86/13

NORTHERN TERRITORY GEOLOGICAL SURVEY

TECHNICAL REPORT

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Department of Mines and Energy

Summary Report on 1982 Stratigraphic Drilling
Huckitta 1:250 000 map sheet area

GS 86/13

By M.J. Freeman, and N. Donnellan

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APPENDICES

1. SUMMARY

Details of twelve stratigraphic drill holes, (DDH. NTGS.HUC 1-9, 9A, 10-11) drilled to an aggregate depth of 2034.3m, are reported. The original proposal and relative success of each hole is recorded. A summary lithological log of each hole is presented.

The project was an integral part of remapping of the Huckitta 1:250 000 map sheet, situated on the SW margin of the Georgina Basin. Principal objectives were to (a) refine our knowledge of the Adelaidean to Cambrian stratigraphy, (b) formalise the Arthur Creek beds as a formation and (c) contribute to our understanding of the structural geology of the area. These three objectives were achieved and surpassed. It proved possible to extend the programme; the supplementary drilling meeting with variable success.

The drilling contractors were Leanda Drilling (Queensland) Pty. Ltd., of Charters Towers.

Drillhole localities are shown on the second edition of the Huckitta map sheet (Freeman, in press).

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2. INTRODUCTION

Stratigraphic diamond drilling conducted during the 1982 field season in the Southern Region of the N.T., by the Northern Territory Geological Survey (NTGS) was intended to complement the remapping of HUCKITTA*. The drilling program was aimed at elucidating several problems associated with the Adelaidean to Middle Cambrian stratigraphy of the SW Georgina Basin.

The original proposals were to:

1) achieve a complete section of the Arthur Creek beds,
2) confirm our structural interpretation of the N Jervois Range,
3) provide a complete section of the sequence from the Arrinthrunga Formation down to crystalline basement in the Elua Syncline,
4) test the westerly extent of the arenaceous facies of the Arthur Creek beds,
5) assess the presence and nature of the Elkera and Errarra formations in the Mopunga Range, and
6) assess the presence of certain faults in the Mopunga Range.

* 1:250 000 scale map sheets names are abbreviated to capitals

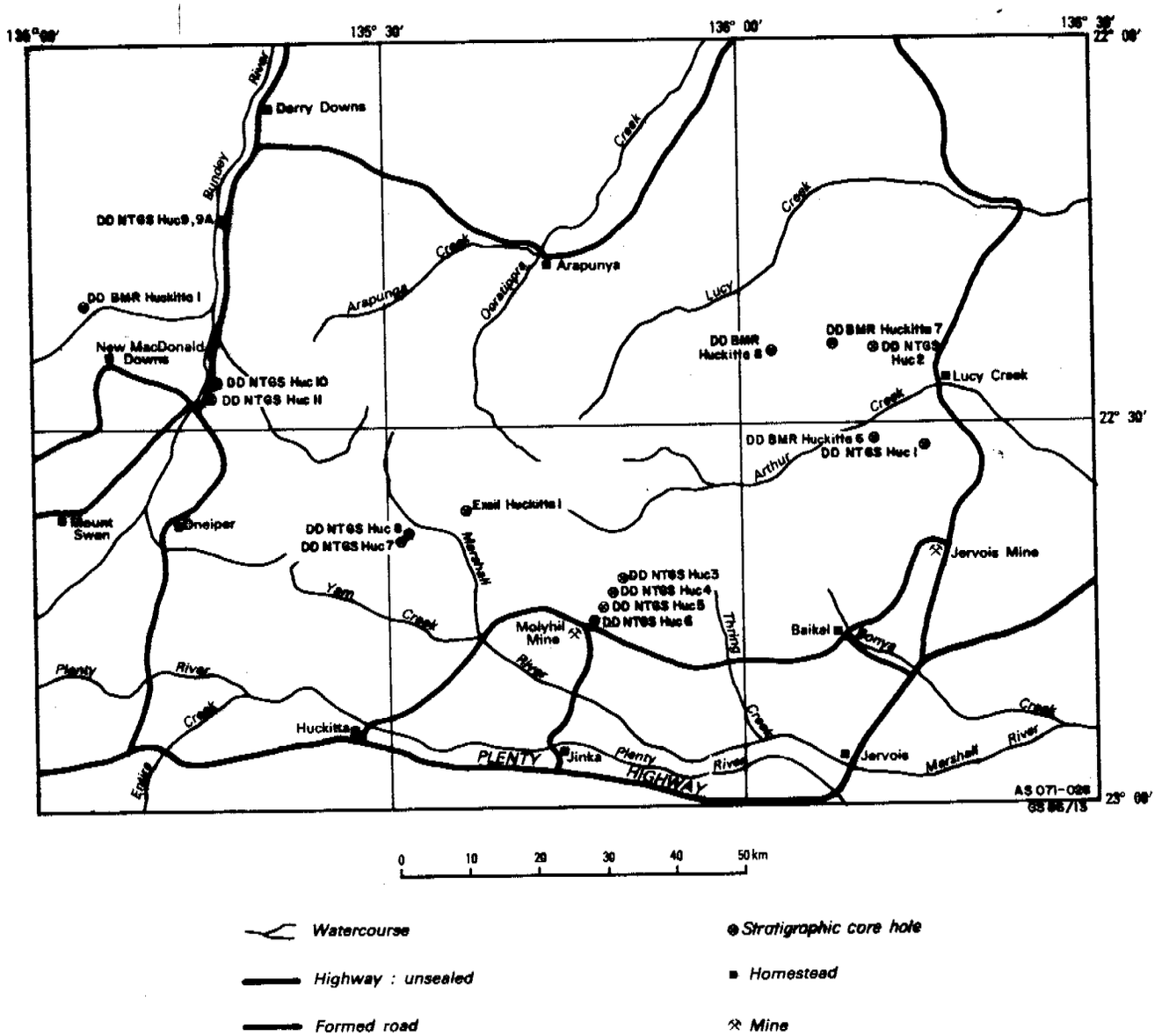


Fig. 1 Location of stratigraphic core holes, Huckitta (1:250 000) map

It was possible to extend the program because:

1) the Elua Range was substantially thinner than anticipated, and
2) specific drilling costs were less than estimated.

Two attempts to drill through the Dulcie Sandstone were aborted because of drilling difficulties. Subsequently two exploratory holes south of the Dulcie Sandstone outcrops near the Bundey River gave unexpected and very interesting results. This phase of the drilling program should eventually be followed up with additional drilling.

The locations of all the diamond drill holes (DDH) are given in Appendix 1 and shown on the second edition Huckitta 1:250 000 map sheet. The aims of each hole and an assessment of its success in terms of the original aims are outlined in Section 3. Outlines of the aims were specified in a memorandum from M.J. Freeman to the Chief Geologist, and this memorandum is included as Appendix 2.

The core was lithologically logged in the field and supplementary examination of selected sections was undertaken in the NTGS core laboratory in Alice Springs. Drilling of the last four holes (HUC 9, 9A, 10, 11) proceeded while all geologists were engaged in other work, and these cores were not logged until drilling had ceased. Lithological logs of all DDHs are included as Appendix 1.

All collars are identifiable in the field with the drill hole number welded onto a steel plate which is attached to a concreted post.

3. DRILLING RESULTS

The drilling contract was allocated to Leanda Drilling (Queensland) Pty. Ltd., of Charters Towers. The Contractor arrived on site on 7th June, 1982, and drilling was completed on the 3rd October. A summary of the drilling rates and costs is included in Appendix 3.

3.1 Drilling on Arthur Creek plain.
DDH. NTGS. HUC 1 and HUC 2

Holes HUC 1 and HUC 2 were proposed to complement cored hole BMR. Huckitta 6 (renamed from Grg 6) (Milligan, 1963) and thereby provide a complete section through:

(a) the lower siltstone facies, DDH.NTGS.HUC1
(b) the middle carbonate facies, DDH.BMR.Huckitta 6, and
(c) the upper arenaceous facies, DDH.NTGS.HUC 2

of the Arthur Creek beds. It was hoped to formalise the Arthur Creek Formation using the core as the lectostratotype. The approximate localities of the drillhole collars is in Figure 6 of Appendix 2.

This drilling was successful beyond expectation. HUC 1 and HUC2 (drilled near the locality of hole 3 in Figure 6 of Appendix 2) overlapped by approximately 75 m, providing a complete section through all three facies which total 417.6 m. In addition, approximately 129 m of the Errarra Formation were unexpectantly encountered between the base of the Arthur Creek Formation and the top of the Mount Baldwin Formation in HUC 1. The Errarra Formation had previously not been recognised within about 60 km of this locality. Subsequently lithologically similar rocks were recognised in poor outcrops along the N flank of the Jervois Range. leading to refinement of the geology on the map.

The Arthur Creek Formation and Errarra Formation will be formalised in Freeman (in press).

It had been interpreted that many of the structures in the Georgina Basin in HUCKITTA were related to basement fault block movement. HUC 1 entered the Mount Baldwin Formation at 372.5 m, below horizontal younger rocks, yet was collared some 3 km from outcrop in which the formation dipped at 40°. This intersection confirms the interpretation that the NW margin of the Jervois Range is a monocline.

Of particular note in HUC 1 was the oily scum which floated on the circulation water at several intervals from 80 to 200 m. The Arthur Creek Formation is potentially an excellent hydrocarbon source rock.

3.2 Drilling in the Elua Range

Four holes were drilled to give a complete section from the base of the Arrinthrunga Formation to crystalline basement. The collar localities are shown in Appendix 2, Figure 1.

3.2.1 DDH.NTGS.HUC 3

This hole was drilled to;

a) give a section through the Grant Bluff Formation which is only partly exposed,
b) give a section through the Elyuah Formation which does not outcrop in the Elua Range,
c) determine if the Oorabra Arkose occurs in this part of the Elua Syncline, and
d) establish the nature of the basement-cover contact.

The hole was successful. The Grant Bluff Formation consists of 84.5 m of sandstone and silty sandstone with rare gypsum and disseminated pyrite. The Elyuah Formation consists of 67.3 m of red and green-grey shale with a basal pebble conglomerate. The formation overlies the Jinka Granite with a sharp contact, and the Oorabra Arkose was not encountered.

3.2.2 DDH.NTGS.HUC 4

This hole was intended to;

a) provide a reference section for the Elkera Formation,
b) expose the contact between the Grant Bluff Formation and the Elkera Formation, and
c) assess the nature of the contact with the Mount Baldwin Formation.

The hole was only partially successful because it was collared in Elkera Formation (concealed by colluvium). It intersected 86.5 m of dusky red, micaceous siltstone and fine sandstone with green-grey intervals, overlying 5 m of porous, grey sandstone contaning ferruginous patches. The contact between the Grant Bluff and Elkera formations is gradational.

3.2.3 DDH.NTGS.HUC 5

This hole was intended to;

a) give a complete section of the Mount Baldwin Formation,
b) expose the Errarra-Mount Baldwin formation's contact,
c) expose the disconformity between the Mount Baldwin and Elkera Formations, and
d) additionally, this hole was needed to give a complete section of the Elkera Formation when combined with HUC 4.

The hole intersected 16.6 m of red to dusky red sandstone overlying 66.3 m of silty sandstone. No breaks in the sequence were recognised in the lower section and it is inferred that the disconformity occurs at this change of lithology. However this gives an extremely thin section for the Mount Baldwin Formation. Correlation of the sections in HUC 4 and HUC 5 was achieved only by graphical estimation on a vertical cross-section; no lithological correlation was established although this may be possible if more detailed logging is undertaken.

3.2.4 DDH.NTGS.HUC 6

This hole was intended to;

a) provide a reference section of the Errarra Formation,
b) assess if the Arthur Creek Formation occurs in the Elua Syncline, and
c) expose the contacts between the Arrunthrunga, Arthur Creek, Errarra and Mount Baldwin formations.

The hole intersected 30 m of Arthur Creek Formation calcareous siltstone, overlying 64.1 m of Errarra Formation dolostone which, in turn overlies Mount Baldwin Formation.

The Arrinthrunga - Arthur Creek Contact is gradational, the Arthur Creek - Errarra contract is a cavern and the Errarra - Mount Baldwin contact is gradational over 0.8m.

3.2.5 Assessment of Elua Range holes.

Formation thicknesses interpreted for the proposal these four holes were much greater than was actually intersected. This means the dip of the formations is lower than suggested by the outcrops and is, on average, about 3° S rather than 8-10° as originally thought.

3.3 Drilling in the Mopunga Range.

One hole was proposed for the Mopunga Range and its objectives were;

a) to establish if the Arthur Creek Formation occurred this far W,
b) to assess the nature of the Errarra Formation and consider using the section as a stratotype,
c) to intersect the Elkera Formation and determine if it is significantly pyritic, and;
d) the ascertain if there are faults present.

The drill hole, DDH.NTGS.HUC 7, entered fresh Arthur Creek Formation under very weathered siltstone at about 40 m. This confirmed the existence of the Arthur Creek Formation siltstone below areas of very pale grey chalcedony which occur in the stratigraphic position of the formation in W HUCKITTA. Errarra Formation dolostone and siltstone was intersected between 68 m and 128.5 m and Elkera Formation siltstone down to 204 m. There is a possibility of faulting within the Elkera Formation having duplicated part of the section. Minimal pyrite occurs.

As a result of this intersection it was decided to recollar at HUC 8, approximately 200 m N of the HUC 7 collar locality, and determine what rock types occurred concealed under the plain between the Arthur Creek Formation in HUC 7 and outcrops of Arrinthrunga Formation just N of the collar locality of HUC 8.

The hole entered. Arrinthrunga Formation below the collar. It penetrated a fault zone containing both Arrinthrunga and Arthur Creek formations in fault-bounded slices, and was abandoned because of drilling difficulties while probably still in the fault zone at a depth of 130 m.

3.4 Drilling in the Dulcie Range.

As noted in the introduction, it was possible to extend the drilling program beyond the original proposal.

It was planned to site two holes in the N limb of the Dulcie Syncline to provide a complete section through the Dulcie Sandstone and a complete, or at least a partial section of the Tomahawk beds. Access and water availability restricted the drilling site to the vicinity of the Bundey River, and the first hole was located near to a percussion drill hole sited by the Water Investigation Unit (N.T. Department of Transport and Works, now Mines and Energy)

DDH.NTGS.HUC 9 was drilled to 83.5 m depth but had to be abandoned because of continuous hole collapse.

DDH.NTGS.HUC 9A was collared 30 m S of HUC 9 and non-core drilled to 60 m. Coring was advanced to 121.7 m when the same difficulties as in HUC 9 forced an abandonment of this hole also. As a result, the Dulcie Sandstone was deemed undrillable with the existing drilling equipment.

A consequence of these problems with HUC 9, 9A was that no attempt was made to drill further N on the flank of the syncline. Even if a hole could have been successfully drilled in essentially analogous lithologies further N, a complete section of the Dulcie Sandstone would not have been achieved with a single hole of maximum depth of 400 m. In retrospect, field work has since demonstrated that it is questionable whether the proposed holes would have given complete penetration of the Dulcie Sandstone because of the formation thickness and structure. The recognition of two units of the Dulcie Sandstone, (Dud_1, and Dud_2) principally on photogeological charaterisitcs by N. Donnellan, has obviated the apparent, marked asymmetry of the Dulcie Sandstone, despite overall shallow dips. Lithological differentiation of the above-mentioned two units is problematical.

3.5 Drilling in the Bundey River plain

Capability for this final phase of stratigraphic drilling in 1982 resulted from the holes in the Dulcie Sandstone failing to reach their target depths. The proposal was to drill in an area of extensive soil cover overlying Adelaidean to Cambrian strata. Regional mapping indicates that some lensing out of the strata occurs and the drilling was intended to assess the presence of any strata penetrated and hence given an indication of lensing of particular formations. To maximise depth penetration within the strata, 40 m of noncore drilling was proposed through the Tertiary, which had been difficult to core in HUC 9, and the holes were to be terminated at 127m for budgetry reasons.

DDH.NTGS.HUC 10 cored Errarra Formation dolostone between 45-127 m, suggesting that a full stratigraphic sequence is preserved this far west, and that any lensing-out of the strata occurs west of the Macdonald Downs - Derry Downs road.

DDH.NTGS.HUC 11 gave very surprising and interesting results. A thick sequence of marls, clays, calcareous sandstone and carbonaceous claystone was cored in the interval 43.7 - 126.7 m. The microflora from the carbonaceous intervals yielded pollen of the genus Gambierina which implies a late Cretaceous to later Palaeocene age (E. Trusswell, pers. comm., 1983). further work will be undertaken on this pollen assemblage. All geological staff were directed to be in Alice Springs at the time that this hole was completed and the rig removed. It is lamentable that a complete section was not achieved through this probably localised Late Cretaceous - early Tertiary basin of deposition. The only comparable sediments known in central Australia occur near Ayers Rock, some 600 km distant (Twidale and Harris).

4. CONCLUSIONS

Investigation of the Cambrian sequence proved particularly successful. Sections from HUC 1 and 2 will permit fomalisation of the Arthur Creek Formation and Errarra Formation. The spatial distribution of these two formations was refined and their outcrop extent increased.

Useful reference sections were also established for the Elyuah, Grant Bluff, Elkera and Errarra formations in the Elua Range.

A localised basin of Late Cretaceous to early Tertiary sediments was located in the western part of HUCKITTA. Further drilling is recommended to completely sample the whole section, formalise the stratigraphy and better define the age of the whole section and its distribution.

5. REFERENCES

FREEMAN, M.J., in press - Huckitta, 1:250 000 Geological Series. Northern Territory Geological Survey, Explanatory Notes, Sheet SF53/11

MILLIGAN, E.N., 1963 - The Bureau of Mineral Resources Georgina Basin core drilling programme. Bureau of Mineral Resources, Australia, Record 1963/86 (unpublished).

TWIDALE, C.R., and HARRIS, W.K., 1977 - The age of Ayers Rock and The Olgas, Central Australia. Transactions of the Royal Society of South Australia, 101, 45-50

APPENDIX 1

Summary drill hole logs

DDH.NTGS.HUC 1

Collar locality: Arthur Creek plain, N of Jervois Range and 11 km SW of Lucy Creek homestead.

Lat 22°31'50"S Long 136°15'04"E
Grid Reference PR 273072
Map: 1:100 000, Jervois Range 6152
Drill hole dip at collar: 90°
Drill hole collared 8/6/82, completed 25/6/86
Logged by: M.J. Freeman, J.R. Laurie (150-300 m)

Summary lithological log

0.0-125.4 m	Calcareous siltstone, medium to dark grey, laminated, flaser bedded, disseminated, fine pyrite grains common; limestone bed 7-9 m
125.4-139.6 m	Calcareous siltstone with chert lenses and laminae
139.6-220.7 m	Calcareous siltstone, rare beds possibly with fine grained sandstone
220.7-243.4 m	Calcareous siltstone, locally contains flat-pebble conglomerate, contains brachiopods
243.4-245.1 m	Dolomitic limestone to siltstone, pale grey, very thin bedded,
245.1-247.1 m	Siltstone, sandstone, calcareous, pale brown-grey
247.1-250.8 m	Limestone, dolomitic, vuggy, recrystallised; chert bed at base
250.8-261.2 m	Siltstone with thin sandstone beds and rare granule to pebble conglomerate siliceous pale green-grey, very thin to thin-bedded
261.2-262.5 m	Limestone, coarse grainstone, chert pebbles
262.5-273.7 m	Siltstone and sandstone pale brown laminated; chert clasts
273.7-310.7 m	Calcareous siltstone to sandstone with limestone beds, laminated, pale grey-brown to green-grey; chert clasts locally
310.7-346.9 m	Laminated siltstone and sandstone, pale green grey; medium brown, friable, medium to coarse sandstone, locally with silty laminae; interbeds of white, porous sandstone, locally calcareous, contains green-grey silt laminae; grey to white concretionary chert nodules near top.
346.9-369.5 m	Dolostone; recrystallised, porous, vuggy, poorly bedded, very pale pink to very pale green, contains disseminated glauconite grains and archaeocyaths, stylolites common; lower 2 m is pale red and contains siltstone laminae

369.5-372.5 m	Distinct fining upward sequence; basal pebbly granule conglomerate with quartzite, gneiss, shale clasts on irregular, sharp base, overlain by sandstone, overlain by laminated mudrock with graded bedding
372.5-384.0 m	Sandstone, dark reddishg brown, with feldspar granules, strongly coherent.
384.0 m	EOH

Stratigraphic Log

0.0-243.4 m	Arthur Creek Formation, Middle Cambrian
243.4-372.5 m	Errarra Formation, Early Cambrian
372.5-384.0 m	Mount Baldwin formation, Early Cambrian

Note that to avoid contamination, no soluble oil was used while drilling the organic-rich Arthur Creek Formation, only aluminium core trays were used and Au and Ag rings and other items of jewellery were not permitted while handling the core during logging.

DDH.NTGS.HUC 2

Collar locality: N of the Arthur Creek plains and 12 km NW of Lucy Creek homestead.
Lat 22°23'07"S Long 136°11'17" E
Grid Reference: PR224241
Map: 1:100 000, Lucy 6153
Drill hole dip at collar: 90°
Drill hole collared 27/6/82, completed 9/7/82
Logged by: J.R. Laurie, M.J. Freeman (220 m-EOH)

Summary lithological log

0.0-12.6 m	Extremely weathered vuggy clayey rock
12.6-20.4m	Dolostone, pale grey to brown, laminated to thin-bedded
20.4-49.7m	Limestone, dolomitic, vuggy, recrystallised, laminated, pale grey to pale brown
49.7-74.7m	Calcareous sandstone to sandy limestone with rounded quartz sand up to very coarse-grained, pale grey to brown grey
74.7-203.8m	Calcareous siltstone, medium to dark grey, laminated, with 0.5 - 1.5 m beds of pale grey micrite; pyrite is commonly disseminated throughout; local nodules more calcareous and silt laminae curve around or through, fossil fragments common.
203.8-268.73m	Calcareous siltstone as above but with no limestone.
268.73m	E.O.H.

Stratigraphic log

0.0-20.4 m	Arrinthrunga Formation, Late Cambrian
20.4-EOH	Arthur Creek Formation, Middle Cambrian

Note that to avoid contamination, no soluble oil was used while drilling the organic-rich Arthur Creek Formation, only aluminium core trays were used and Au and Ag rings and other jewellery were not permitted while handling the core during logging. Correlation with HUC 1 established; 203.8 m in this hole is same as at 9 m in HUC 1.

DDH.NTGS.HUC 3

Collar locality: Elua Range, 10 km NE of Molyhil
Lat 22°43'00"S Long 135°40'56"E
Grid reference: NQ846875
Map: 1:100 000, Jinka 6052
Drill hole dip at collar: 90°
Drill hole collared 13/7/82, completed 20/7/82
Logged by: M.J. Freeman

Summary lithological log

0.0-7.0 m	No core
7.0-9.3 m	Claystone, micaceous, laminated, dark yellow
9.3-10.7 m	Sandy claystone
10.7-15.2 m	Sandstone, very thin-bedded, medium-grained shale interlaminations, yellow-grey
15.2-16.7 m	claystone, micaceous, pale re-purple
16.7-17.1 m	Sandstone, very thin-bedded, fine to coarse-grained, feldspathic, pale grey
17.1-18.6 m	Sandy claystone
18.6-37.0 m	Sandstone, medium grained, very thin-bedded, flat-pebble conglomerate, pale grey, disseminated pyrite
37.0-38.0 m	Mudrock, medium to thin-bedded, very dark grey
38.0-58.8 m	Interlaminated sandstone and pyritic siltstone
58.8-71.4 m	Sandstone, fine grained, laminated to very thin-bedded
71.4-89.1 m	Interlaminated silty sandstone and sandstone
89.1-93.8 m	Sandstone, fine to medium-grained, grey, laminated to thin-bedded
93.8-192.7 m	Shale, some thin silty beds, green-grey or dusky red
192.7-193.3 m	Pebble conglomerate with green-grey siltstone
193.3-199.5 m	Granite
199.5 m	E.O.H.

Stratigraphic log

0.0-10.7 m	Elkera Formation, Ediacarian
10.7-93.8 m	Grant Bluff Formation, Ediacarian
93.8-193.3 m	Elyuah Formation, Ediacarian
193.3-199.5 m	Jinka Granite, middle Proterozoic

DDH.NTGS.HUC 4

Collar locality: Elua Range, 9 km NE of Molyhil
Lat 22°42'25'S Long 135°49'16'E
Grid Reference: NQ842868
Map: 1:100 000 Jinka 6052
Drill hole dip at collar: 90°
Drill hole collared 21/7/82, Completed 24/7/82
Logged by: A.M. Walley

Summary lithological log

0.0-7.5 m	No core
7.5-94.5 m	Siltstone, sandy, to fine grained, silty sandstone, micaceous, laminated to thin bedded, red-brown
94.5-107.4 m	Sandstone, fine to medium-grained rarely to coarse-grained, porous, micaceous, pale grey to pink-grey; with claystone interlaminae
107.4 m	EOH

Stratigraphic log

0.0-94.5 m	Elkera Formation, Ediacarian
94.5-107.4m	Grant Bluff Formation, Ediacarian

DDH.NTGS.HUC 5

Collar locality: Elua Range, 8km NE of Molyhil
Lat 22°44'00"S Long 135°49'00"E
Grid Reference: NQ837857
Map: 1:100 000 Jinka 6052
Drill hole dip at collar: 90°
Drill hole collared 24/7/82, completed 27/7/82
Logged by: A.M. Walley

Summary lithological log

0.0-8.9 m	Dolostone and silty dolostone, yellow-grey to red-brown, siltstone interbeds, stromatolite (at 4.7 m)
8.9-15.2 m	Siltstone, sandy, micaceous, laminated to thin-bedded, red-brown and grey-green
15.2-30.5 m	Sandstone, fine-grained, silty, micaceous, laminated red-brown, changes to green-grey; siltstone interbeds and interlaminae
30.5-42.6 m	Sandstone, medium to coarse-grained, red-brown, thick-bedded to laminated, cross-bedded
42.6-87.9 m	Sandstone, fine-grained, some beds medium-grained, micaceous, thin-bedded, red-brown
87.9-112.7 m	Siltstone, laminated to medium bedded, micaceous, red-brown with green-grey beds, slumped, sandy beds
112.7 m	EOH

Stratigraphic log

0.0-8.9 m	Errarra Formation (base may be at 15.2 m) Early Cambrian
8.9-30.5 m	Mount Baldwin Formation (base uncertain) Early Cambrian
30.5-112.7 m	Elkera Formation Ediacarian

DDH.NTGS.HUC 6

Collar locality: Elua Range, 7 km NE of Molyhil
Lat 22°44'39"S Long 135°48'45"E
Grid Reference: NQ831847
Map: 1:100 000, Jinka 6052
Drill hole dip at collar 90°
Drill hole, commenced 28/7/82, completed 7/8/82
Logged by M.J. Freeman

Summary lithological log

0.0-4.0 m	No core
4.0-19.7 m	Dolostone, pale grey, recrystallised, styolites common, silty
19.7-20.9 m	Sandstone, silty, yellow-orange; interbedded yellow-grey dolostone
20.9-50.9 m	Dolostone, recrystallised, pale-grey to brown, with sandstone as thin interbeds and interlaminae
50.9-80.9 m	Calcareous siltstone to silty limestone medium dark grey, laminated, pyritic
80.9-81.7 m	Cavity
81.7-92.1 m	Calcareous dolostone, recrystallised, pale orange, vuggy, archaeocyaths
92.1-100.3 m	Siliceous calcareous siltstone, grey
100.3-121.4 m	Dolostone, micrite, recrystallised, pale grey, pyritic, stylolitic, cpy on one styolite
121.4-146.5 m	Silty limestone to dolostone, locally arenaceous to rudaceous, recrystallised, styolitic; variety of rock types
146.5-150.0 m	Siltstone, sandy, micaceous laminated, red
150.0 m	EOH

Stratigraphic log

0-50.9 m	Arrinthrunga Formation, Late Cambrian
50.9-80.9 m	Arthur Creek Formation, Middle Cambrian
80.9-146.5 m	Errarra Formation, Early Cambrian
146.5-150.0 m	Mount Baldwin Formation, Early Cambrian

DDH.NTGS.HUC 7

Collar locality: Mopunga Range, 24 km WNW of Molyhil
Lat 22°39'38"S Long 135°32'00"E
Grid Reference: NQ547942
Map: 1:100 000 Jinka 6052
Drill hole dip at collar 55°, azimuth 198° (true)
Drill hole, commenced 9/8/82, completed 16/8/82
Logged by: A.M. Walley

Summary lithological log

0.0-40.4 m	Broken core of vuggy carbonate rock and nodules of chalcedony
40.4-68.0 m	Calcareous siltstone, grey, laminated, fossiliferous
68.0-83.2 m	Dolostone, broken, yellow-grey, vuggy, styloitic, archaeocyaths at 70 m
83.2-92.9 m	Calcareous siltstone, very thin to thick-bedded, undulose-bedded, styolitic
92.9-117.0 m	Dolostone and claystone, thickly interbedded, pale grey, rarely with granules
117.0-124.5 m	Siltstone, sandy, laminated to medium bedded, red-brown to yellow-grey, rare pebbles
124.5-128.5 m	Dolostone, pink-grey to grey, styolitic, calcareous siltstone interlaminae
128.5-146.7 m	Dolostone, grey, stomatolitic, brecciated
146.7-151.7 m	Sandy dolostone, laminated to thick-bedded, sandstone interbeds
151.7-159.0 m	Interbedded dolostone and sandstone, grey to reddish, intraclastic, gypsum-filled vugs
159.0-204.0 m	Siltstone, red-brown, dolomitic to calcareous with carbonate interveds, oncolites
204.0-217.3 m	Siltstone, sandy, dusky red to red-brown, laminated
217.3	E.O.H

Stratigraphic log

0.0-40.04 m	Deep-weathered Arthur Creek Formation, silcreted
40.4-68.0 m	Arthur Creek Formation, Middle Cambrian
68.0-128.5 m	Errarra Formation, Early Cambrian
128.5-217.3 m	Elkera Formation, Ediacarian

DDH.NTGS.HUC 8

Collar locality: Mopunga Range, 24 km WNW of Molyhil 200 m NNE of HUC 7
Lat 22°39'30"S Long 135°32'00"E
Grid Reference: NQ 546942
Map: 1:100 000, Jinka 6052
Drill hole dip at collar 55°, azimuth 198° (true)
Drill hole collared 18/8/82, completed 30/8/82
Logged by M.J. Freeman, A.M. Walley (90-130m)

Summary lithological log

0.0-3.0 m	No core
3.0-19.2 m	Broken core, dolostone and limestone, silty interlaminae, much clay pug
19.2-37.0 m	Dolostone and limestone, thin-bedded, silty interlaminae, pale grey to white; core-to-bedding angle ranges 90°-10°
37.0-38.3 m	Calcareous siltstone, micaceous, grey, weathered, faults common
38.3-38.4 m	White limestone
38.4-44.0 m	Calcareous siltstone, laminated, pink-brown
44.0-46.3 m	Limestone, pink to grey
46.3-87.9 m	Calcareous siltstone, decalcified
87.9-88.5 m	Dolostone
88.5-97.0 m	Calcareous siltstone, weathered, decalcified
97.0-115.9 m	Sandy limestone to calcareous dolostone, pale pink-grey
115.9-130.0 m	Laminated, green-grey, dolomitic to calcareous siltstone, slickenside common
130.0 m	E.O.H.

Note that numerous breaks in the core are inferred to be faults, core-to-bedding angles vary from 90° to 10° throughout.

Stratigraphic log

0.0-37.0 m	Arrinthrunga Formation
37.0-44.0 m	Arthur Creek Formation
44.0-46.3 m	Arrinthrunga Formation
46.3-87.9 m	Arthur Creek Formation
87.9-88.5 m	Arrinthrunga Formation
88.5-97.0 m	Arthur Creek Formation
97.0-115.9 m	Arrinthrunga Formation
115.9-130.0 m	Arthur Creek Formation

DDH.NTGS.HUC 9

Collar locality: Bundey River, 15 km S of Derry Downs
Lat 22°12'05" S Long 135°16'30" E
Grid Reference: NR284449
Map: 1:100 000, Macdonald Downs 5953
Drill hole dip at collar 90°
Drill hole collared 4/9/82, completed 10/9/82
Logged by: N. Donnellan

Summary lithological log

0-18.0 m	No core
18.0-18.7 m	Broken fragments of calcedony in pale yellow sandy clay
18.7-46.7 m	Pale pink to grey sandy clay, poorly indurated; no core 18.7-31.7 m and 34.7-40.7 m
46.7-89.7 m	Sandstone, medium-grained, well sorted, rounded, pink-grey to yellow, very thin to medium bedded, clayey laminae
89.7 m	EOH

Stratigraphic log

0-46.7 m	Waite Formation equivalent, Mio-Pliocene
46.7-89.7 m	Dulcie Sandstone, Devonian

DDH.NTGS.HUC 9A

Collar locality: Bundey River, 15 km S of Derry Downs, 30 m S of HUC 9
Lat 22°12'05" S Long 135°16'30" E
Grid Reference: NR284449
Map: 1:100 000 Macdonald Downs 5953
Drill hole dip at collar: 90°
Drill hole collared 11/9/82, completed 22/9/82
Logged by: N. Donnellan

Summary lithological log

0-60.0 m	No core
60.0-121.7 m	Sandstone as in Huc 9
121.70 m	E.O.H.

Stratigraphic log

60.0-121.7 m	Dulcie Sandstone Devonian

DDH.NTGS.HUC 10

Collar locality: Bundey River plain, 4 km NE of Old Macdonald Downs homestead
Lat 22°26'20"S Long 135°15'15'E
Grid Reference: NR261187
Map: 1:100 000, Macdonald Downs 5953
Drill hole dip at collar: 90°
Drill hole collared 24/9/82, completed 29/9/82
Logged by: N. Donnellan

Summary lithological log

0-7.8 m	No core
7.8-13.8 m	Calcedony, chalcedonic marly limestone, clay and granule conglomerate; ferruginised
13.8-45.7 m	No core, sequence of weakly indurated clay with sandy sections, colour pink to pale yellow
45.7-126.7 m	Dolostone, variously silicified and with clay laminae; pale colours, mostly grey to very pale yellow, lesser green-grey, greyish orange and yellowish brown, poorly bedded, recrystallised; stylolites are common.
126.7 m	E.O.H.

Stratigraphic log

0-45.7 m	Waite Formation equivalent, Mio-Pliocene
45.7-126.7 m	Errarra Formation is thought to be the most likely, though possibly Arrinthrunga Formation

DDH.NTGS.HUC 11

Collar locality: Bundey River plain, 3 km NE of Qld Macdonald Downs homestead
Lat 22°39'30"S Long 135°15'00"E
Grid Reference: NR255159
Map: 1:100 000 Macdonald Downs 5953
Drill hole dip at collar: 90°
Drill hole collared 30/9/82, completed 3/10/82
Logged by: N. Donnellan

Summary lithological log

0.0-6.7 m	No core
6.7-9.7 m	Silicified limestone with cap of calcedony; yellow-grey to white
9.7-43.7 m	No core drilling, indurated sandstone and mudrock
43.7-49.9 m	Marl, weakly cohesive; grades into clay in some intervals; pale green down to 45 m, then turns grey
49.9-57.0 m	Mudrock, sandy, grey, poorly bedded
57.0-95.3 m	Siltstone with mudrock and sandy interbeds; locally slightly calcareous; ranges yellow to grey or red;
95.3-108. m	Black claystone to mudrock, with wood fragments and, at 96.2 m "Compressed leaf litter", carbonaceous; with interbeds and interlaminae of pale grey sandy mudrock
108.1-126.7 m	Interbedded claystone, siltstone and sandstone; yellowish-grey
126.73 m	E.O.H.

Stratigraphic log

0.0-26.73 m	Tertiary sequence. Waite Formation equivalents (Mio-Pliocene) in limestone to 10 m

E. Truswell has examined the palynological components of the carbonaceous core (7 samples between 96.2 and 108.8 m) and considers they are of Palaeocene age.

APPENDIX 2

Proposal of project

MEMORANDUM

TO: CHIEF GEOLOGIST
Through RESIDENT GEOLOGIST

FROM: M.J. FREEMAN

RE: PROJECT PROPOSAL - STRATIGRAPHIC DIAMOND DRILLING

Stratigraphic drilling in the lower Georgina Basin sediments is now proposed; total length is 1500m in six drill holes.

Four holes for 900m (Appendix 1) in a traverse in the Elua Range Syncline will penetrate from the Upper Cambrian Arrinthrunga Formation through ?Arthur Creek beds, Errarra beds, Mt Baldwin Formation, Elkera Formation, Grant Bluff Formation and Elyuah Formation, to establish reference sections through complete formations (c.f. usually 10% - 20% in outcrop) to evaluate the nature of the five unconformities present, to permit a thorough biostratigraphic evaluation and to check for base metal levels. Details of each drill hole are in Appendix 1 and locality plan and cross sections in Figures 1 to 5.

One drill hole for 300m is proposed (Appendix 2) north of the Jervois Range. It will be collared in limestones of the middle Arthur Creek beds and penetrate a virtually non-outcropping underlying siltstone facies to the Mt Baldwin Formation. It will be correlated with BMR drill hole Huckitta No. 6 (drilled 1962) and the two hole swill provide a complete section of the lower 2/3 of the beds. It is shown as DDH1 in Figure 6.

Three alternatives exist for the final drill hole, in decreasing order or priority as below.

If the lower Arthur Creek beds hole does not penetrate through to Mt Baldwin Formation, the rig will be moved half way to Mt Baldwin Formation outcrops and full penetration of the siltstone should then be accomplished. It this situation does occur the drill hole depth is difficult to predict, but it could be up to 300m (Appendix 2, shown as DDH2 in Figure 6).

The second alternative for this hole is to collar in basal Arrinthrunga Formation and penetrate the upper sandstone facies of the Arthur Creek beds to achieve overlap with BMR Huckitta 6. This hole will be less than 200m and possibly as short as 110m (Appendix 3, shown as DDH3 in Figure 3).

These alternatives are illustrated in figure 6.

A final alternative drill hole, for 300m, in in the Mopunga Range, The drill hole will be collared in basal Arrinthrunga Formation and will penetrate a very thin or non-existant Arthur Creek beds sandstone facies, Errarra beds and Elkera Formation to stop in Grant Bluff Formation. The locality and section of the hole is shown in Figure 1 and detailed in Appendix 3. This would be drilled only if further considerations of the second alternative above imply that it should not be drilled.

Core processing requirements which are considered to be warrented are listed below.

Total Core Processing Requirements

Geological time	140 man-days
Technical Assistant	60 man-days
Drafting	35 man-days

External Costs

Analytical, processing	$10,000
Core trays, other sampling	2,500
	$12,500

Grading of access tracks.
Use of Alice Springs contractors possibly $2,500

It should be possible to reduce this by using local station graders.

Water cartage could add $500 to $1,000.

Also time spent in logging BMR Huckitta 6 drill hole, drilled in 1962, in Canberra could total 2 days initally then transport of core to Alice Springs and logging and processing here.

M.J. FREEMAN
GEOLOGIST

APPENDIX 1

Elua Range Syncline

Group of four holes as a single project.

Total estimated depth 900m.

Situation - As a traverse of drill holes north of Gap Bore, Elua Range. Water supply - Gap Bore, Jinka Station, is within 3 km of furthest drill hole.

DDH 1 - Basal Drill Hole, TD. 250 m

Possibly Stratigraphy:

0-80m	Grant Bluff Formation, laminated fissile sandstone.
80-230m	Elyuah Formation, shale
230-250m	Jinka Granite

Site Preparation:

Grading of several gutters from existing track approximately 500m.

Aims: Establish thickness of Grant Bluff Formation produce a complete section to show all rock types (unit commonly has 20% of section exposed). Establish thickness of Elua Formation. This is not exposed within approxiamtely 20km and usually 5% of formation is seen elsewhere.

This drill hole will be the first known in the formation and will provide a reference section for it.

It will expose the basal contact of the sediments resting upon Jinka Granite. It will determine if Oorabra Arkose is preserved in this part of the Elua Range Syncline.

Refer to Figures 1 and 2.

DDH 2 - Second Drill hole 300m TD. 875m south of #1.

Possible Stratigraphy:

0-5m	Mt Baldwin Formation (likely to be missed)
5-270m	Elkera Formation
270-300m	Grant Bluff Formation

Site Preparation:

200m grading of access track across gutters.

Aims: To expose disconformity between MT Baldwin formation as preserved, and hence determine proportion of upper Elkera Formation eroded. Usually 20% of Elkera Formation is exposed.

To establish a second reference section for the formation (other is 40km east of this site).

The base of this drill hole will be at the same stratigraphic level at the top of the hole #1. Recognizable overlap will need to be established before completing the hole.

Refer to Figures 1 and 3.

DDH 3 - Third Drill Hole TD. 150m. 970m south of #2.

Possible Stratigraphy:

0-20m	Errarra beds
20-110m	Mt Baldwin Formation
110-150m	Elkera Formation

Site Preparation:

Nil necessary

Aims: To establish a complete section through the Mt Baldwin Formation, (usually only the resistant quartzite comprising 50% of the unit crops out).

To expose the ?disconformity/paraconformity between the Errarra beds and the Mt Baldwin Formation.

To expose the uppermost part of Elkera Formation which is likely to be missed in hole #2.

This hole will be completed only after establishing continuity of section with the top of drill hole #2.

Refer to Figures 1 and 4.

LDH 4 : Fourth Drill Hole, TD. 200m, 225m south of #3.

Possible Stratigraphy:

0-25m	Arrinthrunga Formation
25-160m	Errarra beds
160-200m	Mt Baldwin Formation

Site Preparation:

Grading several hundred metres of access track onto low dolostone rise.

Aims: To produce a reference section of definition of the Errarra beds as a formal unit.

To establish the nature of the ?paraconformity between the Errarra beds and Arrinthrunga Formation.

To determine if any Arthur Creek bed rocks remain between these two units.

To establish the biostratigraphy and relationship of the above three units.

Correlation of the base of this section with that in hole #3 will be established before completing the drill hole.

Refer to Figures 1 and 5.

APPENDIX 2

Arthur Creek Plain

Two holes are considered likely, a third (intermediate in priority) is unlikely though a possibility.

Hole No 1 to 300m.

Probable Stratigraphy:

0-20m	Arthur Creek beds, carbonate facies
20-280m	Arthur Creek beds, siltstone facies
280-300m	Mt Baldwin Formatiom

Site Preparation:

Grading of access track proably not needed. Water cartage is approximately 8km.

Aims: To expose the basal unit of the Arthur Creek beds which is nowhere exposed. To determine if there is a likelihood of it containing hydrocarbons or being a source rock. Also to establish a type section for the elevation of the beds to formation status. It will complement the section in BMR drill hole Huckitta 6 drilled in 1962. As such, detailed logging of that BMR hole will be needed. It will also permit the biostratigraphic and palaeontological determination of the lower Arthur Creek beds.

Refer to DDH 1 in Figure 6.

Comments: The depth to Mt Baldwin Formation is unknown. If the drill hole exceeds 300m it is proposed to recollor a second hole nearer to the Mt Baldwin Formation (Figure 6) and to establish complete penetration. It is considered unlikely to be needed but is shown as DDH 2 in figure 6.

Hole No 3, to 100m

Probable Stratigraphy:

0-10m	Arrinthrunga Formation
10-80m	Arthur Creek beds, uppermost
80-100m	Arthur Creek beds, middle carbonate facies

APPENDIX 3

Mopunga Range

One hole for 300m.

Probably Stratigraphy:

0-10m	Arrinthrunga Formation
10-20m	?Arthur Creek beds, Arenaceous facies
20-200m	Errarra beds
200-350m	Elkera Formation

Site Preparation:

Grading of approximately 8km of access track may be needed. Water is available from 8km away.

Aims: To establish if the arenaceous facies of the Arthur Creek beds extends this far west. To produce a thick section of the Errarra beds which may be suitable as a type section for the elevation of the unit to formation status. To permit palaeontological examination of the Errarra beds. To evaluate if there is any primary pyrite in the Elkera Formation to explain the widespread ironstone distrubution of the formation in this area.

The plan and section of the hole is in figure 7.

Site Preparation:

Nil, drilled adjacent to station track. Water cartage approx. 3km.

Aims: To produce a section through the uppermost unit of the Arthur Creek beds. This will be tied into the BMR Huckitta 6 drill hole. It will enable detailed stratigraphic logging of the unit and along with the BMR Huckitta 6 the first hole in this group, will facilitate formalization of the Arthur Creek beds.

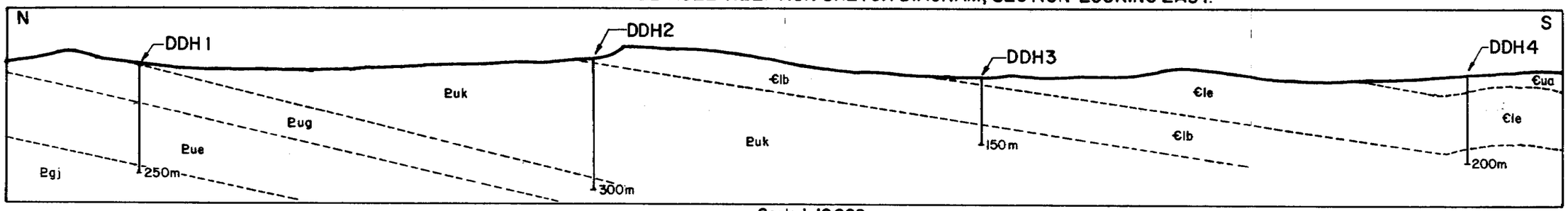
Comments: This group of drill holes will need to have the BMR core logged in Canberra to determine the suitability of the core for more detailed work. If so we will need to have the core transported to Alice Springs, subject to BMR approval.

Georgina Basin Sediments

PROPOSED DIAMOND DRILL HOLE RELATION & LOCALITY MAP

Elua Syncline – Huckitta 1:250000

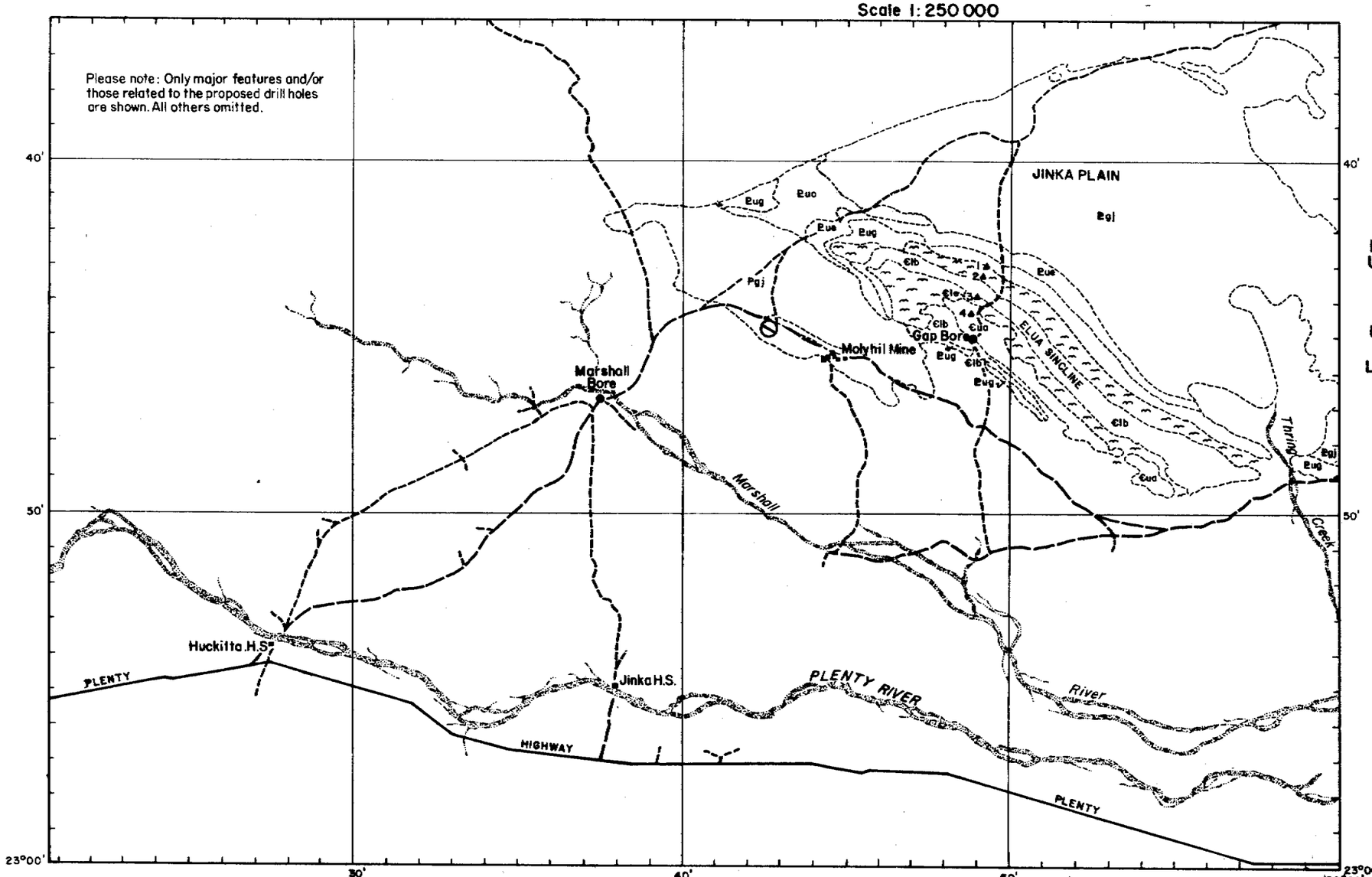
PROPOSED DIAMOND DRILL HOLE RELATION SKETCH DIAGRAM, SECTION LOOKING EAST.



Scale 1: 10000

PROPOSED DIAMOND DRILL HOLE LOCALITY MAP

Scale 1: 250000



GEOLOGICAL INFORMATION AFTER BMR. MAP SHEET SF 53-11/1964 HUCKITTA

LEGEND

UPPER CAMBRIAN	Arrinthrunga Formation	€ua
	Errarra beds	€le:
	Mount Baldwin Formation	€lb
	Grant Bluff Formation	Eug
LOWER CAMBRIAN TO UPPER PROTEROZOIC	Elkera Formation	Euk
	Elyuah Formation	Eue
UPPER PROTEROZOIC	Oorabra Arkose	Euo
LOWER PROTEROZOIC	Jinka Granite	Egj

- PRINCIPAL ROAD
- OTHER ROAD
- VEHICLE TRACK
- BORE
- H.S. HOMESTEAD
- LANDING GROUND
- WATERCOURSE
- GEOLOGICAL BOUNDARY
- 2 ▲ PROPOSED DIAMOND DRILL HOLE

N.T. DEPT. OF MINES & ENERGY – GEOLOGICAL SURVEY

Georgina Basin Sediments

PROPOSED DIAMOND DRILL HOLES

FIG 1

SCALE 1: 10000 & 1: 250000 at A3

GEOLOGY: M.J. FREEMAN | DRAWN: A.v.O. 5.11.81 | PLAN No. AS81G58D

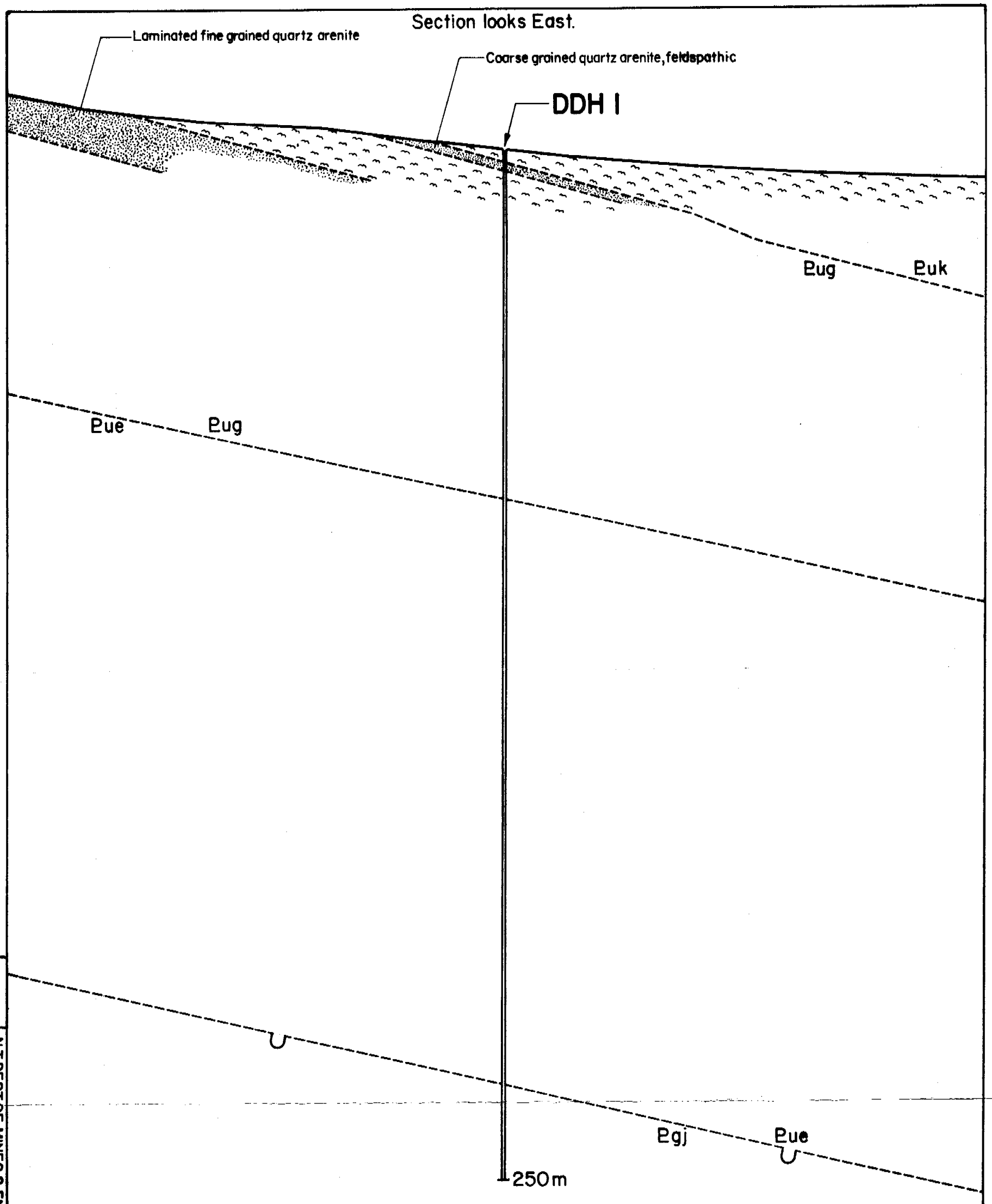
Georgina Basin Sediments

PROPOSED DIAMOND DRILL HOLE No. 1

Elua Sincline

Huckitta 1:250000

Scale 1:1000 H:V = 1:1



LEGEND

Euk	Elkera Formation	———	Ground Level
Eug	Grant Bluff Formation	- - - - - -	Geological boundary, interpreted
Eue	Elyuah Formation	--∪--	Unconformity
Egj	Jinka Granite		

N.T. DEPT. OF MINES & ENERGY - GEOLOGICAL SURVEY

Georgina Basin Sediments

PROPOSED DIAMOND DRILL HOLE No.1

FIG 2

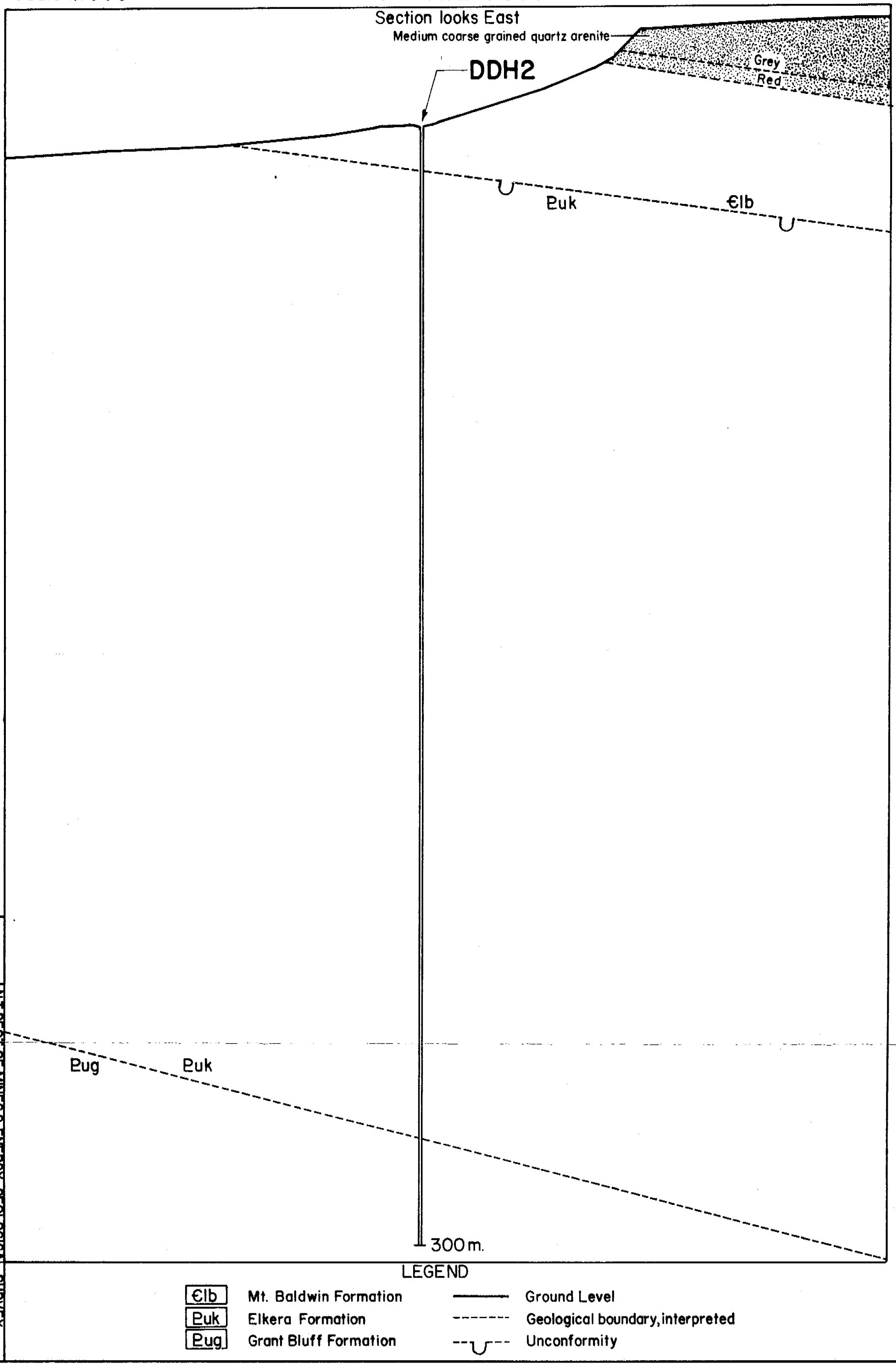
SCALE 1:1000

GEOLOGY: M.J. FREEMAN Drawn: A.v.O 2.11.81 Plan No. AS81G59D

Georgina Basin Sediments
PROPOSED DIAMOND DRILL HOLE No.2

Elua Sincline

Scale 1:1000 — Huckitta 1:250000 — H:V=1:1



LEGEND

Elb	Mt. Baldwin Formation	———	Ground Level
Puk	Elkera Formation	- - - - - -	Geological boundary, interpreted
Pug	Grant Bluff Formation	--∪--	Unconformity

N.T. DEPT. OF MINES & ENERGY - GEOLOGICAL SURVEY

Georgina Basin Sediments
PROPOSED DIAMOND DRILL HOLE No. 2

SCALE 1:1000 at A3 | GEOLOGY: M.J. FREEMAN | Drawn A.v.O. 2.11.81 | Plan No. AS81G60D

FIG 3

Georgina Basin Sediments

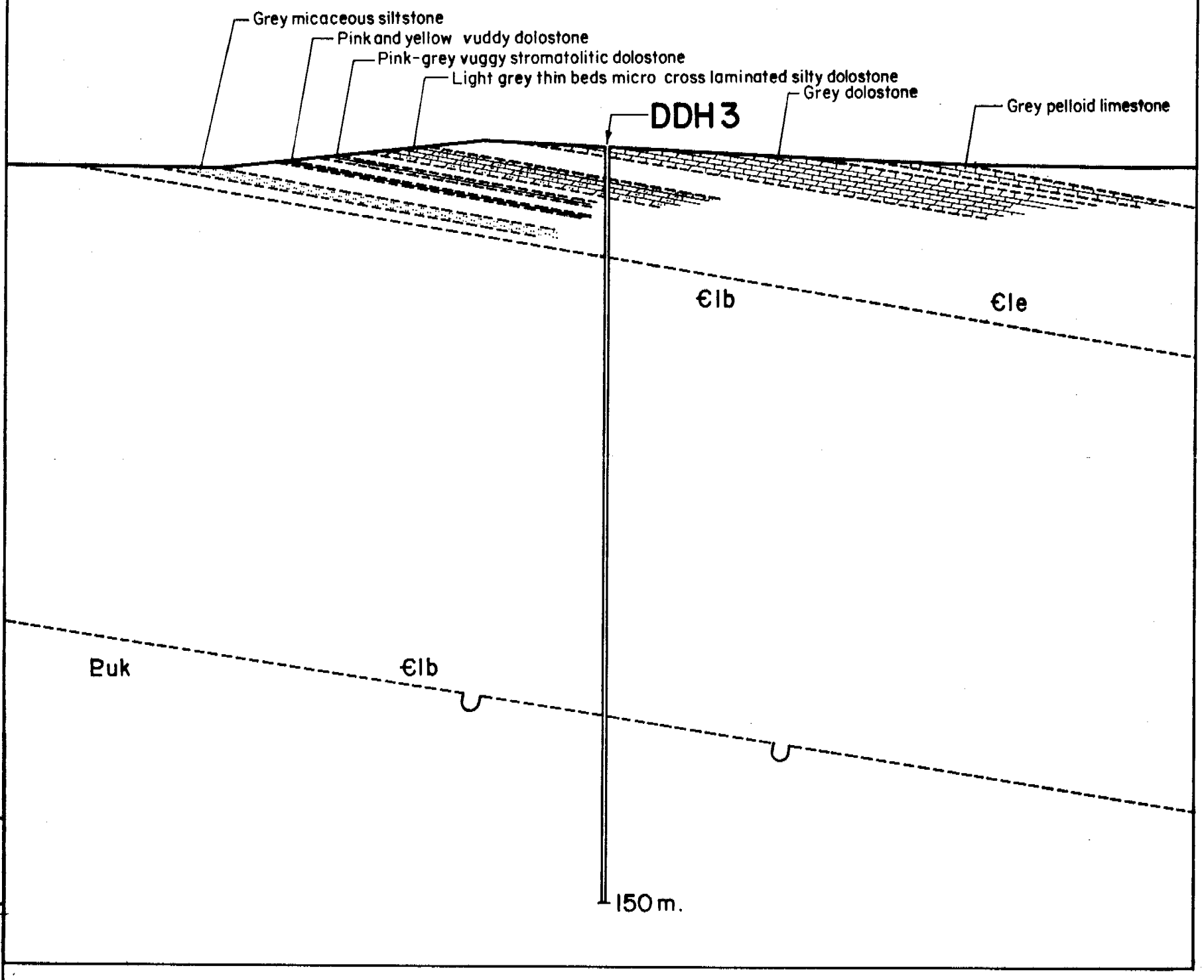
PROPOSED DIAMOND DRILL HOLE No.3

Elua Sincline

Huckitta 1:250 000

Scale 1:1000 H:V = 1:1

Section looking East



LEGEND

Ele	Errarra beds	———	Ground level
Elb	Mt Baldwin Formation	-----	Geological boundary, interpreted.
Puk	Elkera Formation	-__-	Unconformity

N.T. DEPT. OF MINES & ENERGY - GEOLOGICAL SURVEY

Georgina Basin Sediments

PROPOSED DIAMOND DRILL HOLE No.3

SCALE 1:1000 at A3

GEOLOGY: M.J. FREEMAN Drawn: A.v.O. 2.11.81 Plan No. AS81GG1D

FIG 4

Georgina Basin Sediments

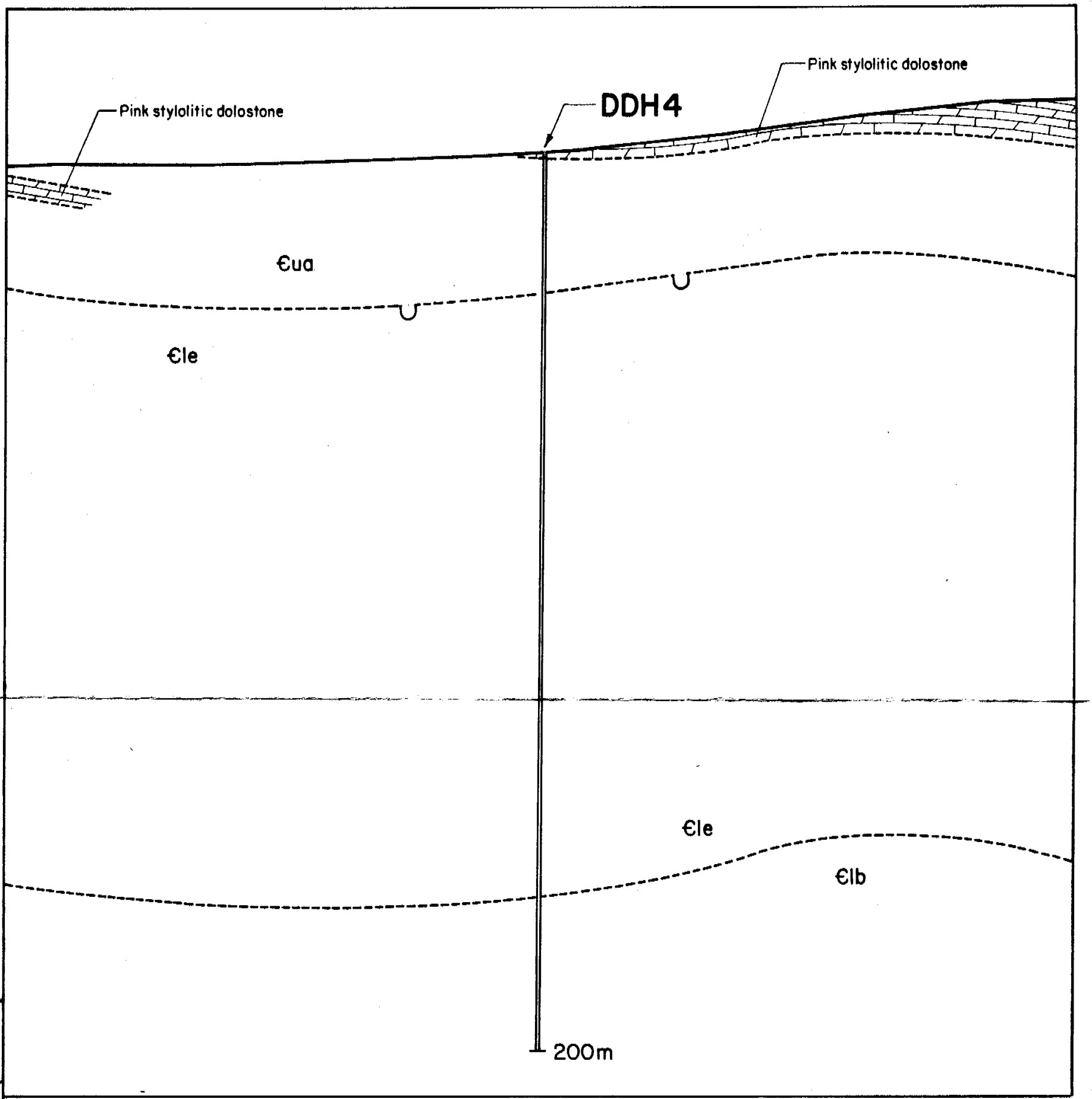
PROPOSED DIAMOND DRILL HOLE No. 4

Elua Sincline

Huckitta 1:250 000

Scale 1:1000 H:V = 1:1

Section looks East



LEGEND

€ua	Arrinthrunga Formation	———	Ground Level
€le	Errarra beds	- - - - - -	Geological boundary, interpreted
€lb	Mt. Baldwin Formation	--∪--	Unconformity

N.T. DEPT. OF MINES & ENERGY-GEOLOGICAL SURVEY

Georgina Basin Sediments
PROPOSED DIAMOND DRILL HOLE No. 4

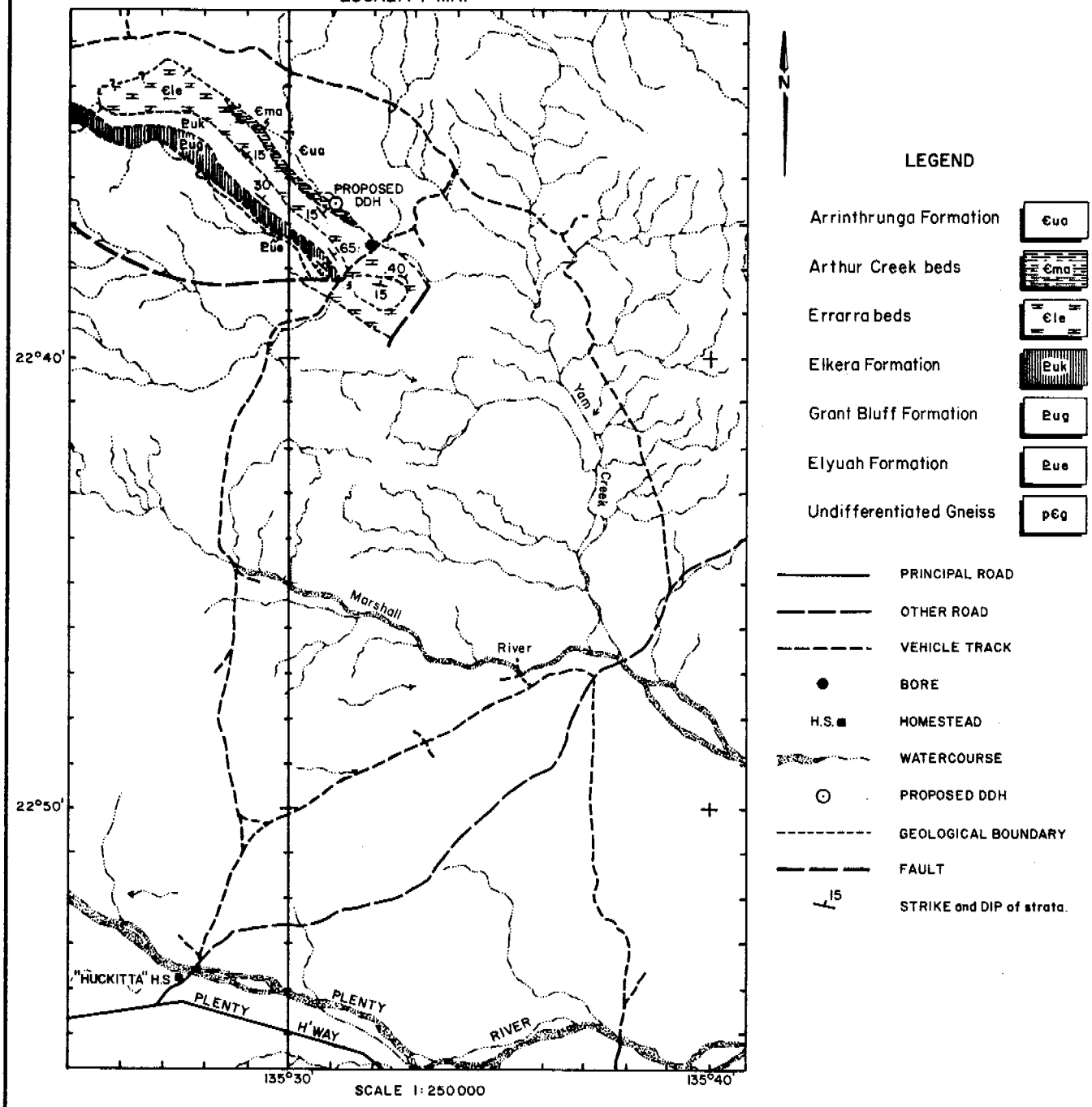
SCALE 1:1000 at A3 | FIG 5

GEOLOGY: M.J.FREEMAN | Drawn: A.v.O 2.11.81 | Plan No. AS81G62D

MOPUNGA RANGE

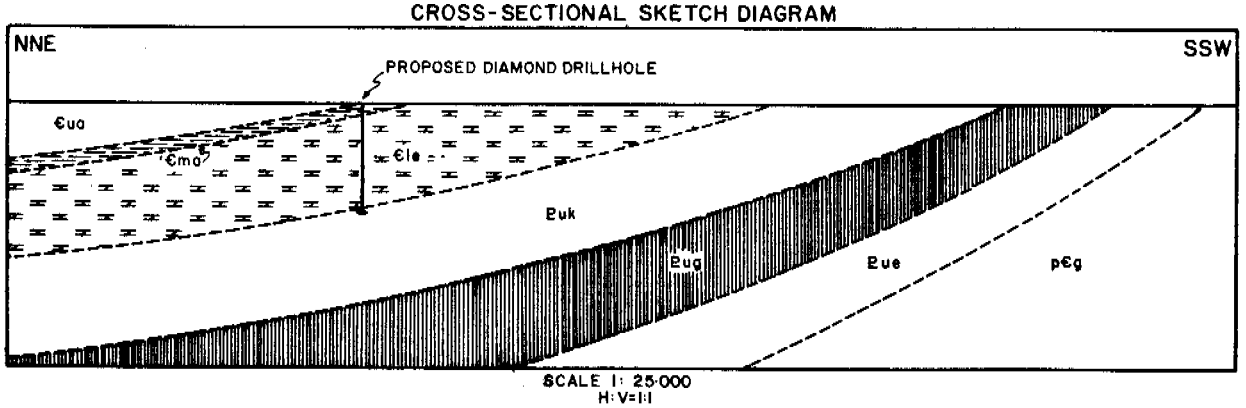
PROPOSED DIAMOND DRILL HOLES

LOCALITY MAP



SCALE 1:250000

CROSS-SECTIONAL SKETCH DIAGRAM

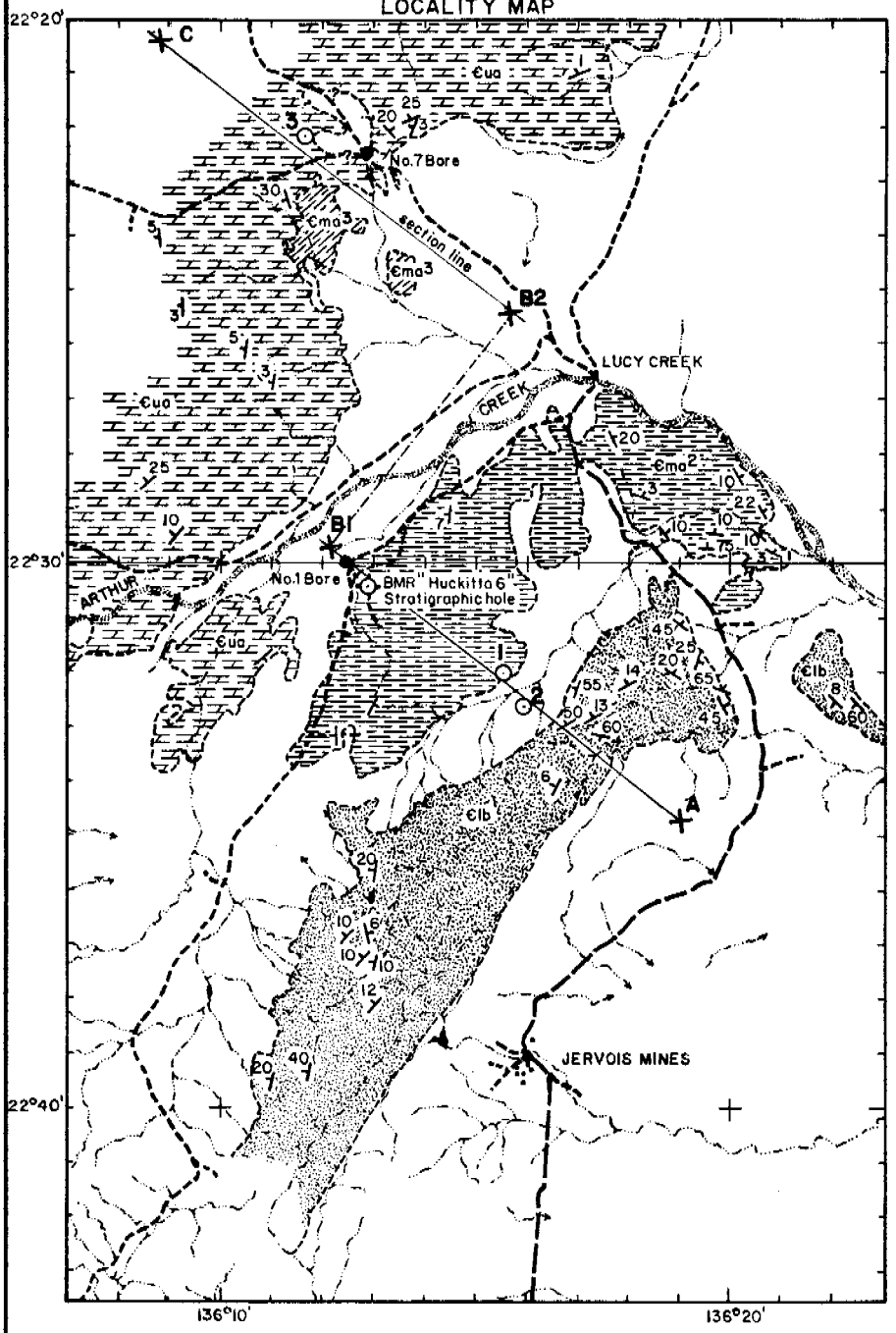


SCALE 1: 25·000
H:V=1:1

N.T.DEPT. OF MINES & ENERGY–GEOLOGICAL SURVEY			
Mopunga Range PROPOSED DIAMOND DRILL HOLE			FIG 7
SCALE 1:25 000 & 1:250 000 at A4			
GEOLOGY: M.J. FREEMAN	DRAWN: AvO 17.11.81	PLAN No. AS81G65E	

ARTHUR CREEK PLAINS
PROPOSED DIAMOND DRILL HOLES

LOCALITY MAP



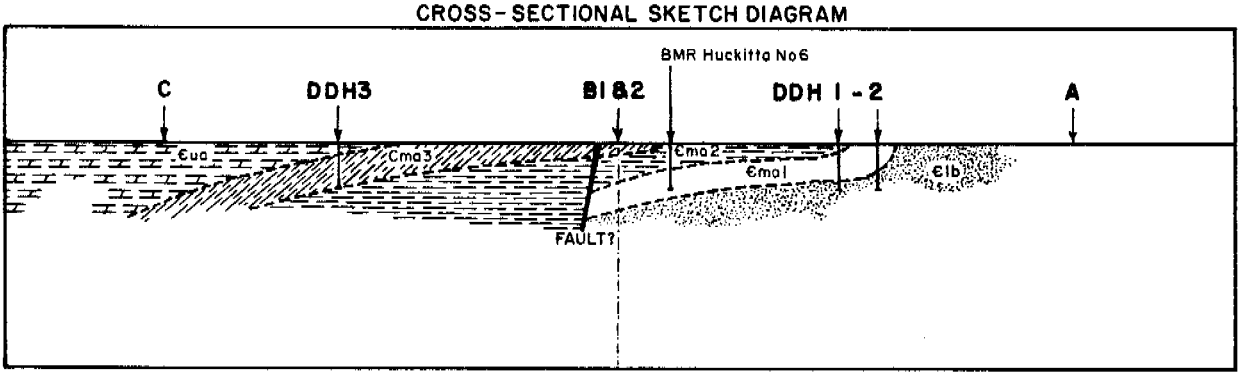
N

LEGEND

- Arrintrunga Formation — €ua
- Arenaceous facies — €ma3
- Arthur Creek beds Carbonate facies — €ma2
- Siltstone facies — €ma1
- Mount Baldwin Formation — €lb
- SECONDARY ROAD
- VEHICLE TRACK
- WATERCOURSE
- PROPOSED DDH
- GEOLOGICAL BOUNDARY
- STRIKE and DIP of strata

SCALE 1 : 250 000

CROSS-SECTIONAL SKETCH DIAGRAM



N.T. DEPT. OF MINES & ENERGY

Arthur Creek Plains
PROPOSED DIAMOND DRILL HOLES

FIG. 6

DIVISION: GEOLOGICAL SURVEY

GEOLOGY: M.J. FREEMAN | DRAWN: AVO 19-11-1981 | AS81G66E

MEMORANDUM

TO: ASSISTANT DIRECTOR OF GEOLOGY

DATE: 25.11.82

FROM: M.J. FREEMAN

REF: 82/62

RE: HUCKITTA DRILLING PROGRAMME

The performance of Leanda Drilling (Qld.) Pty. Ltd., in operating the HUCKITTA diamond drilling programme is considered to have been satisfactory. At all times both the contractor and driller were most cooperative, and complied with our requirements in a satisfactory manner. I recommend further contracts be offered to them.

They commenced drilling with a rig which was different from that specified in the tender. However considering the nature of the drilling programme and how their duration cannot be estimated with any degree of reasonable accuracy, we should request data from contractors on the range of rigs they may put on one of our contracts. Through us extending our programme, Leanda Drilling had to change programmes on their other rigs.

I consider that we benefited from having a well experienced (30 years) driller. We may possibly not get such cooperation from a different drilling team.

It is unfortunate that the completion of the last two holes were unsupervised through manning difficulties. In future programmes we must ensure that at the most critical time of completing holes, there must be a geologist on site, regardless of other priorities.

A summary table of the drilling performance is attached.

M.J. FREEMAN
GEOLOGIST

APPENDIX 3

Summary of drilling rates and cost

N.T.G.S DRILLING PROGRAMME

HUCKITTA, 1982

CONTRACTOR: LEANDA DRILLING (QLD.) PTY. LTD.

HOLE NO.	T D m	COMMENCED	COMPLETED (No. days)	DRILLING m/day	COST $	COST $/m
HUC 1	384.0	08.06.82	25.06.82 (18)	21.3	27 887	72.6
HUC 2	268.7	27.06.82	09.07.82 (13)	20.7	16 988	63.2
HUC 3	199.5	13.07.82	20.07.82 (8)	24.9	12 379	62.1
HUC 4	107.3	21.07.82	24.07.82 (3.5)	30.7	6 888	64.2
HUC 5	112.7	24.07.82	27.07.82 (3.5)	32.2	7 205	63.9
HUC 6	150.0	28.07.82	07.08.82 (11)	13.6	10 482	69.9
HUC 7	217.3	09.08.82	16.08.82 (8)	27.2	13 968	64.3
HUC 8	130.0	18.08.82	30.08.82 (13)	10.0	10 501	80.8
HUC 9	89.7	04.09.82	10.09.82 (7)	12.8	7 614	84.9
HUC 9A	121.7	11.09.82	22.09.82 (12)	12.0	9 295	76.4
HUC 10	126.7	24.09.82	29.09.82 (6)	21.1	7 001	55.3
HUC 11	126.7	30.09.82	03.10.82 (4)	31.7	7 832	61.8
OVERALL	2034.3	08.06.82	03.10.82 (107) (118 including non-drilling days)	19.0 (17.2 including non-drilling days)	138 040 (Target expenditure was $138 000)	67.9