

DEPARTMENT OF
NATIONAL RESOURCES

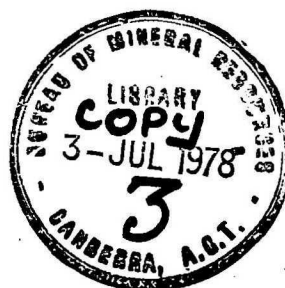
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BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD 1978/28

STRATIGRAPHIC HOLES DRILLED
IN THE CANBERRA AREA, 1971
TO 1976



by

G.A.M. Henderson

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SUMMARY

Seven cored stratigraphic holes ranging in depth from 27 to 300 m were drilled in the Canberra area between 1971 and 1976. One hole was in the State Circle Shale, one was in the Yass Sub-group between Canberra and Yass, and the remainder were in the Canberra Group. One of the holes in the Canberra Group and the hole in the Yass Sub-Group have revealed useful successions of rock units, including limestone beds. Limestone core is now being processed for recovery of conodonts.

INTRODUCTION

Seven holes were drilled in the Canberra area during 1971 to 1976, to obtain information on the succession of rock units within various formations. The holes were drilled by BMR Mayhew rigs and cored throughout. All drill core is stored at the BMR Core and Cuttings Laboratory, Fyshwick.

DRILLHOLE DATA

General data on the depths of drillholes and stratigraphic units drilled are tabulated below (Table 1), and the locations of the holes are plotted in Figure 1. Co-ordinates of holes shown on the logs are those for the ACT metric grid based on Mount Stromlo co-ordinates E200 000, N600 000.

TABLE 1. DRILLHOLE DATA

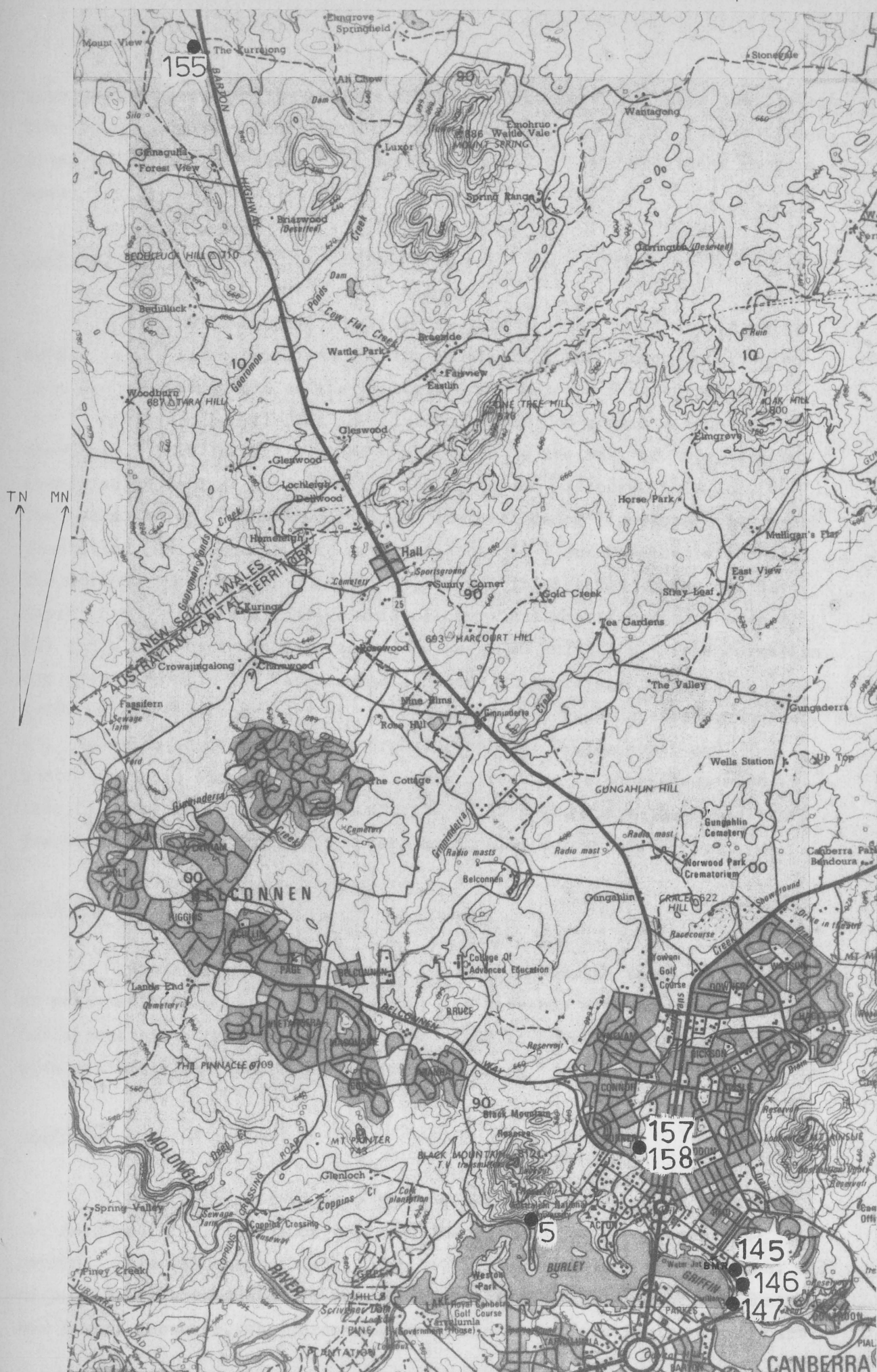
Hole No.	Formation drilled	Depth of hole (m)	Approx. strat. thickness drilled (m)
5	State Circle Shale	137.2	113
145	St Johns Church Beds (Canberra Group)	300.0	294
146	St Johns Church Beds (Canberra Group)	27.4	27
147	St Johns Church Beds (Canberra Group)	30.2	28
155	Yass Sub-Group	220.0	189
157	Turner Mudstone (Canberra Group)	30.2	9
158	Turner Mudstone (Canberra Group)	49.80	45

DRILLING OBJECTIVES AND RESULTS

Hole 5

The purpose of this drillhole, put down in 1971-72, was to determine the formation underlying the State Circle Shale at the southern foot of Black Mountain. It appears from the drill core that the shale passes down into massive mudstone which is thought to be part of the mudstone which crops out on the eastern shores of Black Mountain peninsula. More recently both the mudstone and the State Circle Shale were well exposed in late 1977 during excavations for the Molonglo Parkway, where the contact between the two units is faulted. The drill core did not

STRATIGRAPHIC DRILLHOLE LOCATIONS



clarify the nature of the contact in hole 5, but core loss near the contact indicates a fault. Henderson (in prep. b), reporting on the road-cuttings along the Molonglo Freeway, discusses the stratigraphic relations in this area.

Hole 145

This hole was drilled to the east of the BMR building, to obtain detail on the lithological succession in the St Johns Church Beds, which form the uppermost unit of the Canberra Group (Strusz & Henderson, 1971), and to provide material from any limestone beds for possible recovery of conodonts. Hole 144 was drilled about 140 m to the west of hole 145, but abandoned in faulted rock (for log see Henderson, Jacobson & Taylor, 1977). The second hole, 145, was well sited. Several major limestone units were penetrated, and a shallow dip (average about 10°) ensured that virtually the maximum possible thickness of strata was intersected to the drilled depth of 300 m. A distinctive unit of chert and cherty mudstone with a few sandy interbeds was intersected between 108 and 143 m. This formation may correlate with the Narrabundah Ashstone which is now regarded as lying within the upper part of the Canberra Group (see Henderson, in prep. a). An oriented core was taken from the hole at 37.4 m depth and indicated a dip direction of 037° ; this direction is consistent with data from the westernmost building site at Russell, where the top of the Canberra Group dips northeast under the Ainslie Volcanics.

Hole 146

This hole was drilled about 200 m along strike to the southeast of hole 145 to compare the top part of the sequence with that in hole 145. Tuffaceous siltstone between 15.86 and 17.98 in hole 146 probably correlates with siltstone and tuffaceous sandstone between 13.00 and 16.75 in hole 145.

Hole 147

Opik (1958) showed an outcrop of Narrabundah Ashstone near the northern end of Kings Avenue Bridge; the outcrop has since been destroyed. Hole 147 was drilled in the hope of intersecting the ashstone, and to compare it with the chert and cherty mudstone in hole 145. No ashstone was found. However, the three weathered sandstone beds in the upper part

of the hole may correlate with the sandy beds towards the base of the cherty mudstone between 130 and 138 m in hole 145.

Hole 155

The southern extension of the sedimentary rocks of the Yass Sub-group (Cramsie, Fogson, & Baker, 1975) has been mapped to a point about 6 km northwest of Hall (see Henderson, 1975). Hole 155 was drilled about 11 km northwest of Hall, to obtain detail on the lithological succession near the southern end of this sedimentary belt, and to provide material from limestone beds for possible conodont recovery. It was also hoped to reach the top of the Hawkins Volcanics, which are believed to underlie the Yass Sub-group. The target depth of the hole was 300 m, but drilling was suspended at 220 m, when the drill rig was required elsewhere. It is hoped to resume drilling at some future date.

So far the hole has been successful in intersecting several limestone beds. Two of the limestone beds, between 101 and 109 m (described as marble in log), are coloured pink and possibly correlate with an outcrop of pink limestone about 150 m northeast of the drillhole, and close to the intersection of the Barton Highway and a lane from the east. The dip of bedding at the surface near the drillhole is to the west. The dip in the drillhole averages about 30° and ranges from 0° to 60° , which is a little steeper than would be desirable for a stratigraphic hole. A fault zone was intersected between 108 and 113 m; the succession above and below the fault indicates that the fault has cut out rather than repeated part of the succession. Volcanics had not been reached at the bottom of the hole (220 m) when drilling was suspended, but at a higher level a unit of dacite and ashstone was intersected between 35 and 43 m. The collar of the hole is estimated to be about 100 m stratigraphically below the base of the volcanics which overlie the Yass Sub-group.

Hole 157

Hole 157 was drilled near Sullivans Creek, Turner, to obtain detail on the lithological succession in the Turner Mudstone. The hole was abandoned at 30 m in steeply dipping mudstone.

Hole 158

Another hole near Sullivans Creek was drilled for the same purpose as hole 157; it is located about 70 m to the southeast of hole 157. Shallow-dipping mudstone was intersected, but the lithology is very uniform. Drilling ceased at 50 m. Both holes 157 and 158, encountered zones of extremely weathered rock to the depths drilled (see logs). Similar deep weathering had been found elsewhere in Canberra and is a potential problem for building foundations with high unit loadings.

PROCESSING OF CORE

The drill core from hole 145 is at present (April, 1978) being slabbed and the limestone tested for conodonts. Core from the other holes will be processed in due course. The results of palaeontological work will be presented later in a separate report.

REFERENCES

- GRAMSIE, J., POGSON, D.J., & BAKER, C.J., 1975 - Yass 1:100 000 Geological Sheet. Geological Survey of New South Wales, Sydney.
- HENDERSON, G.A.M., 1975 - Engineering geological notes on the Cooromon Ponds area. Bureau of Mineral Resources Australia, Record 1975/111 (unpublished).
- HENDERSON, G.A.M., in prep. a - Canberra and Queanbeyan, A.C.T. and N.S.W., 1:50 000 geological map and explanatory notes. Bureau of Mineral Resources Australia, Record (unpublished).
- HENDERSON, G.A.M., in prep. b - Geological mapping of cuttings along the Molonglo Parkway between Acton and Black Mountain peninsula. Bureau of Mineral Resources, Australia, Record (unpublished).
- HENDERSON, G.A.M., JACOBSON, G., & TAYLOR, F.J., 1977 - Geological and geophysical investigations of sites for major buildings, Canberra City, Parkes, and Campbell, A.C.T., 1974-5. Bureau of Mineral Resources, Australia, Record 1977/59 (unpublished).

"
OPIK, A.A., 1958 - Geology of the Canberra City district. Bureau of Mineral Resources, Australia, Bulletin 32.

STRUSZ, D.L., & HENDERSON, G.A.M., 1971 - Canberra City, A.C.T., 1:50 000 geological map and explanatory notes. Bureau of Mineral Resources, Australia, Canberra.

APPENDIX 1

LOGS OF DRILLHOLES 5, 145, 146, 147, 155, 157, 158

BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT STRATIGRAPHIC DRILL HOLE

LOCATION SOUTHERN FOOT OF BLACK MOUNTAIN

(CASING WITHDRAWN, HOLE ABANDONED 24/3/72)

ANGLE FROM HORIZONTAL 90°

DIRECTION _____

COORDINATES 603520N, 208230E

R.L. 58.6m

HOLE NO.

CANBERRA

No. 5

SHEET 1 OF 6

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC	DEPTH & SIZE OF CORE	FRAC- TURE LOG	LIFT & % CORE RECOVERY	STRUCTURES JOINTS, VENS, SEAMS, FAULTS, CRUSHED ZONES	WATER LEVEL	WATER PRESSURE TEST Loss in gallons per minute per foot	PHOTO- REF. NO.
Soil and overburden	No core							
SHALE moderately weathered	Brown, soft, weak rock.	14'0" 2 1/2" core			Bedding at 10°			
SHALE slightly to moderately weathered	Greenish-brown, moderately soft and weak rock	26'0" 10m			Bedding at 10° Bedding at 5°			
SHALE moderately weathered	Brown, soft, weak rock	34'0"			Bedding at 5°			
SHALE sl. mod. weathered	Greenish-brown, mod. soft and weak rock	40'0" 44'0"			Bedding at 5°			
SHALE moderately weathered	Greenish-brown, soft, weak rock.	50'0"			Bedding horizontal			
		54'5" 55'3"			Broken zones			
		60'0"			Bedding horizontal			
		67'0" 67'9"			Broken zone			
SHALE slightly weathered	Blue-grey, soft, weak rock	70'6" 80'0"						

DRILL TYPE Mayhew
FEED hydraulic
CORE BARREL TYPE triple tube
split inner tube
DRILLER B.M.R.
COMMENCED 22/7/71
COMPLETED 24/3/72
LOGGED BY G.A.M. Henderson
VERTICAL SCALE 10 feet: inch
1:120

NOTES
FRACTURE LOG - Number of fractures per foot of core. Zones of core logs are marked as
BEDDING AND JOINT PLACES - Angles are measured relative to a plane normal to the core axis

WATER PRESSURE TESTS

PACKER TYPE _____
SUPPLY LINE _____
VERTICAL SCALE _____
Figures given are gauge pressure
Test sections are indicated graphically by shaded columns
PHOTOGRAPH REFERENCE SYSTEM
BLACK AND WHITE _____
COLOUR _____

155/A16/2070

MIPN 98

BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT STRATIGRAPHIC DRILL HOLE

LOCATION SOUTHERN FOOT OF BLACK MOUNTAIN

ANGLE FROM HORIZONTAL 90°

DIRECTION

COORDINATES 603520N 208230E

R.L. 586m

HOLE NO.

CANBERRA
No. 5.

SHEET 2 OF 6

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC.	GRAPHIC LOG	DEPTH & SIZE OF CORE	FRACTURE LOG	LIFT & % CORE RECOVERY	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	WATER LEVEL	WATER PRESSURE TEST Loss in gallons per minute per foot	PHOTO REF. NO.
SHALE slightly weathered	Blue-grey soft, weak rock		2 1/2" core			Bedding at 5°			
			90'0"						
			95'6"						
SHALE fresh	Blue-grey, med. soft and weak rock		30m			Bedding at 20°			
			100'0"						
			110'0"			Bedding at 20°			
SHALE fresh	Pale to dark grey, med. soft, mod. weak to mod. strong rock. Max. core length 17"					Bedding at 5°			
			120'0"			Bedding at 10° Numerous steeply dipping veins of quartz and pyrite up to 1/2" wide			
			130'0"			Bedding at 20°			
			40m			Broken zone Rock extensively broken			
			140'0"			Bedding at 15°			
SHALE fresh	Pale grey, mod. soft and weak rock. Max. core length 2"		1 1/2" core						
			150'0"						
			160'0"						

DRILL TYPE Mayhew
FEED hydraulic
CORE BARREL TYPE triple tube split inner tube
DRILLER BMR
COMMENCED 22/7/71
COMPLETED 24/3/72
LOGGED BY G.A.M. Henderson
VERTICAL SCALE 10 feet: 1 inch
1:120

NOTES
FRACTURE LOG - Number of fractures per foot of core. Zones of core logs are blocked in
BEDDING AND JOINT PLANES - Angles are measured relative to a plane normal to the core axis

WATER PRESSURE TESTS

PACKER TYPE _____
SUPPLY LINE _____
VERTICAL SCALE _____
Figures given are gauge pressures
Test sections are indicated graphically by blocked-in strips
PHOTOGRAPH REFERENCE SYSTEM
BLACK AND WHITE _____
COLOUR _____

155/A16/2070

NIPF 99

BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT STRATIGRAPHIC DRILL HOLE
LOCATION SOUTHERN FOOT OF BLACK MOUNTAIN
ANGLE FROM HORIZONTAL 90° DIRECTION _____
COORDINATES 603520 N, 208230 E R.L. 584m

HOLE NO.
CANBERRA
No. 5
SHEET 3 OF 6

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC.	DEPTH & SIZE OF CORE	FRACTURE LOG	RECOVERY LOG	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	WATER LEVEL	WATER PRESSURE TEST Loss in gallons per minute per foot	PHOTO NO.
SHALE fresh	Pale grey, mod. soft and weak rock. Max. core length 2"	50m 1 1/8" core 170'0"						
	No core	180'0"						
SHALE fresh	Pale grey, mod. soft, mod. strong rock. Max. core length 6"	1 1/8" core 186'0"			Bedding at 30°			
SHALE fresh	Pale grey, mod. soft and weak rock. Max. core length 3"	60m 200'0"						
MUDSTONE fresh	Pale grey, mod. soft, mod. strong rock. Max. core length 6"	213'0"			Bedding horiz.			
MUDSTONE fresh	Pale grey, mod. soft and weak rock. Max. core length 7"	2 1/2" core 218'0"			Bedding at 25°			
		226'0"			Broken zone			
MUDSTONE fresh	Pale grey, mod. soft, mod. strong rock. Max. core length 1'10"	70m 240'0"			Black carbonaceous band Slumping evident Bedding horiz.			

DRILL TYPE Mayhew
FIED hydraulic
CORE BARREL TYPE trip tube
split inner tube
DRILLER RMR
COMMENCED 22/7/71
COMPLETED 24/7/71
LOGGED BY G.M. Henderson
VERTICAL SCALE 10 feet: 1 inch
1:120

FRACTURE LOG - Number of fractures per foot of core. Zones of core loss are bracketed.
BEDDING AND JOINT PLACES - Angles are measured relative to a plane normal to the core axis.

WATER PRESSURE TESTS

PACKER TYPE _____
SUPPLY LINE _____
VERTICAL SCALE _____
COLOUR _____

BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

PROJECT STRATIGRAPHIC DRILL HOLE
LOCATION SOUTHERN FOOT OF BLACK MOUNTAIN
ANGLE FROM HORIZONTAL 90° DIRECTION _____
COORDINATES 603520N, 208230E (Strombo grid) RL 586m

HOLE NO
CANBERRA
No. 5
SHEET 4 OF 6

ROCK TYPE & DEGREE OF WEATHERING LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC GRAPHIC LOG DEPTH & SIZE OF CORE SAMPLE LOG PER CENT CORE RECOVERY JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES WATER PRESSURE TEST LOSS IN GALLONS PER MINUTE PER FOOT PHOTO COPY NO

MUDSTONE
fresh

Pale grey, mod. soft,
mod. strong rock. Max.
core length 1'6"

24"
core

250'

260'

80m

270'

280'

290'

90m

296'

320'

Broken zones

Broken zone

Broken zone

Broken zone

Bedding at 40°

Rock broken
throughout

Broken zone

Broken zone

Broken zone

Broken zone

MUDSTONE
fresh

Pale grey, mod. soft,
weak rock. Max. core
length 5"

MUDSTONE
fresh

Pale grey, mod. soft,
mod. strong rock. Max.
core length 1'0"

DRILL TYPE Mayhew
FEED hydraulic
CORE BARREL TYPE triple tube
split inner tube
DRILLER RMR
COMMENCED 22/7/71
COMPLETED 24/3/72
LOGGED BY G.A.M. Henderson
VERTICAL SCALE 10 feet: 1 inch
1:120

NOTES
FRACTURE LOG: - Number of fractures per foot of core. Zones of core loss are marked in.
BEDDING AND JOINT PLANES: - Angles are measured relative to a plane normal to the core axis.

WATER PRESSURE TESTS

PACKER TYPE _____
SUPPLY LINE _____
VERTICAL SCALE _____
Figures given are gauge pressures.
Test sections are indicated graphically by shaded-in strips.
PHOTOGRAPH REFERENCE SYSTEM
BLACK AND WHITE _____
COLOUR _____

155/A16/2070

M(P1)99

BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT STRATIGRAPHIC DRILL HOLE
LOCATION SOUTHERN FOOT OF BLACK MOUNTAIN
ANGLE FROM HORIZONTAL 90° DIRECTION _____
COORDINATES 603520 N, 208230 E (Stromlo grid) R.L. 528.6m

HOLE NO.
CANBERRA
No. 5
SHEET 5 OF 6

ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC.	GRAPHIC LOG	DEPTH & SIZE OF CORE	RECOVERY LOG	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	WATER LEVEL	WATER PRESSURE TEST Loss in gallons per minute per foot	REMARKS
MUDSTONE fresh	Pale grey, mod. hard, mod. weak to mod. strong rock. Max. core length 1'1"		2 1/2" core 100m 330' 340' 350' 360' 370' 376' 380' 390' 400'		Broken zone Broken almost throughout Broken zone Feldspar veins			
MUDSTONE fresh	Pale to medium grey, mod hard to hard, strong rock. Max. core length 1'10"		110m 120m					

DRILL TYPE Mayhew
FEED hydraulic
CORE BARREL TYPE triple tube
split inner tube
DRILLER RMR
COMMENCED 23/7/71
COMPLETED 24/8/72
LOGGED BY G.A.M. Henderson
VERTICAL SCALE 10 feet: 1 inch

NOTES
FRACTURE LOG - Number of fractures per foot of core. Zones of core loss are blacked in.
BEDDING AND JOINT PLANES - Angles are measured relative to a plane normal to the core axis.

WATER PRESSURE TESTS
PACKER TYPE _____
SUPPLY LINE _____
VERTICAL SCALE _____
Figures given are gauge pressures
Test sections are indicated graphically by blocks in strips
PHOTOGRAPH REFERENCE SYSTEM
BLACK AND WHITE _____
COLOUR _____

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS		PROJECT <u>STRATIGRAPHIC DRILL HOLE</u>						HOLE NO CANBERRA NO 5	
		LOCATION <u>SOUTHERN FOOT OF BLACK MOUNTAIN</u>						SHEET <u>6</u> OF <u>6</u>	
GEOLOGICAL LOG OF DRILL HOLE		ANGLE FROM HORIZONTAL <u>90°</u>		DIRECTION _____		WATER PRESSURE TEST Loss in gallons per minute per foot			
		COORDINATES <u>603520N 202130E (Stromlo grid)</u>		R.L. <u>526m</u>					
ROCK TYPE & DEGREE OF WEATHERING	DESCRIPTION LITHOLOGY, COLOUR, STRENGTH, HARDNESS, ETC	GRAPHIC LOG	DEPTH & SIZE OF CORE	FRACTURE LOG	LIFT & CORE RECOVERY	CASING	STRUCTURES JOINTS, VEINS, BEDS, FAULTS, CRUSHED ZONES	WATER LEVEL	TEST NO
MUDSTONE fresh	Pale to medium grey, hard, strong rock. Max. core length 2'0"		400'				Feldspar veins		
			2 1/2" core						
			410'						
			420'						
			430'						
			130m						
			440'						
			450'						
	END OF HOLE 137.3m		137.3 450'6"						
							450'6"		

DRILL TYPE Mayhew

FEED hydraulic

CORE BARREL TYPE triple tube,
split inner tube

DRILLER BMR

COMMENCED 22/7/71

COMPLETED 24/7/72

LOGGED BY G.A.M. Henderson

VERTICAL SCALE 10 feet: 1 inch

NOTES

FRACTURE LOG - Number of fractures per foot of core. Zones of core loss are checked in.

BEDDING AND JOINT PLANES - Angles are measured relative to a plane normal to the core axis.

WATER PRESSURE TESTS

ROCKET TYPE _____

INFLUENT LINE _____

VERTICAL SCALE _____

Figures given are gauge pressures.

Test results are indicated graphically by drawing in stress.

PHOTOGRAPH REFERENCE SYSTEM

BLACK AND WHITE _____

COLOUR _____

155/A18/2070
M(P1)99

GEOLOGICAL LOG OF DRILL HOLE

LOCATION SECTION 4, PARKES, A.C.T.

HOLE NO 145.

COORDINATES - 212253E, 602525N R.L. OF COLLAR - 570m

SHEET 1 OF 15

STROMER METRIC GALT

Drill type <u>Mayhew</u>	Notes	Core Photograph Negative No.	
Feed <u>Mechanical</u>	<i>Fracture Log - Number of fractures per 25cm of core Zones of core loss blocked in.</i>	Depth(m)	Black & White Colour
Core barrel type <u>Tiefes 2 1/2"</u>	<i>Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.</i>	-----	-----
Driller <u>E. Ladwick (BMR)</u>	<i>Water Level Measurements -</i>	-----	-----
Commenced <u>13/11/75</u>	<i>☒ Level when hole in progress at specified depths</i>	-----	-----
Completed <u>12/4/76</u>	<i>☒ Level in completed hole on specified date.</i>	-----	-----
Logged by <u>J. Cox</u>	Checked by -----	-----	-----
M(P1) 221			155/A16/1593

BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS		PROJECT <u>STRATIGRAPHIC DRILL HOLE</u> LOCATION <u>SECTION 4, PARKES, A.C.T.</u>		HOLE NO <u>145</u>				
GEOLOGICAL LOG OF DRILL HOLE		ANGLE FROM HORIZONTAL (°) <u>90°</u> DIRECTION _____ COORDINATES <u>2122E3E 602525N</u> RL. OF COLLAR <u>570m</u>		SHEET <u>2</u> OF <u>15</u>				
Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc	Percent Graphic Log	Depth and use of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
Calcareous siltstone FS	Blue-grey, laminated		20m 2 1/2"		88%		Bedding joints 0°-10° Limonite on joints. Calcite veins	
			22.20		52%		Bedding at 0°-10° Pyrite, limonite & calcite veins	
			23.60		99%		Pyrite, limonite & calcite veins	
			24.75		82%		Bedding joints 10°	
Limestone FR	Blue-grey, fossiliferous		25.15		93%		Limonite stained joint at 30°	
	Laminated calcareous siltstone		26.75		95%		Calcite on joint planes	
			27.80		64%		Graded bedding	
	Interbedded limestone & laminated calcareous siltstone		30.90		67%		Bedding joints 0°-10° Oriented core 37.25-37.45m dip direction of bedding 037°	
	Sandy tuff		32.25		86%		Graded bedding in sandstone	
			33.90		64%		Bedding joints 0°-10° Pyrite & calcite on joints	
			35m		67%		Bedding joints 0°-10° Oriented core 37.25-37.45m dip direction of bedding 037°	
			35.80		86%		Graded bedding in sandstone	
			37.45		86%		Graded bedding in sandstone	
			37.70		86%		Graded bedding in sandstone	
			40m		86%		Graded bedding in sandstone	
Limestone & calcareous siltstone FR	Interbedded blue-grey fossiliferous limestone and calcareous siltstone		37.70		64%		Bedding joints 0°-10° Pyrite & calcite on joints	
			38.45		67%		Bedding joints 0°-10° Oriented core 37.25-37.45m dip direction of bedding 037°	
			39.80		86%		Graded bedding in sandstone	
			37.45		86%		Graded bedding in sandstone	
			37.70		86%		Graded bedding in sandstone	
			40m		86%		Graded bedding in sandstone	
Calcareous siltstone FR	Blue-grey Minor limestone and quartz sandstone		40m		86%		Graded bedding in sandstone	

Drill type Mayhew
Feed Mechanical

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PROJECT STRATIGRAPHIC DRILL HOLE

LOCATION - SECTION 4, PARKES, A.C.T.

ANGLE FROM HORIZONTAL (θ) 90° DIRECTION

COORDINATES 212253E 602525N RL. OF C

HOLE NO 145.

SHEET 3 OF 15

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Cementation Graphic Log	Lift and % core recovery	Depth and size of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
Calcareous siltstone FR	Blue-grey; minor limestone quartz sandstone, and calcarenite		100% 40.50	40m Thick 2 1/2"		86%		Calcite veins on 80° joints Bedding at 15°	
Siltstone FR	Blue-grey; limestone frags		100% 41.75	42.00		82%		Slickensides on 60° joint Calcite veins on 85° joints Graded bedding	
Calcareenite & siltstone FR	Interbedded blue-grey siltstone and poorly sorted calcarenite		100% 42.10 42.60 100% 43.10	42.60 2 1/2"		100% 86% 63%			
			100% 44.05 100% 44.30			92% 82%		Irregular bedding at 20°	
Siltstone FR	Blue-grey; minor sandstone, calcareous in places		100% 45.25			70%		Irregular bedding at 15°	
Limestone FR	Blue-grey, crystalline; minor calcarenite; pyrite (less than 1%)		46.00 100% 46.35	46.35		67%		Bedding at 10°	
			100% 49.00						
	Calcareous tuff		100% 49.50 49.85	49.85		63%		Graded bedding both up & down	
			100% 50.60 100% 50.85	50.85		88% 100%		Bedding at 5°-10°	
Calcareous siltstone FR	Blue-grey, laminated; some very fine sandy laminae		100% 52.25					Bedding at 10°	
			100% 54.35	54.25					
Calcareous siltstone & sandstone FR	Green-grey laminated siltstone and grey sandstone, possibly tuffaceous		100% 55.90	55m 55.90				Crush zone 55.70-55.80 Calcite & pyrite on joints, occasional iron staining Bedding at 0°-10°	
	Dark grey with disseminated pyrite		100% 56.80						
Limestone FR	Dark grey, fine-grained, massive		57.80 100% 59.55					Steeply dipping discontinuous joints with calcite & pyrite WATER LOSS Rounded L/s pebbles Bedding at 10°	
	Sandy band Thin black band		100% 59.50 100% 60m						

Drill type Mayhew
Feed Mechanical
Core barrel type Tiefes & HQ
Driller E. Lodwick (BMR)
Commenced 13/11/75
Completed 12/4/76
Logged by J. Cox & G. Briscoe
M (P) 221

Notes

Fracture Log - Number of fractures per 25cm of core. Zones of core loss blocked in.

Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.

Water Level Measurements -  Level when hole in progress at specified depths
 Level in completed hole on specified date.

Checked by _____

Core Photograph Negative No.		
Depth(m)	Black & White	Colour
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155/A16/175

BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS		PROJECT STRATIGRAPHIC DRILL HOLE		HOLE NO 14E					
GEOLOGICAL LOG OF DRILL HOLE		LOCATION Section 4, Parkes A.C.T.		SHEET 4 OF 15					
ANGLE FROM HORIZONTAL (θ) 90°		DIRECTION							
COORDINATES 212253E, 602525N		R.L. OF COLLAR 570m							
Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Cement Graphic Log	Lift and % core recovery	Depth and size of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
Limestone FR	As above			60m				Bedding at 10°	
Siltstone, minor sandstone & limestone FR	Dark grey, calcareous laminated siltstone		100%	60.75				Fractured	
				2 1/2"					
				62.55				Fractured with grey clay	
			100%					Bedding at 10°	
				64.15				Calcite veins to 10mm	
			100%					Contorted bedding	
	Sandy non-calcareous			64.80				Serpentine, pyrite, calcite on joints	
	Grey sandstone and grey siltstone, calcareous laminated (bands 3mm) disseminated pyrite			65.25					
			100%					Bedding at 10°	
				66.70				Calcite on joints & in irregular veins	
				66.70				Crush zone	
			100%					Bedding at 10°-15°	
	Sandy, slightly calcareous			67.90				Contorted bedding 67.65-67.90;	
				68.30				68.50-68.60	
				68.90				Calcite with slickensides on joints	
			100%					Bedding at 5°	
				70.50				Pyrite rich band. Bedding at 15°	
				70m				Irregular thin calcite veins	
								Fractured 70.00-70.20	
	Dark grey siltstone & grey crystalline L/S		100%					Bedding at 10°-15°	
	Broken L/S in siltstone							Calcite in discontinuous veins	
	Dark grey crystalline L/S			72.90				Clastic bands	
	Banded grey and green-grey calcareous siltstone and sandstone							Calcite, pyrite & mica on joints	
	Sandy band		100%					Micro faulting and folding	
				75.25				Irregular joints with calcite & pyrite	
				75m				Calcite crystals on some joints	
	Banded, black and grey, fine-grained		100%					Fractured zone with grey clay	
								WATER LOSS	
	Mottled grey and dark grey, possibly fossilif. irregular calcite fillings			78.30				Steeply dipping irregular discontinuous joints with calcite and pyrite	
			100%						
	Strongly banded			79.35				Fractured	
				80m				Calcite veins 5mm wide	
			100%					Irregular thin calcite veins	
								Pyrite on joints & disseminated	
								Bedding at 10°	
Drill type Mayhew		Notes		Core Photograph Negative No.					
Feed Mechanical		Fracture Log - Number of fractures per 25cm of core Zones of core loss blocked in		Depth(m)		Black & White		Colour	
Core barrel type H.A.		Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.							
Driller E. Lodwick		Water Level Measurements -							
Commenced 13/11/75		Level when hole in progress at specified depth							
Completed 12/4/76		Level in completed hole on specified date.							
Logged by G. Briscoe		Checked by							
M(P1) 221		155/A16/1789							

GEOLOGICAL LOG OF DRILL HOLE

LOCATION Section 4, Parkes, A.C.T.

HOLE NO. 145

COORDINATES 212253 E 602525 N R.L. OF COLLAR 570m

SHEET 5 OF 15

Rock Type and Degree of Weathering	Description	Core Log	Graphic Log	Depth and size of Core	Fracture Log	RQD	Structural Log	Structures	Water Level
								Joints, veins, seams, fault, etc.	
Calcareous siltstone FR	Clastic band with broken grey limestone in dark grey matrix	100%	81-70	80m 2 1/2"				Microfolding Bedding at 10°-40° Slumping	
	Crystalline, clastic band	100%	84-15 84-75	85m				Irregular calcite veins & pyrite Contorted bedding, micro faulting Slickensides Calcite crystals on joints Steeply dipping joints Irregular clastic band	
	Laminated Clastic bands Alternating dark and light grey bands up to 4cm wide	100%	87-55	90m				Bedding at 10° Irregular calcite veins Calcite & pyrite on widely spaced joints	
	Blotchy appearance; crystalline grey in dark grey matrix; fossiliferous	100%	90-75					Irregular calcite veins	
	Crystalline, blotchy, fossiliferous?	100%	93-75 94-68	95m				Pyrite & calcite on gently dipping joints Fracture zone; fractures sub-horizontal; open discontinuous joints.	
		100%	96-79 97-83					Disseminated pyrite; calcite infillings	
		100%	99-83	100m				Fractured with grey clay Irregular open joints Steeply dipping veins & joints Microfolding & faulting Discontinuous steeply dipping joints Irregular patches of calcite & pyrite Widely spaced joints, open, irregular Irregular discontinuous calcite veins Widely spaced open irregular joints	

Drill type Mayhew
Feed Mechanical
Core barrel type HQ
Driller E. Lodwick
Commenced 13/11/75
Completed 12/4/76
Logged by G. Briscoe

M(Pt) 221

Notes

Fracture Log - Number of fractures per 25cm of core. Zones of core loss blocked in.

Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.

Water Level Measurements - Level when hole in progress at specified depth

Δ Level in completed hole on specified date

Checked by _____

Core Photograph Negative No.

Depth (m)	Black & White	Colour
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155/A16/1789

GEOLOGICAL LOG OF DRILL HOLE

ANGLE FROM HORIZONTAL (θ) 90° DIRECTION
COORDINATES 212253E, 602525N R.L. OF CO

SHEET 6 OF 15

Drill type <u>Mayhew</u>	Notes	Core Photograph Negative No.	
Feed <u>Mechanical</u>	Fracture Log - Number of fractures per 25cm of core. Zones of core loss blacked in.	Depth(m)	Black & White Colour
Core barrel type <u>H.Q.</u>	Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.		
Driller <u>E. Ledwick</u>			
Commenced <u>13/11/75</u>	Water Level Measurements - <u>▽</u> Level when hole in progress at specified depth.		
Completed <u>12/4/76</u>	<u>▽</u> Level in completed hole on specified date.		
Logged by <u>G. Briscoe</u>			
M(P1) 221	Checked by _____		
			155/A16/1789

GEOLOGICAL LOG OF DRILL HOLE

ANGLE FROM HORIZONTAL (θ) 90°
COORDINATES 213253E, 602525 N DIRECTION R.L. OF COLLAR 570m

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc	Cement Graphic Log	Lift and % core recovery	Depth and size of Core	Fracture Log	RQD	Defect Frequency				Structures Joints, veins, seams, faults, etc	Water Level	Structural Meter Pressure Test Results (Lugeons) #	
							Intercept Angle							
							0	30	60	90				
0 6 12 18+														
Log														
Cherty Mudstone + Siltstone FA	Alternating darker + lighter bands. Silt to fine sand. Alternating fine sand (darker) and medium sand (lighter) grey coloured narrow (2.5-10mm) bands. Changes abruptly to fine darker sediment (continuous) at 132.40. Fine (silt) at top grading to coarse sand at base (134.60m) of which another cycle commences grading down to fine sand (135.28) + again down to (135.90m). Then underlain by narrow light + dark bands + medium sand. Medium sand continues down to 136.45. At 136.70m. get yellow silt interbeds (2-3mm) with grey silt which passes down to fine sand + silt interbeds from 137.30-137.50m. Laminated grey + yellowy interbeds (silt).	120-55	120m											
		100%			77%									
		122-15												
		100%			0%									
		122-80												
		100%			11%									
		123-75	123-85											
		100%			375%									
		125-90	125m											
		100%			41%									
		127-15												
		100%			33%									
		127-75												
		100%			78%									
		128-95												
		100%			84%									
		130-75	130m											
		100%			100%									
		131-35												
		100%			79%									
		133-20												
		100%			92%									
		136-20	135m											
		100%			63%									
		139-20												
		100%			93%									
						140m								

Drill type Mayhew Feed Mechanical Core barrel type HQ Driller E. Ledwick Commenced 13/11/75 Completed 12/12/76 Logged by L.F. David Vertical scale 1cm: 1m.	Notes Fracture Log — Number of fractures per 25 cm of core. Zones of core loss blocked in Bedding and Joint Planes — Angles are measured relative to a plane normal to the core axis Defect Frequency — Number of natural defects (shears, joints, fractures) per 25 cm of core occurring at specified intercept angle range. Water Level Measurements — ∇ Level when hole in progress at specified depth ∇ Level in completed hole on specified date	Water Pressure Tests * Values in lugeons should be read in conjunction with computation sheets. Test sections are indicated by blocked in strips. Core Photograph Negative No Depth (m) Black & White Colour	

GEOLOGICAL LOG OF DRILL HOLE

ANGLE FROM HORIZONTAL (°) 90° DIRECTION
COORDINATES 212253E, 602525N R.L. OF COLLAR 570m

SHEET 8 OF 15

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc	Cementation	Graphic Log	and % core recovery	Depth and size of Core	Fracture Log	RQD	Defect Frequency Intercept Angle	Structures Joints, veins, seams, faults, etc	Water Level	Water Pressure Test Losses (Lugeons) *
As Above				100%	140m				Bedding plane fractures lined with Calcite + pyrite. A 25cm fracture zone starts at 140.80m filled with massive pyrite, pyrrhotite + calcite.		Structural Log
	Medium sandstone to 142.85m then a 2cm dark silt band			100%	142.20						
Calcareous Mudstone FR	Dark grey in colour with pale angular fragments common (coral fragments). Continues to 143.50m where an 18cm band of non-calcareous sandstone occurs (medium grained). Occasional fine sand bands 146.52 angular + rounded light coloured blocks occur, coral remnants.			100%	145.20			100%	Pyrite + calcite on joints. Very widely spaced bedding plane fractures (3 only). Rock is finely bedded. (18°)		
				100%	148.20			54%	Fracture zone at ~146.65 for 20cms. Corals periodically occur. Calcite joints. Some bedding plane fractures. Get lighter + darker bands after fracture zone (1st.?)		
Limestone FR.	3-5cm bands. Mottled light + dark grey. Strong + hard.			100%	150m			73%	Flecks of disseminated pyrite favouring darker bands but both have it. Calcite veins + joints. 151.00 get a 10cm fractured area. Bedding 15°		
				100%	151.10			53%			
				100%	152.10			93%			
				100%	154.40						
Calcareous Mudstone FR.	Scarce green grey thin bands of mudstone in monotonous dark calcareous mudstone. Strong + hard.			100%	155m			93%	Bedding 11°. Widely spaced bedding plane fractures lined with calcite + pyrite. Pyrite flecks throughout.		
				100%	157.10			97%	As above but only 2 fractures + no joints.		
Limestone FR.	As above.			100%	159.20			93%	As above. Solid core except for 4 bedding plane fractures in the bottom metre. Calcite joints.		
				100%	160m						

Drill type Mayhew
Feed Mechanical.
Core barrel type HQDriller E. Lodwick
Commenced 13/11/75
Completed 12/1/76
Logged by L.J. David
Vertical scale 1cm:1m

Checked by

Notes

Fracture Log — Number of fractures per 25 cm of core. Zones of core loss blocked in Bedding and Joint Planes — Angles are measured relative to a plane normal to the core axis.

Defect Frequency — Number of natural defects (shears, joints, fractures) per 25 cm of core occurring at specified intercept angle range

Water Level Measurements — ☒ Level when hole in progress at specified depth
☒ Level in completed hole on specified date

Water Pressure Tests

* Values in lugeons should be read in conjunction with computation sheets. Test sections are indicated by blocked in strips.

Core Photograph Negative No.

Depth (m) Black & White Colour

SHEET 9 OF 15

M(Pf)146

GEOLOGICAL LOG OF DRILL HOLE

ANGLE FROM HORIZONTAL (°) 90° DIRECTION
COORDINATES 212253 E, 602525 N. R.L. OF COLLAR 570 m

SHEET 10 of 15

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc	Graphic Log	Depth and size of Core	Fracture Log	RQD	Defect Frequency Intercept Angle	Structures Joints, veins, seams, faults, etc	Water Level	Water discharge (lugeon) "
As above			180.25 180m				Occasional massive pyrite blebs (25cm)		
			100%		97%		Occasional fossilised coral band		③
			183.25				Only 4 fractures, one pyrite lined.		
	Mottled light + dark grey. Strong + hard. (3-5 cm bands)		100%		100%		Some disseminated pyrite.		
	A 13cm band of medium sand with calcareous matrix at 184.54m.		185m				5 bedding plane fractures widely spaced.		
			186.25				Calcite joint.		
	At 187.05m an almost massive light limestone commences, darker bands have decreased to 1mm "cracks" between lighter limestone.		100%		100%				
			189.25						
	A return to mottled limestone (light + dark grey) with 3-5 cm bands.		190m		100%		Fossils (shelly + corals) are abundant, some time more so in the darker bands + vice versa.		
			100%				Disseminated pyrite in dark bands but blebs (large) in light bands.		
			192.25				3-5cm calcite veins but more commonly 1-2 cm.		
			100%		100%		Fracture fill of massive pyrite + pyrrhotite 3-5cm wide + 7-8cm long at 191.70.		
			195.25		100%		As above but fossils almost absent.		
			195m						
Fresh Cherty Mudstone.	Strong dark coloured slightly calcareous mudstone		80%		90%		Joint calcite + pyrite lined.		
			198.25						
Interbedded Limestone + Mudstone FR	Mottled light + dark bands. Strong + hard.		100%		61%		Dark bands (mudstone) are slightly to non-calcareous while lighter bands (limestone) are.		Δ Δ Δ Δ Δ Δ Δ Δ
			200m				Thick joint (1-2cm) filled		

Drill type Mayhew
Feed. Mechanical
Core barrel type HQDriller E. Lodwick
Commenced 13/11/75
Completed 12/4/76
Logged by L. J. David
Vertical scale 1cm: 1m

Checked by

Notes

Fracture Log — Number of fractures per 25 cm of core. Zones of core loss blocked in Bedding and Joint Planes — Angles are measured relative to a plane normal to the core axis
Defect Frequency — Number of natural defects (shears, joints, fractures) per 25 cm of core occurring at specified intercept angle range.Water Level Measurements — ☒ Level when hole in progress at specified depth
☒ Level in completed hole on specified date

Water Pressure Tests

* Values in lugeons should be read in conjunction with computation sheets. Test sections are indicated by blocked in strips.

Core Photograph Negative No.

Depth (m) Black & White Colour

GEOLOGICAL LOG OF DRILL HOLE

ANGLE FROM HORIZONTAL (θ) 90°
COORDINATES 212253E, 602525NDIRECTION
R.L. OF COLLAR 570m

SHEET 11. OF 15

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc	Cement Graphic Log and % core recovery	Depth and size of Core	Fracture Log	RQD	Defect Frequency Intercept Angle	Structures Joints, veins, seams, faults, etc	Water Level	Water Pressure Test Losses (Lugeons) #
						0 30 60 80 90			
As Above			200m				calcite + pyrite. Fractures are 5-10cms apart + are filled with pyrite & calcite or chlorite. Fragmented zone from 198.60m to 201.20m causing WATER LOSS.		Structural Log. A A
Mudstone and Limestone FR	Slightly calcareous dark grey mudstone occurs which becomes more calcareous downward until a 2-3cm limestone band occurs at the base. Cycle repeats every 60-70cms. Mudstone is siliceous. Both lithology strong + hard.		200.75				Fractured zone (2-7cm apart) from 201.25m - 201.55m then solid core until 202m where another 30cm zone occurs, another slightly less fractured zone (2-20cm apart) from 203.25m - 204.25m. Fractures pyrite calcite lined. Some fossil bands (small bivalves?).		A A
			201.25				Calcite joints. Pyrite + calcite on fracture planes. Fairly fractured (14-15cms)		A A
			100%		72%				
			204.25				Calcite + pyrite on fracture planes, only slightly fractured.		
Cherty Mudstone FR.	Slightly calcareous, dark grey, strong and hard.		100%		62%				
			205.50						
			205.60						
Mudstone and Limestone FR	As above		207.45				Calcite veins. Joints calcite + pyrite lined (60-90cms apart). Fractures rare, except for fragmented bottom 40cm. Rare coralline fossils.		
			100%		40%				
			210m						
			210.65						
			100%		95%				
			213.30				Fractures 2-10cms. apart in top 80cms then 10-30cms, frequently pyrite + calcite lined. Pyrite + calcite lined joint.		
			100%		67%				
			215m						
	Limestone becomes less frequent towards 216.30m.		216.30						
Cherty Mudstone FR.	No limestone but otherwise as above.		216.30				Fractures infrequent. Joints calcite + pyrite filled.		
			100%		48%				
			219.30						
			219.30						
See next page			100%		90%				
			220m						

Drill type Mayhew
Feed Mechanical
Core barrel type HQ
Driller E. Ladwick
Commenced 13/11/75
Completed 12/4/76
Logged by L.J. David
Vertical scale 1cm = 1m

Notes

Fracture Log — Number of fractures per 25 cm of core. Zones of core loss blocked in.
Bedding and Joint Planes — Angles are measured relative to a plane normal to the core axis.
Defect Frequency — Number of natural defects (shears, joints, fractures) per 25cm of core occurring at specified intercept angle range.
Water Level Measurements — I Level when hole in progress at specified depth
II Level in completed hole on specified date

Water Pressure Tests

* Values in lugeons should be read in conjunction with computation sheets. Test sections are indicated by blocked in strips.

Core Photograph Negative No.

Depth (m) Black & White Colour

GEOLOGICAL LOG OF DRILL HOLE

ANGLE FROM HORIZONTAL (θ) 90° DIRECTION _____
COORDINATES 212253E, 602525N R.L. OF COLLAR 570m

SHEET 12 OF 15

Driller: E. Lodwick
Commenced 13/11/79
Completed 12/4/76
Logged by L. J. D.
Vertical scale 1cm!

Fracture Log — Number of fractures per 25 cm of core. Zones of core loss blacked in
Bedding and Joint Planes — Angles are measured relative to a plane normal to the core axis
Defect Frequency — Number of natural defects (shears, joints, fractures) per 25 cm of core occurring at specified intercept angle range
Water Level Measurements — ∇ Level when hole in progress at specified depth
 ∇ Level in completed hole on specified date.

* Values in lugeons should be read in conjunction with computation sheets. Test sections are indicated by blocked in strips.

Depth (m)	Black & White	Colour
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GEOLOGICAL LOG OF DRILL HOLE

ANGLE FROM HORIZONTAL (8) 90°
COORDINATES 212253 E, 602525 NDIRECTION
R.L. OF COLLAR 570m

SHEET 13 OF 15

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc	Cemented Graphic Log	Log	Depth and size of core	Fracture Log	RQD	Defect Frequency Intercept Angle	Structures Joints, veins, seams, faults, etc	Water Level	Water Pressure Test Losses (Lugeons) #
							0 30 60 80 90			
	Limestone cyclicity as before			240m						
	Lighter layer at 241.05 consisting of round coral remnants. Underlain by 30cms of several 2-4cm 1st. layers. Limestone bands now less regular (25-70 cms apart)			241.00				Joints pyrite + calcite lined. Vertical joint 2-3mm wide. Calcite veins.		
	Get a 20cm limestone band after mudstone to 244.55			243.80				Fractures widely spaced from 10-40cms. Calcite + pyrite joints.		
				245m						
				246.80						
				85%						
	Dark mudstone with some very thin lighter patches or bands, one commencing at 250.95m			249.20				Core ground away. Coral and shelly fossils are abundant and scattered throughout. Core relatively unfractured (only 4 fractures) Pyrite, calcite joints + fractures.		
				250m						
				251.00				Lighter bands become more apparent (2-5cms) + frequently are more abundant in fossil content. One thick light band (white) of 25cm thickness contains 3-8mm stringers + blebs of pyrite. Only 2 fractures spaced at ~1.5m.		
				100%						
	Only 1 light band (3-4cms) at 256.40m. A yellow-green band at 257.80 (5cms)			257.00				Calcite vein + joint. Almost continuous core.		
				258m						
				257.00						
	A 5cm limestone band occurs at 257.12m, 30cms below which thinner (0.5-1cm) limestone bands occur every 5cms. This continues to 258.85m where pure mudstone takes over until 259.45 where a limestone band commences.			260.00				Shear zone for last 25cms which is extensively calcite veined. Calcite veins.		
				260m						

Drill type Mayhew

Feed Mechanical

Core barrel type HQ

Driller E. Lodwick

Commenced 13/11/75

Completed 12/4/76

Logged by L.J. David

Vertical scale 1cm:1m

Notes

Fracture Log — Number of fractures per 25 cm of core. Zones of core loss blocked in

Bedding and Joint Planes — Angles are measured relative to a plane normal to the core axis

Defect Frequency — Number of natural defects (shears, joints, fractures) per 25cm of core occurring at specified intercept angle range.

Water Level Measurements — ☒ Level when hole in progress at specified depth.☒ Level in completed hole on specified date.

Water Pressure Tests

* Values in lugeons should be read in conjunction with computation sheets. Test sections are indicated by blocked in strips.

Core Photograph Negative No.

Depth (m) Black & White Colour

GEOLOGICAL LOG OF DRILL HOLE

ANGLE FROM HORIZONTAL (θ) 90°
COORDINATES 212253E, 65025°NDIRECTION
R/L OF COLLAR 570m

Sheet 14 of 15

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc	Cement Graphic Log	Log and % core recovery	Depth and size of Core	Fracture Log	RQD	Defect Frequency Intercept Angle	Structures Joints, veins, seams, faults, etc	Water Pressure Test (Lugeon) *
							0 30 60 80 90		
As Above	Irregularly spaced lighter limestone bands, some thicker (2-3cms) + others thinner (0.5-1cm)		100%	260m				A 55cm extensively calcite veined + stringed interval.	
Limestone FR	Mottled light + dark grey Hard + strong.		100%	263.00 - 267.90				Calcite vein 0.5cm. Pyrite + calcite on joints + fractures. Coralline + corioid remains. Fractures 15-120 cm apart. Calcite vein. Fossils rare (coral). Limestone bands often contain rounded masses of white calcite 2-3cms in diameter. Pyrite blebs in darker matrix.	
Siltstone with Limestone FR	Dark slightly calcareous intervals with occasional 2-5cm limestone bands. 10cm band of mottled limestone at 266.55m.		100%	264.00 - 269.00				Fractures 3-15 cm apart for top 70 cms then 30-90cms. Calcite vein.	
			100%	270m - 272.00				Disseminated pyrite flecks. Some fossils. Calcite vein. Fractures 3-30 cms apart.	
Mudstone FR	Silicified + very dark grey. Hard + strong		100%	272.00 - 275.00				Fossils (bivalve + coral) fairly abundant as are white calcite masses. Calcite vein.	
Siltstone and Limestone FR	As above (264.50-272.00) but with slight more mottled appearance. Becomes more mottled until 278.10m where it turns to siltstone with occasional limestone bands. 4 cms calcareous sandstone bands at 279.10 - 279.50.		100%	277.50 - 280m				Fossils less abundant until 278.10 when they disappear almost completely.	

Drill type Mayhew
Feed Mechanical
Core barrel type HQDriller E. Lodwick
Commenced 13/11/75
Completed 12/4/76
Logged by L. J. David
Vertical scale 1cm:1m

Notes

Fracture Log — Number of fractures per 25 cm of core. Zones of core loss blocked in.

Bedding and Joint Planes — Angles are measured relative to a plane normal to the core axis.

Defect Frequency — Number of natural defects (shears, joints, fractures) per 25 cm of core occurring at specified intercept angle range.

Water Level Measurements — ∇ Level when hole in progress at specified depth
 ∇ Level in completed hole on specified date

Water Pressure Tests

* Values in lugeons should be read in conjunction with computation sheets. Test sections are indicated by blocked in strips.

Core Photograph Negative No
Depth (m) Black & White Colour

Checked by

GEOLOGICAL LOG OF DRILL HOLE

ANGLE FROM HORIZONTAL (°) 90°
COORDINATES 21225° E, 6025° NDIRECTION
R/L OF COLLAR 5.70 m

SHEET 15 OF 15

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc	Cement Log	Fracture Log	RQD	Defect Frequency Intercept Angle	Structures Joints, veins, seams, faults, etc	Water Level	Water Pressure Test Losses (Lugeons) #
As above	Limestone bands every 1 to 1.5m	280.00 100% 281.00 100% 284.00 100% 285.00 100% 287.00 290.00 89% 291.80 100% 294.60 295.00 100% 296.40 297.15 100%	280.00 281.00 284.00 285.00 287.00 290.00 291.80 294.60 295.00 296.40 297.15 300.00		0 30 60 80 90	Fossils rare except for one band of polyzoa (10cms) at 282.00m Fractures 3-5cms apart in a 30cm zone at 281.85m, then solid core. Calcite + pyrite on fractures Calcite veins. 30cms of fractured dark grey cherty mudstone at 284.00m. Rest is fairly solid (fractures 8-70cms apart) Calcite veins. Occasional coral + limestone band. Large calcite vein with associated stringers. Calcite + pyrite in small stringers as well as on fractures + joints. A 50°, 5cm thick joint of calcite at 287.35 with associated brecciation Calcite veins. Occasional fossil bands containing numerous spary calcite rounded masses 2-3 cms in width Core ground away. Joint pyrite lined. Rare coral fossil. Coral fossils + white calcite masses are abundant from 293.40m. Calcite vein Contains occasional polyzoan fossils A 20cm band of dark mudstone (cherty) at 296.75m Calcite + pyrite lined joints Calcite vein Polyzoa + calcite masses abundant in places.		
Limestone FR	Mottled light + dark grey Hard + strong.	100%	295.20 296.40					
Siltstone and Limestone FR	Strong + hard.	100%	297.15 300.00					

END OF HOLE 300m

Drill type Mayhew
Feed Mechanical
Core barrel type HQDriller E. Lodwick
Commenced 13/11/75
Completed 12/4/76
Logged by L.J. David
Vertical scale 1cm:1m

Notes

Fracture Log - Number of fractures per 25 cm of core. Zones of core loss blacked in.
Bedding and Joint Planes - Angles are measured relative to a plane normal to the core axis.
Defect Frequency - Number of natural defects (shears, joints, fractures) per 25 cm of core occurring at specified intercept angle range.Water Level Measurements - ☒ Level when hole in progress at specified depth
☒ Level in completed hole on specified date

Water Pressure Tests

* Values in lugeons should be read in conjunction with computation sheets. Test sections are indicated by blacked in strips.

Core Photograph Negative No.

Depth (m) Black & White Colour

Rock Type and Degree of Weathering		Description Lithology, colour, strength, etc.	Casing Graphic Log	Lift and % core recovery	Depth and size of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
		NO CORE		0-61	0m					
Sand & Clay	Orange-brown silty sand, minor clay Grey-orange-brown silty sand Grey-yellow-brown silty sand Clayey silty sand		25% 1-22 1-52 1-83 2-13 2-18	50% 100% 70% 55%						
Shale & clay EW	Khaki-orange sandy clay & sesquioxides grading to banded white & brown shale		100% 2-90 100% 3-50						Clay, Fe, Mn on joints Very closely jointed Quartz vein 2-3mm wide Moderately close steeply dipping joints Sheared with clay in places Fractured 5-4-6-0m Fe, Mn on joints Moderately closely to closely jointed; Smooth continuous joints Fractured 6-3-7-0m	
Siltstone HW	Yellow-brown and light brown		100% 4-11 100% 4-79 100% 5-49		5m					
			100% 7-93 100%		10m				Bedding at 15° Moderately to closely jointed; joints dip 40°-70°	
Siltstone MW-HW	Brown to grey		100% 13-21 100% 15-86		15m				Open joints, generally steeply dipping; weak zone with breccia & clay Fe, Mn, clay on moderately close joints Closely jointed; joints at 50° & 70° Wider spaced joints than above; smooth with Fe, Mn Fracture zone	
Siltstone MW	Grey, banded in places with tuffaceous patches, moderately strong		100% 17-98						Bedding at 10° Fe, clay on joints; some irregular, some smooth	
Siltstone SW	Grey, strong		100% 19-20 100%		20m				Smooth, continuous joints & some irregular open joints	

Drill type Mayhew 1000
 Feed Mechanical
 Core barrel type Triefus 2 1/2"
 Driller K. Huth, BMR
 Commenced 11/12/75
 Completed 19/12/75
 Logged by G. Briscoe

Notes

Fracture Log - Number of fractures per 25cm of core. Zones of core loss blocked in.

Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.

Water Level Measurements - ☒ Level when hole in progress at specified depths
☒ Level in completed hole on specified date.

Checked by _____

Core Photograph Negative No.

Depth(m)	Black & White	Colour

155/A16/1790

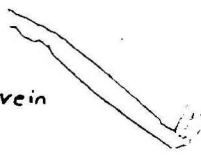
BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS GEOLOGICAL LOG OF DRILL HOLE		PROJECT <u>STRATIGRAPHIC DRILLHOLE</u> LOCATION <u>SECTION 4, RUSSELL</u> ANGLE FROM HORIZONTAL (θ) <u>90°</u> DIRECTION _____ COORDINATES <u>212370E 602349N</u> RL OF COLLAR <u>571m</u>					HOLE NO <u>146</u> SHEET <u>2</u> OF <u>2</u>		
Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Casing Graphic Log	Lift and % core recovery	Depth and size of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
Calcareous siltstone SW	Grey, strong mostly Some weak zones with fractured rock and clay		100% 20.42	20m				Moderately to closely jointed; Fe, Mn, clay, calcite, chlorite on joints Moderately closely jointed Steeply dipping close joints Brecciated zone, solution and alteration of soft fragments; small solution cavities	
			100% 22.55						
			100% 24.85						
			100% 25.91						
			? 27.43						
	END OF HOLE							27.43m	
Drill type <u>Mayhew 1000</u> Feed <u>Mechanical</u> Core barrel type <u>Tiefus 2 1/2"</u> Driller <u>K. Huth</u> Commenced <u>11/12/75</u> Completed <u>19/12/75</u> Logged by <u>G. Briscoe</u>		Notes Fracture Log - Number of fractures per 25cm of core. Zones of core loss blacked in Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis. Water Level Measurements - ☒ Level when hole in progress at specified depth ☒ Level in completed hole on specified date.					Core Photograph Negative No. Depth(m) Black & White Colour _____ _____ _____ _____		
M(P1) 221		Checked by _____					155/A16/1790		

PROJECT STRATIGRAPHIC DRILL HOLE
LOCATION SECTION 4, PARKES, A.C.T.
(CASING WITHDRAWN, HOLE ABANDONED 29/3/76)
ANGLE FROM HORIZONTAL (8) 90 DIRECTION _____
COORDINATES 212150E 601979N R.L. OF COLLAR 560m

SHEET 1 OF 2

b 20

Drill type <u>Mayhew</u>	Notes		Core Photograph Negative No.
Feed <u>Mechanical</u>	Fracture Log - Number of fractures per 25cm of core. Zones of core loss blocked in.		Depth(m) Black & White Colour
Core barrel type <u>Trifus 2 1/2"</u>	Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.		
Driller <u>K. Huth</u>	Water Level Measurements - <u>▽</u> Level when hole in progress at specified depth.		
Commenced <u>22/3/76</u>	<u>▽</u> Level in completed hole on specified date.		
Completed <u>29/3/76</u>			
Logged by <u>L. J. David</u>	Checked by _____		
M (PF) 221			155/A16/1791

BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS GEOLOGICAL LOG OF DRILL HOLE		PROJECT <u>STRATIGRAPHIC DRILL HOLE</u> LOCATION <u>SECTION 4, PARKES, A.C.T.</u> ANGLE FROM HORIZONTAL (θ) <u>90°</u> DIRECTION _____ COORDINATES <u>212152E, 601979N</u> R.L. OF COLLAR <u>560m</u>					HOLE NO <u>147</u> SHEET <u>2</u> OF <u>2</u>			
Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Casing	Graphic Log	Lift and % core recovery	Depth and size of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
Siltstone SW-MW becomes more weathered towards base	Interbedded green-grey and yellow rock Fine sand Band of fresh buffaceous rock at 24.70m			80%					Fracture zones 20.05-20.20, and at 20.45 Sheared clay 20.75-20.90 Rock fragmented 20.90-21.05m 21.35-21.45m 21.80-22.35m Sheared clay 22.40-22.50m 40-60cm core lengths Fractured 40-50cm core lengths  Calcite vein	
				100%						
				100%						
				100%						
Clay	Grey-white and mottled with brown			100%	24.35					
Limestone FR	Grey and white mottled. Hard and strong			100%	28.10					
Clay	Grey-white mottled with brown streaks			100%	29.30					
	END OF HOLE				30.20				30.20m	
Drill type <u>Mayhew</u> Feed <u>Mechanical</u> Core barrel type <u>Triplex 2 1/2"</u> Driller <u>K. Huth</u> Commenced <u>22/3/76</u> Completed <u>29/3/76</u> Logged by <u>L. J. David</u> M(P1) 221		Notes Fracture Log - Number of fractures per 25m of core. Zones of core loss blocked in. Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis. Water Level Measurements - ☒ Level when hole in progress at specified depth ☒ Level in completed hole on specified date. Checked by _____					Core Photograph Negative No. Depth(m) Black & White Colour _____ _____ _____ _____ _____ _____			
										155/A16/1791

PROJECT STRATIGRAPHIC DRILL HOLE
LOCATION 25KMS. FROM CANBERRA ON THE BARTON HWY HOLE NO 155
ANGLE FROM HORIZONTAL (G) 90° DIRECTION _____
COORDINATES 201600E, 626350N R.L. OF COLLAR 610m SHEET 1 OF 11

Drill type <u>Maxlew</u>	Notes Fracture Log - Number of fractures per 25cm of core. Zones of core loss blacked in. Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis. Water Level Measurements - <u>▽</u> Level when hole in progress at specified depths <u>▽</u> Level in completed hole on specified date.	Core Photograph Negative No.	
Feed <u>Mechanical</u>		Depth(m)	Black & White Colour
Core barrel type <u>H.R.</u>			
Driller <u>E. Ladwick</u>			
Commenced <u>3/5/76</u>			
Completed			
Logged by <u>L.J. David</u>			
M(Pf) 221	Checked by		155/A16/2071

GEOLOGICAL LOG OF DRILL HOLE

PROJECT STRATIGRAPHIC DRILL HOLE
LOCATION 25 KILOMETRES FROM CANBERRA ALONG BARTON HWY
ANGLE FROM HORIZONTAL (°) 90° DIRECTION _____
COORDINATES 201600E 626350N R.L. OF COLLAR 610m

HOLE NO 155

SHEET: 3 OF 11

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Casing Graphic Log	Lift and % core recovery	Depth end size of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
As Above	20-70m gets 10cm brown band (SW). 20-80m gets a thinly bedded (0.5-2.0cm) interval which commences with a 20cm band of medium grained sat. with quartz, pink + white feldspar framework		100%	20-30				Calcite stringers + veinlets. 20-80-21.10m. badly fractured + weathered Joint slightly FeO stained	
Limestone FR	Light + dark grey mottled bands (2-3cm) (0.5-1.0cm) After 21.50m where darker bands are 5-20cm + light (3-5cm)		100%	22-10				Occasional calcite veins in bedding planes (2-5 mm) The few bedding plane fractures lined with FeO ± MnO.	
	24-20, medium grained quartz-feldspathic framework set in a light colored calcareous matrix.		100%	24-60				Shelly fossils abundant from 25-60 but gradually decrease to 26-80.	
	25-50m, another medium (5cm) grained sand band, as above.		100%	27-60				Calcite vein Rare shelly fossil.	
	32-40m, colour change to greenish grey. 32-50m, 20cm medium sand band as above.		100%	29-60				3cm calcite vein in bedding plane + calcite stringers. at 30-25m. Occasional shelly fossil	
	Light bands decrease until they disappear and dark grey mudstone is left at approx 35-25m.		100%	32-10				Joints + fractures below 32-40m FeO lined. Thick bedding calcite veins (0.5-1.0cm)	
Ashstone FR	Light green colour, massive.		100%	35-25				Joints + fractures lightly calcite lined. 5cm calcite vein at 35-45m	
Dacite FR	Strong + hard. High feldsparic content and poor flow structure or bedding. Green grey in colour.		100%	36-40				Rare lighter 1-2cm mottled bands where calcite has infiltrated.	
Ashstone HW	Green, prominent flow structure(?)		100%	38-25				Pronounced 1-2cm clay bands on fractures + calcite.	

Drill type Mayhew
Feed Mechanical
Core barrel type HQ
Driller E. Lodwick
Commenced 3/5/76
Completed _____
Logged by L. J. David

M(PY) 221

Notes

Fracture Log - Number of fractures per 25cm of core. Zones of core loss blocked in.

Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.

Water Level Measurements -  Level when hole in progress at specified depth
 Level in completed hole at specified date.

Checked by _____

Core Photograph Negative No.		
Depth(m)	Black & White	Colour

155/A16/2071

BUREAU OF MINERAL RESOURCES,
GEOLOGY & GEOPHYSICS

GEOLOGICAL LOG OF DRILL HOLE

PROJECT STRATIGRAPHIC DRILL HOLE

LOCATION 25 km FROM CANBERRA ALONG BARTON H.WY.

HOLE NO 155

ANGLE FROM HORIZONTAL (°) 90° DIRECTION

COORDINATES 201602E, 626350N RL OF COLLAR 610m

SHEET 3 OF 11

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Casing Graphic Log	Lift and % core recovery	Depth and use of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
Dacite S.W.	Strong and hard. High feldspathic content and poor flow structure or bedding. Gray green in colour	V	40.35 100% 41.45 100% 42.55 100%	40.00 42.70				Arsenopyrite blebs (1-2 mm) surrounded by iron oxide, 0.5 cm diameter altogether.	
Ashstone F.R.	As above.		42.00 42.91						
Limestone F.R.	Mottled light and dark grey. Strong hard dark bands only slightly calcareous.		100% 45.30	45.00		b 32 v 30 b 50		Extensive veining (calcite) and stringers for 30 cm at 43.00. Calcite vein (0.5 mm) Bedding plane calcite vein	
Mudstone F.R.	Dark grey and massive. Strong, hard. Occasional light 1st blocks		100% 46.90	46.00		v 0		4 cm calcite vein termination. Terminates in band (5-7 cm) of fragments + dark grey clay.	
Limestone F.R. Bedded.	Slightly mottled light and mid grey, bedded. Strong and hard. Light mottled 1st starts at 48.20 and becomes finely bedded in places until 49.85m where light and mid-grey bedded 1st occurs (0.2-10 cm beds).		47.90 100% 50.30 100% 53.30 100% 56.00 100%	48.00 50.00 55.00 56.00 57.00		v 85 b 28		calcite vein Fragmented zone.	
Mudstone, Siltstone F.R.	Dark to mid-grey, massive with occasional bedding. Slightly calc.		100%					Fragmented zone.	

Drill type Maxham
Feed Mechanical
Core barrel type H.Q.
Driller E. Lodwick
Commenced 3/5/76
Completed
Logged by L.J. David

M(P1) 221

Notes

Fracture Log - Number of fractures per 25 cm of core. Zones of core loss blocked in

Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.

Water Level Measurements - ☒ Level when hole in progress at specified depth
☒ Level in completed hole on specified date.

Checked by

Core Photograph Negative No.
Depth (m) Black & White Colour

155/A16/2071

BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS	PROJECT <u>STRATIGRAPHIC DRILL HOLE</u>	HOLE NO <u>155</u>
	LOCATION <u>25 km from CANBERRA ON BARTON HWY</u>	
GEOLOGICAL LOG OF DRILL HOLE	ANGLE FROM HORIZONTAL (8) <u>90°</u> DIRECTION _____	SHEET <u>4</u> OF <u>11</u>
	COORDINATES <u>201620E, 626350N</u> RL OF COLLAR <u>610m</u>	

PROJECT STRATISGRAPHIC DRILL HOLE
LOCATION 25 km FROM CANBERRA ON BARTON HWY
ANGLE FROM HORIZONTAL (θ) 90° DIRECTION _____
COORDINATES 201620E, 626350N RL OF COLLAR 610m

HOLE NO 153

SHEET 4 OF 11

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Coring Graphic Log	Lith and % core recovery	Depth and size of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
As Above.	Occasional light coloured calcareous "swirls".		100%	60.00					
			62.00					Fracture zone.	
			100%						
			65.00	65.00				Jointing lined by calcite	
	2 calcareous sand layers		100%					clay in fractures.	
			68.00						
			100%						
			69.40						
			70.00						
			100%						
			73.70						
			100%	75.00					
	calcareous sand layer.		76.60						
			100%						
			79.60						
			100%	80.00				Calcite vein (1.5 cm)	

Drill type Mayhew
Feed Mechanical
Core barrel type H.R.
Driller E. Lockwick
Commenced 3/5/75
Completed _____
Logged by L. J. David

M(Pf) 221

Note 3

Fracture Log - Number of fractures per 25cm of core. Zones of core loss blocked in.

Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.

Water Level Measurements - ∇ Level when hole in progress at specified depth.
 Δ Level in completed hole on specified date.

Checked by _____

Core Photograph Negative N⁴⁵

Depth(m)	Black & White	Colour
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155/A16/2071

HOLE NO 55

SHEET 5 OF 11

Drill type <u>Mayhem</u>	Notes	Core Photograph Negative No.	
Feed <u>Mechanical</u>	Fracture Log - Number of fractures per 25cm of core. Zones of core loss blocked in	Depth(m)	Block & White Colour
Core barrel type <u>H.R.</u>	Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.	-----	-----
Driller <u>E. Lodwick</u>	Water Level Measurements - ☒ Level when hole in progress at specified depth	-----	-----
Commenced <u>3/5/76</u>	☐ Level in completed hole on specified date.	-----	-----
Completed		-----	-----
Logged by <u>L. J. David</u>		-----	-----
M(P1) 221	Checked by -----		
			155/A16/2071

BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS		PROJECT <u>STRATIGRAPHIC DRILL HOLE</u>		LOCATION <u>2.5 km FROM CANBERRA ON BARTON HWY</u>		HOLE NO. <u>155</u>			
GEOLOGICAL LOG OF DRILL HOLE		ANGLE FROM HORIZONTAL (°) <u>90°</u> DIRECTION		COORDINATES <u>201600E, 626350N</u> R.L. OF COLLAR <u>610m</u>		SHEET <u>7</u> OF <u>11</u>			
Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Casing Graphic Log	Lift and % core recovery	Depth and use of Core of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc	Water Level
As above	As above		100% 121.00	120.00					
			100% 124.00	125				shear zone - rock frags., stringers minor clay.	
			100% 127.00					Fracture zones occur through out the unit.	
			100% 128.75						
			100% 130						
			100% 131.05						
Sandstone F.R.	Strong and hard. Quartz grains in calc. matrix. Some lighter limy bands.		100% 131.40					Contact gradational. Crossbedding.	
			100% 132.70						
Sandstone Interbedded F.R.	Interbedded fine and medium grained sandstone. Fine grained sandstone has 1'st. frags included		100% 134.40					Qtz andesite and calc. clasts.	
			100% 135						
			100% 136.10					136.10 - Sharp fracture. stringers (calcite).	
			100% 136.90						
			100% 139.00						
			100% 140						

BUREAU OF MINERAL RESOURCES,
GEOLOGY & GEOPHYSICS
GEOLOGICAL LOG OF DRILL HOLE

PROJECT STRATIGRAPHIC DRILL HOLE
LOCATION 25 km from CANBERRA on BARTON HWY.
ANGLE FROM HORIZONTAL (G) 90° DIRECTION _____
COORDINATES 201600E, 626350N R.L. OF COLLAR 610m

HOLE NO 155
SHEET 9 OF 11

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Casing Graphic Log	Lift and core recovery	Depth and size of core	Fracture Log	R.O.D.	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
As above	Mottled dark & light grey l'st. Interb. s'st. + l'st.		100% 161.67 100% 164	160 0 5 10 15				j 25° qtz. filled joint (bedding plane fracture) slickensided b 20° brecciated zone (10cm)	
Calcareous s'stone. F.R.	Interbedded fine and medium grain calc. sandstone. Loosely cemented.		164.67 100% 166.57	165				j 50° joint with calcite and pyrite fill. Slickensides on bedding planes. v 65° calcite vein	
Mottled Limest.	Brecciated at bottom core		100% 167.07						
Sandstone. F.R.	Calcareous light grey sandstone, loosely cemented. Loose compaction probably due to low intensity shearing. Shearing plane at ≈ 25°		167.37 100% 170.07 100% 171.17	170				calcite joints Bedding planes slicken-sided Vertical stringers (1-1.5 m) of calcite.	
Interbedded limestone and mudstone. F.R.	Black mudstone (non-calc.) and light grey limestone. Grades to calc. mudst. and limestone. Mudstone grades into calc. s'st.		100% 174.17 100% 174.92 100% 175.80	175				b 20° bedding of fine m'st. lamination. b 25° cross bedding in calc s'st layers (right way up).	
Mottled Limestone. F.R.	Top 70cms consist of compacted l'st breccia Limestone fragments included		176.42 100% 179.42 100%	180				Breccia zone (compacted) b 30° calcite stringers. j 30° calcite lining on joints Intense fracturing.	

Drill type Mayhew
Feed Mechanical
Core barrel type H.Q.
Driller E. Lodwick
Commenced 3/5/76
Completed _____
Logged by R. Evans

Notes
Fracture Log - Number of fractures per 25cm of core. Zones of core loss blacked in.
Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.
Water Level Measurements - ☒ Level when hole in progress at specified depth
☒ Level in completed hole at specified date.
Checked by _____

Core Photograph Negative No.
Depth (m) Black & White Colour

BUREAU OF MINERAL RESOURCES,
GEOLOGY & GEOPHYSICS
GEOLOGICAL LOG OF DRILL HOLE

PROJECT STRATIGRAPHIC DRILL HOLE
LOCATION 25 kms FROM CANBERRA ON BARTON HWY
ANGLE FROM HORIZONTAL (°) 90° DIRECTION
COORDINATES 201600E 626350N R.L. OF COLLAR 610 m

HOLE NO. 155

SHEET 10 OF 11

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Casing Graphic Log	Depth Lift and % core recovery	Depth of core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
As above.	Silica content increases to make limestone a calcareous m'st. Mottled light and dark grey m'st. (impure l'st.). Some minor fine gr. s'st.		100% 182.42 100% 185.12 100% 187.4	180 185 187.4				Pyrite crystals on fracture planes. Completely sheared and weathered material. Now consists of grey clay. pebbly l'st. layers (1-2cm) commonly occur, fractured along bedding planes.	
Limestone F.R.	light grey limestone, grading into calc. s'st. (as above)		100% 188.12 15% 191.12	188.12 190 191.12				187.62-187.67 fault.	
Mudstone F.R.	Calcareous m'st, dark grey, and light grey fine grained s'st.		194.47 195.82 197.42	195 197.42				Vertical fractures. calcite stringers	
Sandstone F.R.	Fine-grained calcareous sandstone		198.63	198.63				Highly fractured. Calcite veins along bedding	

Drill type Mayhew
Feed Mechanical
Core barrel type H.Q.
Driller E. Lodwick
Commenced 3/5/76
Completed _____
Logged by R. Evans
M (Pt) 221

Notes

Fracture Log - Number of fractures per 25cm of core. Zones of core lost blacked in.

Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.

Water Level Measurements -  Level when hole in progress at specified depths.
 Level in completed hole on specified date.

Checked by _____

Core Photograph Negative No.		
Depth(m)	Block & White	Colour

155/A16/2071

BUREAU OF MINERAL RESOURCES,
GEOLOGY & GEOPHYSICS
GEOLOGICAL LOG OF DRILL HOLE

PROJECT STRATIGRAPHIC DRILL HOLE
LOCATION 25 km FROM CANBERRA ALONG BASTON HWY.
ANGLE FROM HORIZONTAL (°) 90° DIRECTION _____
COORDINATES 201600 R.L. OF COLLAR _____

HOLE NO 155
SHEET 11 OF 11

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Coating Graphic Log	Lift and % core recovery	Depth of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
As above			100% 200.45	200.0					
Mudstone. F.R.	Black - Blue grey massive mudstone (carbonaceous?)		100% 203.42	201.00				Mudstone shows an irreg. fracture pattern, predominately in a vertical direction.	
			100% 205					Small calcite stringers	
			100% 206.42					Highly calcareous zone (70cm)	
			100% 210.02	210				clay filled fracture.	
Limestone F.R.	light grey 1'st bands		100% 211.30	210.80		b	80	bedding.	
Mudstone F.R.	Interbedded s'st. & m'st. Light grey calcareous mudstone with occasional s'stone interbeds.		100% 213.02			b	45	calcite stringers	
			100% 215			b	30	calcite on bedding fractures	
			100% 216.02						
	light grey s'st.		100% 217.25			b	25		
Limestone (Impure). F.R.	light and dark grey silty limestone, grading into calc. sandstone with 1'st. fragments.		100% 219.02			v	20	Calcite on bedding (1cm)	
			100% 220			b	20		

Drill type Mayhew
Feed Mechanical
Core barrel type M.Q.
Driller E. Lodwick
Commenced 3/5/76
Completed _____
Logged by R. Evans

M(P1)221

Notes
Fracture Log - Number of fractures per 25cm of core. Zones of core loss blocked in.
Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.
Water Level Measurements - ☒ Level when hole in progress at specified depth
☒ Level in completed hole at specified date.
Checked by _____

Core Photograph Negative No.
Depth(m) Black & White Colour

155/A16/2071

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc	Casing Graphic Log	Lift and % core recovery	Depth and size of Core	Fracture Log	RQD	Defect Frequency					Structures Joints, veins, seams, faults, etc	Water Level	Water Pressure Test Losses (Lugeons) "	
							Intercept Angle								
							0	30	60	80	90				
	Not Cored			1-50											
Clay.	Clayey soil dark brown, moderately stiff, very friable.		100%												
				4-10											
			30%												
				5-40											
			100%												
	Sandy soil - friable			6-40											
Mudstone Fragments H.W. - M.W.	Hard light-brown mudstone fragments in stiff grey - brown; red-brown clay matrix.		50%												
				8-10											
			60%												
				10-05											
			60%												
				11-70											
			H.W. - E.W. Mudstone.	90%											
				12-95											
			M.W. Highly fractured Mudstone.	90%											
				13-95											
	90%														
	14-90														
	Qtz pebbles	q													
			100%	15-75											
Mudstone M.W. - S.W.	Bands of yellow- brown + purple E.W. mudstone. mudstone. E.W. Mudstone. E.W. Mudstone.		90%												
				17-20											
			100%												
				19-75											

BUREAU OF MINERAL RESOURCES,
GEOLOGY & GEOPHYSICS

PROJECT Stratigraphic Drill Hole
LOCATION Section 25, TURNER A.C.T.

HOLE NO. 157

GEOLOGICAL LOG OF DRILL HOLE

ANGLE FROM HORIZONTAL (θ) 90°
COORDINATES 210287E, 604988N
Mt Stromlo Metric grid

DIRECTION
R.L. OF COLLAR 563 m

SHEET 2 OF 2

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc	Casing Graphic Log	Lift and % core recovery	Depth and size of Core	Fracture Log	RQD	Defect Frequency					Structures Joints, veins, seams, faults, etc	Water Level	Water Pressure Test Losses (Lugeons) *				
							Intercept Angle											
							0	30	60	80	90							
Same as above M.W. Purple Mudstone M.W. - S.W.	Yellow brown banding		100%															
			21.75															
	M.W. Highly fractured mudstone.		100%														Δ Δ Δ Δ	
			22.70														Δ Δ Δ Δ	
			100%														Δ Δ Δ Δ	
			24.75															
	Black layers present		100%															
			25.75															
	Yellow brown layers		100%															
			26.75															
		100%																
		27.90																
		100%																
		30.20																
END OF HOLE 30.20 m.																		

Drill type Mayhew
Feed Mechanical
Core barrel type Tripes 2 1/2"
double barrel core
Driller L. Keast
Commenced 13/5/76
Completed 20/5/76
Logged by R. Evans
Vertical scale 1cm. = 1m.

Notes
Fracture Log — Number of fractures per 25 cm of core. Zones of core loss blacked in.
Bedding and Joint Planes — Angles are measured relative to a plane normal to the core axis.
Defect Frequency — Number of natural defects (shears, joints, fractures) per 25 cm of core occurring at specified intercept angle range.
Water Level Measurements — ▼ Level when hole in progress at specified depth.
▽ Level in completed hole on specified date.

Water Pressure Tests
* Values in lugeons should be read in conjunction with computation sheets. Test sections are indicated by blacked in strips.
Core Photograph Negative No.
Depth (m) Black & White Colour

BUREAU OF MINERAL RESOURCES,
GEOLOGY & GEOPHYSICS

PROJECT STRATIGRAPHIC DRILL HOLE
LOCATION SECTION 25 TURNER, A.C.T.

HOLE NO 158

SHEET 1 OF 3

Rock Type and Degree of Weathering	Description Lithology, colour, strength, etc.	Coring Graphic Log	Lith and % core recovery	Depth and use of Core	Fracture Log	RQD	Structural Log	Structures Joints, veins, seams, fault, etc.	Water Level
				0.00				0.97m 7/11/77	
	Not Cored		1.50						
Stiff clayey soil E.W.	yellow-stained grey clay pebbly-gravel stiff grey clay and pebbles.		50% 100%	2.75 3.00 4.30 4.60				gravel contains small and large pebbles. Small pebbles are reddish brown, large pebbles are quartz.	
Mudstone M.W.	Yellow-brown to red-brown mudstone, strong but highly fractured. clay clay clay clay bands are yellow clay clay Red-brown to purple mudstone. M.W.		100% 80% 70% 60% 80% 90%	5.00 7.00 8.00 9.00 10.00 13.45 14.65 15.00 16.75 19.55 20.00				Fractures and joints show MnO and FeO staining. Few pieces larger than 10 cms long. 65° 80° Highly fractured. MnO and FeO staining Highly fractured, some minor clay. 40° 75° Bedding 40° Gravel may be joint filling	
Alluvium	Brown pebbly gravel.		100%	20.00					

Drill type Mayhew
Feed Mechanical
Core barrel type H.Q.
Driller L. Keast
Commenced 20/5/76
Completed 28/5/76
Logged by R. Evans

Notes

Fracture Log - Number of fractures per 25cm of core. Zones of core loss blocked in.

Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.

Water Level Measurements - ∇ Level when hole in progress at specified depths
 ∇ Level in completed hole on specified date

Core Photograph Negative No.		
Depth(m)	Black & White	Colour

155/A16/1788

PROJECT Stratigraphic drill hole
LOCATION Section 25 TURNER A.C.T.
ANGLE FROM HORIZONTAL (θ) 90° DIRECTION
COORDINATES 210337 604938 R.L. OF COLLAR 861 m
Mt. Stromlo Metric Grid

SHEET 3 OF 3

Drill type <u>Mayhew</u>	Notes	Core Photograph Negative No.		
Feed <u>Mechanical</u>	Fracture Log - Number of fractures per 25cm of core. Zones of core loss blocked in.	Depth(m)	Block & White	Colour
Core barrel type <u>H.R.</u>	Bedding & Joint Planes - Angles are measured relative to a plane normal to the core axis.	-----	-----	-----
Driller <u>L. Keast</u>	Water Level Measurements - ☒ Level when hole in progress at specified depths	-----	-----	-----
Commenced <u>20/5/76</u>	☐ Level in completed hole on specified date.	-----	-----	-----
Completed <u>28/5/76</u>		-----	-----	-----
Logged by <u>R. Evans</u>		-----	-----	-----
M(P1) 221	Checked by -----			
				155/A16/1788