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REPORT ON CORE-HOLE GRG 9A, GEORGINA BASIN, AND COMPARISON WITH GRG 14.

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by

R.A.H. Nichols

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REPORT ON CORE-HOLE GRG 9A, GEORGINA BASIN, AND COMPARISON WITH GRG 14.

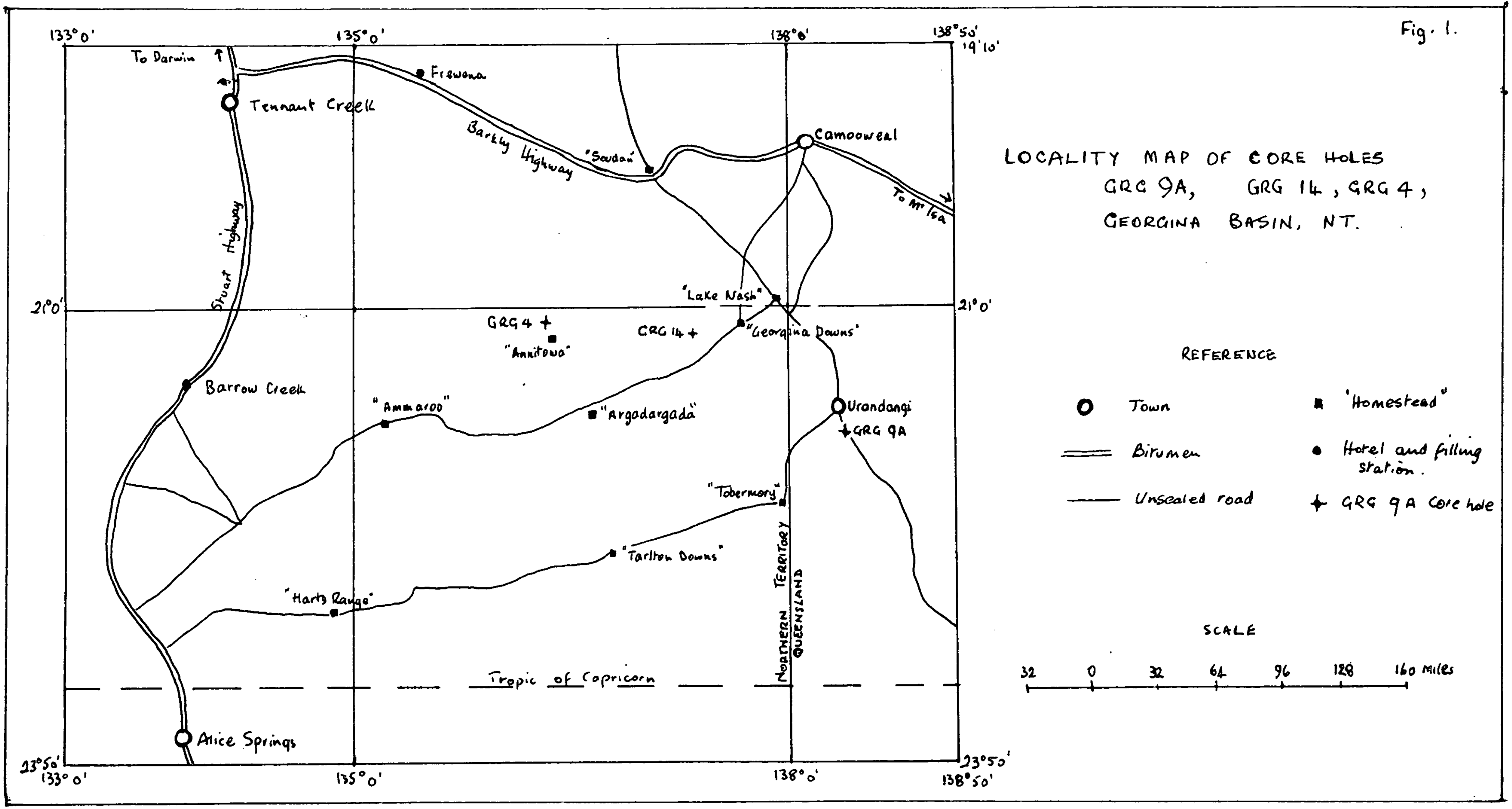
SUMMARY

Core hole GRG 9A is situated four miles south of Urandangi, western Queensland, in the eastern part of the Georgina Basin. It was drilled during the Bureau of Mineral Resources' core drilling programme (Milligan, 1963), to determine the subsurface nature of part of a widespread 'sheet' of carbonate rocks.

The cores of relatively uniform microcrystalline dolomite were examined, etched and stained, and described after microscopic study. No fossils were found. A graphic log, similar in part to that of Bouma (1962) was constructed and the distribution and frequency of occurrence of pellets and intraclasts, ooliths, breccia and conglomerate, cross-bedding, scour and fill, slumped beds, quartz, tourmaline and zircon were plotted.

A comparison between GRG 9A and GRG 14, 72 miles to the north-west was attempted based on the occurrence of major microcrystalline dolomite intervals between abundant pelletal, oolitic etc. intervals, as the latter are considered limited in extent.

Certain intervals in the two core holes were correlated, and it is tentatively proposed that the dolomite is the same unit in both core holes. A discrepancy of about 100 feet occurs in some cases, when GRG 9A is plotted correctly at 300 feet topographically below GRG 14, but this is considered insignificant over 72 miles.



Bureau of Mineral Resources, Geology and Geophysics. To accompany Record 1966/2 AUS 1/91

Introduction.

This study presents more information on the petrology of some dolomite units in the eastern part of the Georgina Basin, and follows the work of Milligan (1963). Plots of the distribution of various parameters are presented which may be useful in a comparison between this hole and GRG 14 and GRG 4. The parameters used in previous studies (Nichols & Fehr, 1964) were the vertical distribution of pellets and intraclasts, ooliths, breccia and conglomerate, cross bedding, scour and fill, slumping, quartz, tourmaline and zircon. These enable only a tentative correlation between GRG 4 and GRG 14. As this may also be the case in correlation with GRG 9A, samples of the different lithologies were sent to the Australian Mineral Development Laboratories to determine the amounts of Sr, P, Co, Ni, V, Pb, Zn, and the presence of illite, kaolinite, montmorillomite, attapulgite, and corrensite. The results of these analyses will be presented at a later date, and when compared with those from GRG 4 and GRG 14, may prove if correlation is possible.

Core-Hole GRG 9A is situated in the Urandangi Sheet area (Queensland) 4 miles south of Urandangi, in the eastern part of the Georgina Basin (Fig. 1.) and was drilled during the Bureau of Mineral Resources core drilling programme (Milligan, 1963). It was one of several core-holes programmed to determine the sub-surface nature of part of a widespread 'sheet' of carbonate rocks ranging from Lower Cambrian to Lower Ordovician in age.

After technical difficulties with GRG 9 which was sited on an outlier of Ninmaroo Formation overlying Camooweal Dolomite (Noakes et al, 1959), GRG 9A was sited 10 miles further south-west, and 140 feet topographically lower, in the hope of recovering a section of the Camooweal Dolomite lithologies, continuous with and below the section in GRG 9. Outcrops of the Ninmaroo Formation occur south of the well-site and "the rock is a sequence of sandy marl, shale, sandstone, with interbedded, hard bands of limestone and dolomite" (Noakes et al, 1959). The limestone contains Ellesmeroceroid nautiloids, "indicating a Tremadocian age of the sequence (loc. cit.).

GRG 9A drilled from surface to 94 feet through limestone and siltstone (Tertiary?) then cored and drilled respectively through dolomite and clay, then dolomite to a total depth of 419'8". The core recovery was 50%, and cores 10, 11, 12, 13, 21, 22, 24, 33, 37, and 43, showing representative lithologies were sent to the Queensland Geological Survey, before this study. Therefore the well-site descriptions were incorporated in the present study for those intervals sent to the Queensland Geological Survey.

Techniques.

The cores were examined in a similar manner to those of GRG 14 and GRG 4 (Nichols and Fehr, 1964). Briefly, this entails selection of the different lithologies slicing, application of hydrochloric acid and alizarine red S (Warne, 1962), calcimetry (Bastian, 1962), and examination of insoluble residues and some thin sections. Determination of the trace elements and the clays is being done by Australian Mineral Development Laboratories.

Representation and results.

An attempt has been made to show all the observed properties of the rocks, by blocks and symbols (Enclosure, 1) presented in columns either side of a lithological log. Some columns represent quantitative results, some qualitative. The various columns used in the graphic log are explained below.

Core recovery.

The core recovery was only 50% as the dolomite was hard, fractured and cavernous; the core-hole was abandoned at 419'8" due to caving. The amount recovered is plotted arbitrarily within the cored intervals as there is no control over the exact position in the intervals.

Grade Size.

Three classes are distinguished eg. lutite, $< 1/16$ mm., clay, silt size and microcrystalline; arenite, 1/16 - 2 mm. sand size and medium crystalline; rudite, > 2 mm. microconglomeratic and coarsely crystalline. Each grade size column represents the range of size in a sample, or a uniform size within the range. As core recoveries are low in some intervals, the interpreted lithological log shows the possible range of a lithology rather than its guessed position.

Insoluble residues.

Insoluble residues occur in every sample and were separated and examined to find some compositional variation in the dolomite sequence. Total residues from each interval were examined in clove oil with a polarizing microscope at a magnification of X80.

Heavy Minerals.

Detrital and authigenic tourmaline and zircon were the predominant heavy minerals, with tourmaline being more abundant than zircon. Only detrital tourmaline and zircon are plotted on figs. 2 & 3.

Tourmaline occurred between 115-129'
183-187'
301-304'
350-408'

Zircon occurred between 116-118'
183-187'
301-315'
350-388'

at 418'

Pyrite occurs at 368' and garnet (?) occurs at 305'

Light minerals.

Light minerals are more abundant in the upper sequence of dolomite from 94-239', where several samples contain 10-20% residue, with two samples recording 75% and 45%. In the lower sequence, the majority of samples contain 10% or less, and only one recorded 30%.

Quartz, clay minerals and iron oxide are the most abundant light minerals; feldspar and chert occur rarely.

Quartz sand and silt occur in most samples, but quartz sand is more abundant between 106 - 126'; 183 - 187'; 215 - 219'; 350 - 362'. Authigenic quartz silt occurs mainly with abundant clay. Chert grains occur at 298', 311', 355', and feldspar occurs at 189', 228' and 418'.

Clay minerals occur in all samples and are mixed with iron oxide, possibly limonite. The greatest occurrence is between 239-264', the whole interval being clay with some quartz. In the intervals with low residue, clay and iron oxide are the dominant minerals, with some authigenic quartz silt. Authigenic tourmaline and zircon occur very rarely.

Lithology log.

The major rock types are presented in this column by major rock symbols; pellets, ooliths are also symbolised.

Synopsis of lithologies.

Most carbonates in GRG 9A are microcrystalline to medium crystalline dolomites with rare interbeds of pelletal dolarenites, intraclastic dolorudites and admixtures of quartz silt and sand. The percentages of the different units in the sequence are as follows:

Microcrystalline-medium crystalline dolomite...............81%
Dolarenite; rare beds 1"-1' thick throughout............... 5%
Dolorudite; rate microconglomeratic beds................... 2%
Quartzose dolomites; quartz silt, sand in crystalline and clastic dolomites.. 5%
Clay; occurs as a thick interbed........................... 7%

Calcimetry log.

In the dolomite sequence from 94-420 feet there are four general divisions in the $CaCO_3$ and total carbonate content.

1. 94-125' $CaCO_3$ content, approximately 5%
   Total carbonate varies from 25-60%
2. 125-239' $CaCO_3$ content varies from 5-22% (with three low points at 2% in the upper part)
   Total carbonate varies generally from 52-99% (with two low points at 25%)
3. 275-298' $CaCO_3$ content is 5%
   Total carbonate varies from 25-48%.
4. 298-420' $CaCO_3$ content varies from 5-17% (with three low points at 2% in the upper part)
   Total carbonate content varies from 45-98% (with three low points at 20% in the upper part)

In the first interval, the low $CaCO_3$ and total carbonate content occur for 30 feet below the junction with the Tertiary? limestone and siltstone sequence; the contents then increase below 125 feet to the thick clay interval. Similarly, below the clay interval, the first 23 feet has low $CaCO_3$ and total carbonate content, and these increase down to total depth

Structures and textures.

Separate columns are used for plotting sedimentary and diagenetic structures and textures. Quartz sand and silt symbols are included as textural elements as they are sometimes related to sedimentary structures, eg. scour and fill, load casts and lenses. In some cases dolomitisation or recrystallisation may partly obliterate some textures, so that some of them are subjective determinations. Other structures are presented objectively eg. vug, intergranular porosity.

A) Sedimentary structures and textures

a) Bedding; changes in bedding are indicated by differences in composition, grain size, planes of discontinuity, including stylolites which often coincide with micro-facies changes. The most frequent manifestation of bedding is by clay and silt laminae. Some layering may be parts of algal stromatolites. Convolute bedding occurs at 324 feet.

b) Scour and fill; occurs at 145'3", 148' and 179'8". The structures are not very pronounced and commonly indicate scouring of less than 1mm. into the unit below; in most cases quartz sand and silt forms thin beds overlying a scoured surface of dolomite.

c) Cross bedding; occurs at 361'9" and possibly at 145'. It is absent in the pelletal, intraclastic dolomites, but occurs in quartzose dolomite where quartz laminae frequently cross in thin, truncating sets.

d) Slumped beds; occur at 148', 154'8", 183', 339', 367' and 371'3, and are indicated by broken and convolute laminae.

e) Fractured beds; occur at 107'10", 128'4", 331'10" and 379'9" and are generally represented by elongate clasts in line which appear to be parts of once continuous layers or thin beds.

f) Lenses; occur at 179'8" and 389'9", are thin and composed of quartz silt and fine sand.

g) Injection veins; occur at 145'3" and are small veins of sediment injected from the beds below.

h) Graded beds; occurs at 145'3" and 217'7" and consist of quartz sand and silt decreasing in size and abundance and grading up into dolomite.

i) Pellets and intraclasts; occur from 128-130'; 183'; 274'; 283'; 293'9"; 333'8"; 335-346'; 379'9"; 388'9"; 411'6" and 416'.

They occur as thin beds and layers 1"-6" thick and scattered (mud supported) throughout the interval. Some ooliths occur between 128-130' and 335-246'. The pellets and intraclasts may be derived from erosion of adjacent sediments, or aggregation and transport (Folk 1962) or be of faecal origin. The majority of intraclasts are composed of microcrystalline dolomite and vary in size from 1mm. to 2 cms.

B) Diagenetic structures and textures.

These features may be related to the original conditions of deposition, and therefore could be useful in correlation in some cases. However, in the present case they are not considered valid criteria as they occur sporadically and are late stage diagenetic features.

a) Dolomitisation. Most of the sequence is dolomite and in some cases sedimentary structures and textures are preserved; this may indicate penecontemporaneous dolomitisation. Medium and coarsely crystalline dolomite indicate later stage dolomitisation.

b) Flocculence and recrystallisation.

i) Grain growth mozaic. Irregularly shaped areas of variable size consisting of medium to coarse crystalline dolomite in a microcrystalline groundmass generally indicate recrystallisation.

ii) Infilled cavities. In one case an irregularly shaped area of medium crystalline dolomite passed to microcrystalline dolomite at the bottom; this indicated a structure formed by internal erosion and suggests bottom sediment lying in an original cavity.

iii) Ferruginisation. The majority of the dolomites are buff coloured, others are mottled tan and grey; some Liesegang banding is present. Iron oxide, probably limonite, occurs in the insoluble residue, and is thought to be secondary.

iv) Stylolites. Several horizons contain stylolites differing in amplitude, some crenulated some undulating, which truncate various textures. Insoluble residue, generally clay minerals and quartz silt occur along them

v) Vugs, pores, fissures. These features occur throughout the sequence, but fissures are rare. The Vugs are lined with dolomite and calcite, and are a late stage solution feature.

vi) Veins. These represent fractures in the rock, now filled with medium crystalline dolomite.

Palaeontology.

Fossils are rare in the core hole and only some algal? layer are present, e.g. 106', 108'8", 148', 318'7", 331'10", 335'62", 389'9". Nothing definitely algal was identified.

Burrows are included under palaeontology as tracefossils, and possible burrows occur at 133'7", 183', 217'8", 318'7".

Colour.

Colour was determined from the wet cores and is represented by blocked areas in columns for hue and brightness. The whole sequence is predominantly light brown or buff, with tan and grey mottling.

Lithological descriptions.

Brief descriptions are added to summarise the essential features and to provide supplementary information.

Comparison between GRG 9A and GRG 14

GRG 14, which is 72 miles to the north-west of GRG 9A, is 300 feet topographically higher and also penetrated a uniform dolomite sequence with no diagnostic fossils, similar in part to the Arrinthrunga Formation dolomite in GRG 4, a further 64 miles to the west. Diagnostic fossils were not found in GRG 9A and correlation is being attempted by a comparison of the distribution of pellets and intraclasts, ooliths, breccia and conglomerate; cross bedding, scour and fill and slumped beds; quartz, tourmaline and zircon.

Pellets, intraclasts. The outline of the frequency curve in GRG 9A is similar to that in GRG 14; a minimum at 190-260 feet separates two maxima in GRG 9A, and may correspond with a similar order minimum between 470-550 feet in GRG 14. This is compatible with GRG 14 being on strike and approximately 300 feet higher than GRG 9A. Individual beds cannot be correlated between the two core holes; this is due to slight changes in conditions or sea floor topography, and may show that pelletal, sands etc. were more abundant within the comparable intervals.

Ooliths. The distribution of ooliths in GRG 9A is similar to that in GRG 14; they both show an interval free of ooliths, again about 300 feet higher than in GRG 14 and 100 feet thicker; the latter is an insignificant difference over 72 miles. A similar percentage of oolitic beds (3-4%) occurs in the oolitic intervals in both core-holes.

Braccia & conglomerate The distribution is again similar to that in GRG 14, with an interval free of fragments approximately 300 feet higher in GRG 9A; intervals above and below do not coincide accurately and show slight variations.

Cross-Bedding, scour & fill, slumped beds. Sedimentary structures are not useful as correlation parameters (Nichols and Fehr, 1964), and this appears to be the case in the present study, except for a comparable break between upper and lower intervals with cross-bedding; the low number of cross-bedded intervals in GRG 9A precludes definite correlation.

Quartz, tourmaline and zircon. The distribution of quartz shows no distinct parallel with GRG 14, but a relatively quartz-free interval in GRG 14 may be correlated with a similar one, though 400 feet higher (instead of 300') in GRG 9A. This again is insignificant over 72 miles.

Tourmaline distribution shows a decrease in occurrence possibly equivalent to one in GRG 14, at approximately 300 feet higher.

Zircon distribution exhibits an interval of non-deposition which coincides with one, approximately 300 feet higher than in GRG 14.

Conclusions.

The comparison of GRG 9A and GRG 14 is vague, but does not show great dissimilarities; a tentative correlation is therefore proposed. The logs are constructed on the occurrence of the various grains and textures throughout an interval, and although individual beds cannot be correlated, a general similarity exists between their distribution.

The correlation between GRG 9A and GRG 14, however is attempted by comparing intervals free of grains and textures; these intervals generally comprise microcrystalline dolomite, which by analogy with present day carbonate mud deposits, are more extensive than pellets, ooliths etc, which form as banks or shoals.

The fact that only pelletal intervals etc, and no individual beds may generally be correlated, indicates the variable conditions of deposition across the intervening area, or variable seafloor topography.

The 25' clay interval (239-264') does not occur in GRG 14, but if original, it is a lateral variation of microcrystalline dolomite in GRG 14. It may however, be insoluble residue after leaching and solution of the carbonate, or cavern infilling.

Intervals in GRG 9A are approximately 300 feet higher than comparable intervals in GRG 14 but when plotted correctly, 300 feet topographically lower in GRG 9A, they show little displacement or dip. The parameters of pellets and intraclasts, ooliths, and quartz give the most useful results, while those of breccia & conglomerate, tourmaline and zircon permit only vague comparison, and are considered unreliable.

A comparison between the two core holes, based on clay minerals and trace elements will be presented later in an effort to substantiate the above.

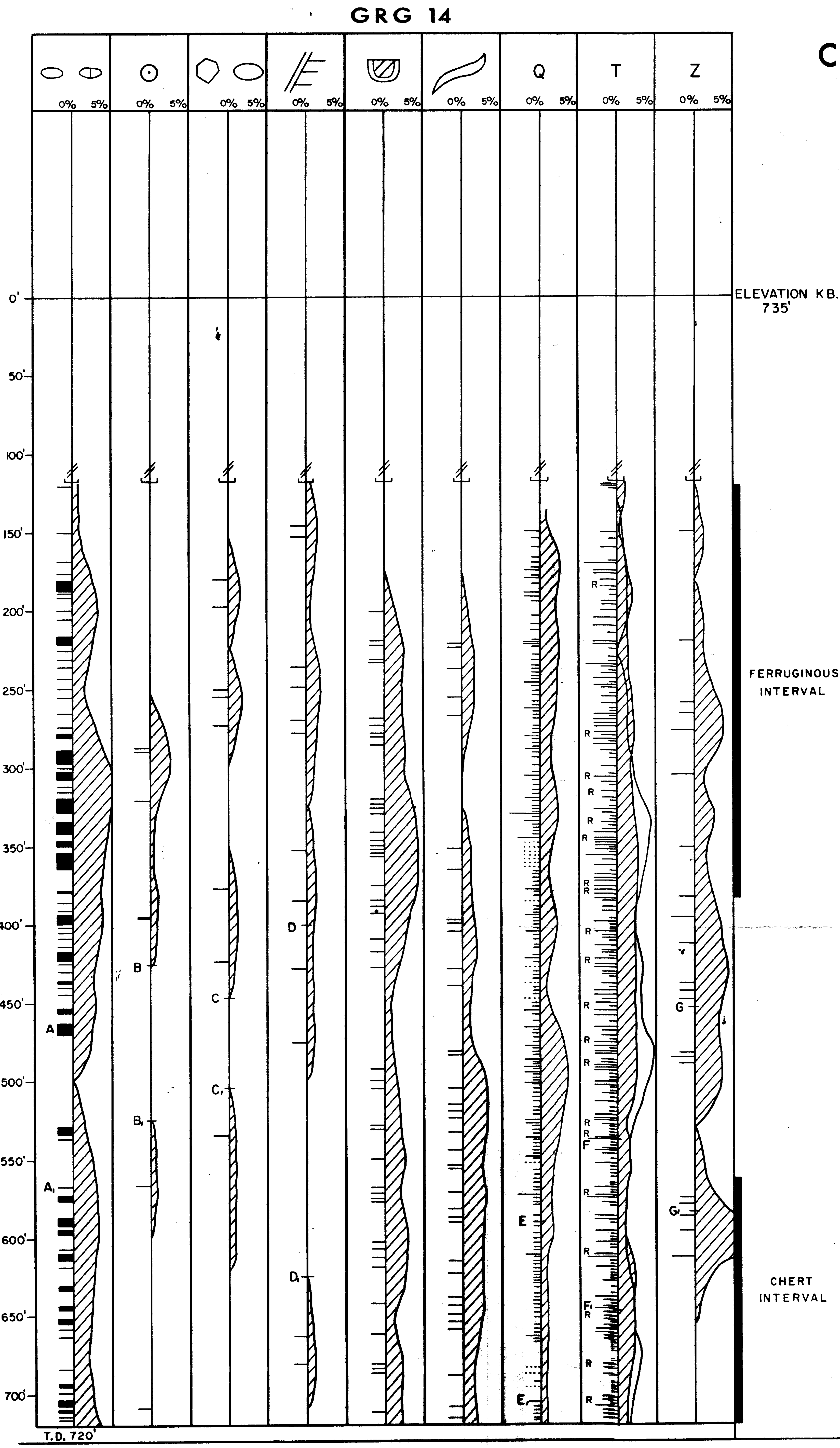
FIG. 2

CORRELATION LOG FOR GRG 14 AND GRG 9A

(Based on lithologic parameters)

GEORGINA BASIN N.T.

(DATUM SEA LEVEL)



REFERENCE

- Superficial deposits
- Pellets and intraclasts
- Ooliths
- Breccia and conglomerates
- Cross bedding
- Scour and fill
- Slumping
- Q — Quartz sand (detrital)
- .... — Quartz silt (detrital)
- T — Tourmaline (total)
- R — Tourmaline (rounded detrital)
- Z — Zircon
- Sample point
- Occurrence
- Medium abundance
- Abundant
- Frequency distribution curves per 50 feet with 50% overlap
- Frequency distribution curve for rounded tourmaline

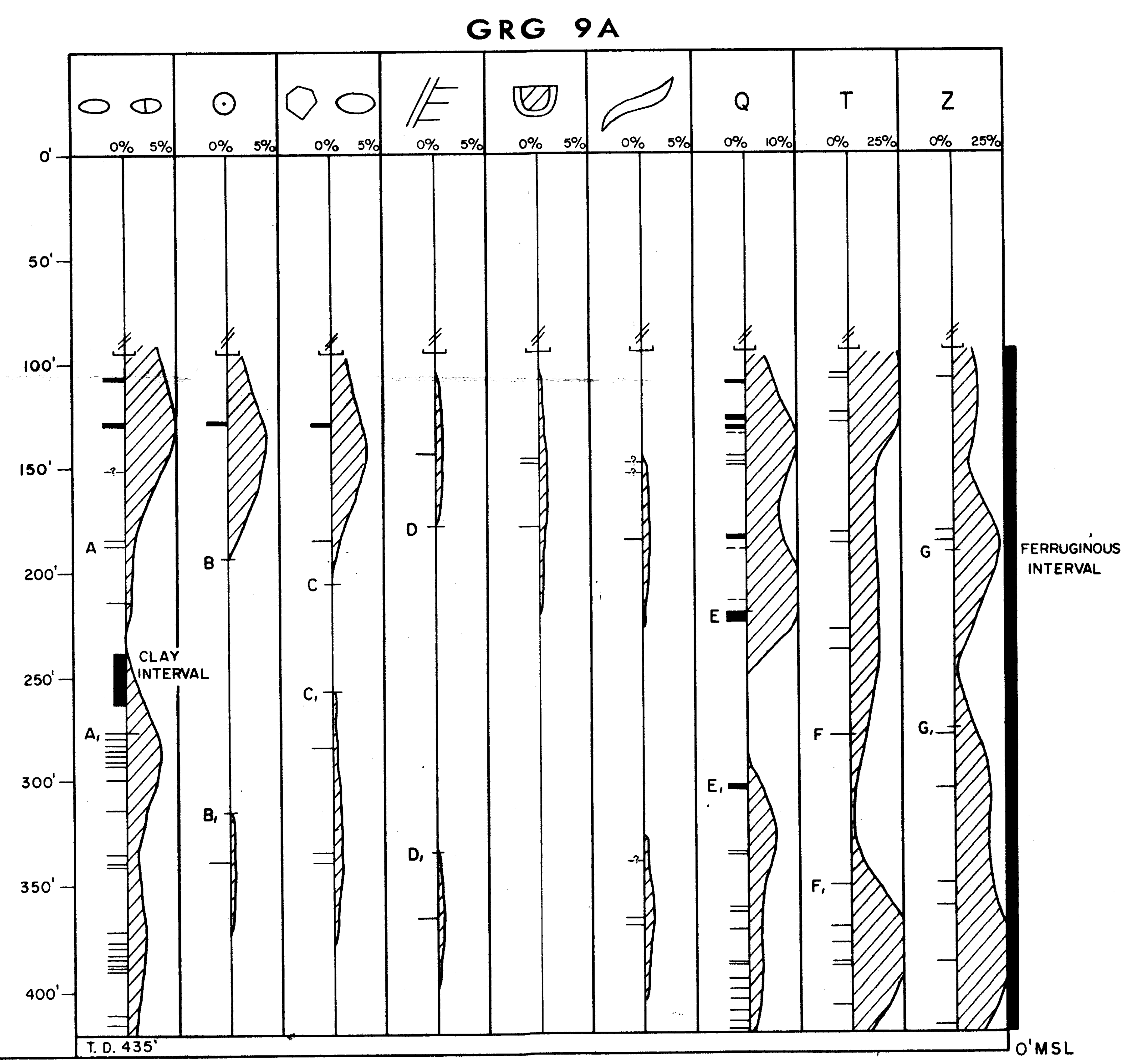
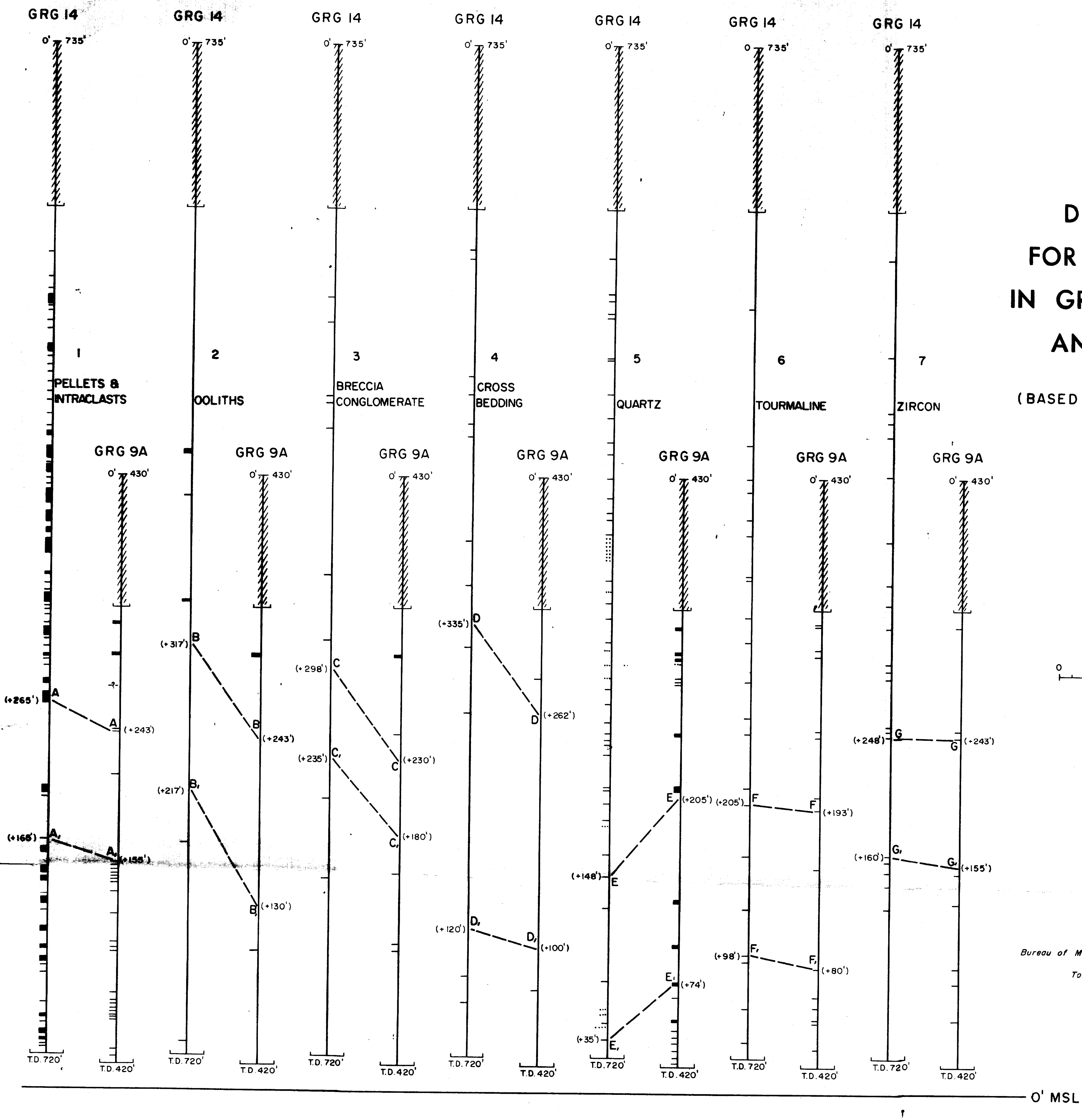


FIG. 3



DISTRIBUTION LOG FOR EACH PARAMETER IN GRG 14 AND GRG 9A, AND CORRELATION

(BASED ON MAJOR MICROCRYSTALLINE DOLOMITE INTERVALS)

REFERENCE

Superficial deposits

Occurrence of pellets, ooliths etc.

0 50' *Scale in feet (vertical)*

Quartz silt.

·735' *Elevation K.B.*

Bureau of Mineral Resources, Geology and Geophysics.
To accompany Record 1966/2

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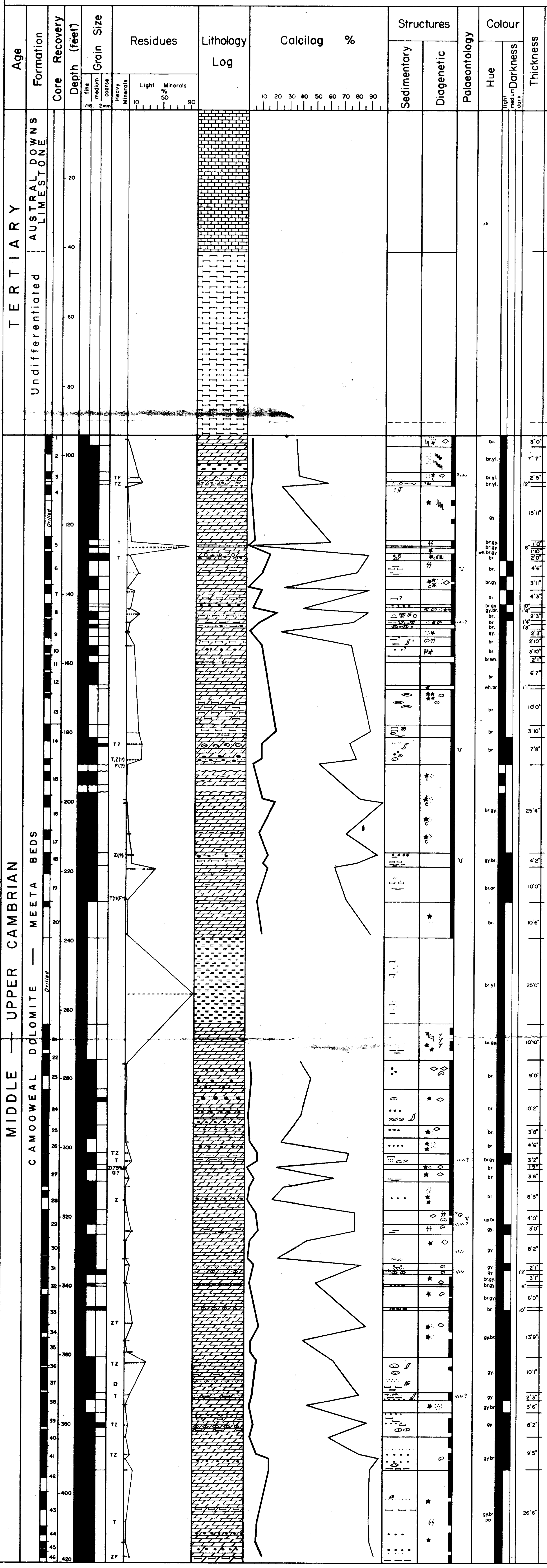
BMR Core hole Grg. 9A

(Georgina Basin)

Long. 138°19'48"E
Lat. 21°42'10"S
El. 430'

Scale = 1 inch : 20 feet

Urandangi
1:250,000 Sheet SF 54/5



Hue	Thickness	Description	Lithological Units
		Limestone: white, grey.	
		Siltstone: brown, soft.	
		Siltstone: green, calcareous, medium hard.	Unconformity
br.	3'0"	*Dolomite: mottled, microcrystalline, some coarser patches.*	Dolomite with thin interbeds of dolarenite and dolorudite; rare medium crystalline dolomite
br.yl.	7'7"	*Dolomite: microcrystalline-medium crystalline, porous, stylolitic; chert grains in clay at base.*	
br.yl.	2'5"	*Dolomite: microcrystalline-medium crystalline, alternating layers ½-1 cm thick (? algal); fine-med. quartz sand.*	
br.yl.	1'2"	*Dolomite: microcrystalline, quartzose, fine-medium quartz sand; rare pellets, uniform distribution of grains.*	
gy.	15'11"	*Dolomite: medium crystalline, uniform texture, traces of inclined laminae.*	
br.gy.	1'0"	*Dolomite: microcrystalline, uniform texture, tight.*	
br.gy.	6"	*Dolomite: quartzose, fine to medium quartz sand, subrounded, average sorting; some clay laminae.*	
wh.br.gy.	1'10"	*Dolomite: microcrystalline-medium crystalline, clayey.*	
br.	2'0"	*Dolomite: calcareous, poorly sorted, unwinnowed, angular rudite fragments.*	
br.	4'6"	*Dolomite: microcrystalline, quartz silt, clay minerals?, laminae? burrow remains?*	
br.gy.	3'11"	*Dolomite: mottled, medium crystalline, calcite in vugs, finer crystalline patches.*	
br.	4'3"	*Dolomite: microcrystalline, silty? tight, hard.*	
br.gy.	10"	*Clay: blue-grey, buff; dol. red. pebbles.*	
gy.br.	1'4"	*Dolomite: mottled, microcrystalline, medium crystalline patches.*	
br.	2'3"	*Dolomite: mottled, quartz silt, fine sand, scattered in beds, scouring, microfaulting, inclined beds.*	
br.	1'4"	*Dolomite: mottled, microcrystalline, laminated, coarser crystalline patches, scour, slumping (?)*	
br.	1'8"	*Clay: with sandy, silt lenses.*	
gy.	2'3"	*Dolomite: microcrystalline to f. medium crystalline.*	
br.	2'10"	*Dolomite: microcrystalline, ? silty, laminated, coarser crystalline patches, disturbed ? beds.*	
br.	3'10"	*Dolomite: microcrystalline, dolarenite, stylolites, calcareous.*	
br.wh.	2'1"	*Dolomite: crystalline.*	
br.	6'7"	*Dolomite: calcareous dololutite and dolarenite*	
wh.br.	1'1"	*Dolomite: crystalline, almost powdery, micaceous.*	
br.	10'0"	*Dolomite: calcareous dololutite & dolarenite, intergrading, silty lenses, micaceous; 5" of medium blue grey, vuggy, cavernous.*	
br.	3'10"	*Dolomite: microcrystalline, silty-quartz silt & f. sand, laminae, thin lenses; scour channels.*	
br.	7'8"	*Dolomite: quartzose, with arenite and rudite clasts of sandstone: poorly sorted; sand in layers f.-medium grained; also pellets of microcrystalline dolomite. Calcareous vuggy dolomite at base.*	
br.gy.	25'4"	*Dolomite: medium crystalline calcite in vugs, porous hard. Some clay minerals.*	
gy.br.	4'2"	*Dolomite: microcrystalline, scattered quartz silt, some concentrated near base, Liesegang layers, pelletal.*	
br.or	10'0"	*Dolomite: microcrystalline, quartz silt to fine sand, argillaceous, scattered; some laminae.*	
br.	10'6"	*Dolomite: microcrystalline, vague laminae? porous, hard.*	
br.yl.	25'0"	*Clay: v. fine, soft, some quartz.*	Clay
br.gy.	10'10"	*Dolomite: calcareous, microcrystalline, clay partings, fractured, weathered in clay parts.*	Dololutite with thin interbeds of dolarenite and dolorudite; rare medium crystalline dolomite
br.	9'0"	*Dolomite: pelletal arenite, microcrystalline interbeds, flocculent, average sorting, some break up of sediment.*	
br.	10'2"	*Dolomite: pelletal arenite, alternating with microcrystalline layers. 5" limestone bands (3)*	
br.	3'8"	*Dolomite: microcrystalline, scattered pellets, medium arenite, medium crystalline patches, some leaching.*	
br.	4'6"	*Dolomite: microcrystalline, mottled, leached around vugs, hard.*	
br.gy.	3'2"	*Dolomite: microcrystalline, quartz silt, fine sand, scattered, argillaceous, 30% brown iron oxide spots.*	
br.	1'5"	*Dolomite: medium crystalline, microcrystalline patches, average uniform texture, hard.*	
br.	3'6"	*Dolomite: microcrystalline, some laminae? small patches medium crystalline dolomite, Liesegang banding.*	
br.	8'3"	*Dolomite: medium crystalline, fairly uniform texture, pelletal, hard.*	
gy.br.	4'0"	*Dolomite: microcrystalline, medium crystalline patches, infilled cavities, algal? structures, leaching?*	
gy.	3'0"	*Dolomite: microcrystalline, silty (black), scattered, leached, medium crystalline dolomite, in fractures Liesegang banding.*	
gy.	8'2"	*Dolomite: microcrystalline-medium crystalline, algal layering (microcryst.) overlies med. cryst. layers & patches.*	
gy.	2'1"	*Dolomite: microcrystalline, black silt, layered; fine quartz sand, laminae pellets, scattered quartz sand.*	
gy.	1'2"	*Dolomite: microcrystalline, flocculent, clastic, rudite fragments, thin 'walls' cryptocryst dol., cell structure.*	
br.gy.	3'1"	*Dolomite: microcrystalline.*	
br.gy.	6"	*Dolomite: pelletal ? oolitic, and microcrystalline with medium crystalline patches.*	
br.gy.	6'0"	*Dolomite: microcrystalline.*	
br.	10"	*Dolomite: arenite to rudite pellets, clasts of dolomite in dolomite matrix.*	
gy.br.	13'9"	*Dolomite: microcrystalline, medium crystalline areas, generally uniform.*	
gy.	10'1"	*Dolomite: quartzose, microcrystalline, f. quartz sand layers, silty, cross bedded, dolomitic matrix & laminae.*	
gy	2'3"	*Dolomite: microcrystalline, scattered silt, thin laminae of quartz sand, slumped bed with pellets & laminae.*	
gy br	3'6"	*Dolomite: microcrystalline.*	
gy	8'2"	*Dolomite: microcrystalline, quartz silt with dolorudite interbeds, app. brokenbeds of dolomite (microcryst.)*	
gy br	9'5"	*Dolomite: microcrystalline, quartz silt & heavy mins; pelletal layers, quartz sand laminae; flocculent, microcrystalline below, with medium crystalline patches.*	
gy.br pp	26'6"	*Dolomite: microcrystalline, 10% scattered quartz, silt & fine sand, also in laminae, poorly sorted, rare coarse quartz sand; green patches of finely disseminated glauconite or chlorite; calcareous.*	

T.D. 419'8"

To accompany Record 1966/2

Geologist: R.A.H. NICHOLS
Drawn by: E. JURELLO

JAN 1966

F54/A5/4

REFERENCE

Lithologies

- Dolomite (with ooliths, pellets, intraclasts and sandstone clasts)
- Dolomite (with quartz sand, silt and clay)
- Siltstone
- Clay
- $CaCO_3$ content
- Total Carbonate content

Residues

- . . . Sand } Quartz
- .... Silt } Quartz
- +++ Feldspar
- === Clay
- T Tourmaline
- Z Zircon
- G Garnet
- ▫ Pyrite

Structures and Textures

Sedimentary

- Slumping
- Scour and fill
- Pellets
- Ooliths
- Intraclasts
- Quartz sand
- Quartz silt
- Undulating laminae
- Planar laminae
- Lens (of quartz sand or silt)
- Injection vein
- Cross bedding

Diagenetic

- Stylolites
- Vugs and pores (C - with calcite)
- Fissures
- Recrystallised
- Flocculent
- Veins

Palaeontology

- Bioclast
- Algal mat
- Burrow

EJ