SUMMARY OF THE PROSPECTING AND DEVELOPMENTAL WORK AT THE ADELAIDE RIVER URANIUM MINE, N.T.

by J. H. Herlihy

April, 1958

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INTRODUCTION

This report summarises records concerning the Adelaide River Uranium Mine filed at the Darwin Uranium Group and the Mines Branch, Northern Territory Administration.

Discovery

Radioactivity was discovered in the Adelaide River area by Mr. T. Lennox on the 13th March, 1954.

Location

The Adelaide River Uranium Mine is situated approximately two and half miles south of the township of Adelaide River which is on the Darwin - Birdum railway line. The mine is about one mile from the Stuart Highway and is about 75 miles by road south-south-east of Darwin. It is about 35 miles by road or rail from the treatment plant at Rum Jungle.

The Adelaide River Uranium Mine is at latitude 13° 16.2', Longitude 131° 5.4'. (scaled from the Katherine - Darwin Regional Map, scale 1"=10 miles).

MINERALISATION

Uranium mineralisation occurs in the sediments of the Noltenius Formation near its boundary with the Burrell Creek Formation. Both formations are of Lower Proterozoic age. The Burrell Creek Formation is represented by siltstone and greywacke siltstone. The Noltenius Formation is represented by conglomerate, sandstone, and siltstone.

The mineralisation has been localised where minor shears intersect sandstone beds of the Noltenius Formation. The mineralised shears have been called the Black Lode, White Lode, Brown Lode, Green Lode, and Orange Lode.

Black Lode

The lode shear is mineralised for approximately 200 feet. The ore is patchy.

The primary zone consists of narrow veinlets of pitchblende in the shear zone and occasionally in the adjacent country rock.

Torbernite is the main secondary uranium mineral in the oxidised zone.

White Lode

This is on the faulted northerly continuation of the Black Lode shear. Only small patches of weakly radioactive rock have been found.

Brown Lode

The Brown Lode is on a strike shear. The known mineralisation, near the surface, is weak and below ore grade. A shaft exposed some low grade secondary uranium mineralisation.

Orange and Green Lodes

These are small mineralised fractures; the known mineralisation is weak and limited.

PRODUCTION

Ten parcels of ore, totalling approximately 3,800 tons with a grade of about 0.5% U_3O_8, have been sent to and treated at Rum Jungle.

ORE RESERVES

The only ore reserves are from the Black Lode.

Reserve	Black Lode	
	Amount	Grade
Broken	1,500 tons	0.5% eU_3O_8.
Proved	Nil.	
Possible	1,800 tons	0.5% eU_3O_8.

The 1,500 tons of broken ore is still in the stopes which have been flooded since February, 1957. Hence the grade of the broken ore is very much in doubt. Leaching and the fretting of the stopes after dewatering will reduce the grade possibly to below ore grade.

DEVELOPMENTAL WORK

Diamond Drilling

No. of diamond drill holes drilled	14
No. " " " probed	14
Total footage drilled	3,989 ft.*
" " probed	3,988 ft.

(* This figure is probably slightly less than actually drilled.)

From available records a total of 10.5 ft. of ore grade material was intersected by diamond drill holes.

Waggon Drilling

No. of waggon drill holes drilled 36
" " " " probed 23

Total footage probed 2,315 ft.

The exact total of footage drilled is not available; it is in excess of 2,315 ft.

The inclinations of nine holes are recorded but their bearings are unknown.

The locations of only fifteen holes are recorded.

No other details are available.

Costeaning

No details of costeaning are available here.

Shafts

Nine shafts were sunk. (see the following table for details). The depth of No. 5 shaft was taken from the records. The depths of shafts Nos. 1,2,3,4,6,7, and 9 were measured by lowering a length of string attached to a weight down the respective shafts. Shafts Nos. 1 and 6 are known to be deeper than measured. It is suspected that the inclined shafts Nos. 2,4, and 9 are also deeper than recorded here.

Shaft	Depth	Inclination	Bearing
No.1	30' (at least)	Vertical for first 30' then 75°	95°
No.2	57' (at least)	78°	280°
No.3	143'	Vertical	-
No.4	30' (at least)	75°	245°
No.5	230'	Vertical	-
No.6	47' (at least)	50°	192°
No.7	31'	Vertical	-
No.8	Believed to be filled in - no details available.		
No.9	145' (at least)	Vertical	-

The total footage of shafts sinking is greater than 713 feet.

Driving and Crosscutting

The following figures have been scaled from cross sections of the area.

Drive or Crosscut	Length	Off Shaft
No.1 Sub Level	60'	No.1
No.1 Level	110'	No.1
No.1 Level	150'	No.5
No.1 Sub Level	100'	No.5
No.2 Level	250'	No.5

These figures are only approximate. The total footage, shown above, is 670 feet. Further details are not available here.

Adits

Two adits are recorded. The locations of the portals are known but no further details, ie. geological mapping and surveying, are available here.

Grids

Radiometrical gridding has been done by the Darwin Uranium Group (B.M.R.) (Clarke, Nov.1954)

Geosurveys of Australia Ltd. have geologically mapped, gridded, and contoured the area.

DEFICIENCIES

Diamond Drill Holes

The locations of all diamond drill holes are shown on a Geosurveys of Australia map. Four holes have been located in the field, the remainder are obscured by grass, scree, or mullock. The bearings, inclinations, and reduced levels of the collars of the holes are only known approximately. No log core is on record here.

Waggon Drill Holes

The locations of holes 11-14, 21-25, 29, and 32-36 (inclusive) are known approximately.

Except for the probe graphs of 23 holes, the inclinations of nine holes and the depth of two holes, no other information is available.

Sharts, Drives, Crosscuts, and Adits

No underground geological mapping is available. If further work is to be done underground surveying and geological mapping is of first importance.

Contoured Geological Map

The two existing maps, one by the B.M.R. scale 1"=100' and the second drawn by Geosurveys of Australia Ltd. scale 1"=40' need completing to include installations and developmental work.

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Adelaide River Uranium Project

D.D.H.	LOCATION	X-S	DATE STARTED	DATE CEASED	BEARING	INCLINATION	DEPTH DRILLED	DEPTH PROBED	R.L. COLLAR	ORE ZONE (o/o)	CORE RECOVERY	PROBE GRAPH.
1.	100S 50E*				266°*	45°	120 ?	130		——		G10
2.	200S 42E*				266°*	45°	150	146		——		G10
3.	00S 162W*				271°*	45°	286	284		164-176-0.03%.		G10
4.	400S 60E*				273°*	70°	170	172		115-126-0.12 132-152-0.19		G10
5.	505S 30E*				261°*	70°	239	235		199½-202-0.72		G11
6.	485S 180E*				82°*	45°	144	140		——		G11
7.	505S 40E*				270°*		370	368		——		G12
8					271°*		200	200		163-168-0.02		G14
9.	102ON 238E*				315°*	45°	220	224		195-198-0.06		G15
10					317°*		260	260		260 - 0.05%.		G17
11	18N 200E*				264°*	55°	370	365	5023.9*	201-210 >0.01 182-186-0.17 196 — 0.32% 214-224 -0.04% 357 — 0.08%.		G18
12.	273S 100E*				93°* ?	70°	390	393	4921.7*	378-382-0.16		G22
13.					270°*	80°	540	541		446-449-0.20% 387-0.10		G24
14.	75S 210E*				279°*		530?	530	4993.0*	171-179-0.03%		G25

ADELAIDE RIVER URANIUM MINE

D.D. Hole No. 1.

Location S 100' Base Line

Depression 45°

Direction grid (magnetic) west.

0-55 feet: Slate and silty slate: Minor (1 ft.) sandstone at 30 feet.

52-53'6": Micaceous medium grained sandstone.

53'6"-56': Slate.

56'-74'6": Micaceous sandstone.

74'6"-76'6": Sandstone with quartz veins and ferruginous quartz stringers

Much grinding of core indicated.

76'6"-104'3": Micaceous sandstone with minor manganiferous quartz stringers at 80 feet and 90 feet.

104'3"-104'6": Quartz vein lying at 45° to core axis.

104'6"-109: Micaceous sandstone.

109'-131: gritty quartz sandstone, yellowish in colour, ferruginous for last 6 inches.

Bore completed at 131 feet.

Geiger probing (background estimated to be 100 counts per minute) Increasing from 300 to 600c.p.m. to 70 feet.
At 70ft. rises rapidly from 820c.p.m. to 1660 at 77 ft.
At 78 ft. the extremely high count of 8000 c.p.m. was recorded.
Hence 3400 at 79, 1700 at 80., 1000 at 81 falling gradually to 700 by 95'. At 96 ft. a sudden increase to 1040, then 1220 at 97 was recorded after which readings fell to 800 or less, except at 116 ft. (local 920) almost to the bottom of the hole. The last reading (at 129'6") gave 1040 c.p.m.

Interpretation.

A zone of quartz veining was entered at about 70 feet, the first vein probably being subhorizontal or "ladder" veins in the lode hanging wall. At 78 feet a narrow extremely highly radioactive zone was encountered representing the main lode shears. The grade of this (80 x's background) is obviously extremely high, probably of the order of several per cent or more. The localisation and concentration of the high readings noted when moving the probe by three inch intervals indicates a narrow width of the rich vein, but on the other hand the spread of 10 x background or greater activity over 15 feet about the lode zone indicates much secondary redeposition of important values out in wall rock and probably also the occurrence of separate uranium mineralization in the associated ladder veins.

The occurrence of a second "high" at 96-97 feet may indicate minor mineralization in a sympathetic (parallel) shear or in one of the more extensive ladder veins.

The high value at the bottom of the hole is probably from dislodged radioactive sludge.

Reg. C. Sprigg.

ADELAIDE RIVER URANIUM MINE

D.D. Hole No. 2.

Location 200' S :E20'
Direction Grid (magnetic) west.
Depression 55°

0-14ft. : No core recovered.

14-23' : Micaceous silty sandstone.

23-39' : Silty weathered slate.

39-40' : Sandstone

40-43' : Slate.

43-78' : Micaceous silty sandstone.
2" Quartz veins at 64 and 71 feet.

78-83' : Slate.

83-95' : Sandstone with vughy section 94'9"-95'

95-129'6" : Coarse gritty (quartz) sandstone, with clay gouge vein, extensively lost by grinding at 98' : Pyrite box works at 100'6"-101' : Quartz vein (2") at 11 feet. Rusty quartz vein ($\frac{1}{8}$") at 117 feet.

129'6"-130'3" : Quartz vein lying 50° to axis of hole.

130'3"-147 : Fine grained sandstone.
Quartz with vughs 133-133'4"
134'9" Quartz for 1 inch.
145'9" Quartz half inch vein (45° to hole.)

Bore completed at 147 feet.

Radioactivity Proving.

0-67 feet gave 3-500 c.p.m.
68 and 69 ft. a local small peak of activity to 660 c.p.m.
At 98 feet a sharp peak of 1480 c.p.m. was recorded, followed by a fall to 700-800 c.p.m. for several feet after which counts of 1000 or better were recorded from 103 to 107 feet inclusive with a maximum at 1120 c.p.m.

A decline to about 640 c.p.m. at 108 feet was followed by counts of about 900 from 111 to 114 feet. Thereafter activity declined to in-significance (220 c.p.m.) with an exception at 123 feet of 820c.p.m.

Interpretation.

The lode channel appears to be a narrow development containing clay gouge at 98 feet. The principal radioactive anomaly is sharp suggesting very localised mineralization, but additional activity particularly a few feet into the footwall suggests lesser activity (? secondary) associated with several quartz ladder veins.

Reg. C. Sprigg.

ADELAIDE RIVER URANIUM MINE

D. D. Hole No. 3.

Location 00N, 160W
Depression 45°
Direction Due East.

0-46' : Slate.

46-99' : Gritty sandstone with quartz stringer at 56' and a minor slaty band from 58' to 59'.
Ferruginous quartz bands at 75', 83' 94' and 95'.

99-106': Purple and grey shale.

106-118': Coarse gritty sandstone with ferruginous bands at 111', 113' and 116'.
: Shale
118-127': Alternating shale, gritty shale and sandstone with ferrugin-
127-139' ous bands at 129' and 134'.

139-159': Gritty sandstone with several thin shaly bands and with ferruginous quartz stringers at 139', 140', 147' and 155'

159_171': Leached pyritic broken shale - highly brecciated and with strongly developed pyritic casts.

171-182': Grey shale (? slightly graphitic).

182-184': Coarse gritty sandstone.

184-208': Slightly carbonaceous shale with finely divided pyrite.
Ferruginous zones at 187' and 188'.

208-211': Coarse sandstone - quartz stringers at 210'.

211-213': Grey shale.
213-216': Coarse gritty sandstone.
216-218': Grey shale (hematised and broken at first).

218-261': Coarse grey gritty felspathic sandstone.

261-269': Graphitic shale (?) with some fine pyrite.

269-286': Coarse gritty and arkosic sandstone with thin shale band from 276' - 278' and a pyritic shear at 269' (? chalcopyrite).

END OF HOLE.

Geiger Probing: (background estimated to be 250 counts per minute). Fairly steady counts of 200 to 300 up to 140 feet. Increasing rapidly from 140 feet to a maximum of 1900 counts at 172 feet and declining to background again at 185 feet. A sharp anomaly occurs at 210 to 211 with a maximum count of 800 counts per minute.

Interpretation.

The zone of highly brecciated and leached pyritic shale from 159' to 171' giving a maximum geiger probing of some 7 times background, represents the main shear. This was intersected in the barren zone, in slates between the Black and White lodes, the intersection lying within the zone of oxidation.

The small sharp anomaly at 211 feet probably represents a quartz ladder vein.

ADELAIDE RIVER URANIUM MINE

D.D. Hole No. 4.

Location 400S Baseline
Depression 70°
Direction Due west.

0-45' : Arkosic gritty sandstone, coarse at top and bottom, with minor manganiferous partings at about 40 feet.

45-63' : Buff to purple slate.

63-92' : Reddish to brownish sandstone; thin quartz stringers at 72', 75', 76' (4" qtz.), 808, 90' and 92' (2" qtz.)/

92-112' : Coarser sandstone from 92'. Big core loss between 96' and 101' where approx. 20% only core recovery. This was mostly quartz and broken ferruginous material. Quartz stringers at 97', 100-101', 102', 110'. Ferruginous fractures (red ochre) at 109', 111' and 11'6".

112-119' : Light grey slate.
Ferruginous clay gouge at 113'6".
N.B. Core recovery from 110 and 121 feet was only 63%.

119-122' : LODE ZONE
Broken arkosic sandstone with pitchblende seams in the hanging wall. Quartz stringers from 121 to 122 feet with heavy pyrite from 121' to 121'4".

122-163' : Arkosic sandstone.
Quartz stringers (3") at 122'6" and (2") at 163'.
Ferruginous gouge stringers at 130' and 134'.

163-169' : Light grey phyllite.

169-170' : Coarse arkosic sandstone.

END OF HOLE.

GEIGER PROBING.

ADELAIDE RIVER URANIUM MINE.

D. D. Hole No. 5.

Location 505S, 34E.
Depression 70°
Direction Due west.

0-62'	:	Coarse grained micaceous sandstone with thin ferruginous stringers at 22', 32', 35' and 61'.
62-67'	:	Greyish slate with ferruginous stringers at 65' and 66'.
67-68'	:	Fine grained sandstone.
68-79'	:	Greyish shale with ferruginous stringers at 70', 75' and 76'.
79-184'	:	Medium grained sandstone with some coarse bands. Ferruginous bands at 84'. Quartz veins with pyrite at 134', 148', 150' and 172'.
184-188'	:	Slate with seam of pyrite at 186'.
188-201'	:	Fairly coarse sandstone with some micaceous bands.
201-205'	:	LODE ZONE Sulphide mineralization and quartz. Slight sulphide to 210'.
205-239'	:	Grey medium grained sandstone.
END OF HOLE.		239'.

ADELAIDE RIVER URANIUM MINE.

D. D. Hole No. 6.

Location 487S, 133E.
Depression 45°
Direction Due E.

0-5'	:	Micaceous sandstone.
5-88'	:	Fine grained reddish slates becoming grey at 75 feet.
88-144'	:	Coarse gritty (grey) sandstone with yellow sandstone at 91 ft. Highly leached limonitised broken zone at 101 ft. 4 inches. Slightly radioactive pyritic zone at 118'. ½" Quartz veins at 143'.

ADELAIDE RIVER URANIUM MINE.

D.D. Hole. No. 7.

Location 506S, 40E.
Depression 63°
Direction S 9°W.

0-80'	:	Coarse gritty arkosic sandstone with numerous irregular thin limonitic and quartz seams, particularly at 64' and 76'.
80-118'	:	Fine siltstone (bedding 15-20° with edge of core).
118-156'	:	Medium to coarse even grained micaceous sandstone, becoming coarser and arkosic beyond 146'. Thin quartz vein (c pyrite) at 142'.
156-170'	:	Siltstone with interbedded fine-grained sandstone. ½" pyritic seam at 164'.
170-249'	:	Coarse arkosic sandstone with ladder veins at 173' and 174'. Quartz-pyritic veins at 192' (½"), 200' (1½"), 208' (1½"), 230' (1").
249-290'	:	Fine grained sandstone (bedding about 30° to core). with quartz-ladder veins at 251', 258', 264', 267', 268', 270', 280', 281'.
290-316'	:	Medium to coarse arkosic gritty sandstone. Pyritic veins at 294' and 306'.
316-339'	:	Fine grained sandstone with 5" (+) pyritic-quartz zone at 328½' to 329'. Slight shearing at 331'. Pyritic mineralisation (c silvery mineral) 333'6" to 334'. Sandstone becoming coarse and arkosic from 333'6" to 339'.
339-363'6"	:	Dark fine slates.
END OF HOLE		363'6"

ADELAIDE URANIUM MINE.

D.D. Hole No. 8.

Location 1022N, 239E.
Depression 50°
Direction Due West.

0-20'	:	Coarse conglomerate with some gritty bands.
20-74'	:	Medium to coarse grained S.S.(micaceous).
74-75'	:	12" Pinkish-white quartz (barren-looking).
75-75'6"	:	Somewhat sheared fine grained micaceous sandstone.
75'6"-102'	:	Finer grained micaceous sandstone, somewhat sheared between 96' and 98'. Minor quartz stringers at 84', 85', 86' and 91'.
102-123'	:	Coarse-grained arkosic sandstone (micaceous.) Minor quartz-veining at 117' and 122'6".
123-125'	:	Fine grained micaceous sandstone (or sandy phyllite) with some sheared surfaces.
125-160'	:	Coarse-grained sandstone (arkosic in places). Minor quartz stringers at 128', 130', 141', 151', 154'.
160-168'	:	Coarse grained sandstone (sometimes arkosic) with silicification and pyritic mineralization. Main sulphide mineralization from 163' to 168'. (2'9" core loss from 160' to 170').
168-179'6"	:	Medium grained arkosic micaceous sandstone.
179'6"-196'	:	Medium grained arkosic micaceous sandstone, somewhat sheared or slaty at 195'. Minor quartz at 180'.
196-204'	;	Coarse grained arkosic sandstone. 18" white quartz from 198'6" to 200' with vughs containing quartz crystals. Quartz veining 203' to 204'.
204-210'	:	Fine grained micaceous sandstone to sandy phyllite with apparent slump structures. Sheared surfaces around 205' to 206' contain yellow flaky mineral. Bedding 20-30° to core.
210-240'	:	Coarse-grained arkosic sandstone. Minor quartz at 212', 214', 215'.

END OF HOLE.

ADELAIDE RIVER URANIUM MINE.

D.D. Hole. No.9.

Location 1022N, 239E.
Depression 50°.
Direction West 49° South.

0-0'6" : Coarse conglomerate.

0'6"-14' : Coarse gritty sandstone with few thin ferruginous bands.

14-22' : Coarse grit with scattered quartz pebbles.

22-86' : Fairly coarse micaceous sandstone, with some shearing at 31'. Minor conglomerate band (1') at 37'. Quartz stringers at 84'.

86-115' : Coarse gritty sandstone (particles up to ¼" diameter) Minor quartz stringers at 87'6", 89', 90', 93', 103', 109'. Some shearing with a little pyrites at 106'. Quartz and brecciation at 114'.

115-153' : Fine grained micaceous sandstone, somewhat sheared from 121' to 128'. Minor quartz stringers at 128 and 129'.

153-181' : Coarse gritty sandstone with minor quartz at 163', 172'.

181-184' : Fine grained siltstone with some patches of mineral together with quartz stringers.

184-188' : Coarser grained gritty sandstone with a few minor quartz stringers.

188-195' : Mainly fine siltstone with sheared zone at 192' and some gritty bands.

195-197' : Fine siltstone and sandstone with many mineral bands.

MAIN MINERALISED AREA.

197-204' : Fairly coarse S.s. with some cracks and veins with black mineral. Core slightly radioactive.

204-224'6" : Medium grained sandstone.
Weak crack with some mineralisation and weak black mineral.
Very slight activity in core.

END OF HOLE.

GEIGER PROBING.

The average background count is estimated to be in the order of 240 counts per minute. The counts rise steadily to 186 feet where a sudden increase in counts per minute occurs.

From a maximum of 1400 counts per minute at 186'6" the counts decline to a minimum of 560 counts at 193'6". From here there is another sharp anomaly extending from 195' to 200 feet. The maximum counts in this zone are 5,800 counts per minute at 199'. These counts decline to a minimum of 1,300 counts per minute at 201'6" and then rise again gradually to a maximum of 1,490 counts per minute at 208'. Another very small sharp anomaly due to a thin ladder vein occurs from 217 to 219', with a maximum of 1,450 counts at 217'6".

D.D. Hole No. 9. Cont.

INTERPRETATION.

This hole passed through the lode very obliquely which accounts for the fact that the counts extend over a large footage in the hole.

One interesting factor is the anomaly which occurs from 205' to 211'. Several blackish-grey thin seams may be recognised in the core from this zone. It seems that the main shear containing pyritic mineralization was intersected in the zone extending from 195' to 200'. Thus both the hanging wall and the footwall zones appear to be mineralised in this northern portion of the shear, while further south, mineralization is mainly confined to the hanging-wall.

ADELAIDE RIVER URANIUM MINE.

D. D. Hole No. 10

0-20	feet	Conglomerate.
20-40	"	Arkosic Sandstone with thin conglomerate at 30 feet.
40-75	"	Conglomerate.
75-90	"	Arkosic Sandstone
90-97'	"	Gonglomerate.
97-185	"	Arkosic Sandstone with greasy shear at 170 feet.
185-190	"	Grey slate becoming slaty-sandstone with thin quartz stringers.
190-192	"	Arkose
192-195	"	Slaty-sandstone with several thin quartz stringers.
195-206	"	Arkosic Sandstone with lode material. 196-197 feet white quartz. 200-201 " quartz with medium heavy pyrites. 202-206 " quartz with medium heavy pyrites and vughs.
206-232	"	Arkosic sandstone with quartz veins at all angles.
232-260	"	Fine grained arkosic sandstone.
260-270	"	Fine grained micaceous sandstone.
270-273'6"		Black slates with 2 inches of quartz at 272 ft.
273'6"-277	feet	Arkose.
277-280	"	Slate.

Reg. C. Sprigg.

ADELAIDE RIVER URANIUM MINE

D.D. Hole No. 11.

0-20	feet	Coarse sandstone.
20-100	"	Fine grained sandstone.
100-165	"	Coarse sandstone becoming finer below 140 feet. End of oxidized zone at 137 feet. (Water Level) Quartz stringers at 137 and 159 feet.
165-196	"	Fine grained sandstone. 174-179 feet Quartz pyrite stringers 181-186 " Pitchblende section.
196-213	"	Coarse arkosic sandstone.
213-217	"	Dark grey slate.
217-266	"	Coarse Arkosic sandstone. At 230' - Quartz pyrite stringer.
266-273	"	Grey micaceous sandy siltstone.
273-370	"	M - C. Arkosic sandstone Siderite vein at 330. Quartz vein with high count at 350' Black slate band 325-336'.

END OF HOLE at 370 feet.

Reg. C. Sprigg.