitic shale. Pyrite disseminated also in black shale, some vein gypsum especially in 110° veins. Bedding 75°.					
542'8"	543'1"	5"	100%		5895)	32	72	240	0.8								
543'1"	543'11"	10"	100%		5896	42	86	74	0.8			Massive fissile black shale. Pyrite concordant and on 20° joints. Bedding 75°.					
543'11"	544'6"	7"	100%		5897)	34	80	72	0.7			Massive fissile black shale. Irregular $\frac{1}{8}$" - $\frac{1}{2}$" bands dolomitic shale. Dolomite often broken by vertical microfaults. Dolomite contains minute sphalerite blebs. Weak 130° joints show gypsum veins.					
~~544'6"~~	~~545'2"~~	~~8"~~	~~100%~~		~~5898)~~	~~44~~	~~76~~	~~1200~~	~~0.7~~								
545'2"	545'10"	8"	100%		5899)	34	76	380	0.7								
545'10"	546'5"	7"	100%		5900	34	74	64	0.7			Massive fissile black shale containing irregular $\frac{1}{2}$" - 1$\frac{1}{2}$" bands dolomitic shale. Pyrite on bedding and weak 120° joints. Much vein gypsum. Bedding wavy 75°.					
546'5"	546'11"	6"	100%		5901	40	76	66	1.0			Massive fissile black shale. Few regular $\frac{1}{2}$" bands dolomitic shale show weakly distorted bedding. Bedded pyrite. Possible sphalerite in dolomitic shale.					
546'11"	547'6"	7"	100%		5902	42	64	64	1.1			Massive fissile black shale with infrequent sharp $\frac{1}{16}$" bands dolomitic shale. Common bedded pyrite in black shale. Bedding 75°.					
547'6"	548'1"	7"	100%		5903)	48	82	64	1.0			Massive pure fissile black shale, $\frac{1}{4}$" bed of gypsum at 548'1" contains pyrite. Weak 110° joints with pyrite, also bedded pyrite. Bedding 75°.					
548'1"	548'9"	8"	100%		5904)	44	92	74	0.9								
548'9"	549'4"	7"	100%		5905	38	78	66	0.9			Massive fissile black shale. Irregular and infrequent narrow beds dolomitic shale. Bedded pyrite in black shale. Bedding 75°.					

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
524'7"	525'8"	13"	96%		5871	30	58	44	0.9	As above but dolomitic shale bands fewer and less regular, joints and dolomitic bands appear "leached" - show white incrustations, probable lime, trace disseminated and concordant pyrite, Bedding 75°.					
525'8"	526'7"	11"	100%		5872)	38	70	70	0.8	Fissile black shale. Highly jointed and broken in 5872 but more massive in 5873 (20° joints). No mineralisation. Bedding 75°.					
526'7"	527'7"	12"	100%		5873)	40	76	88	0.7						
527'7"	528'4"	9"	100%		5874)	32	66	48	0.7	Alternating fissile black shale and irregular 1/8" - ½" bands or groups of bands of dolomitic shale, showing trace sphalerite in small (up to 1/8") blebs. 1/16" bands vein gypsum in 125° joints. Disseminated concordant pyrite, also in joints Bedding 75°.					
528'4"	529'2"	10"	100%		5875)	30	62	54	0.8						
529'2"	529'11"	9"	100%		5876)	32	50	110	0.7						
529'11"	530'8"	9"	100%		5877)	34	64	160	0.8						
530'8"	531'5"	9"	100%		5878)	36	70	72	0.7						
531'5"	532'3"	10"	100%		5879	38	70	72	0.7	Alternating very regular 1½" bands fissile black shale and 1/16" bands dolomitic shale. Weak 120° joints. No mineralisation. Bedding 75° - 80°.					
532'3"	532'9"	6"	100%		5880)	40	78	86	0.6	Massive pure fissile black shale. Weak 60° joints. Trace disseminated pyrite. Bedding 70°.					
532'9"	533'6"	9"	100%		5881)	36	78	66	0.7						
533'6"	534'9"	15"	100%		5882	32	70	82	0.6	Identical to 5879 above. Trace sphalerite as minute blebs in dolomitic shale. Bedding 75°.					
534'9"	535'5"	8"	100%		5883)	28	68	150	0.8	Irregularly alternating ¼" - 1" bands fissile black shale and single or multiple 1/8" - ¼" bands dolomitic shale. More than trace sphalerite as blebs and crystals in dolomitic shale. Bedding 75°, also considerable disseminated and concordant pyrite. Weak 100° jointing.					
535'5"	536'0"	7"	100%		5884)	28	68	500	1.0						
536'0"	536'9"	9"	100%		5885)	34	74	310	0.8						
536'9"	537'10"	13"	100%		5886	38	80	100	0.7	Massive fissile black shale, weak 100° joints, also 30° joints containing framboidal pyrite and some gypsum. Bedding 75°.					
537'10"	538'6"	8"	100%		5887	32	76	230	0.7	Massive 1" - 2" bands fissile black shale and irregular ¼" - 1" multiple ½" bands dolomitic shale. Sphalerite blebs in dolomite, pyrite on 30° joints. Bedding 75°.					
538'6"	539'1"	7"	100%		5888)	30	76	94	0.9	Regularly alternating ½" bands fissile black shale and ½" wide groups of 2 or 3 1/8" wide bands dolomitic shale. Disseminated pyrite in black shale. Trace sphalerite in dolomite. Bedding 75°.					
539'1"	539'8"	7"	100%		5889)	28	72	50	0.9						

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD.3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0087

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
564'5"	565'5"	12"	100%		5928	36	82	380	0.9	Massive fissile black shale, irregular $\frac{1}{2}$" - $\frac{3}{4}$" bands pyritic possible sphalerite? dolomitic shale. Bedding 75°.					
565'5"	566'2"	9"	100%		5929	30	74	720	1.4	Irregularly alternating $\frac{1}{4}$" bands dolomitic shale and $\frac{1}{4}$" - $\frac{1}{2}$" bands black shale. Dolomite frequently broken in bedding - microfaulted. Rare $\frac{1}{8}$" blebs sphalerite and common pyrite in dolomite. Bedding 75°.					
566'2"	566'7"	5"	100%		5930	40	90	430	1.1	Fissile black shale with regular $\frac{1}{4}$" distorted bands dolomitic shale containing frequent $\frac{1}{16}$" blebs sphalerite. Also common pyrite. Bedding 75°.					
566'7"	567'4"	9"	100%		5931	48	110	150	0.8	Massive near pure fissile black shale. One distorted band dolomitic shale at 567'1" contains small bleb sphalerite. Bedding 75°.					
567'4"	567'10"	6"	100%		5932	42	120	180	1.1	A single $2\frac{1}{2}$" band massive unbedded dolomitic shale followed by a pure $3\frac{1}{2}$" band black shale. 20° vein calcite in dolomite contains some sphalerite blebs. Bedding 75°.					
567'10"	568'6"	8"	100%		5933	42	98	900	0.9	Massive black shale with few irregular $\frac{1}{2}$" band sphaleritic dolomitic shale. Bedding 75°.					
568'6"	569'0"	6"	100%		5934)	32	84	2900	1.2	Regularly alternating $\frac{1}{2}$" - 1" bands fissile black shale and wavy bedded distorted $\frac{1}{2}$" - 1" bands dolomitic shale containing small blebs sphalerite. Bedding 75°.					
569'0"	569'6"	6"	100%		5935)	36	86	660	1.2						
569'0"	570'1"	7"	100%		5936)	56	120	280	0.9	Massive pure fissile black shale. Framboidal pyrite on 10° joints. Bedding 75°.					
570'1"	570'8"	7"	100%		5937)	50	130	96	0.8						
570'8"	571'3"	7"	100%		5938	34	84	68	1.1	Irregular, alternating $\frac{1}{2}$" - 1" bands pyritic dolomitic shale containing crystalline sphalerite, also in 10° veinlets and $\frac{1}{2}$" - 2" bands black shale. Bedding 75°.					
571'3"	571'9"	6"	100%		5939)	46	90	120	0.8	Massive fissile black shale in 1" - 2" bands and $\frac{1}{4}$" - $\frac{1}{2}$" bands and "wedges" interdigitating dolomitic shale. Bedded and vein pyrite common, sphalerite in 10° veinlets rare. Bedding 75°.					
571'9"	572'3"	6"	100%		5940)	40	72	160	1.1						
572'3"	572'9"	6"	100%		5941)	40	76	110	0.8						
572'9"	573'2"	5"	100%		5942	46	110	860	0.6	Massive fissile black shale in 2" bands separated by $\frac{1}{8}$" bands dolomitic shale containing rare blebs and veinlets sphalerite. Common pyrite. Bedding 75°.					

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD.3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords. of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0088

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
549'4"	550'0"	8"	100%	5906	46	72	62	0.8	Massive fissile black shale, frequent irregular 1/8" - ¼" bands distorted dolomitic shale. No mineralisation. Bedding 75°.					
550'0"	550'9"	9"	100%	5907	36	74	56	0.9	Regularly alternating ½" - 1" bands fissile black shale and 1/16" - ¼" bands dolomitic shale. Common pyrite on 20° joints, micro blebs sphalerite in dolomitic shale. Bedding 75°.					
550'9"	551'9"	12"	100%	5908	36	70	52	1.0						
551'9"	552'7"	10"	100%	5909	34	72	54	1.0	Irregular ½" - 2½" bands fissile black shale and ¼" - ½" bands distorted dolomitic shale. Common bedded pyrite and concordant gypsum veins. Bedding 75°.					
552'7"	553'3"	8"	100%	5910	38	74	62	0.9	Massive fissile black shale, few irregular narrow and distorted bands dolomitic shale with disseminated pyrite. Disseminated pyrite also in black shale. Weak 110° jointing. Bedding 75°.					
553'3"	554'1"	10"	100%	5911	48	88	56	0.9						
554'1"	554'10"	9"	100%	5912	36	68	56	0.8						
554'10"	555'6"	8"	100%	5913	36	72	52	0.8	Regularly alternating ½" - 1" bands fissile black shale and 1/8" bands distorted dolomitic shale. Much framboidal pyrite on 10° joints and 110° joints. Bedding 75°.					
555'6"	556'2"	8"	100%	5914	38	72	52	0.8						
556'2"	556'11"	9"	100%	5915	36	70	52	0.8						
556'11"	557'6"	7"	100%	5916	34	80	76	0.8						
557'6"	558'4"	10"	100%	5917	34	68	46	0.9						
558'4"	558'10"	6"	100%	5918	38	74	58	1.0	Massive fissile black shale. Broad irregular "wedges" dolomitic shale. Microscopic blebs sphalerite, trace disseminated pyrite. Bedding 75°.					
558'10"	559'6"	8"	100%	5919	46	94	84	0.9	Massive pure fissile black shale. No mineralisation. Bedding 75°. Weak 130° jointing.					
559'6"	560'2"	8"	100%	5920	54	130	120	0.8						
560'2"	560'9"	7"	100%	5921	34	68	4800	0.7	Massive fissile black shale, irregular broken ¼" bands dolomitic shale containing crystalline sphalerite, especially at 560'3". Trace disseminated pyrite. Bedding 75°.					
560'9"	561'4"	7"	100%	5922	34	70	54	0.8	Alternating ½" - 1" bands fissile black shale and 1/8" - 1" generally regular, well bedded dolomitic shale bands. Some broken beds and microfaults - dolomite contains bleb and crystals sphalerite - especially at 562'8". Much disseminated pyrite. Bedding 75°.					
561'4"	561'11"	7"	100%	5923	40	88	72	1.0						
561'11"	562'5"	6"	100%	5924	32	68	42	1.0						
562'5"	562'11"	6"	100%	5925	48	88	760	1.2						
562'11"	563'7"	8"	100%	5926	38	78	130	0.9	Massive pure fissile black shale. Trace disseminated pyrite. Bedding 75°.					
563'7"	564'5"	10"	100%	5927	48	130	200	0.9						

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0089

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
584'11"	585'6"	7"	100%		5963	62	170	78	0.9	Massive pure fissile black shale. No mineralisation. Bedding 60°.					
585'6"	586'0"	6"	100%		5964)	36	100	260	1.4	Intricate alternating 1/8" wavy beds fissile black shale. 1/8" wavy interdigitating bands dolomitic shale. Common micro sphalerite blebs in dolomitic shale. Bedding 65°.					
586'0"	586'7"	7"	100%		5965)	62	130	470	0.9						
586'7"	587'3"	8"	100%		5966	34	100	360	1.3	Intricate banding as before but black shale bands up to ½" wide. Disseminated sphalerite in dolomitic shale. Bedding 70°.					
587'3"	587'10"	7"	100%		5967	38	100	180	1.1	Alternating 1/8" - ½" bands fissile black shale and 1/16" - 1/8" bands well bedded but frequently microfaulted dolomitic shale. Rare disseminated sphalerite in dolomite. Bedding 75°.					
587'10"	588'4"	6"	100%		5968)	40	110	1900	1.1	Intricately alternating and interdigitating fissile massive black shale and wavy bedded ¼" - ½" bands dolomitic shale. Weak 20° jointing. Common bedded pyrite in black shale. Sphalerite disseminated in dolomitic shale and on 20° joints. Bedding 75°.					
588'4"	588'10"	6"	100%		~~5969~~)	~~38~~	~~110~~	~~48~~	~~1.2~~						
588'10"	589'4"	6"	100%		5970)	28	80	500	2.2						
589'4"	589'10"	6"	100%		5971)	45	120	150	1.3						
589'10"	590'3"	5"	100%		5972)	52	160	370	1.2						
590'3"	591'3"	12"	100%		5973	62	180	1400	1.0	Fissile black shale, much broken, strong gypsum injection along 20° joints. Some sphalerite on 20° joints. Bedding 70°.					
591'3"	591'10"	7"	100%		5974)	40	100	1500	1.5	Intricately alternating 1 - 2" bands dolomitic shale and 1/8" - ½" bands fissile black shale. Disseminated sphalerite in dolomitic shale. Disseminated and bedded pyrite in dolomite and black shale. Bedding 75°. Weak 20° jointing with crystalline sphalerite.					
591'10"	592'3"	5"	100%		5975)	30	100	840	1.4						
592'3"	592'9"	6"	100%		5976)	28	100	130	1.4						
592'9"	593'4"	7"	100%		5977)	46	130	440	1.3	Alternating well bedded ¼" - 1" bands fissile black shale and ½" - 1" multiple bands dolomitic shale. Disseminated and crystalline sphalerite in dolomitic shale and on 20° - 30° joint planes. Maximum sphalerite at contacts of black and dolomitic shale. Bedding 75°.					
593'4"	593'10"	6"	100%		5978)	32	100	9200	1.4						
593'10"	594'2"	4"	100%		5979)	36	120	92	1.3						
594'2"	594'7"	5"	100%		5980)	52	200	170	1.0	Near pure strongly jointed fissile black shale. A single 1" band sphaleritic/dolomitic shale at 594'7" - 8". Strong 20° and 100° joints bear gypsum "skins" only. Bedding 75°.					
594'7"	595'3"	8"	100%		5981)	58	220	1400	1.1						

0600

Drilled by S. A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S. A. Depth of Hole 631'11" Co-ords. of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
573'2"	574'1"	11"	100%		5943	52	130	80	0.9	Massive fissile pure black shale. Rare bedded pyrite. Weak 30° joints. Bedding 75°.					
574'1"	574'8"	7"	100%		5944)	36	94	400	0.9	Regular alternating ½" - 1½" bands fissile black shale and 1/8" - ½" multiple interdigitating bands and wedges dolomitic shale. Common framboidal pyrite, bedded on 30° joints. Bedding 75°.	-				
574'8"	575'5"	9"	100%		5945)	44	96	160	0.9						
575'5"	576'0"	7"	100%		5946)	44	96	150	0.9						
576'0"	576'7"	7"	100%		5947)	36	96	340	1.1						
576'7"	577'5"	10"	100%		5948	50	140	70	0.8	Massive pure fissile black shale. No mineralisation. Bedding 75°.					
577'5"	577'10"	5"	100%		5949	46	100	130	1.0	Irregular alternating ½" bands fissile black shale and 1/8" - 3/4" wavy bands and wedges dolomitic shale. Dolomite highly pyritic and contains rare sphalerite veinlets (10°). Bedding 75°.					
577'10"	578'3"	5"	100%		5950)	40	110	130	0.9	Massive fissile black shale and ½" bands alternating with 1/16" or 1/8" bands dolomitic shale. Framboidal pyrite on 30° joints. Bedding 75°.					
578'3"	578'10"	7"	100%		5951)	38	100	160	0.9						
578'10"	579'4"	6"	100%		5952)	42	98	160	0.7						
579'4"	579'11"	7"	100%		5953)	42	120	110	1.0						
579'11"	580'5"	6"	100%		5954)	44	92	150	1.1	Alternating irregular ¼" - 1" bands fissile black shale and 1/8" - 1" wavy bands dolomitic shale. Rare small blebs sphalerite in dolomitic shale. Weak 120° joints. Bedding 75°.					
580'5"	580'11"	6"	100%		5955)	38	94	390	1.3						
580'11"	581'8"	9"	100%		5956	48	130	100	0.9	Massive pure fissile black shale. No mineralisation. Bedding 60°. Weak 120° jointing.					
581'8"	582'1"	5"	100%							Regular 1½" bands fissile black shale and ½" bands pyritic dolomitic shale. Bedding 75°.					
582'1"	582'5"	4"	100%		5957)	44	98	160	1.1	Regular alternating ½" bands fissile black shale and 1/16" - 1/8" bands dolomitic shale. Common pyrite on 10° joints. Rare micro blebs sphalerite in dolomite. Bedding 75°.					
582'5"	583'0"	7"	100%		5958)	44	58	250	1.0						
583'0"	583'6"	6"	100%		5959)	46	110	300	1.0						
583'6"	583'11"	5"	100%		5960	34	68	220	1.3	Massive black shale with 1 1½" band unbedded non fissile band dolomitic shale. Uncommon sphalerite blebs. Bedding 75°.					
583'11"	584'5"	6"	100%		5961)	34	72	140	1.3	Regular alternating 1/8" - ¼" bands fissile black shale and 1/8" - ½" wavy interdigitating bands dolomitic shale. Common micro blebs sphalerite in dolomitic shale and rare 1/8" sphalerite blebs. Bedding 70° - 75°.					
584'5"	584'11"	6"	100%		5962)	38	100	480	1.1						

Drilled by S. A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

T600

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
605'11"	606'4"	5"			6001	120	200	82	6.0	Massive fissile black shale, rare disseminated pyrite, Bedding 75°.					
606'4"	607'1"	9"			6002	26	560	860	2.9	Alternating ¼" - 1" bands dolomitic shale and 1/8" - ½" bands fissile black shale. Trace disseminated sphalerite in dolomite, pyrite throughout.					
607'1"	607'10"	9"			6003	42	430	1700	3.5	Alternating ¼" - 1" bands fissile black shale and ¼" bands dolomitic shale with disseminated sphalerite.					
607'10"	608'7"	9"			6004	40	380	2000	3.6	Alternating 1" - 1½" bands fissile black shale and ¼" - ½" multiple bands dolomitic shale with disseminated sphalerite. Bedding 75°.					
608'7"	609'2"	5"	100%		6005	54	700	2000	3.4	Massive fissile black shale, rare irregular, narrow dolomitic shale bands with trace sphalerite.					
609'2"	609'9"	7"	100%		6006	28	1100	1800	3.7	Alternating ½" bands fissile black shale and ½" bands dolomitic shale containing trace sphalerite. Bedding 75°.					
609'9"	610'5	8"	100%		6007	28	1000	480	3.6	Alternating ½" - 2" bands dolomitic shale and ¼" - ½" bands fissile black shale. Trace sphalerite in dolomite. Bedding 75°.					
610'5"	610'11"	6"	100%		6008	32	720	1200	4.4	3" pure fissile black shale followed by 3" pure dolomitic shale. Trace sphalerite in dolomitic shale.					
610'11"	611'11"	12"	100%		6009	64	500	600	7.5	Massive pure fissile black shale. Trace disseminated pyrite only. Bedding 75°.					
611'11"	612'7"	8"	100%		6010	30	1000	6600	4.1	Alternating ½" - 1" bands dolomitic shale and ¼" - ½" bands fissile black shale. Disseminated sphalerite in dolomite, pyrite in black shale. Bedding 75°.					
612'7"	613'2"	7"	100%		6011	48	1700	3600	5.0	Alternating ½" - 1" bands fissile black shale and ½" bands dolomitic shale, disseminated sphalerite in dolomite.					
613'2"	613'5"	3"	100%		6012	38	1600	>1%	3.6	Dolomitic shale with few narrow black shale bands. Disseminated sphalerite throughout dolomite, possibly up to 1% Zn.					Mineragraphic Report Ref No. CMS 71/6/2 by Central Mineralogical Services P/L.

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD.3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0092

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
595'3"	595'8"	5"	100%		5982)	20	110	1800	1.8	Alternating wavy bedded 1/8" - 1" beds fissile black shale and 1/8" - 1" bands weakly sphaleritic dolomitic shale, disseminated pyrite in black shale. Bedding 75°.					
595'8"	596'2"	6"	100%		5983)	32	120	150	1.6						
596'2"	596'7"	5"	100%		5984)	40	170	1200	1.4						
596'7"	597'1"	6"	100%		5985)	30	120	1300	1.7	Alternating wavy interdigitating 1/4" - 1" bands dolomitic shale and 1/4" - 1/2" bands fissile black shale. Dolomitic shale weakly sphaleritic - microscopic disseminated blebs. Bedding 75°.					
597'1"	597'10"	9"	100%		5986)	34	140	1200	1.9						
597'10"	598'5"	7"	100%		5987	50	200	220	1.7	Highly fissile black shale containing frequent 1/16" bands dolomitic shale. Some disseminated pyrite. Bedding 80°.					
598'5"	599'4"	11"	100%		5988	62	260	980	2.0	Massive fissile black shale. Some disseminated pyrite plus 1/8" blebs sphalerite. Bedding 75°.					
599'4"	599'8"	4"			5989	32	120	440	2.2	Dolomitic shale with frequent 1/16"- 1/8" black shale bands. Trace disseminated sphalerite. Bedding 75°.					
599'8"	600'3"	7"			5990)	36	160	350	1.7	Alternating, interdigitating 1/8" - 1/2" bands fissile black shale and 1/8" - 1/2" bands dolomitic shale. Trace sphalerite in dolomitic shale. Rare pyrite in black shale. Bedding 75°.					
600'3"	600'9"	6"			5991)	34	180	1300	1.9						
600'9"	601'4"	7"			5992)	54	180	470	2.0	Alternating 1" - 2" bands dolomitic shale and 1/8 - 1/2" bands black shale. Trace disseminated sphalerite in dolomitic shale. Bedding 80°.					
601'4"	601'10"	6"			5993)	32	140	250	2.1						
601'10"	602'5"	7"			5994)	30	190	1300	2.2						
602'5"	603'2"	9"			5995	48	220	1700	2.9	Alternating 1" multiple bands dolomitic shale and 1/2" - 2" bands fissile black shale. Pyritic gypsum on 20° joints. Trace sphalerite in dolomitic shale.					
603'2"	603'8"	6"			5996	28	240	270	2.6	Alternating 1/2" - 1" bands dolomitic shale. 1/8" - 1/4" bands fissile black shale. Disseminated pyrite throughout. Bedding 80°.					
603'8"	604'3"	7"			5997)	34	210	940	2.6	Intricately alternating interdigitating 1/8" bands fissile black shale and 1/8" - 1" multiple bands dolomitic shale. Disseminated sphalerite in dolomitic shale and pyrite throughout.					
604'3"	604'9"	6"			5998)	36	330	1100	2.6						
604'9"	605'3"	6"			5999)	38	330	1400	2.6						
605'3"	605'11"	8"			6000	24	350	900	2.7	Alternating 3/4" bands dolomitic shale and 1/8" - 1/4" bands black shale. Trace sphalerite in dolomite. Pyrite throughout. Bedding 75°.					

0093

Drilled by S. A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S. A. Depth of Hole 631'11" Co-ords. of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
629'0"	629'10"	10"			6037	340	30	10	1.9	Pandurra sandstone. Poor grainsize distribution. Red-brown coloration. Trace pyrite.					
629'10"	630'6"	8"			6038	72	18	12	0.3						
630'6"	631'11"	17"			6039	48	20	8	0.6						

Drilled by S.A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD.3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
613'5"	614'0"	7"	100%		6013)	42	2100	3500	5.0	Alternating $\frac{1}{4}$" - 1" bands fissile black shale and $\frac{1}{8}$" - 1" bands dolomitic shale, disseminated sphalerite in dolomitic shale, also some disseminated pyrite throughout. Bedding 75°.					
614'0"	614'6"	6"	100%		6014)	40	2500	5000	5.0						
614'6"	615'0"	6"	100%		6015)	40	2000	2100	5.5						
615'0"	615'7"	7"	100%		6016)	50	1800	1000	6.0	Alternating 1" bands fissile black shale and $\frac{1}{2}$" - $\frac{1}{4}$" bands dolomitic shale, dolomite contains much disseminated sphalerite, pyrite in black shale. Bedding 75°.					
615'7"	616'2"	7"	100%		6017)	54	2000	5000	6.5						
616'2"	616'8"	6"	100%		6018)	42	1900	7000	5.5	Alternating $\frac{1}{8}$" - $\frac{1}{2}$" bands sphaleritic dolomitic shale and $\frac{1}{4}$" - 1" bands fissile black shale. Sphalerite richly disseminated between 616'9" and 616'10".					
616'8"	617'0"	4"	100%		6019)	44	2100	>1%	5.5						
617'0"	617'7"	7"	100%		6020)	50	1300	6200	6.0	Massive fissile black shale and infrequent narrow dolomitic shale bands containing disseminated sphalerite. Bedding 75°.					
617'7"	618'1"	6"	100%		6021)	56	1300	7200	6.5						
618'1"	619'3"	14"			6022	46	1500	3600	6.0	Massive fissile black shale. No dolomite. No mineralisation. Bedding 75°.					
619'3"	619'9"	6"			6023	52	2000	5200	5.5	Massive fissile black shale containing 3 widely spaced $\frac{1}{2}$" bands dolomitic shale, with disseminated sphalerite.					
619'9"	620'5"	8"			6024)	54	2300	460	6.5	Pure fissile black shale, rare disseminated pyrite only. Bedding 75°.					
620'5"	621'1"	8"			6025)	40	1500	410	5.5						
621'1"	622'0"	11"			6026)	46	1100	200	5.0						
622'0"	622'9"	9"			6027)	60	740	5400	5.5						
622'9"	623'5"	8"			6028	82	1700	5400	8.5	As above but with infrequent narrow bands dolomitic shale with disseminated sphalerite.					
623'5"	624'0"	7"			6029)	20	2500	3200	3.4	Alternating massive $\frac{1}{2}$" - 1" bands black shale and 1" - 2" bands dolomitic shale. Trace disseminated sphalerite only much silicification apparent. Bedding 75°.					
624'0"	624'9"	9"			6030)	56	3000	3600	8.0						
624'9"	625'7"	10"			6031)	68	2500	4600	8.0						
625'7"	626'5"	10"			6032)	720	3000	6000	8.5	As above. Last 3" broken along vertical joints. Bedding 75°.					
626'5"	626'11"	6"			6033)	190	2000	3600	10.0						
626'11"	627'10"	11"			6034)	450	350	880	8.5						
627'10"	628'5"	7"			6035)	190	60	66	3.8	Sandy massive dolomitic shale, pale grey, contains few narrow bands black shale. Some disseminated pyrite. Bedding distorted - generally 80°.					
628'5"	629'0"	7"			6036)	130	58	28	4.8						

Drilled by S. A. Mines Department Type of Drilling Percussion Hole Size % Recovery Surveyed by Instrument Used

Date Started 24th April, 1971. Date Completed 24th May, 1971. Logged by C. Douch Sampled By C. Douch & P. Larwood Record Completed

No. of Hole LD. 3 Location Lake Dutton, S.A. Depth of Hole 631'11" Co-ords.of Collar 137° 3'E. 31° 46'S. Bearing Vertical Inclination 90°

0095

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
208'6"	209'5"	11"			6066	38	380	700						
209'5"	209'8"	3"			6067	46	430	720						
209'8"	210'11"	15"			6068	36	350	680	Highly fissile, soft and clayey black shale. No dolomitic material. Bedding generally at very steep angle 20° - 30° Considerable distortion and microfaulting generally 0° - 10°. 10° joints weak but contain framboidal pyrite. Can be gouged with the finger nail.					
210'11"	212'2"	15"			6069	52	390	440						
212'2"	213'8"	18"			6070	52	410	380						
213'8"	214'8"	12"			6071	46	380	620						
214'8"	216'0"	16"			6072	34	350	480						
216'0"	217'0"	12"			6073	38	350	450						
217'0"	218'0"	12"			6074	30	390	700						
218'0"	219'4"	16"			6075	36	800	940						
219'4"	220'6"	14"			6076	40	450	900						
220'6"	221'7"	13"			6077	28	420	600						
221'7"	222'8"	13"			6078	30	320	640						
222'8"	223'9"	13"			6079	36	420	3100	As above but some dolomite in alternating narrow bands - difficult to see but make the black shale harder. Rare pyrite on weak 10° joints.					
223'9"	224'5"	8"			6080	42	440	780						
224'5"	225'7"	14"			6081	36	640	410						
225'7"	226'7"	12"			6082	34	470	360						
226'7"	227'9"	14"			6083	26	310	960						
227'9"	228'9"	12"			6084	32	410	300						
228'9"	229'7"	10"			6085	50	580	310						
229'7"	230'7"	12"			6086	56	380	360						
230'7"	231'2"	7"			6087	26	310	300						
231'2"	232'0"	10"			6088	50	430	280						
232'0"	232'9"	9"			6089	26	360	860						
232'9"	233'9"	12"			6090	46	280	4650						
233'9"	234'9"	12"			6091	38	300	480	Soft muddy highly fissile weakly jointed black shale. No mineralization. Bedding uniform 80°.					
234'9"	235'4"	7"			6092	34	320	640						
235'4"	236'1"	9"			6093	38	330	620						
236'1"	237'0"	11"			6094	40	300	560						
237'0"	237'8"	8"			6095	38	330	700						
237'8"	238'0"	4"			6096	26	240	1400	Massive, hard and fissile black shale. Becoming more calcic as chemical cement, causing increased hardness Bedding generally 80°. Some gypsum? leaches from bedding after wetting. Trace pyrite only.					
238'0"	238'11"	11"			6097	36	300	820						
238'11"	239'7"	8"			6098	32	270	1500						
239'7"	240'8"	13"			6099	26	280	1600						
240'8"	241'7"	11"			6100	34	260	1200						
241'7"	242'4"	9"			6101	38	330	880						
242'4"	243'9"	17"			6102	36	370	1300	As above, core becoming harder and more limy, lime? or gypsum in considerable quantities leached from bedding. Black shale. Bedding 80°. Some distortion of bedding. Trace pyrite on bedding.					
243'9"	244'6"	9"			6103	42	470	380						
244'6"	245'7"	13"			6104	42	390	680						
245'7"	246'8"	13"			6105	38	430	3000						
246'8"	247'6"	10"			6106	44	480	390						
247'6"	248'4"	10"			6107	36	420	380						
248'4"	249'4"	12"			6108	30	340	740						
249'4"	250'1"	9"			6109	28	320	700						
250'1"	250'11"	10"			6110	36	420	760						

Drilled by S. A. Mines Department Type of Drilling Rotary Diamond core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed 2nd June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole L.D. 4 Location Lake Dutton, S.A. Depth of Hole 450'2" Co-ords. of Collar 136° 58'E. 31° 48'S. Bearing Vertical Inclination 90°

0096

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
0'	10'0"	10'			6040					Surface sand, gypsum. Much iron staining.					
10'0"	20'0"	10'			6041					Surface sand, gypsum. Much iron staining.					
20'0"	30'0"	10'			6042					Surface sands cemented with gypsum. Grey, little iron staining.					
30'0"	40'0"	10'			6043					Whyalla Sandstone					
40'0"	50'0"	10'			6044					Whyalla Sandstone					
50'0"	60'0"	10'			6045					Whyalla Sandstone					
60'0"	70'0"	10'			6046					Whyalla Sandstone					
70'0"	80'0"	10'			6047					Whyalla Sandstone					
80'0"	90'0"	10'			6048					Whyalla Sandstone					
90'0"	100'0"	10'			6049					Whyalla Sandstone					
100'0"	110'0"	10'			6050					Whyalla Sandstone and 20% grey clay and silt size particle					
110'0"	120'0"	10'			6051					Whyalla Sandstone and 20% grey clay and silt size particle					
120'0"	120'0"	10'			6052					Whyalla Sandstone and clay with rare fragments black shale					
130'0"	140'0"	10'			6053					Whyalla Sandstone and clay with rare fragments black shale					
140'0"	150'0"	10'			6054					Clay 70%. Few sand sized particles, black clay infrequent					
150'0"	160'0"	10'			6055										
160'0"	170'0"	10'			6056										
170'0"	180'0"	10'	15-20%		6057	180	110	260		Shale penetrated at 171'6".					
180'0"	190'0"	10'	15-20%		6058	150	90	170		Black shale, cuttings to 200'.					
190'0"	200'0"	10'	15-20%		6059	100	150	180							
200'0"	201'6"	18"	91%		6060	60	260	270		Massive black, highly fissile black shale. No dolomitic material. Bedding highly contorted - usually 30 - 40'. Much slumping and microfaulting. Trace framboidal pyrite. Galena in calcite veins in sample 6061. Sphalerite on joint surfaces (110°) or bedding planes.					
201'6"	202'9"	15"	91%		6061	50	310	250							
202'9"	204'6"	21"	91%		6062	42	700	420							
204'6"	206'4"	22"	91%		6063	46	290	700							
206'4"	207'6"	14"	91%		6064	42	320	500							
207'6"	208'6"	12"	91%		6065	42	390	500							

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed 2nd June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole LD. 4 Location Lake Dutton, S.A. Depth of Hole 450'2" Co-ords. of Collar 136° 58'E. 31° 48'S. Bearing Vertical Inclination 90°

1600

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
292'4"	293'2"	10"		100%	6155	30	100	780		Massive well laminated fissile black shale. No dolomitic shale. Rare pyrite. Bedding 80°.					
293'2"	293'9"	7"		100%	6156	24	88	520							
293'9"	294'11"	14"		100%	6157	22	98	68		Massive fissile black shale containing infrequent dolomitic bands up to 1/2" wide. No mineralization. Bedding 80°.					
294'11"	295'9"	10"		100%	6158	22	78	400							
295'9"	296'10"	13"		100%	6159	24	86	1100		Massive highly fissile black shale. Infrequent narrow bands dolomitic shale. Trace pyrite only. Bedding 80°.					
296'10"	297'8"	10"		100%	6160	26	76	260							
297'8"	298'7"	11"		100%	6161	52	150	500							
298'7"	299'4"	9"		100%	6162	100	140	160		Massive fissile black shale. Infrequent narrow bands dolomitic shale. No mineralization. Bedding 80°.					
299'4"	300'4"	12"		100%	6163	48	86	460		Massive fissile black shale. No dolomitic bands. No mineralization. Bedding 80°.					
300'4"	301'4"	12"		100%	6164	24	170	190		Massive fissile black shale. Frequent regular narrow bands dolomitic shale. Rare micro blebs sphalerite, trace pyrite. Bedding 80°.					
301'4"	302'2"	10"		100%	6165	28	68	330							
302'2"	303'1"	11"		100%	6166	34	74	88							
303'1"	303'9"	8"		100%	6167	30	68	210							
303'9"	304'8"	11"		100%	6168	38	72	210		Massive highly fissile black shale, Regular 1/8" bands diffuse dolomitic shale. Rare blebs sphalerite. Trace pyrite on bedding. Weak 20° jointing bears rare framboidal pyrite. Bedding 80°.					
304'8"	305'6"	10"		100%	6169	26	68	170							
305'6"	306'5"	11"		100%	6170	30	68	150							
306'5"	307'6"	13"		100%	6171	28	70	220							
307'6"	308'5"	11"		100%	6172	28	70	300							
308'5"	309'5"	12"		100%	6173	32	72	220							
309'5"	310'10"	17"		100%	6174	30	76	140							
310'10"	311'10"	12"		100%	6175	42	86	140							
311'10"	313'2"	16"		100%	6176	30	68	68							
313'2"	313'9"	7"		100%	6177	34	78	130							
313'9"	314'8"	11"		100%	6178	38	86	120		As above but dolomite bands less frequent. 1/2" bands every inch. Massive fissile black shale. No mineralization.					
314'8"	315'8"	12"		100%	6179	76	80	340							
315'8"	316'6"	10"		100%	6180	34	76	94							
316'6"	317'1"	7"			6181	44	68	150		Massive black shale containing broken fragments of beds of dolomitic shale. No structure. Trace sphalerite.					
317'1"	318'1"	12"			6182	48	82	340		Massive fissile black shale, regular alternating 1/2" - 1" bands black shale and 1/8" - 1/2" multiple bands dolomitic shale. No mineralization observed. Bedding 80°.					
318'1"	318'10"	9"			6183	40	110	80							
318'10"	319'10"	12"			6184	36	88	90							
319'10"	320'11"	13"			6185	34	80	110							
320'11"	321'8"	9"			6186	36	74	500							
321'8"	322'7"	11"			6187	32	74	130							
322'7"	323'9"	14"			6188	32	74	140							

Drilled by S. A. Mines Department Type of Drilling Rotary Diamond core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed 2nd June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole LD. 4 Location Lake Dutton, S.A. Depth of Hole 450'2" Co-ords.of Collar 136° 58'E. 31° 48'S. Bearing Vertical Inclination 90°

0098

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery		Sample No.	Assays			Geological Log	Angle to core	Survey			Notes
				%		Cu	Pb	Zn			Depth	Bearing	Inclination	
250'11"	251'11"	12"			6111	34	380	780	As above, core becoming harder and more limy. lime? or gypsum in considerable quantities leached from bedding. Black shale. Bedding 80°, some distortion of bedding. Trace pyrite on bedding.					
251'11"	252'10"	11"			6112	32	300	640						
252'10"	253'9"	11"			6113	24	210	2000						
253'9"	254'9"	12"	100%		6114	36	310	1500						
254'9"	255'10"	13"	100%		6115	34	250	920	Pale grey, highly fissile, hard well laminated black shale. No distinct dolomitic bands, but rock becoming cemented with lime (dolomite). Rare framboidal pyrite, on bedding planes. Bedding 80°.					
255'10"	256'9"	11"	100%		6116	30	220	620						
256'9"	257'7"	10"	100%		6117	38	220	800						
257'7"	258'11"	16"	100%		6118	26	200	1700						
258'11"	259'9"	10"	100%		6119	36	180	1100						
259'9"	260'6"	9"	100%		6120	38	250	640						
260'6"	261'5"	11"	100%		6121	36	270	460						
261'5"	262'4"	11"	100%		6122	40	300	340						
262'4"	263'9"	17"	100%		6123	34	240	400						
263'9"	264'6"	9"	100%		6124	36	410	640						
264'6"	265'6"	12"	100%		6125	50	240	1000						
265'6"	266'5"	11"	100%		6126	36	210	820						
266'5"	267'4"	11"	100%		6127	36	240	1400	As above, but bedding slightly more distorted - jointing more prominant. Common 60° joints with no mineralization.					
267'4"	268'4"	12"	100%		6128	28	240	1700						
268'4"	269'0"	8"	100%		6129	32	210	800						
269'0"	269'11"	11"	100%		6130	30	210	720						
269'11"	270'11"	12"	100%		6131	24	210	800						
270'11"	271'9"	10"	100%		6132	22	210	1600						
271'9"	272'6"	9"	100%		6133	32	320	1200						
272'6"	273'5"	11"	100%		6134	32	220	720						
273'5"	274'4"	11"	100%		6135	24	230	940						
274'4"	275'3"	11"	100%		6136	30	170	1200						
275'3"	276'4"	13"	100%		6137	28	240	1300						
276'4"	277'5"	13"	100%		6138	28	150	1300						
277'5"	278'7"	14"	100%		6139	34	160	640						
278'7"	279'7"	12"	100%		6140	28	230	470						
279'7"	280'6"	11"	100%		6141	46	680	230	Massive highly fissile well laminated black shale. No dolomitic material. Rare pyrite on bedding planes. Bedding 85°.					
280'6"	281'6"	12"	100%		6142	28	660	620						
281'6"	282'7"	13"	100%		6143	54	310	2500						
282'7"	283'5"	10"	100%		6144	38	700	1400						
283'5"	283'9"	4"	100%		6145	26	700	430						
283'9"	284'11"	14"	100%		6146	54	440	1100						
284'11"	285'9"	10"	100%		6147	30	68	700						
285'9"	286'10"	13"	100%		6148	24	120	2300						
286'10"	287'9"	11"	100%		6149	24	190	1400						
287'9"	288'9"	12"	100%		6150	28	230	680	Massive highly fissile black shale. Few irregular 1/2" - 1" bands dolomitic shale, containing trace sphalerite in vertical veins and in minute blebs throughout. Trace pyrite in black shale. Bedding 85°.					
288'9"	289'9"	12"	100%		6151	26	340	350						
289'9"	290'6"	9"	100%		6152	64	240	1000						
290'6"	291'7"	13"	100%		6153	30	124	300						
291'7"	292'4"	9"	100%		6154	26	110	540						

6600

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed 2nd June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole LD.4 Location Lake Dutton, S.A. Depth of Hole 450'2" Co-ords of Collar 136° 58'E. 31° 48'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag			Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
348'2"	349'4"	14"		100	6215	34	82	130				Massive fissile black shale containing irregular 1/8" - 1/4" distorted bands dolomitic shale containing trace sphalerite. Bedding 85°.					
349'4"	350'8"	16"		100	6216)	28	70	200				Alternating 1/2" - 1" bands fissile black shale and distorted 1/16" bands dolomitic shale. No mineralisation. Bedding 85°.					
350'8"	351'4"	8"		100	6217)	44	72	270									
351'4"	352'2"	10"		100	6218	58	96	200				Massive fissile black shale. Only 1 1/4" band dolomitic shale contains trace sphalerite. Bedding 85°.					
352'2"	352'10"	8"		100	6219)	36	78	200				Irregular alternating 1/4" - 1/2" bands black shale and 1/16" single bands or 1/2" multiple bands dolomitic shale. No mineralisation. Bedding 85°.					
352'10"	353'9"	11"		100	6220)	32	70	260									
353'9"	354'8"	11"		100	6221)	46	98	160				Massive highly fissile black shale containing irregular widely spaced 1/4" bands dolomitic shale. No mineralisation. Bedding 85°.					
354'8"	355'9"	13"		100	6222)	38	80	230									
355'9"	356'9"	12"		100	6223	42	74	64				Finely laminated alternating crenulated bands 1/8" - 1/4" bands black shale and < 1/16" bands dolomitic shale? No mineralisation. Bedding 85°.					
356'9"	357'9"	12"		100	6224	46	94	130				Massive highly fissile black shale. No dolomitic shale. No mineralisation. Bedding 85°.					
357'9"	358'10"	13"		100	6225)	36	70	260				Finely alternating 1/8" - 1/2" bands fissile black shale and 1/16" crenulated bands dolomitic shale. No mineralisation. Bedding 85°.					
358'10"	359'11"	13"		100	6226)	34	72	88									
359'11"	361'0"	13"		100	6227	44	88	70				Massive highly fissile black shale, infrequent widely spaced 1/4" - 1/2" bands dolomitic shale. No mineralisation. Bedding 85°.					
361'0"	361'10"	10"		100	6228)	36	66	54				Alternating 1/4" - 1/2" bands fissile black shale and 1/16" - 1/4" multiple bands dolomitic shale. Bedding 85°. Trace sphalerite in dolomitic shale.					
361'10"	362'10"	12"		100	6229)	36	70	50									
362'10"	363'9"	11"		100	6230	48	80	60				Massive fissile black shale containing infrequent irregular 1/8" bands dolomitic shale. No mineralisation. Bedding 85°.					
363'9"	365'1"	16"		100	6231)	46	74	64				Alternating regular 1/4" bands fissile black shale and very narrow diffuse crenulated laminae dolomitic shale. No mineralisation. Bedding 85°.					
365'1"	365'10"	9"		100	6232)	38	72	130									

Drilled by S. A. Mines Department Type of Drilling Rotary Diamond Core Hole Size % Recovery Surveyed by Instrument Used

Date Started Date Completed 2nd June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed

No. of Hole L.D. 4 Location Lake Dutton, S. A. Depth of Hole 450'2" Co-ords. of Collar 136° 58'E. 31° 48'S. Bearing Vertical Inclination 90°

0100

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
323'9"	324'9"	12"			6189)	28	70	160		As above but 20° calcite veins more frequent. No sulphides in calcite.					
324'9"	325'10"	13"			6190)	30	74	150							
325'10"	326'7"	9"			6191)	32	74	160							
326'7"	327'7"	12"			6192)	36	70	220							
327'7"	328'6"	11"			6193)	26	70	78							
328'6"	329'6"	12"			6194)	22	64	44		Finely laminated alternating 1/16" bands diffuse dolomitic shale and fissile black shale. Trace sphalerite associated with 20° joints. Bedding 85°.					
329'6"	330'3"	9"			6195)	22	60	600							
330'3"	331'3"	12"			6196)	32	76	98		Alternating 1/4" - 1/2" bands fissile black shale and <1/16" bands dolomitic shale showing trace pyrite. Bedding rippled and wavy 85°. Weak 20° joints with framboidal pyrite.					
331'3"	332'4"	13"			6197)	36	70	400							
332'4"	333'0"	8"			6198)	28	64	370							
333'0"	333'9"	9"			6199	32	78	100		Alternating 1" bands fissile black shale and 1/4" - 1/2" bands dolomitic shale. Possible Zns in minute vertical veins.					
333'9"	334'5"	8"		100	6200)	30	78	52		Generally alternating 1" bands fissile black shale and 1/4" - 1/2" bands dolomitic shale but often up to 3" bands black shale and 2" bands dolomitic shale. Trace sphalerite in dolomite. Bedding 85°, 20° joints unmineralised.					
334'5"	335'5"	12"		100	6201)	28	60	320							
335'5"	336'6"	13"		100	6202)	30	76	200							
336'6"	337'5"	11"		100	6203)	28	72	200		Finely alternating 1/8" - 1/4" bands black shale and <1/16" bands dolomitic shale. Framboidal pyrite on 20° joints. Bedding 25°.					
337'5"	338'8"	15"		100	6204)	20	60	90							
338'8"	339'7"	11"		100	6205)	30	78	100		Irregular alternating black shale (1/2" - 2" bands) and dolomitic shale in generally 1/8" - 1/4" bands. No mineralisation observed. Bedding 85°.					
339'7"	340'8"	13"		100	6206)	34	72	600							
340'8"	341'5"	9"		100	6207)	36	70	200							
341'5"	342'6"	13"		100	6208)	30	72	102		Regular alternating 1" - 1 1/2" bands fissile black shale and 1/8" - 1/4" bands dolomitic shale. Possible trace sphalerite in dolomite. Bedding 85°.					
342'6"	343'9"	15"		100	6209)	28	70	54							
343'9"	344'9"	12"		100	6210	24	66	46		Pale coloured dolomitic black shale containing regular fine laminae diffuse dolomitic shale. No mineralisation. Bedding 85°.					
344'9"	345'7"	10"		100	6211)	36	78	60		As before but contains irregular 1/8" - 1/4" bands dolomitic shale and often no finer laminae. No mineralisation. Bedding 85°.					
345'7"	346'5"	10"		100	6212)	30	78	58							
346'5"	347'4"	11"		100	6213)	30	70	80		Alternating 1/4" multiple bands dolomitic shale and 1/16" - 1/8" bands black fissile shale. No mineralisation observed.					
347'4"	348'2"	10"		100	6214)	24	66	50							

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond Core Hole Size ... % Recovery ... Surveyed by ... Instrument Used ...

Date Started ... Date Completed 2nd June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed ...

No. of Hole LD.4 Location Lake Dutton, S.A. Depth of Hole 450'2" Co-ords.of Collar 136° 58'E. 31° 48'S. Bearing Vertical Inclination 90°

0101

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
384'9"	385'6"	9"	100	6254)	38	76	50		Irregular alternating 1/8" - 1/2" bands fissile black shale and 1/16" crenulated laminae dolomitic shale. No mineralisation. Bedding 85°.					
385'6"	386'5"	11"	100	6255)	40	80	170							
386'5"	387'4"	11"	100	6256	70	100	190		Massive fissile black shale with rare irregular narrow bands dolomitic shale. No mineralisation. Bedding 85°.					
387'4"	388'1"	9"	100	6257)	42	78	150		Regular alternating 3/8" bands fissile black shale and 1/16" - 1/8" multiple bands dolomitic shale. No mineralisation. Bedding 85°.					
388'1"	388'11"	10"	100	6258)	42	84	820							
388'11"	389'10"	11"	100	6259	60	110	300		Massive fissile black shale. No mineralisation. Weak 0° jointing. Bedding 85°.					
389'10"	390'7"	9"	100	6260)	34	78	280		Irregular alternating 1/4" - 1" bands fissile black shale and 1/16" - 1/2" multiple bands dolomitic shale. Possible trace sphalerite. Bedding 85°.					
390'7"	391'4"	9"	100	6261)	42	86	72							
391'4"	392'1"	9"	100	6262	130	160	280		Massive fissile black shale. No mineralisation. Bedding 85°.					
392'1"	392'11"	10"	100	6263)	100	82	88		Irregular alternating 1/4" - 1" bands fissile black shale and 1/16" - 1/2" bands dolomitic shale. No mineralisation. Bedding 85°.					
392'11"	393'9"	10"	100	6264)	38	78	130							
393'9"	394'10"	13"	100	6265	46	92	68		Massive fissile pale coloured homogeneous dolomitic black shale. No mineralisation. Bedding 85°.					
394'10"	395'9"	11"	100	6266	32	72	70		As above but contains irregular 1/8" - 1/4" band dolomitic shale, with trace sphalerite. Bedding 85°.					
395'9"	396'5"	8"	100	6267)	38	78	40		Massive fissile black shale containing irregular narrow laminae dolomitic shale - some extremely contorted and broken. No mineralisation. Bedding 85°.					
396'5"	397'0"	7"	100	6268)	40	84	40							
397'0"	398'2"	14"	100	6269	46	96	40		Massive fissile black shale. Few irregular 1/8" - 1/4" bands dolomitic shale showing considerable distortion. No mineralisation. Bedding 85°.					
398'2"	398'11"	9"	100	6270)	36	72	32		Massive fissile black shale with irregular infrequent extremely distorted and broken-up narrow dolomitic shale bands, weak 25° jointing. Bedding between 60° - 80°.					
398'11"	399'11"	12"	100	6271)	36	76	36							
399'11"	400'8"	9"	100	6272	40	74	34		Massive fissile black shale, few diffuse < 1/16" laminae dolomitic shale. No mineralisation. Bedding 75°.					

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond Core Hole Size % Recovery Surveyed by Instrument Used

Date Started Date Completed 2nd June, 1971 Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed

No. of Hole LD.4 Location Lake Dutton, S.A. Depth of Hole 450'2" Co-ords.of Collar 136° 58'E. 31° 48'S. Bearing Vertical Inclination 90°

0102

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
365'10	366'11"	13"		100	6233	46	90	230		Massive fissile black shale with widely spaced 1/8" multiple bands dolomitic shale with trace sphalerite. Bedding 85°.					
366'11	367'10"	11"		100	6234)	32	72	82		Alternating regular 1/8" - 1/4" bands fissile black shale and 1/4" diffuse crenulated zones dolomitic shale. No mineralisation Bedding 85°.					
367'10	368'5"	7"		100	6235)	36	86	280							
368'5"	369'7"	14"		100	6236	46	92	340		Massive fissile black shale. Irregular infrequent 1/8" bands dolomitic shale. No mineralisation. Bedding 85°.					
369'7"	370'11"	16"		100	6237	34	76	340		Alternating regular 1/2" band fissile black shale and 1/8" - 1/4" multiple bands dolomitic shale with trace sphalerite. Bedding 85°.					
370'11	371'11"	12"		100	6238	48	98	240		Massive fissile black shale. Irregular infrequent 1/8" - 1/4" Bands dolomitic shale with trace sphalerite. Bedding 85°					
371'11	372'10"	11"		100	6239)	40	76	270		Alternating regular 1/2" band fissile black shale and 1/8" - 1/4" multiple bands dolomitic shale with trace sphalerite. Bedding 85°.					
372'10	373'9"	11"		100	6240)	38	72	1300							
373'9"	374'10"	13"		100	6241	52	98	80		Massive highly fissile black shale. No mineralisation. Bedding 85°.					
374'10	375'9"	11"		100	6242)	38	68	100		Regularly alternating 1/2" bands fissile black shale and diffuse crenulated 1/16" bands dolomitic shale. No mineralisation. Bedding 85°.					
375'9"	376'4"	7"		100	6243)	36	72	52							
376'4"	377'1"	9"		100	6244)	42	86	52		Near pure highly fissile black shale. Infrequent narrow dolomitic shale bands with trace sphalerite. Bedding 85°.					
377'1"	378'2"	13"		100	6245)	44	74	54							
378'2"	378'10"	8"		100	6246)	46	70	56		As above but narrow dolomitic shale bands more frequent, contain trace sphalerite.					
378'10	379'4"	6"		100	6247)	46	70	54							
379'4"	380'5"	13"		100	6248)	40	78	56		Massive fissile black shale. Infrequent irregular 1/4" bands dolomitic shale. No mineralisation observed. Bedding 85°.					
380'5"	381'2"	9"		100	6249)	52	100	66							
381'2"	381'11"	9"		100	6250)	56	120	60		Massive fissile black shale in 1/8" - 1/4" bands alternating with frequent irregular 1/16" crenulated and diffuse bands dolomitic shale. No mineralisation observed. Bedding 85°.					
381'11	382'7"	8"		100	6251)	40	72	52							
382'7"	383'9"	14"		100	6252)	42	74	52							
383'9	384'9"	12"		100	6253	48	96	62		Massive fissile black shale. No dolomite. No mineralisation. Bedding 85°.					

Drilled by S. A. Mines Department Type of Drilling Rotary Diamond Core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed 2nd June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole LD. 4 Location Lake Dutton, S. A. Depth of Hole 450'2" Co-ords. of Collar 136° 58'E. 31° 48'S. Bearing Vertical Inclination 90°

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
414'10"	415'6"	8"	100	6290	34	90	66	Alternating irregular 1/4" - 1" bands fissile black shale and 1/8" - 1/4" multiple, diffuse bands dolomitic shale. Trace sphalerite. Bedding 85°.					
415'6"	416'8"	14"	100	6291	34	84	44	As before but dolomite in last 7" is very folded and distorted Bedding generally 85°.					
416'8"	417'6"	10"	100	6292	62	130	44	Irregular alternating 1/2" - 2" bands fissile black shale and 1/16" - 1/2" multiple bands dolomitic shale. No mineralisation. Bedding 85°.					
417'6"	418'6"	12"	100	6293	56	92	50	Alternating 1/8" - 1" bands massive fissile black shale, irregular, multiple, diffuse laminae dolomitic shale. No mineralisation. Bedding 85°.					
418'6"	419'3"	9"	100	6294	42	90	40						
419'3"	420'0"	9"	100	6295	32	78	66						
420'0"	420'7"	7"	100	6296	50	150	50	Massive non-fissile black shale. Bedding extremely contorted and folded. No mineralisation. Bedding 20° - 100°.					
420'7"	421'5"	10"	100	6297	36	82	100	Massive fissile black shale with regular, frequent, very diffuse, multiple laminae, dolomitic shale. No mineralisation. Bedding 85°.					
421'5"	422'3"	10"	100	6298	48	86	98						
422'3"	422'9"	6"	100	6299	34	78	210						
422'9"	423'9"	12"	100	6300	38	88	140	Regular alternating 1/8" - 1/4" bands fissile black shale and 1/8" - 1/4" bands, contorted dolomitic shale. Trace mineralisation. Bedding 80° - 90°.					
423'9"	424'7"	10"	100	6301	64	180	92	Fissile black shale, tending to crumble in places. No mineralisation. Bedding 85°.					
424'7"	425'7"	12"	100	6302	32	88	40	Irregular alternating 1/4" - 1/2" bands black shale and 1/16" - 1" multiple bands dolomitic shale. No mineralisation. Bedding 85°.					
425'7"	426'3"	8"	100	6303	42	86	38	Massive fissile black shale with regular diffuse laminae, dolomitic shale. No mineralisation. Bedding 85°.					
426'3"	426'10"	7"	100	6304	36	76	32	Massive alternating 1/16" - 1/8" bands fissile black shale and 1/16" - 1" multiple bands dolomitic shale. No mineralisation. Bedding 80° - 85°.					
426'10"	427'4"	6"	100	6305	38	120	34						
427'4"	427'11"	7"	100	6306	72	200	42	Massive fissile black shale. Prominant slickensided 20° joints No mineralisation. Bedding 85°.					

Drilled by S. A. Mines Department Type of Drilling Rotary Diamond Core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed 2nd June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole LD. 4 Location Lake Dutton, S. A. Depth of Hole 450'2" Co-ords. of Collar 136° 58'E. 31° 48'S. Bearing Vertical Inclination 90°

0104

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Ag	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
400'8"	401'5"	9"	100	6273	40	80	52		As above but dolomitic bands more frequent, Bedding 85°.					
401'5"	402'2"	9"	100	6274	52	110	44		Massive fissile black shale. No dolomitic shale. No mineralisation. Bedding 85°.					
402'2"	402'8"	6"	100	6275	34	74	40		Regular alternating 1/2" bands fissile black shale and 1/8" - 1/2" bands dolomitic shale. No mineralisation. Bedding 85°.					
402'8"	403'8"	7"	100	6276	44	72	44		Massive fissile black shale with frequent irregular laminae dolomitic shale. No mineralisation. Bedding 85°.					
403'3"	403'9"	6"	100	6277	40	78	1300							
403'9"	404'6"	9"	100	6278	56	86	48		Massive fissile black shale regular frequent 1/16" bands dolomitic shale. No mineralisation. Bedding 85°.					
404'6"	405'7"	13"	100	6279	44	110	340		Massive fissile black shale, few irregular 1/8" bands dolomitic shale. No mineralisation. Bedding 85°.					
405'7"	406'5"	10"	100	6280	36	78	92		Irregular alternating 1/8" - 1/2" bands black shale and 1/8" - 3/4" multiple bands dolomitic shale. No mineralisation. Bedding 85°.					
406'5"	407'3"	10"	100	6281	58	82	110							
407'3"	408'6"	15"	100	6282	60	130	370		Massive fissile black shale. A single 1/2" multiple band dolomitic shale at 406'5" contains blebs sphalerite. Bedding 85°.					
408'6"	409'5"	11"	100	6283	74	90	220		Irregular alternating 1/2" - 2" bands fissile black shale and 1/8" - 1/2" distorted multiple bands dolomitic shale. Bedding 85°. Trace sphalerite in dolomitic shale.					
409'5"	410'4"	11"	100	6284	36	94	110							
410'4"	410'10"	6"	100	6285	34	92	290							
410'10"	411'7"	9"	100	6286	56	160	260		Jointed fissile black shale. Weak unmineralised 110° joints. No mineralisation. Bedding 85°.					
411'7"	412'6"	11"	100	6287	42	84	72		Massive 1/2" - 1" bands fissile black shale alternating with regular 1/8" - 1/4" bands dolomitic shale. No mineralisation. Bedding 85°.					
412'6"	413'9"	15"	100	6288	96	98	160		Massive fissile black shale, containing regular extremely contorted and broken and folded 1/4" bands dolomitic shale. Trace sphalerite in dolomitic shale. Bedding 85°.					
413'9"	414'10"	13"	100	6289	48	140	340		Massive fissile black shale. Weak 110° jointing. No mineralisation. Bedding 85°.					

Drilled by S. A. Mines Department Type of Drilling Rotary Diamond Core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed 2nd June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole LD. 4 Location Lake Dutton, S. A. Depth of Hole 450'2" Co-ords. of Collar 136° 58'E, 31° 48'S, Bearing Vertical Inclination 90°

0105

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
427'11"	428'10"	11"	100	6307	40	86	36	Irregularly alternating 1/8" - 1" bands black shale containing diffuse laminae dolomitic shale and 1/16" - 1/4" bands dolomitic shale, containing trace sphalerite. Bedding 85°.					
428'10"	429'7"	9"	100	6308	36	80	48						
429'7"	430'4"	9"	100	6309	40	84	46						
430'4"	430'11"	7"	100	6310	30	74	68	Massive alternating 1/8" - 1/2" bands massive dolomitic shale and 1/16" - 1/4" bands fissile black shale. No mineralisation. Bedding 85°.					
430'11"	431'7"	8"	100	6311	24	70	28						
431'7"	432'6"	11"	100	6312	36	80	42	Irregularly alternating 1/8" - 1" bands black shale containing diffuse laminae dolomitic shale and 1/16" - 1/4" bands dolomitic shale, containing trace sphalerite. Bedding 85°.					
432'6"	433'0"	6"	100	6313	30	74	38	Alternating 1/2" bands solid dolomitic shale and 1/8" - 1/4" bands fissile black shale. No mineralisation. Bedding 85°.					
433'0"	433'9"	9"	100	6314	100	240	54	Fissile black shale. Prominent 110° joints, narrow crush zones. No mineralisation. Bedding 85°.					
433'9"	434'4"	7"	100	6315	34	80	140	Irregular alternating 1/16" - 1" bands fissile black shale and 1/16" - 1" massive distorted bands dolomitic shale. Trace sphalerite. Bedding 85°.					
434'4"	434'11"	7"	100	6316	38	78	40						
434'11"	435'9"	10"	100	6317	38	76	44						
435'9"	436'5"	8"	100	6318	28	66	38	Alternating diffuse laminae fissile black shale and dolomitic shale in up to 1/2" zones. No mineralisation.					
436'5"	437'0"	7"	100	6319	36	70	42						
437'0"	437'8"	8"	100	6320	44	72	46	As above but zones more diffuse.					
437'8"	438'4"	8"	100	6321	56	78	50						
438'4"	439'2"	10"	100	6322	44	80	70	Irregular alternating 1" bands fissile black shale and 1" - 2" bands massive dolomitic shale. No mineralisation. Bedding 80°.					
439'2"	439'10"	8"	100	6323	78	150	98	Massive 1/8" - 2" zones fissile black shale and 1/8" - 1" multiple bands dolomitic shale. No mineralisation. Bedding 85°.					
439'10"	440'7"	9"	100	6324	66	70	88	Irregular alternating 1/16" - 1" bands fissile black shale and < 1/16" - 1/2" multiple, diffuse bands dolomitic shale. No mineralisation. Bedding 85°.					
440'7"	441'4"	9"	100	6325	68	72	94						
441'4"	442'0"	8"	100	6326	140	78	140						
442'0"	442'6"	6"	100	6327	58	78	60	As above - 6326.					
442'6"	442'10"	4"	100	6328	380	210	130	Massive fissile black shale. No dolomitic shale. Bedding 85°. No mineralisation.					

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond Core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed 2nd. June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole L.D. 4 Location Lake Dutton, S.A. Depth of Hole 450'2" Co-ords.of Collar 136° 58'E. 31° 48'S. Bearing Vertical Inclination 90°

0106

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
442'10"	443'3"	5"	100	6329	200	64	84	Massive dolomitic shale. Weak 110° joints, contains large blebs iron stained pyrite. Bedding 85°.					
443'3"	443'9"	6"	100	6330	220	78	110	Alternating 1/16" - 1/8" diffuse zones fissile black shale and unmineralised dolomitic shale. Bedding 85°.					
443'9"	444'10"	13"	100	6331	12	26	14						
444'10"	445'10"	12"	100	6332	6	14	8	Pandurra Sandstone					
445'10"	447'4"	18"	100	6333	6	14	8						

Drilled by S. A. Mines Department Type of Drilling Rotary Diamond Core Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed 2nd June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole L.D. 4 Location Lake Dutton, S. A. Depth of Hole 450'2" Co-ords. of Collar 136° 58'E, 31° 48'S. Bearing Vertical Inclination 90°

0107

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
209'9"	210'8"	11"	95	6361	330	120	280	Complete mixture of black shale and utterly disrupted beds dolomitic shale - shale 40% of rock. Common pull aparts and tight isoclinal and zig zag folds. Trace pyrite.					
210'8"	211'6"	10"	95	6362	1400	140	520						
211'6"	212'3"	9"	95	6363	450	110	240						
212'3"	213'2"	11"	95	6364	660	120	250	Massive fissile black shale, with bedded but distorted dolomitic shale 20%. Bedding 70° - 90°. A single 1" band dolomitic shale from 612'7" - 612'8". Trace pyrite.					
213'2"	214'3"	13"	95	6365	280	120	210	Mixture of poorly bedded dolomitic shale and poorly fissile black shale. Bedding 70° - 100° disrupted. Trace pyrite.					
214'3"	214'9"	6"	95	6366	300	120	230	Fissile black shale with 5% poorly bedded broken dolomitic shale. Bedding 80°. Trace pyrite. Weak 60° jointing represents of greatest bed disruption - greatest stress.					
214'9"	215'5"	8"	95	6367	160	140	320	Massive poorly fissile black shale and containing rare disrupted narrow beds dolomitic shale and dropped pebbles of dolomitic shale. Bedding? 80°. No mineralisation.					
215'5"	216'1"	8"	95	6368	260	140	340						
216'1"	217'6"	17"	96	6369	220	190	390	Massive poorly fissile black shale. <5% dolomitic shale. Bedding 85°. No mineralisation.					
217'6"	218'4"	10"	96	6370	48	190	250	Alternating 1/4" - 1/2" bands fissile black shale and 1/8" - 1/4" bands distorted microfaulted dolomitic shale. Weak 10° joints. Trace galena, pyrite and sphalerite. Bedding 80°.					
218'4"	219'6"	14"	96	6371	84	460	640	Alternating 1/8" - 1/4" bands dolomitic shale (disrupted) and 1/8" - 1/4" bands fissile black shale. Bedding improving. Common microfaulting (16°). Trace sphalerite.					
219'6"	220'2"	8"	96	6372	34	470	250	Irregular alternating 1/8" - 1/4" bands black shale and 1/8" - 1/16" bands dolomitic shale. Microfault displacement up to 1". Trace galena in dolomitic shale. Bedding 90°.					
220'2"	221'2"	12"	96	6373	38	580	320	Irregular alternating 1/8" - 1" bands fissile black shale and 1/16" - 1/4" multiple laminae dolomitic shale showing some microfaulting (10°) and distortion. Trace galena in dolomitic shale. Bedding 90°.					
221'2"	221'11"	9"	96	6374	32	820	330						
221'11"	222'8"	9"	96	6375	58	1000	320						
222'8"	223'6"	10"	96	6376	45	800	290	Irregular alternating 1/2" - 2" bands fissile black shale and 1/16" - 1/2" multiple bands disrupted and microfaulted dolomitic shale. Trace galena in dolomitic shale and sphalerite. Bedding 80° - 90°.					
223'6"	224'9"	15"	96	6377	36	620	290						

Drilled by S. A. Mines Department Type of Drilling Rotary Diamond Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed ..... Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole LD. 5 Location Lake Dutton, S. A. Depth of Hole 272'9" Co-ords. of Collar 137° 8'E. 31° 50'S. Bearing Vertical Inclination 90°

0108

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
0'	10'	10'			6334				Loose surface gypseous sand, red-brown colour.					
10'	20'	10'			6335				Loose surface gypseous sand, red-brown colour					
20'	30'	10'			6336				Gypseous grey-white Whyalla Sandstone.					
30'	40'	10'			6337				Grey-white Whyalla Sandstone					
40'	50'	10'			6338				Whyalla Sandstone					
50'	60'	10'			6339				Whyalla Sandstone					
60'	70'	10'			6340				Whyalla Sandstone					
70'	80'	10'			6341				Whyalla Sandstone					
80'	90'	10'			6342				Whyalla Sandstone					
90'	100'	10'			6343				Whyalla Sandstone					
100'	110'	10'			6344				Whyalla Sandstone					
110'	120'	10'			6345				Whyalla Sandstone					
120'	130'	10'			6346				Whyalla Sandstone					
130'	140'	10'			6347				Whyalla Sandstone, 10% grey-white clay fraction					
140'	150'	10'			6348				Whyalla Sandstone, up to 15% grey-white clay fraction					
150'	160'	10'			6349				Whyalla Sandstone more than 10% grey clay					
160'	170'	10'			6350				Whyalla sandstone more than 10% grey clay					
170'	180'	10'			6351				Whyalla Sandstone, 20% grey clay, 2% black shale chips					
180'	190'	10'			6352				Whyalla Sandstone, 30% grey clay, 10% black shale					
190'	200'	10'			6353	26	32	38	Whyalla Sandstone, 50% Grey clay, 20% black shale					
200'	204'6"	4'6"			6354	42	78	120	Black shale, 75%,grey clay, 20%,Whyalla Sandstone 5%					
204'6"	205'4"	10"			6355)	82	180	280	Massive muddy black shale, containing 5% broken unbedded fragments dolomitic shale. Poorly fissile along bedding. Easily crushed. Trace Pyrite.					
205'4"	206'1"	9"			6356)	170	210	390						
206'1"	207'0"	11"			6357	460	180	480	As above but with more dolomitic shale fragments, also larger, appear as dropped pebbles.					
207'0"	207'10"	10"			6358)	200	160	390	As before but dolomitic material taking on a bedded character, soft and muddy, rare, trace pyrite. Bedding extremely varied.					
207'10"	209'2"	16"			6359)	170	140	370						
209'2"	209'9"	7"			6360	880	180	390	Massive extremely contorted microfaulted black shale, poorly fissile, 10% dolomitic shale in broken and microfaulted bands. Trace pyrite. Bedding - very variable.					

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed ..... Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole LD.5 Location Lake Dutton, S.A. Depth of Hole 272'9" Co ords.of Collar 137° 8'E. 31° 50'S. Bearing Vertical Inclination 90°

0109

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
240'2"	240'10"	8"			6403	62	1800	350	Massive fissile black shale containing few 1/16" - 1/4" bands dolomitic shale containing galena and sphalerite on vertical joints. Bedding 90°.					
240'10"	241'6"	8"			6404	24	680	190	Regular alternating 1/4" bands black shale and 1/8" bands dolomitic shale. No mineralisation observed. Bedding 90°.					
241'6"	242'1"	7"			6405	20	620	190	Near massive banded dolomitic shale with frequent irregular 1/16" - 1/4" bands black shale. Trace galena and sphalerite in dolomitic shale. Bedding 90° generally wavy.					
242'1"	242'9"	8"			6406	16	240	300						
242'9"	243'5"	8"			6407	24	340	270						
243'5"	243'11"	7"			6408	16	190	580						
243'11"	244'4"	5"			6409	14	160	50	Massive fissile dolomitic shale. Rare narrow bands fissile black shale. No mineralisation. Bedding 85°.					
244'4"	245'1"	9"			6410	56	760	120	Alternating broad bands fissile black shale and dolomitic shale. Framboidal pyrite on bedding, possible disseminated galena in black shale.					
245'1"	245'9"	8"			6411	48	660	140	Regular alternating 1/4" - 1/2" bands fissile black shale and 1/8" - 1/2" bands dolomitic shale. Trace galena in black shale. Bedding 85°. 0° micro faulting gives 1/4" offsets. Trace Lead and Zinc mineralisation in dolomitic shale. Some pyrite in bedding planes. 20% dolomite.					
245'9"	246'4"	7"			6412	54	500	320						
246'4"	247'0"	8"			6413	48	640	140						
247'0"	247'10"	10"			6414	30	600	120						
247'10"	248'8"	10"			6415	32	490	92	Alternating 1/8" - 1" bands fissile black shale and 1/8" - 1/2" bands dolomitic shale. Trace galena in black shale. Bedding 85°.					
248'8"	249'6"	10"			6416	46	1300	170	1/2" - 2" bands fissile black shale and 1/8" - 1/2" bands dolomitic shale. No mineralisation observed. Bedding 85°-90°.					
249'6"	250'4"	10"			6417	38	1200	240	Regular alternating 1/16" - 1/8" bands fissile black shale and 1" - 2" multiple bands dolomitic shale. Bedding generally wavy but about 85°. Trace lead and zinc mineralisation. Pyrite as rare 1/16" blebs in dolomitic shale. 80% dolomitic shale.					
250'4"	251'2"	10"			6418	26	280	60						
251'2"	251'10"	8"			6419	14	190	22						
251'10"	252'4"	6"			6420	24	170	40						
252'4"	252'11"	7"			6421	30	210	42						
252'11"	253'6"	7"			6422	90	1200	150	Massive fissile black shale in 1/4" - 2 1/2" bands and frequent irregular 1/16" - 1 1/2" bands dolomitic shale. Some distortion of beds and vertical microfaulting. Trace Lead and Zinc in vertical veinlets with pyrite. Bedding 85°.					
253'6"	254'0"	6"			6423	48	210	60						
254'0"	254'7"	7"			6424	120	210	70						
254'7"	255'5"	10"			6425	240	72	100						

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond Hole Size % Recovery Surveyed by Instrument Used

Date Started Date Completed Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed

No. of Hole LD.5 Location Lake Dutton, S.A. Depth of Hole 272'9" Co-ords. of Collar 137° 8'E. 31° 50'S. Bearing Vertical Inclination 90°

0110

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
224'9"	225'7"	10"	96	6378	34	720	780	Irregular alternating 1/2" - 4" bands hard fissile black shale and 1/4" bands dolomitic shale. Bedding 90°. Crystalline galena in vertical joints in dolomite. Pyrite on bedding.					
225'7"	226'3"	8"	96	6379	56	880	390						
226'3"	226'11"	8"		6380	30	680	460	Irregularly alternating 1/8" - 1/4" bands fissile black shale and distorted shattered 1/16" - 1/8" bands dolomitic shale. Bedding 80° - 90° commonly step-faulted. Trace galena and pyrite.					
226'11"	227'6"	7"		6381	26	600	660						
227'6"	228'2"	8"		6382	34	820	400	Massive fissile black shale, containing a single 1" band dolomitic shale, 227'11" - 228'0". Rare galena. Bedding Wavy 60 - 110°.					
228'2"	228'9"	7"		6383	26	540	300	Irregular alternating 1/16" - 2" multiple bands dolomitic shale and 1/16" - 1/2" bands fissile black shale. Bedding 85° - 90° 65% dolomitic. Trace galena on vertical calcite veins and on 0° joints. Framboidal pyrite on bedding.					
228'9"	229'5"	8"		6384	26	660	800						
229'5"	230'0"	7"		6385	24	630	310						
230'0"	230'8"	8"		6386	22	440	190						
230'8"	231'3"	7"		6387	18	250	130						
231'3"	231'10"	7"		6388	22	280	310						
231'10"	232'6"	8"		6389	22	290	86						
232'6"	233'1"	7"		6390	24	320	340						
233'1"	233'8"	7"		6391	16	86	42						
233'8"	234'3"	7"		6392	22	250	88						
234'3"	235'0"	9"		6393	32	380	150						
235'0"	235'8"	8"		6394	30	210	130	Regular alternating 1/8" bands hard fissile black shale and 1/8" bands dolomitic shale. Often offsett by microfaults. Trace sphalerite. Bedding 90°.					
235'8"	236'3"	7"		6395	56	400	1200						
236'3"	236'9"	6"		6396	94	1700	250	Massive fissile black shale. 1 x 1" band dolomitic shale 236'5"-6" contains galena, sphalerite, pyrite in vertical calcite veins.					
236'9"	237'4"	7"		6397	42	290	130	Irregular alternating 1/8" - 1" bands fissile black shale and 1/8" - 1/4" bands dolomitic shale, slight distortions in bedding. Generally 90°. Trace galena and sphalerite in dolomitic shale.					
237'4"	237'10"	6"		6398	30	270	230						
237'10"	238'5"	7"		6399	46	450	400						
238'5"	239'0"	7"		6400	34	700	240	Massive fissile black shale with rare narrow wedges - inclusions dolomitic shale. No mineralisation. Bedding 90°.					
239'0"	239'7"	7"		6401	28	420	170	Regular alternating 1/8" - 1/4" bands fissile black shale and 1/16" - 1/8" multiple bands dolomitic shale. Bedding 90°. 45° joints slickensided. No observed mineralisation.					
239'7"	240'2"	7"		6402	26	440	210						

Drilled by S. A Mines Department Type of Drilling Rotary Diamond Hole Size ... % Recovery ... Surveyed by ... Instrument Used ...

Date Started ... Date Completed ... Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed ...

No. of Hole LD. 5 Location Lake Dutton, S. A. Depth of Hole 272'9" Co-ords. of Collar 137° 8'E, 31° 50'S. Bearing Vertical Inclination 90°

0111

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
0'	10'	10'			6454				Loose surface gypseous sand. Much iron stain.					
10'	20'	10'			6455				Grey-white loose gypseous sand.					
20'	30'	10'			6456				Whyalla Sandstone.					
30'	40'	10'			6457				Whyalla Sandstone.					
40'	50'	10'			6458				Whyalla Sandstone.					
50'	60'	10'			6459				Whyalla Sandstone.					
60'	70'	10'			6460				Whyalla Sandstone.					
70'	80'	10'			6461				Whyalla Sandstone.					
80'	90'	10'			6462				Whyalla Sandstone, 95%, Orange Clay 5%.					
90'	100'	10'			6463				Buff-brown orange clay 10%, Grey clay 10%, Whyalla 80%.					
100'	110'	10'			6464				Grey-white clay, 25%, Whyalla Sand grains 75%.					
110'	120'	10'			6465				Grey-white clay: Whyalla sand grains 60:40					
120'	130'	10'			6466				Grey-white clay : Whyalla sand grains 70:30					
130'	140'	10'			6467				Grey clay 80%, sand grains 5%, black shale 15%					
140'	150'	10'			6468	6	14	16	Black shale: grey clay and sand 30 : 70					
150'	160'	10'			6469	28	28	46	Black shale: grey clay and sand 50 : 50					
160'	177'	17'			6470	800	82	250	Black shale cuttings 80%, grey clay and sand 15 : 5%					
177'0"	177'9"	9"		90	6471)	360	40	50	Massive dolomitic shale, containing frequent irregular "meandering" bands unmineralised non fissile black shale. Trace pyrite in dolomite, mainly on vertical joint planes. Bedding variable, generally 80° - 90°.					
177'9"	178'6"	9"		90	6472)	740	52	110						
178'6"	179'7"	13"		90	6473)	660	84	220						
179'7"	180'4"	9"		85	6474)	300	110	160						
180'4"	181'0"	8"		85	6475)	360	66	230						
181'0"	181'7"	7"		85	6476)	120	40	160						
181'7"	182'4"	9"		92	6477)	120	64	170	Massive dolomitic shale with frequent irregular meandering microlaminae, poorly fissile black shale and less frequent 1/8" - 1/4" bands fissile black shale. Common framboidal pyrite disseminated through dolomitic shale and on 0° joint surfaces. Bedding 85° - 90°.					
182'4"	182'11"	7"		92	6478)	46	66	84						
182'11"	183'7"	8"		92	6479)	20	40	38						
183'7"	184'4"	9"		92	6480)	22	48	74						
184'4"	184'11"	7"		92	6481)	56	46	66						
184'11"	185'8"	9"		92	6482)	160	58	120						
185'8"	186'1"	5"		92	6483)	90	48	100						

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond Hole Size % Recovery Surveyed by Instrument Used

Date Started Date Completed Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed

No. of Hole LD. 6 Location Lake Dutton, S.A. Depth of Hole 222'4" Co-ords.of Collar 137° 15'E. 31° 48'S. Bearing Vertical Inclination 90°

0112

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
255'5"	256'0"	7"			6426	100	61	84	$^1/16$" - 3" bands massive dolomitic shale separated by < $^1/16$" - $^1/4$" bands fissile black shale, 90% dolomitic shale. Bedding 85° - often distorted. Only trace blebs pyrite observed - no Lead or Zinc.					
256'0"	256'8"	8"			6427	190	94	68						
256'8"	257'3"	7"			6428	380	100	80						
257'3"	257'9"	6"			6429	160	120	64						
257'9"	258'5"	8"			6430	240	100	80						
258'5"	259'0"	7"			6431	660	78	270						
259'0"	259'6"	6"			6432	400	80	150						
259'6"	260'0"	6"			6433	680	140	250	Extremely distorted alternating $^1/8$" - $^1/2$" current bedded? bands dolomitic shale and $^1/8$" - $^1/2$" bands black shale. Bedding 45° - 90°. No observed mineralisation.					
260'0"	260'9"	9"			6434	820	160	360						
260'9"	261'3"	6"			6435	1000	74	490	Massive 100% dolomitic shale. Bedding 45° - 75°. Considerable 10° - 15° jointing. Mineralisation only in pyrite as $^1/16$" - $^1/8$" blebs.					
261'3"	261'10"	7"			6436	180	58	130						
261'10	262'7"	9"			6437	340	82	240	$^1/4$" - $^1/2$" dolomitic shale bands separated by $^1/16$" - $^1/8$" bands black shale. All considerably distorted. Bedding 50° to 85°. Pyrite in $^1/16$" blebs in dolomitic shale.					
262'7"	263'0"	5"			6438	460	80	340						
263'0"	263'9"	9"			6439	240	64	190	Massive dolomitic shale containing no black shale. Bedding extremely varied, from 20° - 90° and often slickensided. Weak 100° jointing. Pyrite only in $^1/8$" stained blebs.					
263'9"	264'4"	7"			6440	150	82	120						
264'4"	264'11"	7"			6441	400	120	270						
264'7"	265'7"	12"			6442	880	210	740						
265'7"	266'4"	9"			6443	480	190	600						
266'4"	266'10"	6"			6444	380	140	290						
266'10	267'8"	10"			6445	130	46	60	Pure dolomite similar to that on east of Pernatty Culmination. No apparent mineralisation except for trace pyrite. Bedding ? apparently about 80°.					
267'8"	268'3"	7"			6446	160	46	72						
268'3"	269'0"	9"			6447	320	60	130						
269'0"	269'10"	10"			6448	210	52	100						
269'10	270'5"	7"			6449	270	64	140						
270'5"	271'0"	7"			6450	~~36~~	60	62						
271'0"	271'7"	6"			6451	34	78	48	Pandurra Sandstone. Very sharp contact. Deep red lithic sandstone.					
271'7"	272'3"	8"			6452	16	24	24						
272'3"	272'9"	6"			6453	14	22	16						

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed ..... Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole LD.5 Location Lake Dutton, S.A. Depth of Hole 272'9" Co-ords.of Collar 137° 8'E. 31° 50'S. Bearing Vertical Inclination 90°

0113

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
212'0"	212'10"	10"	100	6517	900	50	72	Massive unjointed non fissile black shale grading down into pure dolomite. Common 1/16" - 1/8" blebs pyrite. Bedding 90° - 70°.					
212'10"	213'6"	8"	100	6518	880	66	100						
213'6"	214'2"	8"	100	6519	800	66	190						
214'2"	214'8"	6"	100	6520	900	84	90						
214'8"	215'3"	7"	100	6521	2400	150	190						
215'3"	215'11"	8"	100	6522	2400	210	110						
215'11"	216'8"	9"	100	6523	260	200	170						
216'8"	218'2"	18'	100	6524	20	8	8	Massive dark red, weakly structured Pandurra Sandstone.					
218'2"	218'11"	9"	100	6525	10	16	4						
218'11"	219'8"	9"	100	6526	16	14	6						
219'8"	222'4"	32"	100	6527									

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond Hole Size ..... % Recovery ..... Surveyed by ..... Instrument Used .....

Date Started ..... Date Completed ..... Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed .....

No. of Hole LD. 6 Location Lake Dutton, S.A. Depth of Hole 222'4" Co-ords.of Collar 137° 15'E. 31° 48'S. Bearing Vertical Inclination 90°

0114

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery %	Sample No.	Assays Cu	Pb	Zn	Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
186'1"	186'11"	10"	92	6484)	94	60	170	As before but laminae black shale very fissile and frequent. Dolomitic shale breaks into thin slices. Common pyrite on 10° - 20° joints. Bedding generally 90°.					
186'11"	187'6"	7"	92	6485)	110	44	140						
187'6"	188'1"	7"	92	6486)	98	60	140						
188'1"	188'11"	10"	97	6487)	78	40	120						
188'11"	190'0"	13"	97	6488)	44	50	90						
190'0"	190'9"	9"	97	6489)	18	36	48	Massive dolomitic shale showing frequent microlaminae, well bedded, poorly fissile black shale. Trace pyrite in dolomitic shale. Bedding 85° - 90°.					
190'9"	191'4"	7"	97	6490)	20	46	96						
191'4"	192'0"	8"	97	6491)	80	60	140						
192'0"	192'7"	7"	97	6492)	80	68	270	As before but containing frequent 1/8" - 1/4" bands poorly fissile black shale. Trace pyrite. Bedding 90°.					
192'7"	193'3"	8"	97	6493)	170	80	300						
193'3"	193'11"	8"	97	6494)	68	82	320						
193'11"	194'8"	9"	97	6495)	160	110	200	Massive non fissile dolomitic shale containing very frequent microlaminae black shale and less frequent 1/8" - 1/4" bands well bedded black shale. Trace pyrite disseminated in dolomitic shale. No jointing. Bedding 85° - 90°.					
194'8"	195'4"	8"	97	6496)	270	42	110						
195'4"	196'2"	10"	97	6497)	54	40	82						
196'2"	196'9"	7"	97	6498)	180	42	88						
196'9"	197'3"	6"	97	6499)	260	60	130						
197'3"	197'11"	8"	97	6500)	290	78	120						
197'11"	198'10"	11"	100	6501)	540	66	130	Massive non fissile dolomitic shale with regular 1/16" bands black shale, breaks easily into 1/8" - 1/4" laminae. Bedding distorted but generally 90°. Trace pyrite only.					
198'10"	199'8"	10"	100	6502)	450	54	110						
199'8"	200'8"	12"	100	6503)	800	50	110						
200'8"	210'6"	10"	100	6504)	410	40	40						
201'6"	202'2"	8"	100	6505)	450	36	32	Massive dolomitic shale. Rare narrow and distorted black shale bands. Common disseminated pyrite. Bedding often distorted 50° - 90°.					
202'2"	202'8"	6"	100	6506)	310	42	86						
202'8"	203'7"	11"	100	6507)	700	36	78						
203'7"	204'6"	11"	100	6508)	480	52	120	Alternating massive non fissile dolomitic shale and frequent, irregular, poorly fissile distorted black shale bands (less than 1mm). Common pyrite. Bedding generally 90° but commonly highly distorted.					
204'6"	205'7"	13"	100	6509)	600	64	270						
205'7"	206'7"	12"	100	6510)	100	56	100						
206'7"	207'6"	11"	100	6511)	300	50	86						
207'6"	208'4"	10"	100	6512)	390	40	78						
208'4"	209'6"	14"	50	6513)	420	36	52	As before but tends to be more shattered and broken along vertical - 20° joint planes. Rare pyrite, Bedding 90°.					
209'6"	210'4"	10"	55	6514)	370	54	78						
210'4"	211'6"	14"	70	6515)	1000	64	250						
211'6"	212'0"	6"	50	6516)	700	46	72						

Drilled by S.A. Mines Department Type of Drilling Rotary Diamond Hole Size % Recovery Surveyed by Instrument Used

Date Started Date Completed Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed

No. of Hole LD. 6 Location Lake Dutton, S.A. Depth of Hole 222'4" Co-ords.of Collar 137° 48'S. 31° 48'S. Bearing Vertical Inclination 90°

0115

NORANDA AUSTRALIA LIMITED

DRILL RECORD

From	To	Sample Length	Recovery	%	Sample No.	Assays Cu	Pb	Zn				Geological Log	Angle to core	Survey Depth	Bearing	Inclination	Notes
0'	10'	10'			6528							Surface gypseous sand, red-orange, much iron stain.					
10'	20'	10'			6529							Gypseous sand, grey-white, little iron staining.					
20'	30'	10'			6530							Whyalla Sandstone					
30'	40'	10'			6531							Whyalla Sandstone					
40'	50'	10'			6532							Whyalla Sandstone					
50'	60'	10'			6533							Whyalla Sandstone					
60'	70'	10'			6534							Whyalla Sandstone - 20% grey-white clay					
70'	80'	10'			6535							Whyalla Sandstone					
80'	90'	10'			6536							Whyalla Sandstone					
90'	100'	10'			6537							Whyalla Sandstone					
100'	110'	10'			6538							Whyalla Sandstone					
110'	120'	10'			6539							Whyalla Sandstone 30%, Silty clay 70%					
120'	130'	10'			6540	1400	1900	150				Whyalla Sandstone 10% Pandurra Sandstone 60%, clay					
130'	140'	10'			6541	1800	1600	140				Mixture Pandurra Sandstone and Whyalla Sandstone and 30% silt and clay content. Common pyrite nodules in Pandurra. Trace galena?					
140'	150'	10'			6542	240	410	50				Pandurra Sandstone, some pyrite and MnO_2					
150'	160'	10'			6543							Pandurra Sandstone					
160'	170'	10'			6544							Pandurra Sandstone					
180'	190'	10'			6545							Pandurra Sandstone					
190'	200'	10'			6546							Pandurra Sandstone					
200'	210'	10'			6547							Pandurra Sandstone					
210'	220'	10'			6548							Pandurra Sandstone					
220'	230'	10'			6549							Pandurra Sandstone					
230'	240'	10'			6550							Pandurra Sandstone					
240'	247'	7'			6551							Pandurra Sandstone					

Drilled by S.A. Mines Department Type of Drilling Rotary - fluid Hole Size % Recovery Surveyed by Instrument Used

Date Started 30th May, 1971. Date Completed 1st June, 1971. Logged by C. Douch Sampled By C. Douch & F. Wolf Record Completed

No. of Hole LD. 7 Location Lake Dutton S.A. (Magnacowie Well) Depth of Hole 247'0" Co-ords.of Collar 137° 6'E. 31° 58'S. Bearing Vertical Inclination 90°

0116