

W430A

DEPT. NAT. RES & ENV



PE904906

HOLLANDS LANDING - 1
(BENGWORDEN SOUTH - 1)
(G.B)

ONSHORE

ELEMENTARY INFORMATION

LOCATION

38° 03' 20" S
147° 20' 40" E

1969/54

UPPER CRETACEOUS FORAMINIFERA FROM HOLLAND'S
LANDING WELL (BENGWORDEN SOUTH No.1), GIPPSLAND

Introductory Explanaton

The much-quoted record of ^{marine} ~~Upper~~ Cretaceous sediments in the Holland's Landing bore in Gippsland is based on a report to the Chief Government Geologist in 1960 by former Departmental micropalaeontologist Mr. D.J. Taylor. The original report was never published, however, nor made available through the Department's unpublished report system. I am now taking the liberty of fulfilling the latter.

J.B. Hocking

J.B. Hocking
Geologist
Sedimentary Basin Studies Section

15th August, 1940.

Memorandum to the Chief Government Geologist.Holland's Landing Well (Longwooden South
No. 1, 1940)

At the request of Woodside (Lakes Entrance) Oil Co. Ltd., I have examined for micro-fauna the bottom 200 feet of core samples from the Holland's Landing Well.

The most significant discovery was that in a sample of the core from 4004 feet (bottom of hole) the light grey silty shale contained two specimens of the pelagic foraminifera Præglototruncana delicua (species undescribed - manuscript name) which is restricted to a certain interval of the marine Cretaceous sequence (upper Albian) in Belfast No. 4 Bore, and Port Campbell No. 1 & 2 Wells, in South-western Victoria. Unfortunately the issue is confused as the sample from the Hollands Landing Well was contaminated with Oligocene foraminifera. However the possibility that this sample was contaminated with these Cretaceous foraminifera has been eliminated. But there still remains the possibility that the Cretaceous foraminifera are relict fossils derived from earlier sediments as only two specimens were isolated, though both these specimens were well preserved with little sign of wear. Therefore, ~~that~~ even if the specimens were derived, ~~that~~ the age of the sediment intersected at 4004 feet is younger than the Jurassic age assigned by Crespin (1940 - Victorian Mines Dept. Annual Report, p. 29). I am of the opinion that Crespin did not subject this sample to palaeontological examination, but assigned an age on appearance thus adhering to tradition. Furthermore I am of the opinion that the core at 4004 feet is probably of Cretaceous (upper Albian) age. As already stated P. delicua is restricted to a certain horizon of the Marine Cretaceous from well samples in South Western Victoria, but the Holland's Landing core does not correlate lithologically with the dark grey mudstones of the upper Albian of South-western Victoria. The fact that only two pelagic specimens were recorded provides evidence for an interesting speculation. This speculation is that the two specimens represent a sudden influx of Cretaceous seas onto a terrestrial environment. This marine break-through was apparently sudden, carrying in only pelagic foraminifera, and the marine conditions did not remain long enough for the benthonic foraminifera (especially the typical arenaceous forms) to establish themselves.

cont...

Another point of interest is that an abundant foraminiferal assemblage of Oligocene aspect was recorded in a core at 3884 feet. Crespin does not record any foraminifera below 3743 feet, although she states that the Oligocene persists to 3949 feet. As yet I have found no foraminifera between the definite Oligocene at 3884 feet and the probable Cretaceous at 4004 feet. Therefore, it would appear slow deposition or non-deposition took place between upper Albian and Oligocene times.

I intend to examine further samples from the Holland's Landing Well, and extend my investigations to other wells in the vicinity where Jurassic has been reported.

D.J.Taylor
Geologist.

1969/57

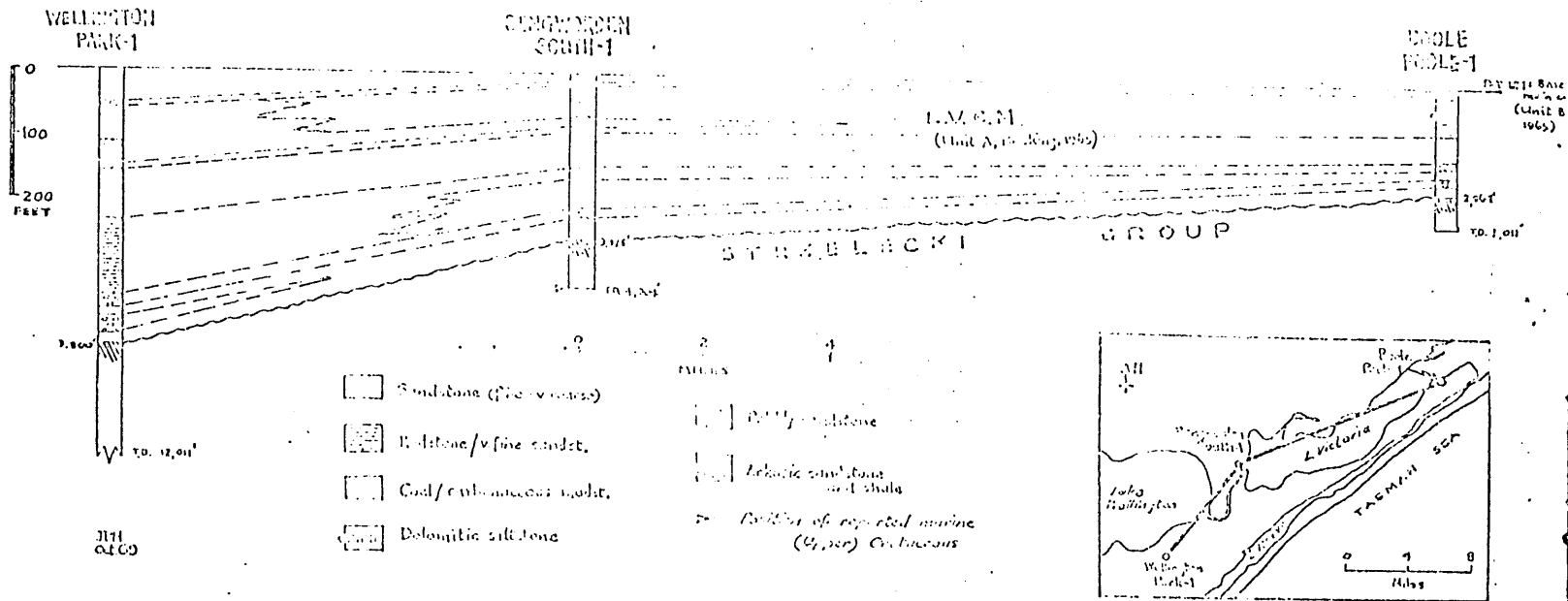


FIG.1 Diagrammatic correlation of basal Tertiary and topmost Mesozoic beds, Gippsland Trough district

86317

HOLLANDS LANDING

BENGWORDEN SOUTH
No. 1.

18

Limbo R. Fm. - 735'
B-date L.S. 745-1516!

Lakes Ent. Fm. 2400 - 3176 Glauc. sd. 3156 - 3166 10'
L.V.C.M. ~~2350~~ - ~~3800~~
Strzelecki Gp. 3949.

CORE DESCRIPTION SHEET*

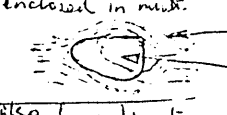
WELL NAME: -

DEPTH	COLOUR	LITHOLOGY	DIAGENESIS & POROSITY	MINERALS	FOSSILS AND/OR COMMENTS	GRAIN SIZE	GRAIN SHAPE
3127	lt ol. gy - lt gy	med (calcareous mudstone) [silty calcstone]	tight	• occ. G • Pyr. "trails" patches • rare fine M.	forams.		
3137	lt gy - lt lt gy	as above, sl. more silty, sl. glauc.	"	• M. G (more than above) • Pyr. occ "trails" • occ Q	forams UNUSUAL FOSSIL(?) tr. fish remains		
3143	lt gy	last page					
3151	greenish gy - dk gn - gy	pyrite, containing quartz & glauc. grains • soft unknown mineral	hard & tight	Q G } other than ? } pyrite.		Q grs. VC "recr." upper. C - f G	rounded.
3154	light gy. (sl. ol. gy tinge)	glauc. sandy calcareous mudstone [silty claystone] ••• sand qns. patchy	tight	Q Glauc (E Pyr) Pyr. also as "trails"	forams	M - G (C)	rounded.
3155	A lt ol. gy - lt bn. gy.	glauc. mostly ls.	tight well-indurated	M. Q G (/pyr.)	forams		
	B (med.) ol. gy - bn. gy. with a	glauc. sandy dolomite pellet of -	tight shard. (sucrosic)	G. (E pyr) Q	foram tr.	F/M - G (C) M - (P) (VC/G) P	mostly rounded to some extent
	med. dk gy (sl. gn tinge)	glauc & pyr. sandstone (almost quartzite)	v. tight	Q Glauc (/pyr) Pyr.			
3156	as above	B (: dolomite)	crystalline sucrosic	Q not extremely common		M - VC (C)	mostly rounded
SAMPLES MISSING							
3196	A lt ol. gy	silty v. fine sandstone	firm			silt/VF (VF)	
	B bn. black	ligneous clay.					
3200	black	lignite	tight, sl. crumbly, vel. low sg	-	sl. luster, homogeneous vel. high qdc.		

* Describe sedimentary structures on rear page

CORE DESCRIPTION SHEET*

WELL NAME:- ... No. 1

DEPTH	COLOUR	LITHOLOGY	DIAGENESIS & POROSITY	MINERALS	FOSSILS AND/OR COMMENTS	GRAIN SIZE	GRAIN SHAPE
3220	pell. gy - lt. ol gy	calcareous mudstone w/ shaly or quite sandy	SUSPECTED CONTAMINATION	v. tight & vel hard.	tr. forams		
3236	dusky, yell (10yr) - bn black	lignite	rel earthy + crumbly	-	horiz. layers of dots, semi-lustrous lignite 2-in earthy mat		
3246	bn black / 13/ bn gy - ol. gy	lignite / lignitic mudstone ligneous mudstone (silty claystone) / almost a "shale"	tight intergrading & inter-laminating	φ v. rare.	φ gn. (f GR, rdad) enclosed in matrix  also frags. lignite		microshelling traces grain flat face on qz grain
3250	black	shaly lignite	hard tight, dis. into flakes		semi-lustrous		
3260	mottled lt - dk gy	sand, lignitic, & for also lignitic clayey sand	v. friable v. wk cement of dissonid. lignite & clay.	φ	frags. lignite	M - GR (C) v. poorly sorted	all but smallest coarse rounded
3270	benzo bn. gy + bn. black	lignitic clayey sand	partially friable, low porosity	φ	lign. frags.	M - GR (coarse)	above, though appear to be a little more ang.
3280	pell. - lt. ol. gy	silty sandstone (? sti clayey)	powdery mat. breaks vel. cleanly	φ tr. M.	-	VF - F (F)	sub-a.
3290	bn black	lignite	POOR SAMPLE				
3300	lt. ol. gy	clayey sandstone	CONTAMINATED SAMPLE, no fresh pieces	partially - v. friable	φ	VF - GR (?C)	coarse with shaly rdg.
3306	v. lt - lt. gy	v. clayey sandstone how much due to det. acids	HIGH DEGREE OF CONTAMINATION	tight & firm	φ	VF - VC (M) w/ GR	sub-a, some rdg. v. gn. often tabular

* Describe sedimentary structures on rear page

CORE DESCRIPTION SHEET *

WELL NAME: -

100, 1

(3)

DEPTH	COLOUR	LITHOLOGY	DIAGENESIS & POROSITY	MINERALS	FOSSILS AND/OR COMMENTS	GRAIN SIZE	GRAIN SHAPE
3450	yell gy. -lt. ol. gy.	sli clayey silty sandst. POOR SAMPLE	rel. friable	Q. tr. M.	occ. spic. lignite	VF - C (F/M)	white edge, even in corner qtz.
3470	A as above	as above	"	"	"	VI - M (F)	"
	B yell gy -lt. ol. gy. pink gy -tan gy.	clayey, as above PROBABLY JUST A CONTINUED UNIT OF A.	"	"	"	VI - F (F)	"
3490	lt. clayey (shaly) as for B above	sli clayey, silty sandstone.	partially friable, calc. porous.	Q. Some M.	"	VI - F (F/M)	"
3510	as above	as above FIRST LIGNITE CORE SINCE REF 3250'	partially friable, etc.	Q. M. minor Foliage & lignite qtz.	refine to 3250' level streak of lignite material	VI - C (F/M)	"
SAMPLES MISSING							
3570	lt. cl. gy.	partially clayey, silty sandst.	sli friable, firm, slight abnormal porosity	"	"	"	"
3571	A "	as above	"	mostly Q. some M.	"	VI - C (F/M)	Color same as 3570
	B tan black	lignite (within) thin, appears to be in contact	"	"	"	"	"
3589	lt. cl. gy.	silty sandstone (v. sli. clayey)	rel. friable, rel. good pores.	Q. some M. some F. lignite frags.	"	as above	white edge
3590	pinkish gy.	clayey, quite silty, sandst.	powdery, but rel. firm.	Q. vint no M. qtz. ? lignite.	1/2 in. clay-silt/sand highest qtz.	as above	"

* Describe sedimentary structure on rear of page (3)

DEPTH	COLOUR	LITHOLOGY	DIAGENESIS & POROSITY	MINERALS	FOSSILS AND/OR CONTENTS	GRAIN SIZE	GRAIN SHAPE
3610	brn. black	lignite*, red sulphureous (could be highly lign. mudstone)	light & red. dense	• sulphureous min. red. predominant • also M III			
3625	black	lignite	light, lower 50% - somewhat crumbly when struck	—	has woody material, & of amber resin.		
3628	light ol. gy (pinkish tinge)	(v. sil. clayey) silty sandstone, (calcareous, pres. dolomitic) <u>hard dolomitic sst. along one side of core (as for 3630)</u>	partly friable sform, good porosity	• CP • M • at base of lignite (unclear)		VF-C (F)	
3629	as	above			1 mm thick layer of lignitic mat dips at 25°		
3630	red gy (mottled 2 ft. of gy patches)	dolomitic sandstone	dense, hard & crystalline	• lignite specks	one surface covered by a v. thin layer of semi-vitrinite lignite dipping at 10° slowly visible in 1162	VF-Vc (M)	
3631	red dk. gy - brn. gy	somewhat lignitic, dolomitic siltstone - mudstone	hard & tight				
3631.6"	as	above					
3632	as	for 3610, although not noticeably	sulphureous				
3637	A B black ? lt. brn. gy	lignite lignite clayey, ? silty, sands sand is thin horizontal micro-lenses (rarely > 2mm th.)	semi-vitrinite evanescent woody			VF-C (M)	sub/a

* Describe sedimentary structure on rear of page

1/6

CORE DESCRIPTION SHEET

WELL N

DEPTH	COLOUR	LITHOLOGY	DIAGENESIS & POROSITY	MINERALS	FOSSILS AND/OR COMMENTS	GRAIN SIZE	GRAIN SHAPE
3639	A med dk gy - bn. gy.	shale, reasonably lignitic	tight	-	dark plant fragments // shaly texture.	-	-
	B med. lt gy - qnch.	pyrite	hard dense	sulphurous weathering products • glauconite? • quartz		gr: ↑ GR (not enough for mean)	rounded. CAN THIS BE IN SITU? *
3650	ol. gy (sl. bn. tinge) * also appears to be some lignite present	slate, partially lignitic } CONTAM ^N to be some lignite present	tight				
3660	bn. black	lignite (as for 3610 + 33)		rel. sulphurous.			
3672	-	as above - sl. shaly, ± patches of lt. ol. gy (sl. bn. tinge) siltstone along surfaces: v. thin & discontinuous.	-		no apprec. dip.		
3682	pinkish gy.	mudstone (silty claystone)	tight		plant mat. eq. stms.		
* 1st 3684	pinkish gy - lt bn. gy.	as above			v. fine traces of plant mat.		
3690	gy black	lignite			occ. layers of sub-irregular woody material & traces silt (See 3672)		
3696	lt. pinkish tinge	sl. clayey, sandy siltstone - silty (v.f) sandstone	rel tight firm, rather low porosity tight & silty greasy	Q M ss gr. of lignite	silt - v.f (silt/sand) plant debris.		
3699	sl. dk. gy / pinkish - lt bn. gy	claystone			occ. v. fine traces of plant mat.		
3699		claystone			v. fine branching traces of twigs		

* Describe sedimentary structure on rear of page

CORE DESCRIPTION SHEET

WELL NO: -

DEPTH	COLOUR	LITHOLOGY	DIAGENESIS & POROSITY	MINERALS	FOSSILS AND/OR COMMENTS	GRAIN SIZE	GRAIN SHAPE
3702	42	for 3699 to 3700					
3712	42	above					
3722	pinkish gy - silt gy	sli clayey (?) siltstone	rel. tight firm, sli. powdery surface	• rare M • occ. specks of • lignitic material			
3743	UNRELIABLE (lt) pinkish gy	SAMPLE clayey (silty) sand, sli. granular	?	G M		10.00 of 16 gr VF → P (bb) (meds?)	ultra-spherical highly rounded spherical grains (near equal) angular - fine sub-angular (")
3754	pinkish gy	as above	rel. friable, low-auger porosity	Q		VF - Gr (as?) v. sparsely sorted	
3760	medium gy (sli. pinkish tinge)	micaceous mudstone (clayey siltstone) - sli. shaly	tight, rel hard	M quite common	tr. plant debris P.T.O		
3761	LOOSE vll. gy. pinkish tinge	SAMPLE stoppage clayey sand, silty gravel (ie sli. clayey, sandy gravel) ^{gravelly} ^{gravelly} clayey sand, silty gravel ^{gravelly} ^{gravelly}	?	Q tr. lignite	- P.T.O	VF - P (as?) (as?) v. highly porous	mostly sub-angular to ang. →
3761	42	for 3760					
3774	LOOSE SAMPLE	sli. clayey, sandy gravel [as for 3761]				→ P (bb) (as?)	above
3781	42	above				as above	
3794	pinkish gy - lt. gy	clayey sand, partially granular powdery gms	rel. friable, fairly un-porous			VF - Gr. (c/vc)	mostly sub-ang, all s. gr. non-equal
		LOOSE SAMPLE					

* Describe sedimentary structure on rear of page (19)

CORE DESCRIPTION SHEET #

WELL NAME: -

DEPTH	COLOUR	LITHOLOGY	DIAGENESIS & POROSITY	MINERALS	FOSSILS AND/OR COMMENTS	GRAIN SIZE	GRAIN SHAPE
3804	pinkish gy.	slt. granular, clayey sand powdered gns?	Loose SAMPLE 40 for 379u	Q -		VF - Gr (C/Vc)	
3834	4. bn gy to 4 sl. gy	mudstone (silty claystone), slt. shaly	lighter hard		thin streak of lignitic mat "bedding", also plant debris		
3838	pinkish gy - lt. gy (black specks)	(slt. clayey) silty sandstone, laminated P.T.O.	firm, up to good porosity	Q rare M, (V/une)	approx. specks of lignite, also plant debris	VF - F (F) very well-sorted.	sub-a
	B laminar med gy.	lignitic sand (= frag. lignite.)			frag. of lignite (larger than gns)	med. VF	
3884		COMPLETE CONTAMINATION					
3885		CONTAMINATION Consists of clay sand, gravel, pebbles, the latter	up to 2.5 cm long				
3903	pinkish gy (1) med. gy (2) mottled	clayey sand (1) (2)	tight (rel low por)	Q		?M - Gr (Vc) (can be less)	occasional gns generally show some shaly, + can be equant (commonly) "tabular"
3927		CONTAMINATION includes few frags. of high grade ^{sub} lignite (??)					
3949	med. light grey	mudstone (slty silty claystone) in contact with: slt. clayey, siltstone	tight.				dip of 18° dlt.
3951	med. gy (greyish tan) brassy luster	partially lignitic pyrite	tight	res. well-oxidised to sulph mineral.	partially lign matrix + traces lustrous fibrous lignite	? plant remains.	

* Describe sedimentary structure on rear of page

CORE DESCRIPTION SHEET #

WELL NO.

DEPTH	COLOUR	LITHOLOGY	DIAGENESIS & POROSITY	MINERALS	FOSSILS AND/OR COMMENTS	GRAIN SIZE	GRAIN SHAPE
3975 A	vt/lt qz - lt. qz. qy med. lt qy	interbedded interlaminated A & B: - v. fine arkosic sandstone, clayey matrix mudstone (clayey siltstone)	tight - v. low pores	Q F	some arcosic lignite as v. fine plant debris some lignite (laminae), as above.	vf-M(^{vf} /F) (rare)	dip(?) about 15 to 20°
Samples	2. he. melted:						
3143	lt. ol. qy (silt. to sh.)	glauc. sli sandy calc. mudstone	tight	sand mostly glauc matrix qz		lt. to med.	br
3149	ycl. - lt. ol. qy (m. porosity)	glauc sandy calc. mudst.	tight; glauc → indist. mottling	glauc. v. common, qz. more common than above. glauc not common			
3166	(med) ol. qy br. qy	sli sandy? calc. mudst.	tight	Q. (not v. common - rather) Pgr. traces			
3176							
3186							

* Describe sedimentary structure on rear of page

cf. gravel (below) this mudstone could be deposited
by same river, but in quiet waters, eg. on flood plain or
a shifting, sometimes torrential, stream



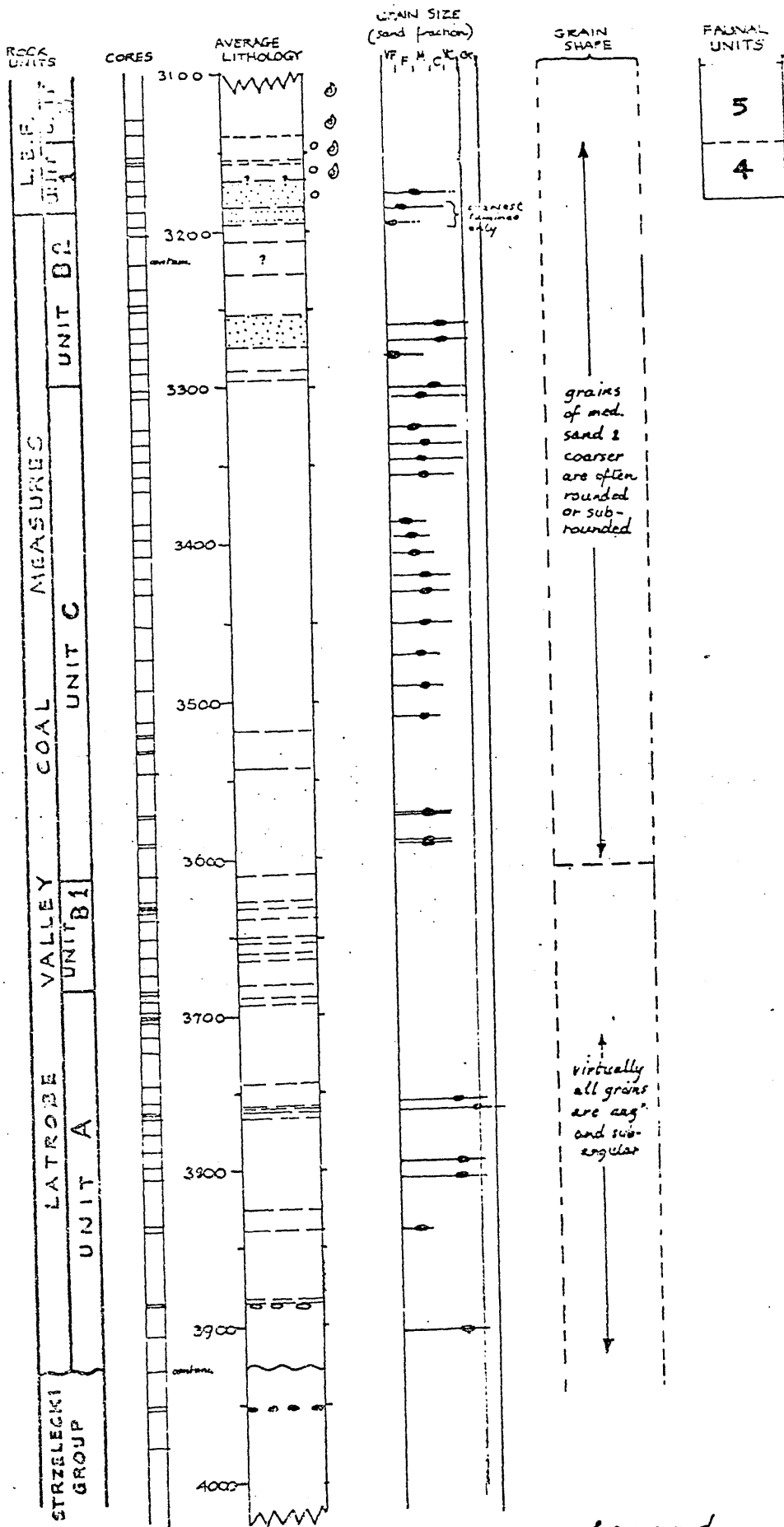
A.S.M. 'dune stage' (too large for ripple stage)

suspected that most of powder is due to grinding.

Qns show fracturing due to chem weathering which kept ahead of
the physical removal of the grains.

- rel. typical of sand 2m say 30-40 miles of granite (or quartz)
- small amount of smudging, though not rounding, as a result of inefficient
fractures present in the original granite
- size of grains are reasonably equal

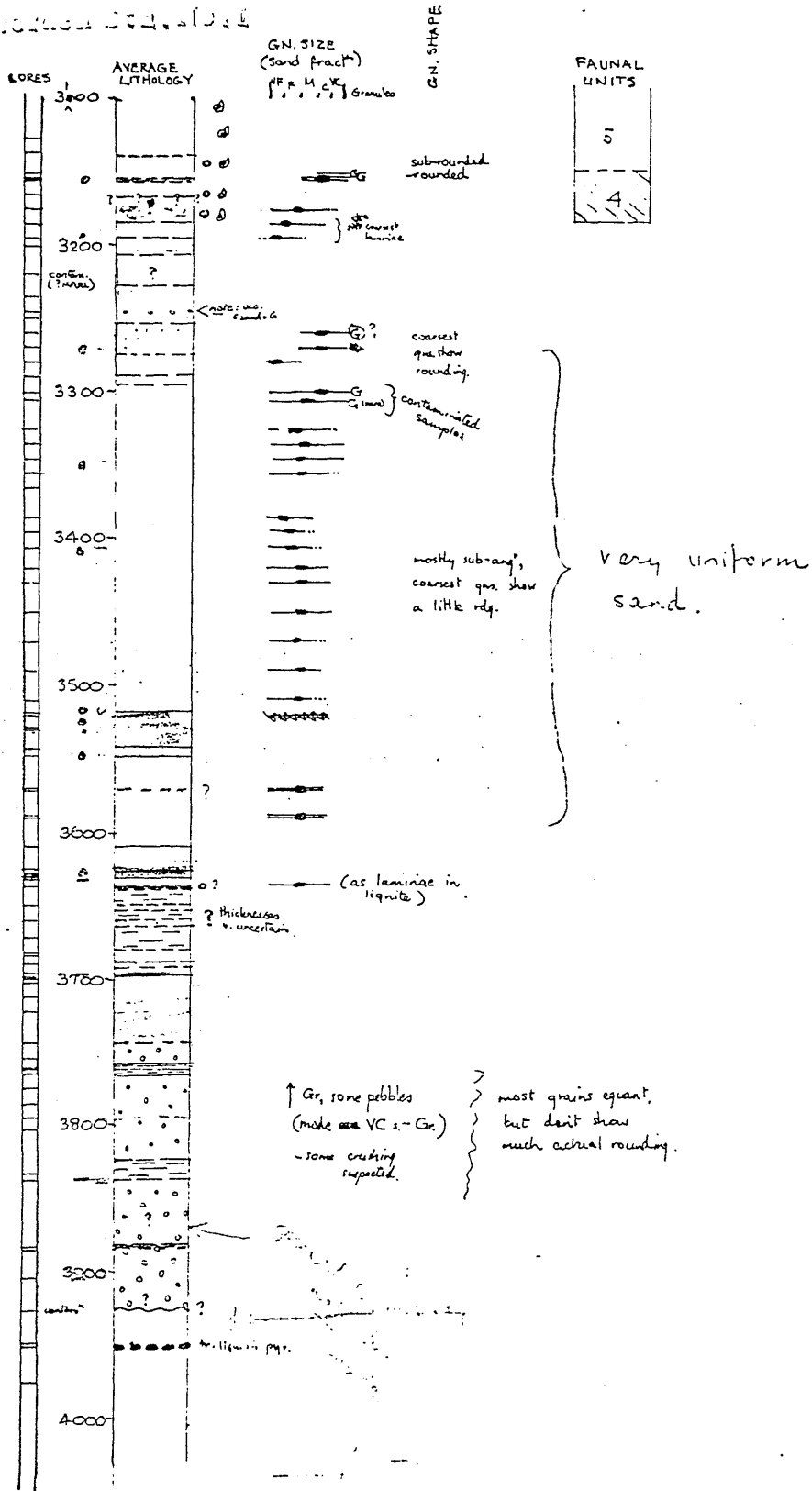
(Example ...)



Legend

- | | | | |
|--|--|--|---|
| | calcareous mudstone | | muddy sandstone |
| | glauconitic (or calcareous) sandy mudstone & muddy ss. | | non-ligneous mudstone - very fine sandstone |
| | ligneous mudstone & sandstone | | glauconite |
| | lignite | | fossils (largely foraminifera) |
| | | | nodules |

DESCRIPTION OF STRATA



LONG RECORDS

SIZE ANALYSIS
WITH SECTIONS.
-1/8" WORDEN

STH. No. 1
(AND INK) 11/11/11

- 2 -
(HL)

- 3639 : Core: solid pyrite
Core: gy mudstone, with brown-black linear plant fragments.
- 3650 : highly fragmented gy. low ligenous siltstone, coal fragments.
- 3660 : mic. v. ligenous claystone / coal.
- also 3672.
- 3682 : rel. tight lt. gy siltstone/claystone good plant remains. (ident. to LEF) icc
- 3687 : " yellowish gy. mudstone, traces of plant material
- 3690 : coal, (low grade not much more than a claystone)
- 3696 : gy. v. fine sandstone (mica traces) with black plant material. m
- 3699 : as above, but a ~~mudstone~~ (sandstone) m
[lt. yellowish gy to light ss]
- ~~3700~~
- also 3700, -02, -12.
- 3722 : as above, lt. gy. siltstone
contam., though appears to be a v. fine "1" sandstone (or silty sandst. - powdery) 25
- 3754 : lt. gy. v. powdery silty sand, some grit
- 3760 : rel. dark gy. mudstone, v. fine mica quite common, rel. tight, 4'
- 3761 : fine gravel, grit, sand, & silt.
- 3767 : gy. micaceous mudstone, rel. tight.
- 3774 : gravel, grit, etc., high ppv. of white powder
- also 3784 -94, 3804
- 3834 : tight bn. gy mudstone, occ. large black carbonaceous pieces.
- 3838 : lt. bn. gy sandstone (res. well cemented), quite porous
small black carbon particles throughout. may be lens.
- 3884 : contamination.
- 3885 : gravel, etc - contamination.
- 3927 : whitish weakly cemented grit & contamination
- 3903 : lt. bn. grit & sand, angular, clayey cement (limy appearance)
- would not be v. porous. (cf. Well Park)
- 3949 : tight grey mudstone.
- 3951 : solid pyrite, slightly weathered, and associated bn coal flakes.
- 3975 : greenish gy. v. fine sandstone black carbonaceous particles.
- 3977 : tight gy. mudstone, easily fragmented traces of whitish? kaolin, lustrous black carbonaceous material.
- 4007 : gy. mudstone, rather shaly.

RILLING RECORDS
ESPIN.

SIZE ANALYSIS
ETHN SECTIONS.

ACRES.

BENGWORDEN STH. No.1

(HOLLANDS LANDING) ~~STH. No.1~~

DOLMITE - contin
leaves some-
shore areas
- v. promising.

Samples missing: check LEF log.

3196: bn. to brish gy ligenous silty sand, sl. micaceous.

3200: piece of bn coal (not earthy). - black greasy.

3220: puggy ^{foreign} meal + contamination.

3236: earthy brown coal.

3246: bn coal (or a v ligenous claystone, fine mica flakes).
- also 3250.

3260: extremely friable sugary sand, weak cement of finely dissemin.
ligeneous material.

3270: 99. bn. sand, stronger clayey matrix.

3280: light gy. v. fine silty sand.

3290: bn. coal + ligenous clay.

3300: lt. gy. sand, clayey cement. (rel. friable) ^{doesn't fall apart but can be broken} faintly mic.

- also 3306, -26, -36, -46, -56, -66, -86, -96, 3406, -20-30,

^{finer sand} [-50, -70, -90] ^(rather powdery silty)

→ 3510: as above, less powdery: a v. porous, rel. friable gy. sand, mic.
horiz. traces of black carb. material. →

→ 3518: as for 3300 etc

? SIZE ANALYSIS

3520: dense grey dolomitic sandstone, also ^{black} pyrite in parts, fine mica

- also 3529, -30, -42'6" ^{↑ brown carb. material to small extent} traces of pyrite

? THIN SECTION

3549: brish gy mic. silty sand, friable + powdery.
- also 3550

? SIZE ANALYSIS

3571: ~~as above~~ as above, in contact with bn coal

3589: lt. gy. silty sand

- also 3590

3610: v. ligenous grey black claystone, assoc. sulphurous material (virt. coal)

3625: black greasy coal.

3628: yellowish gy. silty sand

? SIZE ANALYSIS

3629: dense gy. dolomitic sandstone

? THIN SECTION

- also 3630

3631: dense fine-grained pyritic sandstone.
- also 3631'6"

3633: bn. coal (brittle-type).

- also 3637, -

LONG RECORDS

SIZE IN METERS WITH SECTIONS. - 1/8" WORDEN

STH. No. 1

(LANDING) ~~11/11/11~~

there are - preliminary.

- 2 -
(HL)

3639 : Coar: ^{solid} pyrite
Coar: gy mudstone, with brown-black linear plant fragments.

3650 : highly fragmented gy. bn. ligenous siltstone, coal fragments.

3660 : mic. v. ligenous claystone / coal.

- also 3672.

3682 : rel. tight lt gy siltstone/claystone good plant remains.

3684 : " yellowish gy. mudstone, traces of plant material (ident. to LEF)

3690 : coal (low grade not much more than a claystone)

3696 : gy. v. fine sandstone (mica traces) with black plant material.

3699 : as above, but a ~~siltstone~~ ^{mudstone} (yellowish gy to light lt)

~~3700~~

- also 3700, -02, -12.

3722 : as above, lt gy siltstone contain, though appears to be a v. fine "sandstone (or silty sandst. - powdery)

3754 : lt gy v. powdery silty sand, some grit

3760 : rel. dark gy. mudstone, v. fine mica quite common, rel. tight,

3761 : fine gravel, grit, sand, & silt.

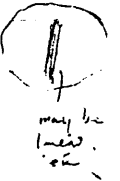
3764 : gy. micaceous mudstone, & rel. tight.

3774 : gravel, grit, etc., & high ppv. of white powder

- also 3784 -94, 3804

3834 : tight bn. gy mudstone, occ. large black carbonaceous pieces.

3838 : lt. bn. gy sandstone (res. well cemented), quite porous, small black carbon particles throughout.



may be lower

3884 : contamination.

3885 : gravel, etc - contamination.

3927 : whitish weakly cemented grit & contamination

3903 : lt. bn. grit & sand, angular, clay cement (limey appearance) - would not be v. porous.

cf. Well Park

3949 : tight grey mudstone

3951 : solid pyrite, slightly weathered, and associated bn coal flakes

3975 : greenish gy. v. fine sandstone black carbonaceous particles.

3977 : tight gy. mudstone, easily fragmented traces of whitish kadiu, lustrous black carbonaceous material.

4007 : gy. mudstone, rather shaly.