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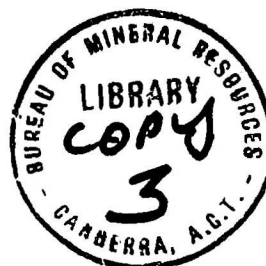
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THE ADELAIDE RIVER URANIUM MINE,

NORTHERN TERRITORY

by

B.P. Walpole



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4	Cross Sections, Black Lode, Adelaide River Uranium Mine.	1" = 100'

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SUMMARY

Development work and exploratory diamond drilling at the Adelaide River Uranium Mine showed the presence of an ore shoot, known as the Black Lode, which contained about 70 tons per foot depth of ore averaging about 0.5% U_3O_8 . The shoot was developed to a depth of 200 feet. Most of the developed ore has been stoped and about 3,800 tons of ore from the mine have been treated at Rum Jungle. About 1,500 tons of ore remain broken in stopes but there are no proved ore reserves. The mineralization is localized by the intersection of shears and beds of sandstone. The evidence suggests that the Black Lode ore shoot continues in depth and that a repetition of the ore shoot is possible. Diamond drilling and development work are recommended.

INTRODUCTION

The Adelaide River uranium mine is situated about two and a half miles south of the township of Adelaide River on the Darwin-Birdum railway line and the adjacent Stuart Highway. It is about 75 miles by road south-south-east of Darwin and about 30 miles by road or rail from the treatment plant at Rum Jungle.

Operations at the mine ceased in February, 1957, owing to financial difficulties incurred by the operating company, Australian Uranium Corporation N.L., and soon afterwards the workings became flooded. On 29th and 30th May, 1957, G. Mead, Mining Engineer, and C. E. Prichard, Senior Geologist of the Bureau of Mineral Resources inspected the mine at the request of the Australian Atomic Energy Commission. This was done in connection with an application for financial assistance made by the operating company. Mr. R. C. Sprigg of Geosurveys Ltd., representing Australian Uranium Corporation, and Mr. R. J. S. Clappison of Gold Mines of Australia also took part.

The Company had agreed to dewater the mine but at the time the inspection was made only that part above the No. 1 Level had been dewatered and made accessible. The inspection was therefore limited to an examination of the surface geology and accessible workings, and to a study of mine plans supplied by Mr. Sprigg.

This report was compiled from information provided in reports by J. H. Lord and C. E. Prichard of the Bureau, and from the author's own knowledge of the mine. The accompanying plans are based on information supplied by Mr. Sprigg, with the exception of the radio-metric contours shown on Plate 1 which were determined by the Bureau of Mineral Resources.

GENERAL GEOLOGY

Uranium mineralization at the Adelaide River Mine is in sediments of Lower Proterozoic age, which belong to the Burrell Creek and Noltenius Formations. In the mine area the Burrell Creek sediments consist of siltstone and greywacke siltstone and the Noltenius of conglomerate and sandstone with some siltstone. The sediments strike at about 350° and dip to the west and south-west at angles ranging between 60° and 70° . The boundary between the two Formations is in part gradational and in part interfingered. It is arbitrarily taken at

the western boundary of the western sandstone bed (see Plate 1). The beds are cut by a number of minor faults which strike at about 75° . These faults displace the beds north block to the east.

The mineralization is localized by minor shears some of which strike north, some at 20° , and some parallel to the strike of the beds. The main ore occurrences are found where these shears intersect beds of sandstone. The mineralized sections of the shears have been named the Black Lode, White Lode, Brown Lode and Orange Lode by the company's geologists.

Black Lode

This is the most important lode. It strikes north and dips at about 70° to the east. The lode-shear has been traced for about 1,000 feet but only a section about 200 feet long near No. 1 and No. 2 shafts is mineralized. The stope outline shown on Plate 3 indicates that there is a shoot pitching to the south at about 30° and roughly parallel to the trace of the intersection of the lode shear and the bedding.

The ore is patchy and in the primary zone consists of narrow veinlets of pitchblende in the shear zone and in some places in the adjacent country rock. In the oxidized zone, the main ore mineral is torbernite. The weighted average width from stope samples was 45.5 inches, but the operators considered that the grade (1.34% eU_3O_8) allowed an economical stoping width of five feet. Using a conversion factor of 14 cubic feet per ton, the shoot contains about 70 tons of ore per foot depth.

Plates 2 and 3 show the development carried out on the ore shoot to February, 1957. The main development is from No. 5 shaft with levels driven at 100 feet and 200 feet below the collar of the shaft. Most of the ore between No. 1 and No. 2 levels has been stoped. Only a limited amount of stoping has been carried out above No. 1 level.

The deepest penetration of the shoot is by No. 5 diamond drill hole which intersected the shoot about 25 feet below No. 2 level and showed 48 inches of ore of 0.72% eU_3O_8 grade. This is illustrated by Plate 4, Cross Section at 500 S, which shows that the mineralization intersected by another hole, No. 13, may be a repetition of the Black Lode ore shoot. This deeper mineralization appears to be localized where the Black Lode shear cuts a second sandstone horizon.

White Lode

The White Lode is on the faulted northerly continuation of the Black Lode lode shear. A small area of radioactivity near the northern end of the lode shear has been tested by No. 7 shaft and drill holes Nos. 8, 9 and 10. These intersected only small patches of weakly radioactive rock.

Brown Lode

The Brown Lode is on a strike shear and is mineralized near No. 3 shaft (Plate 1). The known mineralization near the surface is weak and below ore-grade. No. 4 shaft, which connects with No. 1 Adit,

exposed low-grade secondary uranium mineralization. The dip of the lode cannot be determined from available information.

The intersection of ore-grade material in No. 11 drill hole is shown by the cross section along the 00 co-ordinate (Plate 4). This is vertically below the collar of No. 8 shaft and may represent a downward intersection of the Brown Lode. The writer has no details of the depth of No. 8 shaft but it would appear that the results obtained from No. 11 hole should be further investigated.

No. 14 diamond drill hole did not intersect any material of ore grade but as the inclination of this hole is not known, its position in depth cannot be plotted.

Orange Lode and Green Lode

These are small weakly mineralized fractures which strike at about 25° and 125° respectively. Little information is available on the extent and grade of mineralization in any of the openings in these lodes, but the mineralization is believed to be weak and limited.

HISTORY AND PRODUCTION

The history of the mine and of its development has been outlined in quarterly reports of inspection of the property carried out on behalf of the Australian Atomic Energy Commission by J. H. Lord, then Senior Geologist, Bureau of Mineral Resources.

Uranium was discovered in February, 1954. Since then nine shafts have been sunk (Plate 1) and levels opened up from No. 1, 2 and 5 shafts. The deepest opening is a winze from No. 2 level on the Black Lode, 215 feet below the collar of No. 5 shaft. Most of the ore above No. 2 level has been stoped and little developed ore exists in the mine at present.

Examination of the mine plans shows that about 7,500 tons of material were broken to February, 1957. Of this amount, an estimated 1,500 tons remain broken in the stopes, about 3,800 tons have been forwarded to the treatment plant at Rum Jungle, and the remainder has apparently been discarded on the dump.

Ten parcels of ore have been sent to Rum Jungle. Details of these parcels are given in Table I below. The tonnages and grades shown, with the exception of Parcel 10, represent purchaser's figures on delivery.

Table I.

Production Figures, Adelaide River Uranium Mine, N.T.

<u>Parcel No.</u>	<u>Amount (long tons)</u>	<u>Grade (% U₃O₈)</u>
1	404	0.396
2	517	0.608
3	217	1.52
4	211	0.664
5	250	0.527
6	814	0.383
7	398	0.464
8	315	0.579
9	283 (wet)	0.37
10	400 (approx.)	0.20 (approx.)
Total	<u>3,809</u>	Weighted Average <u>0.509</u>

The amount and grade of No. 10 parcel are approximate only and the total production is probably best expressed as being about 3,800 tons of ore with a grade of about 0.5% U₃O₈.

This is a much lower figure for grade than the weighted average of samples from the Black Lode, which is 1.34% eU₃O₈ over 45.5 inches (see Plate 3). Even allowing for dilution from an average stoping width of 60 inches, the figure derived from sampling is still higher than that obtained from final treatment. For parcels No. 2 to 5 inclusive, the average stope width was 84 inches and the calculated grade is 0.73% eU₃O₈; the grade based on treatment was 0.765% U₃O₈. This is a very close correlation: but the total production must be regarded as the most accurate sample and the average grade of ore mined from the Black Lode is therefore taken as about 0.5% U₃O₈.

The grade of most parcels has been kept up by hand-sorting and discarding obvious waste material at the surface. This has been made necessary because of the tendency of the stope walls to fret, giving a stope width of about 7 feet. A stoping width of 5 feet would be most desirable in the mine and the operating company had hoped to achieve this below the water table where they believed the walls would stand better than in the oxidized zone. It was hoped that this would lead to an increase in grade. However as the dilution of ore mined above water table was more or less compensated by hand picking, any increase in grade would probably be slight.

Very little further development work has been carried out on the mine since it was reported on by J. H. Lord in November, 1956. No. 10 parcel, totalling about 400 tons of about 0.2% U₃O₈ grade, was delivered to Rum Jungle before mining ceased in February, 1957. At this date No. 9 shaft had been sunk to nearly 200 feet but was 25 ft. from the workings on No. 2 level. Stoping had continued above No. 2 level and some stoping had been carried out above No. 1 level.

A winze 15 feet deep had been sunk below No. 2 level (Plate 3). This winze, and an intersection of 48 inches of 0.72% eU₃O₈ grade ore in No. 5 drill hole 25 feet below No. 2 level, provide the only information of ore below No. 2 level.

Probing has shown that No. 12 drill hole intersected 42 inches of 0.36% eU₃O₈ grade ore and No. 13 drill hole 31 inches of 0.25% eU₃O₈ grade ore. The approximate positions of these intersections are shown on Plate 2, and on the cross sections (Plate 4). The cross section through 500 S. shows that drill hole No. 13 intersects the projected extension of the Black Lode shear near where it crosses the top of the lower sandstone bed shown on Plate 1. It seems likely therefore that this drill hole has intersected another shoot where the Black Lode shear crosses a favourable bed. No. 12 hole may have intersected this shoot further to the north.

ORE RESERVES

Black Lode

Company records show that about 1,500 tons of broken ore of 0.5% eU₃O₈ grade remain in the stopes. This figure is presumably derived from weighted stope assays. Fretting of the stope walls after dewatering may increase the tonnage and decrease the grade of this broken ore. The grade may also be reduced by leaching and no certainty is felt that it can be regarded any longer as ore.

There are no proved unbroken ore reserves on the mine.

Some ore is present above No. 1 level and below No. 2 level, but with the information available, no accurate estimates of tonnage and grade can be given.

The intersection of the Black Lode obtained in diamond drill hole No. 5 suggests that the ore-shoot developed above No. 2 level extends below No. 2 level for at least 25 feet. A winze to 15 feet below No. 2 level at 530 feet south (Plate 3) also shows that some ore is present below the level. If the ore continues to 25 feet below the level about 1,800 tons of possible ore can be predicted, assuming that the block involved has the same length (300 feet) and width (5 feet) of the shoot above No. 2 level.

A repetition of the Black Lode ore-shoot is suggested by intersections obtained in No. 12 and No. 13 drill holes. These however do not provide sufficient information on which to base figures for any class of reserve.

Other Lodes

These contain no proved ore and no information is available on which to predict possible ore.

Summary of Ore Reserves

<u>Reserve</u>	<u>Black Lode</u>		<u>Other Lodes</u>
	<u>Amount</u>	<u>Grade*</u>	
Broken	1,500	0.5%	Nil
Proved	Nil		Nil
Possible	1,800	0.5%	Nil

* The grade shown may be reduced by leaching. The tonnage shown may be increased by fretting of the stope walls with a resultant dilation in grade.

CONCLUSIONS

The general picture of ore distribution at the Adelaide River Uranium Mine is one of small shoots erratically distributed in minor shear fractures. The most important mineralized zone is the Black Lode, which contains an ore shoot about 200 feet long and 5 feet wide. The possible pitch length of this shoot is about 530 feet, but it is not certain that ore is continuous between No. 1 level and the surface. In fact the assay figures given for samples from No. 1 level are not encouraging and suggest that mineralization between this level and No. 1 shaft could be below ore grade.

The lode shear on which the shoot is localized is not a prominent one, and the surprising feature of the ore shoot is its persistence down pitch. This would suggest some controlling feature other than the lode shear itself. The surface radiometric contours suggest that the ore distribution is partly controlled by the intersection of the lode shear and the competent sandstone horizon shown surrounding No. 1 shaft (Plate 1). If this is so, it seems probable that the pitch of the shoot is controlled by the trace of the intersection of the lode shear and the bedding. No geological plans of the underground workings are available to confirm this, but the calculated pitch of the intersection of the Black Lode lode shear with the bedding is much the same as the pitch of the ore shoot indicated by underground development.

A winze and a drill hole suggest that the shoot may continue below No. 2 level.

No. 13 diamond drill hole may have intersected another shoot where the Black Lode shear crosses a second favourable sandstone horizon. No. 12 drill hole may have intersected this same shoot further to the north.

The ore shoot outlined by underground development is not large and the geological conditions suggest that only small shoots of ore can be expected. Of a total of 14 drill holes drilled to February, 1957, the aggregate length of ore intersected is less than 11 feet.

RECOMMENDATIONS

A large scale diamond drilling programme to search for extensions of the known shoot or for other shoots cannot be recommended on present evidence of the size and distribution of the known shoots.

One borehole to test a possible down-pitch continuation of the Black Lode shoot is recommended. This should be collared at co-ordinates 620S, 200E, bearing 270°, inclination 7½°, to a depth of 400 ft. These figures should be checked against a cross-section drawn along 800S, using surface topographic data which are not available to the author.

The amount of ore below No. 2 level can then be determined by normal development from No. 5 and No. 9 shafts. The value of ore already indicated, and possibly some of the material broken in the stopes could contribute towards any expenditure involved in dewatering and reopening the mine. It should be noted that leaching of the broken ore may have taken place and this may have reduced the grade of 0.5% quoted by the mine operators for this material.

The intersections obtained by drill holes No. 12 and No. 13 indicate another possible ore shoot but the grades and widths shown by probing are low and small. This shoot can probably be most cheaply tested by development from the northern end of No. 2 level or by drilling from a cross cut off No. 5 shaft. Survey data available are not adequate to plan such drill holes at present, but this could be done if and when the mine is re-opened.

If the mine is re-opened, geological mapping of the underground development should be carried out. All drill core should be logged and a reappraisal of the mine made on the basis of this information and the data provided by additional development and by the borehole recommended above.

Canberra.
August, 1957.

APPENDIX I

DIAMOND DRILLING INFORMATION TO FEBRUARY 1957

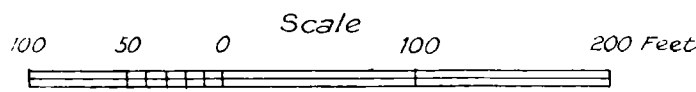
The collar positions and bearings of the drill holes referred to below are shown on Plate I.

Hole	Inclination	Length (feet)	Remarks
1	45°	120	No ore intersected
2	45°	150	" " "
3	45°	286	0.03% eU ₃ O ₈ 164 to 176 ft.
4	70°	170	0.12% eU ₃ O ₈ 115 to 126 ft. 0.09% eU ₃ O ₈ 152 to 155 ft.
5	70°	239	0.72% eU ₃ O ₈ 199'6" to 202 ft.
6	45°	144	No ore intersected.
7	Not known	370	" " "
8	Not known	200	0.02% eU ₃ O ₈ 163 to 168 ft.
9	Not known	220	0.06% eU ₃ O ₈ 195 to 198 ft.
10	Not known	260	0.05% eU ₃ O ₈ 260 ft.
		Less than -	0.01% eU ₃ O ₈ 201 to 210 ft.
11	55°	370	0.57% eU ₃ O ₈ 182 to 186 ft. 0.32% eU ₃ O ₈ 196 ft. 0.04% eU ₃ O ₈ 224 ft. 0.08% eU ₃ O ₈ 351 ft.
12	70°	390	0.26% eU ₃ O ₈ 378 to 382 ft.
13	80°	540	0.20% eU ₃ O ₈ 446 to 448 ft. 0.10% eU ₃ O ₈ 387 ft.
14	Not known	530	0.03% eU ₃ O ₈ 171 to 179 ft.

Total footage drilled 3,989 feet.

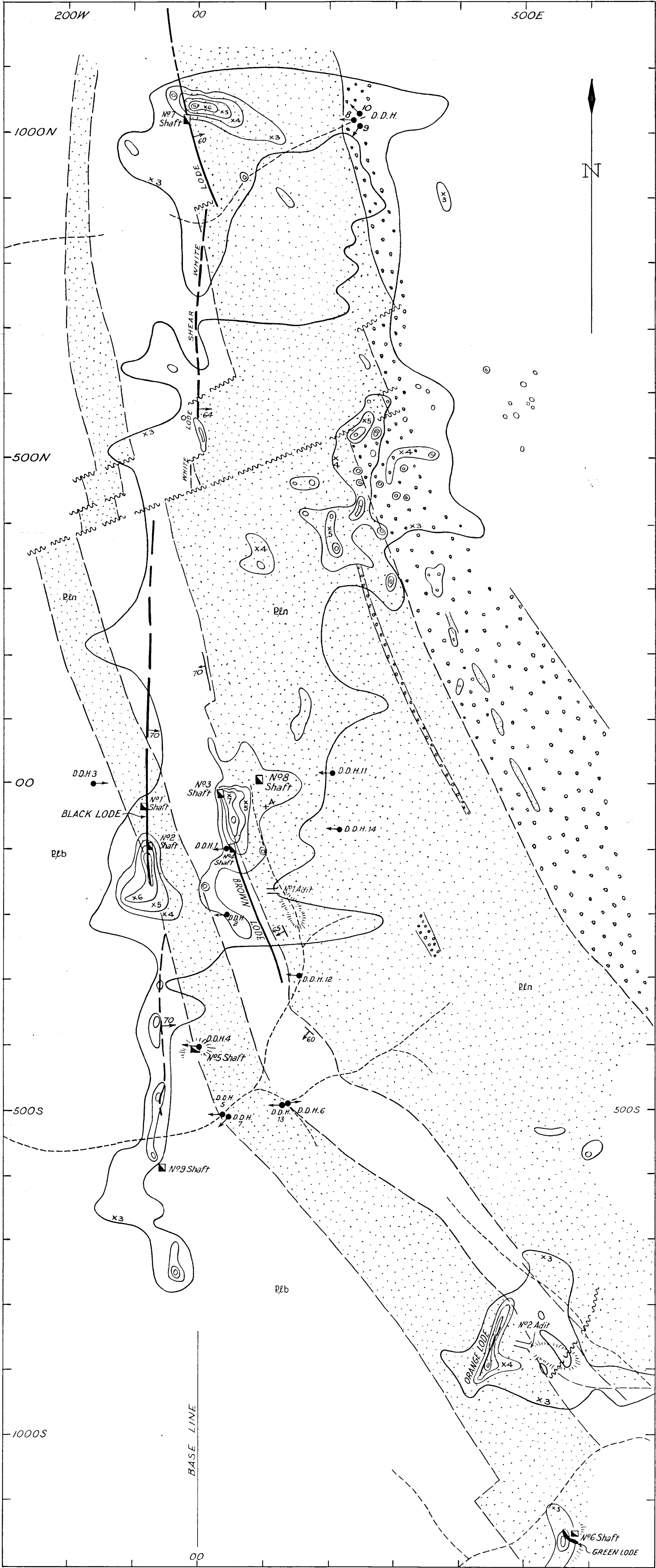
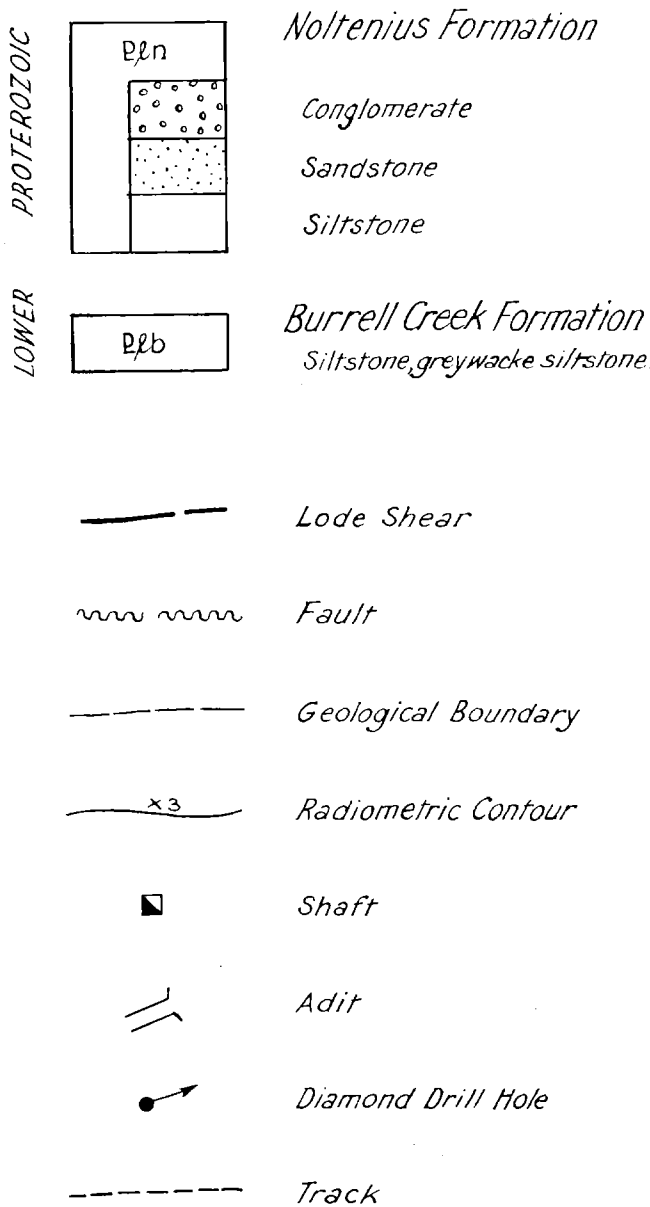
Aggregate length of ore intersections - less than
11 feet.

Geological Plan
ADELAIDE RIVER
URANIUM MINE
Northern Territory



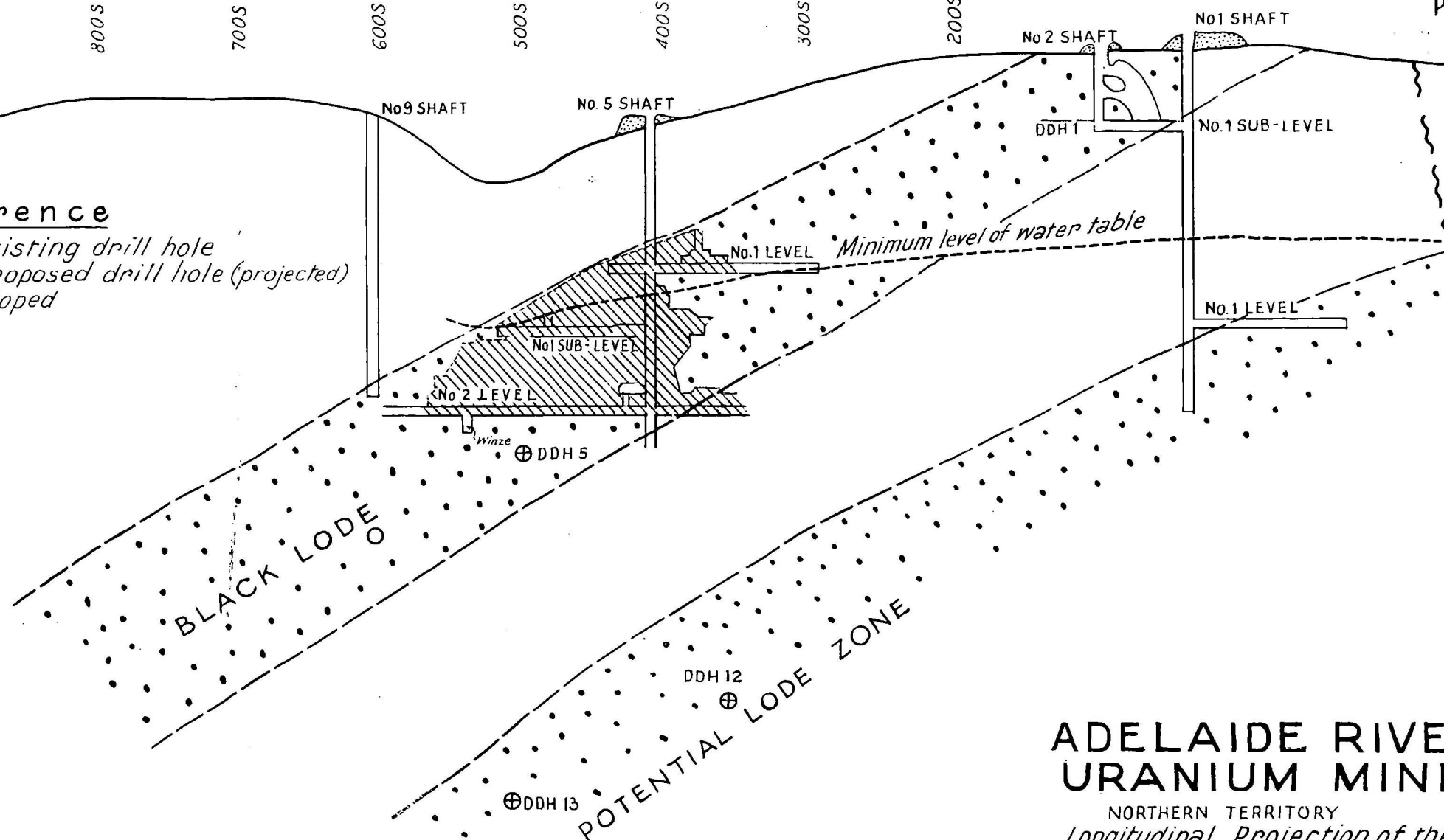
Geology by Geosurveys Ltd.
Radiometric Gridding by B.M.R.

Reference



Reference

- ⊕ DDH Existing drill hole
- Proposed drill hole (projected)
- //// Stope

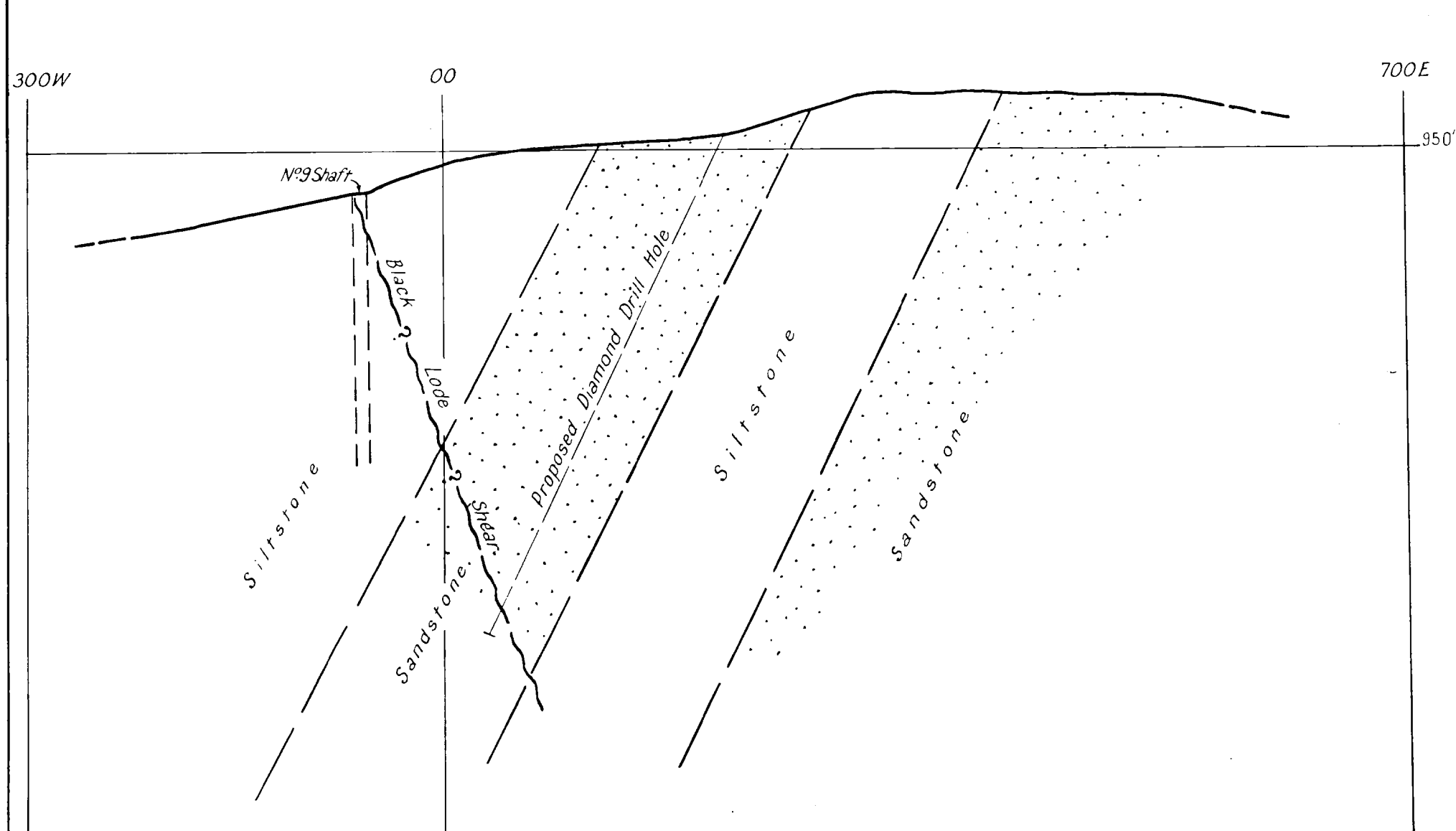
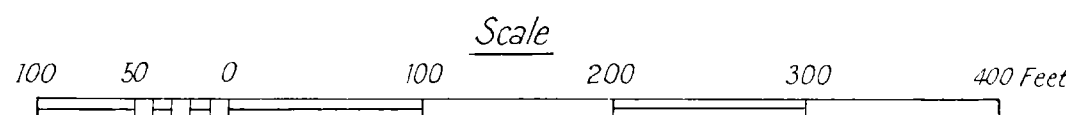


ADELAIDE RIVER URANIUM MINE

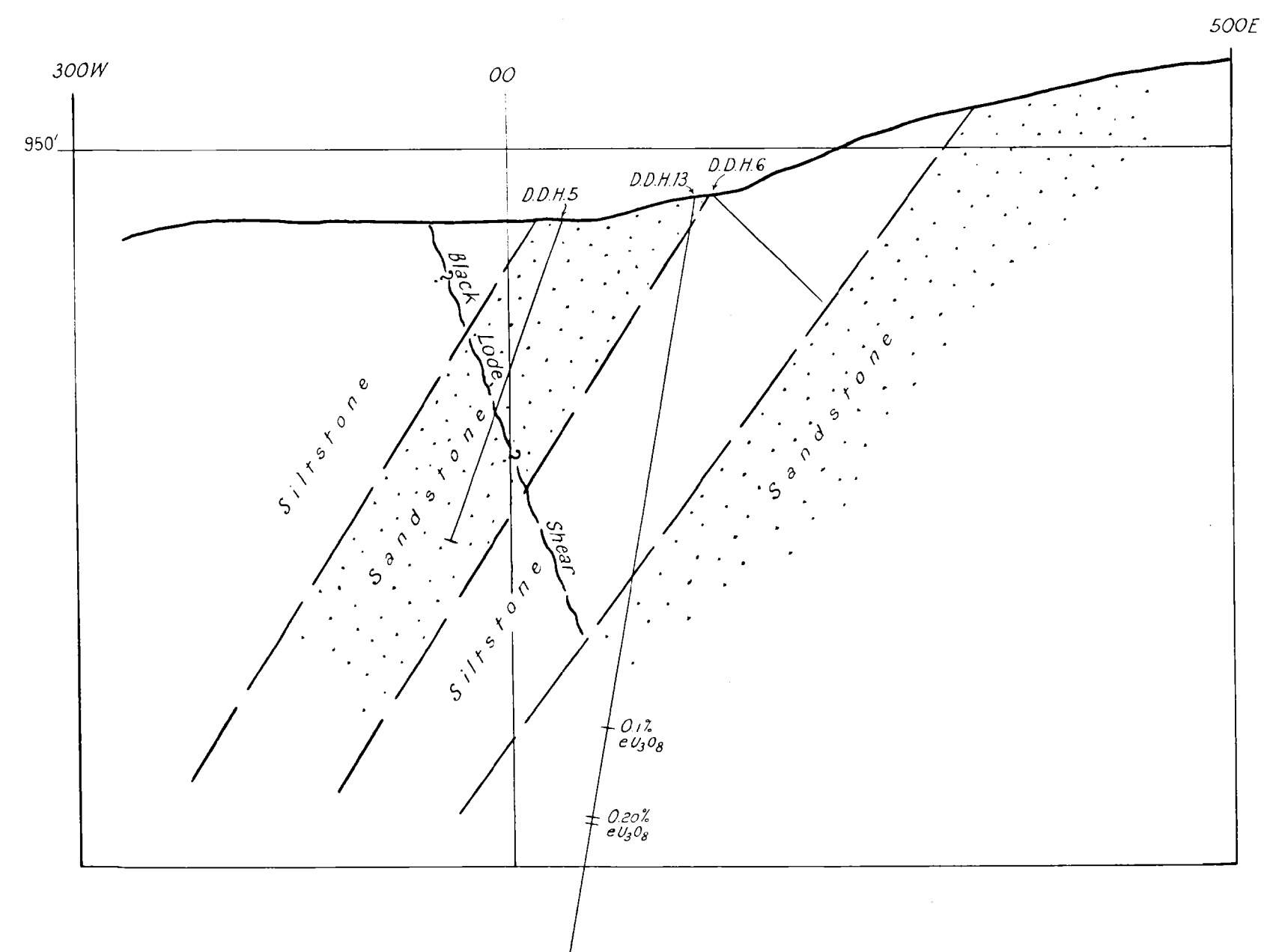
NORTHERN TERRITORY
Longitudinal Projection of the
BLACK LODGE



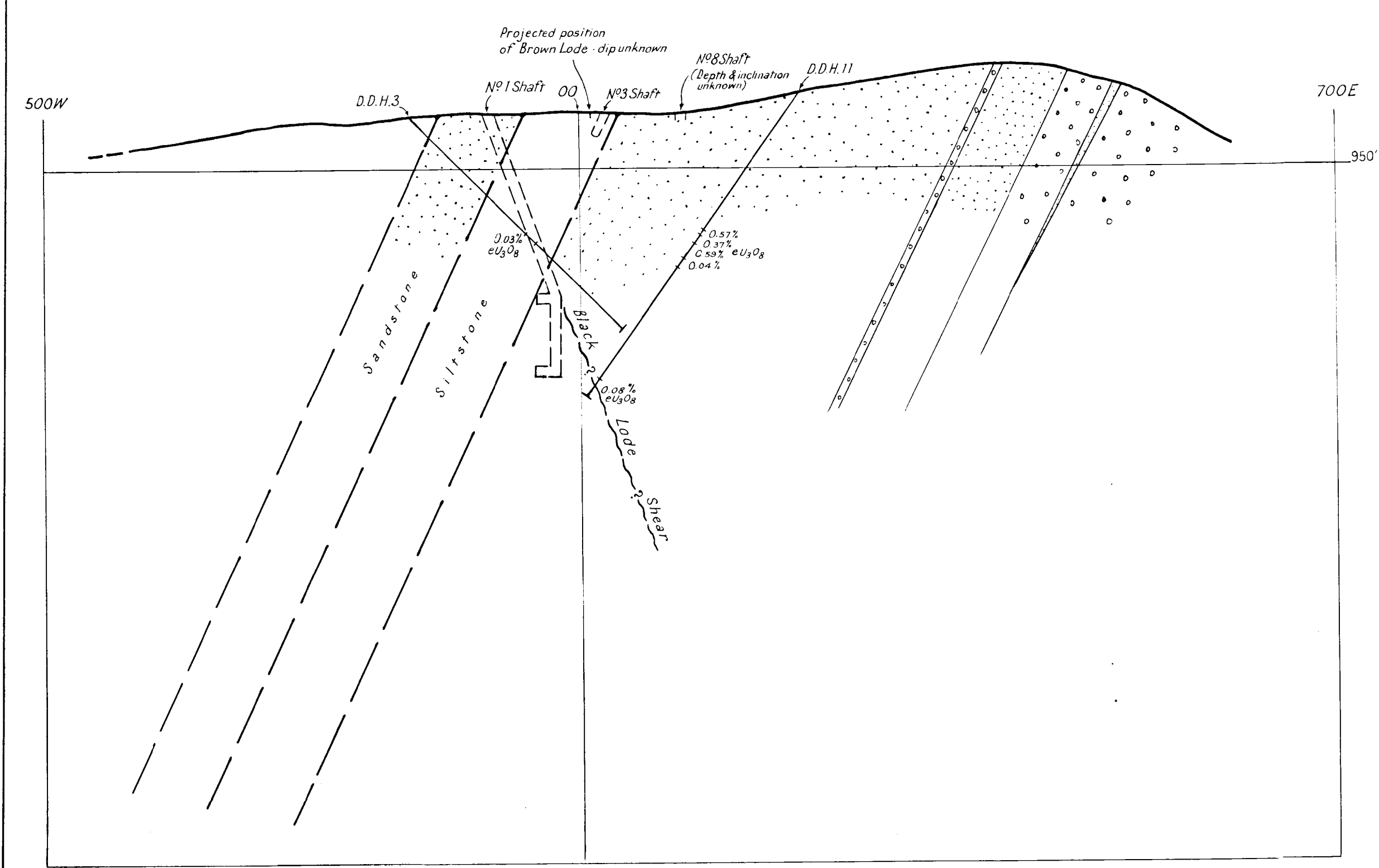
CROSS SECTIONS
BLACK LODGE
ADELAIDE RIVER
URANIUM MINE
N.T.



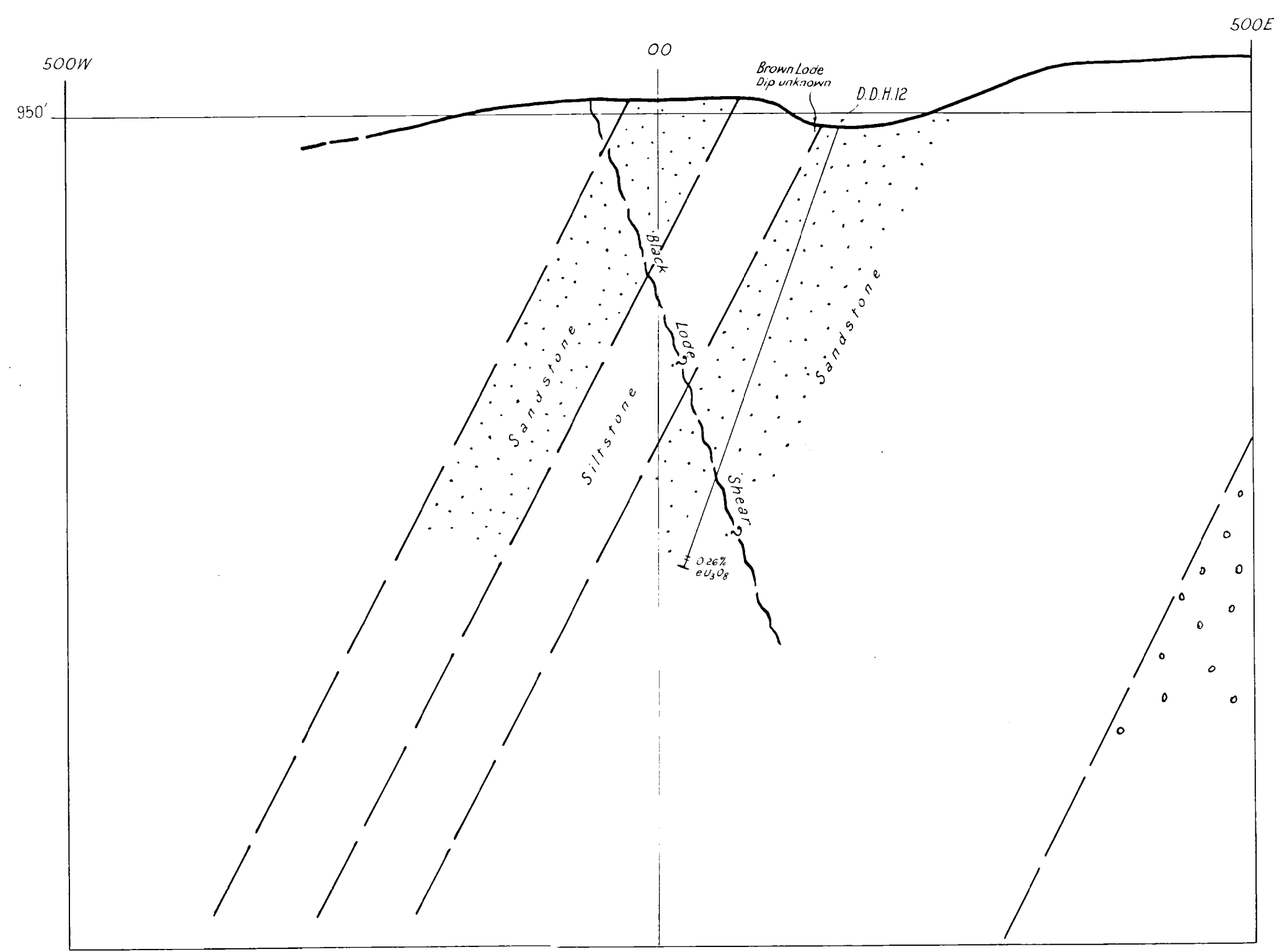
Cross Section at 600S
Looking North



Cross Section at 500S
Looking North



Cross Section through 00
Looking North



Cross Section through 300S
Looking North