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BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

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1965/170

FOUNDATION INVESTIGATIONS E.L.D.O. PROJECT GOVE PENINSULA, NORTHERN TERRITORY.

by

P. Rix and J. Shields

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SUMMARY

Exploratory diamond drilling was carried out at two sites on Gove Peninsula, Northern Territory, to determine foundation conditions for a proposed down-range guidance and telemetry station for the European Launcher Development Organisation. One site was located on granite and the other on a bauxite plateau. It was concluded that the only sure way of satisfying the foundation requirement would be to locate the station on the granite. However, this site was later ruled out for non-technical reasons and foundation testing was concentrated on the bauxite plateau.

The foundation testing consisted of jackhammer holes, diamond drill holes and a costean. From the results of this work it is concluded that the tubular and nodular types of bauxite are unreliable as foundation rocks and that the overlying pisolitic bauxite is the best foundation rock at the proposed site for the tracking station. It is therefore recommended that consideration be given to raft footings founded in the upper part of the pisolitic bauxite layer. If friction footings are preferred, it is considered essential that grouting be carried out to stabilise the nodular and tubular bauxite. Laboratory tests on undisturbed samples of the bearing and friction layers are also recommended.

INTRODUCTION

Exploratory diamond drilling was carried out at two sites on Gove Peninsula, Northern Territory, to determine foundation conditions for a proposed down-range guidance and telemetry station for the European Launcher Development Organisation (E.L.D.O.). The main requirement for the antenna foundations was that the rock should be solid enough to preclude foundation movements of a few millimetres over a period of ten years or more. A very stable foundation rock is therefore required. The sites selected for exploratory investigations consisted of a northern site, located in a topographically low area with numerous granite outcrops, and a southern site, located on a bauxite plateau (Plates 1, 2 and 3). After the exploratory drilling the northern site was ruled out for non-technical reasons and further investigations were concentrated on the southern site.

Initially, foundation testing on the southern site consisted of short jackhammer holes drilled at two alternative locations for the antenna grouping. Later, more detailed foundation testing was done by means of short diamond drill holes put down on three patterns selected in such a way that all possible locations of the antenna grouping could be tested. Finally a costean was excavated through the bauxite layer close to the most favourable location for the antenna grouping.

The drilling was requested by the Constructional Engineering Section, Commonwealth Department of Works, and was carried out by the Drilling Section, Mines Branch, Northern Territory Administration. The exploratory drilling was done during January and February 1964, the jackhammer drilling in April 1964, and the foundation testing between September and November 1964. The drill hole patterns were surveyed and levelled by surveyors from the Department of the Interior, Canberra.

EXPLORATORY DIAMOND DRILLING

SOUTHERN SITE

Location

The site is located seven miles south of Gove airstrip and one mile south of the southern boundary of the Special Mineral Leases covering the Gove bauxite deposits (Plate 1).

Surface Geology

The site forms part of a narrow bauxite plateau that rises 200 to 300 feet above the adjacent valley floors (Plate 2). Bauxite crops out on the edge of the plateau and also on the plateau surface, particularly in places where slight gully erosion has taken place. On the level parts of the plateau, the bauxite is covered by 2 to 3 feet of orange-red bauxitic soil. The valley floors adjacent to the plateau are covered by quartz sand and are probably underlain by decomposed granite. No rock outcrops were seen on the scarp slopes of the plateau, owing to the presence of bauxite talus, but fragments of feldspathic sediment have been recorded from a scarp slope close to the site (Gardner, 1957). Prior to the present drilling, therefore, little was known about the rocks that underlie the plateau.

Diamond Drill Holes

Three diamond drill holes, totalling 174 feet, were put down. One deep hole was designed to provide information about any suitable hard rock underlying the bauxite, and if possible, the depth to bedrock, and two shallower holes were planned to test the thickness of bauxite; their locations are shown in Plate 2.

Drill hole No. 2 showed that no hard rock exists within 104 feet of the surface at the drill site. The rocks underlying the bauxite are shale with numerous fractures, claystone, and friable micaceous siltstone. The two shallow holes showed that the tubular bauxite layer varies in thickness and is overlain by weakly-cemented pisolitic bauxite (see Appendix 1).

It is evident from the drilling results that no solid foundation rock is likely to be found on the southern site.

NORTHERN SITE

Location

This site is located seven miles north-west of Gove airstrip and is adjacent to, and on the south side of, the Melville Bay road (Plate 1).

Surface Geology

Outcrops of fresh granite occur at the site. They are numerous along the Melville Bay road and one granite hill about 50 feet high, situated close to the road, forms a useful marker (Plate 3). The country between this hill and the mangrove swamp one mile south has a surface of coarse-grained quartz sand with scattered outcrops of fresh granite. Slightly elevated areas, with numerous granite outcrops and intervening sand pockets, have been differentiated from slightly lower areas that consist of a cover of quartz sand with only sparse, scattered outcrops of fresh granite.

The granite is leucocratic, coarse-grained, garnetiferous, locally of gneissic texture, and with scattered xenoliths of quartz sandstone. It is a hard, crystalline rock, ideally suited to provide stable foundations. Vertical or steeply-dipping joints are present in the larger outcrops.

Diamond Drill Holes

Five diamond drill holes, totalling 169 feet 6 inches, were put down on the northern site. The maximum depth of the holes was to be 50 feet or the depth to fresh bedrock, whichever was less. In the event, the holes were drilled at least 15 feet into fresh bedrock to preclude the possibility of a loose granite boulder being mistaken for bedrock.

Only one drill hole, No. 2, failed to encounter fresh granite within 50 feet. The other drill holes showed that from 6 to 23¼ feet of sand and decomposed granite overlie fresh granite. Weathered granite occurs along joints at greater depth. (See Appendix 1.) Drill hole Nos. 3 and 4 gave the most favourable results and it is concluded that the most suitable site for the E.L.D.O. station is in the area between these two drill holes, where numerous granite outcrops occur (Plate 3. The circle encloses sufficient area for selection of the site within it.). Joints, both vertical and horizontal, were encountered in the drill holes. The decomposed granite associated with the joints could prove troublesome if a structure were sited directly on a joint.

Conclusions

It was concluded that a location with stable foundations could certainly be found on the northern site, whereas it was considered unlikely that such a location could be found on the southern site. The tubular bauxite could possibly serve as a foundation rock on the southern side.

FOUNDATION TESTING

JACKHAMMER HOLES

It was decided that the initial phase of the foundation testing on the southern site would consist of jackhammer holes to determine, if possible, the thickness of the bauxite layer, and its hardness, at proposed antenna locations. Ten holes, representing three alternative locations for the antenna grouping, were planned.

A test hole was drilled alongside D.D.H.3 (Plate 2) to establish criteria by which the other holes might be evaluated. The test hole showed that the layer of cemented pisolitic bauxite was dry and cohesive and that the tubular bauxite beneath was wet and fairly soft. Air drilling was impracticable in the wet material and the hole was stopped as soon as soft ground was encountered. Following the drilling of the test hole, six holes, representing two alternative locations for the antenna grouping, were put down at sites 1, 2, 3, 8, 9 and 10 (Plate 2). Sites 4, 5, 6 and 7 were not drilled because they were inaccessible at the time owing to previous heavy rain. In all, seven holes, with a total footage of 81 feet 7 inches, were drilled.

The results of the drilling are tabulated below:

Hole No.	Depth	Time	Colour of Powder	Rock Type
Test Hole	0" - 1'3"	-		Bauxitic soil
	1'3" - 4'	-	Orange-red	
	4' - 8'	1m. 54s.	Orange-red, some pisolites	Pisolitic bauxite
	8' - 12'	2m. 40s.	" " "	
	12' - 14'	-	" " "	
	14'	-	Orange-red mud	Top of tubular bauxite
Hole 8	0" - 1'7"	-		Bauxitic soil
	1'7" - 5'1"	2m. 0s.	Orange-red, some pisolites	Pisolitic bauxite
	5'1" - 8'7"	1m. 35s.	" " "	
	8'7" -10'3"	-	" " "	
	10'3"	-	Orange-red mud	Top of tubular bauxite
Hole 9	0" - 6"	-		Bauxitic soil
	6" - 3'6"	2m. 15s.	Orange-red, some pisolites	Pisolitic bauxite
	3'6" - 7'3"	2m. 35s.	" " "	
	7'3" -11'6"	2m. 45s.	" " "	
	11'6" -12'6"	-	" " "	
	12'6"	-	Orange-red mud	Top of tubular bauxite
Hole 10	0" - 4"	-		Bauxitic soil
	4" - 3'6"	2m. 45s.	Orange-red, some pisolites	Pisolitic bauxite
	3'6" - 6'3"	1m. 50s.	" " "	
	6'3" -	-	Orange-red mud	Top of tubular bauxite
Hole 1	0" - 2'	-		Bauxitic soil and boulders of pisolitic bauxite
	2' -12'4"	-	Orange-red, some pisolites	Pisolitic bauxite
	12'4"	-	Orange-red mud	Top of tubular bauxite
Hole 2	0" - 9"	-		Bauxitic soil
	9" - 15'	-	Orange-red, some pisolites	Pisolitic bauxite
	15'	-	Orange-red mud	Top of tubular bauxite
Hole 3	0" - 9"	-		Bauxitic soil
	9" - 3'9"	-	Orange-red, some pisolites	Pisolitic bauxite
	3'9" - 7'9"	1m. 45s.	" " "	
	7'9" -11'3"	-	" " "	
	11'3"	-	Orange-red mud	Top of tubular bauxite

The jackhammer drilling showed that a layer of moderately hard, cohesive, pisolitic bauxite, from 6 to 15 feet thick, underlies the antenna sites. This material was dry whereas the underlying tubular bauxite was found to be wet and rather soft (in the dry state the tubular bauxite is known to be reasonably hard). It is concluded that the strength of the pisolitic bauxite is likely to be constant however wet the material becomes; the strength of the tubular bauxite probably decreases progressively with its degree of saturation. It seems, therefore, that the pisolitic bauxite would probably be the better foundation rock.

This result conflicts with that obtained from the exploratory diamond drilling, which indicated that the tubular bauxite is the harder and more cohesive material. It must be noted, however, that the diamond drilling was done when the tubular bauxite was thoroughly dry.

In view of these equivocal results, it was obvious that more exacting foundation testing was necessary to determine the physical nature of the two materials in situ.

DIAMOND DRILL HOLES

Requirements

Evidence from the previous drilling and from laboratory tests done on core samples of tubular bauxite led officers of the Commonwealth Department of Works, Adelaide, to the conclusion that the tubular bauxite would be a satisfactory foundation rock. Calculations showed that an 8-foot layer would provide adequate support for the foundations of the proposed structures.

Owing to probable variations in the thickness of the tubular bauxite from place to place, it was necessary to lay out three patterns of drill hole sites to cover all the possible locations of the grouping of three antennae. It was hoped that at least three holes, having the required triangular arrangement, would reveal a minimum thickness of eight feet of tubular bauxite.

The core barrel used during this drilling was a 5-foot BMS double-core barrel with a split inner tube. A larger diameter, triple-core, barrel with split inner tube would have given better core recovery in this type of material but no such barrel was available at the time.

Drilling Results

Because of the fixed antenna arrangement not all the sites in any one of the three patterns needed to be drilled. In the event, 27 holes were drilled; the locations of the drill holes are shown on Plate 4 and the detailed results are given on the log sheets (Appendix 2).

The drill holes showed that the tubular bauxite is extremely variable both in thickness and in physical texture. Some of it is cohesive and cored well whereas a great deal of it was recovered only as fragments or sludge, probably because it was soft, had a high incidence of cavities or was extensively fractured. Apart from the cohesive portions of tubular bauxite, only the thin bands of hard ironstone cored well. The texture of the pisolitic bauxite (closely packed, hard pisolites with a soft cement) made it a very difficult material to core with the diamond drill. In fact, the pisolitic bauxite was completely ground up by the drill bit, with the result that no knowledge was gained about the hardness or state of cohesion of the undisturbed pisolitic bauxite (cf. jackhammer drilling results).

The required thickness of tubular bauxite was not obtained in any holes of the 200 or 300 series and these patterns were excluded from further consideration. Better results were obtained from the 100 series where an

adequate thickness of cohesive tubular bauxite was obtained in holes 107, 108, 110 and 113. Unfortunately, no group of three of these sites has the required triangular antenna arrangement and there is only one location where two of the sites can be used as antenna positions: the 107 - 105 - 113 triangle (Plate 4).

After these results it was clear that it would be desirable to sink a shaft or excavate a costean to expose a section through the bauxite profile.

COSTEAN

A costean was begun by the Commonwealth Department of Works, Darwin, to expose a section through the bauxite profile. It is sited between diamond drill holes Nos. 108 and 109 which are 300 feet apart. The costean was inspected on 30th November 1964, when it had been excavated to a depth of 25 feet.

A sketch of part of the north-eastern wall of the costean (Plate 5) shows that the tubular bauxite does not form a continuous layer at this locality.

The diamond drill hole at site 108, approximately 100 feet from the north-western end of the costean, encountered tubular bauxite between 14 feet and 23 feet, clay and fragments of tubular bauxite between 23 feet and 32 feet, and beneath this, mottled clay.

The diamond drill hole at site 109 which is approximately 100 feet from the south-eastern end of the costean, recovered fragments of tubular bauxite between 17 feet and 28 feet.

The tubular bauxite is generally hard and well cemented at the top of pillar-like clusters. The pillars are irregular in shape and size; the largest seen in the costean is 20 feet in width the smallest is an isolated lump about a foot across. The nodular bauxite is generally very loose.

The pisolitic bauxite forms a continuous layer in the exposed section. The pisolites are well cemented with the result that this material is both hard and cohesive.

Pipes of diameter up to one foot penetrate well into the nodular bauxite. They are filled with loose pisolites, clay and tree roots.

CONCLUSIONS

It is concluded that the tubular bauxite is unreliable as a foundation rock owing to its variable thickness and the poor state of cohesion throughout most of the formation. The nodular bauxite, as seen in the costean, is a very weak material and would not be satisfactory as a foundation rock. The pisolitic bauxite is well cemented and is much less variable in thickness than the tubular and nodular material, with the result that it forms a continuous, cohesive layer. The pisolitic bauxite is therefore the strongest foundation rock at the proposed site for the tracking station, but has the disadvantage of not extending to a great depth.

RECOMMENDATIONS

It is recommended that consideration be given to antenna foundations in the form of reinforced concrete platforms embedded in the upper part of the pisolitic bauxite layer. This arrangement would be expected to provide high strength by spreading the load (which is not a heavy one) over a large area. If antenna design necessitates friction footings that pass through the pisolitic bauxite layer, it may be advisable to stabilise the underlying nodular and tubular bauxite by grouting.

Whichever foundation design is adopted, laboratory tests on both dry and water-saturated undisturbed samples of the bearing layer are recommended to determine shear and compressive strength and to ascertain whether any volume change takes place on wetting. With friction footings all layers in contact with the foundation pier should be tested.

REFERENCE

GARDNER, D.E. 1957 Geology of Melville Bay Area, Arnhem Land, N.T., including Report on Gove Bauxite. Bur. Min. Resour. Aust. Rec. 1957/8.

APPENDIX 1.

LOGS OF EXPLANATORY DIAMOND DRILLHOLES

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GEOLOGICAL LOG OF DRILL HOLE

E.L.D.O. PROJECT, GOVE, N.T.

NORTHERN

HOLE NO SITE DDH 1 R.L. —

marker peg on

... 1,200 feet on mag. bearing 154° from Melville Bay road ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

ROCK TYPE & WEATHERING	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture LOG	CORE RECOVERY %	STRUCTURES, JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
...nsolidated ...se-grained ...uartz ...and	Angular fragments of quartz - majority 1-2mms in grain size.		NM		5	
			10'0"			
...mposed ...anite	Angular quartz fragments and partially decomposed feldspar fragments in a matrix of white kaolin clay.		BXM		15	
			14'5"			
Fresh ...anite	Coarse-grained leucocratic garnetiferous granite - first 3" and last 4" slightly stained and weathered.				100	
			18'8"			
...osed granite	Coarse quartz fragments in kaolin.		19'4"		63	Joint in granite
Fresh ...anite	Coarse-grained leucocratic garnetiferous granite - first 1½" iron-stained owing to slight weathering. Narrow joint from 23'11" to 24'1" filled with weathered granite - fresh granite iron-stained for ⅛" on each side of joint.		23'11"		100	Joint in granite
			24'1"			
			28'8"			
...mposed ...anite	Small pieces of weathered granite in a matrix of quartz fragments and kaolin clay.		33'0"		10	Joint in granite - probably oblique penetration of a relatively narrow near-vertical joint.
Fresh ...anite	Coarse-grained leucocratic garnetiferous granite.		35'6"		100	
	END OF HOLE					

... No. 1

EDECO MK.6

...S. BERGER.

...3-1-64

...3-2-64

NOTES:

Fracture Log Shaded zones indicate decomposed material formed by weathering along joint planes in the granite.

LOGGED P. RIX

VERTICAL SCALE 5 FEET / INCH

D53/3-4/DG5

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GEOLOGICAL LOG OF DRILL HOLE

L.D.O. PROJECT, GOVE, N.T. HOLE NO. NORTHERN SITE DDH 2 R.L. ____

100 feet on mag. bearing 3° from DDH 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION ____

	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture LOG	CORE RECOVERY %	STRUCTURE JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	
...solidated ...-grained quartz sand	Angular quartz fragments - grain size 1-3 mms. Iron oxide staining gives pinkish-brown colour.		NM		5		
			10'5"				
...mposed ...anite	Angular quartz fragments in a matrix of soft white kaolin clay. To 12'6" quartz fragments are numerous and range from 1-5 mms. in size. Under 12'6" fragments are smaller and markedly fewer in number, the material being a gritty compacted kaolin clay.				100		
					no core		
					100		
			20'0"		100		
...ginised ...mposed ...anite	Mottled white, yellow and pink kaolin clay with quartz fragments - slightly ferruginised material.				90		
					55		
			29'6"				
...solidated brown quartz sand	Medium to coarse-grained quartz sand with a small silt and clay fraction which causes the brown to pinkish-brown colour of the material.				10		
	END OF HOLE		39'0"				

RIG No. 1
EDECO MK 6
S. BERGER
12-2-64
14-2-64

LOGGED P. RIX.

VERTICAL SCALE 5 FEET 1 INCH

D53/3-4/DG6

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GEOLOGICAL LOG OF DRILL HOLE NORTHERN

E.L.D.O. PROJECT, GOVE, N.T. HOLE NO. SITE DDH3 R.L. ...

350 feet on mag. bearing 180° from DDH 1. ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture LOG	CORE RECOVERY %	STRUCTURES. JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
...solidated ...dish ...rtz ...nd Coarse angular quartz fragments with some feldspar fragments.		NM		11	
		5'11"			
Fresh ...anite Coarse-grained leucocratic garnetiferous granite. First 1" and last 8" slightly stained and weathered.				100	
		8'9"			
...osed granite Quartz fragments and partly decomposed feldspar fragments		9'8"		54	Joint in granite
Fresh ...anite Coarse-grained leucocratic garnetiferous biotite granite; some muscovite present; flakes of graphite at 10'9". Last 7" slightly weathered and iron-stained.		BXM		SPEC. 1 100	
		21'0"		SPEC. 2	
END OF HOLE					

RIG No. 1.
EDECO MK6
S. BERGER
4-2-64
5-2-64

NOTES: SPEC. 1. Specimen, E.L.D.O.
SPEC. 2. Specimen, Works Dept., Adelaide.
Fracture Log. Shaded zones indicate decomposed material formed by weathering along joint planes in the granite.

LOGGED P. RIX

VERTICAL SCALE 5 FEET 1 INCH

D53/3-4/DR 7

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GEOLOGICAL LOG OF DRILL HOLE

L.I.O. PROJECT, GOVE, N.T. HOLE NO NORTHERN SITE DDH4 R.L.

... feet on mag. bearing 95 ° from DDH 3 ANGLE FROM HORIZONTAL VERTICAL DIRECTION

DESCRIPTION	Graphic Log	DEPTH & TYPE OF CORE	Fracture LOG	% CORE RECOVERY %	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
... quartz and garnet fragments.		NM		11	
		6'2"			
... Kaolin clay with brown and ... mottling - quartz fragments		7'1"			
Coarse-grained leucocratic garnetiferous granite with scattered patches of diopside. Very slight weathering indicated by patchy iron staining.		BXM		100	
... quartz fragments in kaolin clay.		10'10"		no core	Joint in granite
		12'5"			
Coarse-grained leucocratic garnetiferous granite with scattered patches of diopside. First 2" slightly weathered and iron-stained, followed by fresh bluish-white granite.				100	
		21'0"			
END OF HOLE					

... No. 1
... PK 6
S. ... GER
... 2-61
... 2-61

NOTES:
Fracture Log. Shaded zones indicate decomposed material formed by weathering along joint planes in the granite.

LOGGED P. RIX

VERTICAL SCALE 5 FEET 1 INCH

D53/3-4/DG8

RESOURCES, GEOLOGY AND GEOPHYSICS

LOGICAL LOG OF DRILL HOLE NORTHERN

E.L.D.O. PROJECT, GOVE, N.T.

HOLE NO SITE DDH 5 R.L.

[illegible] feet on mag. bearing 116° from DDH 3 ANGLE FROM HORIZONTAL VERTICAL DIRECTION

DESCRIPTION		DEPTH OF CORE OR CHIP SAMPLES	Fracture Log	Core Recovery %	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
Angular quartz fragments, [illegible] feldspar fragments. [illegible]% of grain size estimated to be 0-5 mm. [illegible] 2 mms.		NM 5'0"		13	
Angular quartz fragments, [illegible] amount of clay. Range of grain size estimated to be .25 mm. - 1 mm. The [illegible] material is [illegible] sand and gravel (2 mms. grain size) comprising large quartz fragments in a matrix of smaller quartz fragments and red clay.		11'0"		15	
[illegible] of ferruginised [illegible]		11'5"		100%	
Angular quartz fragments in kaolin clay - soft crumbly texture. Some [illegible] sand mixed with [illegible] material.		16'0"		31	
[illegible] pebbles of ferruginised weathered granite followed by zones [illegible] kaolinised granite [illegible] harder limonite-stained [illegible] granite. Short [illegible] of core of both [illegible] of natural [illegible] fragments.		21'3"		100 no core	
[illegible] - brecciated [illegible] coherent rock [illegible] [illegible] quartz [illegible]		23'3"			
[illegible] - gneissic leucocratic [illegible] granite. Diopside [illegible] lenses alternate with [illegible] leucocratic lenses giving the rock a gneissic texture. Phenocrysts of pink garnet are distributed throughout the rock. This rock type is [illegible] softer than the leucocratic granite encountered in drill holes Nos. 1-4 on this site.		3XM 30'0"		100	
END OF HOLE					

LOGGED P. RIX

VERTICAL SCALE 5 FEET 1 INCH

D53/3-41DG9

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

[illegible]: E.L.D.O. PROJECT, GOVE, N.T. — HOLE No.: SOUTHERN SITE DRILL — [illegible]

[illegible]: 100 feet on map bearing 215° from Junction of Rig access track and [illegible] — ANGLE FROM HORIZONTAL: VERTICAL — DIRECTION: ——

[illegible]	[illegible]	Log	Depth	Fracture Log	Core Recovery %	[illegible]
Weathered pisolitic bauxite	Orange pisolites set in a mottled yellow and white ochreous clay matrix.		NX casing set; 5'0"			
Pisolitic bauxite	[illegible] bauxite pebbles, [illegible] show pisolitic texture and limonite-stained matrix.		7'3"		23	
Tubular bauxite	Sub-angular or ovoid fragments of sandy ironstone in a matrix of orange-red bauxitic clay, portions of which are mottled white and yellow. Vertical tubular holes occur in the bauxite.		BXM; 15'0"		42; 100; no core	
Pink shale	Pink shale with a blocky fracture. Crumbles easily – recovery as powder and fragments.		24'0"		30; 18; 12; 6	
	END OF HOLE					

RIG No. 1. EDECO. [illegible]

[illegible]: E. BERGER
27-1-66
30-1-66

NOTES
Fracture Log – indicates number of fractures per foot of core. Zones of core loss and zones of recovery as fragments and [illegible] sludge are assumed to be completely fractured.

LOGGED: R. RIX

VERTICAL SCALE: 5 FEET 1 INCH.

D53/3-4/9610

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT: E.L.D.O. PROJECT, GOVE, N.T. HOLE NO. SOUTHERN SITE [illegible] R.L. 31'

LOCATION: 5100 feet on mag. bearing 120° from DDH 1 ANGLE FROM HORIZONTAL: VERTICAL DIRECTION: —

ROCK TYPE	DESCRIPTION	Graphic Log	Depth	Fracture Log	Core Recovery %	STRUCTURE: JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	
Bauxitic soil and bauxite	Red bauxitic soil and ground-up bauxite. Recovery as fine powder.		NM 5'9"		15		
Bauxitic clay	Compacted bauxitic clay - orange in colour - Some pieces show pisolitic texture but mostly massive compacted clay.		8'5"		75		
Tubular bauxite	Ovoid fragments of sandy ironstone, having a spongy texture and slightly altered to yellow ochreous limonite, in a matrix of orange bauxitic clay. Some pellets of [illegible] hard shale in bauxite. Recovery as fragments varying from powder to 2-3 inch pieces of core.		17'9"		56 19		
Pink clay	Pink clay with fragments of white shale. Some pellets of [illegible] compacted clay.		19'8"		100		
Shale	Mottled shale. Zones of deep lilac shale alternate with zones of mottled white and lilac-coloured shale. Blocky fracture results in a number of small fragments. Two harder bands of purple-brown ironstone (probably ferruginised shale) with small tubular holes occur from 30'4" to 30'11" and 38'8" to 39'1".		46'6"		[illegible] 36 [illegible] 63 30		
White claystone	White, kaolinitic claystone: sub-conchoidal fracture. Cores well in contrast to the very broken shale above.				100		

DRILL NO.: RIG No. 1

TYPE: EDECO MK. 6

DRILLER: S. BERGER

COMMENCED: 17-2-64

COMPLETED: 21-2-64

NOTES

Fracture [illegible] - indicates number of fractures per foot of core. Zones of core loss and zones of recovery as fragments and sludge are assumed to be completely fractured.

LOGGED: P. [illegible]

VERTICAL SCALE: 5 FEET 1 INCH

D53/3-4/98 [illegible]

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E.L.D.O. PROJECT, GOVE, N.T. HOLE NO. SOUTHERN SITE DDH 2 R.L. 311'

LOCATION 5100 feet on mag. bearing 120° from DDH 1 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture Log No/ft. of core	CORE RECOVERY %	STRUCTURES. JOINTS, VEINS, SEAMS, FAULTS CRUSHED ZONES
		0 6 12 19			
White clay stone — See previous sheet.		NM 52'7"		100	
Ironstone — Hard band of fine-grained ironstone - spongy texture. Similar in appearance to ferruginous zone of laterite profile. Irregular patches of bauxitic clay within it.		56'5"		no core	
Interbedded micaceous siltstone and soft sandstone — Soft, friable, silty micaceous kaolin clay. White with pink and lilac tinges; white mica flakes common. The parent rock of this material is probably a soft micaceous siltstone. Small sections are iron-stained. Sludge samples over this section consisted of fine to medium-grained quartz sand, with some mica flakes and only a small clay fraction, suggesting interbeds of friable sandstone.				5	
				31	
				23	
				39	
				43	
		99'0"			
Sand — Fine grained brown quartz sand.				9	

RIG No. 1
EDECO MK 6
S. BERGER
17-2-64
21-2-64

NOTES

Fracture Log - indicates number of fractures per foot of core. Zones of core loss and zones of recovery as fragments and sludge are assumed to be completely fractured.

LOGGED P. RIX

VERTICAL SCALE 5 FEET 1 INCH

D53/3-4/1 G11 (B)

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E.L.D.O. PROJECT, GOVE, N.T. HOLE NO. SOUTHERN SITE DDH 2 R.L. 311'

LOCATION 5100 feet on mag. bearing 120° from DDH 1 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture Log No/ft of core	CORE RECOVERY %	STRUCTURES, JOINTS, VEINS, SEAMS FAULTS CRUSHED ZONES
Sand	Fine grained brown quartz sand, probably from soft sandstone.		NM 10 4" 40	0 6 12 18	9	
	END OF HOLE					

RIG No. 1
EDEC MK-6
S. BERGER
17-2-64
21-2-64

NOTES

Fracture Log - indicates number of fractures per foot of core. Zones of core loss and zones of recovery as fragments and sludge are assumed to be completely fractured.

LOGGED P. RIX

VERTICAL SCALE 5 FEET 1 INCH

D53/3-4/9 G11 (C)

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE SOUTHERN

BAUXITE PROJECT, GOVE, N.T. HOLE NO SITE DDH 3 R.L 323'

1200 feet on mag. bearing 93° from DDH 2 ANGLE FROM HORIZONTAL VERTICAL DIRECTION

	DESCRIPTION	DEPTH IN FEET OF CORE	Fracture No/ft. of core	CORE RECOVERY %	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
		0 5 12 19			
Laterite Gravel	Orange-red bauxitic gravel with some finely-ground bauxite	VM 3'0"		16	
Pisolitic Bauxite	Bauxite pebbles and bauxite pisolites between 5' and 8'. Recovery over the rest of the section is as finely-ground bauxite. Between 3' and 5' and 8' and 13' the pisolites were ground to fragments of grain size < 1mm. From 13'-16' the grain size is 1-2mms.			25	
				39	
				26	
		16'0"		10	
Tubular Bauxite	Homogeneous orange red compacted bauxitic clay, with tubules. Slightly sandy in places - some yellow mottling near tubules.			92	
	Inhomogeneous rock, comprising ovoid fragments of spongy ironstone in a matrix of compacted red bauxitic clay - with tubules.	32'0"		100	
Shale	Pink to lilac-coloured shale - blocky fracture. Some fragments of white shale also present.	36'0"		19	
	END OF HOLE				

Rig No. 1
Type MK 6
SPERGER
Spud 2-2-64
Comp 2-2-64

NOTES

Fracture log - indicates number of fractures per foot of core. Zones of core loss and zones of recovery as fragments and sludge are assumed to be completely fractured.

LOGGED P. RIX

VERTICAL SCALE 5 FEET 1 INCH

D53/3-4/DG12

APPENDIX 2.

LOGS OF DIAMOND DRILLHOLES FOR FOUNDATION TESTING.

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GEOLOGICAL LOG OF DRILL HOLE

E.L.D.O. PROJECT, GOVE, N.T. HOLE NO. 101 R.L. 328'

See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture LOG	LIFT & CORE RECOVERY %	STRUCTURES: JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	
olitic and odular auxite	Poorly cemented pisolitic and nodular bauxite. Recovery as loose pisolites and nodules with bauxitic clay. Main nodular zone between 18' and 20'.		NM		100		
			20'0"		25		
	Orange bauxitic clay with fragments of tubular bauxite and spongy ironstone (ferruginised shale). Recovery as fragments - material probably soft or extensively fractured. Ironstone band from 17'2" - 17'6".		BMS		58		
					75		
					63		
					75		
					50		
			31'0"		75		
	Pink and lilac mottled clay with fragments of lilac shale.				87		
					100		
			35'6"				
	END OF HOLE						

EDECO

H. CAVELL

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT Gove, N.T. HOLE NO 102 R.L. 329

Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION

DESCRIPTION	DEPTH & SIZE OF CORE	Fracture Log	LIFT & CORE RECOVERY %	STRUCTURES JOINTS VEINS SEAMS FAULTS CRUSHED ZONES
...ly cemented ...olitic and nodular bauxite. Recovery as loose ...olites and nodules in bauxitic clay ...dge.	NM 12'0"		100	
Compacted bauxitic clay with irregular tubular holes - mottling near holes. Recovery as 1"-3" pieces of solid core. 2" band of ironstone at 17'.	BMS 17'0"		100 / 50	
Mottled bauxitic clay with fragments of tubular bauxite and iron stone. Recovery as fragments up to 1" diameter.	22'0"		25 / 37 / 50	
Pink clay with some yellow mottling. Fragments of ferruginised shale. Recovery as small fragments	28'1"		3	
END OF HOLE				

LOGGED P. RIX

VERTICAL SCALE 1 INCH

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

D.O. PROJECT, GOVE, N.T. HOLE NO. 105 R.L. 326'

See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

	Graphic Log	Water Level & Loss of Circulation	Fracture Index	Core Recovery %	Structures: Joints, Veins, Seams, Faults, Crushed Zones
...ly cemented ...olitic ...ite. Recovery as loose pisolite, nodules and clay sludge.		NM		60	
		19'0"			
Clay sludge with numerous nodules and some fragments of tubular bauxite.		BMS		75 100	
		23'6"			
Compacted bauxitic clay with spongy ironstone fragments (ferruginised shale?) and limonite mottling. Recovery: 23'-25' 1"-6" solid cores 25'-28' fragments only		28'0"		75 25	
Mottled orange and yellow clay		29'0"		62	
Pink clay with fragments of white and lilac mottled shale. Recovery as fragments. 6" band of ironstone between 29' and 31' - solid core.		33'0"		50 100	
END OF HOLE					

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 F.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT, Cove, N.T. HOLE NO. 105 A R.L. 326'

4 ANGLE FROM HORIZONTAL Vertical DIRECTION

DESCRIPTION	Graphic Log	Depth & Size of Core		Core % Recovery	Structures: Joints, Veins, Seams, Faults, Crushed Zones	
Laterite and lateritic clay. Pisolitic as pisolites (some broken) and clay. Broken pisolites possibly indicate material cemented to some degree.		NM 17'		100		
17'–22' Less than 2" core recovered. 2" of tubular laterite. 22'–25' Tubular laterite with ovoid pieces of spongy ironstone		MS 6'		3 / 35		
Some clay recovered which is lateritic clay. Pink clay also recovered		7'		25		

END OF HOLE

LOGGED J. Shields

VERTICAL SCALE 1 inch : 5 feet

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E.L.D.O. Project Gove N.T. HOLE NO. 1058 R.L. 326'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL Vertical DIRECTION

ROCK TYPE / DEGREE OF WEATHERING	DESCRIPTION	Graphic log	DEPTH & SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	STRUCTURES, JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	
Pisolitic bauxite and bauxitic clay	Poorly cemented pisolitic bauxite. Recovery as loose pisolitic and bauxitic clay.		NM 14'		100		
Nodular bauxite	Loose nodular bauxite and bauxitic clay.		14'		15		
Tubular bauxite	16'-19' Tubular bauxite 1X3" pieces unbroken core, the rest very broken. 19'-20' Nodular bauxite? and pieces tubular bauxite 20'-22' Tubular bauxite with rounded pieces spongy siliceous 1X3" pieces unbroken core 22'-23' Nodular bauxite?		BMS 23'		60 65		
?	1" of spongy bounded siliceous only core recovered.		27'		2		
Pink clay	Pink and purple mottled clay.		32'		5		
	END OF HOLE						

DRILLED EDECO

DRILLER H. CAVELL

COMMENCED 1964

COMPLETED

LOGGED J. SHIELDS

VERTICAL SCALE 1 inch : 5 feet

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

E.L.D.D. PROJECT, GOVE, N.T. HOLE NO. 106 R.L. 326'

See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture LOG	LIFT & CORE RECOVERY %	STRUCTURES. JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	
Pisolitic and nodular bauxite	Bauxitic soily poorly cemented pisolitic bauxite with nodules and bauxitic clay. Recovery as small fragments only - no solid core.		NM		75		
			20'0"				
Bauxitic clay	Orange bauxitic clay.		BMS		83		
			23'0"				
Tubular bauxite	Tubular bauxite - recovery as ¼" - 2½" solid cores.		24'0"		66		
Mottled clay	Pink and lilac mottled clay - small fragments of tubular bx.		25'0"		100		
Tubular bauxite	Indurated and ferruginised tubular bauxite.		26'0"		75		
Pink clay	Pink clay with fragments of lilac shale. Recovery as fragments.				100		
			29'0"		62		
	END OF HOLE						

NO EDECO

H. CAVELL

CHANGED

COMPLETED

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

L.D.O. PROJECT, GOVE, N.T. HOLE NO. 107 R.L. 326'

See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture LOG	LIFT & CORE RECOVERY %	STRUCTURES JOINTS VEINS SEAMS FAULTS CRUSHED ZONES
Pisolitic bauxite	Poorly cemented pisolitic and nodular bauxite - some bauxitic soil at surface. Recovery as loose pisolites and fragments of pisolites only - no solid core. Nodules ¼" - 1" in diameter were recovered mainly between 8' and 16'.		NM		90	
			16'0"			
Tubular bauxite	Compacted bauxitic clay with irregular tubular holes. Mottled yellow and white limonitic clay occurs adjacent to tubes and sometimes filling them. Recovery as 1" - 3" pieces of core.		BMS		67	
					100	
					100	
					92	
			25'0"			
Pink clay	Pink clay with fragments of tubular bauxite. Also spongy ironstone (ferruginised shale?) fragments at 25'3" and 28'.				50	
			28'0"		75	
Lilac clay	Lilac clay - some pink mottling.				75	
			30'0"		75	
	END OF HOLE					

EDECO

H. CAVELL

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT ELDO PROJECT GOVE N.T. HOLE NO. 107A R.L. 326'

See Plate 4. ANGLE FROM HORIZONTAL Vertical DIRECTION

	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
Psolitic auxite and auxite clay	Poorly cemented pisolitic bauxite recovered as sludge of pisolites (some broken) and bauxitic clay.		NM		100	
	16'-18' Pisolites mostly broken		18'			
Tubular bauxite	Tubular bauxite with irregular open tubes. Core in pieces up to 2" long.				100	
	20'-20'6" Broken tubular bauxite with some nodular? bauxite. From 23', tubular bauxite has rounded pisolitic inclusions and tubes are filled by white clay.		BMS		100	
					100	
					33	
			27'		50	
?	No core recovered				0	
			31'			
nk clay	Pink and purple mottled clay.		33'		5	
	END OF HOLE					

ELECO

H. CAVELL

1964

LOGGED J. SHIELDS

VERTICAL SCALE 1 inch : 5 feet

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E.L.D.O. Project Gove N.T. HOLE NO. 107 B R.L. 326'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL Vertical DIRECTION

ROCK TYPE AND WEATHERING	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	STRUCTURES, JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
Oisolitic bauxite and bauxitic clay	Poorly cemented pisolitic bauxite. Recovered as loose pisolites and bauxitic clay.		NM 18'		100	
Tubular bauxite	Tubular bauxite. Pieces approximately ¼" in size. R1'-27' Tubular bauxite with irregular tubes and inclusions of rounded ironstone. Some open tubes, some clay filled. 2" band ironstone		BNS 27'		15 60 30	
Pink clay ?	No core recovered Probably mottled clay.		32'		0	
	END OF HOLE					

EDICO

H. CAVELL

CHECKED 1964

FILED

LOGGED J. SHIELDS

VERTICAL SCALE 1 inch : 5 feet

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E. L. D. O. PROJECT, GOVE, N.T. HOLE NO. 108 R.L. 326'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

ROCK TYPE OR DEGREE OF WEATHERING	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture LOG	LIFT & CORE RECOVERY %	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	
Pisolitic bauxite	Poorly cemented pisolitic bauxite. Recovery as sludge of loose pisolites and clay - no solid core.		NM 14'0"		86		
Tubular bauxite	Compacted bauxitic clay with irregular tubular holes and ovoid fragments of spongy iron (ferruginised shale?) partly altered to ochreous limonite. Recovery as 1" - 4" pieces of solid core.		BMS 23'0"		100 60		
Tubular bauxite ?	Orange clay sludge with small fragments of spongy ironstone and tubular bauxite. No solid core recovered. This material could be extensively fractured tubular bauxite that disintegrated during drilling.		32'0"		55 3		
Mottled clay	Pink and lilac mottled clay, with one 3" zone of hard ironstone between 32' and 37'. Clay recovered as fragments - ironstone as core.		40'0"		15 33		
	END OF HOLE						

ERECO

H. HAVELL

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

E.L.D.O. PROJECT, GOVE, N.T. HOLE NO. 109 R.L. 325'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION

	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture LOG	LIFT & CORE RECOVERY %	STRUCTURES. JOINTS, VEINS, SEAMS, FAULTS CRUSHED ZONES
Pisolitic bauxite	No recovery. Probably very poorly cemented pisolitic bauxite.		NM 5'0"		NIL	
	Moderately well cemented pisolitic bauxite with some irregular tubular holes.		8'0"		75	
Nodular and tubular bauxite	Nodules and 1" diameter pieces of tubular bauxite. Recovery very poor - no solid core - material probably very poorly cemented. Top of tubular bauxite could not be determined.		BMS 18'0"		12 62	
Tubular bauxite and bauxitic clay	Fragments of tubular bauxite, mottled and limonite-stained and containing fragments of spongy ironstone (ferruginised shale?). Orange bauxitic clay also present. Recovery very poor - probably soft or extensively fractured material.		28'0"		17 4	
Pink clay	Pink clay with fragments of lilac shale. Recovery as small fragments.		32'0"		20	
	END OF HOLE					

EDITED H. CAVELL

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E.L.D.O. Project Gove, N.T. HOLE NO. 110 R.L. 323'

LOCALITY See Plate 4 ANGLE FROM HORIZONTAL Vertical DIRECTION

	DESCRIPTION		DEPTH & SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	STRUCTURES. JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	
Pisolitic and nodular bauxite	Poorly cemented pisolitic bauxcite. Processed as loose pisolites and bauxcitic clay.		NM		100		
	Loose nodular bauxite with clay from 16' – 18'6"		7'		50		
			18'6"		100		
Tubular bauxite	Tubular bauxite with irregular open tubes. Recovery as broken core, maximum unbroken length of 2". From 29' tubular bauxite with rounded pieces of spongy iron (possibly ferruginised shale).		BMS		80		
					75		
					50		
	2 x ½" bands of spongy ironstone, between 28' and 32'				10		
Pink clay	Pink & lilac mottled clay.		32'		4		
	END OF HOLE		34'				

EDITED

H. C. NELL

LOGGED J. SHIELDS

VERTICAL SCALE 1 inch : 5 feet

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT GOVE N.T HOLE NO 111 R.L. 324'

See Plate 4 ANGLE FROM HORIZONTAL Vertical DIRECTION

	DESCRIPTION		DEPTH & SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	STRUCTURES JOINTS, VEINS SEAMS, FAULTS CRUSHED ZONES	
oolitic and odular uxite	Poorly cemented pisolitic bauxite and clay. Recovery as loose pisolites and clay.		NM		100		
	16'-18' loose nodular bauxite		18'				
Pink clay	Pink clay with shale fragments. No core recovered, only sludge samples.		BMS		0		
					0		
			25'				

EDECO
H. CAVELL
1964

LOGGED J. SHIELDS

VERTICAL SCALE 1 inch : 5 feet

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

L.C.D. PROJECT, GOVE, N.T. HOLE NO. 112 R.L. 324'

See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture LOG	LIFT & CORE RECOVERY %	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
Pisolitic Bauxite	Poorly cemented pisolitic bauxite. Recovery as loose pisolite and clay, forming a sludge - no solid core.		NM 7'0"		100	
Clay	Orange bauxitic clay and pink clay.		BMS 10'0"		20	
Tubular bauxite	Compacted bauxitic clay with irregular tubular holes. Portions altered to mottled yellow and white limonitic clay. Some ovoid fragments of spongy ironstone (ferruginised shale?) within the bauxite. Recovery - ½" pieces up to 2½" cores.		17'0"		75	
?	NOTHING RECOVERED		26'0"		NIL	
Clay	Orange bauxitic clay.		28'0"		13	
Clay with shale fragments	Pink clay with fragments of lilac shale, some pink mottling. Recovery as small fragments.		32'0"		44	
	END OF HOLE					

DECO

CAVELL

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

N.T.S. PROJECT, GOVE, N.T. HOLE NO. 113 R.L. 321'

Plate 4 ANGLE FROM HORIZONTAL Vertical DIRECTION —

DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	STRUCTURES, JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
0-13' Pisolitic bauxite and bauxitic clay. 4½" Recovery as broken pisolites indicating that when cemented.		1M		100	
13'-15' Nodulan and Pisolitic bauxite		13'			
Nodulan bauxite and clay. Nodules up to 1" in size.		15' 3MS 18'		15 25 50 50	
18'-21'9" Tubular bauxite with large widely spaced irregular open tubes. Core only broken because of tubing.				85	
21'9"-26' Tubular bauxite with ovoid pieces of spongy ironstone. Tubes infrequent.				100	
26'-29' Nodulan? or tubular? bauxite. Recovery as pieces or nodules less than 1" in size				100 35	
Pink clay with fragments of purple shale		29' 30'		15	
END OF HOLE					

LOGGED J. Shields

VERTICAL SCALE 1 inch : 5 feet.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

L.I.O. PROJECT, GOVE, N.T. HOLE NO. 115 R.L. 322'

See Plate 4

ANGLE FROM HORIZONTAL VERTICAL DIRECTION

	DESCRIPTION	DEPTH IN FEET ON CORE	Fracture LOG	LIFT & CORE RECOVERIES %	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
	Poorly cemented pisolitic bauxite. Recovery as loose pisolites only - no solid core.	NM 7'0"		100	
	Orange bauxitic clay with ¼" - ½" diameter nodules. Recovery as sludge - no solid core.	BMS 13'0"		92	
	Orange bauxite nodules ¼" - ½" diameter - one piece of tubular bx.	16'0"		3	
Tubular bauxite ?	Bauxitic clay with numerous small (¼") angular fragments of compacted bauxite in it. No solid core. This material could be extensively fractured tubular bauxite that disintegrated during drilling.	23'0"		42 63 40	
Tubular bauxite	Compacted bauxitic clay with irregular tubular holes and patches of mottled clay. Some spongy iron (ferruginised shale?) fragments. Recovery as ½" to 1½" cores.	28'0"		25	
Mottled clay	Pink and lilac mottled clay - some fragments of tubular bauxite.	34'0"		8	
	END OF HOLE				

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

Project: Gove N.T. HOLE NO. 200 R.L. 311'

Plate 4 ANGLE FROM HORIZONTAL Vertical DIRECTION

DESCRIPTION		DEPTH & SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
Poorly cemented pisolitic bauxite. Recovery as broken pisolitic and bauxitic clay		NM 14'		100	
Tubular bauxite in pieces up to 3" in size. Ironstone clay filled tubules, ... inclusions spongy ironstone		17'		50 / 15	
No core recovered.		BMS 26'		0	

LOGGED J. SHIELDS

VERTICAL SCALE 1 inch : 5 feet

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E.L.D.O. PROJECT, GOVE, N.T. HOLE NO. 201 R.L. 312'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture Log	LIFT & CORE RECOVERY %	STRUCTURES JOINTS, VEINS, BEAMS, FAULTS, CRUSHED ZONES
Pisolitic bauxite	Poorly cemented pisolitic and nodular bauxite. Recovery as loose pisolites and nodules in clay sludge.		NM 8'0"		100	
Tubular bauxite	Tubular bauxite with spongy ironstone (ferr. shale?) fragments. Recovery mostly as ½" fragments - some 4"-5" pieces of core.		BMS 13'0"		92 38	
Tubular bauxite and ironstone	Small fragments of ironstone with a few fragments of tubular bauxite. Recovery v. poor - soft or fractured material.	?	17'0"		8	
Ironstone	Ironstone with bauxitic clay - some fragments of tubular bauxite.				42	
	Solid ironstone with irregular holes. Recovery as 3"-5" pieces of core.		22'0"		50	
Pink clay with shale fragments	Pink clay with some mottling - contains fragments of lilac shale. Recovery as fragments.				19 25 11	
	END OF HOLE		35'0"			

DRILL NO —

TYPE EDECO

DRILLER H. CAVELL

COMMENCED —

COMPLETED —

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E.L.D.O. PROJECT, GOVE, N.T. HOLE NO 202 R.L 312'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture Lips	LIFT & CORE RECOVERY %	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	
Pisolitic bauxite	Poorly cemented pisolitic bauxite. Some nodular bauxite. Recovery as loose pisolites and nodules in clay sludge.		NM		100		
			12'0"				
Mottled clay with ironstone bands	Mottled pink, lilac and white clay. Recovery as fragments. Ironstone bands occur between 13' and 26'. Recovery in this zone consisted of ironstone fragments only - the clay was probably washed away.		BMS		100		
					6		
					10		
					75		
					12		
			31'0"				
	END OF HOLE						

DRILL NO —

TYPE EDECO

DRILLER H. CAVELL

COMMENCED —

FINISHED —

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E.L.D.O. Project Qove N.T. HOLE NO. 205 R.L. 310'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL Vertical DIRECTION

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	LOG	LIFT & CORE RECOVERY %	STRUCTURES JOINTS, VEINS, SEAMS FAULTS CRUSHED ZONES	
Pisolitic bauxite	Poorly cemented pisolitic bauxite. Recovery as loose pisolites and bauxitic clay.		NM 6'		100		
Tubular bauxite	Tubular bauxite 2 x 2" pieces unbroken core		7'6"		75		
Pisolitic and Nodular bauxite	Loose nodular and pisolitic bauxite and pieces of tubular bauxite?		10'				
Tubular bauxite	Tubular bauxite with rounded pieces of remnant shale (now spongy ironstone)		12'		50		
?	3" of spongy banded ironstone. No other core recovered		BMS		8		
Pink Clay	Pink and purple mottled clay.		17' 19'		8		
	END OF HOLE						

DRILL NO

TYPE EDECO

DRILLER H. CAVELL

COMMENCED 1954

COMPLETED

LOGGED J. SHIELDS

VERTICAL SCALE 1 inch : 5 feet

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E. L. D. O. PROJECT, GOVE, N. T. HOLE NO 236 R.L. 319'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

ROCK TYPE AND DEGREE OF WEATHERING	DESCRIPTION	Graphic Log	DEPTH & SIZE OF CORE	Fracture Log	CORE RECOVERY %	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	
Pisolitic bauxite	Poorly cemented pisolitic bauxite - thin silicified cap. Recovery as loose pisolites in clay sludge.		NM 3'0"		38		
Tubular bauxite	Compacted bauxitic clay with irregular tubular holes. Contains ferruginised shale fragments; patchy limonitic mottling. Recovery as ¼" fragments up to 3" solid cores		BMS 14'0"		83 42		
?	NOTHING RECOVERED material probably soft or extensively fractured.	?	19'0"		NIL		
Mottled clay	Pink and lilac mottled clay with some ironstone fragments. Recovery as fragments.		25'0"		25 75 25		
	END OF HOLE						

DRILL NO —

TO EDECO

FOR LCH H. CAVELL

COMMENCED —

COMPLETED — —

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E.L.D.O. PROJECT, GOVE, N.T. HOLE NO 207 R.L. 319'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

	DESCRIPTION	Graphic Log	WIDTH & SIZE OF CORE	Fracture Log	CORE RECOVERY %	STRUCTURES JOINTS VEINS SEAMS FAULTS CRUSHED ZONES	
Pisolitic bauxite	Poorly cemented pisolitic and nodular bauxite. A few pieces of tubular material. Recovery as loose pisolites and nodules in clay sludge. Some fragments up to 1" diameter.		NM 10'0"		100		
Mottled clay	Pink and lilac mottled clay with some orange bauxitic clay between 16' and 18'. Recovery as fragments.		RMS 18'0"		25 17 37		
Ironstone	Ironstone with irregular holes giving spongy texture. Recovery as fragments.		21'0"		39		
Sand and clay	Fine quartz sand in a matrix of pink clay - some orange bauxitic clay. Recovery as sludge.		26'0"				
	END OF HOLE						

DRILLING EDECO

DRILLER H. CAVELL

COMMENCED

COMPLETED

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

E.L.D.O. PROJECT GOVE N.T. HOLE NO 216 R.L. 302

See Plate 4 ANGLE FROM HORIZONTAL Vertical DIRECTION —

[illegible]	DESCRIPTION	Graphic log	DEPTH & SIZE OF CORE	LOG	LIFT & CORE RECOVERY	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES
Pisolitic bauxite & bauxitic clay	Poorly cemented pisolitic bauxite and bauxitic clay. Recovery as loose pisolites (some broken) in bauxitic clay sludge.		NM 17'		100	
Tubular bauxite	17' Tubular bauxite with ovoid pieces of spongy ironstone. 1 x 5' Dory [illegible] cord. Very few [illegible]. 19'-21' Small pieces of nodular or tubular bauxite. Open tubes.		DMS 21'		87	
Pink clay	2" recovery of spongy ironstone band. 1" recovery of pink clay.		27'		25 0	
	End of hole					

RIG NO EDSCO		LOGGED J. Shields.
DRILLER H. CAVELL		
COMMENCED 1964		VERTICAL SCALE 1 inch : 5 feet
COMPLETED		

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

E. L. D. O. PROJECT, GOVE, N.T. HOLE NO 301 R.L. 313'

See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

	DESCRIPTION	Graphic Log	DEPTH & CORE RUNS	Fracture Freq.	CORE RECOVERY %	STRUCTURES JOINTS VEINS SEAMS FAULTS CRUSHED ZONES
Pisolitic bauxite	Poorly cemented pisolitic bauxite with bauxitic clay. Recovery as sludge.		NM 6'0"		50	
	Cemented pisolitic bauxite.		7'0"		100	
Tubular bauxite	Computed bauxitic clay with irregular holes, linear mottling and ferruginised plate fragments. Recovery as 1"–5" pieces of solid core. From 10'6" – 11'0" material is softer.		BMS 11'0"		100	
Tubular bauxite with ironstone bands ?	Fragments of soft tubular bauxite and of ironstone. A few pieces up to 1" diameter. Recovery very poor – material probably very soft or extensively fractured.	?	21'0"		50 17 2	
?	NOTHING RECOVERED material probably very soft or extensively fractured.	?	32'0"		NIL	

EDECO

H. CAVELL

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT E.L.D.O. PROJECT, GOVE, N.T. HOLE NO 302 R.L. 312'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

	DESCRIPTION	Graphic Log		Fracture	CORE %	STRUCTURES JOINTS VEINS SEAMS FAULTS CRUSHED ZONES	
Pisolitic bauxite	Poorly cemented pisolitic bauxite. Recovery as pisolites and pisolite fragments in a bauxitic clay sludge.		NM 5'0"		60		
	Cemented pisolitic bauxite. Recovery as solid core - up to 6" long pieces.		7'0"		85		
Tubular bauxite	Compacted bauxitic clay with irregular tubular holes. Patchy limonite mottling. Ferruginised shale fragments present (spongy iron frames) Recovery as pieces of solid core up to 4" long. Ironstone band 13'3"-13'6"		SMS 14'0"		69 92		
Tubular bauxite and ironstone ?	Fragments of tubular bauxite and ironstone. Recovery extremely poor - material probably soft or extensively fractured.	?	21'0"		17 5		
?	NOTHING RECOVERED material probably soft or extensively fractured	?	26'0"		NIL		

DRILLED EDECO

SUPERVISED H. CAVELL

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

E.L.D.O. PROJECT, GOVE, N.T. HOLE NO 306 R.L. 316'

LOCATION See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

	DESCRIPTION	CASING	CORE RECOVERY	FRACTURE	CORE RECOVERY %	STRUCTURES JOINTS VEINS SEAMS FAULTS CRUSHED ZONES	
Pisolitic bauxite	Poorly cemented pisolitic bauxite. Recovery as loose pisolites in clay sludge.		NM 7'0"		100		
Tubular bauxite	Compacted bauxitic clay with irregular tubular holes and limonite mottling; contains ferruginised shale fragments. Recovery: 7'-11' - pieces of core up to 3" long 11'-13' - small fragments of soft tubular bauxite 13'-13'6" - 2" pieces of core		BMS 13'6"		63 07 100		
?	NOTHING RECOVERED material probably very soft or extensively fractured.	?	31'0"		NIL		
Pink clay and ironstone	Pink clay and ironstone. Recovery very poor - a few small fragments only were recovered.		36'0"		6		
	END OF HOLE						

CORE NO —

DRILLED BY EDESCO

SURVEYED BY M. CAVELL

UNIT NO —

RECEIVED —

LOGGED P. RIX

VERTICAL SCALE 1 INCH : 5 FEET

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

G.L.D.O. PROJECT, GOVE, N.T. HOLE NO 307 R.L. 310'

See Plate 4 ANGLE FROM HORIZONTAL VERTICAL DIRECTION —

		CORE LOSS		Fracture	CORE RECOVERY %	STRUCTURE JOINTS VEINS SEAMS FAULTS SHEARED ZONES
Pisolitic bauxite	Poorly cemented pisolitic bauxite. Recovery as sludge.		2'0"			
	Cemented pisolitic bauxite.		6'6"			
	Poorly cemented pisolitic bauxite - recovery as sludge.		5'0"			
Tubular bauxite	Compacted bauxitic clay with irregular tubular holes and limonite mottling. Contains fragments of ferruginised shale. Recovery as fragments from ½" to 2½" long.		DMS. 11'6"		56	
Ironstone with clay ?	Ironstone with irregular holes giving spongy texture. Recovery as one 3" piece of core. Probably a lot of soft clay in this zone, that was washed away during drilling.		16'0"		5	
?	NOTHING RECOVERED - HOLE CAVED IN material probably softer or extensively fractured.	?	18'0"		NIL	
	END OF HOLE					

EDECO

E. CAVELL

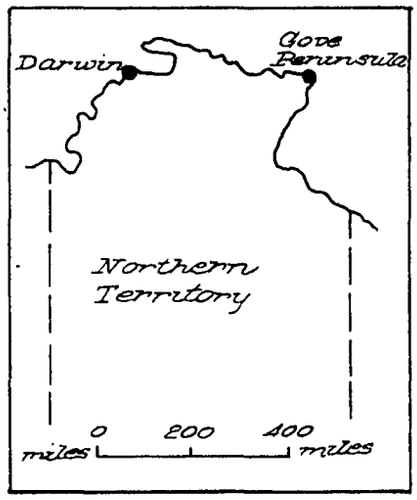
LOGGED R. NIX

VERTICAL SCALE 1 INCH = 5 FEET

PLATE I.

LOCALITY MAP
GOVE AREA
ARNHEM LAND, N.T.

1 0 1 2 3 4 5 MILES



---- Vehicle track

Boundary of Special Mineral Lease

S.M.L. 1 - Vacant

S.M.L. 2, " 3, " 4 - Gominco

Jetty

Ramp

PLATE THREE

Melville Bay Road

MELVILLE BAY

S.M.L. 3

Gove Airstrip

GOMINCO CAMP

YIRRKALA MISSION

Miles Island

Lacktham River

S.M.L. 1

Rocky Bay

Cato Road

PLATE TWO

S.M.L. 4

S.M.L. 2

Dalywoi Bay

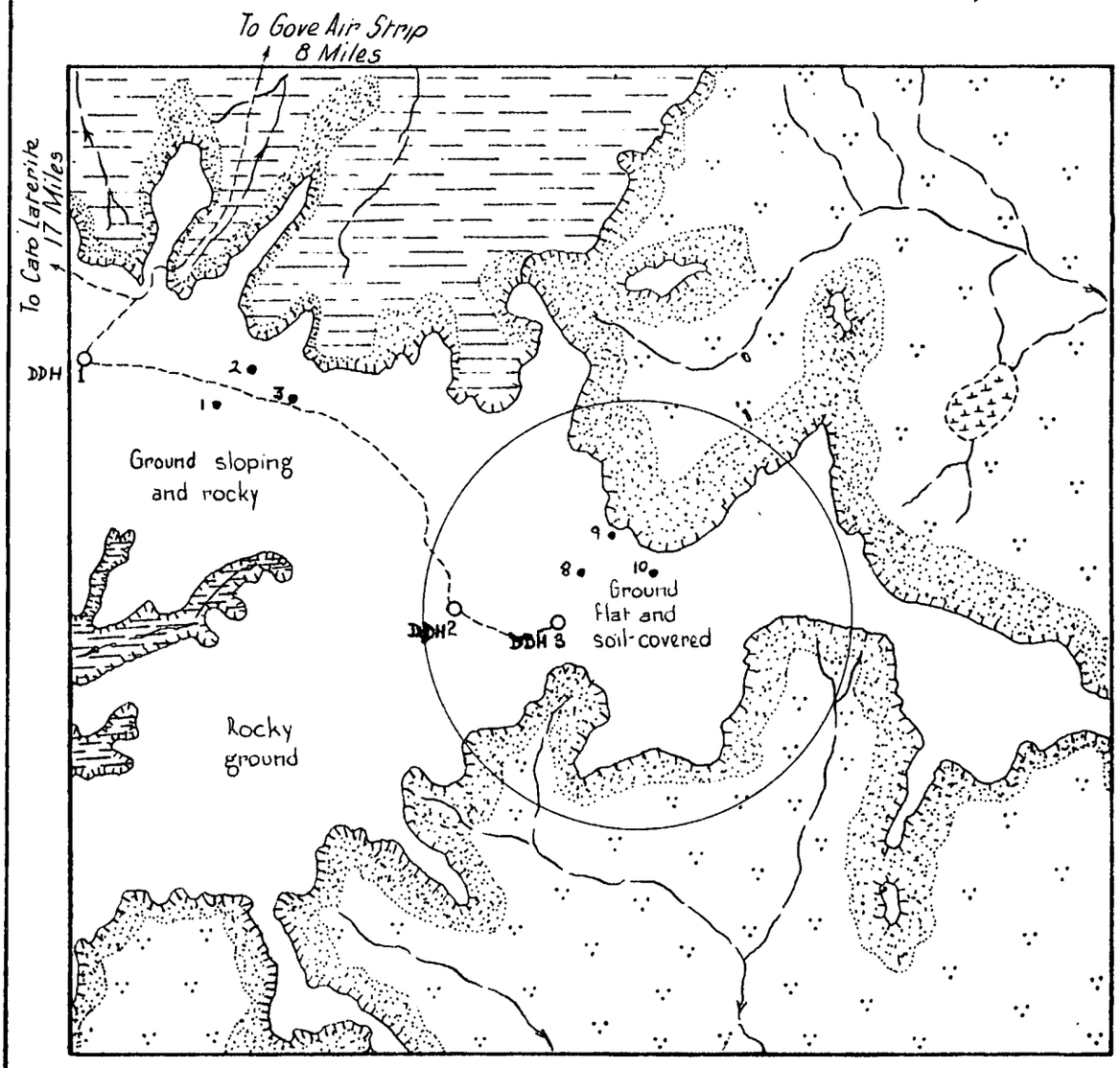
Cape Arnhem

Resident Geological Section, Darwin, N.T. February - 1964

D53/A4/2

To Accompany Record 1965/170. D53/3-4/D

PLATE 2



SCALE

2000 0 2000 4000 6000 8000 FEET

Sand, soil and detrital bauxite probably overlying sediments

Bauxite talus

Coarse quartz sand overlying decomposed granite

Bauxite, overlying sediments.

Edge of bauxite plateau

Tropical jungle - Water table at surface.

Seasonal creek, with flow direction.

Vehicle Track

DDH2 Diamond drill hole (exploratory)

8 Jackhammer hole

The circle encloses the most suitable site for the E.L.D.O. station

E. L. D. O. PROJECT, GOVE, N.T.

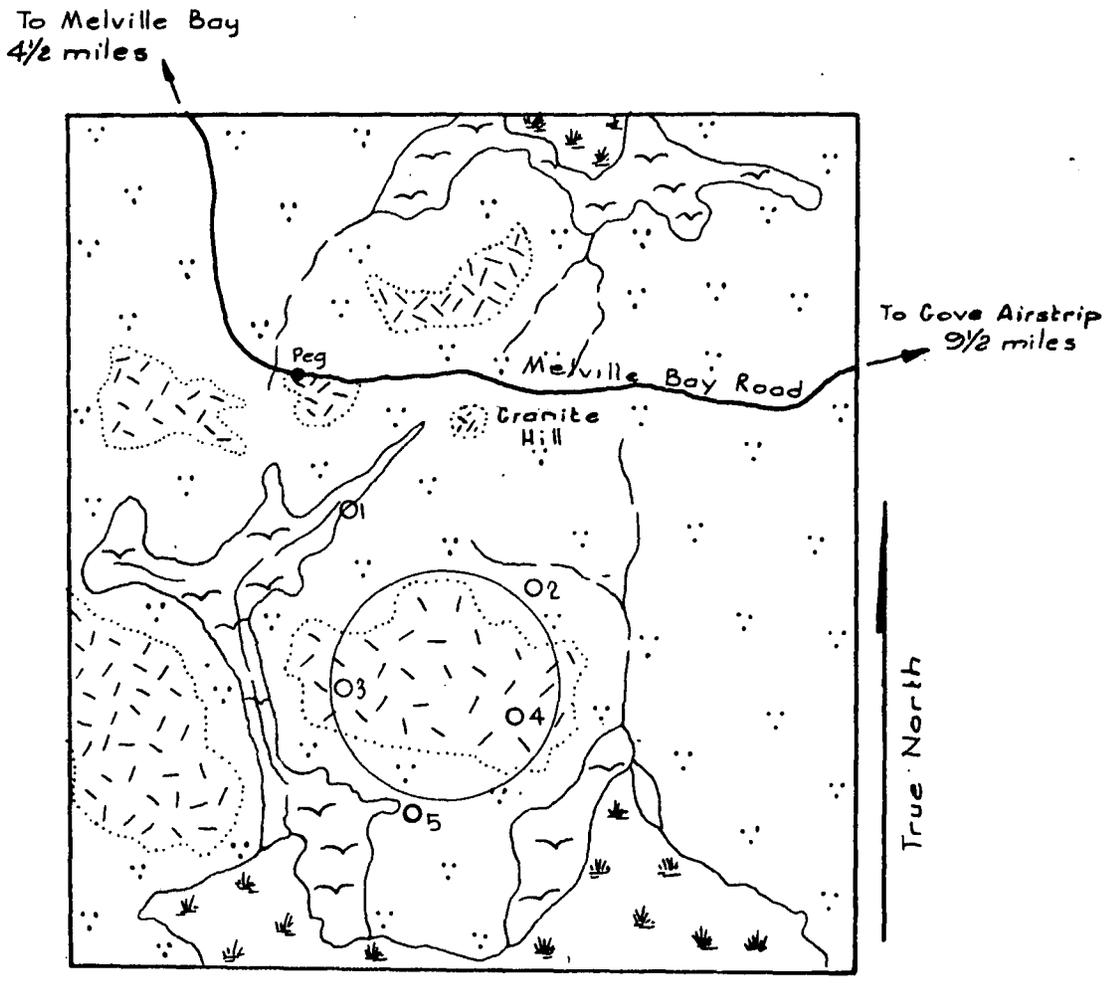
GEOLOGICAL SKETCH MAP

SOUTHERN SITE.

Resident Geological Section, Darwin, N.T. February - 1964 D53/A4/7

To Accompany Record 1965/170 . D53/3-4/D63

PLATE-3-



SCALE

2000 0 2000 4000 6000 8000 FEET

Mangrove swamps on coastal silt

Alluvial silt

Coarse quartz Sand with scattered small outcrops of fresh granite

Numerous outcrops of fresh granite, with intervening sand pockets

Outcrop boundary

Geological boundary

Seasonal creek

Graded road

• Marker peg for drill hole location

O 2 Diamond drill hole

The circle encloses the most suitable site for the E.L.D.O. Station

E.L.D.O. PROJECT, GOVE, N.T.

GEOLOGICAL SKETCH MAP

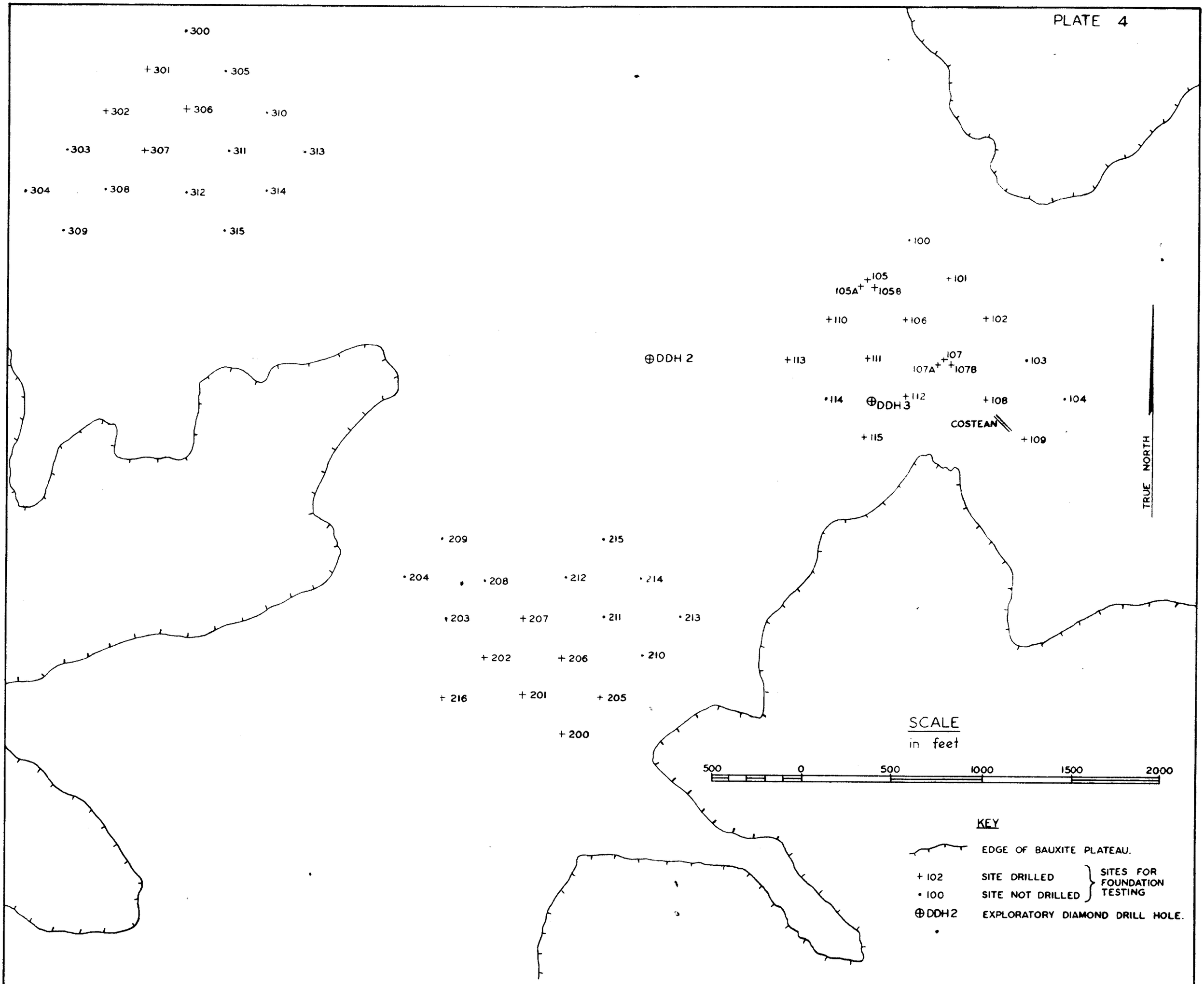
NORTHERN SITE

Resident Geological Section, Darwin, N.T. March 1964

D53/A4/4

To Accompany Record 1965/170 D53/3-4/DG.4

PLATE 4



E.L.D.O PROJECT GOVE N.T.

sketch map showing diamond drill hole sites for foundation testing.

MINES BRANCH GEOLOGICAL SECTION – DARWIN FEBRUARY 1965

TO ACCOMPANY RECORD 1965/170

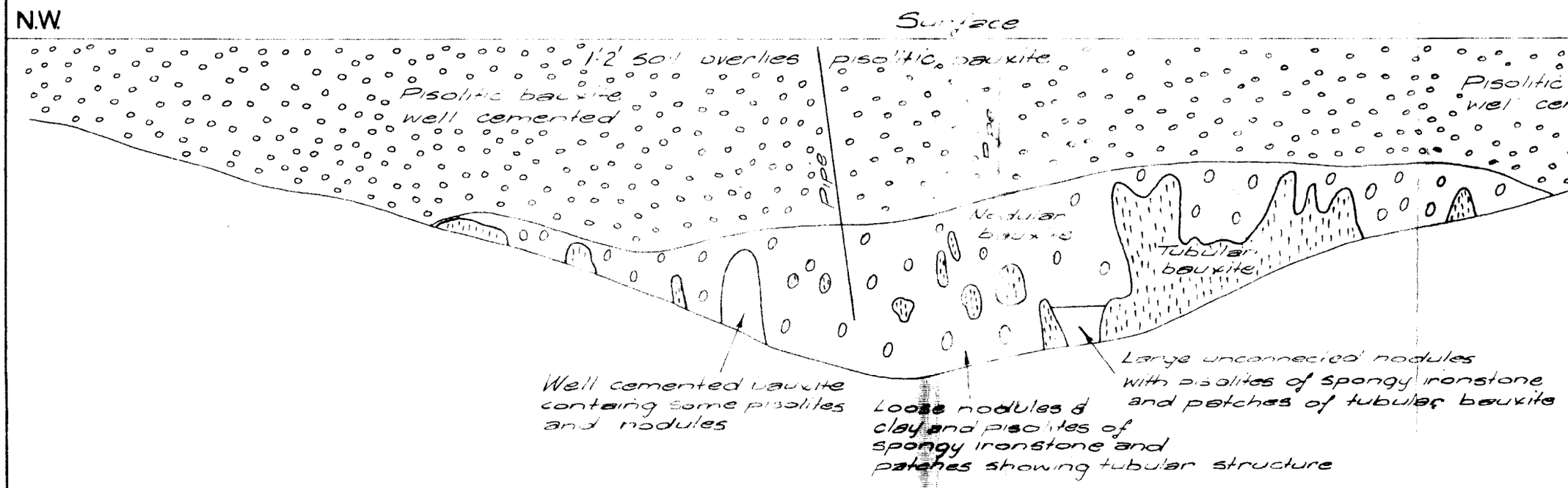
D53/A4/5

PLATE 5

E.L.D.O. PROJECT - GOVE, N.T.

SECTION OF COSTEAN BETWEEN DIAMOND DRILL HOLES NOs. 108 & 109

View looking North-East



Scale:

Vertical -- 10 feet to an inch

Horizontal - 10 feet to an inch

LEGEND

- Cemented Pisolitic Bauxite and Bauxitic Clay.
- Loose Nodular Bauxite and Bauxitic Clay.
- Tubular Bauxite.

Mines Branch Geological Section - Darwin. November 1964.

To Accompany Record 1965/170.....

D53/AA/6