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SEDIMENTOLOGY AND STRATIGRAPHY
OF THE DURHAM COAL MEASURES,
AND COMPARISONS WITH OTHER BRITISH COALFIELDS

by

CHRISTOPHER ROWLAND FIELDING, B.Sc.

Vol. 2.

A thesis submitted to the University of Durham
for the degree of Doctor of Philosophy

Department of Geological Sciences

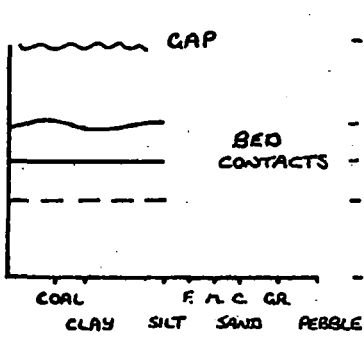
October 1982



APPENDIX I

- comprising a series of graphic sedimentary logs and other field notes, and forming the basic field information used in this thesis.

KEY TO SYMBOLS USED IN GRAPHIC SEDIMENTARY LOGS



GAP IN SECTION
- EROSIIVE
- PLANAR / SHARP
- TRANSITIONAL
GRAIN-SIZE

PEBBLE IMBRICATION
000
O IRONSTONE CLAST
@ SHALE CLAST
⊙ SANDSTONE CLAST.
● COALIFIED PEAT CLAST.
- COALY TRACES
(/ FRAGMENTED REMAINS)

LENSES AND NODULES OF IRONSTONE (LARGELY SIDERITE)
⊙ IRONSTONE CONCRETIONS
⊙ SPHAEROSIDERITE
◇ PYRITE
* GYPSUM
⇓ CONE-IN-CONE

MASSIVE / UNLAMINATED

POORLY LAMINATED

LAMINATED

WELL-LAMINATED

IRREGULARLY LAMINATED

DISTURBED LAMINATION

"CRUMBLY" LAMINATION

FAULT

TECTONIC DISTURBANCE

DRIFT DISTURBANCE

MINERAL UELIN

CANWEL - CANWEL COAL
F.A.S. - FUSAIN
K.C. } - KAOLINITIC CLAYSTONES
F.C.R. }

TROUGH CROSS-BEDDING

TABULAR CROSS-BEDDING

EROSION SURFACE
 RIPPLE CROSS-LAMINATION

CLIMBING RIPPLES.

BACKFLOW RIPPLES

RIPPLE FORM SETS

SILT FORM SETS

WAVE RIPPLES

"RIB-AND-FURROW"

INTERFERENCE RIPPLES

LADDER RIPPLES

P.C.L.
P.L.
PRIMARY CURRENT LINEATION
PARTING LINEATION

SINKISOIBAL RIPPLES.

LOAD-CASTING

DRAG FOLDING

CONVOLUTE LAMINATION

DEWATERING STRUCTURES

SYNAERESIS CRACKS

DESICCATION CRACKS

NON-MARINE BIOVALVES

" - IN LIFE POSITION

FISH REMAINS

LINGULA

MARINE FOSSILS.

SPIROBIS

OSTRACOIDS

ALGAE

TRACE FOSSILS

VERTICAL BURROWS

HORIZONTAL BURROWS

TRACKS AND TRAILS

PELECYPODICHANUS

STIGMARIA ROOTS

ROOTLETS

IN SITU CALAMITES

IN SITU LYCOPOD

DRIFTED FOLIAGE

DRIFTED PLANT STEMS

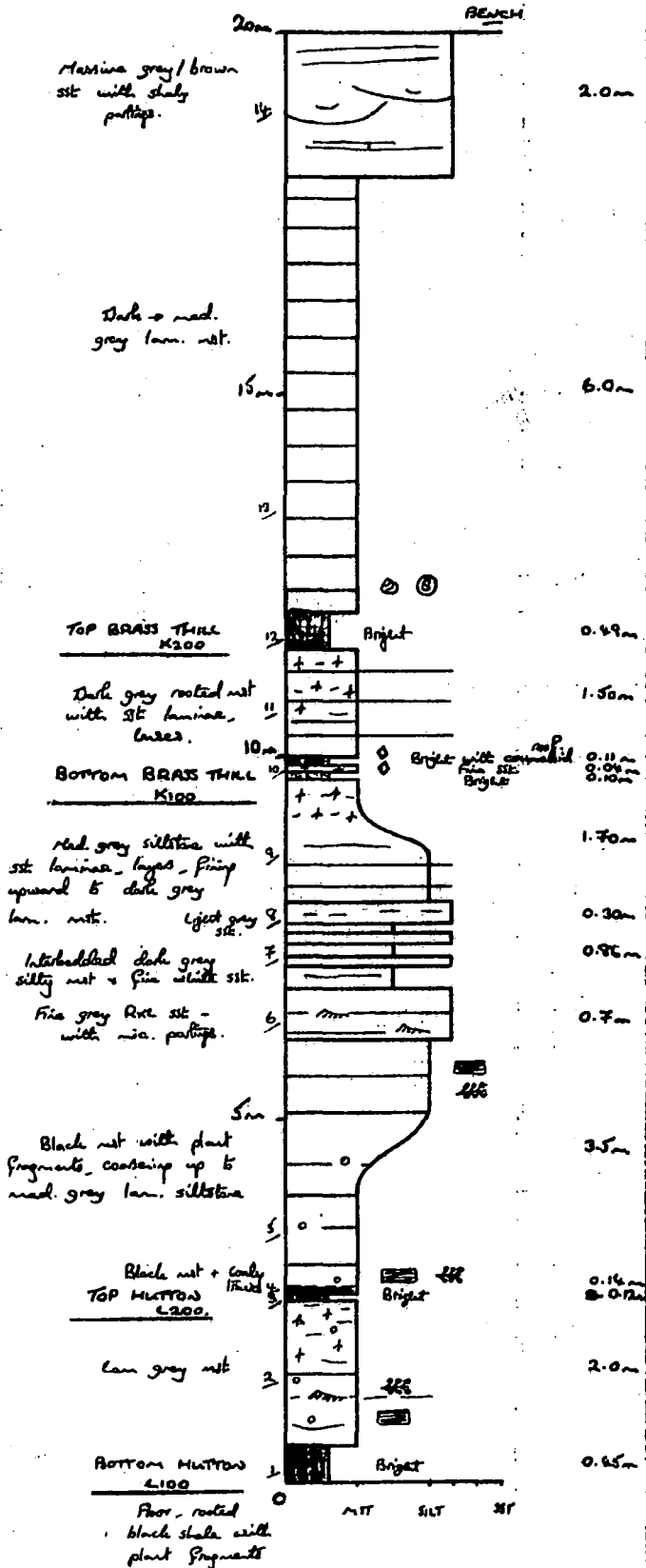
DRIFTED CALAMITES STEMS

VERTICAL CRACKS

MICROFAULT

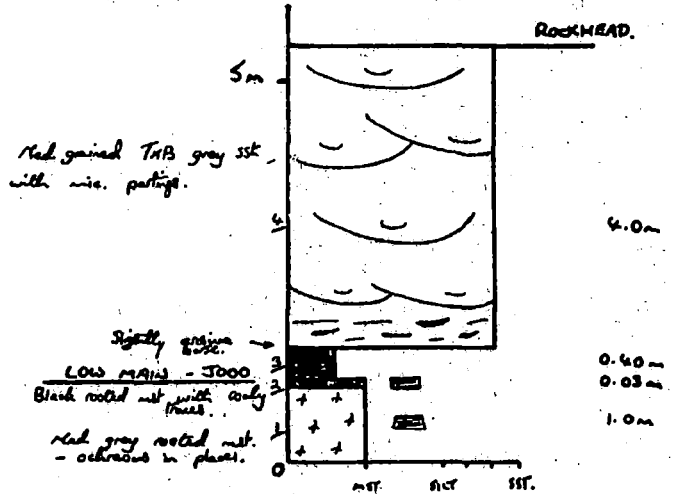
INCLINE On excavated floor of Bottom Mutton coal, plentiful flattened plant stems - almost all Sigillaria, up to 6m long x 0.6m wide, on bedding planes.

SECTION 001
INCLINE O.C.S. Cut 95 - Final Cut of Site.

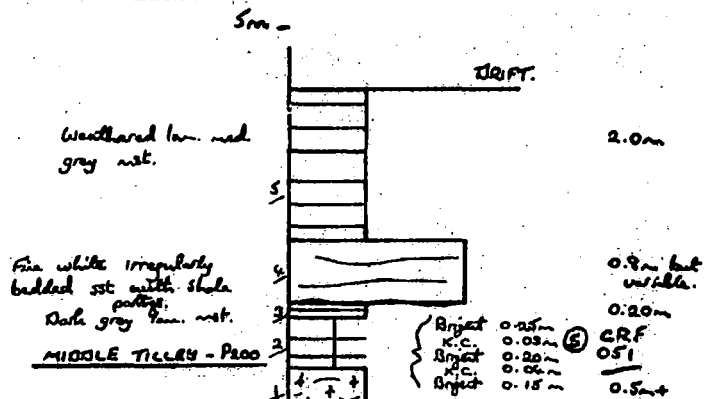


SECTION 002
INCLINE - CUT 11.

Virtually no tectonic dip.
Final cut to low strain.
See Section 006.

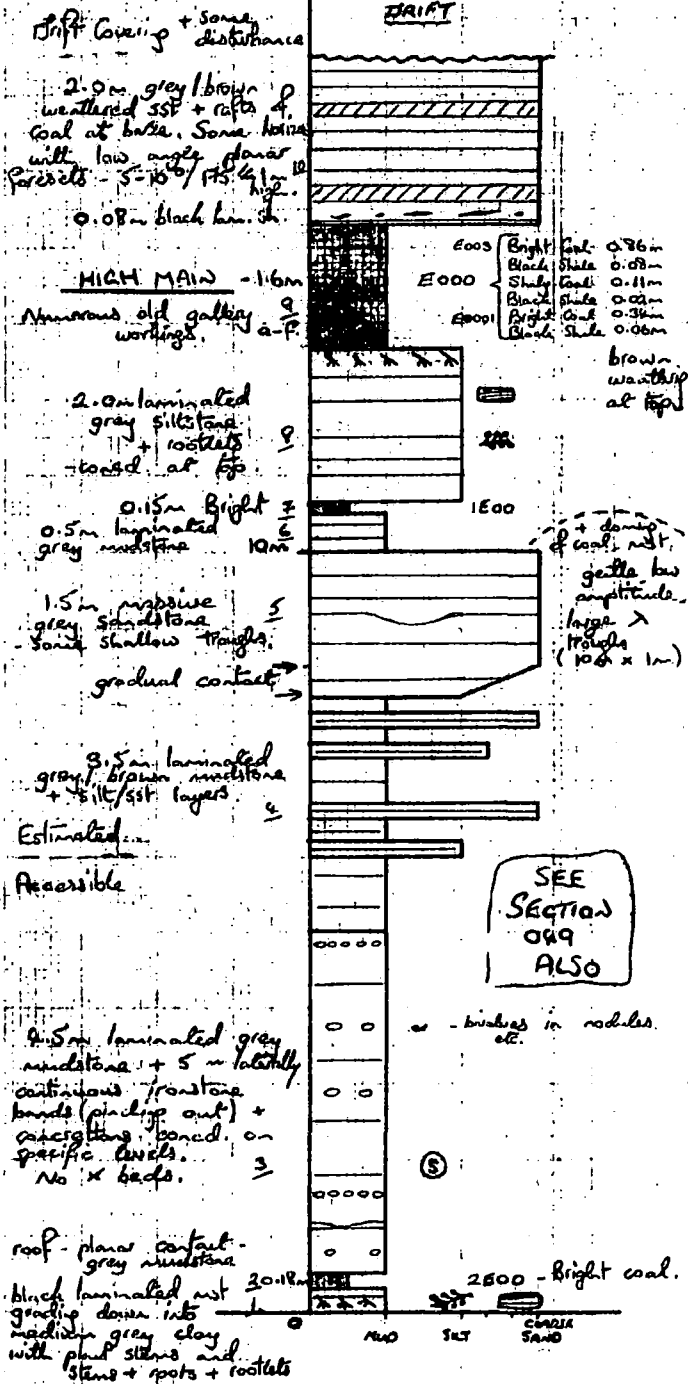


SECTION 003
ROWLEY AS(n)



Section taken near eastern corner of mid-wall.
Unit is downcut to east along wall.
Virtually no tectonic dip.

SECTION 004
 IRRETSONS 20
 CUT 1 (EXTENSION)
 G.R. 4920 SK850
 NZ ACT NZ 1868



Comments - Shear backwall.

Logging 29/10/79

Bedding - horizontal.

8 frames 4/5 ASA 125 shot.

NB Dipping effect in 11:00

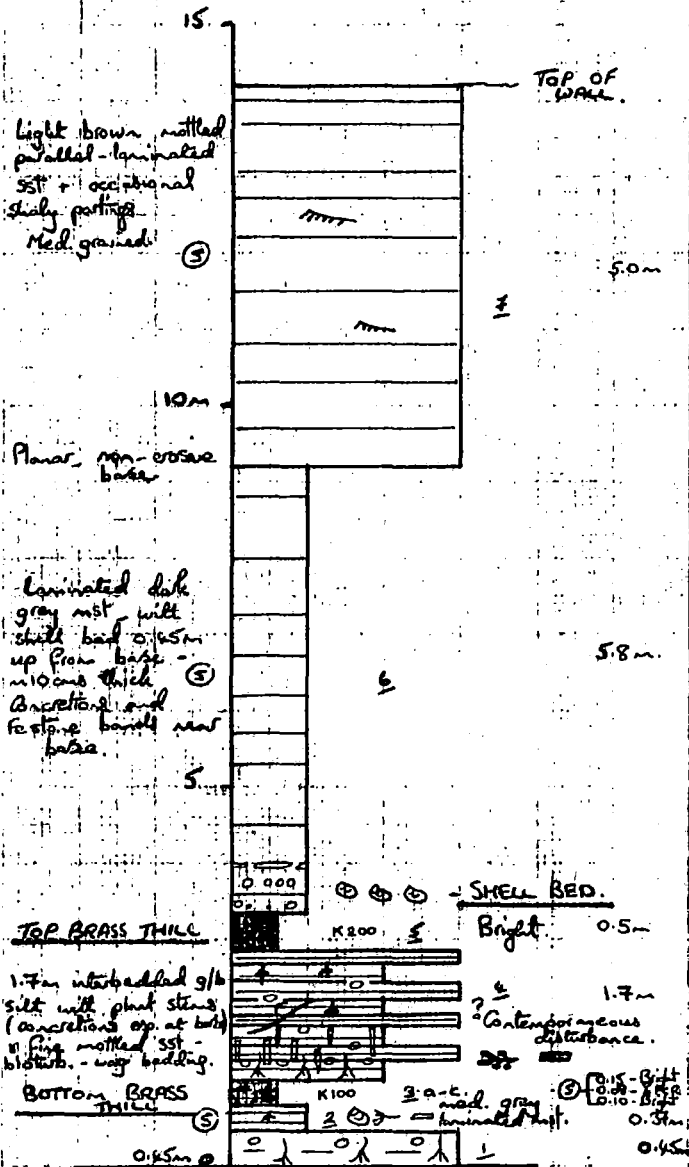
Some slight lateral variation - sst troughs & coal washing.

NB Seams split → NE.

SAMPLE - Ironstone
 Concretion.

SECTION 005 - INCLINE.

CUT 95 - 9520 3100 C.R.



Rest of section on 001.

Comments

- Seam better wall - backfilling 3/10/79.
- Site finished coalip.
- 3 frames b/w ASA 125 film shot.
- 4 SAMPLER - 1. BBT floor mst CRF 053
- 2. BBT Band CRF 054
- 3. BBT Mussel Band CRF 055
- 4. BT Post. CRF 056

All measured. Bedding - horizontal.

This section forms the upper half of log 001 which could previously only be estimated.

SECTION 006 - INCLINE.

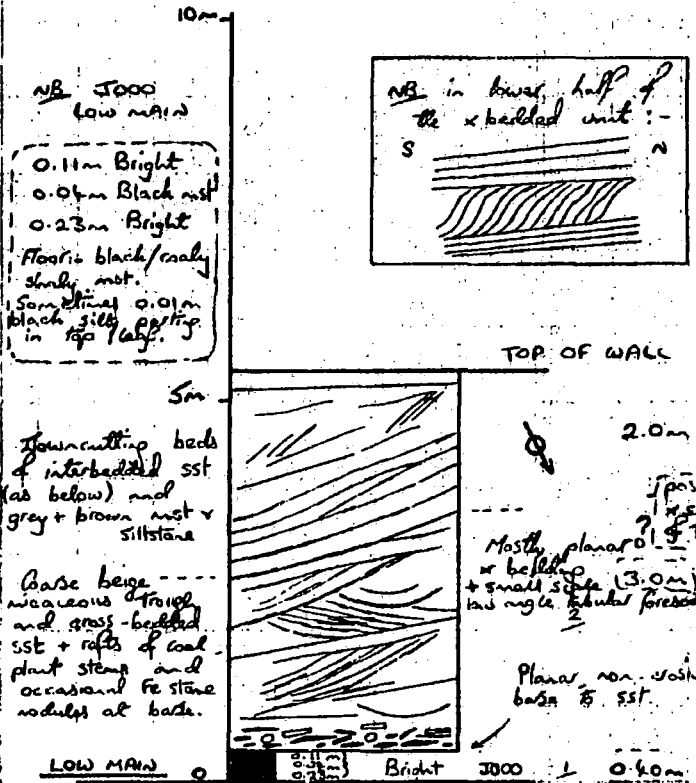
CUT 11 - C.R. 9800 2400

CROSS-BEDS :- $\approx 2.0m \uparrow$ 0-15° / 155° NB°
 011° - 159° - 154° - 113° - 334° - 135° - 352° - 351° - 333°
 206° - 358° - 153° - 159° - 157° - 161° - 156° - 163°
 357° - 193°

n = 21.

See Rose Diagram

Spurious measurements of oblique sections trough trough. * (125) Estimated



Same cut as 002 - Logged slightly further south along the same face.

Slight roll in seam in 2m high.

Comments

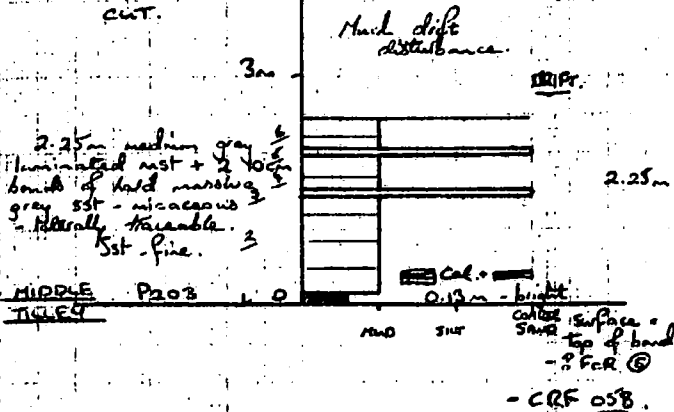
- Low cut wall - backfilling 3/10/79
- Site finished coalip.
- 4 frames b/w ASA 125 film shot.
- 1 Sample - low main Post - CRF 057

All measured. Bedding - horizontal.

SECTION 007

ROWLEY - CUT A4(S)

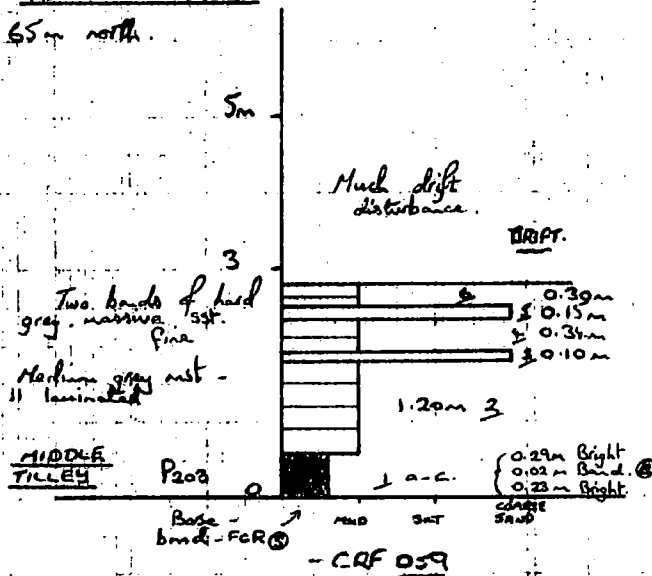
South end of cut.



SECTION 008

ROWLEY - CUT A4(S)

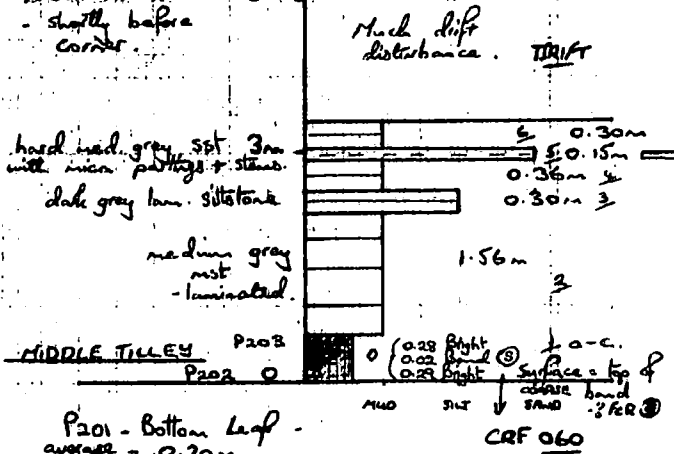
65m north



SECTION 009

ROWLEY - CUT A4(S)

100m north - shortly before corner



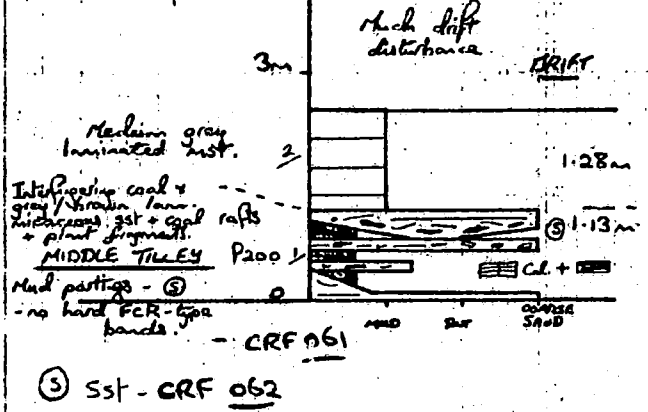
P201 - Bottom leaf - average - 0.20m

Whole Series - South part - A4(S) - of a 1km long back wall - separated from northern half by a small fault - 3m sheer walls + drift. Possibly glacial thickening of seam by raft movement - close to outcrop. Dating 5/11/79. Not continuous exposure.

SECTION 010

ROWLEY - CUT A4(S)

10m north of corner

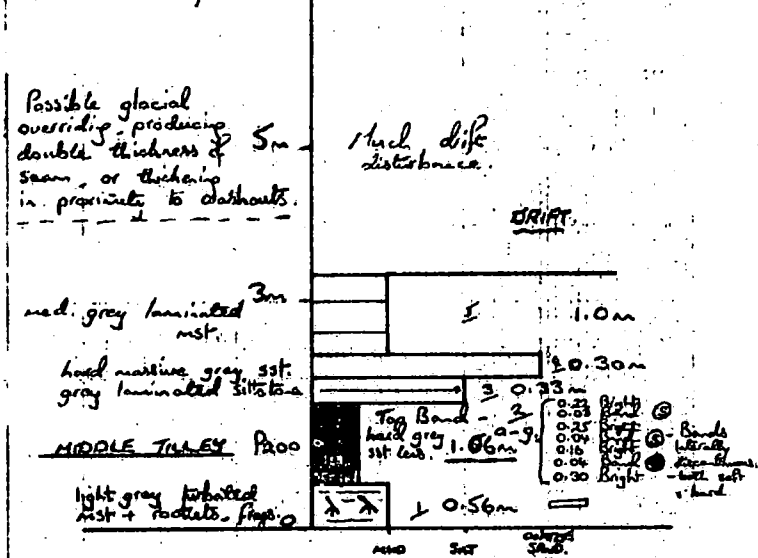


All seams leaves coalesce after a further 10m.

SECTION 011

ROWLEY - CUT A4(S)

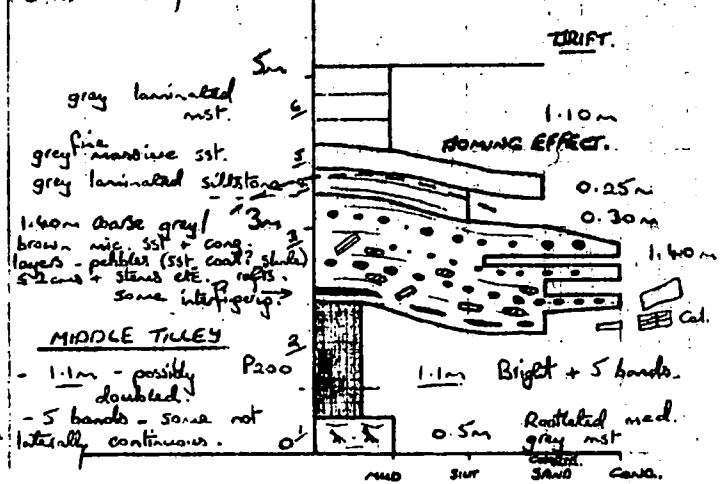
40m north of corner



SECTION 012

ROWLEY - CUT A4(S)

50m north of corner

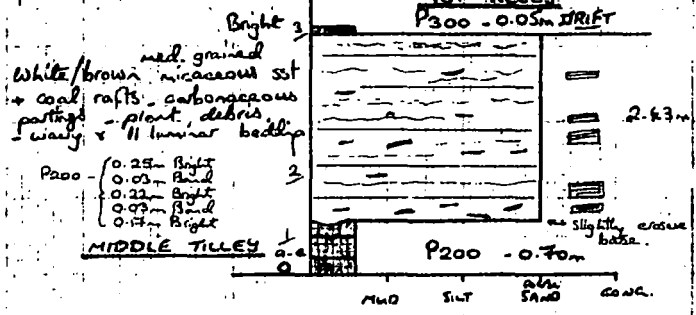


Drift orientated toward 265° - 586

SECTION 013

ROWLEY - CUT AS(N)

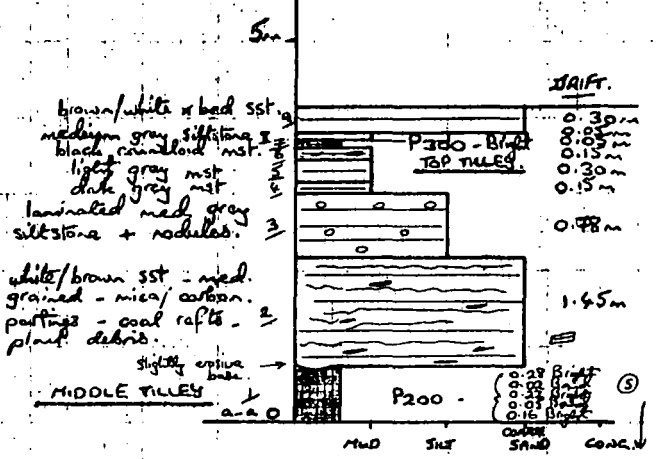
25m north of fault wall.



SECTION 014

ROWLEY - CUT AS(N)

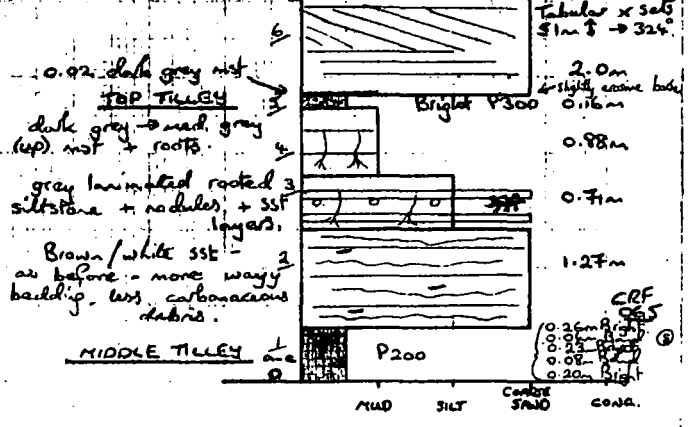
50m north of fault wall.



SECTION 015

ROWLEY - CUT AS(N)

100m north of fault wall.



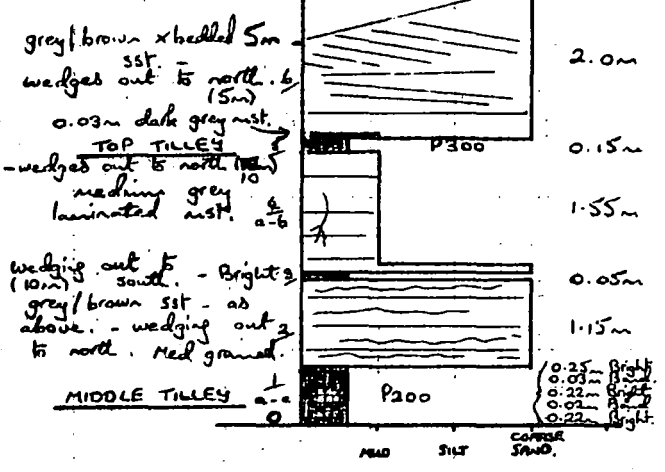
WHOLE SERIES

- 013-020 - gradually working north along Cut AS(N) - low backwall. Cont'd 8/11/79 - Working down to bottom Tilley. 6 Planes ASA 125 by 2 shot. Numerous small faults. Exposure in continuous. See field sketches.

SECTION 016

ROWLEY - CUT AS(N)

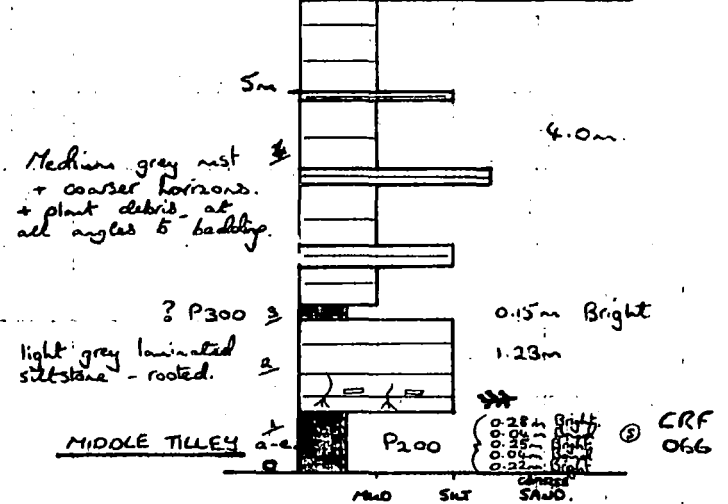
200m north of corner. (Fault)



SECTION 017

ROWLEY - CUT AS(N)

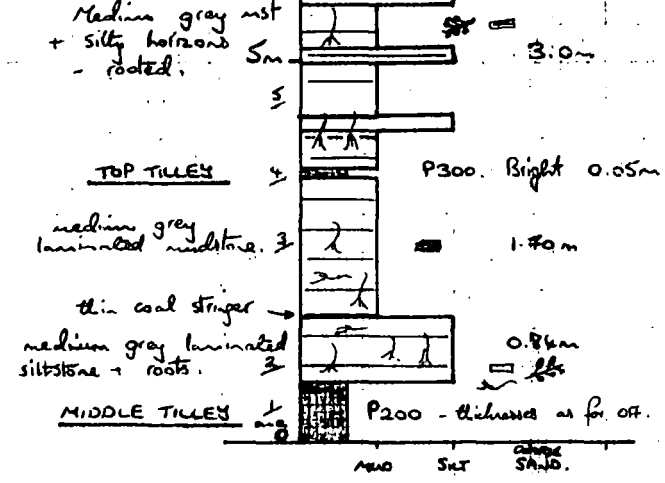
210m north of fault.



SECTION 018

ROWLEY - CUT AS(N)

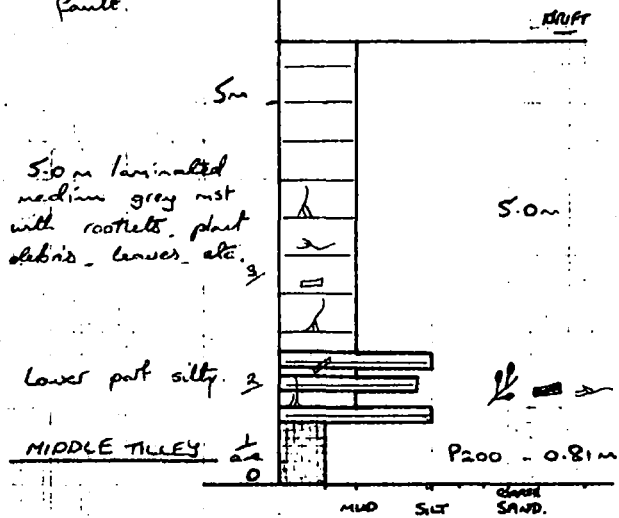
215m north of fault.



SECTION 019

Rowley - cut AS(N)

265m north of fault.

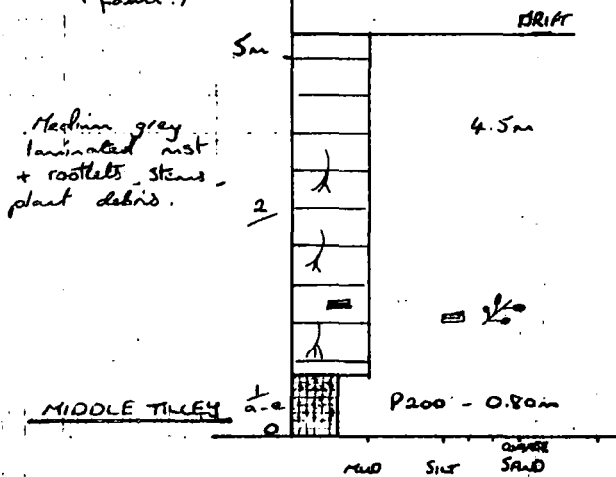


Sample - Top Band of P200 - 255m north of fault.
CRF 067 - Flattened Stigmaria impression on bedding plane.

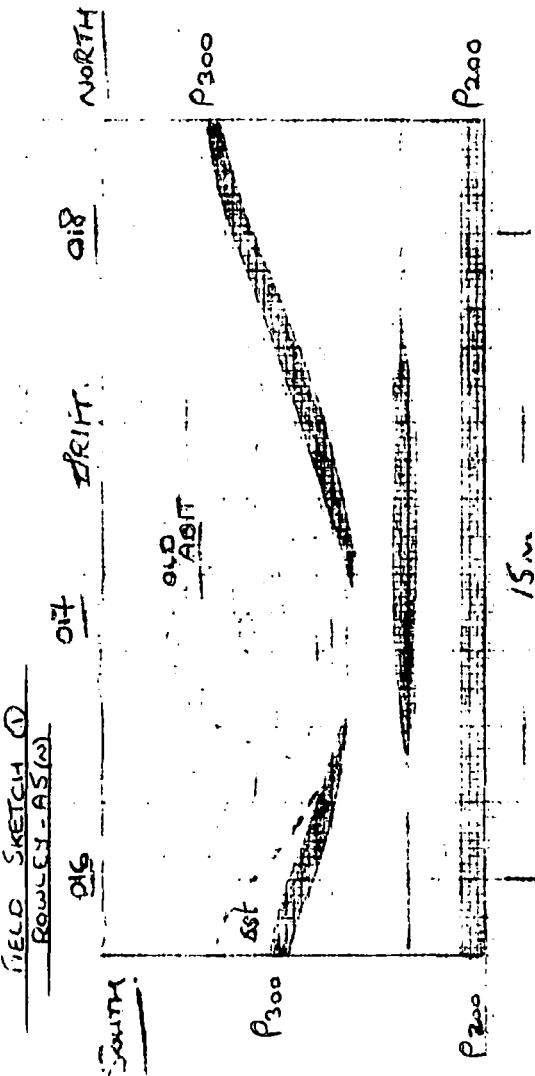
SECTION 020

Rowley - cut AS(N)

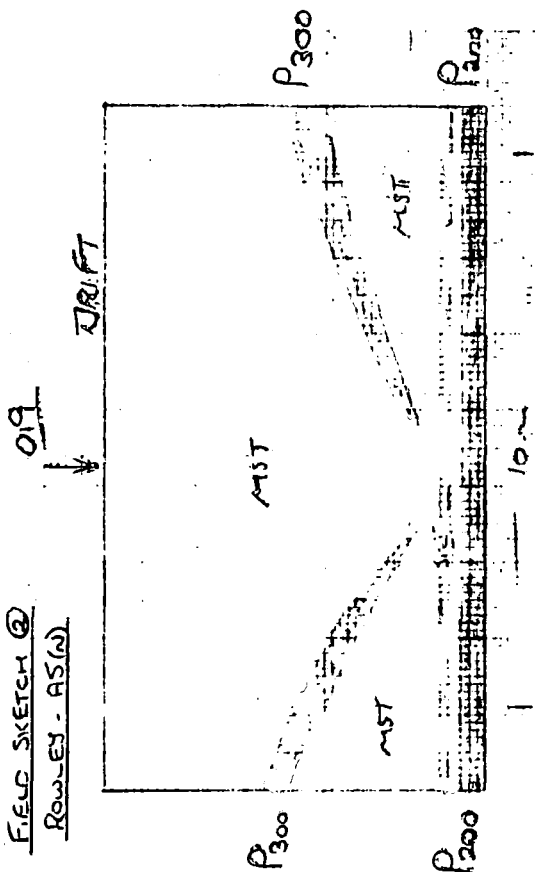
300m north of wall (fault.)



FIELD SKETCH (2)
Rowley - AS(N)



FIELD SKETCH (1)
Rowley - AS(N)

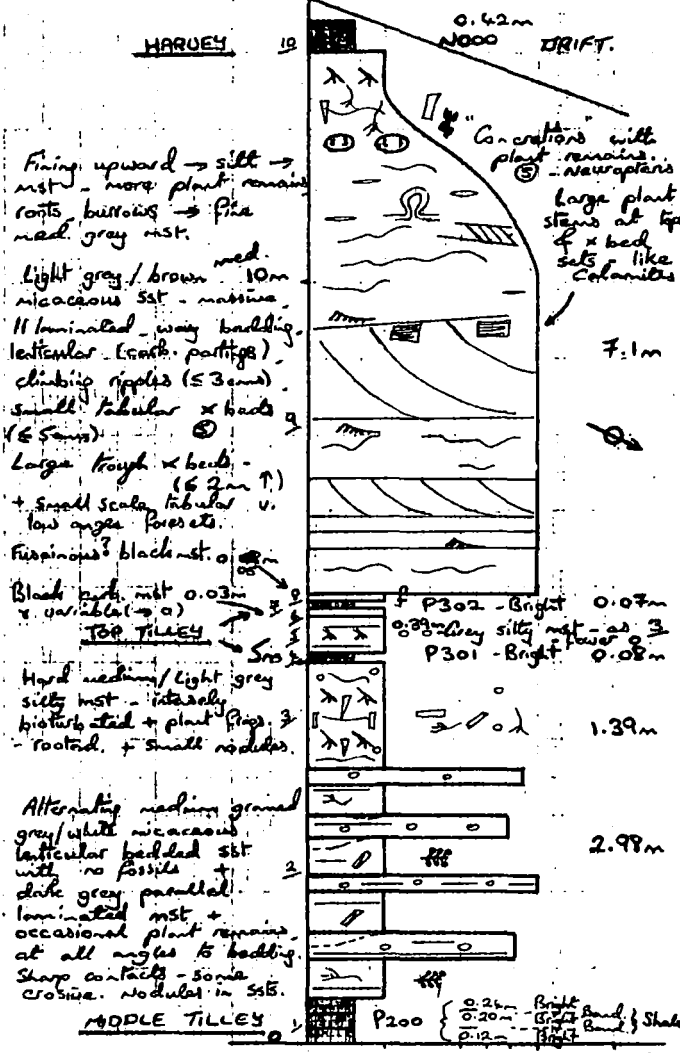


SECTION 021

ESH WINNING - CUT K5.

East end of extension.
Side wall trending 321°

Drift gradually cuts out beds 10 & 9 to south.



Fining upward → silt → mst - more plant remains roots burrows → fine med grey mst.
Light grey / brown med. 10m micaceous sst - massive. // laminated wavy bedding. lenticular (conc. partings) climbing ripples (≤ 3cm) small tabular x beds (≤ 5cm) Large trough x beds (6.2m ↑) + small scales tabular v. low angle. Bioturb. v. Fungus? black mst. 0.03m

Black part. mst 0.03m v. variable (→ a) TOP TILLEY
Hard medium/light grey silty mst - intensely bioturbated + plant props. 3 - rooted. + small nodules.

Alternating medium ground grey/white micaceous lenticular bedded sst with no fossils + dark grey parallel laminated mst + occasional plant remains at all angles to bedding. Sharp contacts - some cross-bedded. nodular in sst.

MIDDLE TILLEY
P200 { 0.25m - Bright Band / Shale
0.20m - Grey Band
0.12m - Blue Band }
MUD SILT COARSE SAND PEBBLE CONT.

Comments - Combination of back and side walls.
Coaling on P203 - 13/11/79
Shear walls.
Two small faults displace strata.
Little lateral variation - all beds traceable across cut.

2 frames 4/w ASA 125 film shot.

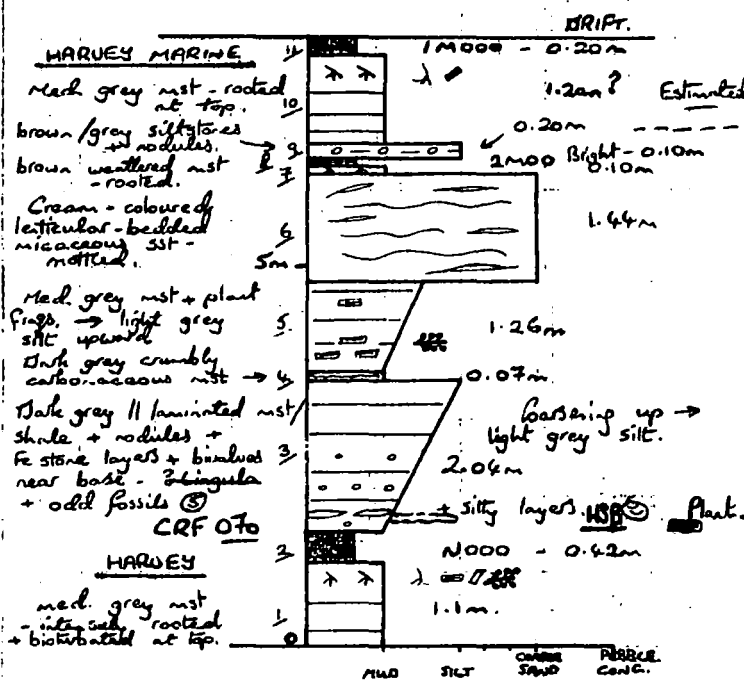
Cross bedding data on Unit 9
- 8/111 - 6/082 - 12/113 - 15/133 - 18/131 - 10/135 - 16/135 / 6/111 - 7/094.

2 samples - sst - and ? newspapers.
CRF 068 CRF 069

SECTION 022.

ESH WINNING - CUT J4.

100 yds west of east end.
Wall trending 235°



Med grey mst - rooted at top.
brown/grey silty mst w nodules.
brown weathered mst - rooted.

Cream - coloured lenticular-bedded micaceous sst - mottled.

Med. grey mst + plant frags → light grey sst upward
Dark grey crumbly carbonaceous mst →

Dark grey // laminated mst/shale + nodules + Fe stone layers + bivalves near base - bivalves + odd fossils

HARVEY
med. grey mst - intensely rooted + bioturbated at top.

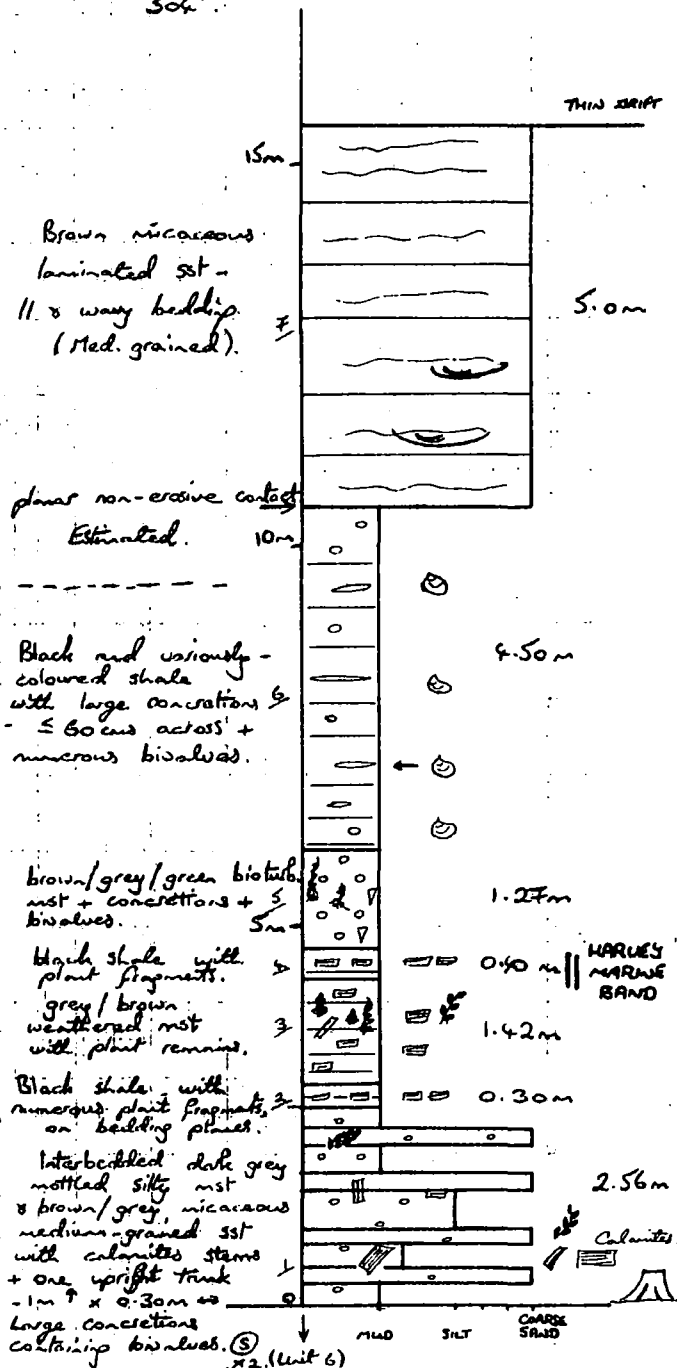
Comments - Backwall - shear.
Coaling on N000 - 13/11/79
Some lateral variation - sst below 1m00 thins to west and south. Otherwise varies laterally uniform.
5 frames 4/w ASA 125 film shot.

1 sample - odd fossil.

SECTION 023.

ESH WINNING - CUT F1.

West end of site.
Backwall, Trending
30°.



Comments

Section above 1400 - Harvey Marine Seam.
4 frames 4w ASA 125 film shot.

Backwall - coating finished - now backfilling slowly.

Sloping wall 1 in 1.

2 samples - concretions.

CRF 071

" 072

CONTINUED ABOVE

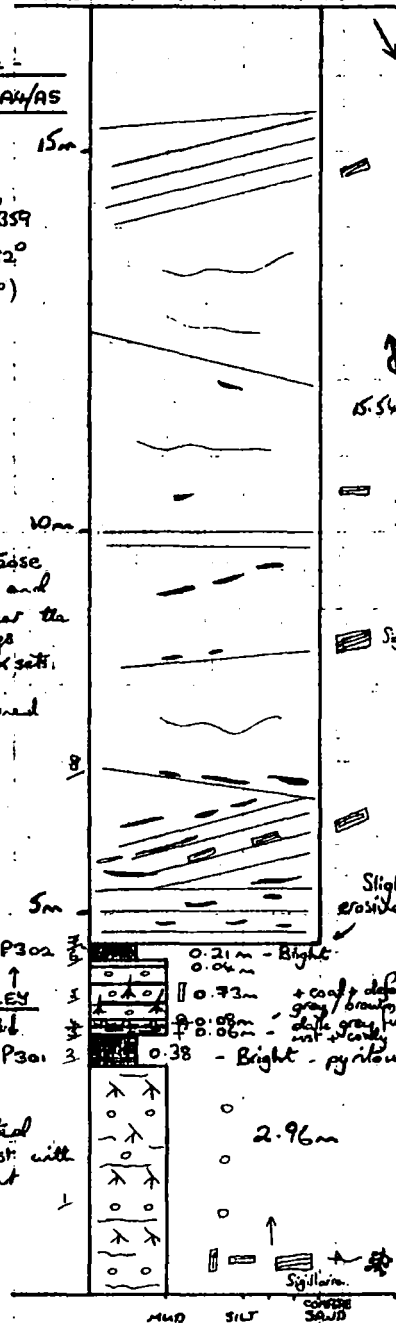
SECTION 024 -
DEBORAH - CUT AW/AS
(West end).

Regional Bedding 18/359
Wall orientation 082°
(Plat. = 1 in 3, 010°)

White/brown quartzose sst - coal partings and rafts especially near the base - mica partings also. - Tabular x sst.
③ Med. grained CRF 073

Fe-rich hard mst P302 0.21m - Bright
bedded ③ CRF 074 ↑ 0.04m
Med. gray mst + roots TOP TILLEY 0.73m + coal + deformed gdt.
rafts + nodules 0.08m - dark gray fusaroid mst + coaly partings.
P301 0.38m - Bright - pyritous

Thoroughly rooted medium gray mst with concretions - plant fragments.



SECTION 024
- CONTINUED.

considerable drift disturbance - downcutting in places.

White/brown tabular & bedded quartzose sst with mica partings + 1/2 primary current lineation. - very ferruginous - lamellar cement? ③ CRF 075

Laminated dark gray mst - plants abundant at base - along bedding planes. nodular rich horizon in middle.

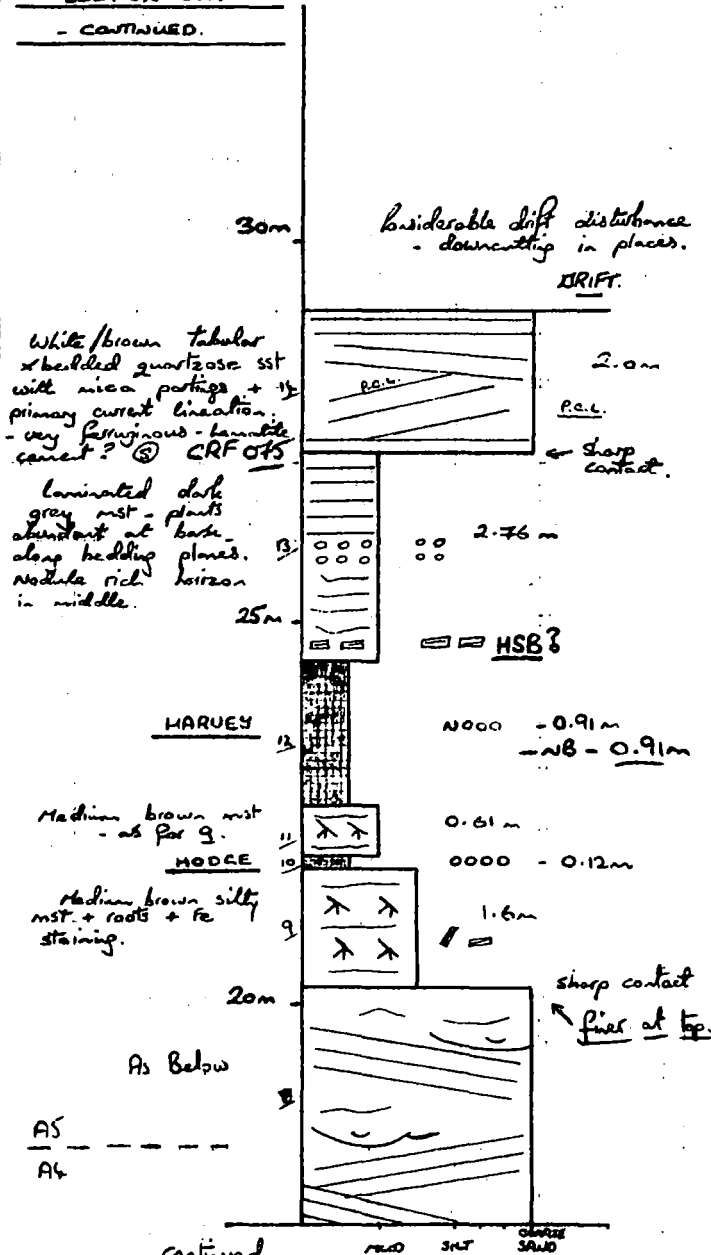
Medium brown mst - as for 9.

Medium brown silty mst + roots + Fe staining.

As Below

AS
AK

Continued from below.



Comments.

Little lateral facies variation.
Shear Backwalls with ramps - slipping.
8 Planes ASA 125 b/w floor shot.
3 & samples taken :- CRF 073 a, b
CRF 074
CRF 075

x Sets from unit 8 :-

- | | |
|------------------|------------------|
| 1. 1.5m/14/012° | 2. 0.4m/6/314 |
| 2. 0.3m/27/013° | 10. 0.3m/28/305° |
| 3. 0.4m/18/328° | 11. 0.5m/10/351° |
| 4. 0.2m/23/337° | |
| 5. 0.4m/20/351° | |
| 6. 0.6m/17/336° | |
| 7. 0.25m/30/360° | |
| 8. 0.5/21/322 | |

$n = 11$
See also Section 025.
See Correction

considerable drift
disturbance.

SECTION 025

DEBORAH - CUT A4 (EAST)

White/brown tabular x bedded micaceous sst with wavy partings - rafted exp. at base. med. grained. Estimated

heavily bioturbated & rooted silt & clay particles - ? conc. ? FeR @ CRF 077 a, b

TOP TILLEY
Light grey/brown clay, no bedding @ CRF 078
Fewer nodules at top.

Medium/light grey silt, as before - with abundant nodules @ concentrated in certain CRF 076 horizons. heavily bioturbated toward top.

DRAWING ENLARGED

After 2m - becomes silty gradually. + a fine sst layer (10cms).

Medium/light grey mst, lam. + small scale (2cms) low angle foresets + wavy bedding. Fe stone bands near base.

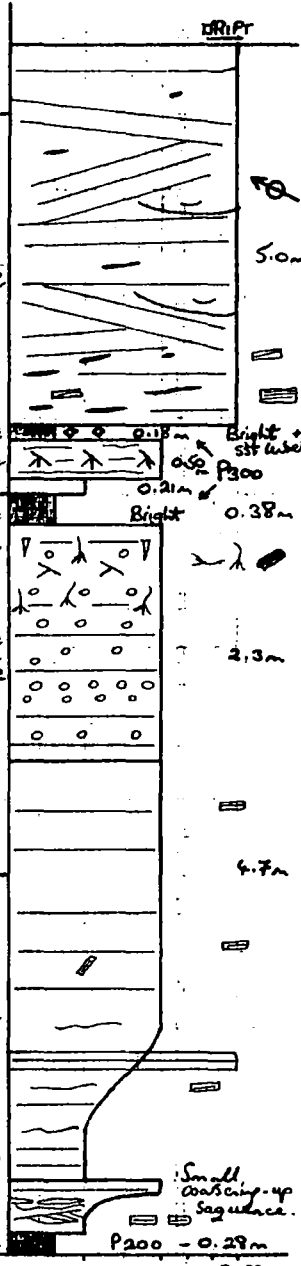
Bright - MIDDLE TILLEY

BOTTOM TILLEY NB info. to P100

Remarks
Tip of top Tilley seam - 13/355° (Plan - 1 in 6, 010°)
P200 ↑ 1.57m strata
P100 ↑ 0.26m Bright
Little lateral facies variation
70° backwalls - coalip.
5 frames ASA 125 b/w film stat.
3 Samples.

X Sets from Unit 8:-

1. NB ripples - symmetrical, smooth-topped - 0.15m \pm , dipping of 41/310 - up to 0.15m high - 0.3m λ
 2. 1.0m/18/39°
 3. 0.6m/20/319°
 4. 1.0m/29/357°
 5. 0.6m/22/303°
 6. 0.3m/25/004°
 7. 0.5m/25/320°
 8. 1.0m/7/353°
 9. 1.0m/22/354°
- $\lambda = 8$



SECTION 026

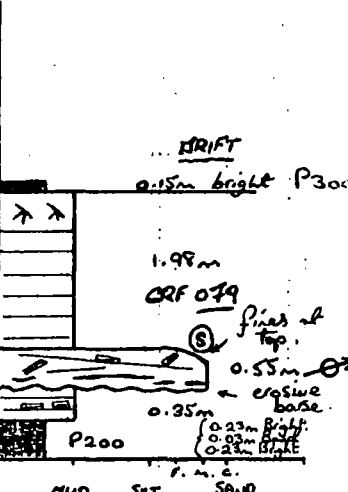
ROWLEY - CUT A4(9)

3rd and final Ar cut Ssm in A4 (SOUTH). Measurements south from former corner.

TOP TILLEY
Med. grey lam. mst - thoroughly rooted at top.

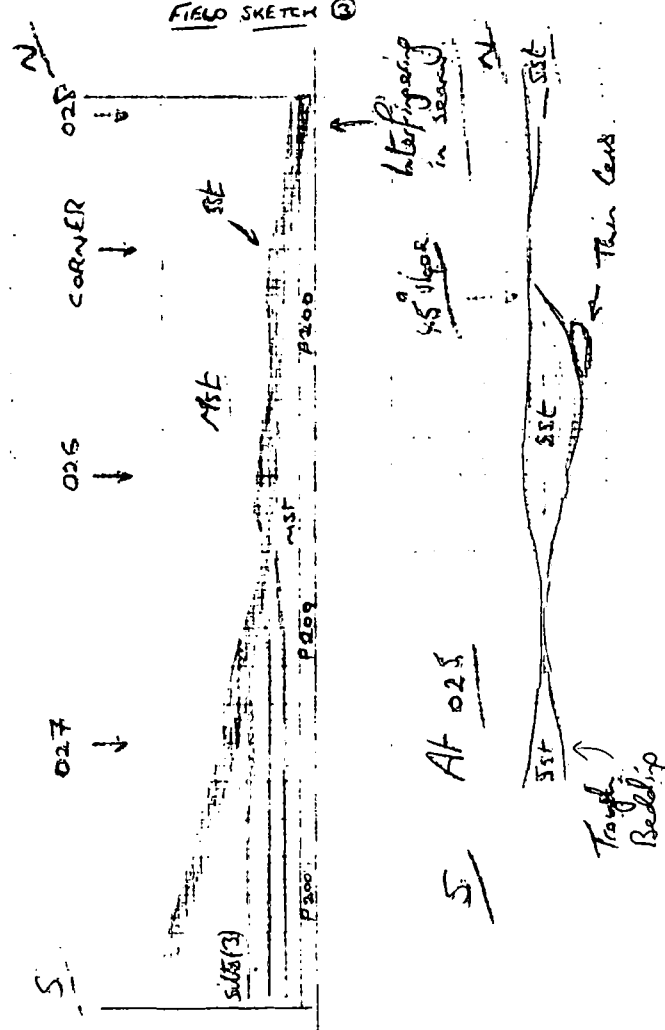
med. grained, grey/brown mic. sst + coal partings + pitl casts

MIDDLE TILLEY
med. grey lam. mst + coal partings + pitl casts + plant remains. 0.49m



NOTES
1. at top of Unit 2 - a thin bed (0.56m \times 0.14m) of dark grey plant rich sst occurs - precursor of main body.
2. Unit 3 is a lens shape - wedged out in 8m to south the reappears (5) with trough (0.3m) \times bedding - 8/261° and 12/080° in mst above. - the arcuate cliff gradually as a consistent 0.45m unit. In trough-bedded exposure - a thin mst parting appears in the middle. Sample - erosive sst -

SKETCH OF THE AREA AROUND 026/027



SECTION 027 -

ROWLEY - CUT A4(S)

105m south of midway corner - near south end.

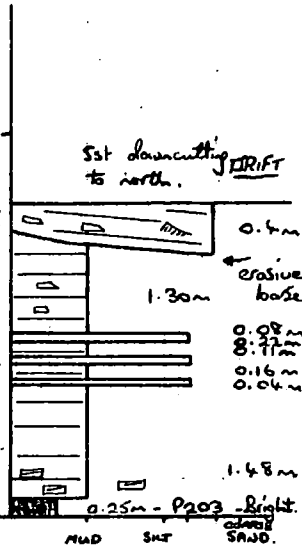
Med. grained gray/brown mic. sst.

Light gray 11 lam. mst. + plant frags.

Interbedded mst - as below - and fine gray mic. sst.

1.68m light gray mst - 11 laminated + plant remains near base.

MIDDLE TILLEY



NOTES Progressing north from southern end of cut, sst (Unit 5) eroded through Units 4, 3 & 2 until reaching Section 026 - lies over part of Unit 2. Further north - lies directly over P200.

To north of 026 - some low angle x bedding (tabular) displayed - sides of troughs?

See Also Additional notes.

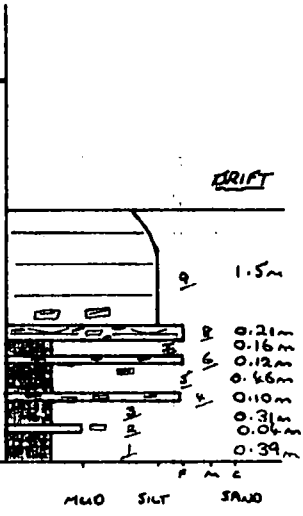
SECTION 028

ROWLEY - CUT A4(S)

30m north of midway corner.

Total seam thickness - 1.48m (composite)

(P200)
MIDDLE TILLEY
- ripple at top.
Med. gray 11 lam. siltstone.
Fine sst - gray
Bright
Fine sst - gray
Bright
Fine sst - gray
Bright
Gray shaly mst
Bright



- NOTES**
- Unit 4 grades laterally into med gray mst. - to north.
 - Ssts have occasional plant remains along bedding planes.
 - Unit 4 has a ripple - erosive base. rounded. small. symmetrical ripples. 4.5m x 2.0m
 - Unit 5 - Bright coal displays trough structure - steep channel side to north - gutter edge to south.
 - Unit 6 - erosive base.
 - Unit 8 - trough bedding displayed.

SECTION 029

ROWLEY - CUT A4(S)

50m north of Midway corner.

Thickness of seam before channel (to south) - 0.94m.

See Section 012.

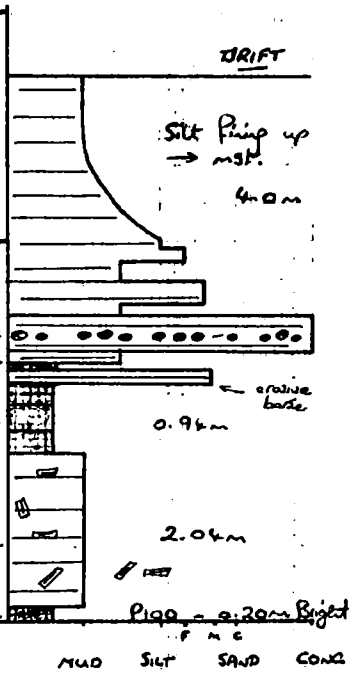
Interbedded sst - silt mst. cong coal in channel form - See 012

+ 0.30m Bright s silt
0.21m Bright
0.09m Bright
0.17m Bright
0.03m Bright
0.19m Bright

MIDDLE TILLEY

Med. gray clayey mst + abundant plant fragments at all angles.

BOTTOM TILLEY



SECTION 030 -

ROWLEY - CUT A4(S)

60m north of midway corner.

Estimated 2.0m med gray 11 lam. mst + occasional scattered nodules.

1.10m interbedded fine/med. sst + med. gray silt. + trough forms.

MIDDLE TILLEY

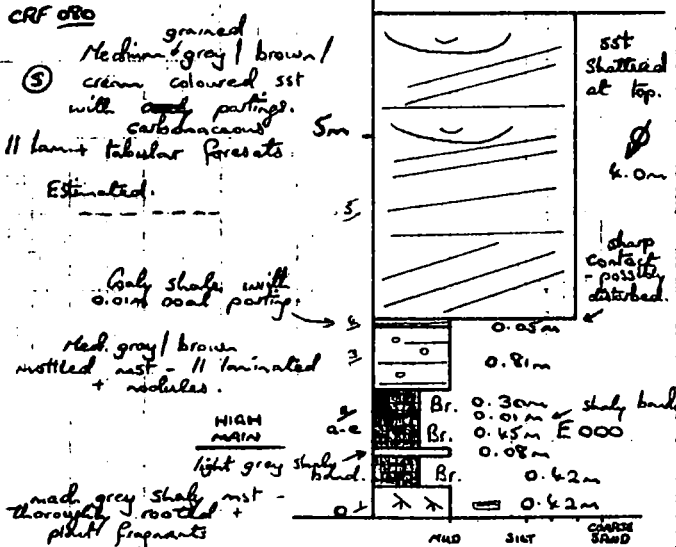
0.76m Bright coal + 2 fine sst bands - brown mic. medium grained.

NOTES - Further channel structure - too thin sst layers within coal - partial washout? - or addition.

Overall comments - Working on P200 & P100 22/11/79 - nearly finished on A4(S).
Low bank walls.
To. train dip 1 in 30 → 80°
& pinned ASA 125 4/10 film shot.
See Additional Notes.

SECTION 031.
IBBETSON'S - CUT 1 (EXT.)
(AREA A.)

Cut trends → 179° 10m
Good exposure in old drift gallery.



Comments

Unit 5 - sst with tubular foresets

1. 0.3m / 19 / 198°
2. 0.3m / 21 / 197°
3. 0.6m / 5 / 255°

3 frames ASA 125 4/w film shot.

1 sample taken - High Main post.

Small cut near the top of A(i) EXT.

high wall.

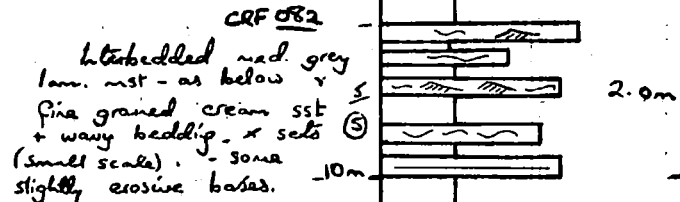
Two abandoned drift galleries well preserved and exposed.

Calip on E000 - 27/11/79

Regional dip = 1 in 17 → 011°

SECTION 032.
IBBETSON'S - CUT 1 (EXT.)
(AREA A.)

Med. gray laminated nst + occasional nodules - heavily rooted near top.



11 laminated med. gray nst. as below. - rare plant fragments.

CRF 081
gray cream fine grained sst + coaly partings - 11 lam. + wavy bedded.

11 laminated med. gray nst - no fossils seen. + brown weathered layers.

1/2/80 - Yellow pyrites nst immediately above F000 + nst had silt layers + nodules

- 0.75m Bright
- 0.04m Band
- 0.61m Bright
- 0.05m Band
- 0.60m Bright

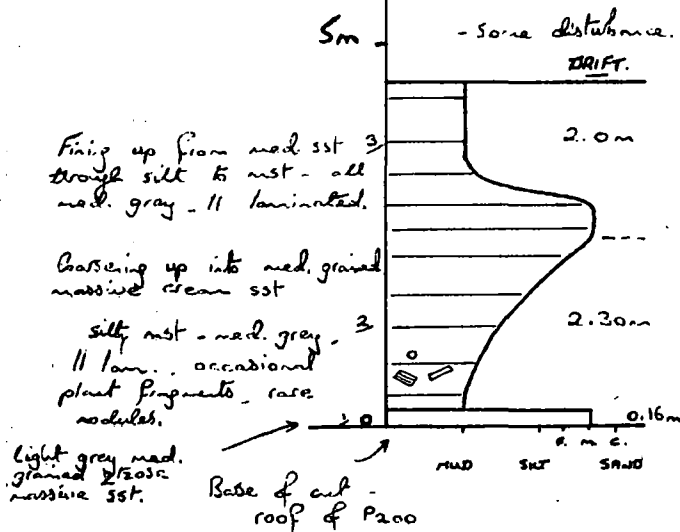
Comments - High Backwell,
Calip on F000 - 27/11/79
3 frames ASA 125 4/w film shot.
2 samples taken,
Little lateral variation in facies.
See Borochula Data - in notebook.

SECTION 033

ROWLEY - CUT A6(S)

10yds south of Mid Wall.
- Beginning of Cut A6(S)
Wall trending 180°

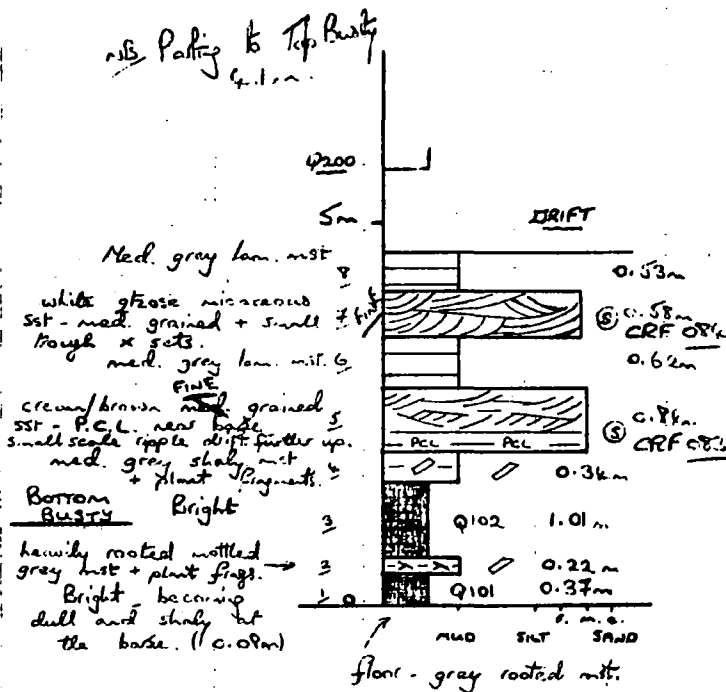
Further south (5m) -
laterally variable &
discontinuous med.
grained massive cream
- brown mic sst layers
- ≤ 30cm s. - wedge
out rapidly.
Silt & muds laterally
variable in grain size.



SECTION 035

ROWLEY CT.

NE of road.
Narrow cut to East of glacial channel
- cut trends 056°.

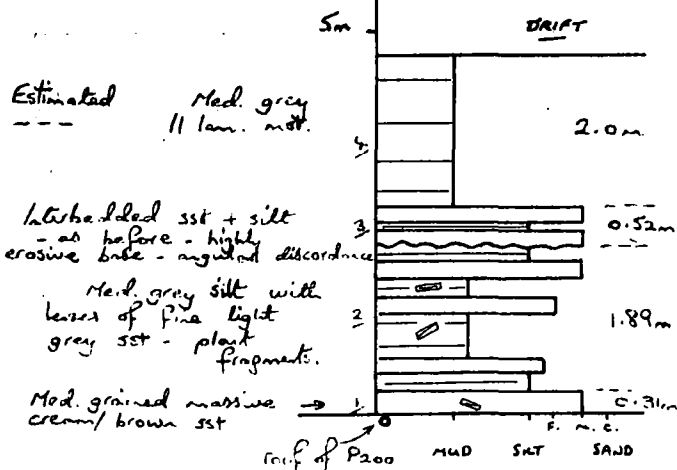


SECTION 034

ROWLEY - CUT A6(S)

Middle Wall - trending 263°

Unit 3 - comes down from the top of the wall to lie directly over P200 at east end of wall. (10m) - Precursor to large sst?



NOTES

1. 2nd sst laterally variable in thickness from 0.05 - 1.0m along the cut.
2. 1m above second sst - trace of Q200 in drift disturbance.
3. 2 samples - 2nd from 1st sst.
4. 6 frames ASA 125 4/12 film shot
5. lens of flaser bedded white med. grained 0 - 0.30m - on SE wall - med. flaser. are red/brown coloured - 2 photos. - between first and second ssts. - bases out to west, rapidly.

General

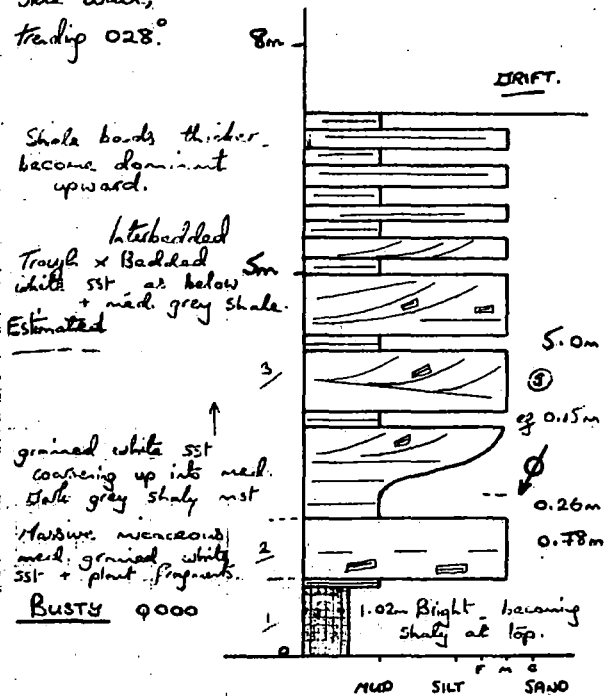
1. Shale walls - fairly small.
2. Working on P200, and Q100.
3. Beginning cuts A6(S) & A1(S) N on west side of road.
4. Up to 50% old working in Q100.
5. Some minor faulting.

Angular discordance - 13°/070 (S) as opposed to 1°/090 - Unit 2 - no 3d. exposure - but difference marked.
1 frame 4/12 ASA 125 shot

SECTION 036

DEBORAH - AU

Area/Cut Bii
Side Wall,
Trendip 028°



Micaceous and carbonaceous partings in ssts.

Trough x Beds x Wavy bedding.

Trough x Beds - orientations

1. 0.2m / 10 / 190
2. 0.2m / 2 / 230
3. 0.3m / 7 / 239
4. 0.3m / 10 / 227
5. 0.2m / 21 / 207

n=5.
1 sample - x Bedded sst. CRF 085
No Photographs.

Some downcutting - both in sst + shale bands - many erosive surfaces. (x sets)

Shear back + side walls - conlig on 0000 - 17/12/79

Seam doubled in thickness 50yds south drift disturbed.

Some larger scale Trough x Beds $\leq 2m$ ↓
Little lateral facies variation, apart from basing out of x sets (downcutting).

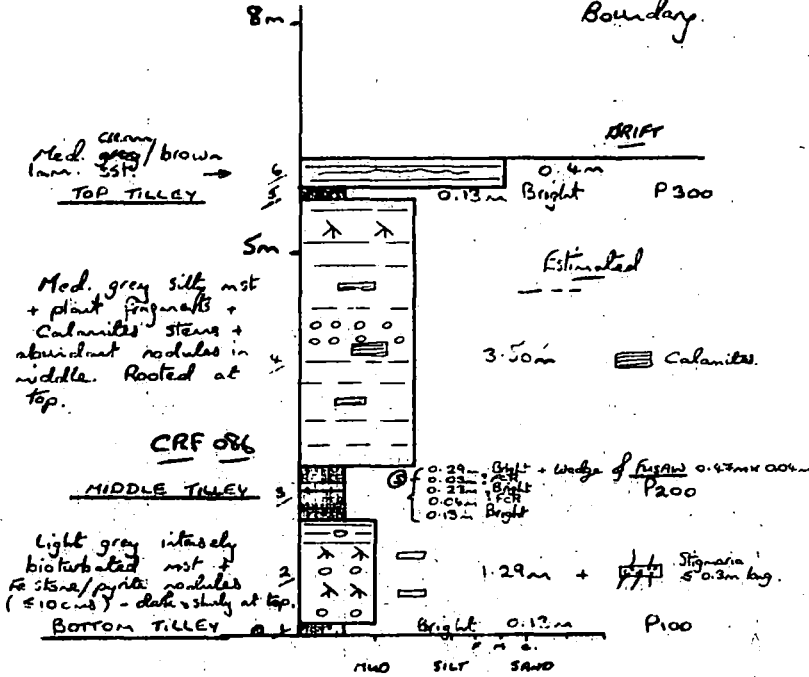
Regional dip 1 in 9 / 028°
= 3.33 / 028°

SECTION 037

ROWLEY - CUT AS(N)

Cut AS(N) 10m north of roll-fault near north end

← 315m north of n/s Boundary.



Comments

1. Looking on P100 - 4.1.80.
2. Shear low Backwall
3. 1 sample - ? FAR - Top Band, P200.
4. 3 frames ASA125 1/2 film shot

Top Band in P200 varies 0.03m → 0.

NB AG(N) South end - sst over P300 - slightly trough-shipped foresets + PCL + wavy lamination + climbing ripples. Sets not too well-exposed.
Orientations 0.3m / 10 / 037°
0.3m / 14 / 025°

Start of Film 4

SECTION 040

ESH WINDING CUT J6

50m west of 022
- back wall, trending East/West.
- Middle of wall.

Black shaly mst - metallic lustre, soft - no fossils
canneloid horizon 0.4m from base - occasional Fe stone lodes

1000 HARVEY MARINE 9

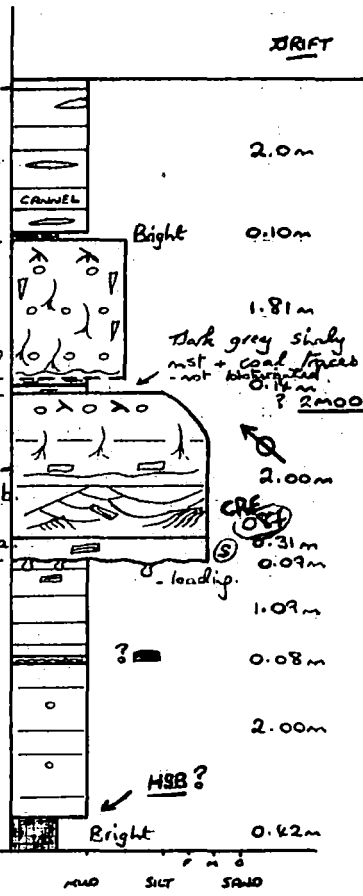
Silty grey/brown mottled bioturbated nodular mst. - roots + burrows
Base - gradual contact with wavy surfaces.
Rising up - nodular, bioturbated olive grey silty mst

grey/white med. parallel wavy & trough cross-bedded sst + climbing ripples
Bottom 0.31m - highly micaceous, darker colour, wavy erosive base.

Parallel laminated med. grey mst.

crumbly black mst

Medium grey mst - parallel laminated, occasional nodules.



Trough x Sets in Unit 5

- 0.2m / 20 / 319°
- 0.3m / 8 / 345°
- 0.4m / 10 / 323°
- 0.4m / 8 / 348°

Vector Plan
(Curry 1956)
- $\Sigma = 333.75$
 $L = 97.5\%$
 $n = 4$

- Notes
- Unit 6 - shaly mst with coaly traces - traced eastward, becomes 2m00 seam. - bright coal. No trace of this horizon to west - see Section 039.
 - 2 samples. - ? HMB - 3 sandstone - see CRF 027
 - No photographs - see 022.
 - Backfilling 8/1/80
 - Gallop finished in area J - now only working Area K.
 - Shed walls - backfilling
 - Total 6 photographs taken

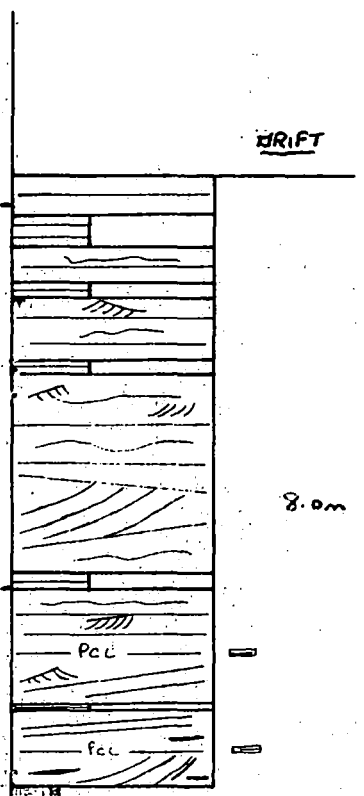
SECTION 041

DEBORAH - J1 - CUT 5.

Area J1 - Cut 5
SE corner of long cut
- boundary with J11.

More mst layers and thicker upwards - nearly cyclic!

White/grey - med. grained sst, weathering brown + // lamination.
PCL - low angle trough foresets. 5m
Coaly layers near base. Some dark grey mst partings $\leq 0.04m$.
Climbing ripple/wavy lam. + occasional plant fragments.



Busy 000

- Bright shaly - Dull coal - 1000
- Bright - 2000

Notes

- No Samples
- No Photographs
- Long narrow cut - coning on 0000, 1000, 2000

NB 2 seams previously not accounted for - 1000, 2000 - not drilled while prospecting.

SECTION 042

DEBORAH - Dii - Cut

Northern wall of Dii - under pylons - wall trending 285°

Cream/gray medium grained sst - weathering brown - only traces near base + carb.-rich partings - some low angle foresets + troughs - occasional thin dark shaly partings.

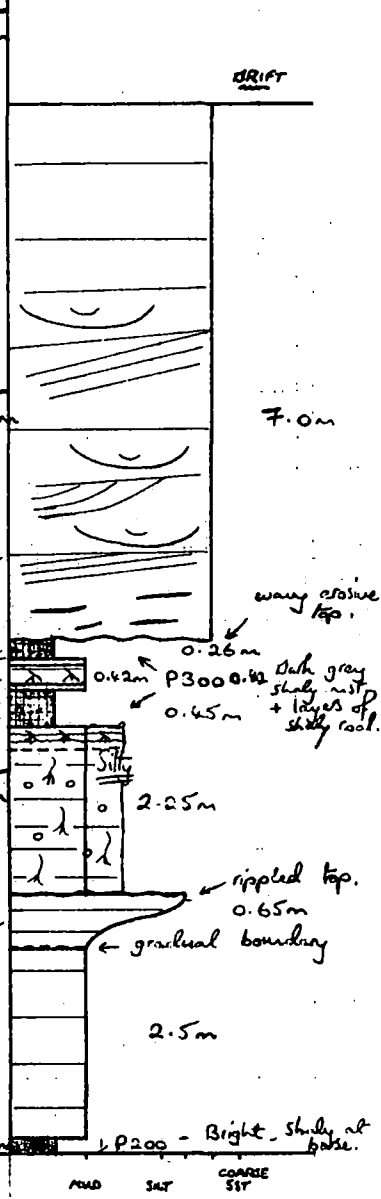
Bright - P302 - TOP TILLEY
Bright - P301

Silty heavily rooted light gray mst + small nodules - top 0.30m darker - crumbly.

Coarsening upward sequence light gray lam mst → silt → fine gray/white sst - massive + ll lam. - rippled top.

Light gray lam. mst.

MIDDLE BOTTOM TILLEY 0.20m



- Notes
1. No Samples
 2. 2 frames ASA 125 b/w film shot
 3. Balip on P200 - high back wall.

SECTION 043.

DEBORAH - Bii - Cut 6.

log thin cut.

Gray/cream med. grained sst - weathering brown - ll lam. + trough x bedded - log casts on bedding planes.

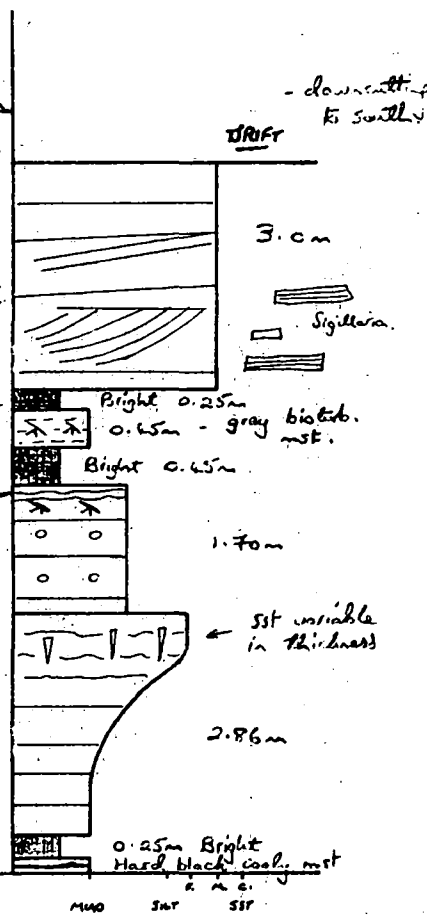
Estimated

TOP TILLEY

Gray silt mst + nodules getting darker ochreous + crumbly at top. Bioturbated.

Light gray laminated mst - coarsening up into fine gray ll lam. sst - sst burrowed, but wavy lam. preserved.

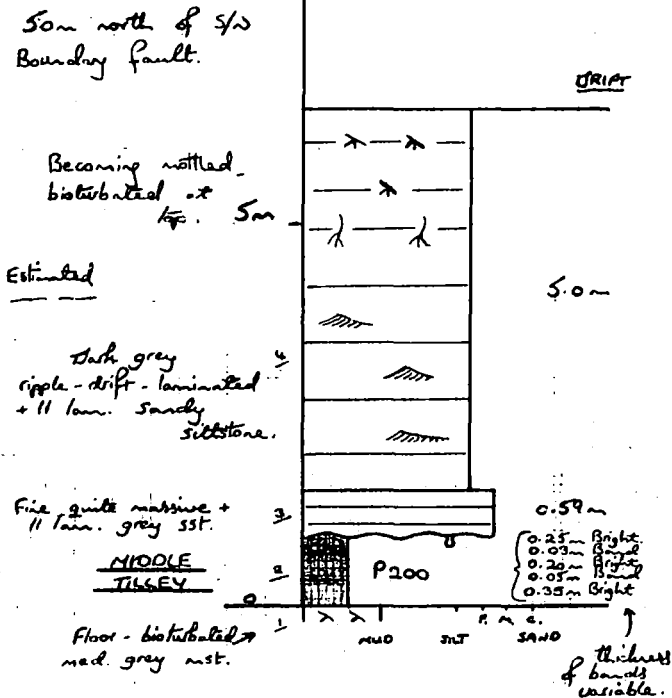
P200 - MIDDLE TILLEY



Notes

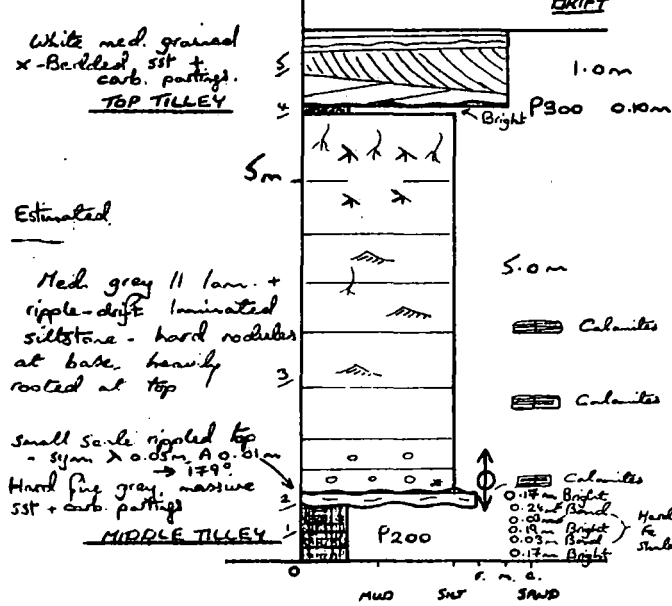
1. No Samples.
2. Lots of photographs - log fragments.
3. Balips on P200
4. Parting between top of Unit 3 and P300 widens out down the cut → 35°.

SECTION 044
ROWLEY - CUT A6(N)



- Notes:
- 2 frames b/w ASA125 shot.
 - Sst thin abruptly \rightarrow 0 within 2yds to south - also thin gradually to south - varying laterally in thickness.
 - Working north - after 20m sst band up to 0.6m thick - then thin again.

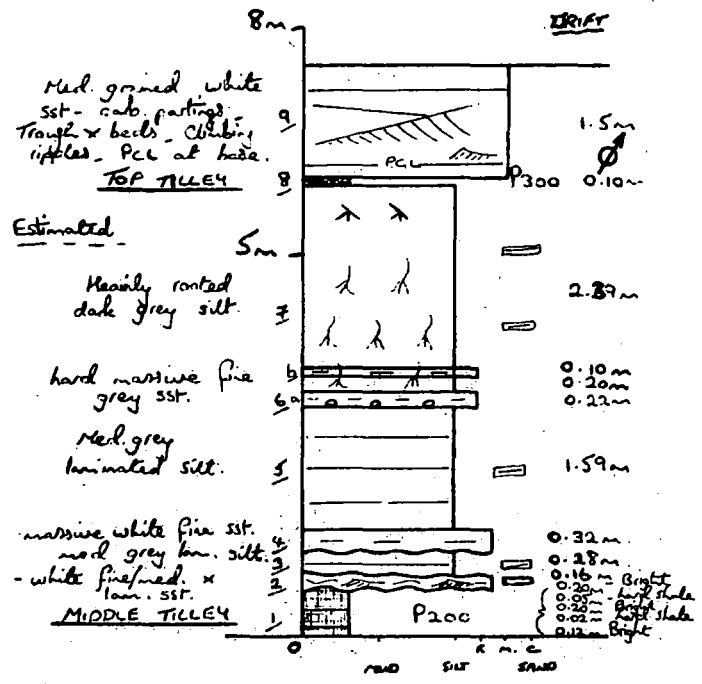
SECTION 045
ROWLEY - CUT A6(N)



- Small scale ripples on top - dimensions above.
- 3 frames - panorama showing lateral accretion - in Unit 5.
- 1m to north wedge of sst comes in abruptly from 0 \rightarrow 0.5m at 1.58m above P200 - continues to north - wavy base and abrupt top - wavy x bedding - log casts of Calamites \leq 0.5m x 0.03m

SECTION 046
ROWLEY - CUT A6(N)

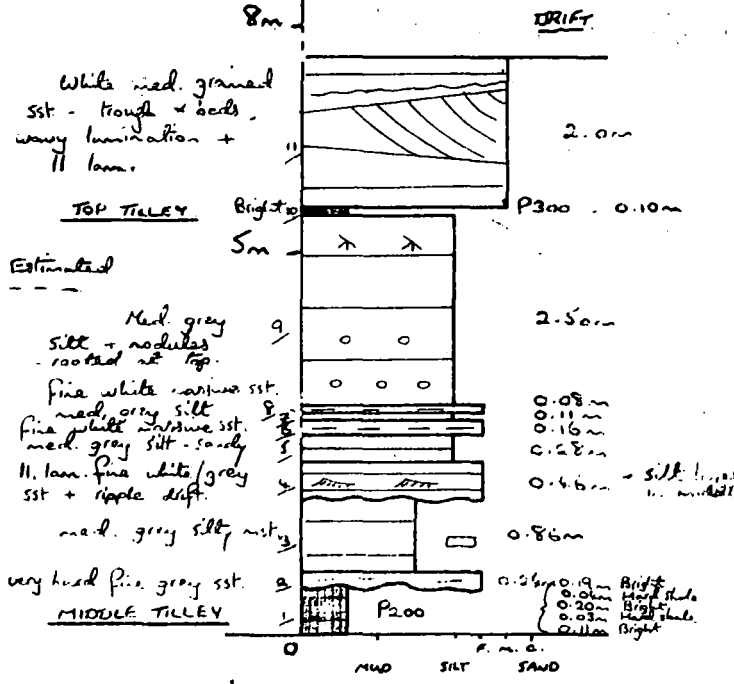
125m north of N/S Junction



- Cross-bedding data on Unit 9 (4/1/80) - trough x beds $n=2$.
 $1. 0.3m/10/037^\circ$
 $2. 0.3m/14/025^\circ$
- Unit 4 disappears rapidly to south - changes grade to silt - rather than pinching out
- Unit B4 correlates with Section 047.

SECTION 047
ROWLEY - CUT A6(N)

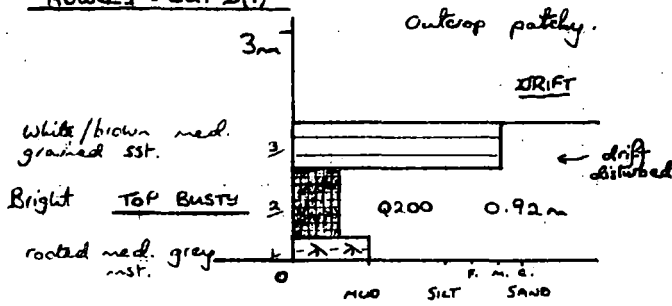
150m north of N/S boundary.



- Silt parting between P200 & P300 described to north.
- 3 frames shot.
- Units 4 & 6 join to the south - and correlate with Unit B4 of Section 046.

SECTION 048.

ROWLEY - CUT B(1)



1. Corner of cut - extra coal - not contractual.
2. Total 8 frames b/w ASA125 film shot.

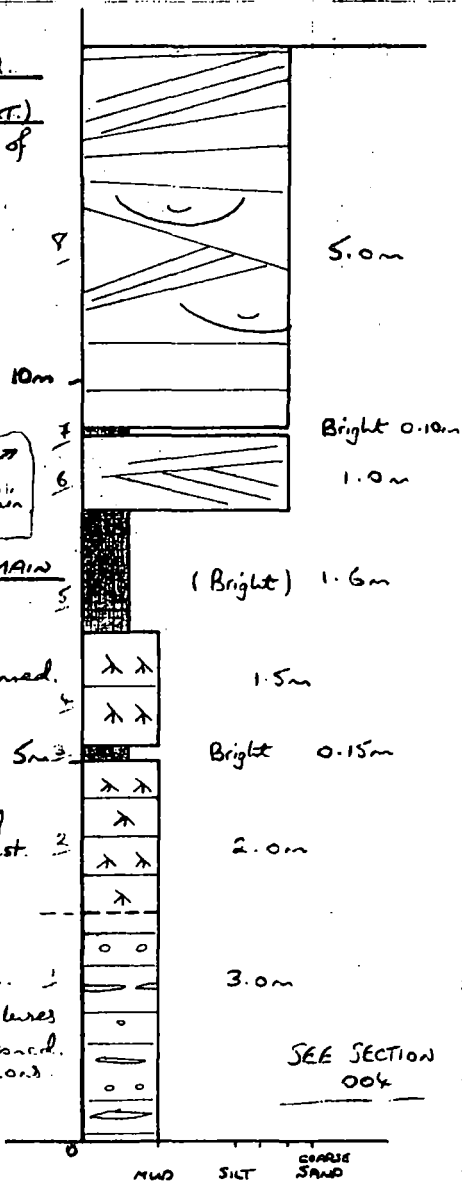
SECTION 049.

IBBETSON'S (EXT.)

northern edge of extension cut.

ROUGH LOG

Med. grained white to brown ll lam/x lam. sst.



Estimated

Bioturbated med. gray mst.

1E00 Sm3

Bioturbated med. gray mst.

Med. gray lam. mst + Fe stone luses and nodules, concd. on certain horizons.

SEE SECTION 004

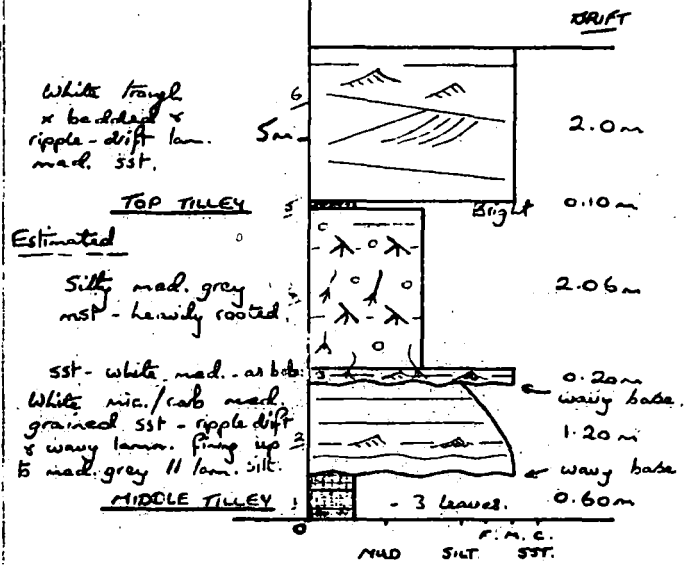
1. Partly backfilling.
2. 1 sample - yellow pyritous mst from roof of 5th seam - below section. CRF 089
3. 12 frames ASA125 1/4 film shot.
4. NB ROUGH LOG

SECTION 051

ROWLEY - CUT A6(N)

25m north of 050.

180m north of n/s boundary.



Estimated

Silty med. gray mst - heavily rooted

sst - white med. as bed
White mic./carb med. grained sst - ripple drift & wavy lam. fine up to med. gray ll lam. silt.

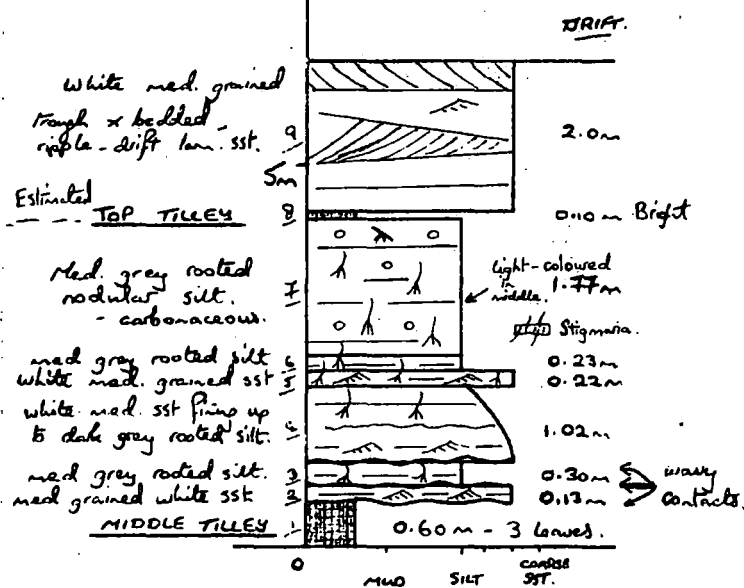
MIDDLE TILLEY

SECTION 050.

ROWLEY - CUT A6(N)

5m north of 047.

155m north of n/s boundary.



Estimated

TOP TILLEY

Med. gray rooted nodular silt - carbonaceous.

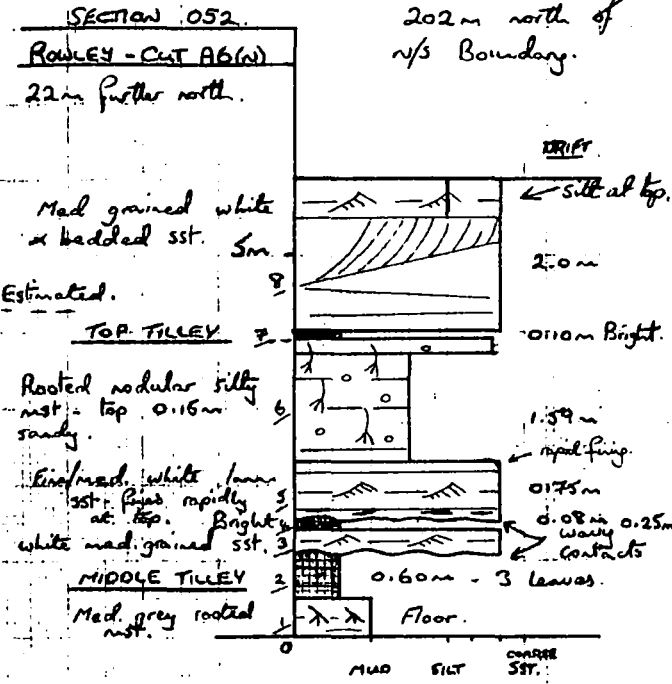
med. gray rooted silt
white med. grained sst

white med. sst fine up to dark gray rooted silt.

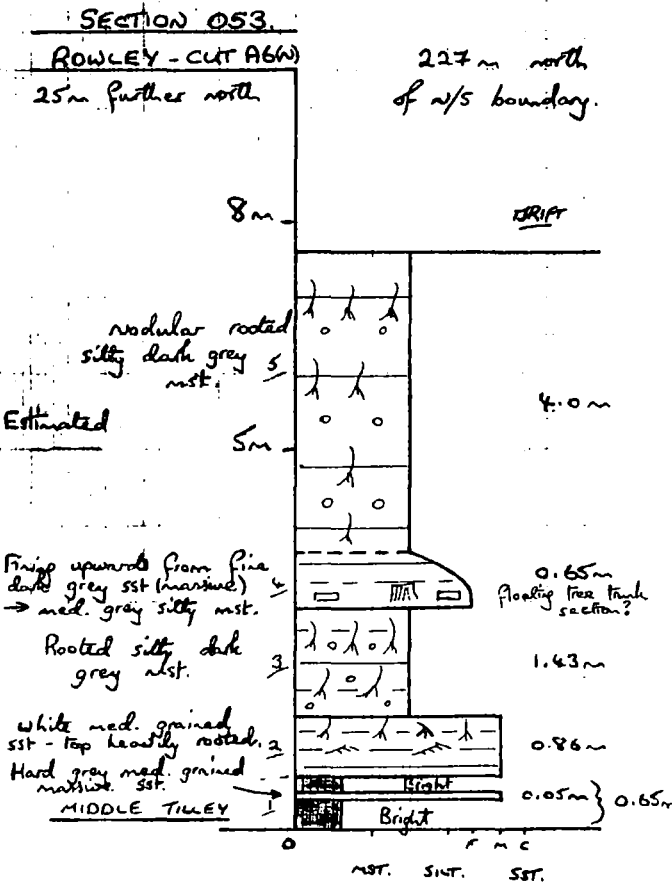
med. gray rooted silt
med. grained white sst

MIDDLE TILLEY

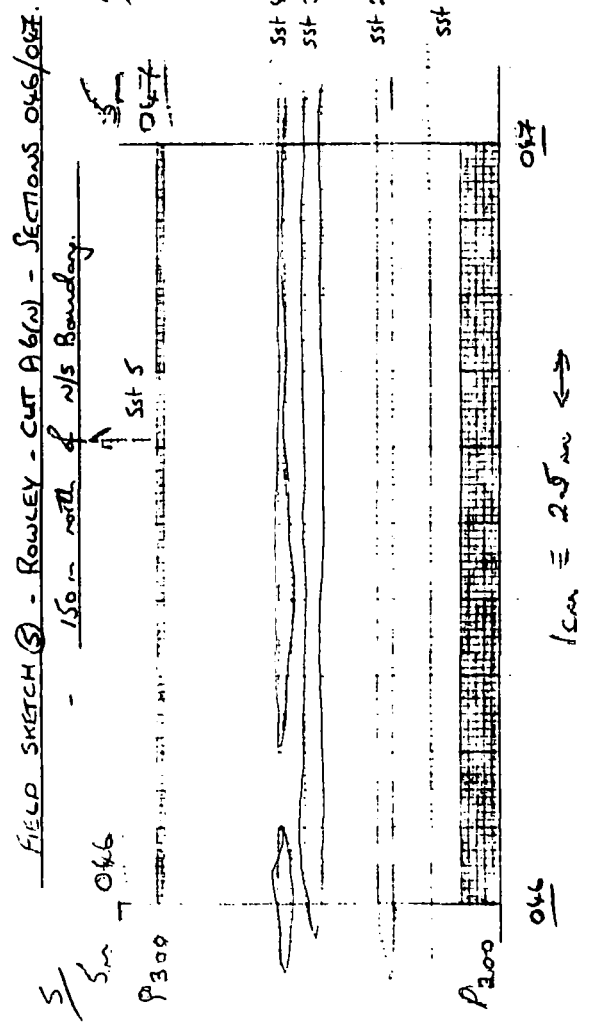
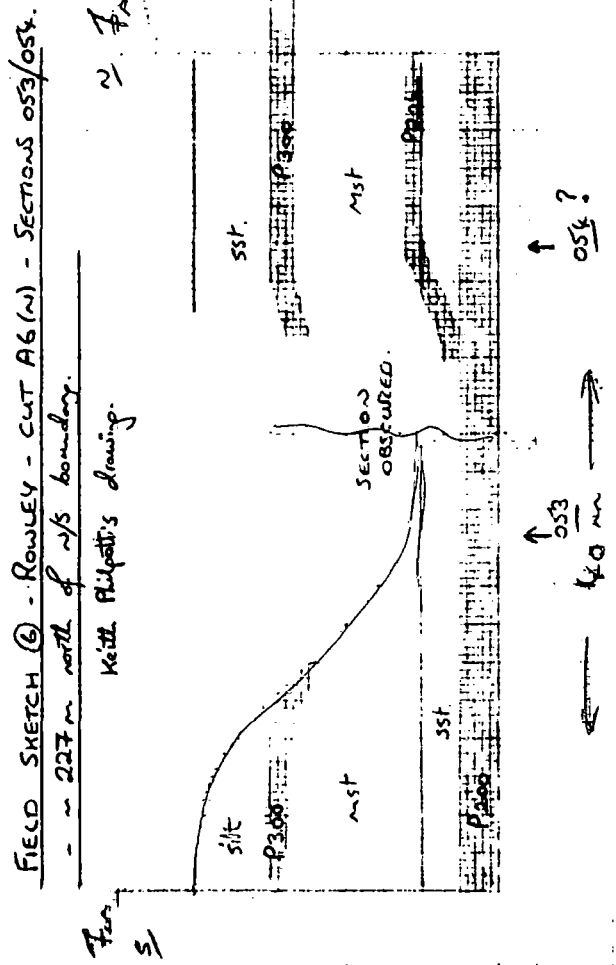
6 frames shot.



Unit 4 is a laterally inconsistent rider of coal above P203 - variable in thickness.



10m to south - washout in P300 - downcutting channelled feature - see sketch.

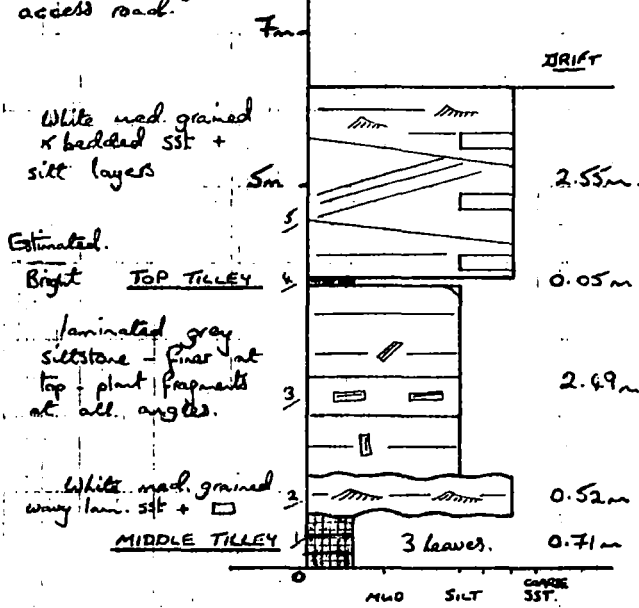


SECTION 054

- ROWLEY - CUT A6(N)

Between two washouts.

240m north of Mid Wall
- 10m south of top access road.

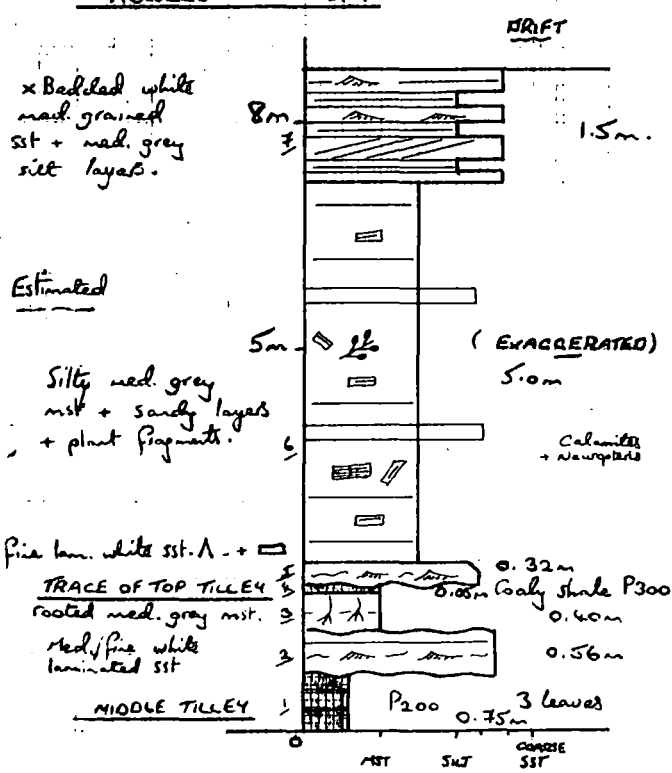


See working sketch NB from 053+
 3 samples - Sst
 1. Within P300 rider 092
 2. Above P300 rider 091
 3. Base of channel fill 090

SECTION 055

- ROWLEY - CUT A6(N)

255m north of Mid Wall
- 2nd washout.

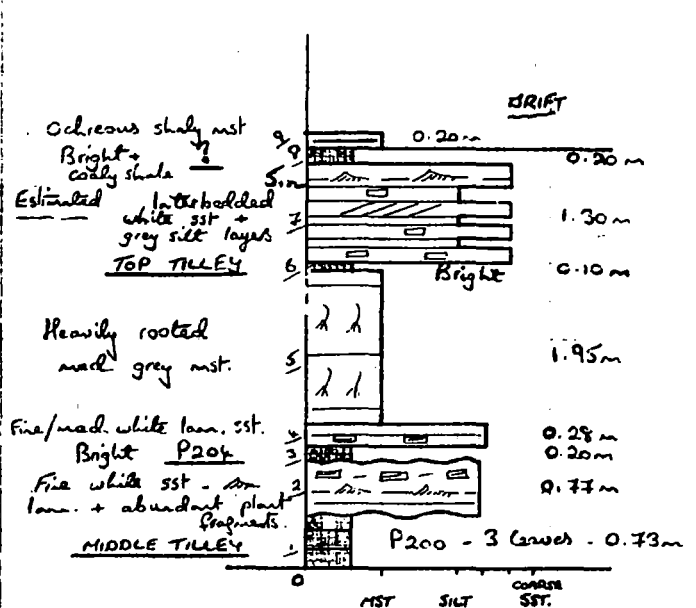


Slightly to north of channel axis.
 Sst Unit 5 does not occur on southern margin of channel.

SECTION 056

- ROWLEY - CUT A6(N)

290m north of Mid Wall.



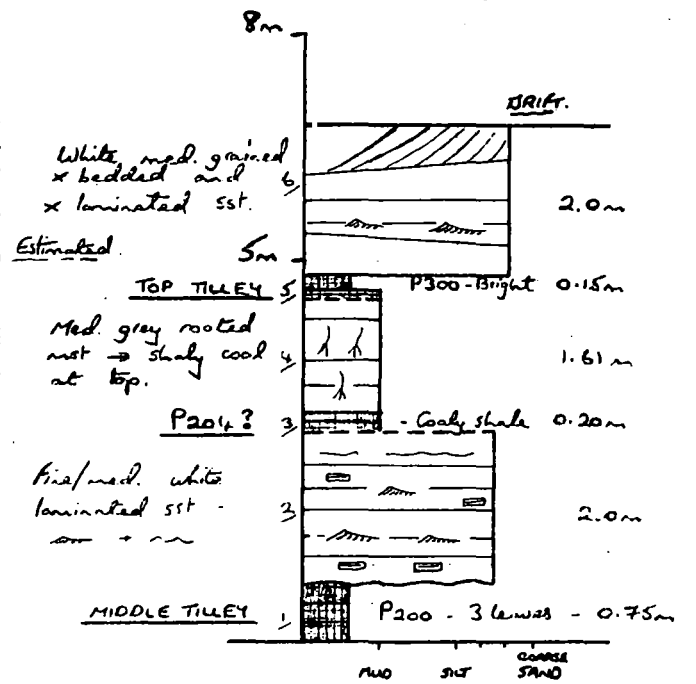
P204 joins P200 10m to south.

SECTION 057

- ROWLEY - CUT A6(N)

- 057 - SEE OVER

330m north of mid wall - by 1m fault - down faulted to north

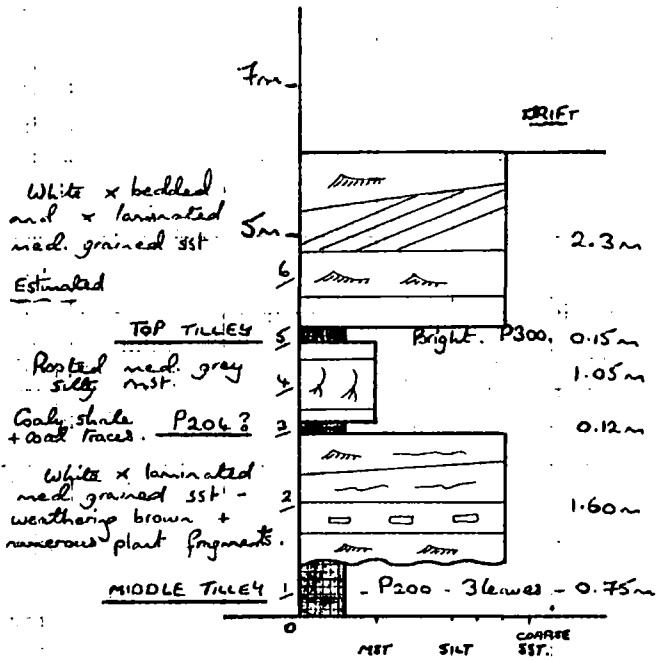


057 - See over

SECTION 057

- ROWLEY - CUT A6(W)

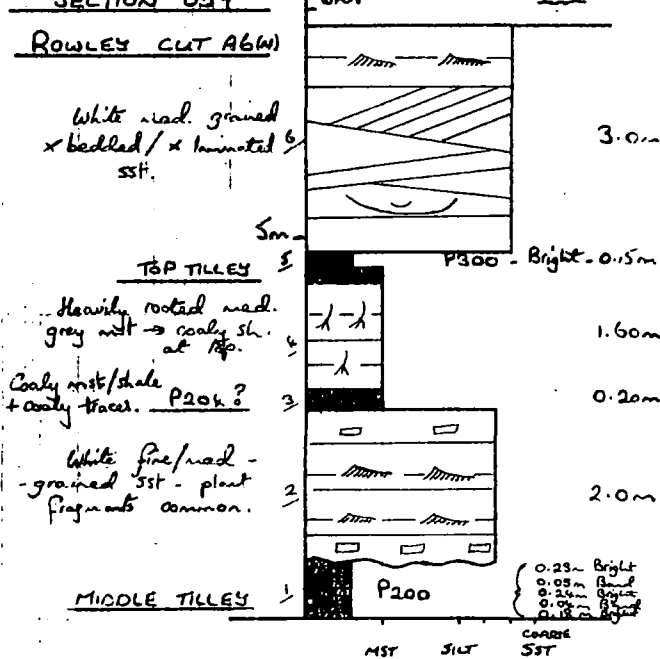
300m north of Mid wall.



SECTION 059

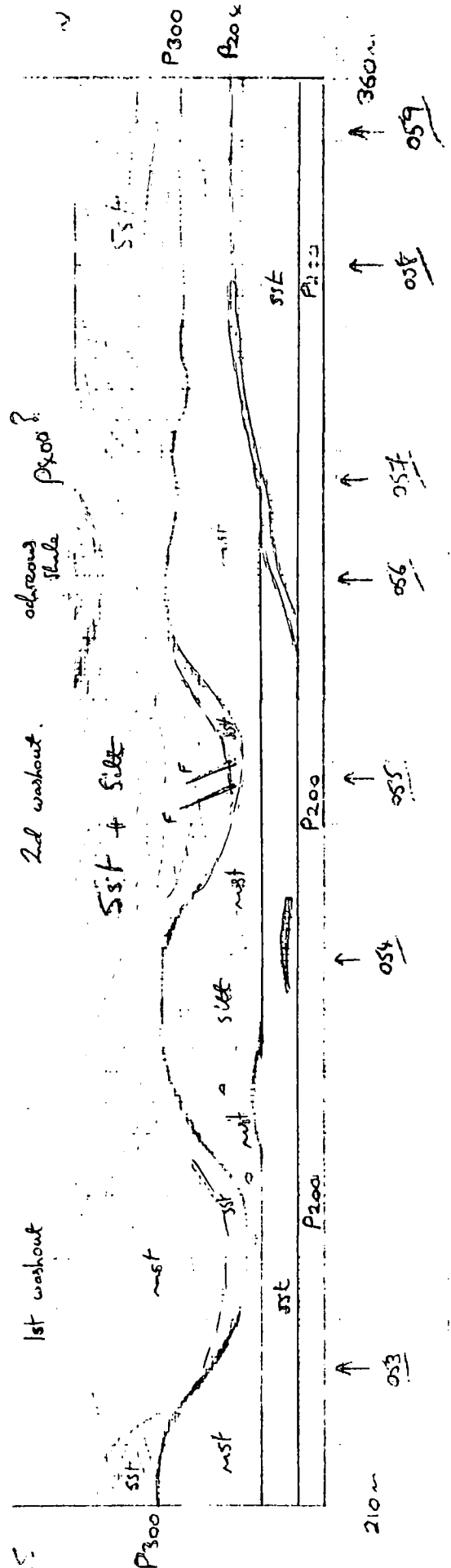
ROWLEY CUT A6(W)

360m north of mid wall
8m - Cut End. DRIFT



Traverse along A6(W) now complete
- see longitudinal section & sketch 7.
Total - 3 samples - 110 photographs
Presently coring on P100.

FIELD SKETCH 7 - ROWLEY A6(W) - NORTH END - SECTIONS 053 - 059.



SECTION 060

DEBORAH - CUT II F.

Long cut trending 297° 35m west of pylons.

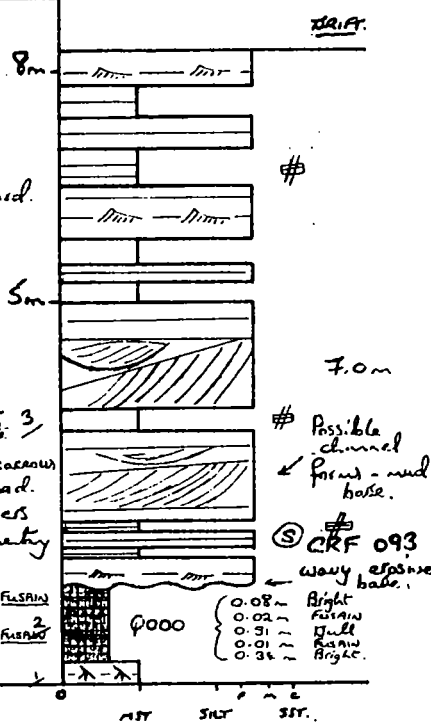
Silty mst bands become thicker - more frequent upward.

Estimated.

x bedded and ripple - 3 drift laminated white fine/med grained micaceous sst. + occasional med. gray silty mst layers $\le 0.05m$ with fragmentary plant debris.

BUSTY

Med. gray rooted mst



Notes - 2 frames ASA 400 b/w film shot. 1 Sample - sst - 0.4m above unit base. x Beds in sst will dip → west.

SECTION 062.

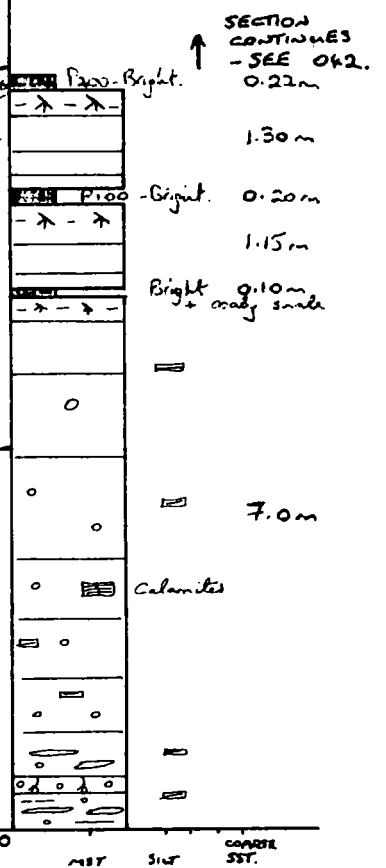
DEBORAH CUT III.

Two northern walls + East wall at north end - See Diagram MIDDLE TILLY

1m. med. gray silty mst. 3
Bottom TILLY 3
Laminated med gray silty mst. 3
1P00 3

Laminated silty light gray mst + bedules + plant remains on bedding planes.

Rooted nodular disc. horizon at base - 0.20m



SECTION 061

DEBORAH - CUT III

Side wall (west) - trending 051°

med. gray laminated mst.

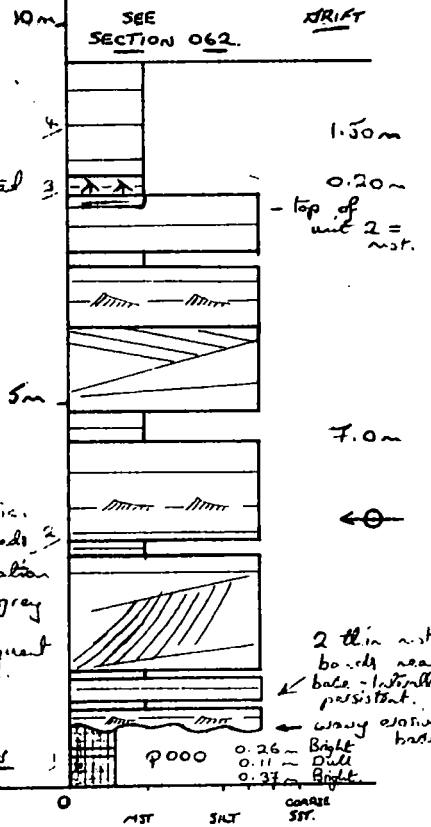
med. gray biotubated mst

Estimated

Med./fine white mic. sst with trough x beds 3 ripple-drift x lamination - occasional med. gray mst bands getting thicker & more frequent upward. Sst very friable.

BUSTY

2 frames ASA 400 shot FUSAIN not recognizable.



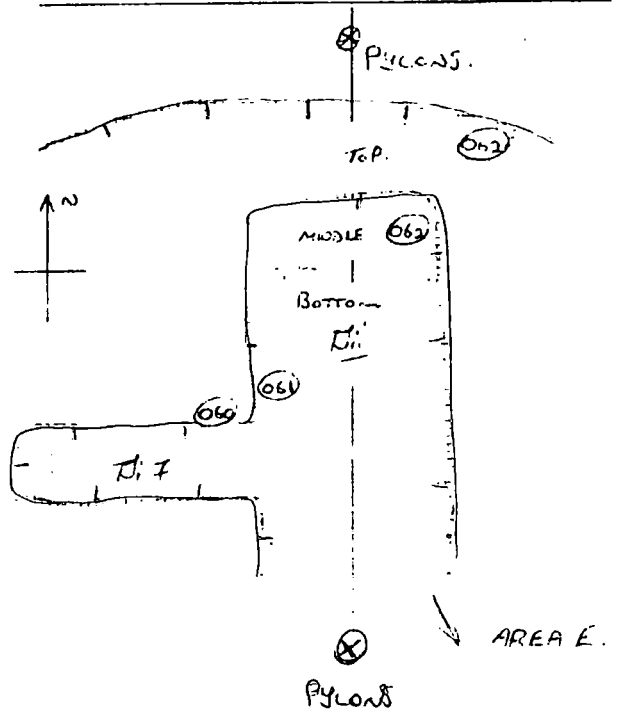
Trough x beds in sst 2
1.0 0.5m / 23/275°
2.0 0.6m / 16/275°

nb Joins on to top of 061.

Small coarsening-upward sequence lifts toward P100 to west ad of E-W north wall - parting decreases in thickness.

6 frames ASA 400 4/5 shot.

SKETCH PLAN OF AREA II AT 19/2/80. DEBORAH



SECTION 063.

DEBORAH - CUT A5.

Long wall trending 267°

20m

DRIFT

White → brown 15m
medium-grained trough
& bedded sst.

Estimated

Only shale changing
upward → med.
grey mst.
TOP TILLEY
Med. grey clay.
Only shale.

Ochreous silty mst
- heavily rooted.

Coarsening upward from
soft grey clayey mst
to grey silty mst.

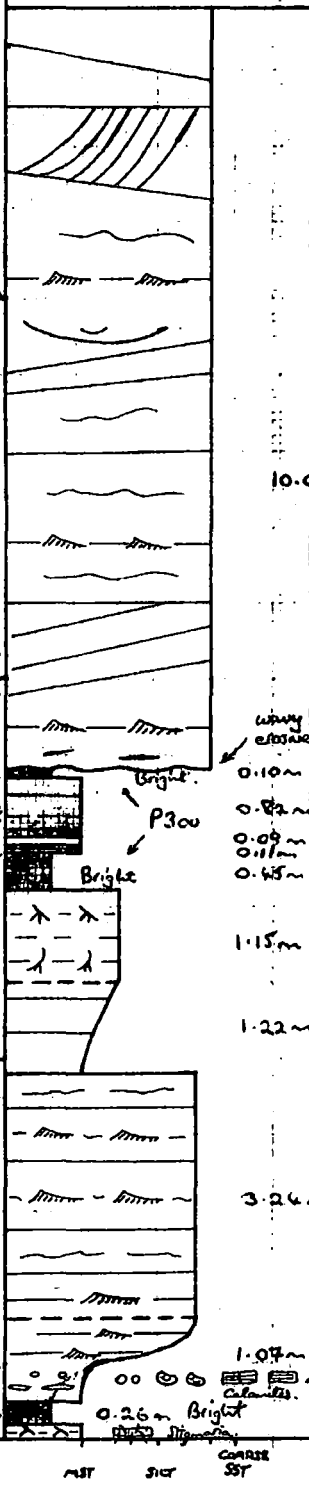
Grey/white fine-grained
sst - carb. mud claper.
ripple drift cross-
lamination.

Coarsening upward from
med. grey mst - nodular
near base & fine white/
grey sst.

floor - hard dark
grey hict. mst.

Little lateral variation in facies
Sandals - fossiliferous grey mst.

CRF 094



SECTION 064.

ESH WINNING - CUT K8.

South end of cut
- only first part dug.

5m

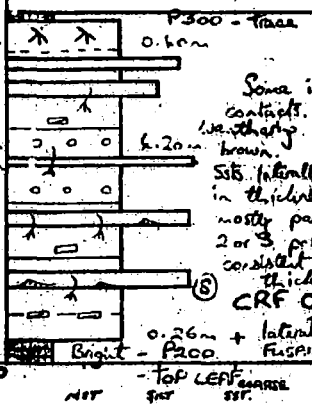
DRIFT

TOP TILLEY
heavily rooted at top.

Interbedded fine white
massive micaceous sst with
some ripple-drift & lamination
(at bases of layers)
≤ 0.15m thick and
light grey silty lam.
mst + □. Some rooting
not horizon-specific.

MIDDLE TILLEY

4 frames ASA 400 b/w film shot
1 sample - sst interlayer.



Some irregular
contacts.
Weathering strongly
brown.
Sst. typically variable
in thickness but
mostly persistent.
2 or 3 particularly
consistent in
thickness.
CRF 095

SECTION 065.

ESH WINNING - CUT K7.

Long Sidewall -
trending NW.

DRIFT

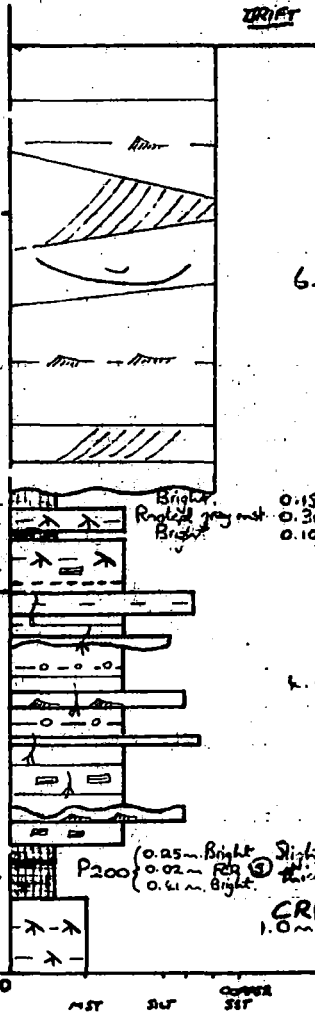
Med. grained
& bedded / Ripple drift
& laminated white
sst - weathering brown.

P300 TOP TILLEY

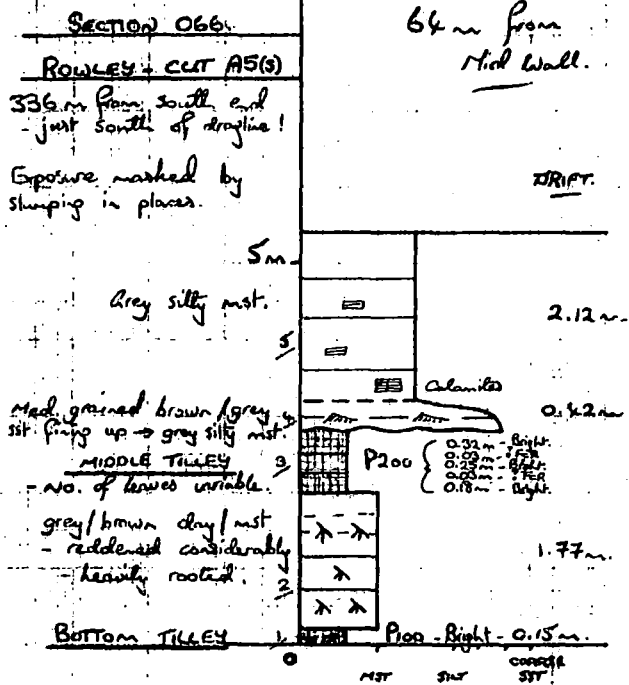
Estimated
Interbedded
fine white
massive sst and
light grey silty
mst + □
as for 064.

Heavily rooted med.
grey mst.

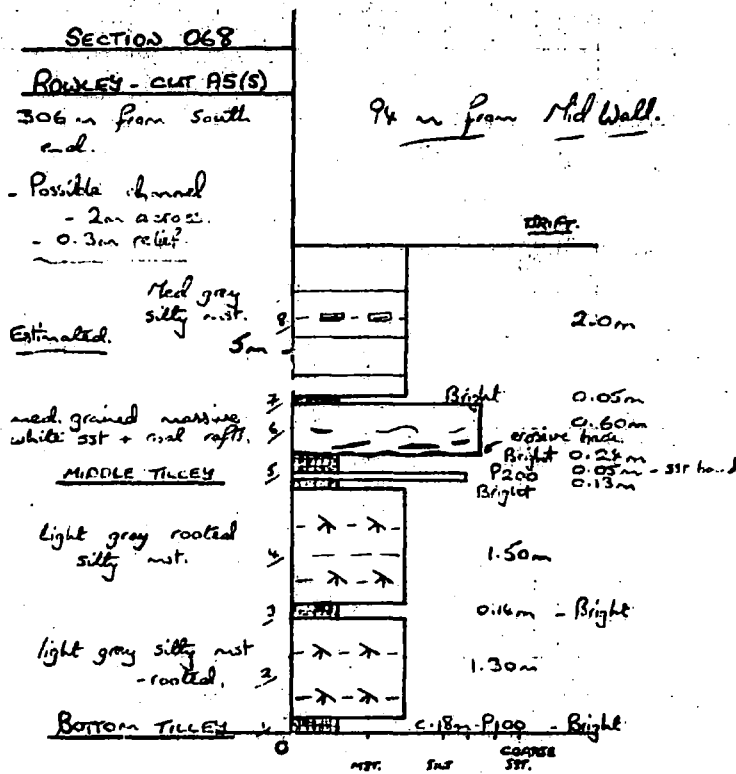
- only traces within.
P200 band definite FER - SAMPLE taken.
5 frames ASA 400 b/w film shot.
Shear backwall.



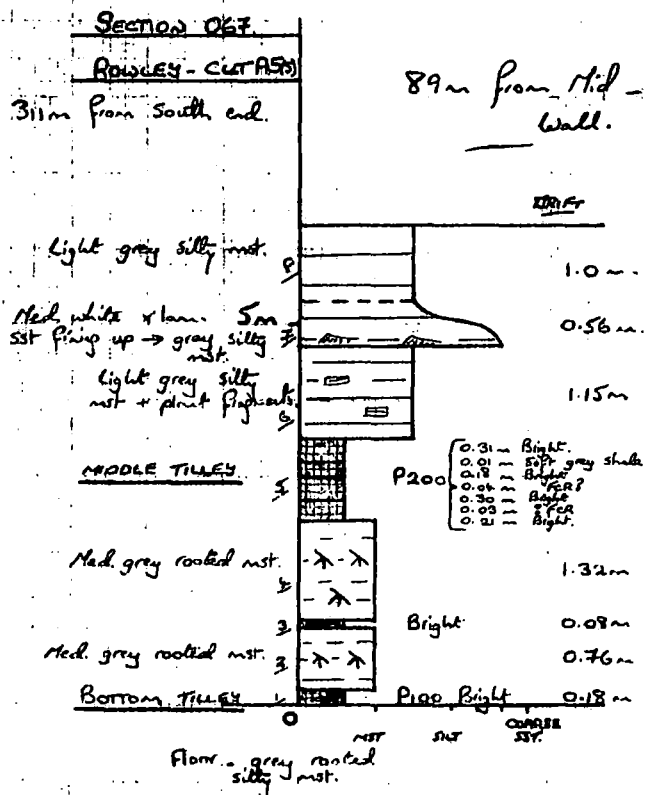
CRF 096



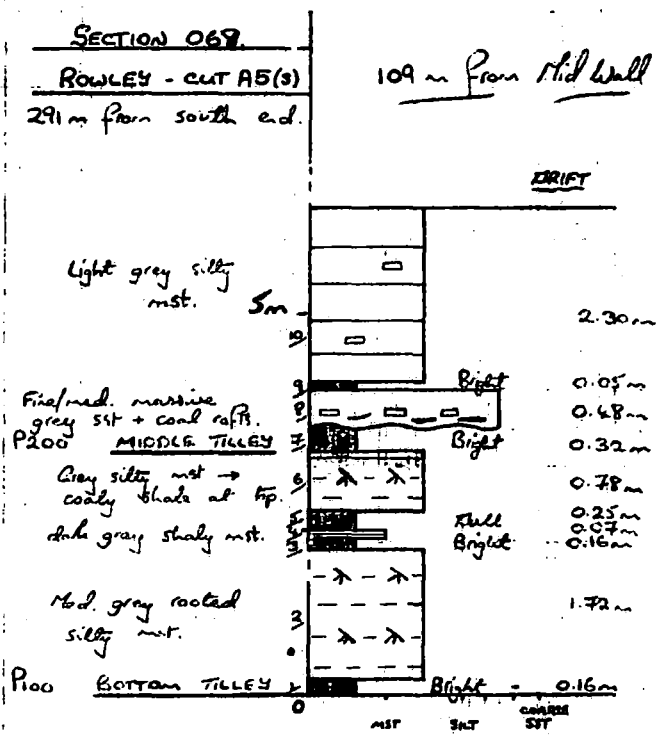
Some minor faulting to south:
 no. of leaves in P200 increases to south.



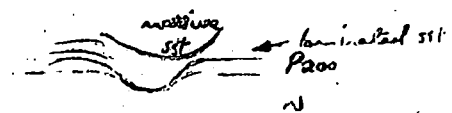
Unit 7 - rider - dies out to south. ⑤ P203
 Unit 3 - variable in thickness - 35° P20/2

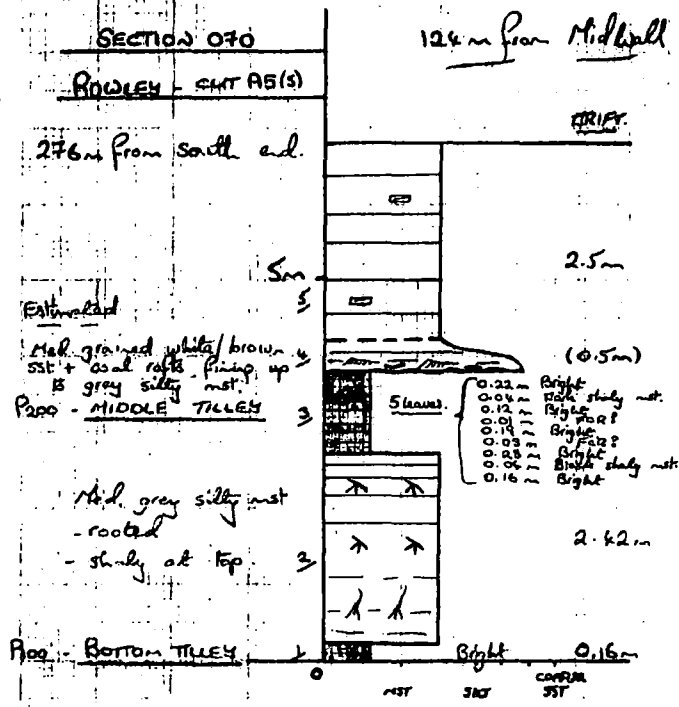


Unit 3 - dies out to south → early shale within 10m to north.
 Unit 7 - internally degrades to south? - probably.

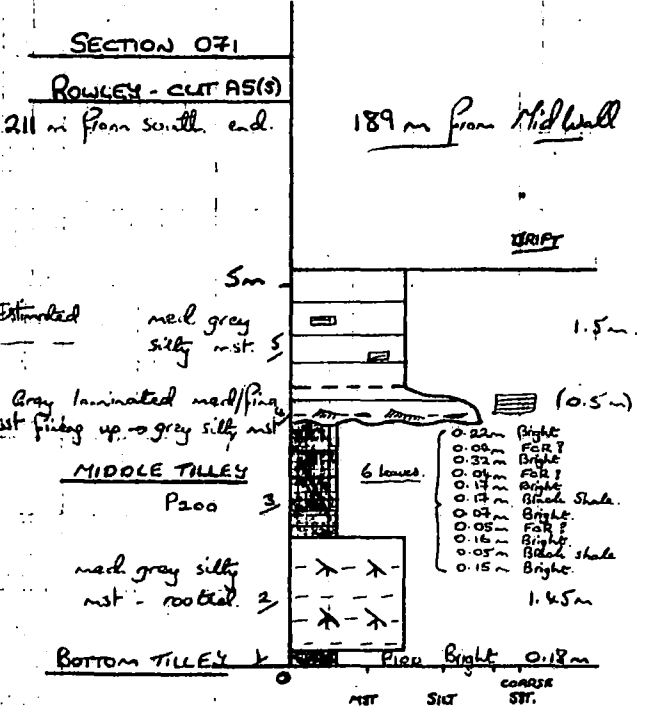


Presence of steeply dipping slickensided rootlets with coal leaves - dip planes?
 5m to south - P200 proper almost completely cut out by narrow (1m wide) sst channel - top rider dies out - 2. framed



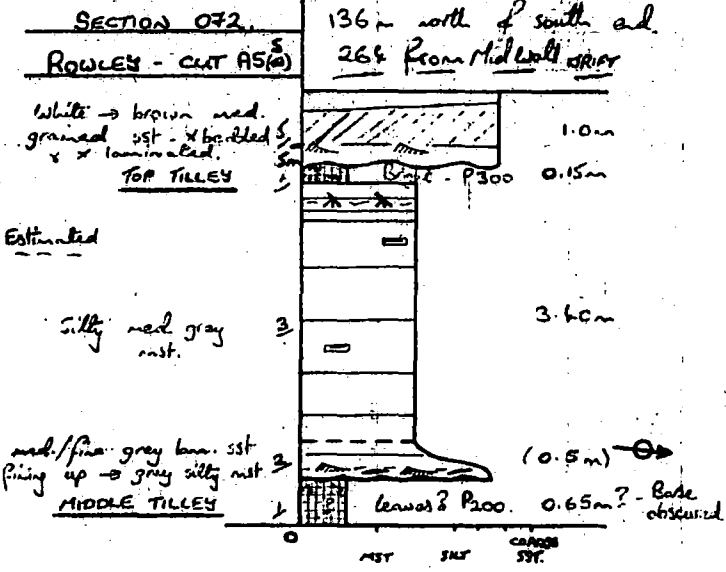


- Basal laminated sst first seen in previous channel continues.
- 266m north of S. end - another 1m wide downcutting sst body - 2 photos taken. 0.3m ↑ - top leaves played out.
- 246m north of S. end - same again - "channel" 3m across, 1m deep - top 2 leaves cut out - asymmetrical with shallow dip on S. side.
- 229m north of south end - most of seam taken out by sst channel 5m x 1m - interfingering of coal & sst to north. Massive unit in channel - leaves out 5m to N & 10m to S. Trough x sets: 1. 0.2m/13/070° 2. 0.3m/18/102° 3. 0.2m/10/083° n = 3.



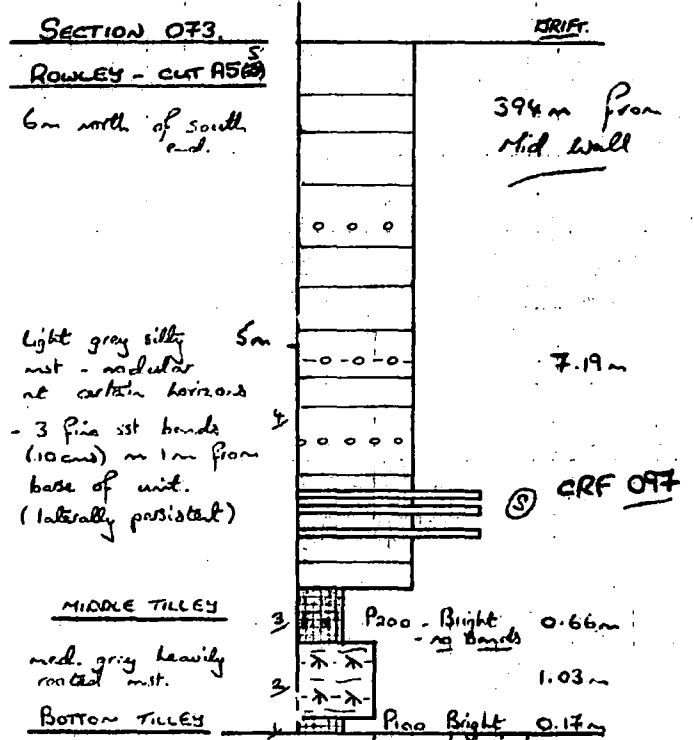
2 photos.
 Small slip plane present in coal seam

176m north of south end - further west, comes in - interfingering sst & coal layers - continues for 320m - old workings the obscured section.
 136m north - Outcrop of P300 appears in top of face.



- 101m north of south end - sst over P200 has graded laterally into silt. 1m sst band 1.3m from top of P200 (did out laterally to north) - continues southward. P200 normal thickness - 0.63m.
- 86m north of south end - sst lifting up face.
- 80m " - x sets in sst (locally thickened) - 2m ↓ / 10 / 076°? s.

- 56m from end - P300 cut out by drift.
- 36m " - 1m sst band reaches top of face.
- 16m " - trace of P300 reappears at top of face. - drift disturbed.

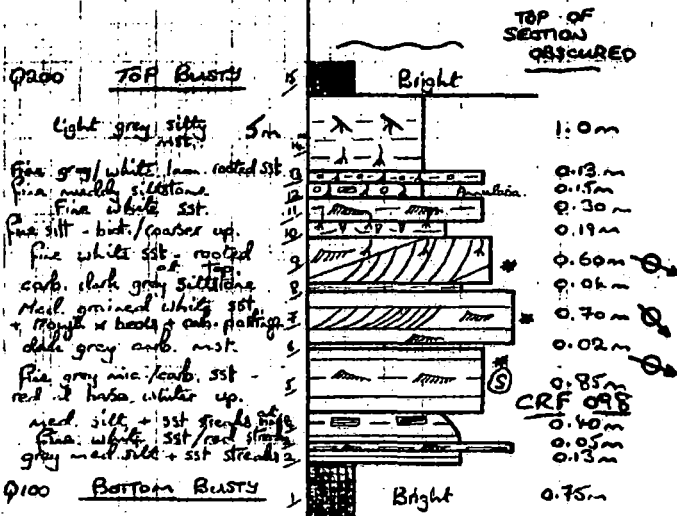


1 sample - thin sst.
 Entire cut - 336m long (from base line)

SECTION 074
CABIN HOUSE (S. CUT)

Cut AB2

1st visit - Private licence site. South cut - face trending 160/340° Situation 200m on 100° from pylon. Tectonic dip negligible.



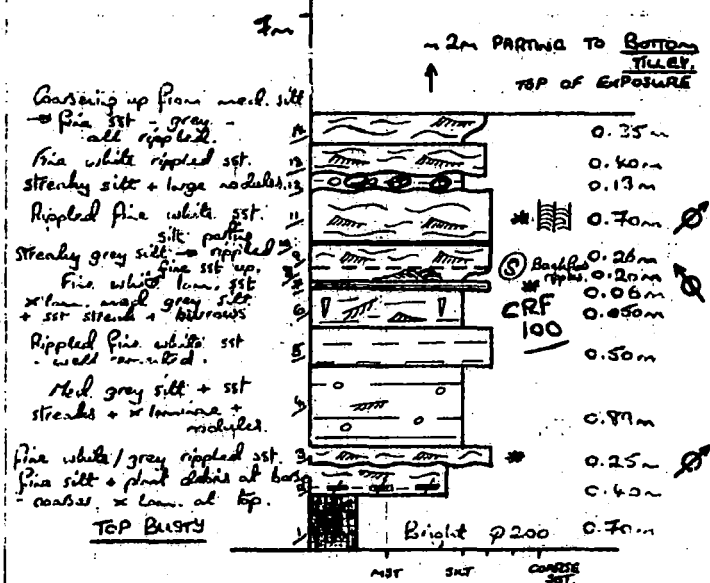
Raddling = copper shade - dark brown/porous colour. SAMPLE - SST

- * DIRECTIONAL DATA -**
- Unit 9 - Trough cross bedding
 - 1. 0.18m x 1.10m @ 15/137
 - 2. 0.13m x 0.70m @ 12/104
 - Unit 7 - Trough cross bedding.
 - 1. 0.15m x 2/25/144
 - Unit 5 - Rippled ~~bed~~ → 124

SECTION 076
CABIN HOUSE (S. CUT)

Cut TB1

Back wall of south cut, Top Bench.



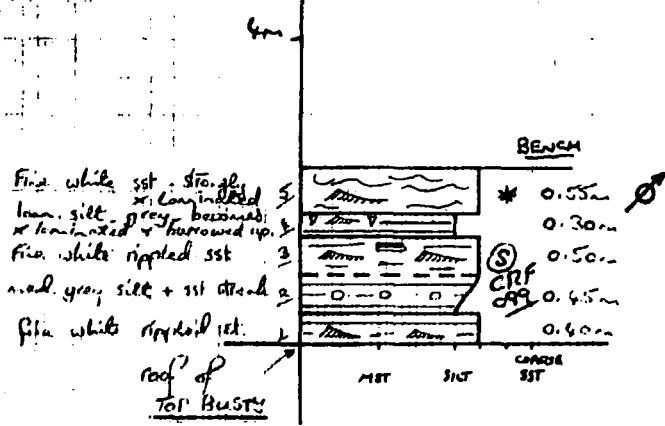
nb Units 3 & 5 are laterally discontinuous - 3 disappears by 20m south - and 5 stops within 2m south - both continue to north.

- * DIRECTIONAL DATA -**
- Unit 11 - Rib & furrow troughs → 040°
 - Unit 7 - ripple crest orientation 246° wiggle tip → 336°
 - Unit 3 - Rippled x lamination → 040°

SECTION 075
CABIN HOUSE (S. CUT)

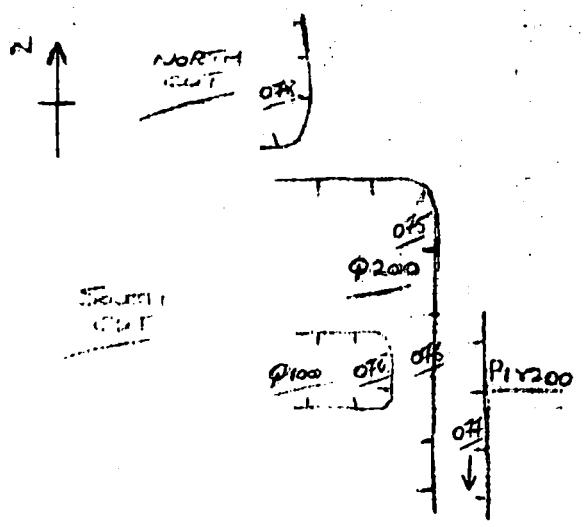
Cut TB1

50m north of 074 - on backwall.

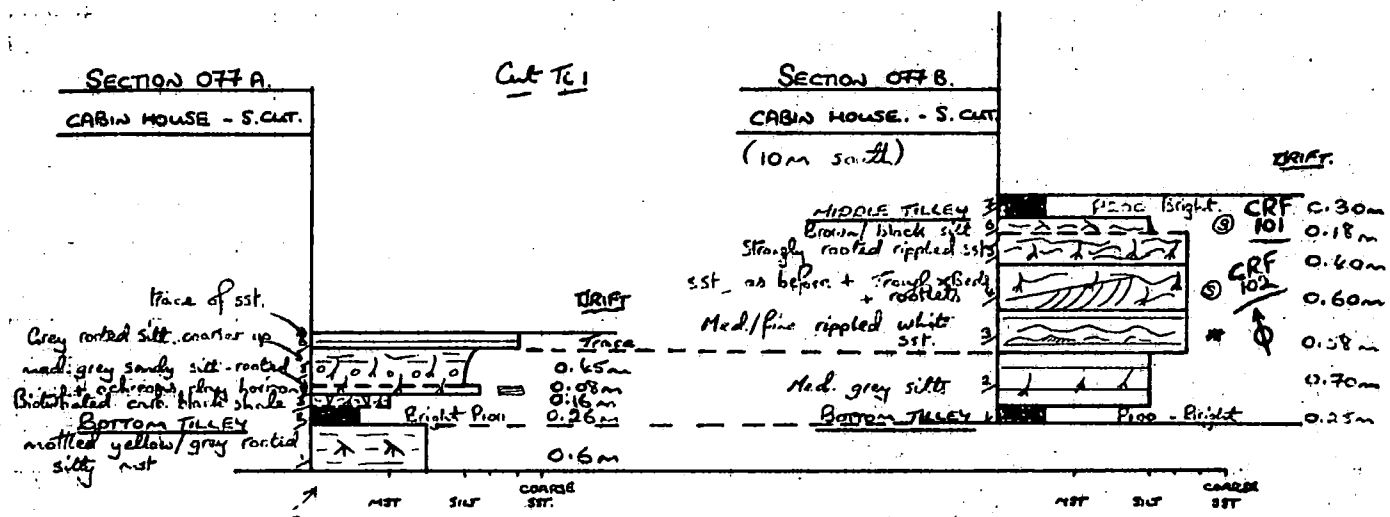


- * DIRECTIONAL DATA**
- Unit 5 - ripple x lamination → 042°

SKETCH PLAN OF WORKINGS AT CABIN HOUSE - 3.3.80



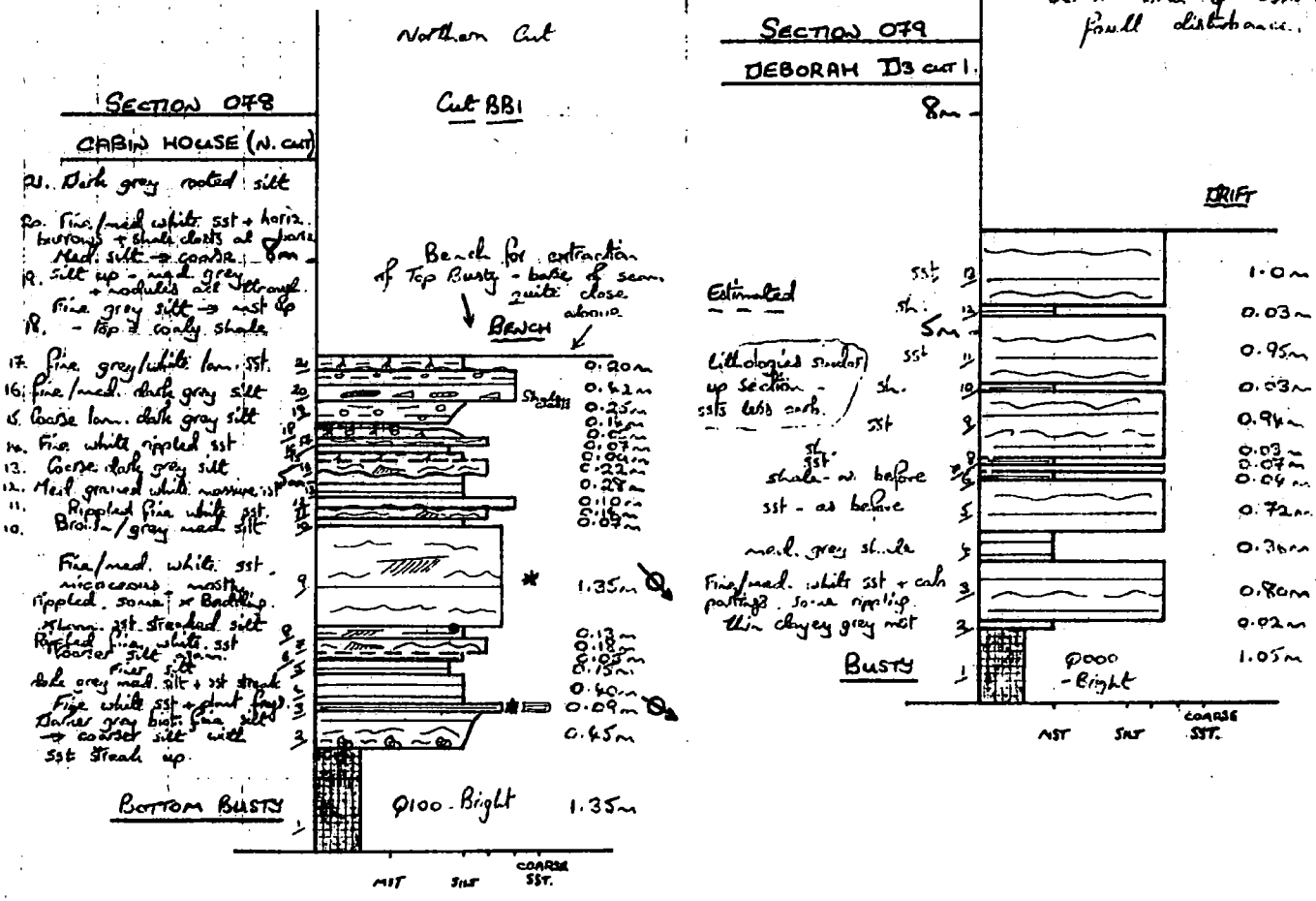
NE. Area, further 10m south same soil type occurs - sst is not downcutting



* DIRECTIONAL DATA.
Unit 3 - climbing ripples → 130° - 350°
n = 2.

Total 5 samples.
3 frames 4/5 ASA 400 film shot.

Long wall trending 030°
20m north of sst.
Fault disturbance.



* DIRECTIONAL DATA
Unit 9 - trough x beds ≤ 0.10m → 140°
n = 1.
Unit 3 - orientated plant debris → 120/300°
n = 1 (huddle)

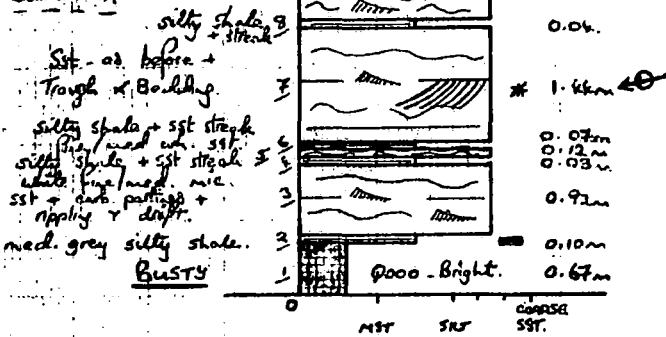
4 frames - 2 panorama over D1 iii
2 slump in Dii

SECTION 080
DEBORAH D1-cut 8.

Long wall trending 292°
N.B. Dip steepens dramatically from 5° to 20° toward backwall i.e. north.

Similar rock types upward - progressively more and thicker silt shale units upward.

Estimated.



* DIRECTIONAL DATA -

Unit 7 - Trough cross-bedding.

- 0.3m x 1.5m @ 180°/307.
- 0.1m x ? / 14/281.

n = 2.

Corrected orientations - 16/270, 10/280, Avg - 156°

SECTION 082

DEBORAH B2-cut 9.

Long wall trending 360°

2 frames

White/brown med. grained sst + carb. partings esp. at base + log roots + plant fragments at all angles - also shale cherts surrounded by coaly drupe near base.



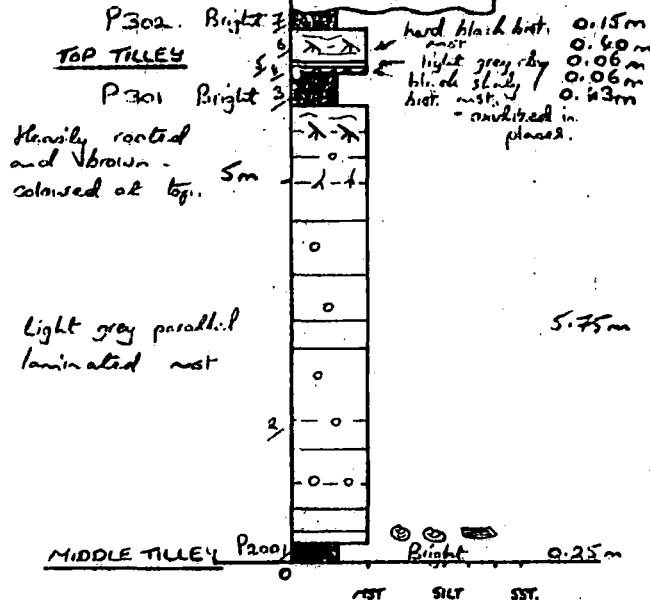
* discontinuous shale lens, 2m x 2 - 0.05m & at 0.05m where P302 further along cut.

SECTION 081

DEBORAH B1-cut 7

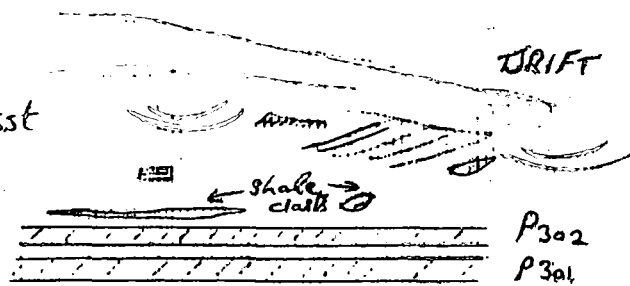
Long wall trending 270°
Some stamping disturbance
2 frames.

Medium grained white/brown micaceous ripple-drift + trough x Bedded SST.



Total 5 samples
8 frames ASA 400 4x6 film
- film 8 finished.

SKETCH - SECTION 082

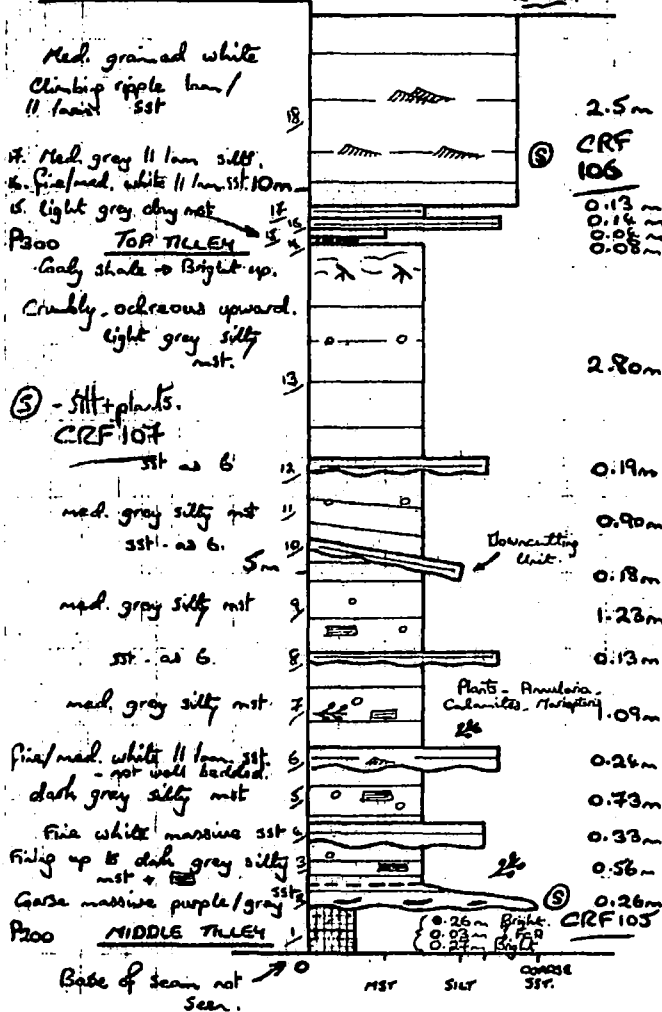


SECTION 083.

Middle wall, west end.

ROWLEY - CUT A6(S)

DRIFT



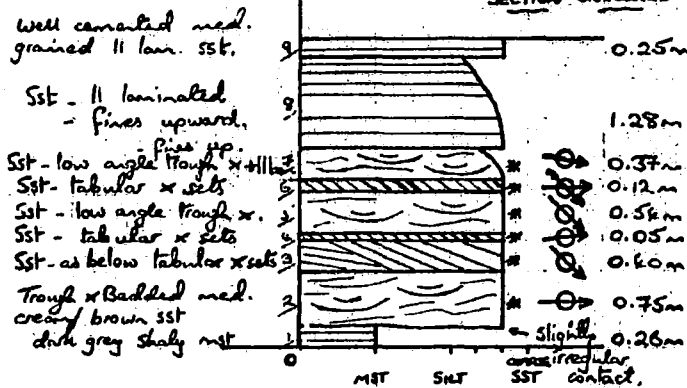
- NB 1. Thin sst units are laterally variable in thickness and discontinuous.
2. Top Tilley post grades laterally to north into silty mst. (then back to sst up A7(w).)
3. Units 15-17 all laminated fine/med. white sst in places - particularly to north.
4. Middle wall - west end - face trending 263°
5. East end of wall - similar lithologies - not well - exposed
6. Up to 100m south - similar lithologies - sst layers $\leq 1m$ thick - the start of washouts again. Silt + plants -
7. 2 samples - Sst over P300 - Top Tilley Post. - 1 frame b/w ASA 400 film shot

SECTION 084 -

West end of Prebends Bridge
- corner of track leading to
road - by cottage.
Horizon - ? above Mauldin.

WEAR GORGE.

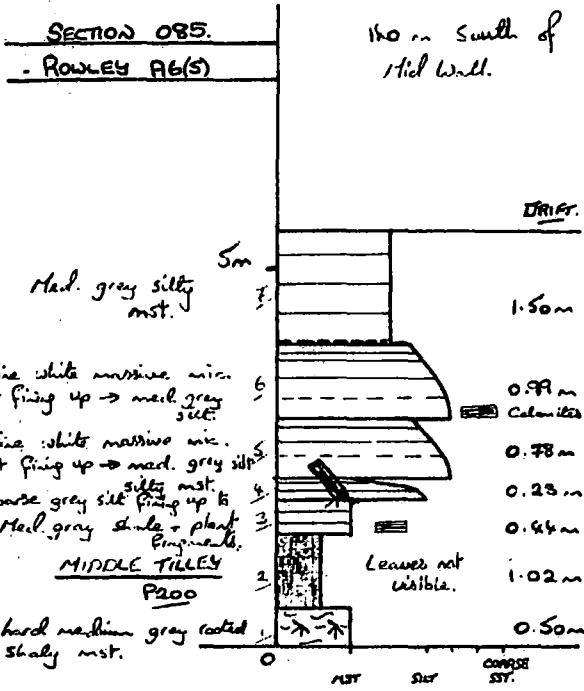
SECTION OBLIQUE



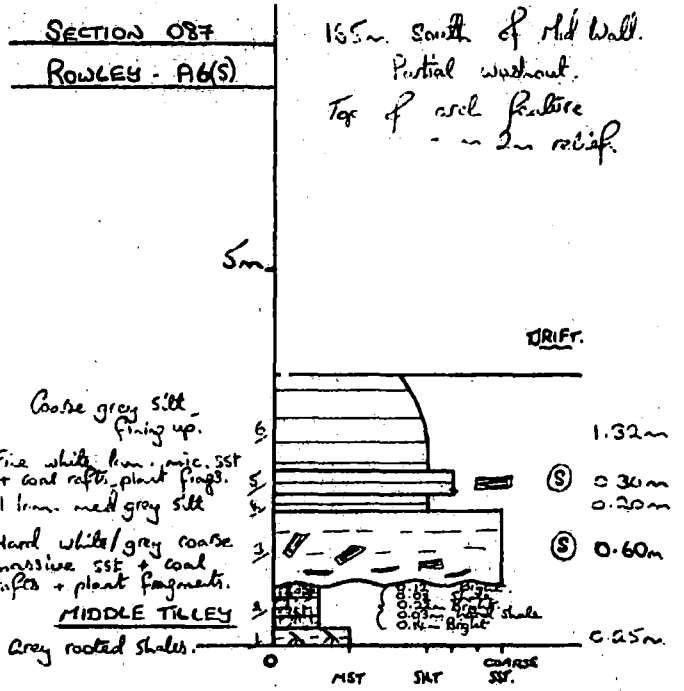
- NB
1. Trough x sets become noticeably more asymptotic upward.
 2. Unit 4 is cut out 5m to east.
 3. Unit 6 thickens to the east \rightarrow 0.25m.

* DIRECTIONAL DATA

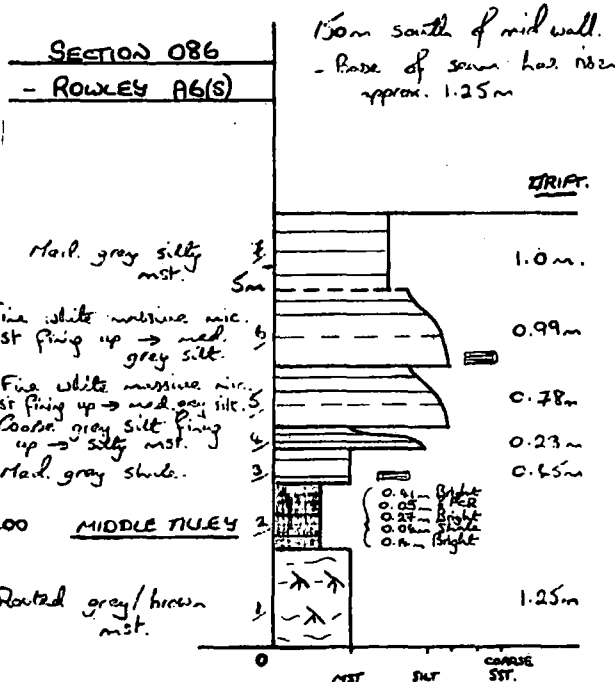
- Unit 7 - Low angle trough x sets
 $0.15m/12/105^\circ$ $\lambda = 1$. $\theta = 105^\circ$
- Unit 6 - tabular x sets.
 $0.12m/14/092^\circ$ $\lambda = 1$. $\theta = 092$
- Unit 6 - Low angle trough x sets.
 $0.23/17/133^\circ$ $\lambda = 1$. $\theta = 133^\circ$
- Unit 4 - tabular x sets - $\theta = 075^\circ$
 $0.05m/22/080^\circ$ $0.05/23/071^\circ$ $\lambda = 2$.
- Unit 3 - tabular x sets - $\theta = 141^\circ$
 $0.3m/15/143^\circ$ $0.35/16/140^\circ$ $\lambda = 2$.
- Unit 2 - Trough x sets - $\theta = 089^\circ$
 $0.32m/16/107^\circ$ $0.82m/18/068^\circ$ $\lambda = 3$.
 $0.70m/19/093^\circ$ $w = 1.8m$.
- (CRF 108)



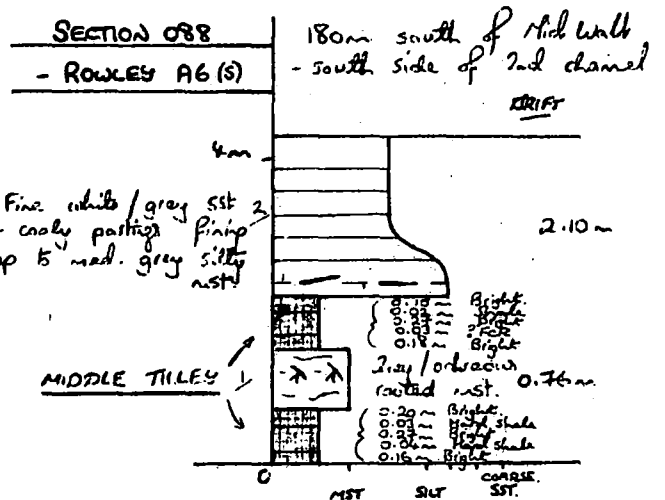
- NB**
- At this point, 110m, the top and base of P200 rises up - doming effect - probably depositional. Channel westwards to south.
 - To north, fines as for Section 083 - interbedded gray silty mst & fine sst.
 - 75m south of Mid Wall, with top 2m above roof of P200 - but-over Calamites
- * DIRECT-track - but toward 136° - 0.12m thick - 100% DATA (flattened). 1m+ long - Dip 38° - coalified in places.
- N = 1



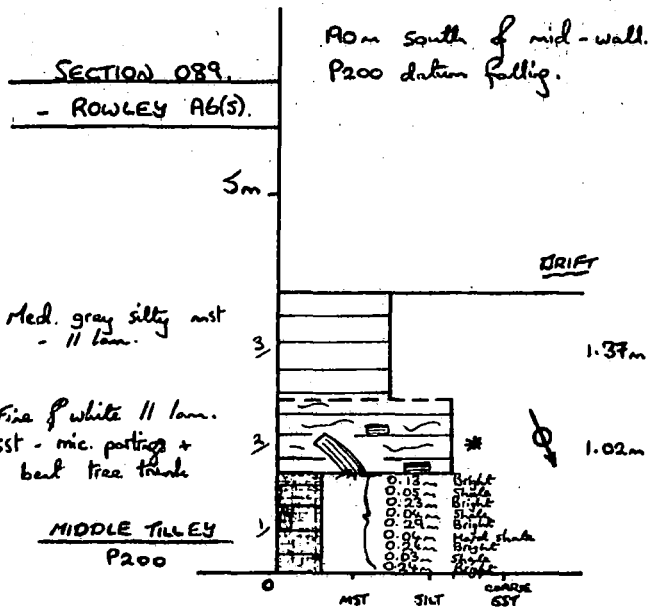
- NB**
- Thin ssts over P200 in previous sections are sub-parallel to the channel - do not merge.
 - Partial washout feature - doming of sst - lots of photos - 2 samples - CRF 110, CRF 109.
- Top 1/3 lower cut out - leaves must split, because 3 lower are present under the washout, though thinned.
- Semia Plancks become sst to north & south at margins of washout. - Splay effect with top lower whole channel 5m across.
3. Seam falls down gradually to previous level over next 65m.
 - At 177m, another similar channel, partially obscured - 3m across.



- NB**
- At 160m south, seam (top) has risen another 0.5m - measurements - 50m thick bed up!
- | | | |
|------|--------|--------|
| 0.48 | Bright | } P200 |
| 0.05 | ? (CR) | |
| 0.30 | Bright | |
| 0.04 | Shale | |
| 0.20 | Bright | |



- NB**
- Unit of ochreous mst which splits P200 thin → no in 5m to south - obscured to north.



* DIRECTIONAL DATA 1 - Unit 2 - bent tree trunk.
 - 0.12m long x 0.5m wide - Bed toward 159° - dipping at 26° $\lambda = 1$.

NB Very small channel (0.30m across) in top of P200 - 2m to south - orientated E-W.

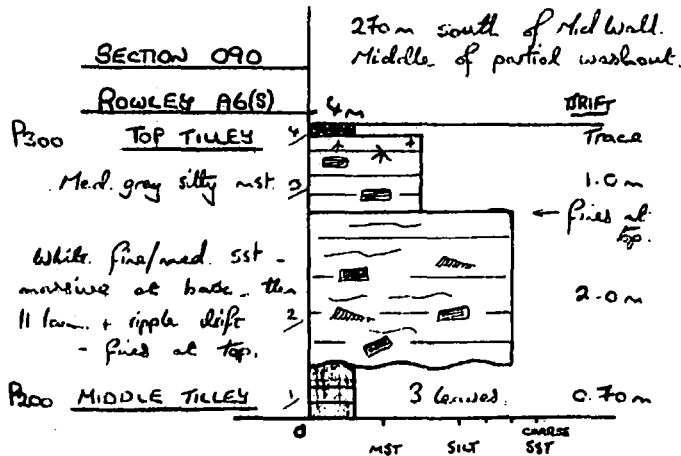
210m south of Mid Wall - more sst bands in P200 - $\leq 0.30m$ thick - seen 0.72m thick & leaves.

215m south - another channel - ~3m wide - thin fine sst layers in silty mst over sst. Sst over P200 more or less laterally continuous.

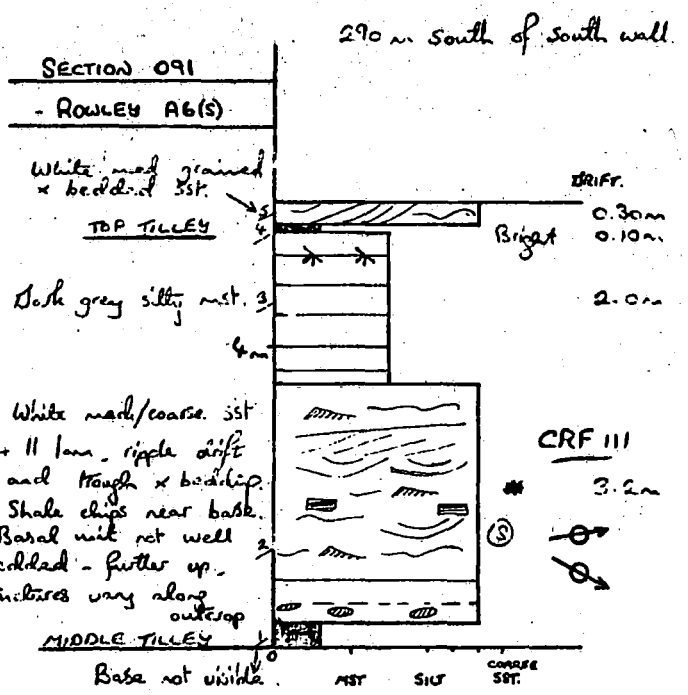
217m - Old collapsed working - P200 level back to previous base level.

250m - Face still collapsed

270m - Another channel washout - dimensions uncertain - but showing spalling out of P200 leaves. Large sst body over P200 comes in at ~243m by lateral coarsening from silt - thickens up gradually - by 270m is 2m thick.



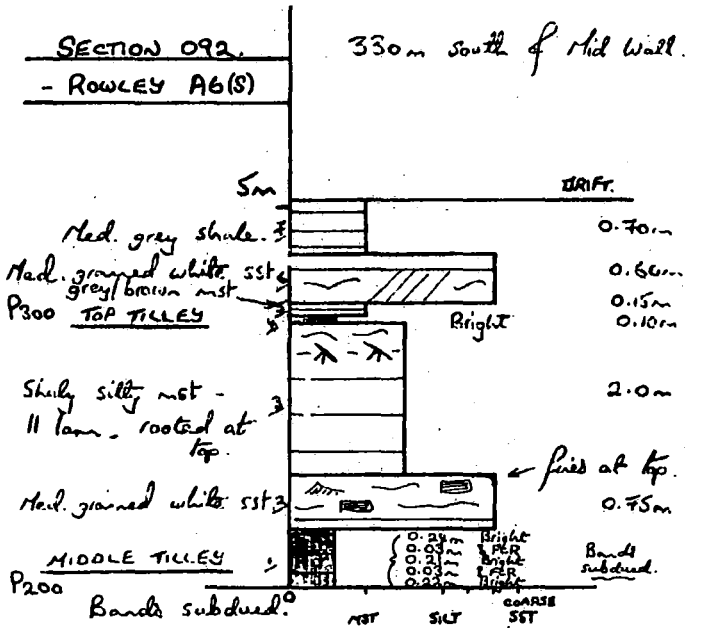
Top leaf of seam removed. South of washout - sst thickens to south.



* DIRECTIONAL DATA 1 - Unit 2 - Trough Cross-bedding. $\theta = 123^\circ$
 0.6m (x 1.5m wide) / 12/123° $\lambda = 1$

Unit 2 - Ripple drift
 → 072° 079° 097° $\lambda = 3$
 $\theta = 123^\circ / 98^\circ$

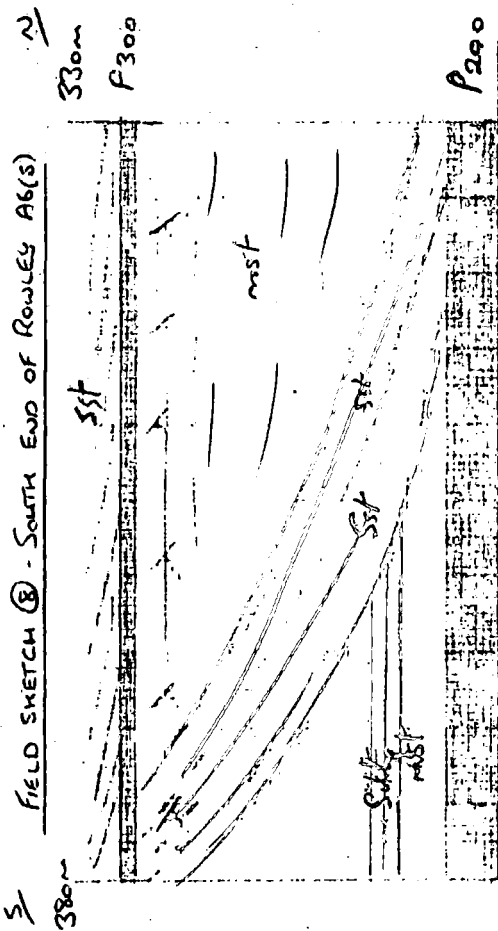
Sst thins down again to south 98.2°



Sst continues to thin to south. P300 comes down the face at 330m then starts to rise to south.

By 360m, sst band is 2m above P200, rising up the face - under = silty mst with occasional nodules and thin sst bands. Similar facies to e. of cut at 410m. 2-3 sst bands, 0.10m thick at 1.40m over P200 roof.

Thick white med. grained sst under Unit 2 rising up face - pri. P300 (ie cut out at top)



NB By 350m, Top Tilley Post is mostly sandstone, with thin interbedded shales. - appears to drape over to NE. face ~ 8m high.

SECTION 093.

40m south of Mid Wall - South end of cut.

- ROWLEY AB(S).

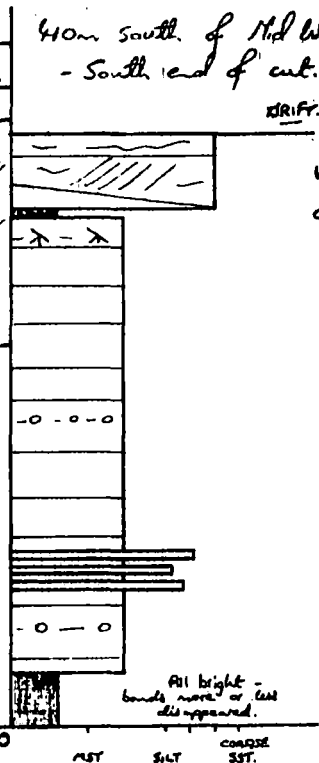
NB 9m 8m
Med. white x-bedded sst.

TOP TILLEY

5m
Silty mst - 11 lam. - some nodules + 3 fine grey sst bands 0.10m thick 1.4m from roof of coal

MIDDLE TILLEY

All bright - bands more or less disappeared.



P300 x TTP rising up face to south into sink wall.

Back wall, under Pylons.

SECTION 094.

ZEBORAH - III.

Bright 1P00

SECTION CONTINUES.

Med grey mst + nodules.

dark grey crumbly clay shale med grey rootled clayey mst.

Interbedded 5m fine white x-bedded and x-laminated mic. ssts and med. grey shaly mst.

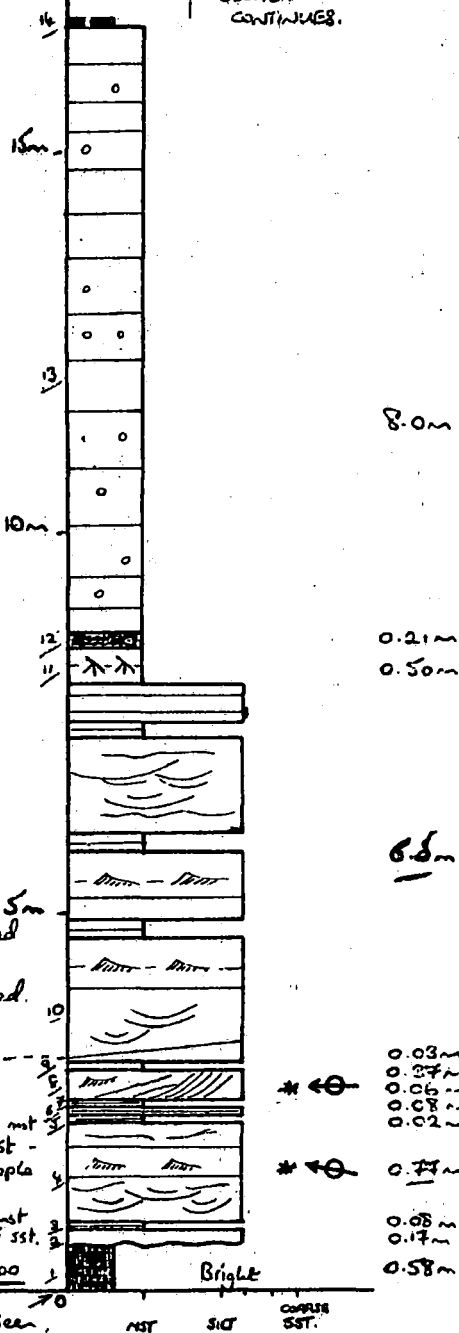
Shaly mst sst mst med. grey shaly mst Fine white mic. sst - Trough x-bedded + ripple drift + 11 lam. med. grey shaly mst Fine hard massive white sst.

BUSTY - 9000

Bright

Base not seen.

CONGLOM SST.



NB 1. See also x-bedding data for TTP - Cut 10/ Area Bii - Section not taken - See over.

* DIRECTIONAL DATA.

Unit 4 - Trough x Bedding - 0.2m / 7 / 271° $\lambda = 1$.
Unit 8 - Trough x Bedding
0.3m / 13 / 275
0.2m / 11 / 203
0.2m / 14 / 280.

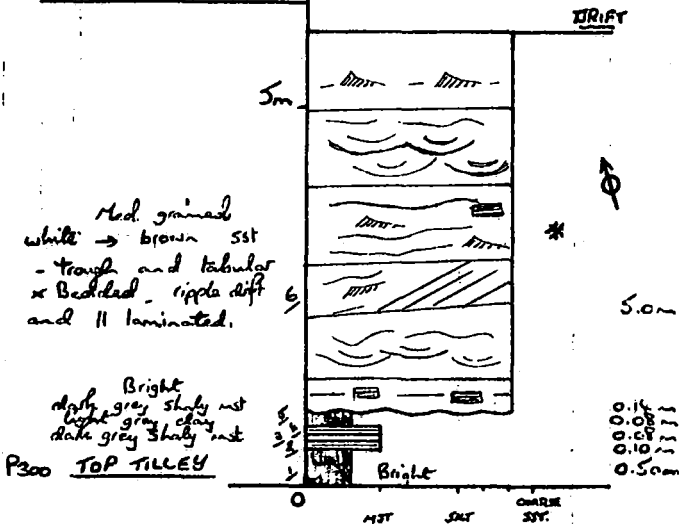
112/262
CORRECTED
16/255
17/262
13/272
 $\lambda = 3$

$e = 263^\circ / 99\%$

From ASA 400 Hw film shot.

**SECTION 095 -
JEBORAH - Bii/10**

Cut 10, area Bii - long wall.



*** DIRECTIONAL DATA :-**

- Unit 6 - Trough foresets $\leq 0.5m$
1. 22/345
 2. 20/349
 3. 13/338
 4. 17/339
 5. 29/338
- $\lambda \neq 5.$
- Tabular foresets - asymptotic based.
1. 36/358°
 - $\lambda = 1.$

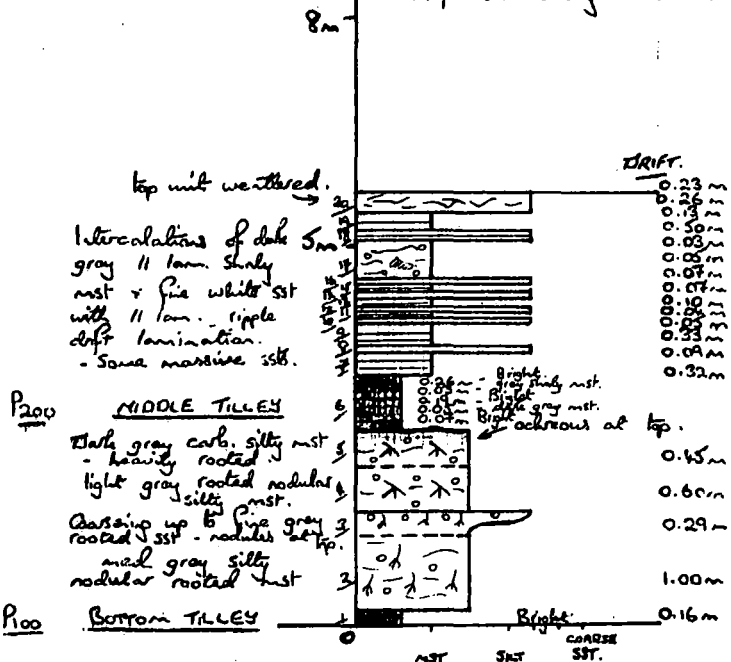
Corrected measurements

1. 10/324
 2. 15/329
 3. 25/334
 4. 17/339
 5. 16/346.
- $\theta = 334.6^\circ$ $\lambda = 99\%$
1. 31/356°

SECTION 096.

- ESH WINNING - K10.

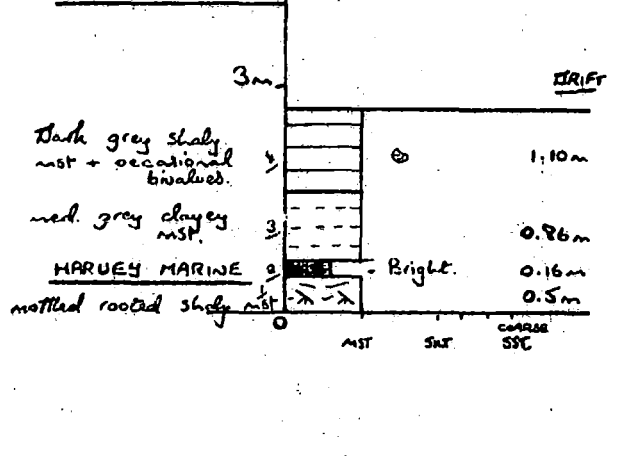
Last cut on the site. SE corner of wall - wall trending 310°. Drift down cutting to south.



NB Unit 3 thicker, coarses to NW and thins. Pies to

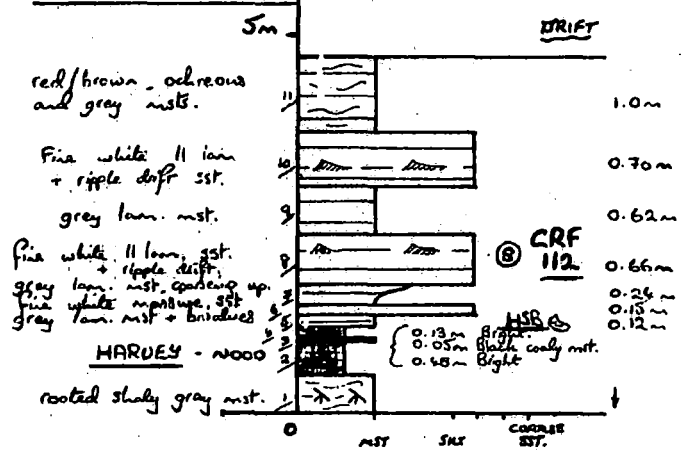
**SECTION 097 -
ROWLEY - H.A.1.**

West end of site - 1st cut in Harvey Marina.



**SECTION 098:-
ROWLEY - H-2.**

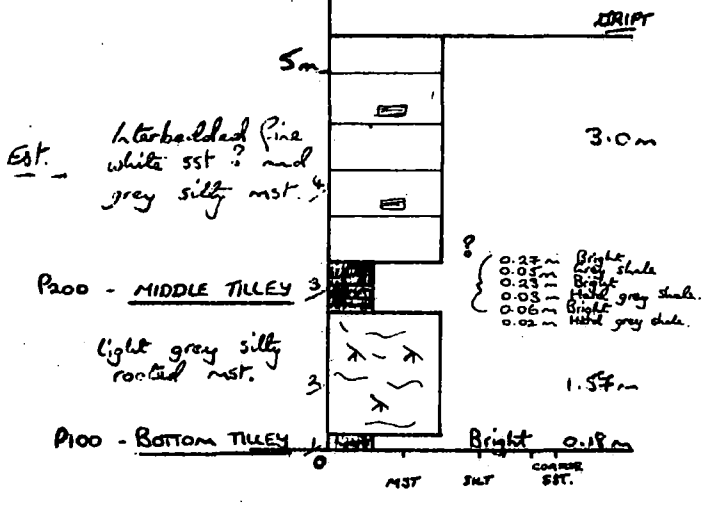
2nd. Cut in Harvey - west end of site. (1st cut - seam only just below outcrop.)



NB One sample - sst over Harvey. Sst's are laterally variable (even discontinuous) in thickness.

SECTION 099 - ROWLEY - CUT A6(S)

270m north of South end - near base of "dome" feature

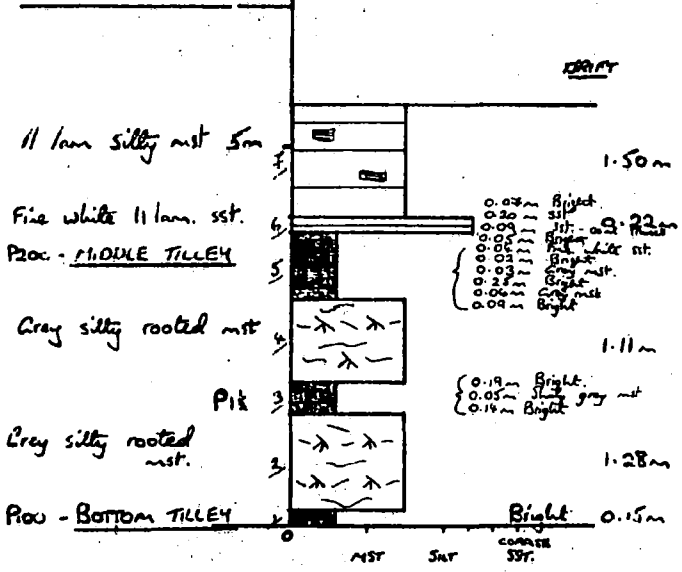


Est. - Interbedded fine white sst? and grey silty mst.?

NB 10m north is at base of "dome". P100 - parting = 0.95m.

SECTION 102 - ROWLEY - CUT A6(S)

240m north of south end. - top of "dome" feature.



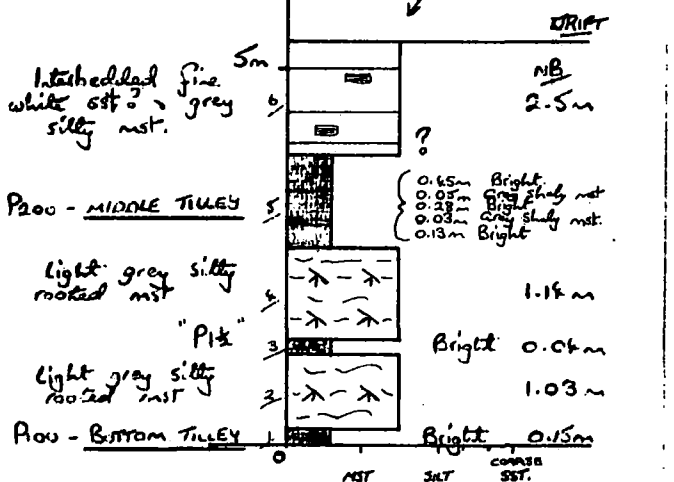
NB - 1st washout continues as interbeds of sst in P200 as far as section 102.

- P100 has a shaly band in the middle south of Section 101.

- 5m further - 2nd washout.

SECTION 100 - ROWLEY - CUT A6(S)

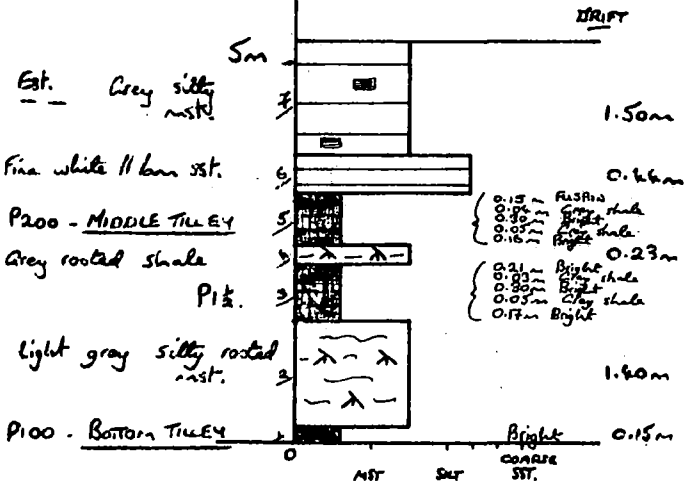
260m north of south end NB logged thicknesses slightly inaccurate



NB Unit 3 dies out rapidly to a coaly trace to N.

SECTION 103 - ROWLEY - CUT A6(S)

230m north of south end - past 2nd washout. level of seam partings.

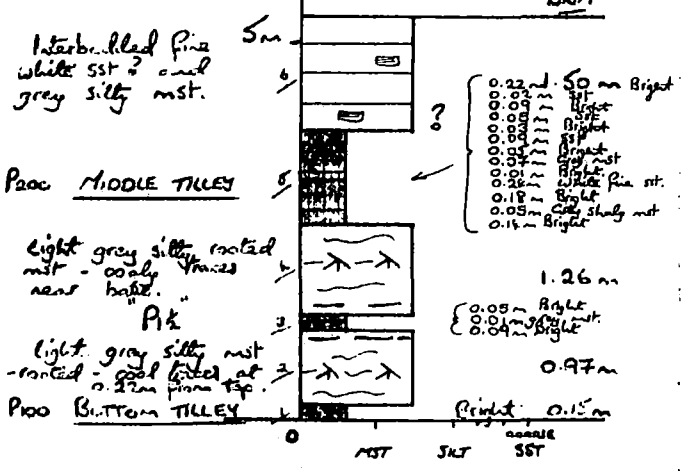


NB 1. Bands in P100 discontinuous - 0.45m continuous coal at 3m south.

2. Fine air band passes laterally into Bright.

SECTION 101 - ROWLEY - CUT A6(S)

250m north of south end. 4m north of 1st washout. - Curves of P200 begin to split.

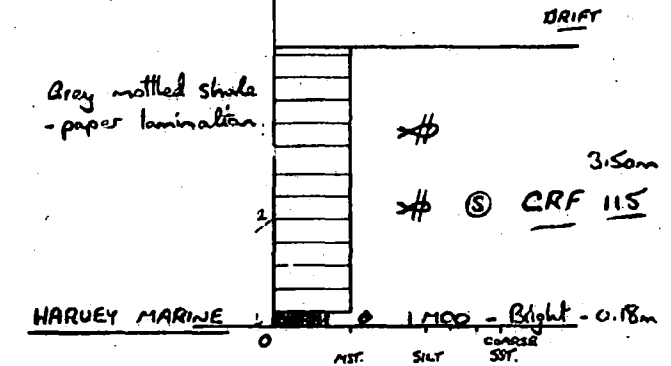
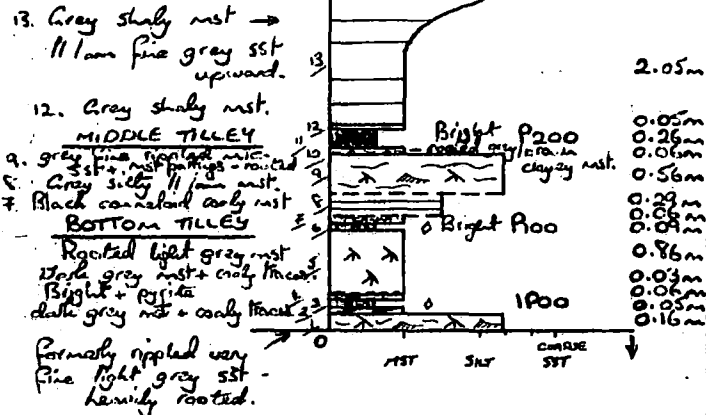


Area Diii - Cut 3 - East-ward extension of Area Dii past pylons. North End of cut - 70m east pylons.

South end of cut - 30m north of huts.

SECTION 107
- DEBORAH - Diii cut 3.
Sidewall trending 010°

SECTION 109
- ROWLEY - H2.



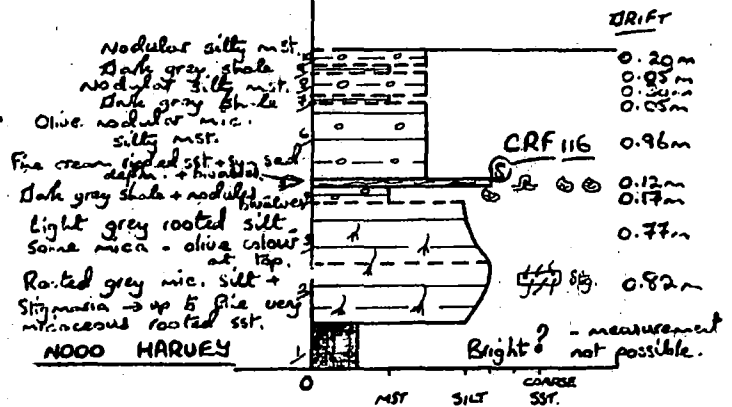
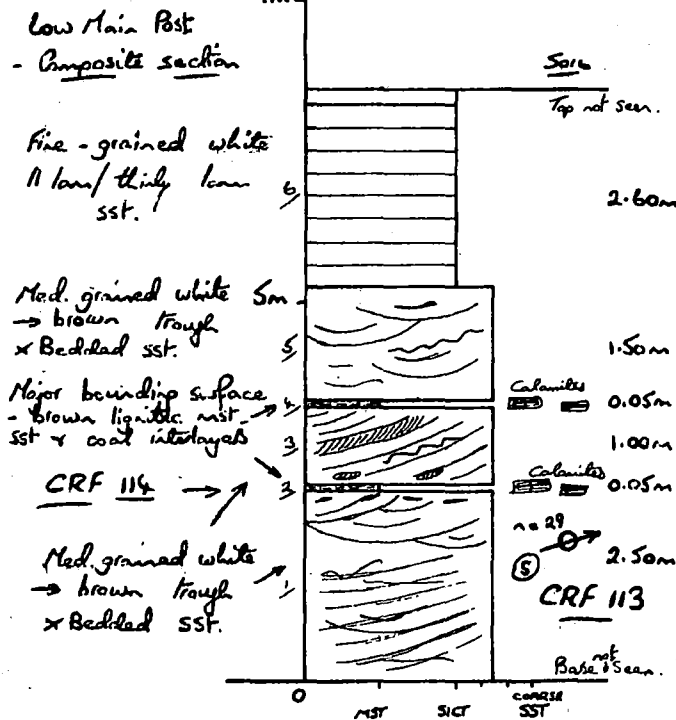
SAMPLE - Shale with fish scale. Little lateral variation along cut. 2 photos.

NB 1. Unit 9 - sst thickens to west - 1.28m thick 20m to west.

Harvey Cut - 50m north of south end. Cut trending 133°

SECTION 108
- HILL TOP QUARRY.

SECTION 110
- ROWLEY - H3.

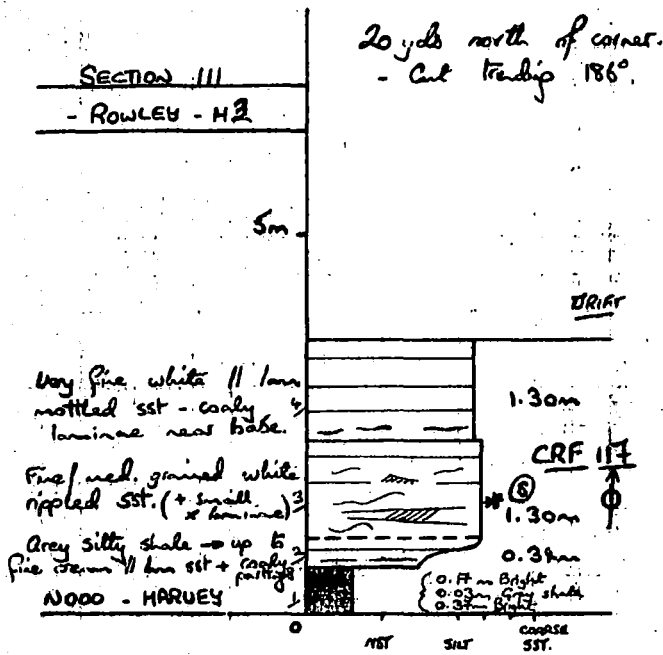


Sample - sst + bivalves - shells probably drifted - very fossiliferous sst laterally continuous at same level x thickness. 2 photos.

Following north along cut - sst continues for some the slump - the cut corner - face the trough -> 186°

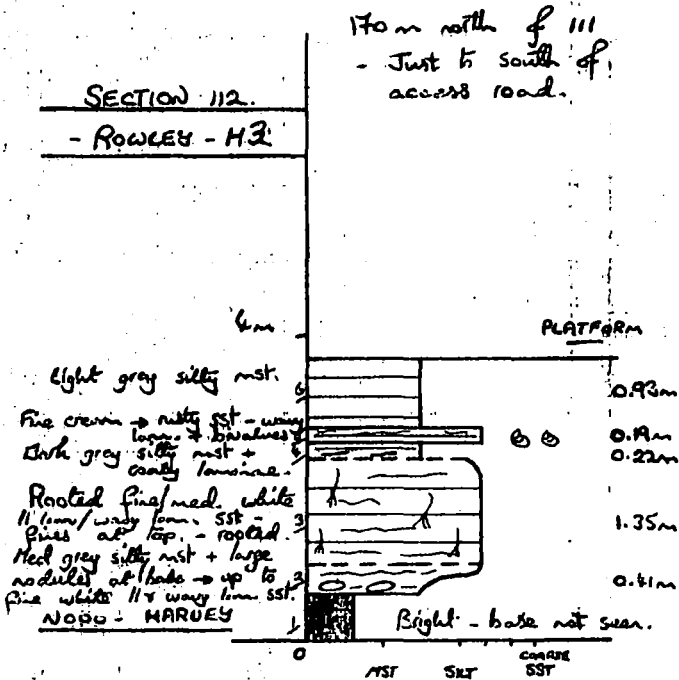
11 photos taken 1 sample.

SEE NOTES ON HILL TOP QUARRY.

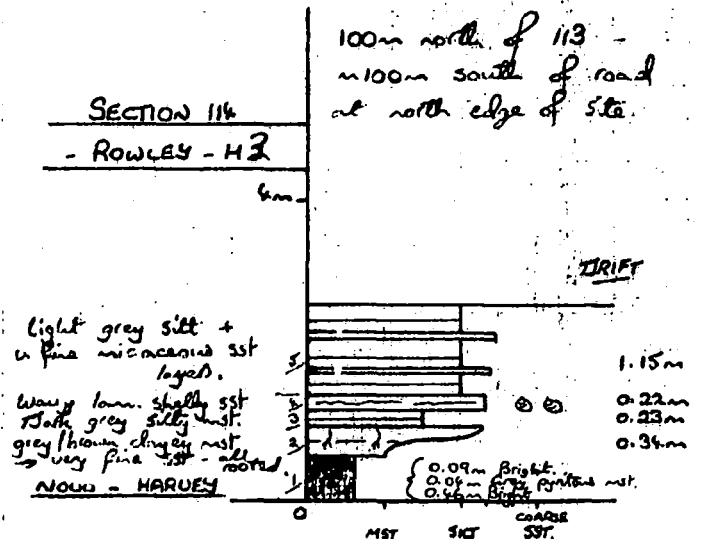
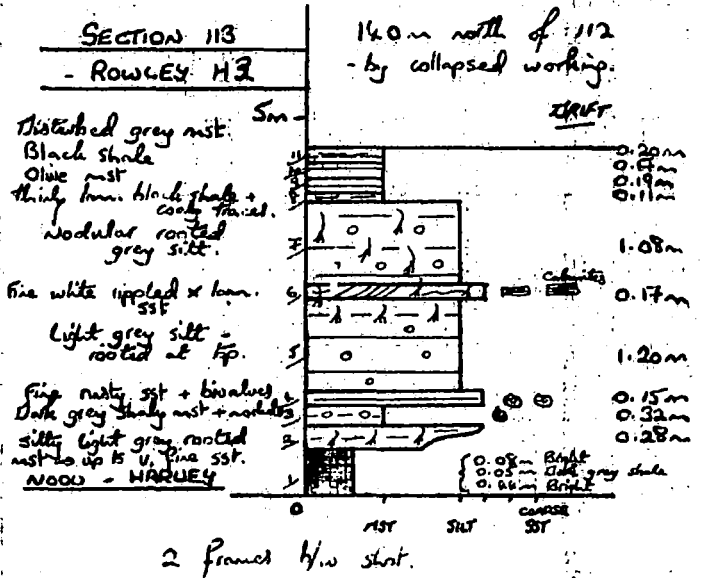


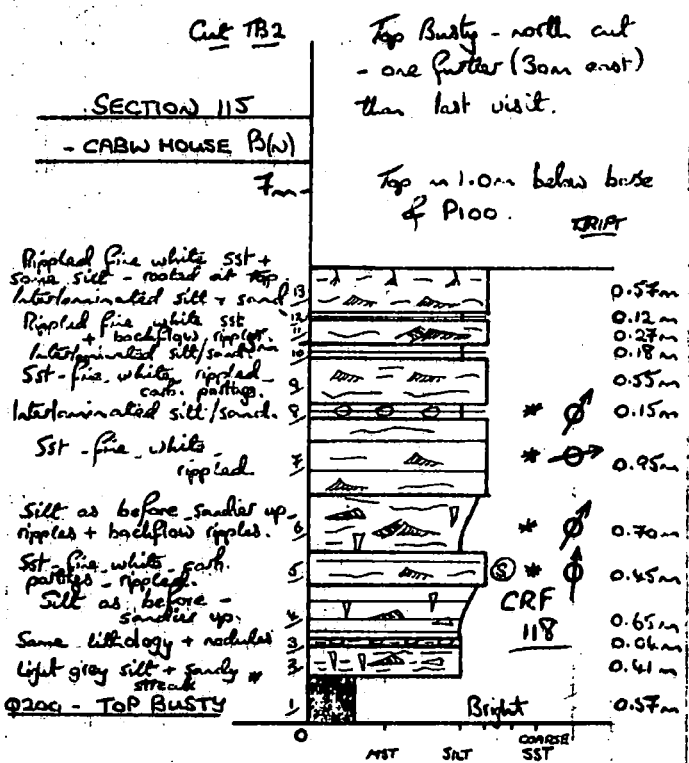
* DIRECTIONAL DATA :-

Unit 3 - Ripple drift - 010° $\alpha = 1$
Cross lamination - 360° $\alpha = 1$.



Nodules in Unit 2 \approx 10 cm long.





NB 2 frames b/w ASA 125 shot.

* Unit 2 - Micaceous + occasional sst lenses, some ripple form sst, burrows

Sample - fine white sst - Unit 5.

* DIRECTIONAL DATA.

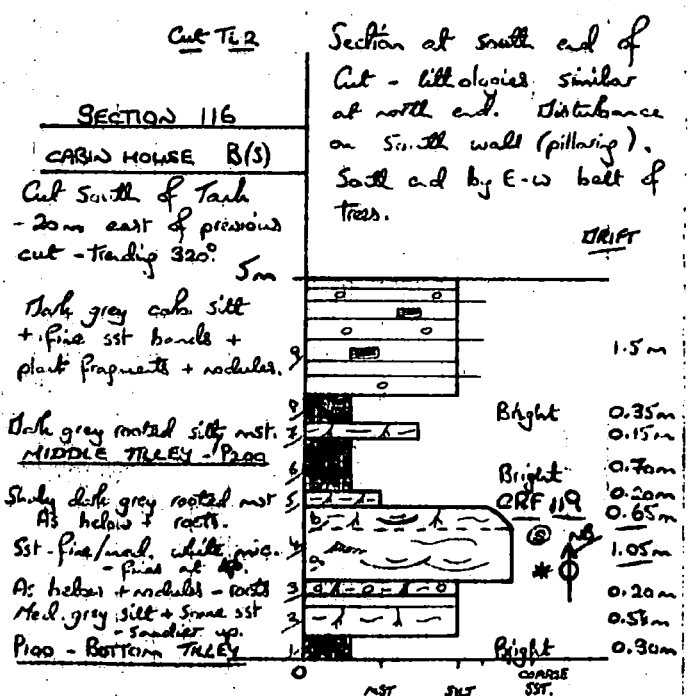
Unit 5 - Ripples - 015° $\lambda = 1$

Unit 6 - Ripple - 060° $\lambda = 1$ - others consistent.

Unit 7 - Ripple - 070° $\lambda = 1$

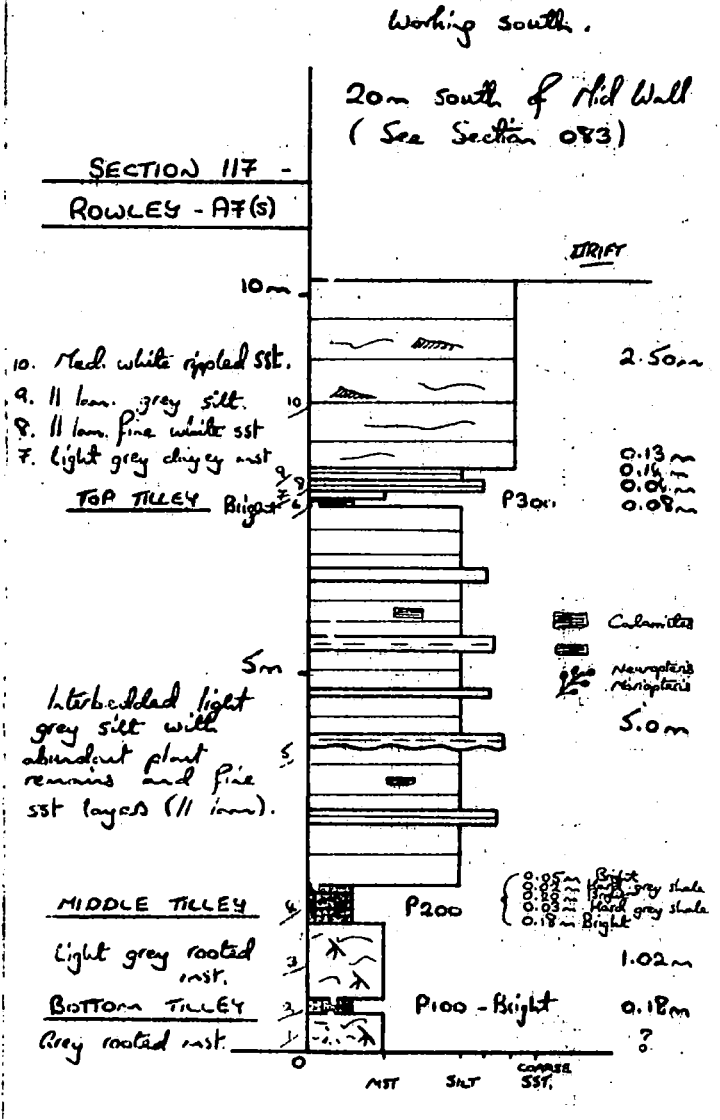
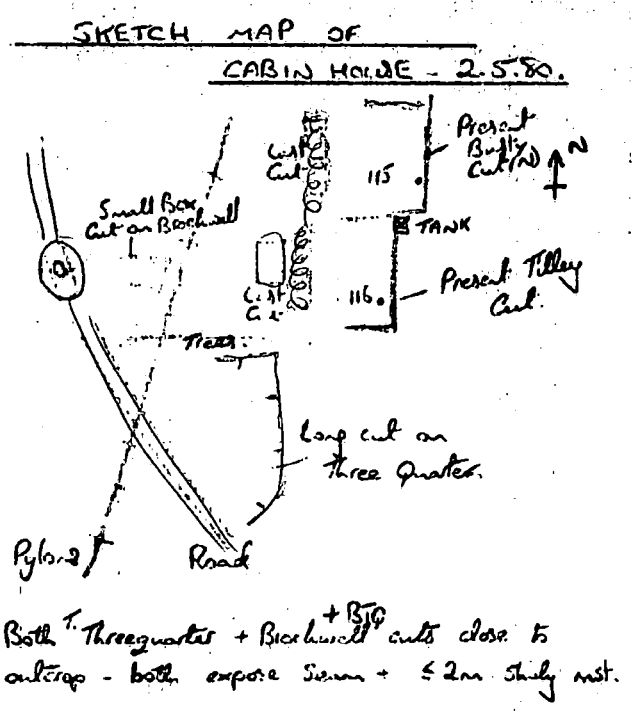
Unit 8 - Ripples - 010° - 030° $\lambda = 2$

Ripple crest 300 ← $\lambda = 1$



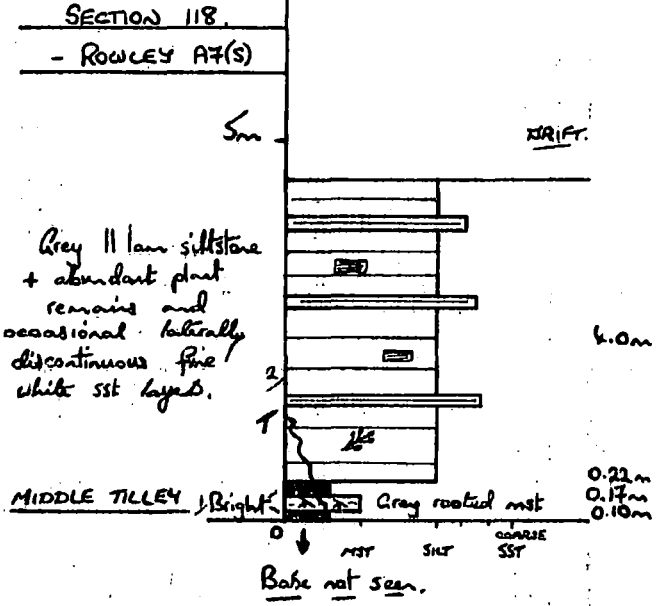
Sample - fine sst - Unit 6 a

* DIRECTIONAL DATA - Unit 6 a - Small troughs - 358° - 360° - $\lambda = 2$ - 50.3m ↑



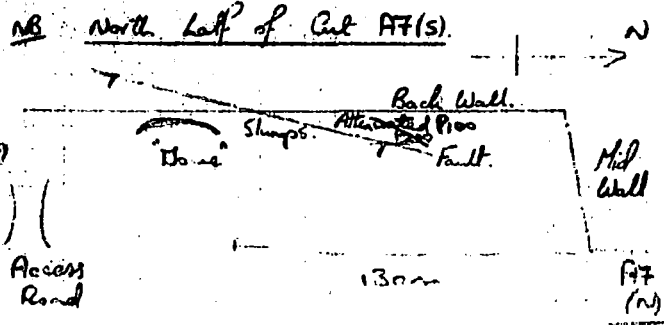
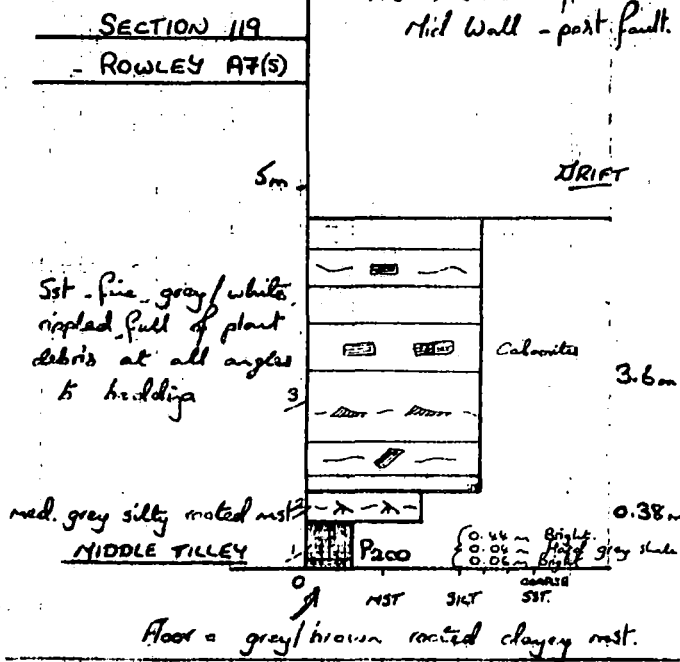
Sst layers in unit 5 mostly discontinuous internally.

70m south of Mid Wall - getting close to fault.

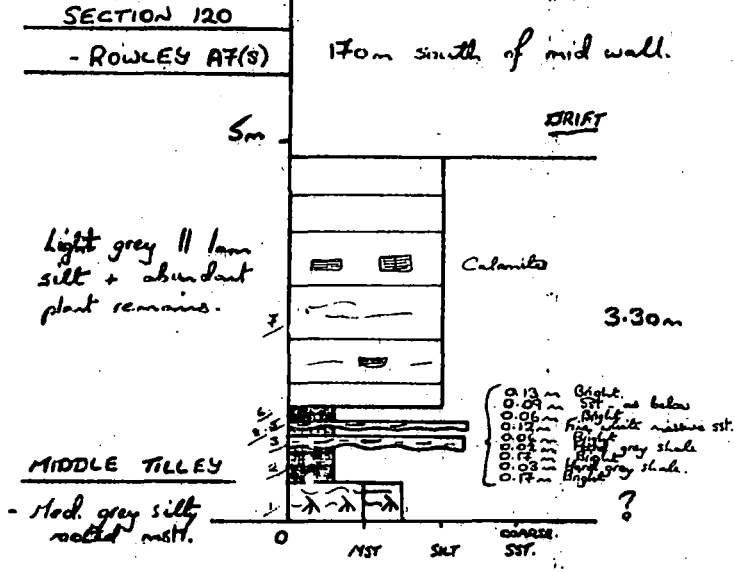


NB Coal and mst above somewhat tectonised. At 130m south, fault plane runs into wall - considerable slumping - downthrow to east, fault plane trends \rightarrow 013°.

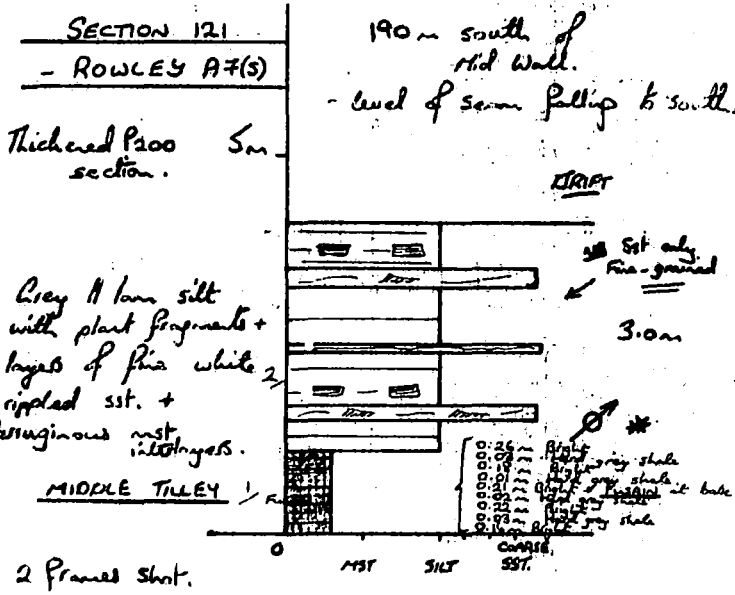
145m south of Mid Wall - part fault.



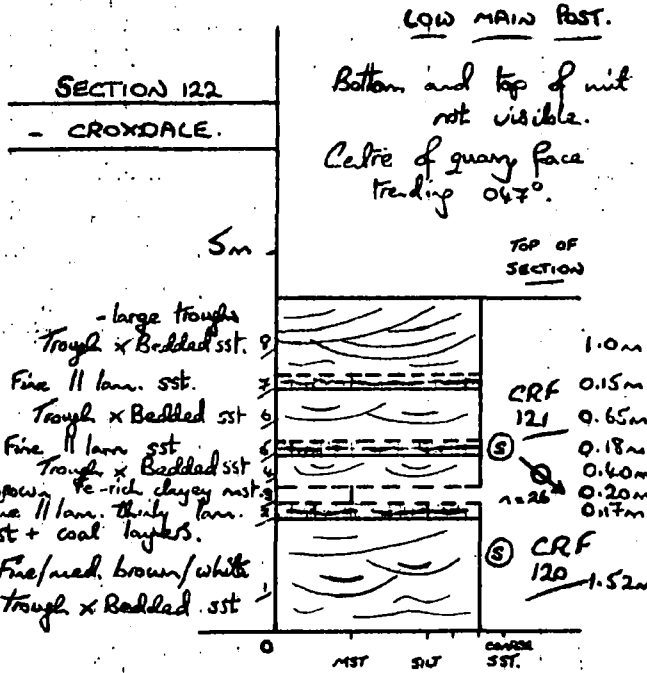
170m south - new top of dome feature - relief apparent again - though distorted by fault. Interfingering of P200 and sst up to 5m north then obscured by slumping.



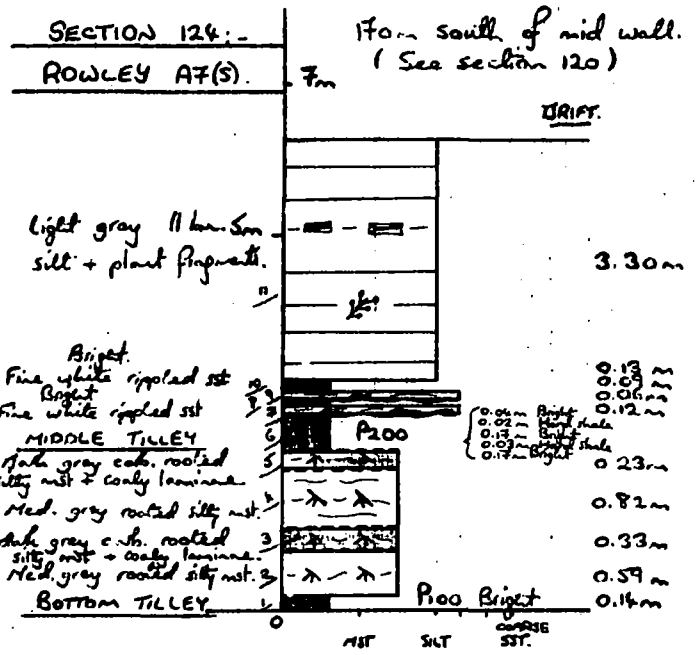
6th leaf dies out to south. Just to south - centre of partial washout - exposure not good, but in Section 120 leaves 5 & 4 & 3 are lost - leaf 2 is split and largely lost, leaf 1 remains. 6 frames shot + 2 panorama. By 185m south - washout finished.



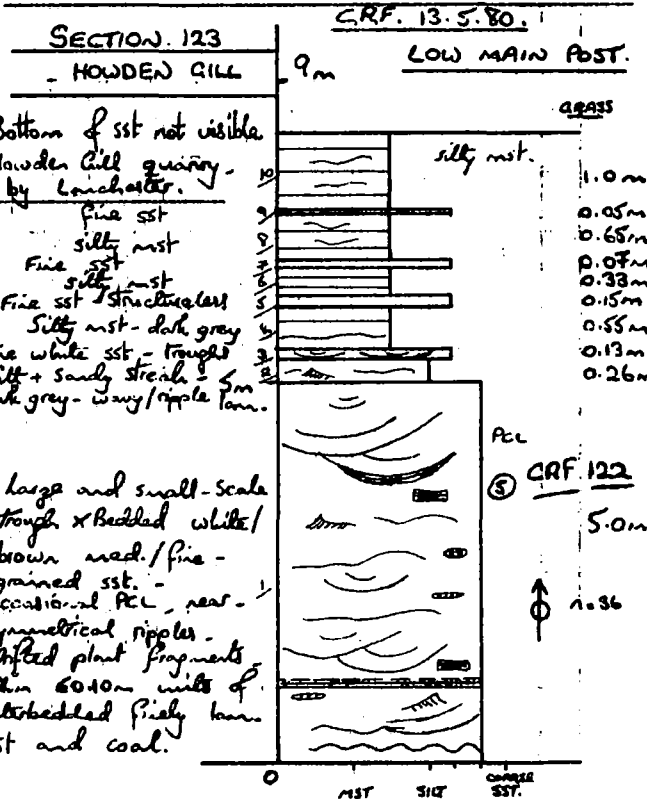
NB Leaves 3 & 4 merge in places. Leaf 5 dies out to south (15m) - further washout (opposite access road) - same lithologies, but slumping obscures exposure. Just to north (3m) of 121 - small partial washout (4m wide) - top leaf cut out - sst in washout coarser than elsewhere. * DIRECTIONAL DATA. Unit 2 - Ripple x lamination \rightarrow 065°



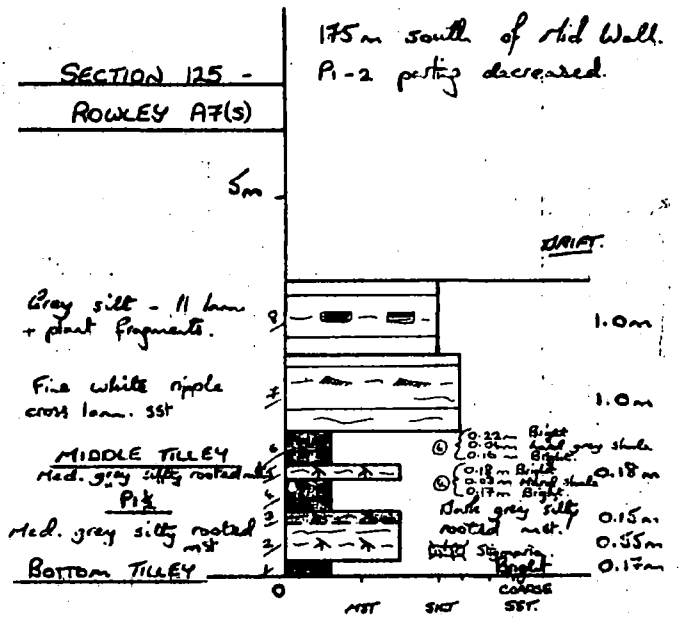
2 photos, 2 samples.
SEE NOTES.



Unit 3 - dies out 10m to north as same lithology - immediately to the south - transforms into bright coal - 10.5m south of Section 124. Unit 3 is represented by 0.30m bright.

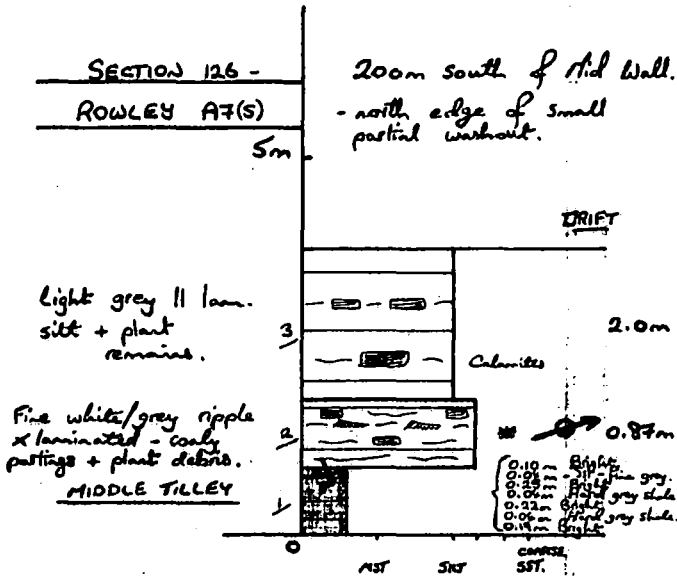


Section on middle of north wall - face trending 275°.
See Notes. 12 photos and 1 sample.
Thin ssts variable in thickness.



Band in P150 dies out to north.
By 7m south of section 125, P150 has joined up with main P200 = 182m south of mid wall. P200 - P100 parting = 0.71m.
All lenses returned - 3 from P150 (2nd band develops), 2 (+ 1 over wastout) from P200. Interfingering of sst with P200 occurs by joining of P150 and P200 - as well as at 10m to north & south.

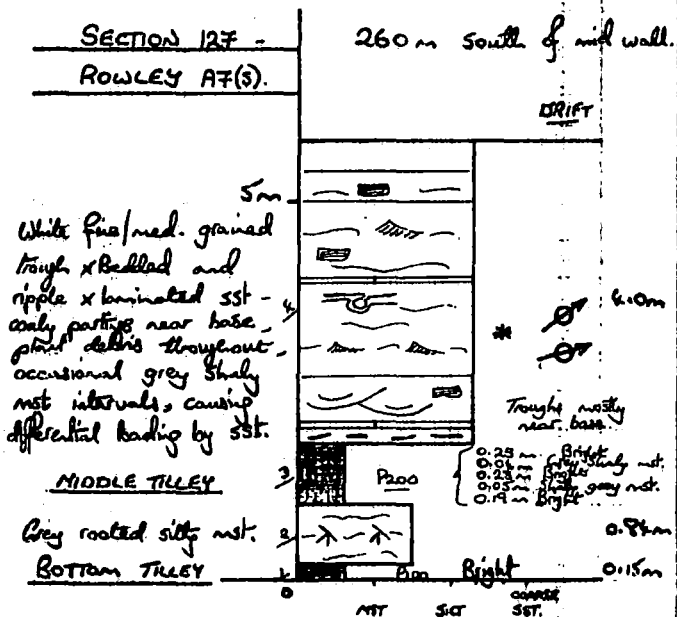
At 200m south of mid wall (5m short of access road), thickened P200 outcrop.



NB Unit 12 - thinned and amalgamated leaves 3 & 4 from north. Evidence for small synsed fault where sst bands into top of P200 - sst more or less continuous along face.

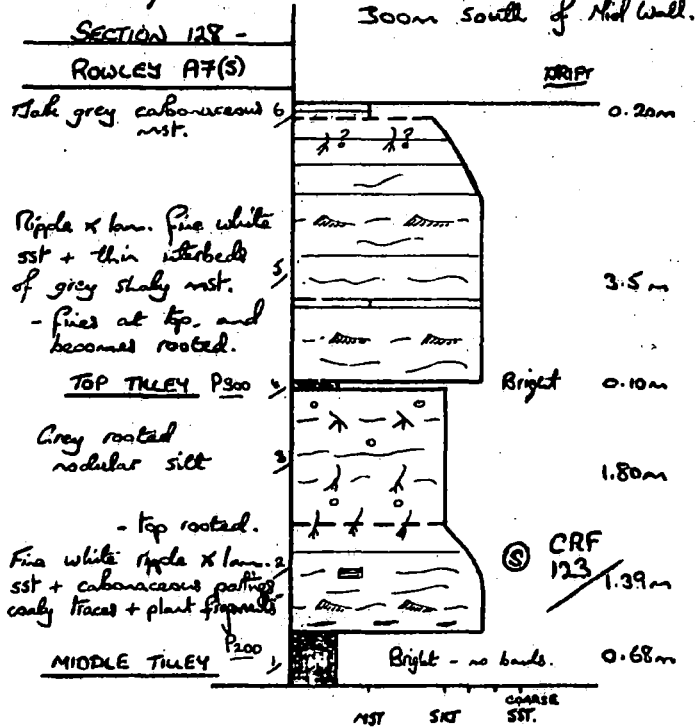
* DIRECTIONAL DATA :- Unit 2
 - Drifted plant debris → 1. 035° 2. 351°
 3. 096° 4. 100° 5. 093° 6. 133° 7. 059° 8. 066°
 θ = 074° / 77%

At 235m south of Mid Wall, shoring due to old workings - P200 probably close to original thickness. At 240m - small (1/2m displacement & 8) fault also meaning of large sst body - laterally changed from silt, with sst below (over P200).

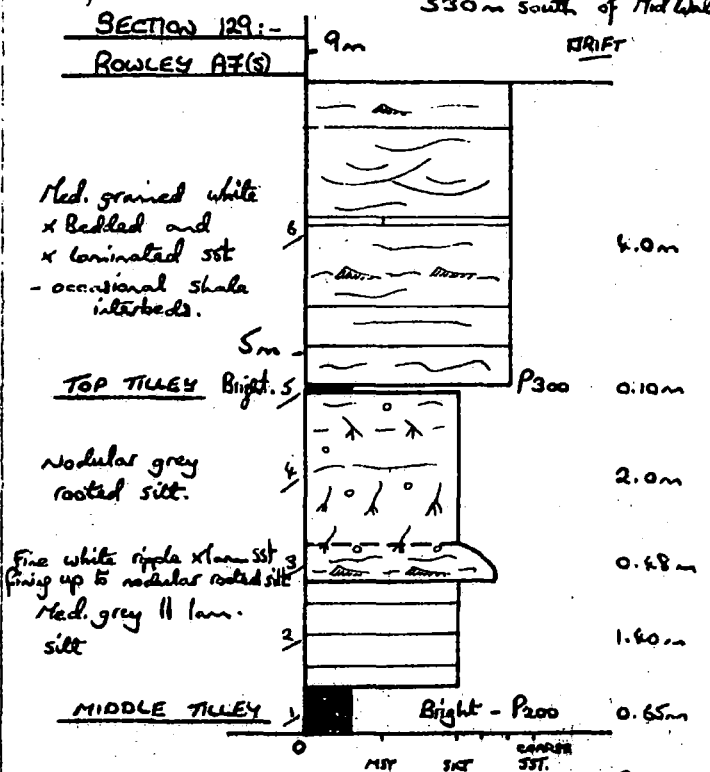


* DIRECTIONAL DATA :- Unit 4
 1. Trough x bedded 0.15m + 1m ss / 8 / 036°
 2. Ripple drift → 073° n=1.

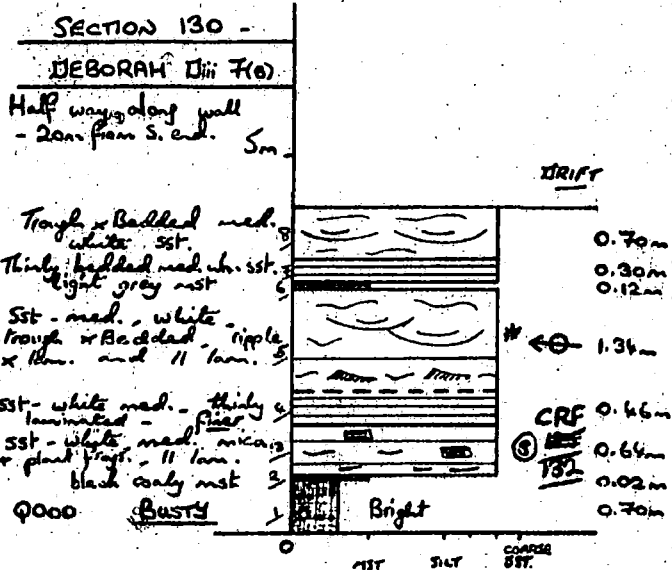
At 270m south of Mid Wall - P300 appears in top of wall - starts to come down the face to the south. Top Tilley Post above is interbedded sst and shaly sst.



Level of P300 is at lowest - starts to rise again to south. At 315m, sst starts to rise off the roof of P200. At 330m - P300 is 3-3.5m above the top of P200, sst over P200 is rising gently up the face to the south.



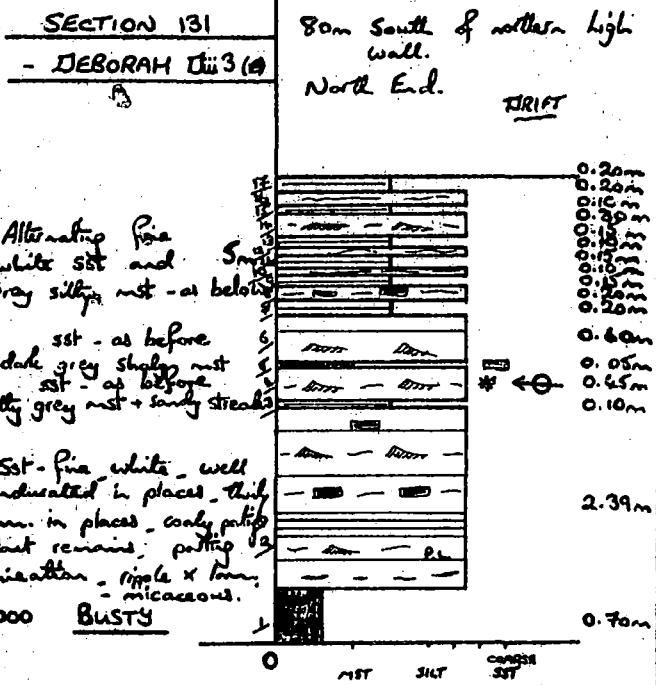
NB Sst thin from section 128 before rising off seam. At 350m thin fine sst bands in silt over P200 came in - continue to end of face. By 370m P300 is 5m above P200 - sst has reached P300 level. At 360m - sst forms a bedded trough feature - thickened locally to 1.5m. Top Tilley nearly died away in places. Thin fine sst bands with common at end of face. Total length of cut - 395m.



* DIRECTIONAL DATA :-

Unit 5 - Trough x Set - ?/0.5m/277° ~ = 1
 - width unknown.

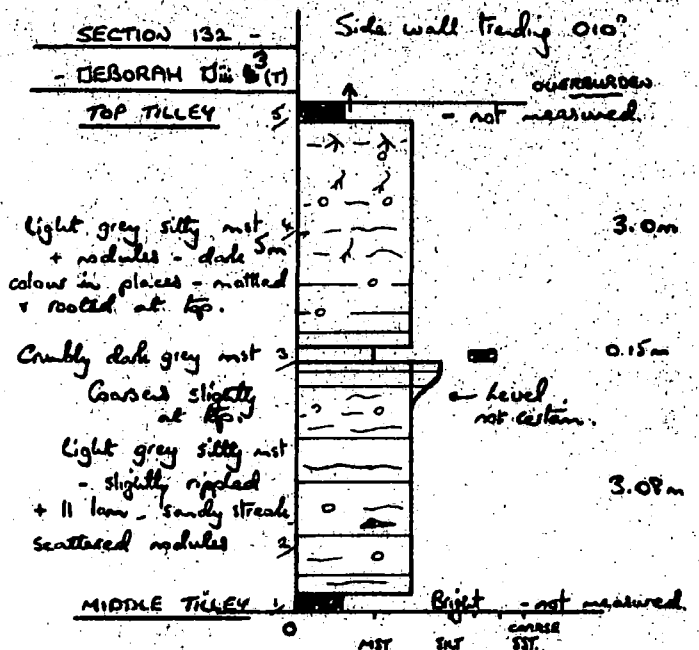
NB Cut wall trends 223° - Drift cuts down to S.
 Much less fine material intercalated than in previous cuts. Unit 6 splits to north-east.
 Sst is internally variable in character.
 Col 0000 thin 0.98m → 0.70m to NE over 65m. from back of cut.



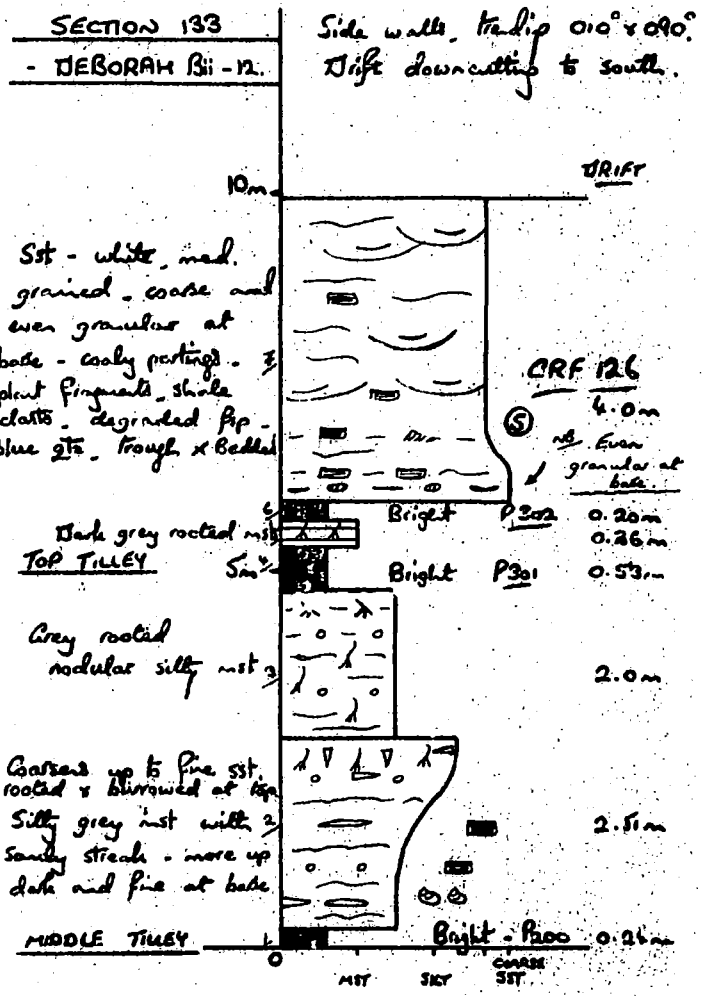
* DIRECTIONAL DATA :- Unit 4
 - Trough x Set - ?/0.2m/276° - ~ = 1
 2m wide.

NB. 2 frames ASA 125 4/6 film shot - film 11 finished.
 Unsharpened surfaces picked out by thin silty mst horizon.

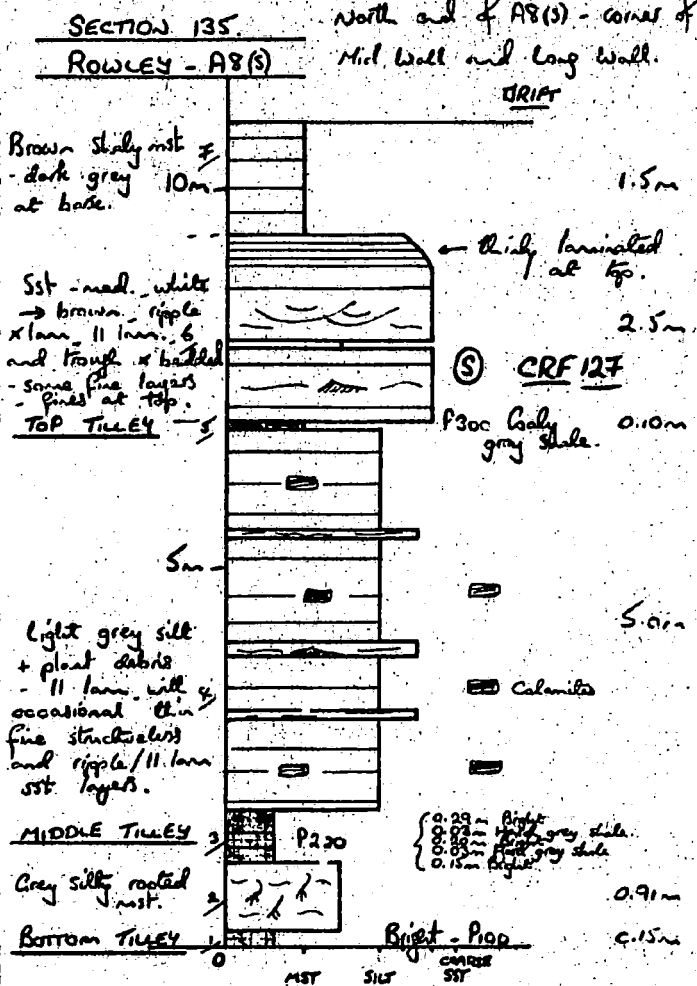
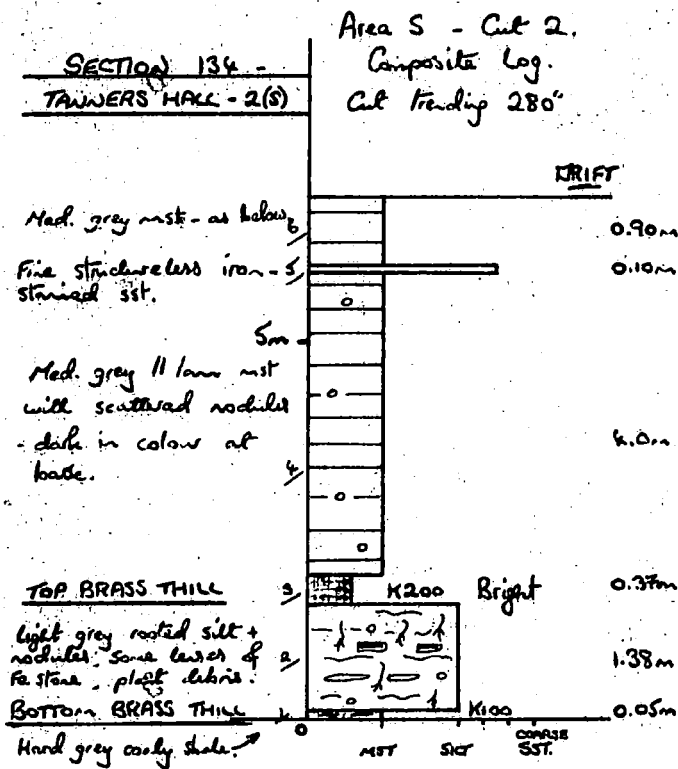
Unsharpened Busty or under 0000 dip



NB. 100 is not present as a coal seam may be represented by dark mottled layer - not prominent. Coarsening upward sequence present to the north is largely absent - slight coarsening occurs near or at top of Unit 2.

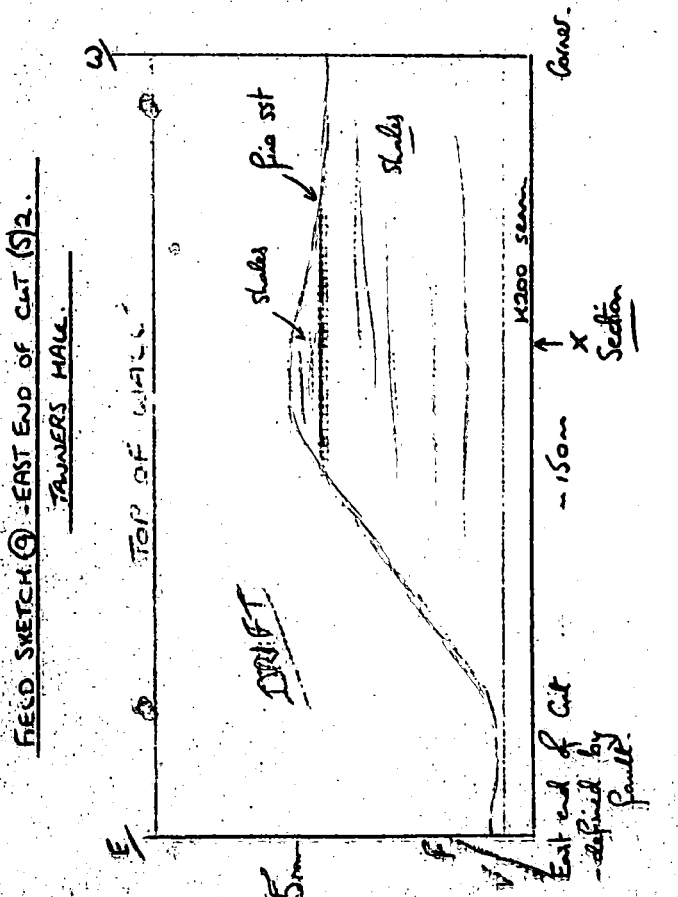


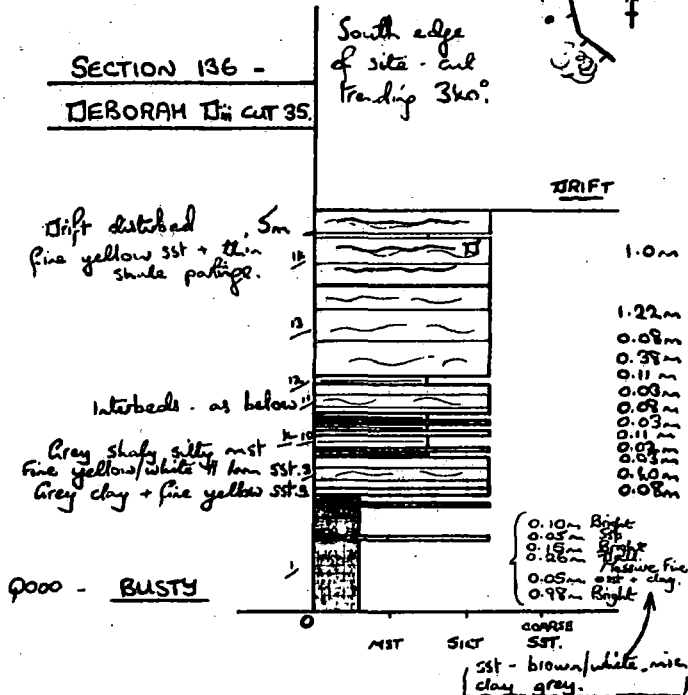
NB In Area A: Top Busty splits off main Busty seam - to north



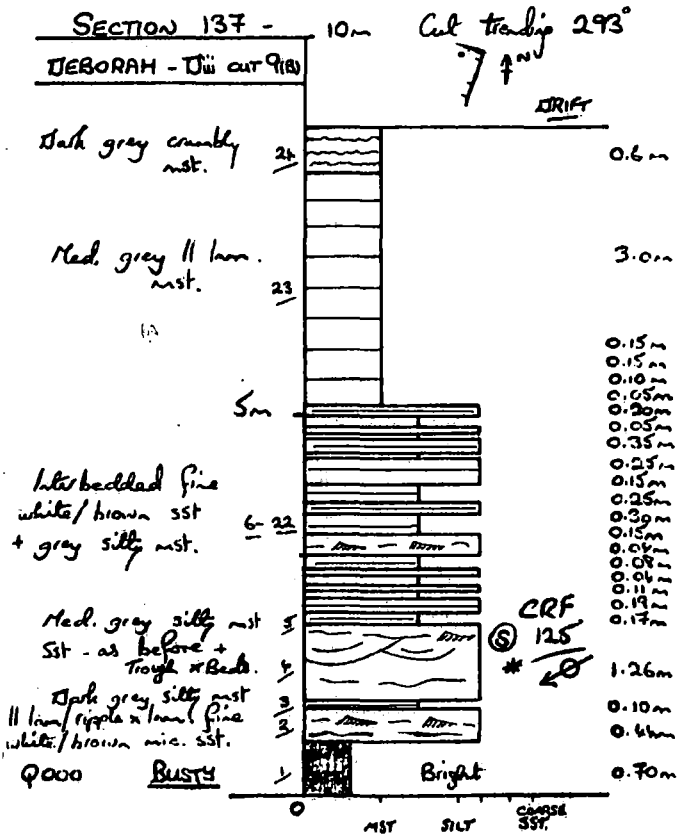
Drift cutting down to east - at east end of cut, in 150m from slight corner drift is just above roof of seam.
At east end, small experimental cut exposes level of K100 - hence composite section.
Half way between corner and east end, solid section is ~ 5m - thin sst occurs - not present further west, due to drift outcut.

One sample - Top Tilley Post.
3 photos - ASA 25 b/w.
In Mid Wall, downcutting relationships in that is not apparent - probably level bedded.
Working south along high wall, fine unit at top of Top Tilley Post becomes as thick as the main sst (1.25m each) - at 20m south. Then, by 40m south, fine grained unit has disappeared - 2.5m all main sst. - facies otherwise similar to Section 135. Starts of slumping due to fault/old workings. Barren area in Pros approaching.
Along Mid wall, to east, main sst of Top Tilley Post thins down markedly. Fine material at top thickens correspondingly.



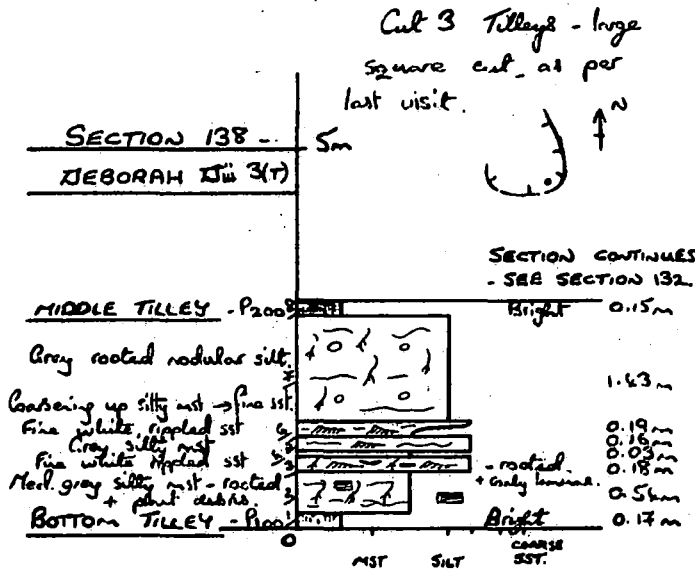


Clay diopis present in Busty seam. Sst partings in Busty increase in thickness from 0-0.10m at the south end of the cut. - gray clay predominantly at the top of the bottom parting. Sst layers less in and out. Some laterally continuous. Unit 13 - less shaped sst - appears from 0 thickness → 2m at south end of cut. Beds below are also involved with this sst in a downcutting → south. Unit 11 also wedges out 10m to north.



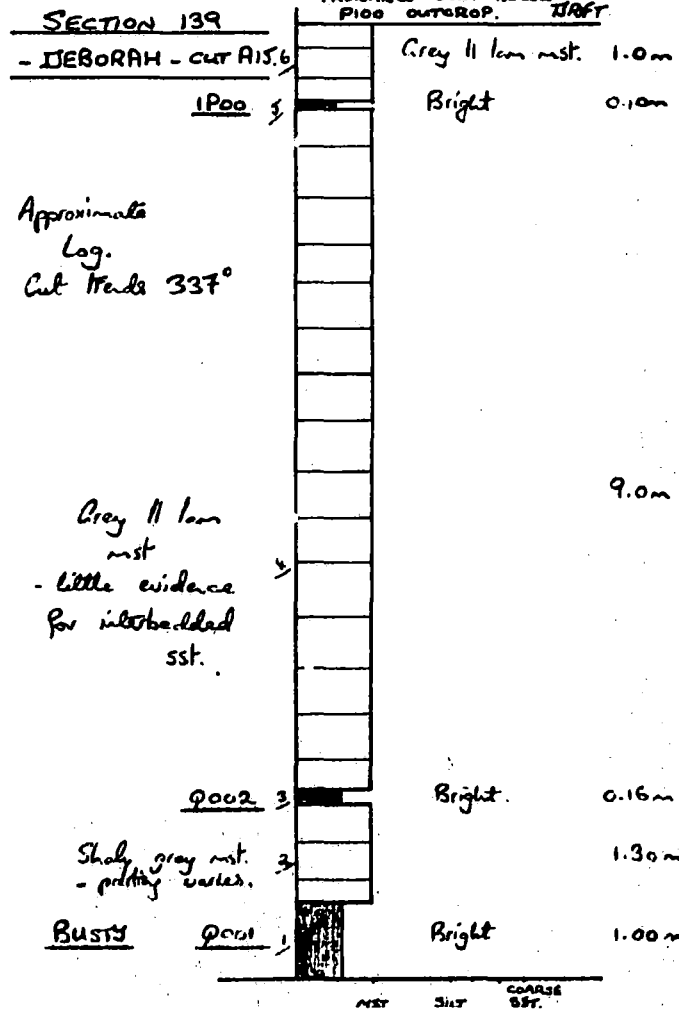
* DIRECTIONAL DATA:- Unit 4 - Trough x Sals.
 1. 0.7m/18/265° 2. 0.8m/16/268°
 P... 2. 1. 0. ↑. 0. ↑. 0. a=2

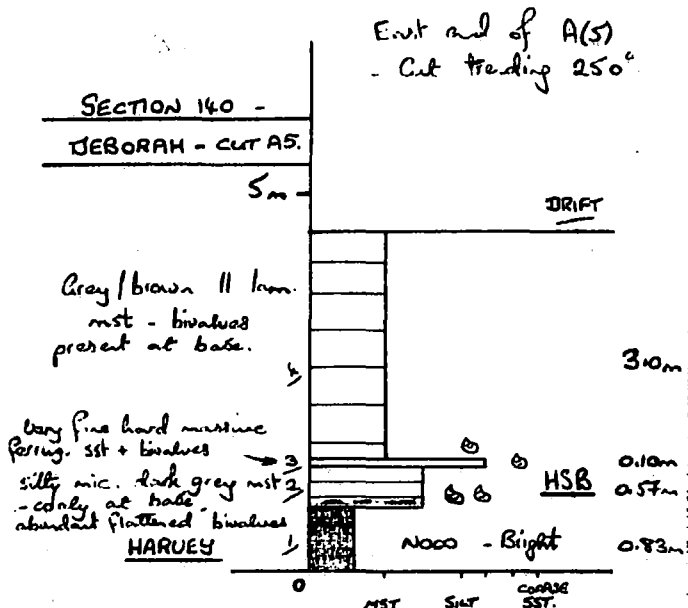
Again, sst layers less in and out - both E-W and N-S - layers more obviously continuous along N-S face - 1st 3m over Busty is nearly all sst - thin sequence of ~0.5m sst and thin shaly mst. Most beds laterally continuous. Tectonic 10/108. 5 frames ASA 125 4/w shot.



Presently digging down to Busty on III x (B) N - 1P00 not present.

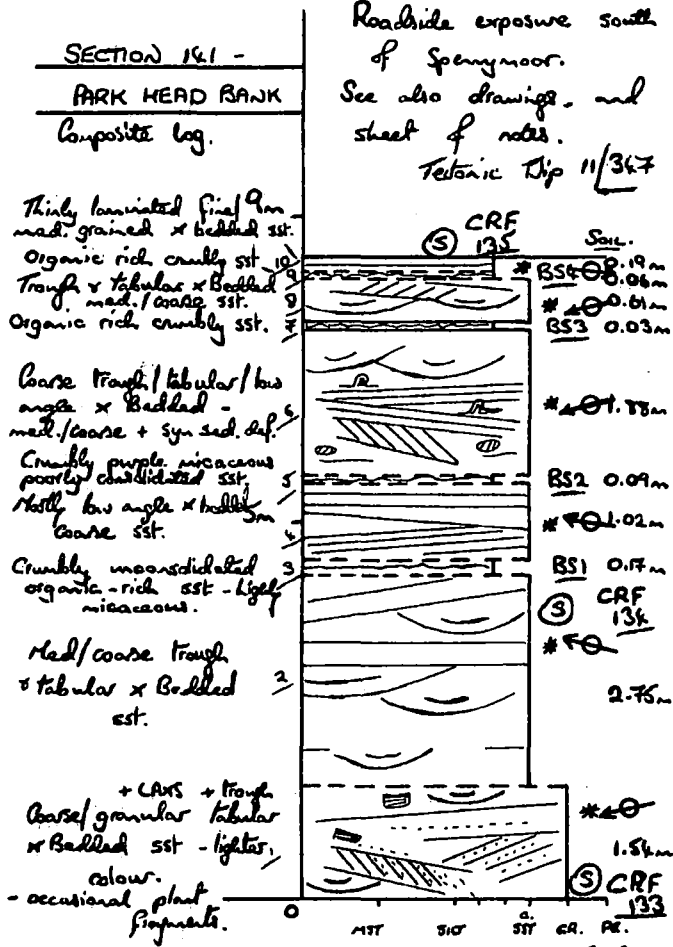
Section at SE corner of Cut. Sst bands die out along the face to the north within 10m. At SW corner, sst bands present - roughly same thickness. Sst comes in right on corner - units add onto top of section - no splitting. 2 frames shot.





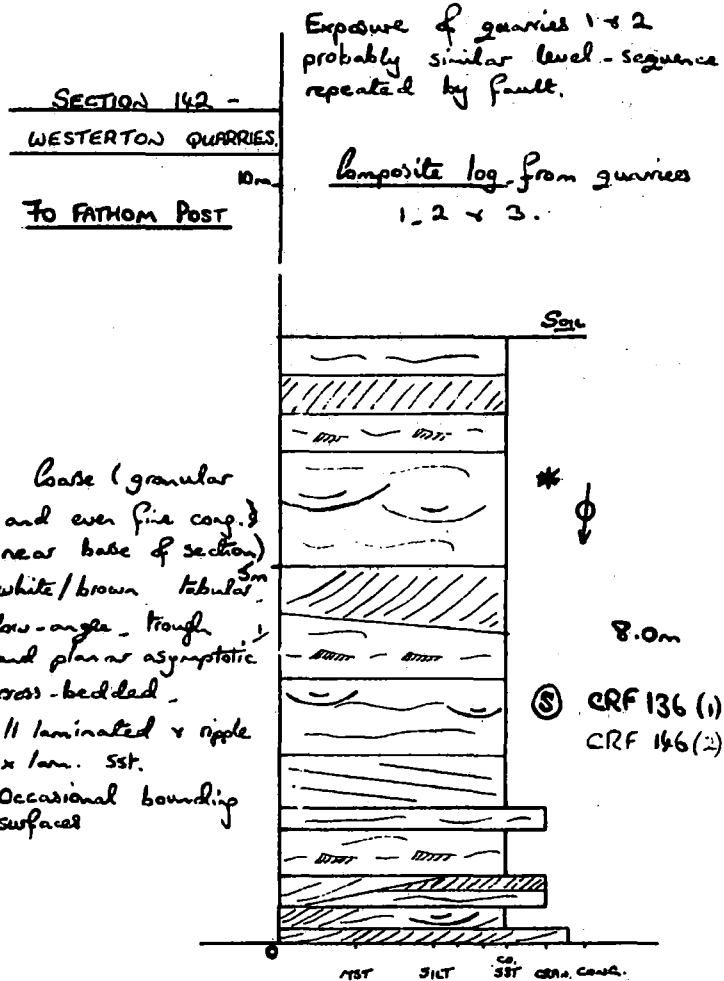
Sst preserves decalcified moulds of bivalves.
2 sst units wedge in at extreme east end of
cut. - both above shell bed - bottom one
≤ 0.5m - second one ≤ 0.3m - wedge
out to west.

C.R. FIELDING 25.6.80.



Units internally variable in thickness.
Entire outcrop red/brown colour - significantly
red-banded.

* DIRECTIONAL DATA :- See separate sheet.
(... → 1)



Some of planar asymptotic sets may be
troughs

* DIRECTIONAL DATA :-

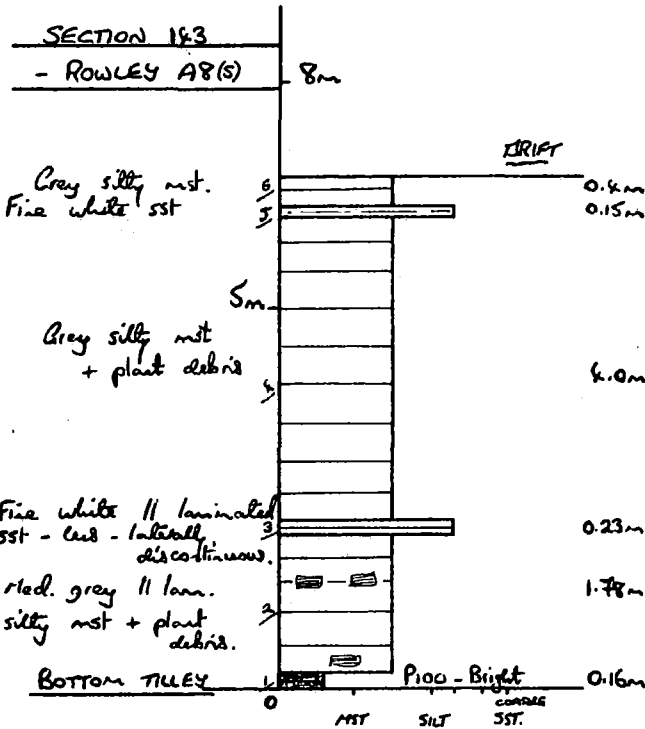
See separate sheet -
cross-bedding of several types - n = 46

$$\theta = 186.2^\circ$$

$$L = 56.0\%$$

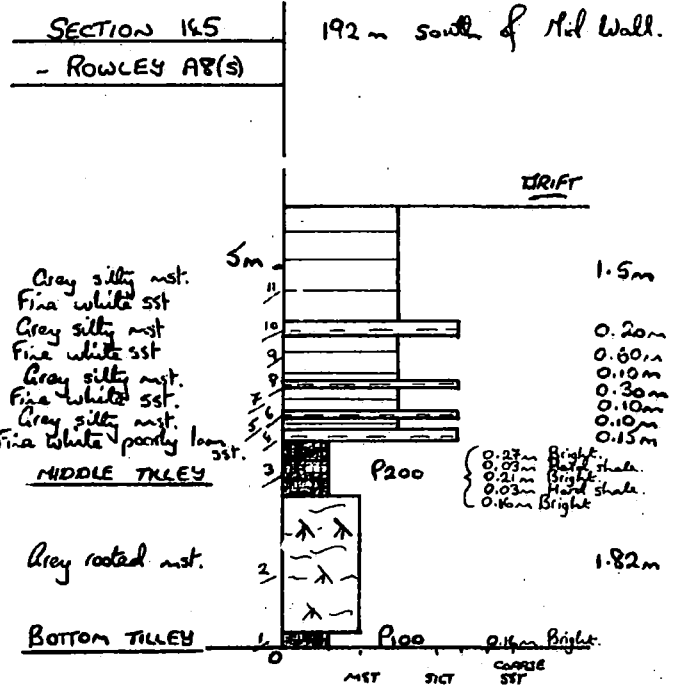
For quarry ① $\theta = 252.1^\circ$ $L = 17.7\%$ $n = 19$
 ② $\theta = 176.8^\circ$ $L = 93.3\%$ $n = 26$
 ③ $\theta = 248.0^\circ$ $n = 1$

140m south of Mid Wall.

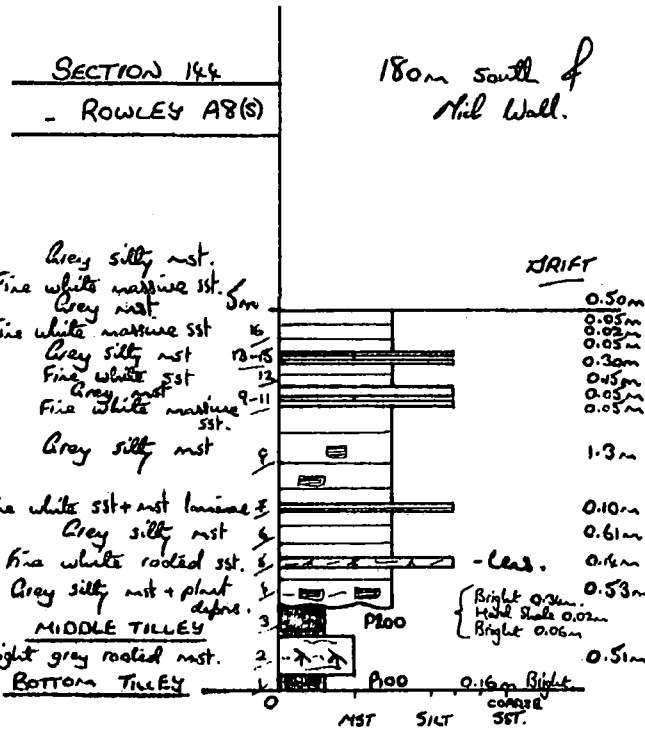


NB 100m south of Mid Wall - facies same as at Mid Wall, but P200 missing - taken out by erosion - disappears in first slump 125m - second smaller slump. 180m south of Mid Wall - P200 can be seen to thin laterally → 0 at 173m (→ N), and gradually thickens to south. P100 remains intact - so thin seam in barren area to north is P100.

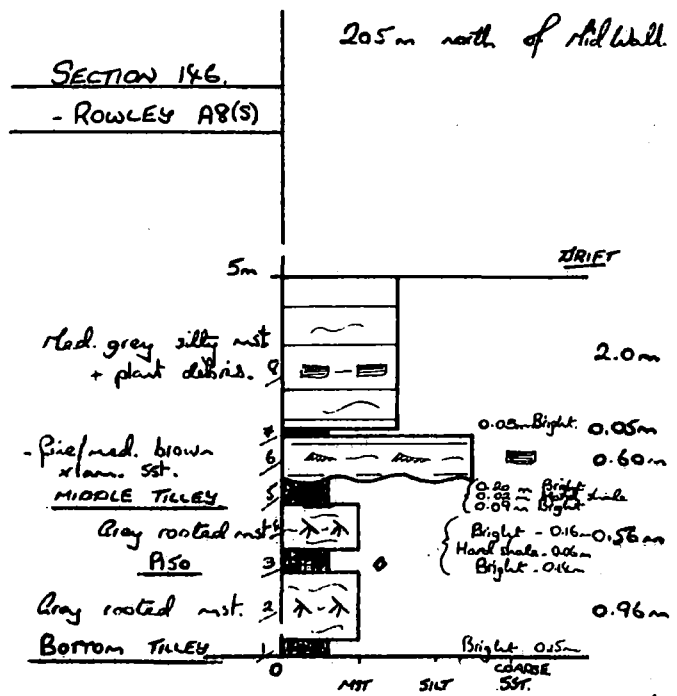
Bottom leaf of P200 continues to thicken to south - top leaf stays ~ constant in thickness. But on = 186m south - Bottom leaf proper comes in - P200 now full 3 leaves. Bottom downcutting sst thin → 0 to south, but overlying units continue - cut down to lie at angle over P200.



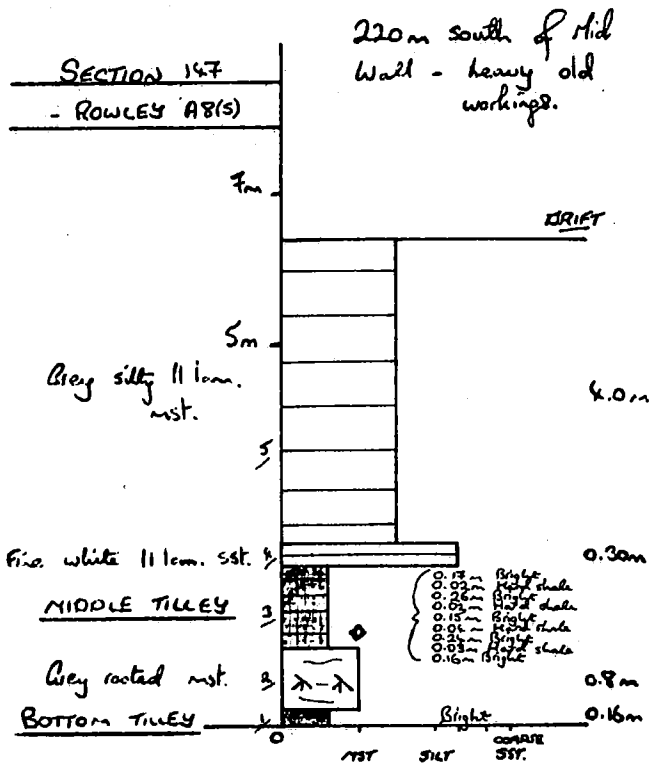
NB Unit 4 is equivalent to the second downcutting sst of Section 144. Beds immediately to south level out - cross-cutting no longer apparent. At 200m south, extra seam P150 comes in - half way up the P1-2 parting - grades in from coaly mst (to north) toward south - thickens southward.



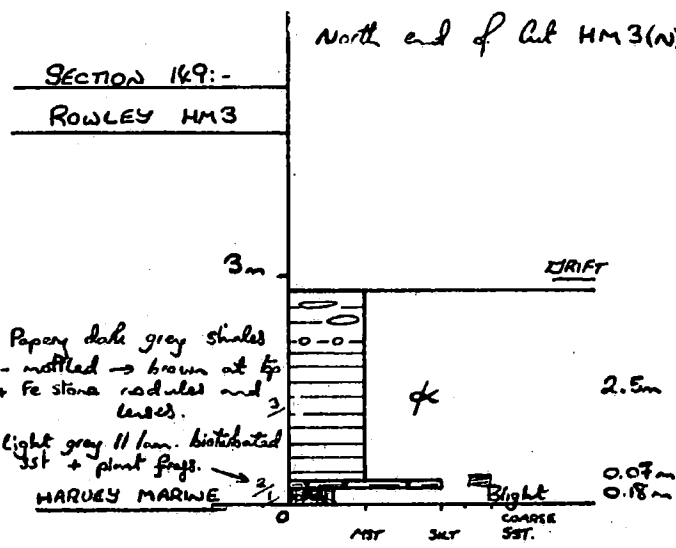
NB Bottom leaf of P200 dies out 2m to north. Unit 7 - first bed to cut down to south - beds above cut down - Sst 7 level bedded until 175m - then starts to cut downward.



NB Band in Unit 3 appears at 203m - variable in thickness. Unit 6 - partial washout - begins 1m to north - continues for 1.5m to south (partly obscured by slumping) - sst arched up - coal ridges ...



To south - Top Tilley Post comprises 0.3m sst, then 0.5m shaly mst below drift - Top level of large sst over P200 starts to drop to south - bedding dips over to south. Section badly disturbed by old workings.



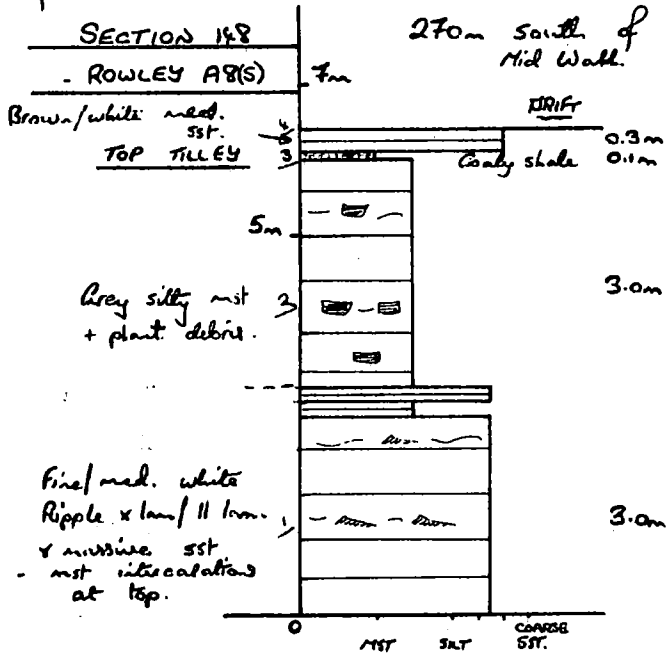
(At 210m, P150 joins onto P200 - thickened seam to south - topographic high for P200 - remnant of same feature perhaps.)

Section 147 - 5 leaves - reduced to 4 by 5m to south - down to 3 shortly after. Unit 4 - sst thin to 0 by 5m to south - section all silty mst.

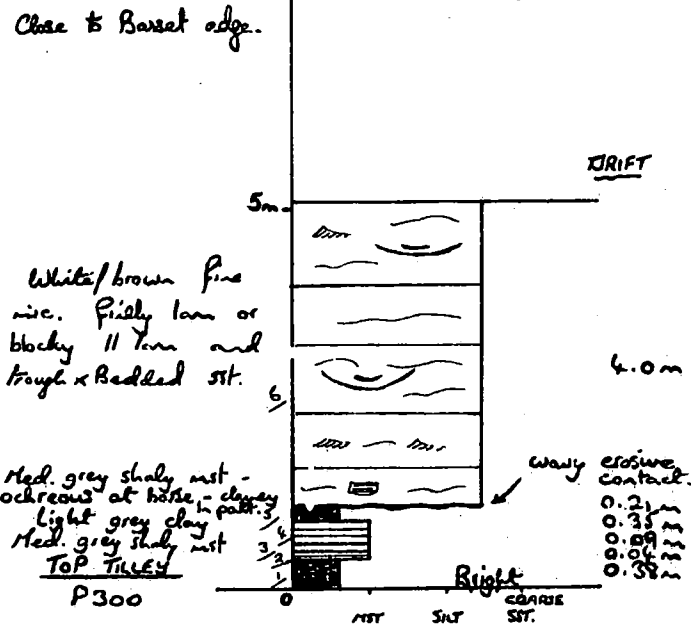
240m - large sst is gradip in - P200 obscured by pile of debris - sst starts as two bands - 2m above the floor of P200 - thicken up and more sst grades in to south.

270m - P200 still obscured - measures above new solid sst for 3m - silty mst horizons at top of sst.

NB Silt band dies out after 20m to south - grades into black carbonised mst. South half of cut - same lithologies - HM3(S). Some ironstones become discrete bands continuous for ~10m along face.



Just south of corner and small fault (6 to 5). Cut trending 331°.



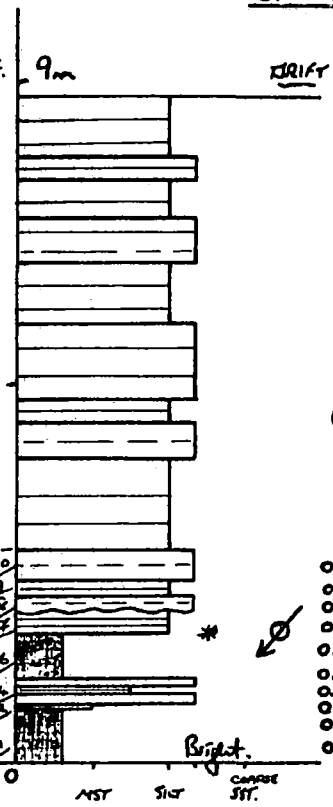
NB Sst interfingres with top of coal at south end of cut.

SECTION 151 -
DEBORAH III cut 37.

Cut trending 336°.

Interbedded fine white sst and grey silt.

Fine white sst.
Grey // lam silt
Fine white sst - erosive base
Grey // lam silt
Bright
Fine white massive sst
Silt grey // lam. mst.
Fine white massive sst
Grey shaly mst
BUSTY - 0000

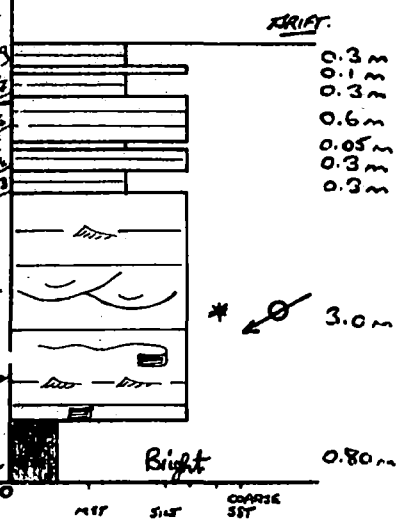


SECTION 153 -
DEBORAH - III 10 (B)

Cut trending 035° - long wall.
1 photo. taken

Alternating.
Est. Fine white sst
Med. grey silt mst

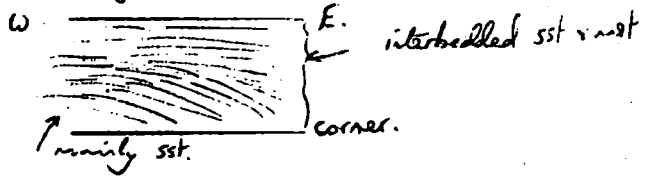
Fine white thin lam.
or blocky // lam
and trough x bedded sst.



NB Extra seam above Bussy - lenses out at south end of cut. Washout occurs to north - not yet draped. Extra leaf present as narrow area in previous cut - wedge shaped. Bedding in sst still downcutting along cut to SE. Proportion of sst and thickness of sst units increases to NW. Extra leaves appear to north, above 2nd leaf - finger out to south. Sst and silty mst fill intervals. In top of 2nd leaf, straight aligned sst - filled gutters. - approaching washout.

* DIRECTIONAL DATA :- Trough x Sets -
1. 0.5m/8/250 - 2. 0.5/?/218.
n = 2. $\theta = 236^\circ$

NB Draping at north end of cut - E-W wall.



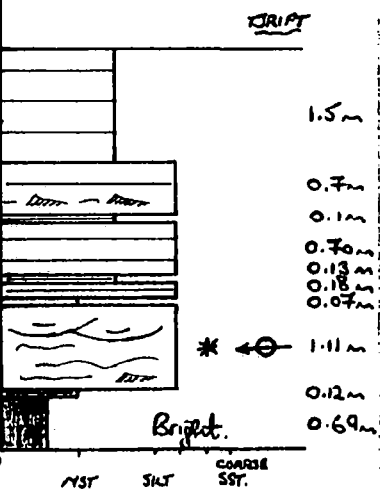
D.D. * 1. 1m wide/235 2. 1m wide/232
3. 0.10m wide/188°
Unit 7 - n = 3
 $\theta = 218.70^\circ$ $\lambda = 93.17\%$

Observations from other areas :-
① Area III NE corner - Back wall beneath pylon - ~ 30m (E) away from power line wall $\rightarrow 240^\circ$ - Top tiller post sst in interfingering contact with grey mst and fine white // ripple x lam sst + mst streak - mst to East, sst to west. Mst continues for 20m to east, then steeply disturbed by faulting. Disturbance around contact also but must be sedimentary - lamination in fine member preserved intact. 2 photos.

SECTION 152 -
DEBORAH III 4 (B)

Cut trending 216° near south end.
2 photos.
Units laterally persistent.

Grey silt mst - striped.
Fine white sst
Estimated - Grey silt mst
Fine white sst
Grey silt mst
Fine white sst
Grey mst + silty streaks
Fine white // lam x bedded sst with carb. partings
Dark grey shaly mst.
BUSTY 0000



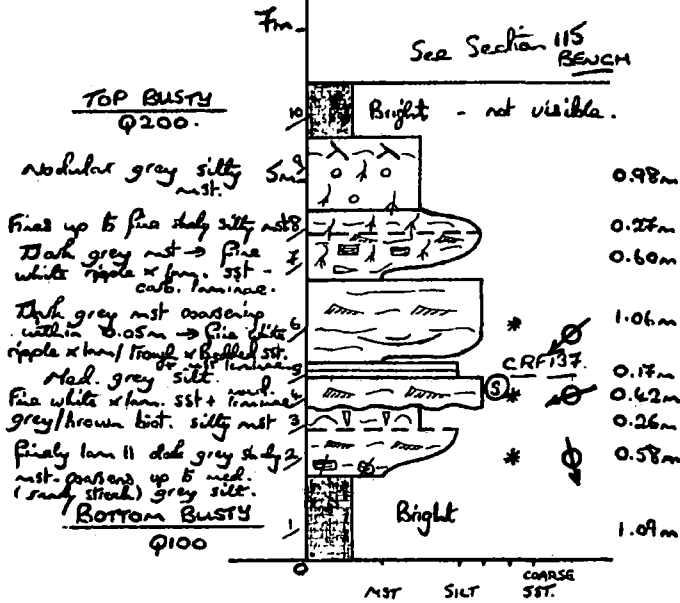
* DIRECTIONAL DATA - Low angle x set (Top of unit)

② In III 3 (T) wall (observed from distance) in P200 - P300 parting - less thin ssts? at north end, only top one at south end - both below crumbly mst 3/3 up parting. Visible as outstanding horizons in section from a distance.

Cut TB2

SECTION 154 - CABIN HOUSE - BN

Long wall trending 337° - same cut as last visit, but lower level. South end of wall.



* DIRECTIONAL DATA :-

- Unit 2 - Ripple x lamination → 164° - 150° $\theta = 157^\circ$ $n = 2$
- Unit 4 - Ripple x lamination → 247° - 270° $\theta = 259^\circ$ $n = 2$
- Unit 6 - Trough x Set 0.3m/16/261° $n = 1$
- Ripple x lamination 258°, 241°, 197° $\theta = 232^\circ$ $n = 3$

Some lateral variation along face to north - mainly in thickness of ssts - nothing systematic.

Sample - fine sst - Unit 4.

Top Busty → Bottom Tilley interval logged on 2.5.80 - Section 115.

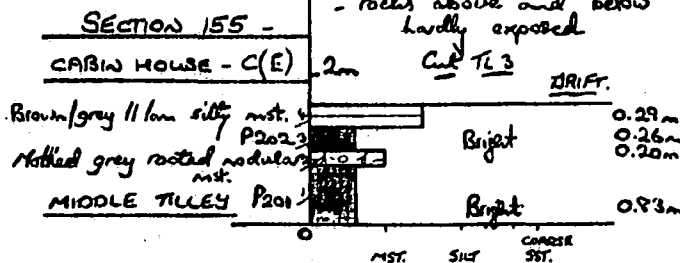
Bank with intermittent exposure Top Busty - 5m wide - then rest of wall as for last visit.

Above platform - field excavated down to Bottom Tilley for 85m to east - as far as minor road - north as far as Cabin House - ~ 150m.

Presently digging down at north end.

Tilley in Area B(s) - same visit cut as per last visit - land to east as far as road stripped of soil, but not yet worked. - south part belt of trees into Area C.

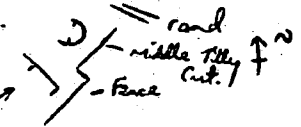
Into area C - east end - box cut to P200 - rocks above and below hardly exposed



Possible fault occurrence between this and main Tilley cut to north.

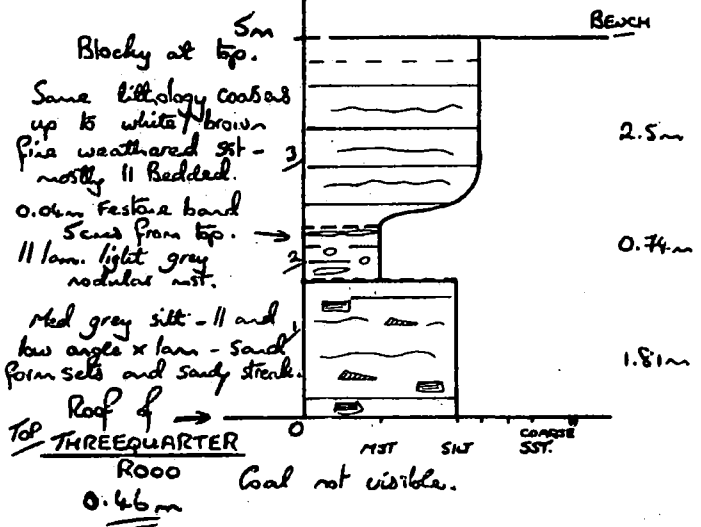
Face making south end of site trends → 037° - then does two 90° turns and continues in same direction toward minor road.

Small abandoned cut to Top Busty. Face trends 310°.



SECTION 156 - CABIN HOUSE - C(W) Cut TP2

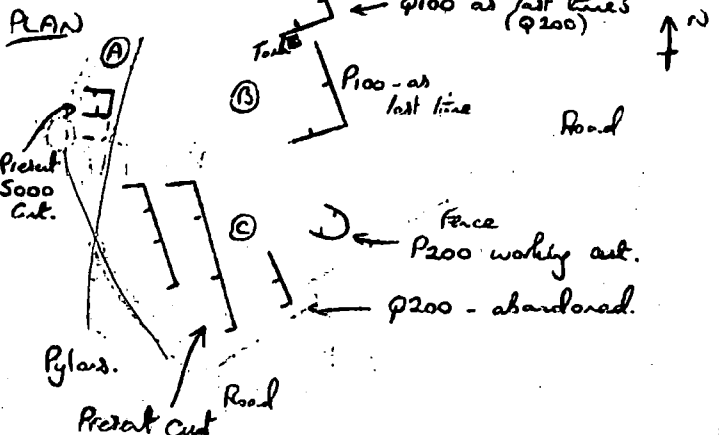
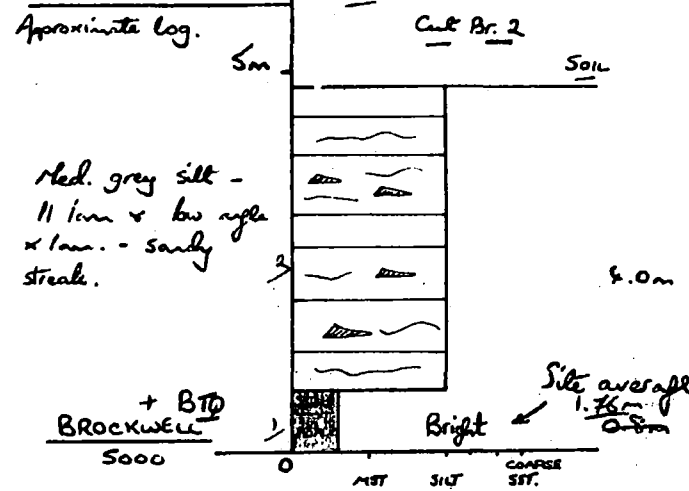
Long three-quarter cut - south end of cut. Cut trends 314° From bench ~ 0.7m strata before inferred base of Bottom Busty - probably southeast - coal not exposed.

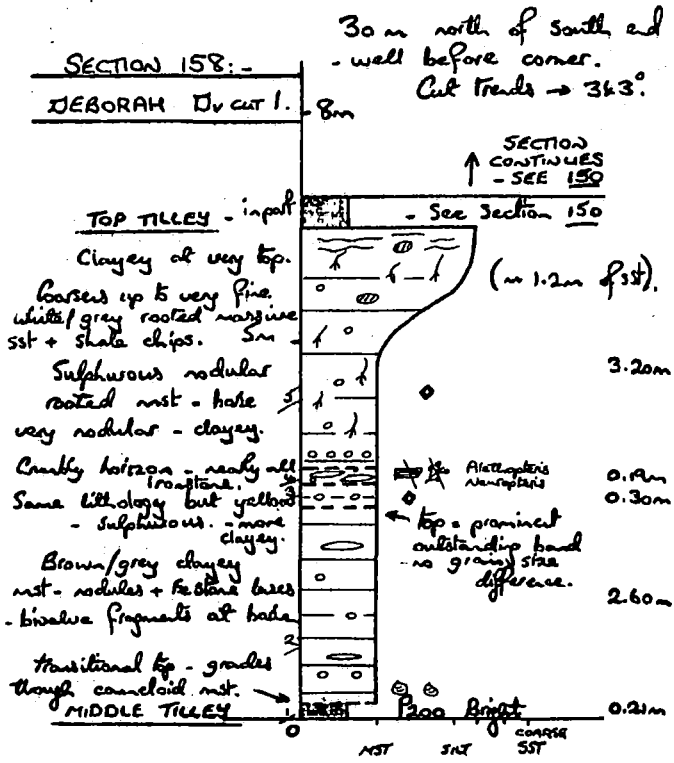


Presently digging at north end of cut - just to south of belt of trees. Cut ~ 25m east of previous one.

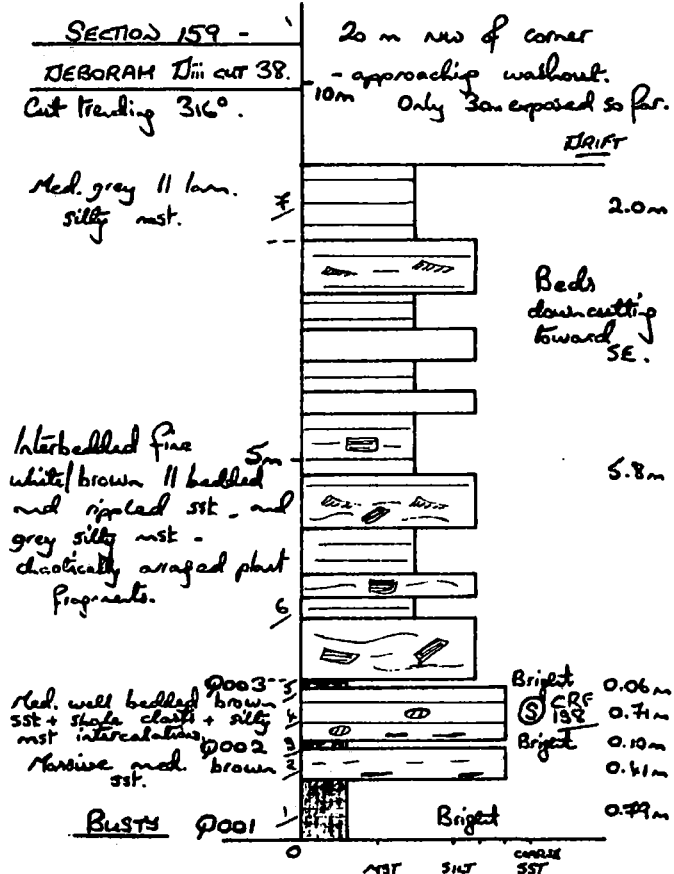
SECTION 157 - CABIN HOUSE A Approximate log.

Small box cut - directly to north of previous one - See PLANS.

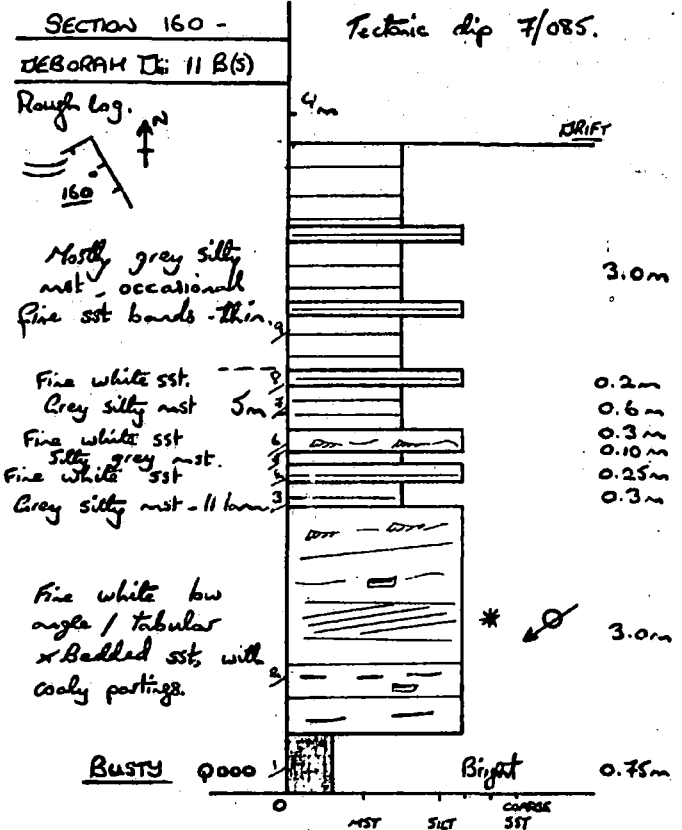
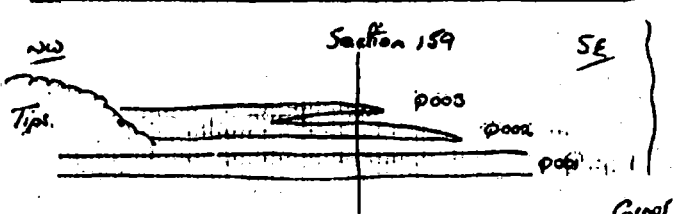




Faulting and shearing present at cut corner - close to outcrop.
 1 colour photo taken - ASA 100.
 1 photo - panorama.



Sample - "washout" sst: -



* DIRECTIONAL DATA :- Unit 2 - low angle x Set - tabular form - n=1, 0.5m/10/235.

Sst layers mostly laterally continuous - less of them, and thinner up section. Big continuous sst body now over Busty seam.

GENERAL PROGRESS - End June 1980.

Deborah - on cuts A16, Diii 11 B(s), Diii & B(w), Diii & T, Dv 1 - Dii Top Tilley under pylons, Diii 38. Areas Bi, Bii, C complete, E abandoned.

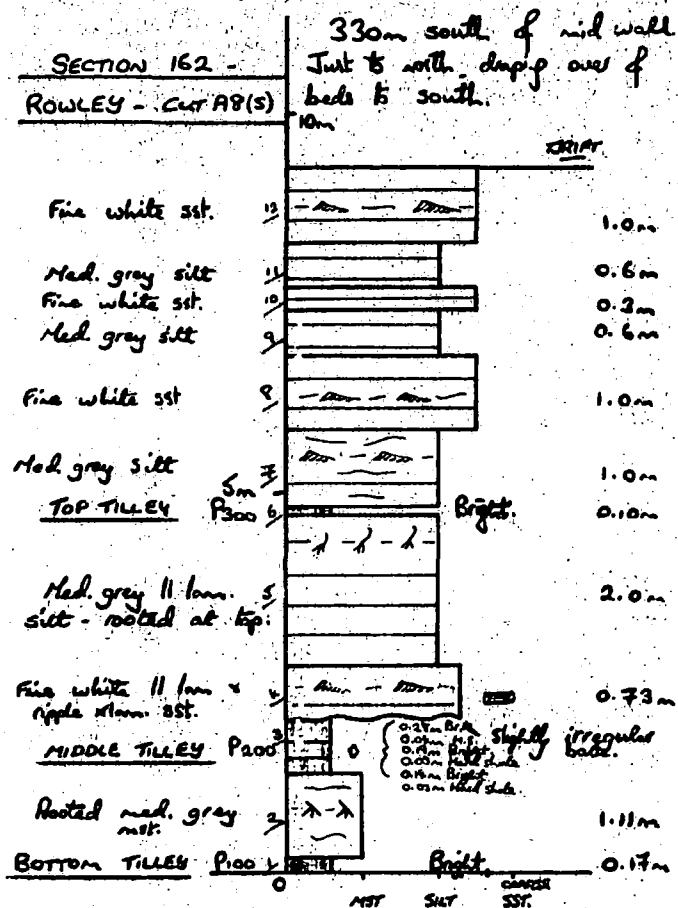
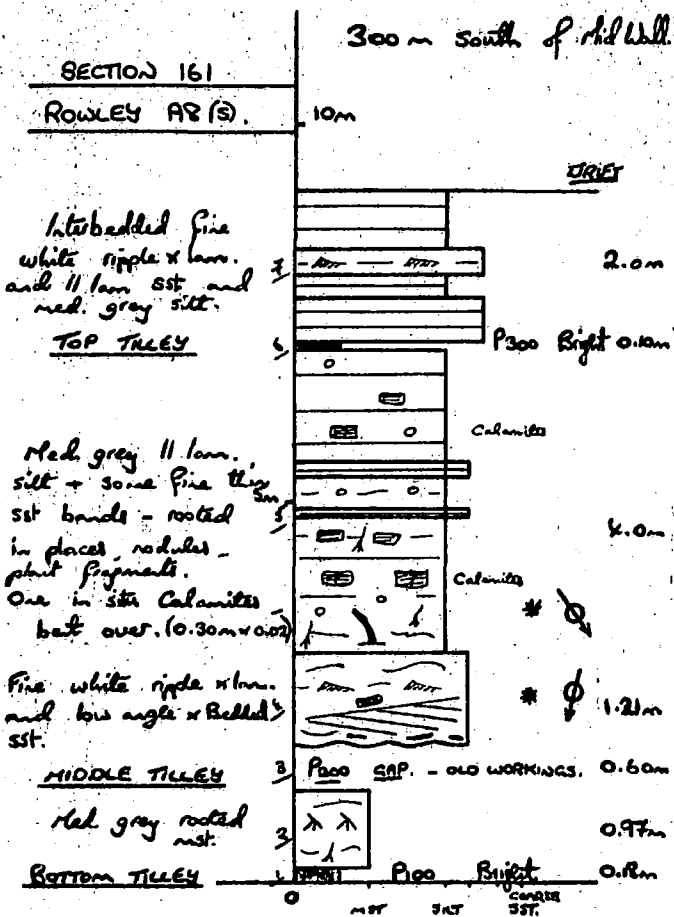
Rowley - on cuts A8(s), A7/8 (w). Areas B & C complete - Harvey complete.

Tanners Hall - work recently started - working Cut 2 (s).

Buckhead - work recently started - not yet visited - Harvey exposed.

Edmondshay - work due to start July 1980.

also Private Licence sites
 - Cabin House - 1/2 way
Moun Meadows - just started.



* DIRECTIONAL DATA :- Unit 4 - L&S
 → 1. 199° 2. 195° $\wedge = 2$
 $\ominus = 197^\circ$

Unit 5 - in situ Calamites, best over -
 (divisions 0.02 x 0.30m) → 169° $\wedge = 1$

P300 continues at about the same level for 15m to south, then starts to rise gently up the face at 315m. Top Tilley Bit at 315m comprises 2.0m silt, 0.6m sst, 0.6m silt.

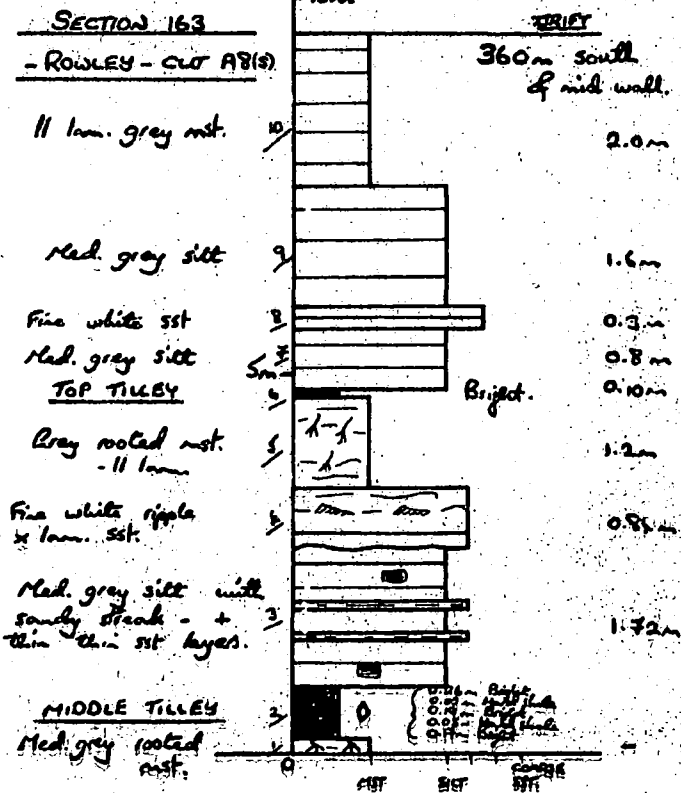
NB Starting at 270m south of mid wall - at 270m, major sst over P300 is at greatest level of dev. - 3m thick, and with thin sst units above, interbedded with silt unit.

At 300m, P300 level starts to drop down the face. By 310m, sst has thinned down further, but more sst layers above - thickness variable.

More best Calamites

At 360m, thin sst over P300 is lifting - P300 still only rising very gently. Beds under rising sst are dipping down toward south - lateral accretion over P300?

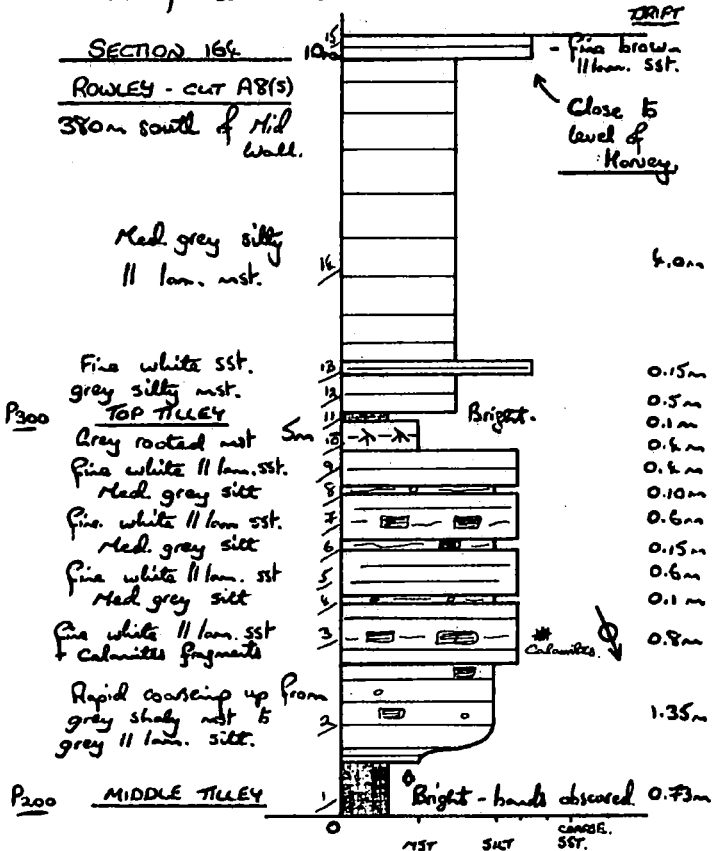
* DIRECTIONAL DATA - 310m - best Calamites -
 1. 162° 2. 150° 3. 205°
 $\ominus = 172^\circ / 92^\circ$
 - all in silt horizon = Unit 5.



At 322m, local thickening of sst unit to 2m.

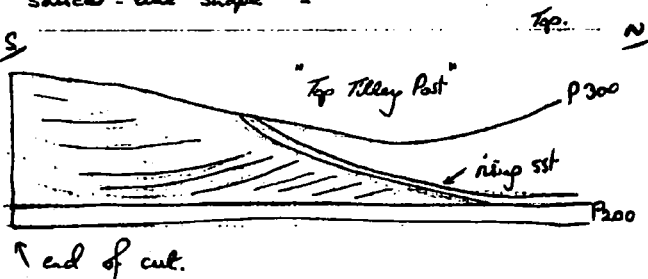
At 330m, Top Tilley at lowest level in face.

At 369m south of mid wall, upright Calamites section - 0.03m across - 0.05m ↑ - in situ - in silt unit below rising sst. At 380m uprising sst reaches level of P300, and is phased off. Section below is dipping concavely off to south - lot of sst in section.

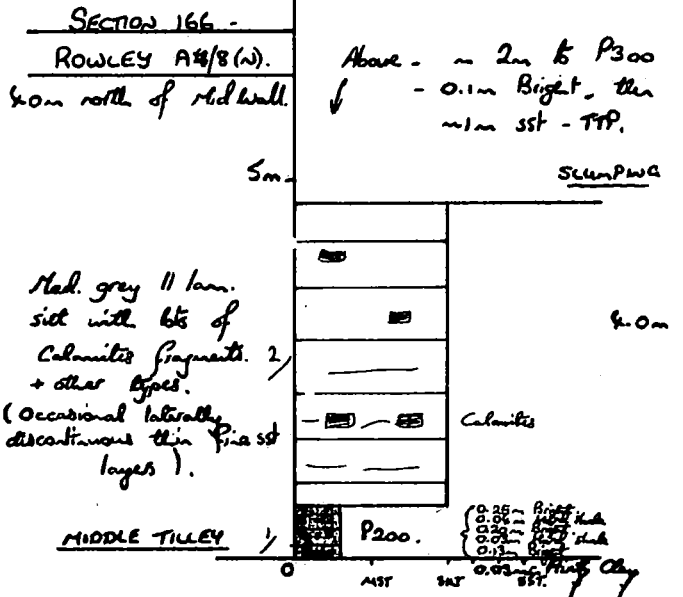
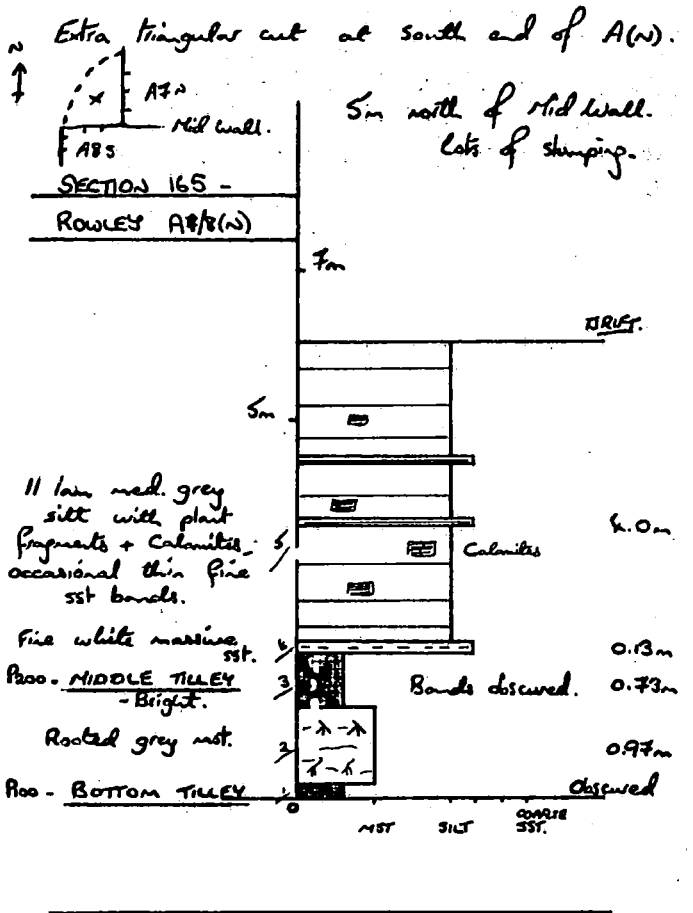


* DIRECTIONAL DATA :- Large horizontal Calamites stem
 → 151° n = 1.

End of cut ~ 400m - beds over P200 in saucer-like shape -



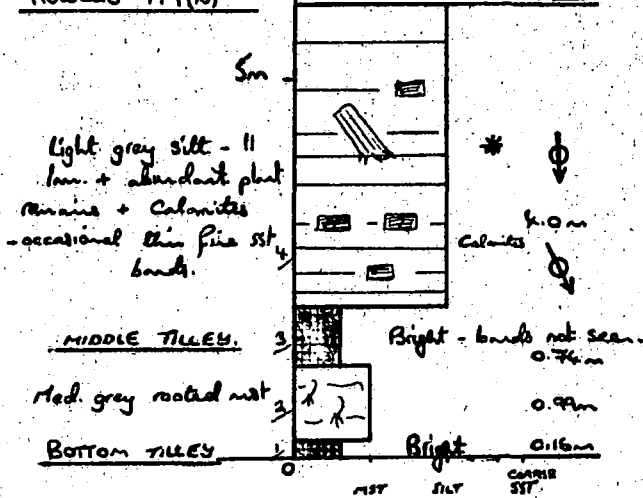
2 colour photos taken + 1 of in situ Calamites.



1 colour photo.
 Entire face to north is badly obscured by slumping.
 P200 appears to thin slightly to north.
 Similar faces for next 100m - dogline probably working ~150m north of mid wall.
 First section of A7(N) mislab.

SECTION 167 -
ROWLEY A9(N)

Southern end of cut.



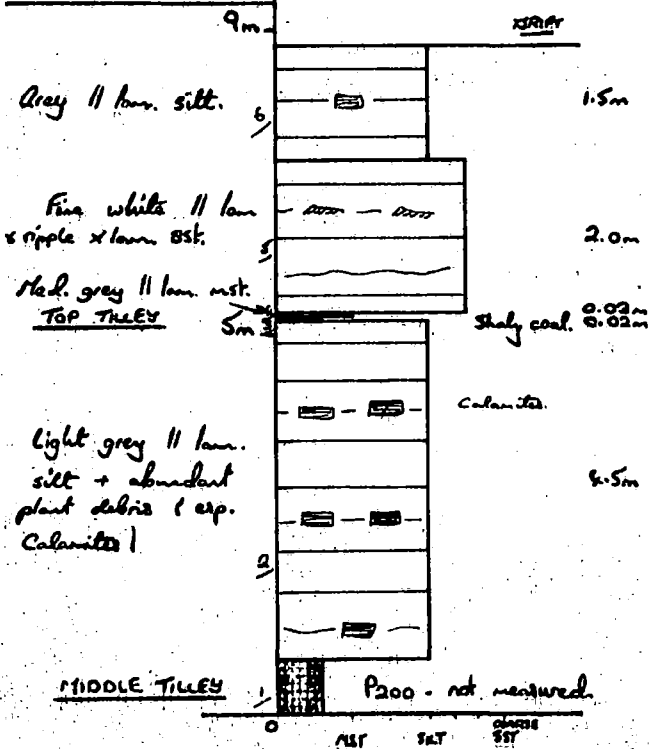
* DIRECTIONAL DATA: - Section of tree - 0.6m thick and 1.5m high, but over toward 174° - type indeterminate. 174° - $n = 1$. Orientated Calamites stipes $\rightarrow 141^\circ - 147^\circ$ $n = 2$. $\theta = 155^\circ$

Progressing north, section similar in aspect - disused in places by stumping. At 50m north, measurement of P200 :-
 { 0.28m Bright
 0.03m Med. shale
 0.20m Bright
 0.03m Med. shale
 0.11m Bright

At 90m, Top Tilley Post appears in upper part of face. - composed mostly of silt. At 145m, TTP comprises 2m fine white well laminated sst abruptly overlain by light grey silty mst.

SECTION 168 -
ROWLEY A9(N)

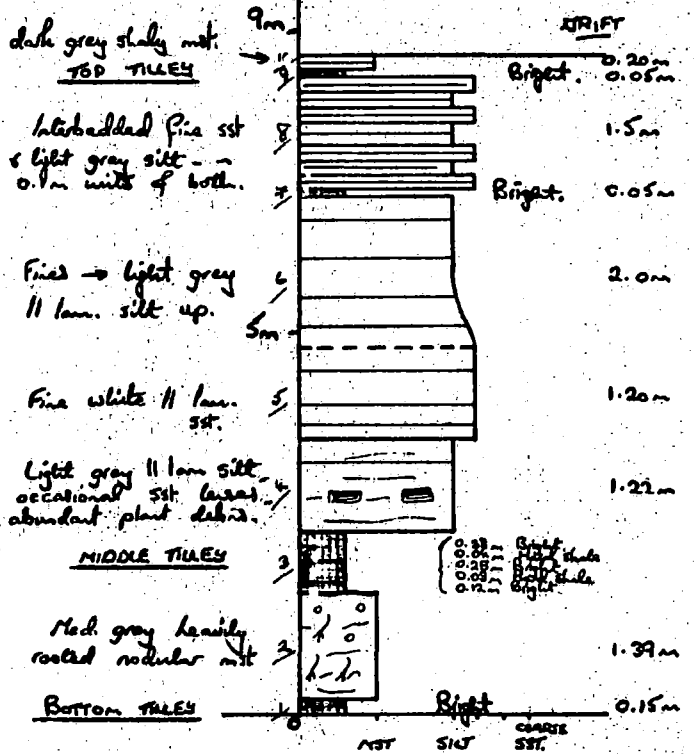
145m north of Mid Wall



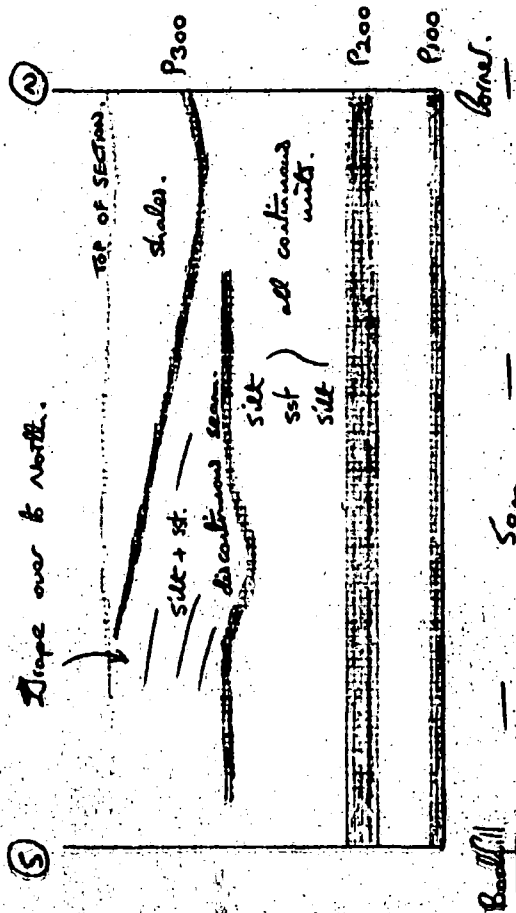
At 182m north of Mid Wall, large pile of debris. - to north = thin pilot cut for 50m, then dragline removing A 8-9 interval.

SECTION 169
- ROWLEY A8(N)

20m south of north end



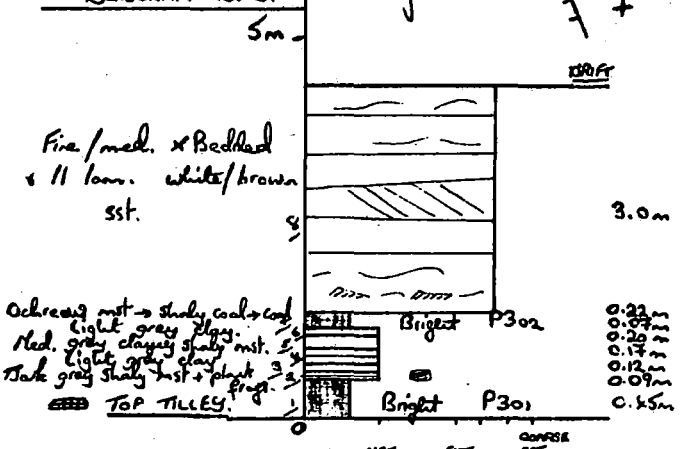
FIELD SKETCH (10) - NORTHERN END OF A8(N)



SECTION 170

- JEBORAH D3 3.

North end by corner - face
Trendip 039°

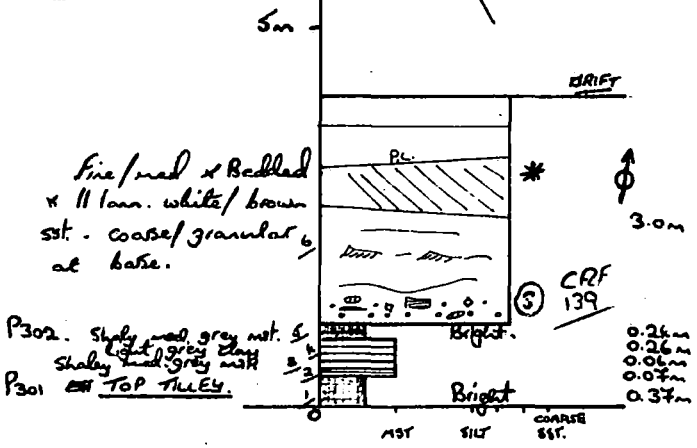


Presently backfilling Cut 2

SECTION 171 -

- JEBORAH D3 41

long face trendip $\rightarrow 321^\circ$



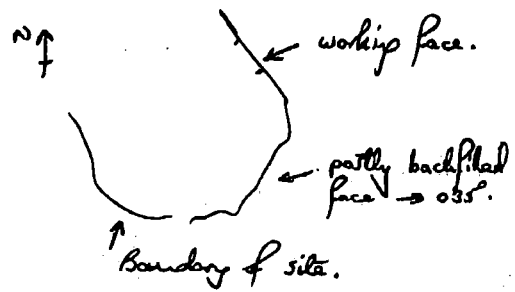
NB base base to T.T.P. contains coalified plant remains, shale cherts, areas of pyritised clay, granular horizons with 2mm detrital garnets.

* DIRECTIONAL DATA :-
Planes asymptotic x Set - $10^\circ/1.2m/010^\circ$. $n=1$
Parting location also present.

Drift cuts down to SE - lies over coal at S. end of cut.

Cut 38? - long face exposing Top Tilly post trendip $\rightarrow 311^\circ$. - cross bedding not very apparent.

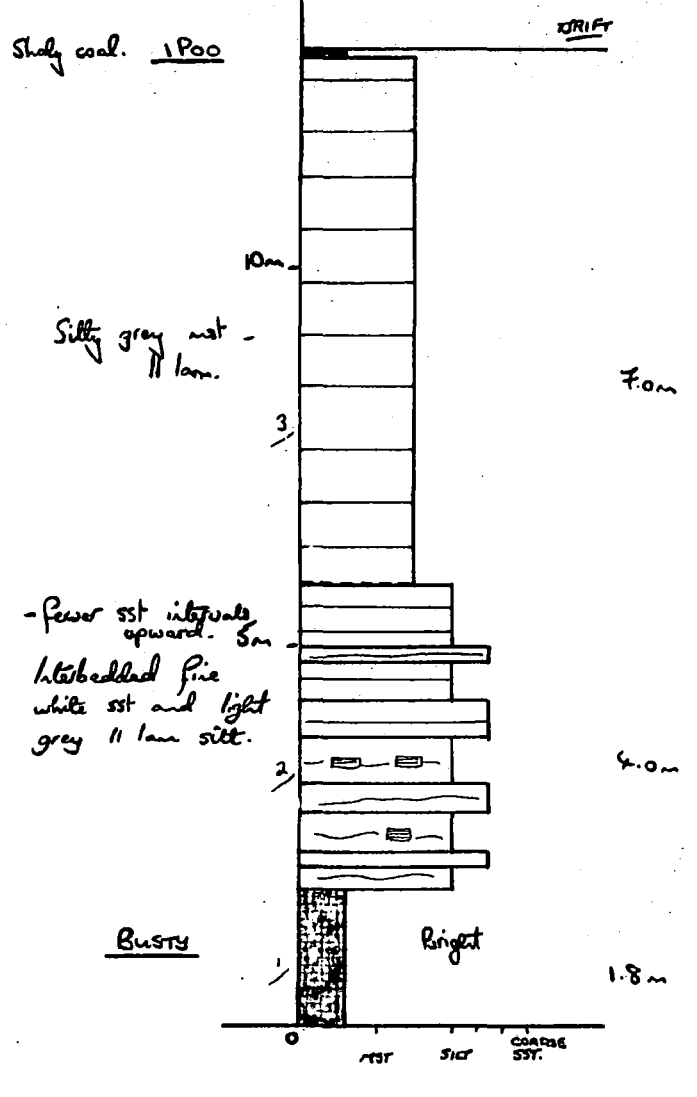
Area D3 cut 41 - cut trends $\rightarrow 337^\circ$.



SECTION 172 -

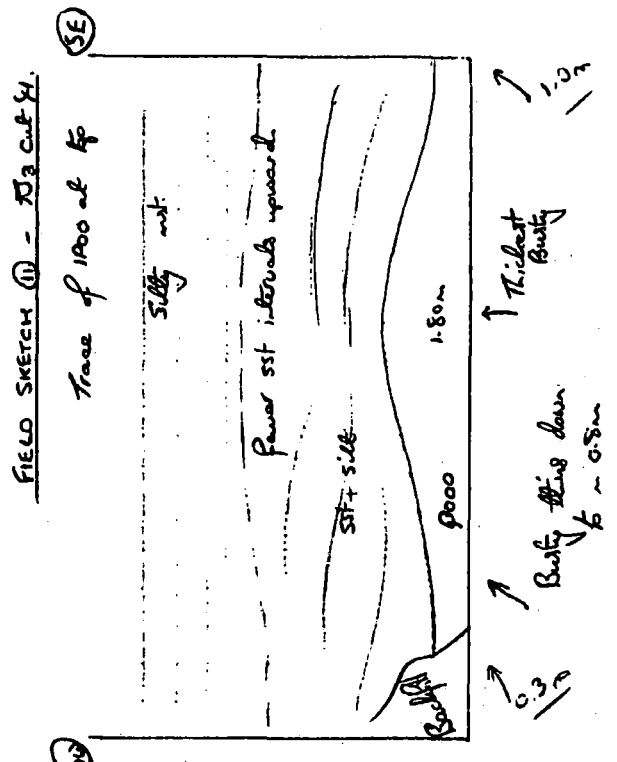
JEBORAH D3 41

Middle of working face
- trendip $\rightarrow 337^\circ$



- fewer sst intervals upward. 5m
Intbedded fine white sst and light grey 11 lam silt.

BUSTY



Cut D3 14 B (3) - as previous cuts - 0.8m BUSTY overlain by ~8m silt and fine interbedded sst -
P.A. trends $\rightarrow 337^\circ$ T25R (ii) ...

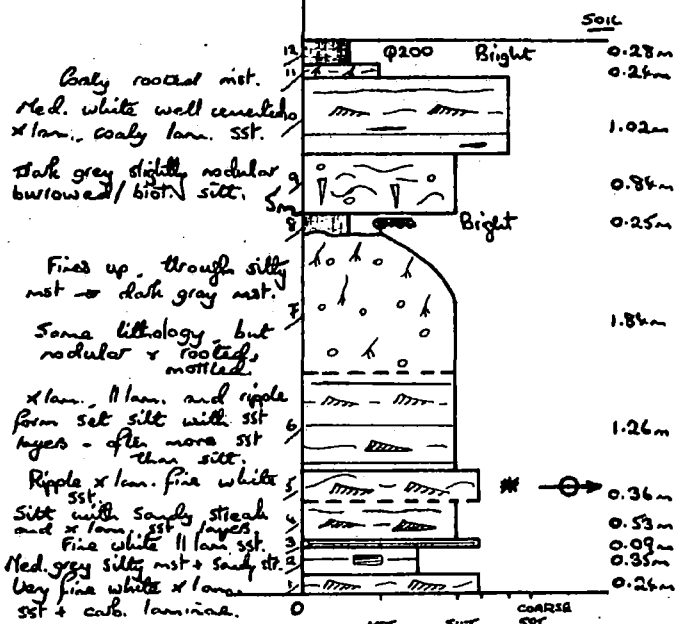
South end of long cut to Top Busty.

SECTION 173:-

CABIN HOUSE - B(N)

Hole at north end of long cut - just to south of cabin house. Cut TBS

MIDDLE TILLEY



3m down to Top Busty

* DIRECTIONAL DATA:- Ripple x lamination
 → 114°, 068°
 α = 091°

NB Units are laterally continuous within range of exposure. Bottom of cut not seen - filled in - 3m to Bottom Busty.

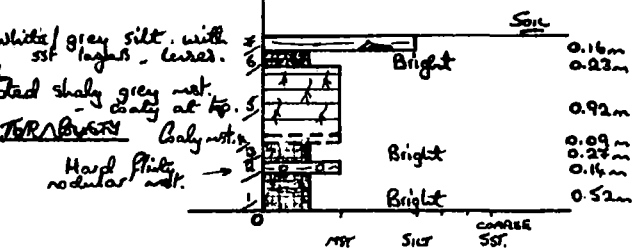
SECTION 174:-

CABIN HOUSE B(N)

20yds south of 173, side of long cut - Top Busty splits (see 19296). Cut Tc 4

TOP TILLEY

MIDDLE TILLEY



SECTION 175:-

CABIN HOUSE B(N)

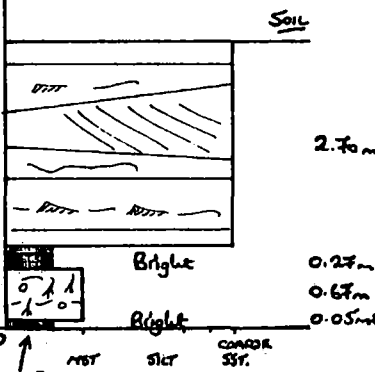
35m south of 174 - 1/2 way along long cut. Cut Tc 4

Sst - white/brown med./coarse - ripple x lam. low angle x bedded - wavy lam. x 11 lam. coaly partings.

TOP TILLEY

TOP BUSTY

MIDDLE TILLEY



Base not seen.

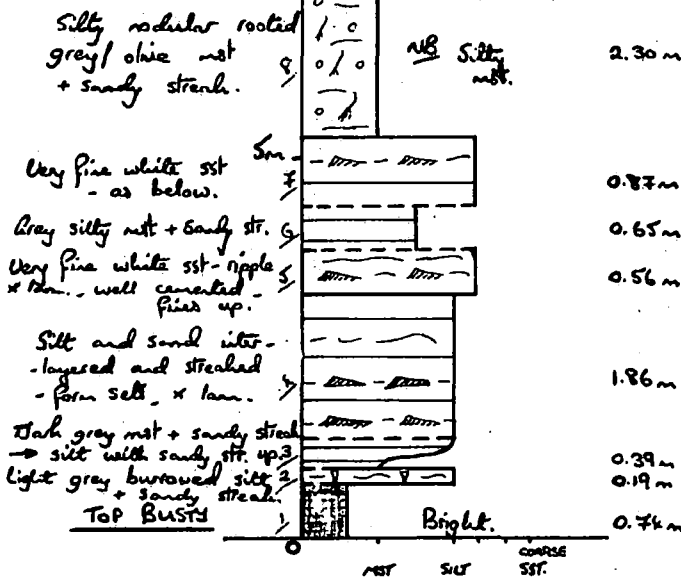
Low sst nodules in fine silt & was between

SECTION 176 -

CABIN HOUSE B(S)

Cut TB 4

Base of P100 BENCH

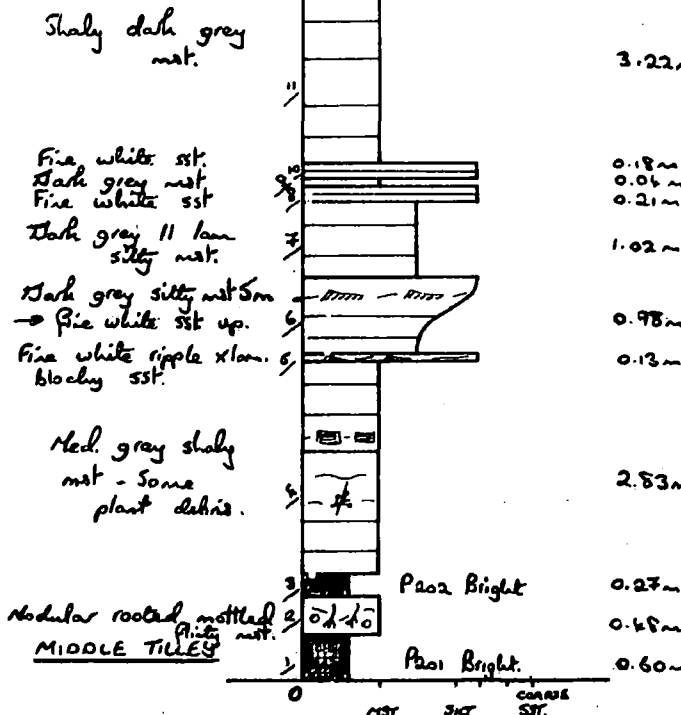


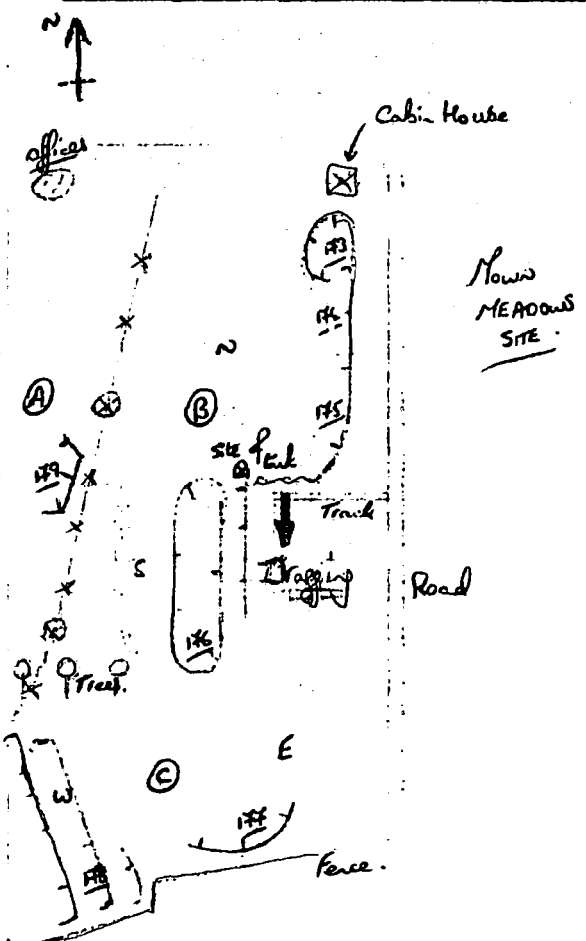
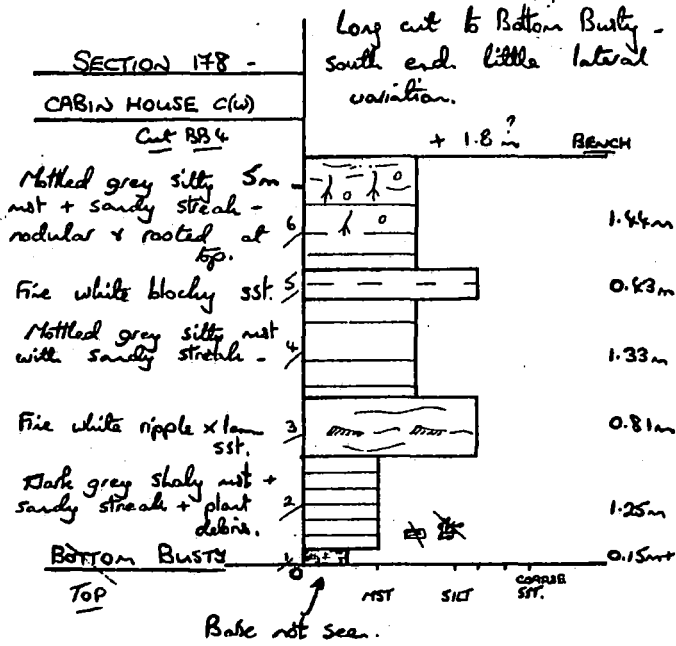
SECTION 177 -

CABIN HOUSE C(E)

Remains of Middle Tilley cut - taken back to face site boundary. Cut Tc 5

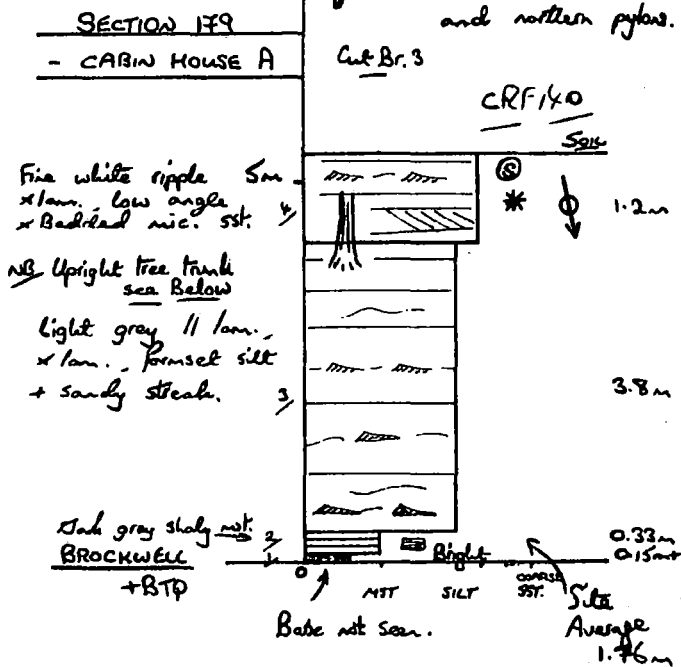
TOP TILLEY





Area C (w) - big Threequarter cut from previous visit is cooled out and partly backfilled - To east - just before small abandoned Top Busty cut - long cut to Bottom Busty - See 178. Scrapers presently removing interval to Threequarters

Area A - Brockwell workings - one cut further north than previous visit - back face trends $\rightarrow 340^\circ$ $\frac{2}{3}$ of distance between southern and northern pyons.

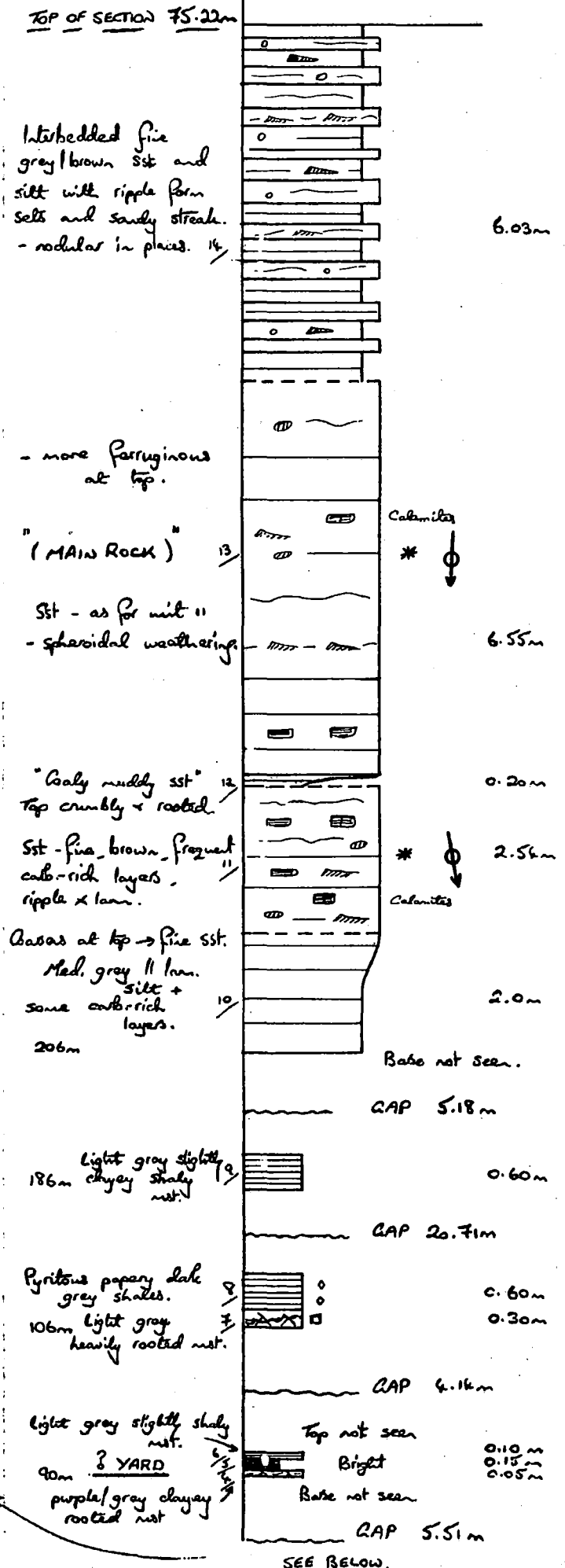
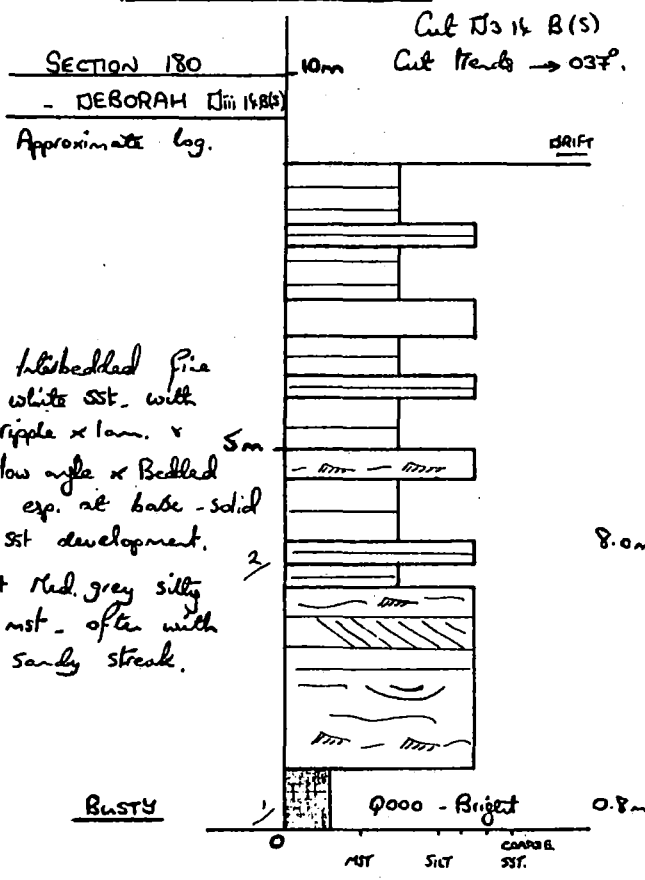


Developments since last visit:-

1. long cut to Top Busty in area B (N) with hole at north end down to Bottom Busty.
2. Area under former Tilley (P100) cut dropped away down to Top Busty (176). B (S)
3. Dragline presently taking next cut to P100 and Busty east of 176. B (S)
4. Previous small cut to Middle Tilley in B(S) expanded, and worked out back to bounding fence.
5. long Threequarter cut from previous visit in area C (w) worked out and partly backfilled. Presently scraping for next cut.
6. new big cut to Bottom Busty in area C (w) - cooled out.
7. New cut to Brockwell in area A - further north from that exposed in previous visit.

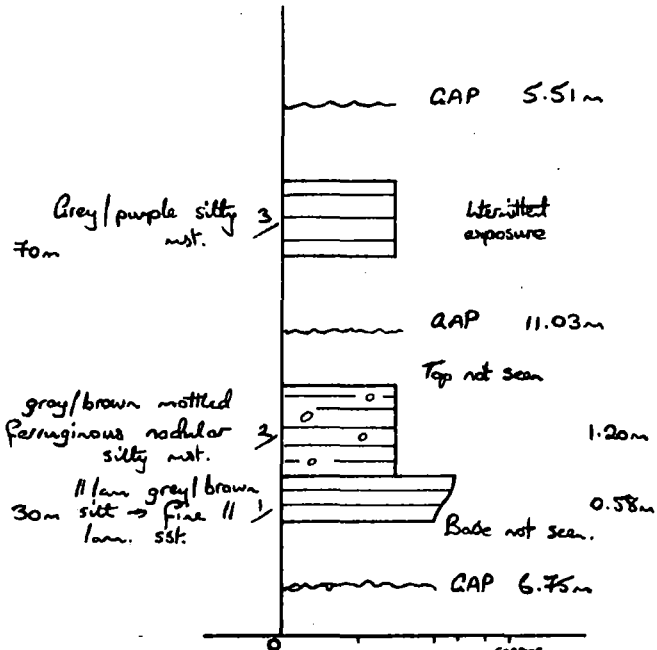
* DIRECTIONAL DATA:- low angle x Bedding - $0.2m/10^\circ/156^\circ$ $n = 1$

Sample - Unit 4 - Fine white sst.
Upright tree - in situ - roots visible - not burnt over - in top 0.3m of silt unit, and first 1m of sst. - 0.25m thick - type indeterminate. Top evidently chopped off by sst flooding.



BENHOW BECK - Lower Part.

CONTINUED OVER



nb Dip - Units 1/2 = 13/251.
Dip - Units 4-6 = 16/253.
Dip - Units 10-14 = 15/199
Progression up stream from Reservoir - Units 1 → 14.

* DIRECTIONAL DATA :-
Unit 13 - R x L → 193, 181° ~ = 2
θ = 187°
Unit 11 - R x L → 165° ~ = 1

Continued Over.

A.R. 977 152.

SECTION 182

- SELDOM SEEN.
(WHITEHAVEN).

Progressing upstream from edge of Council estate.

Tip of Units 1/2 = 16/249
Tip of Units 3-8 = 12/289.

Top of section 18.69m

Form

Thinly interbedded fine sst & silty mst
- less sst upward
- nodular in places.

Coarsens up to fine brown ripple x lam. sst.
- nodular near top.

Med. grey shales
Spheroidal weathering.

Grey/brown YARD rooted shales.

40m

Fine white/brown rippled and ripple x lam. sst (wave)
- spheroidally weathering.

Med. grey ll lam. silty mst - nodular.
Concentrated on specific horizons.

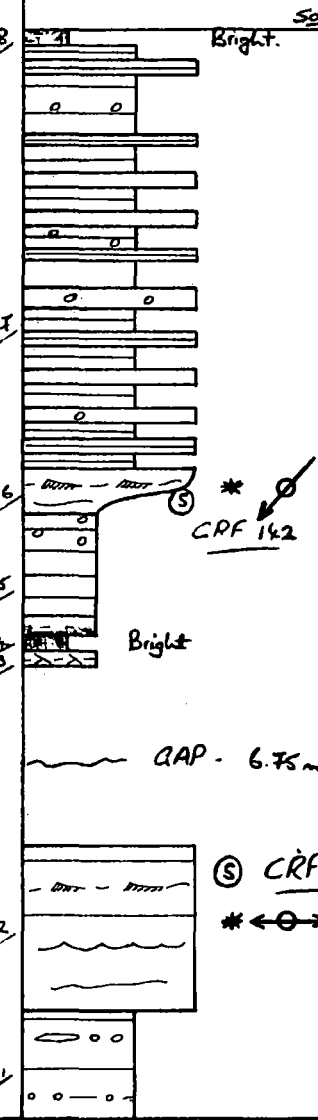
* DIRECTIONAL DATA :-

Unit 6 - ripple x lamination → 221°
α = 1.

Unit 2 - ripple crests - fairly straight - sharp topped - 0.01m ↑ - average 0.04m ↔ - Symmetrical

- strikes →
321°
271°
248°
260°

Flow → θ = 089/268°
(86%)



SECTION 183
- LOWER HALF.

20m

15m

12

10m

8

7

6

5

4

3

2

1

0.16m

1.00m

0.16m

1.04m

Med. grey siltstone - rooted in part, no nodules, abundant drifted plant remains, mostly highly fragmented.

Med. grey rooted sst grade sealwith + occasional nodules.

Colour gets lighter up. Dark grey shales with nodules and large lenses of Fe stone. Possible marine fossils at base. Med. grey sst grade Fe string Bright

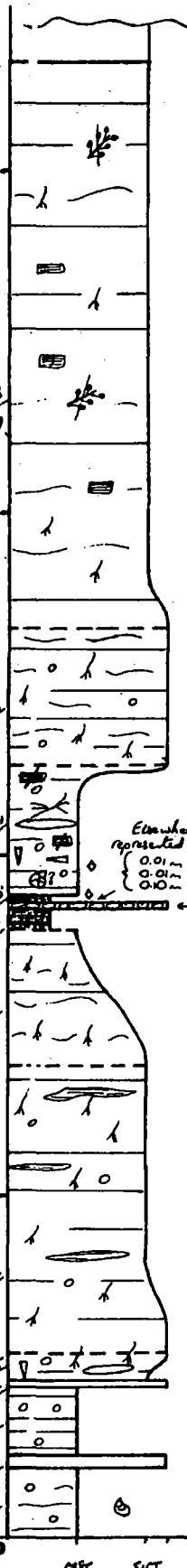
Fines to mst grade - light grey, rooted, no nodules.

Thin to silt grade 5m - clayey, rooted, mottled brown/yellow/grey. Thin discant. Ferruginous sst layers. Light grey rooted/bioturb. silt → fine grey massive mic. sst. Hard sst - as below

Grey shaly clayey nodular mst.

Hard well-cemented purple/grey sst.

Med. grey slightly nodular mst + bivalve remains, occasional decalcified sst lenses.



Elsewhere, seam represented by 0.12m Bright. { 0.01m Bright, 0.01m Bright, 0.01m Bright }

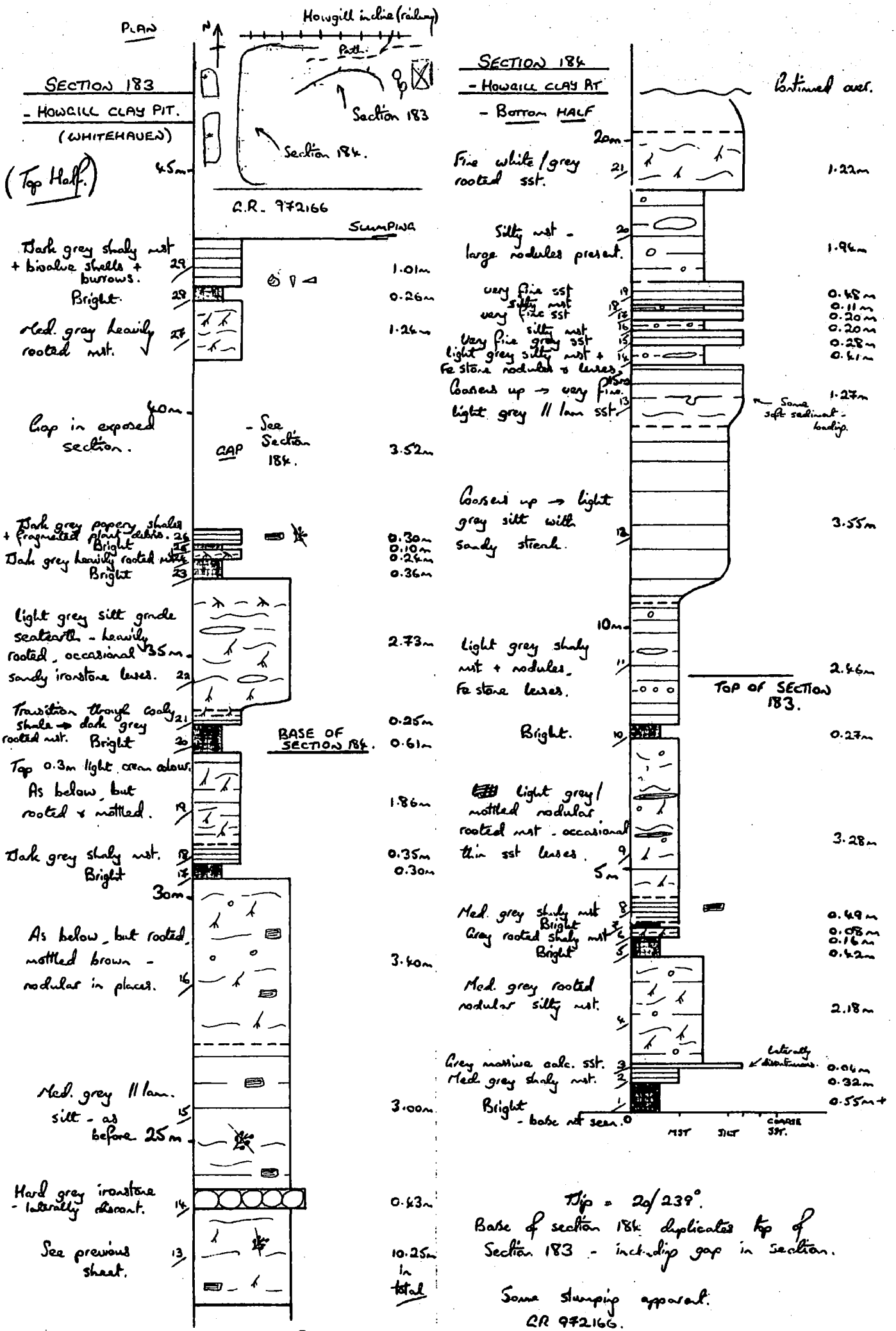
Colanites + other stalks, leaves etc. of Neuropteris, Alethopteris, Maropteris, Sphenophyllum.

Tip 19/262

Notes Selected clay pits for Whitehaven Brickworks. Rocks in quarry well appear laterally persistent and only slightly variable in thickness along face.

See photos.

Slumping at top of section obscures highest units - re-plotting of units - see notebook.



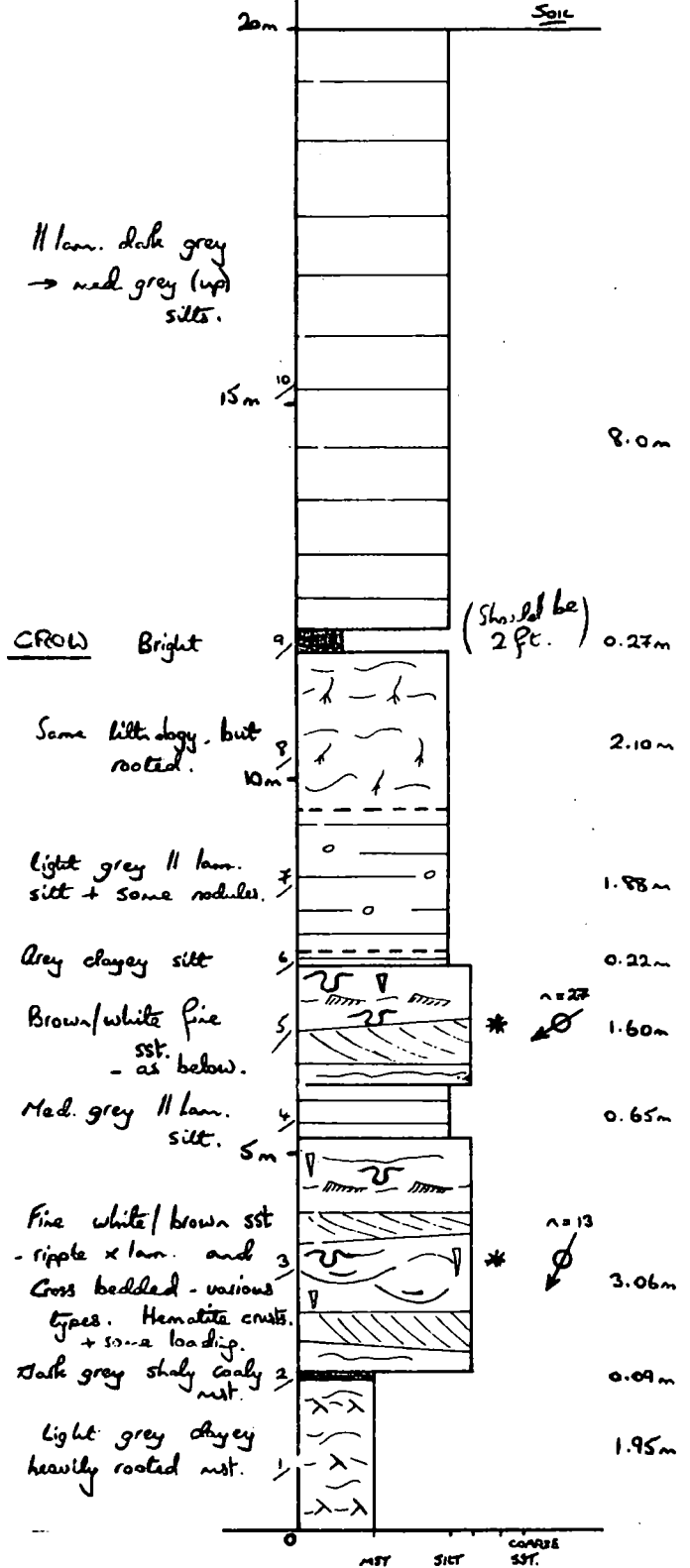
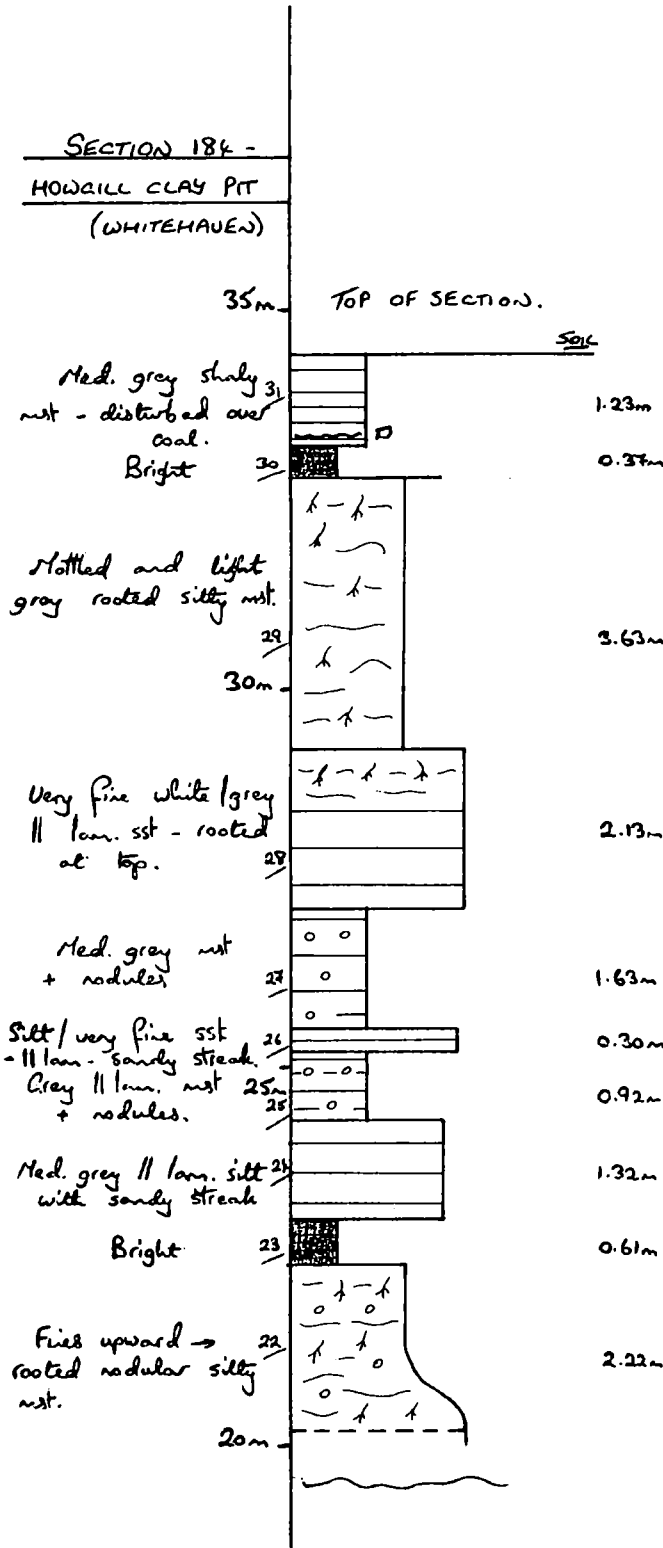
Dip = 29/239°
Base of section 184 duplicates top of Section 183 - including gap in section.
Some stumping apparent.
CR 972166.

West face of main quarry - composite section. Units laterally very persistent and uniform. Unit 8/9 possibly replaced by sst at south end

Composite. - from first 500m of section south from Tom Hurd Rock

SECTION 184 -
HOWAILL CLAY PIT
(WHITEHAVEN)

SECTION 185 -
WHITEHAVEN BEACH
(SOUTH)



Tip 13/244.

Little lateral variation in lithology or thickness.

4.20m

Soil

C.R. FIELDING - 8.8.80.

SECTION 186
- WHITEHAVEN BEACH
(South)

SECTION 187 -
WHITEHAVEN BEACH
(South)

At 107m south of
Tom Hurd Rock -
small gully.
Start of exposure in km
above slope foot.
NB At least 2m more
purple sst under base
of exposure at top of
gully.

Slightly purple/white
med/coarse & bedded
sst
Similar lithology -
but heavily rooted
- iron stained at top.

Purple stained coarse
grained cross-bedded
sst - conglomeratic
in places
- full description -
see sheets.

Blue/dark grey shaly
silty mat - slightly
rooted and nodular
in places.

"W.S.S."

? Cond 1ft 3.5.

- as for Unit 5.
Some lithology, but
hard - flinty.
Light grey silty mat
- rooted and heavily
bioturbated - some Fe
staining.

Hard fine white/yellow
sst - burrowed -
heavily rooted at top.

Olive brown / grey,
silty mat - occasional
nodules, horizontal
burrows.

Blue/grey mat grade
seatearth.

Spheroidal weathering.

light grey shaly
silty mat + nodules.

Med. grey shaly mat
+ nodules - plant
fragments.

light grey silty
mat - rooted.

Bright

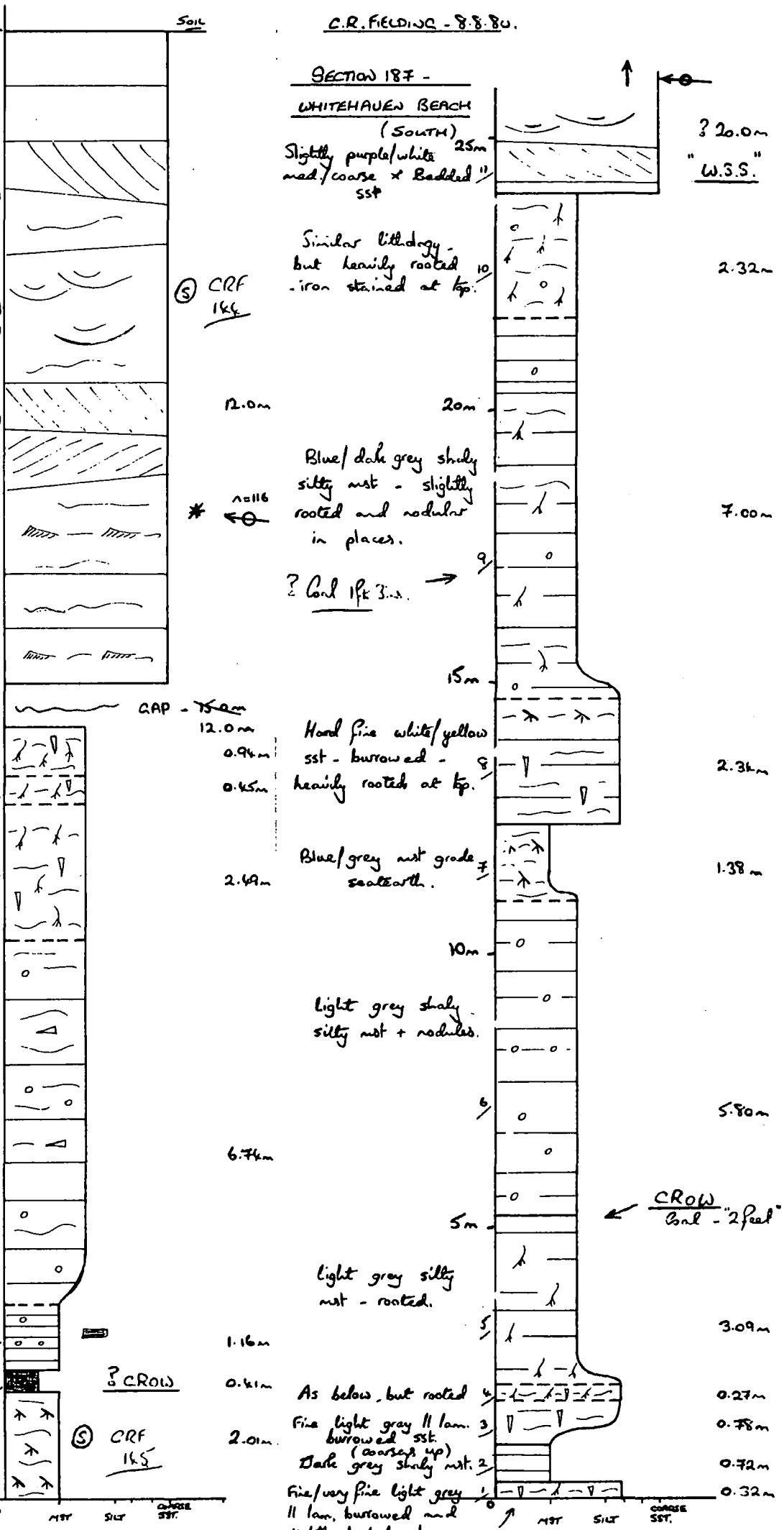
Light grey/cream
mottled red mat -
grade seatearth.

As below, but rooted
Fine light grey ll lam.
burrowed sst.
(coarser up)
Dark grey shaly mat.
Fine/very fine light grey
ll lam, burrowed and
slightly rooted sst

Base not seen

Base not seen.

... at 1535m south of



SECTION 188
- FULSHAW LAKE
(SOUTH YORKS.)

4m CR SE 212012.
CRF 147-150

Old gaineater workings - 300m east of minor road, north of Langsett.

Dark grey papery bitum. shales + marine fossils - some nodules near top. ALTON M.B.

Fusainous black mt. 5

HALIFAX HARD BED. Bright.

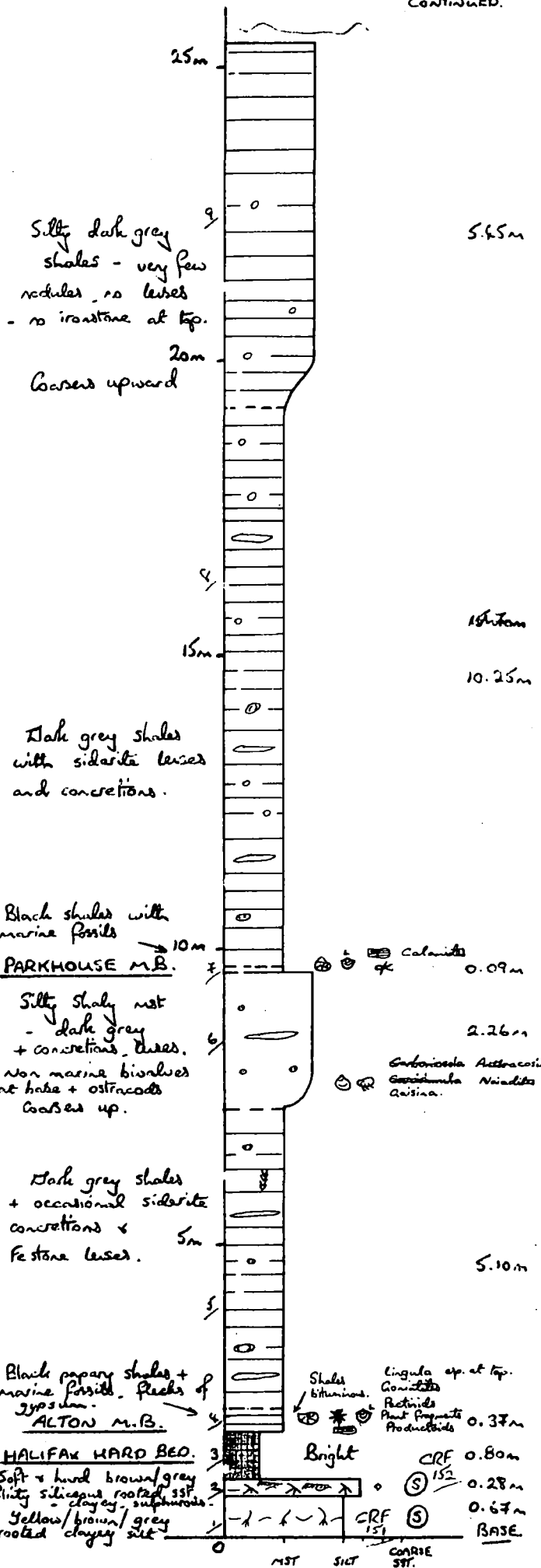
Hard white siliceous flinty heavily rooted sst - goniatites white rooted clay

Hard white siliceous rooted sst - fewer roots. - not quite gaineater.

Large Stigmara.
Knobbly base N

↑ MST SICT CONCRETE SST.
Babe not seen.

= Sheffield Blue Ganister.
Main ganister unit varies laterally in thickness - very prominent uneven knobbly base.
Tectonic dip 9/080.



Section 189 - 18B At a small exposure, a thin (0.02m) pyritic fusain mt separates the coal from the Alton marine shales.
- not present in main face. Dispersed siderite present throughout the section.
Fossils all flattened impressions on bedding planes. Concretions early-stage formation - displace strata and contain uncrushed goniatites.
Bone-in-cone calcite occasionally occurs.

SECTION 189 -
MIDDLECLIFFE QUARRY
(SOUTH YORKS.)

35m

Working quarry for Hepworth Iron Co. - A.R. SE 202041
Composite section.
Main face trends → 30°.

Fine to coarse white/brown ll lam & ripple x lam sst - massive in places. - slightly micaceous.

Dark grey shaly mt.

Light gray ll lam silt - burrowed + single sandy layer (0.05m) near top.

GAP - 2.55m

UPPER HALF

Black shales with marine fossils

PARKHOUSE M.B.

Silty shaly mt - dark grey + concretions, lenses. Non marine bivalves at base + ostracods Coarsened up.

Dark grey shales + occasional siderite concretions & Festuca lenses.

Black papery shales + marine fossils. Pecks of gypsum. ALTON M.B.

HALIFAX HARD BED. Bright

Soft & hard brown/grey flinty siliceous rooted sst - clayey, sulphurous. Yellow/brown/grey rooted clayey silt

Calamites 0.09m

Carbonifera Actinocaria Goniatites Nivalites Quisina.

Lingula sp. at top.

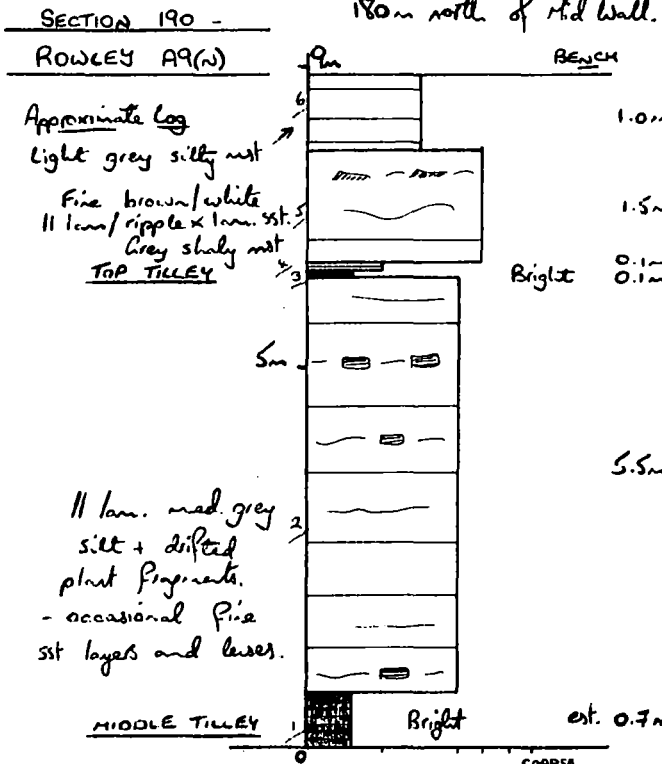
Shales bituminous. Goniatites Pectinids Plant Fragments Productella

CRF 153

CRF 152

CRF 151

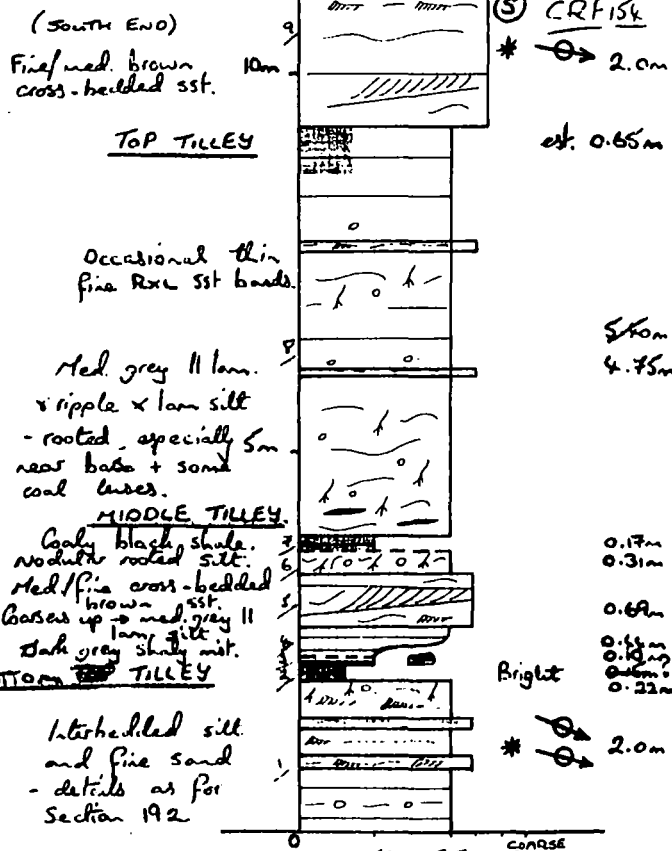
BASE



Middle Tilley not visible due to slumping. NB Top Tilley Post present all along out.

At 190m, TOP sst down to 1m thick - then increases to 2m+ to north. Junction between sst and overlying silty mud is sharp - a little interfingering occurs in places - thin layers of mud at top of sst. Above bench - more mud - becomes brown mottled and is rooted after 2m from top of sst - total 6m mud, the trace of coal - ? Harvey - just below soil level.

SECTION 191 - BINCHESTER CRAGS.

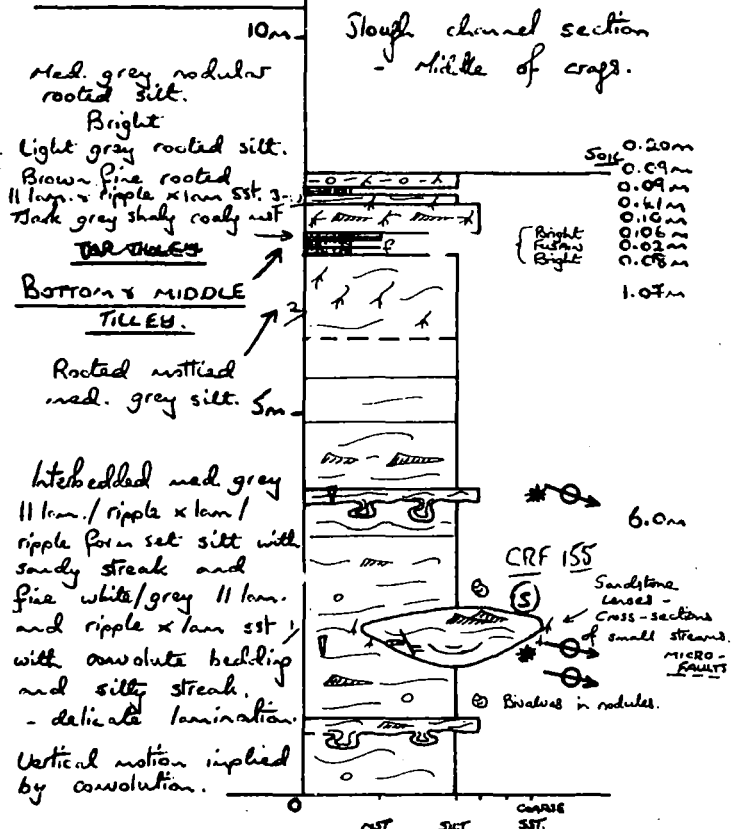


Med. grey 11 lam. & ripple x lam silt - rooted, especially 5m near base + some coal lenses.

Coaly black shale, nodular rooted silt. Med./fine cross-bedded brown sst. Coarsens up to med. grey 11 lam silt. Dark grey shaly mud.

Interbedded silt and fine sand - details as for Section 192

SECTION 192 - BINCHESTER CRAGS.



Vertical motion implied by convolution.

* DIRECTIONAL DATA: - OVERALL - $\theta = 118^\circ$, $L = 94\%$, $\lambda = 28^\circ$

Unit 1 - Sandstone lenses - oblique cross sections in small streams - $\lambda = 5$, $\theta = 113.5^\circ$, elongate $\rightarrow 045^\circ, 100^\circ, 095^\circ, 125^\circ$, $L = 96.0\%$

Unit 1 - Ripple x lam. in fine sst. & silt $\rightarrow 136^\circ, 111^\circ, 135^\circ, 110^\circ, 127^\circ, 121^\circ, 130^\circ, 122^\circ, 166^\circ$, $\theta = 124.6^\circ$, $L = 88.4\%$, $\lambda = 10$, $\theta = 113.6^\circ$, $L = 94.5\%$

Unit 1 - Ripple x lam. in sst lenses $\rightarrow 140^\circ, 157^\circ, 089^\circ, 117^\circ, 107^\circ, 109^\circ, 099^\circ, 110^\circ, 105^\circ, 125^\circ, 095^\circ$, $\lambda = 11$, Also - AXI in 622 at $\theta = 037^\circ - 31.1.81$.

Overall - $\theta = 109.0^\circ$, $L = 60.1\%$, $\lambda = 32$.

Tabular x Sets $\theta = 127.5^\circ$, $L = 77.0\%$, $\lambda = 6$.

Planar asymptotic = sets $\theta = 102.6^\circ$, $L = 59.1\%$, $\lambda = 23$.

Low angle x Sets $\theta = 227^\circ$, $\lambda = 1$.

Trough x Sets $\theta = 088^\circ$, $\lambda = 1$.

Near symmetrical ripples $\theta = 080^\circ$, $\lambda = 1$.

* DIRECTIONAL DATA: - Unit 1 - rib & furrow x lamination $\rightarrow 123^\circ$, $\lambda = 1$.

Unit 1 - rippled surface - 0.01m \uparrow , 0.05m x, sinuous crested, round topped, near symmetrical, strike $\rightarrow 193^\circ$, $\lambda = 1$.

Tectonic dip $14/123^\circ$ (\Rightarrow find 103)

Only top 0.05m of Bottom Tilley measured - base not exposed - thickness inferred.

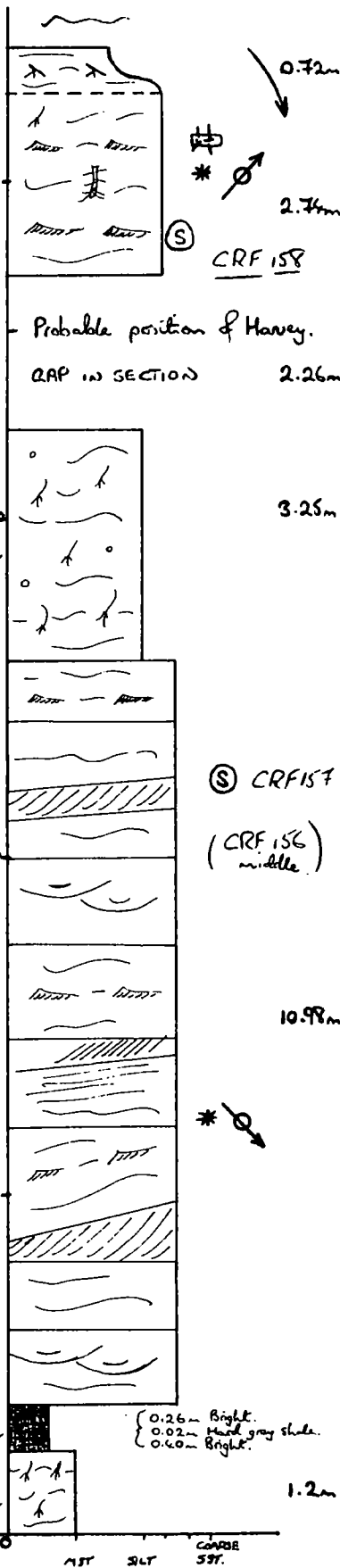
Continued over
Heavily rooted med. grey silty mst.
Very fine cream/brown rooted sst with some complex ripple x lam. Large roots in places.

? HARVEY

Med. grey rooted silt + occasional nodules.

Med./fine grained white → brown // laminated, ripple x laminated and trough/tabular/plunar asymptotic x Bedded sst.

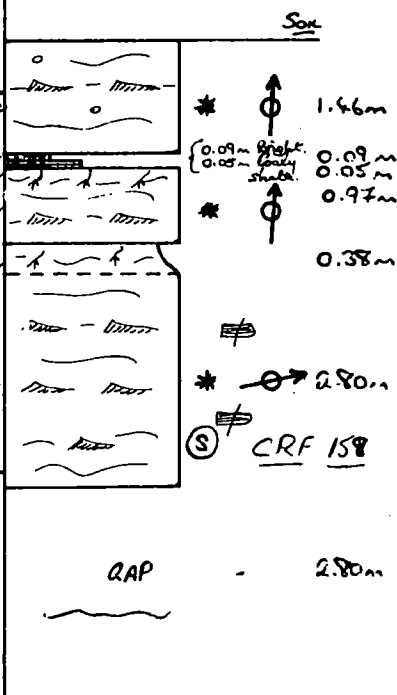
Soft blue-grey mst-grade sandstone heavily rooted.



SECTION 193 -
BINCHESTER CRAGS.
(NORTH END)

Section in small gully above craft - at north end of main exposure.
TOP OF SECTION.

Very fine brown ripple x lam sst + some 30m² nodules.
? 1 m 00
Fine white/brown ripple x lam sst. - rooted & mottled at top. Fines up to med. grey silt + occasional roots.
Fine cream/brown ripple x lam micaceous sst + fragmented plant debris - silty at base.



* DIRECTIONAL DATA :-

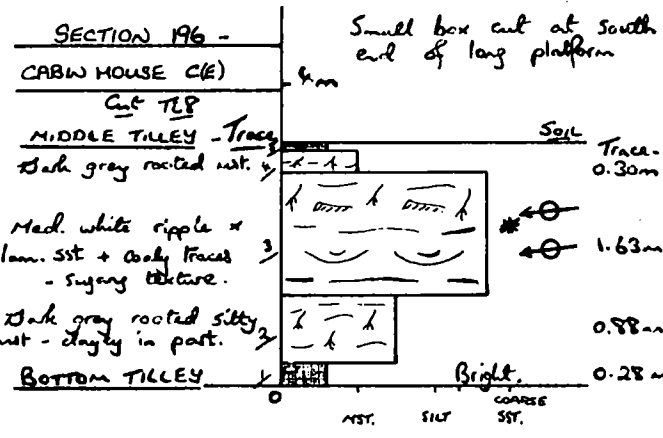
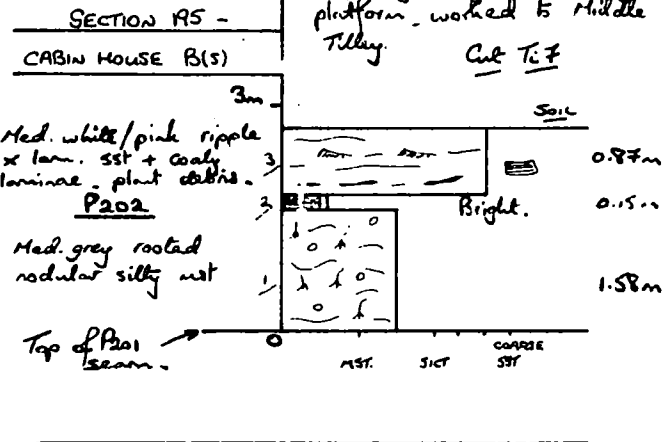
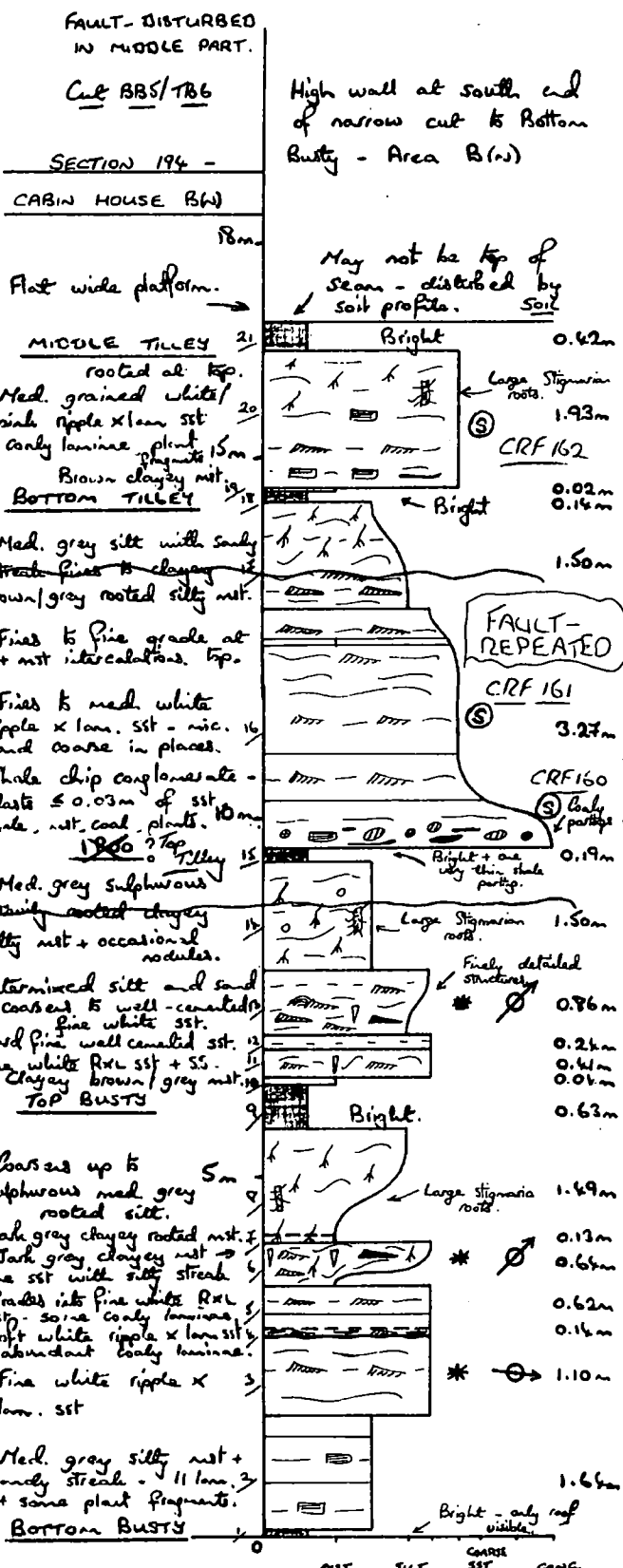
- Unit 12 - Ripple x lam → 356°, 016° n = 2. θ = 005°.
- Unit 9 - Ripple x lam → 015°, 355°, 009°, 013°. n = 4. θ = 008.0° L = 98.95% n = 4
- Unit 7 - Ripple x lam → 070°, 076°. n = 2. θ = 072°
- Unit 5 - Ripple x lam → 081°, 041°, 084°, 055°, 065°, 006°, 337°. n = 7. θ = 046.1° L = 80.9% n = 7

Unit 3 -

- Tabular x Sets θ = 142.8° L = 71.0% n = 10
- Planar asymptotic x Sets θ = 136.7° L = 80.6% n = 98
- Trough x Sets θ = 166° n = 1
- Rippled θ = 360° n = 1

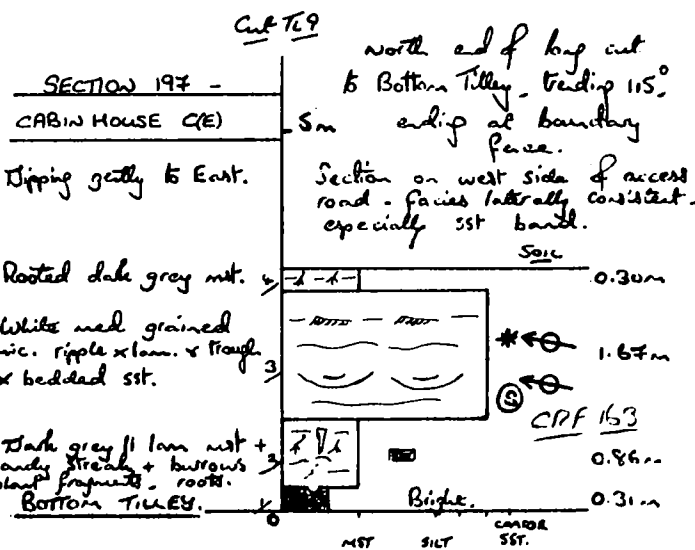
Overall - θ = 137.4°
L = 76.55%
n = 60

Half way along wide long platform, worked to Middle Tilley. Cut T17

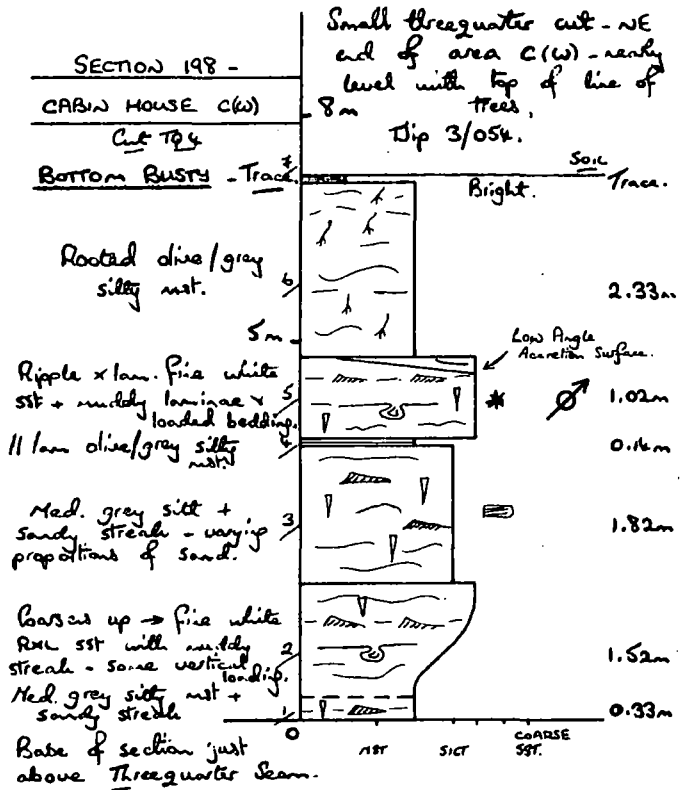


* DIRECTIONAL DATA :-
 Unit 3 - ripple x lamination $\rightarrow 1. 289^\circ, 2. 266^\circ, 3. 231^\circ, 4. 257^\circ, 5. 253^\circ, n = 5.$
 $\theta = 259^\circ, l = 95\%.$
 Unit 3 - Trough x set - $0.2m/22/263^\circ, n = 1.$

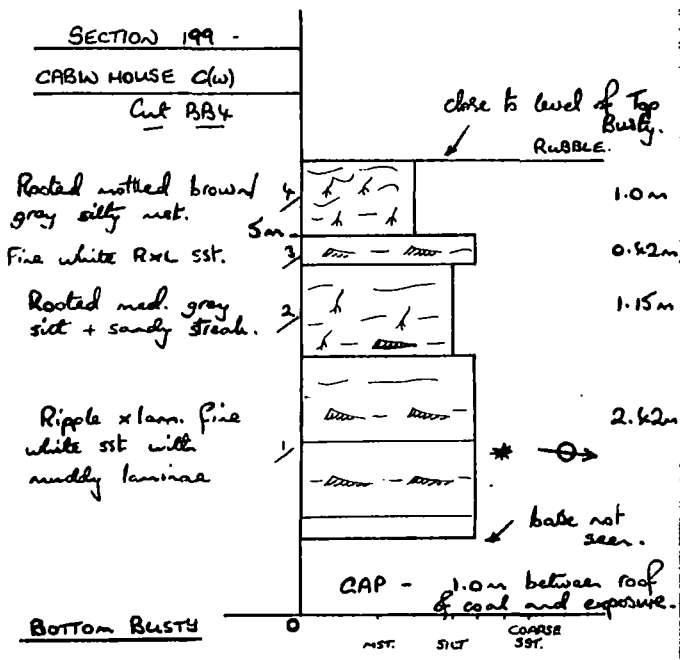
* DIRECTIONAL DATA :-
 Unit 13. Ripple x lamination $\rightarrow 052^\circ, n = 1$
 + backflow ripples.
 Unit 6. Ripple x lamination $\rightarrow 051^\circ, n = 1$
 Unit 3. Ripple x lamination $\rightarrow 112^\circ, 100^\circ, n = 2.$
 $\theta = 106^\circ$



* DIRECTIONAL DATA :-
 Unit 3 - Ripple x lamination $\rightarrow 293^\circ, 302^\circ, 284^\circ, 293^\circ, 284^\circ, n = 5.$
 Unit 3 - Trough x sets $\rightarrow 1. 0.3m/12/285^\circ, n = 2, 2. 0.15m/17/297^\circ, \theta = 291^\circ$
 low angle accretion surface visible along face.

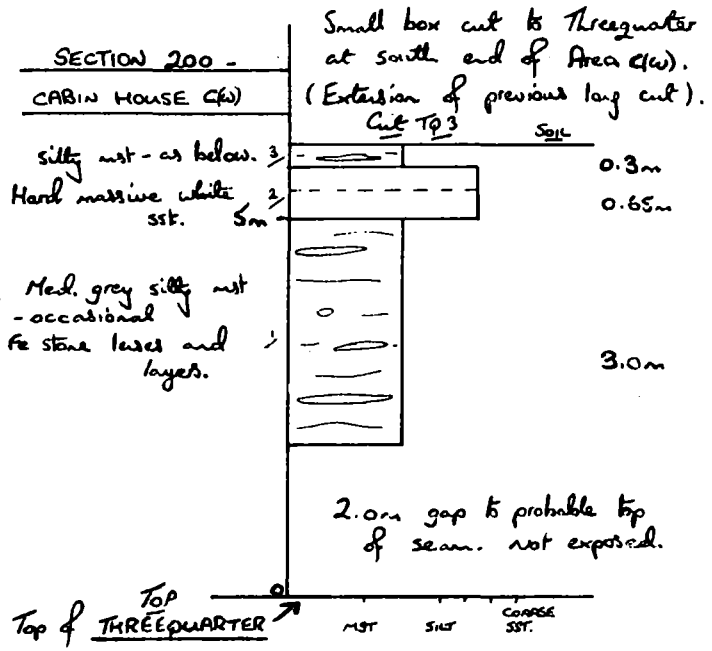


* **DIRECTIONAL DATA:-**
 Unit 5 - Large low-angle x surface
 → 046° - n=1

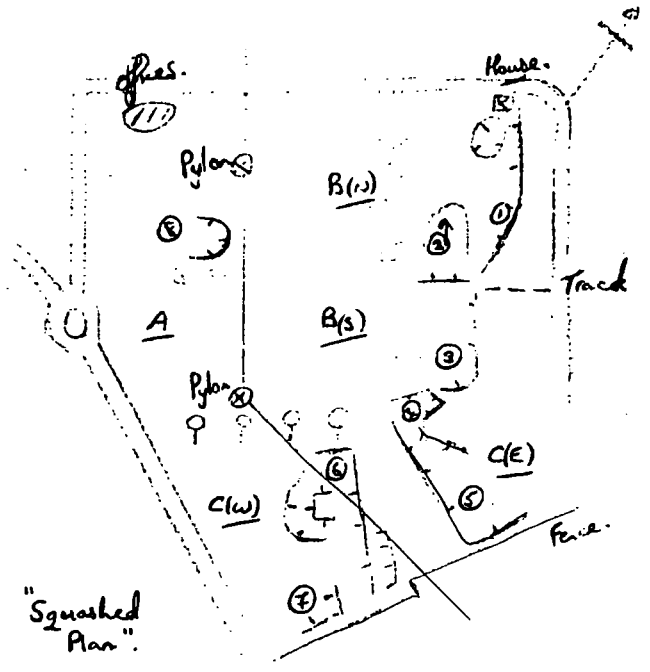


* **DIRECTIONAL DATA:-** Unit 1 -
 Ripple x lamination → 099°, n=1.

Section at north end of long cut - same as last visit. - wall continues to southern site boundary Trendip 154° - to south. Faces remain similar to Section 199 - but sst of Unit 3 thin to 0.2m and dies out completely after 4.0m. Cut ends just below small abandoned cut to Top Busty.



PLAN OF WORKINGS AT CABIN HOUSE SITE - 27.8.80.

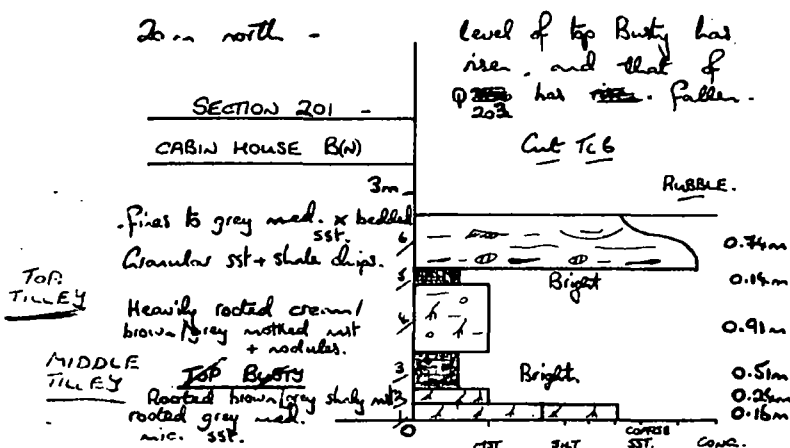


1. long cut to Top Busty extended and worked out - cut trends 300° - then 350° at south end.
2. Dragline standing on Top Busty platform - dragging narrow cut to Bottom Busty - 20m back so far. Back wall exposes down to Bottom Busty roof.
3. Large flat platform - Middle Tilley coaled out. - cut which was dragging on last visit. Long wall trends → 170°. Cut is 20m wide. 50m to road to east. Back of cut in line with line of trees.
4. Small box cut to Bottom Tilley
5. Large cut to Bottom Tilley - working Middle Tilley on last visit.
6. Threequarter and Busty workings at top of line of trees. Long cut to 9100 - smaller one to 8000.
7. Small box cut to Threequarter.
8. Box cut to Brockwell - one further than last

Working along long face in Area B (r).
 South end - see Section 194 - single Q200 + 1P00 or (Q200) ~ 3m above. P100 ~ 5m above that. Facing north from south end - Base lies at back wall. 1P00 in wall 2m above Q200 bench.

2m north -

SECTION 201 -
 CABIN HOUSE B(N)



level of top Rusty has risen, and that of Q203 has fallen. Cut T6

Some of rise in level of Q200 accommodated in dip.

27m along - still 1.00m parting between two seams - 0.18m discontinuous Fe stone layer developed half way up the parting. Facies otherwise similar. However - Top Rusty only 0.30m thick - underlain by hard dark grey rooted shale - seam must have split below.

82m along - top leaf 0.22m - overlain by 2m coarse white/brown sst - conglaminate base in places - underlain by 0.69m med. grey mst grade shaly seat earth - the bench - seam? - under = seat earth - the white sst fining down to silty dark grey mst. Total ~ 2m.

72m along - by corner - wall now 5m high. To north, large hole by cabin house is being infilled.

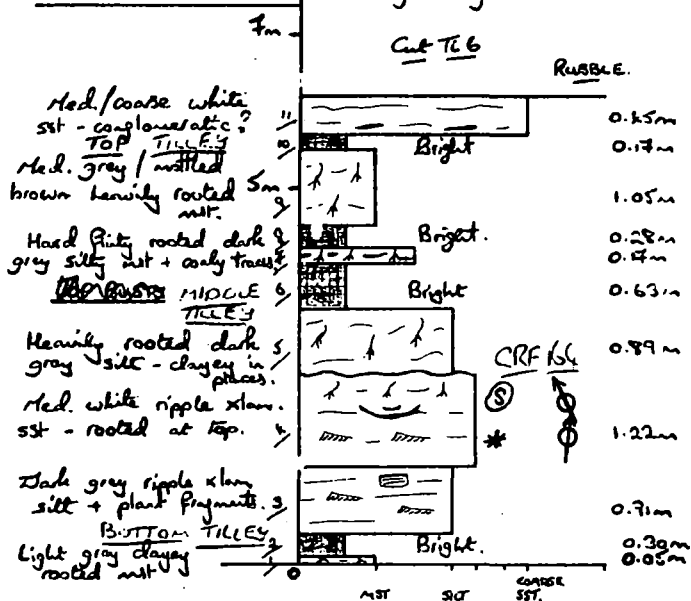
Facies continue north for 35m, to remains of large hole. See Sections.

1P20 of Section 173 is equivalent to bottom of seam in section 202.

Back to southern backwall - "1P20" has graded into dark grey shaly mst - Unit 6 (base) of Section 194.

SECTION 202 -
 CABIN HOUSE B(N)

95m north from backwall along long wall.



DIRECTIONAL DATA:-

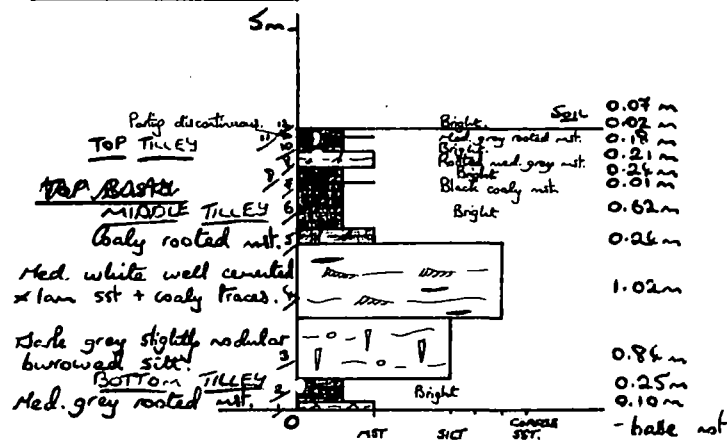
Unit 4 - Ripple x lamination → 326° n = 1.

Unit 4 - Trough x Sat - 0.2m/21/012°, n = 1

NB leaves 2 & 3 appear to join just to north. Traction shuiping in places.

SECTION 203 -
 CABIN HOUSE B(N)

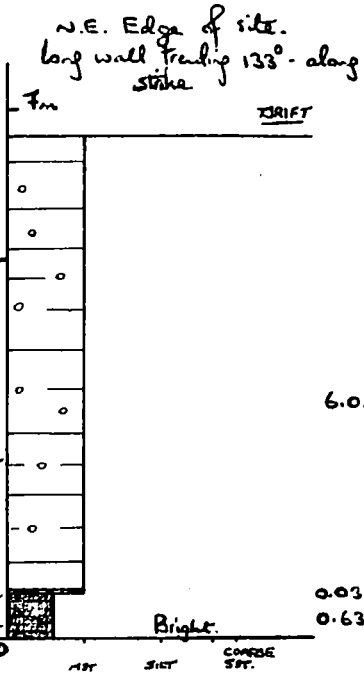
1100m along long wall (to north) - over remains of large hole.



SEE SECTION 173.

NB leaves 2 & 3 have amalgamated - leaf 4 has grown slightly - leaf 1 has shrunk. - leaf 1 is "1P20" of section 173.

SECTION 206 -
BUCKHEAD - C1.



Dark grey ll lam.
nit + festone nodules.

6.0m

Soft clayey med.
grey nit.

BRASS THILL

K000

Bright

0.03m

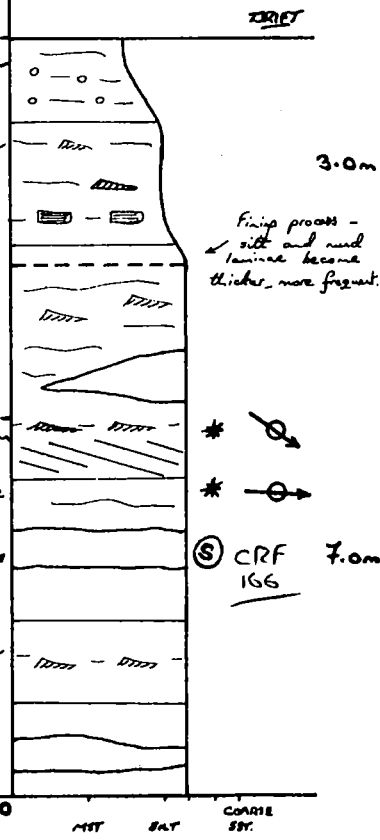
0.63m

Coal logged at 0.50m in borehole.

To north, fault brings down low Main coal and low Main Post - coal not yet reached - ground level still in sst.

SECTION 207
BUCKHEAD - C1.

North of fault.



Fines to silt, nit at top mottled + nodules. Fines to silt, med. grey, x laminated with drifted plant remains, ripple form sets, sandy streak.

3.0m

Fining process - silt and mud laminae become thicker, more frequent.

Structures - mostly ripple x lamination. Some tabular x Bedding. no structures in massive buff units.

Massive buff-colored fine sst.

Fine white ripple x laminated and tabular x bedded sst. + muddy laminae. LOW MAIN POST.

(SEE SKETCH)

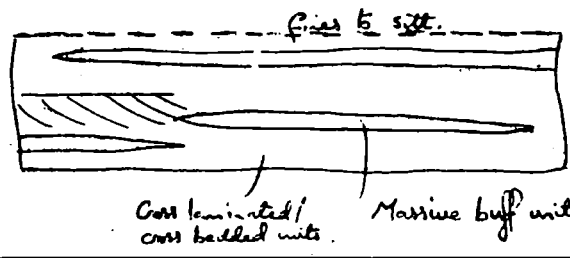
7.0m

* DIRECTIONAL DATA :-

Unit 1 :- Ripple x lamination → 119°, 133°, 155°, 162°, 123°, 152°, 089°, 143°, 115°, 135°, 133°, 123°, 154°, 111°, 146°, 085°, 122°, 144°, 140°. n = 19.
θ = 131° L = 94%

Unit 1 - Tabular x set
1.2m / 16 / 097°

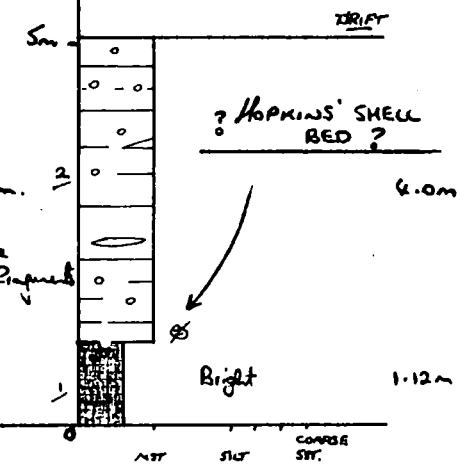
FIELD SKETCH OF BUCKHEAD C-1 WALL
- SEE SECTION 207.



Layers of buff coloured sst ≤ 100m long - 1.5m thick - some seen to pinch out very rapidly. NB comparatively little cross bedding in low Main Post.

SECTION 208 -
BUCKHEAD - A1.

East end of cut 1.



Dark grey ll lam. nit + nodules. Occasional Fe stone lenses. Bivalve fragments at base.

4.0m

HARVEY

N000

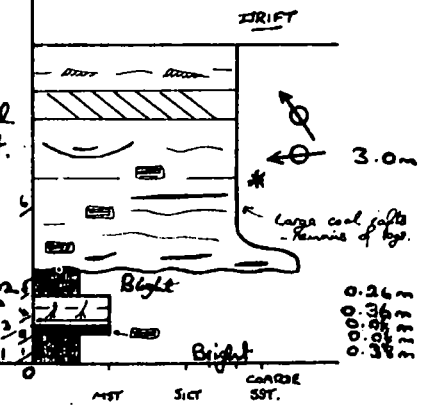
Bright

1.12m

Variable thickness over coal, due to drift cuts out. Small fault exposed coal heavily pillaged. At west end of cut - seam 1.50m thick - with a thin discontinuous clay band near the base.

SECTION 209
- DEBORAH IV 4

North end of cut IV is. Clay unit not well developed. Cut trends → 154°.



Granular brown sst at base, fines to med. grained x bedded sst. + coaly traces, plant fragments.

3.0m

Grey shaly rooted nit. Med. grey clayey nit. Med. grey silt. nit. TOP TILLEY

P302

Bright

P301

Bright

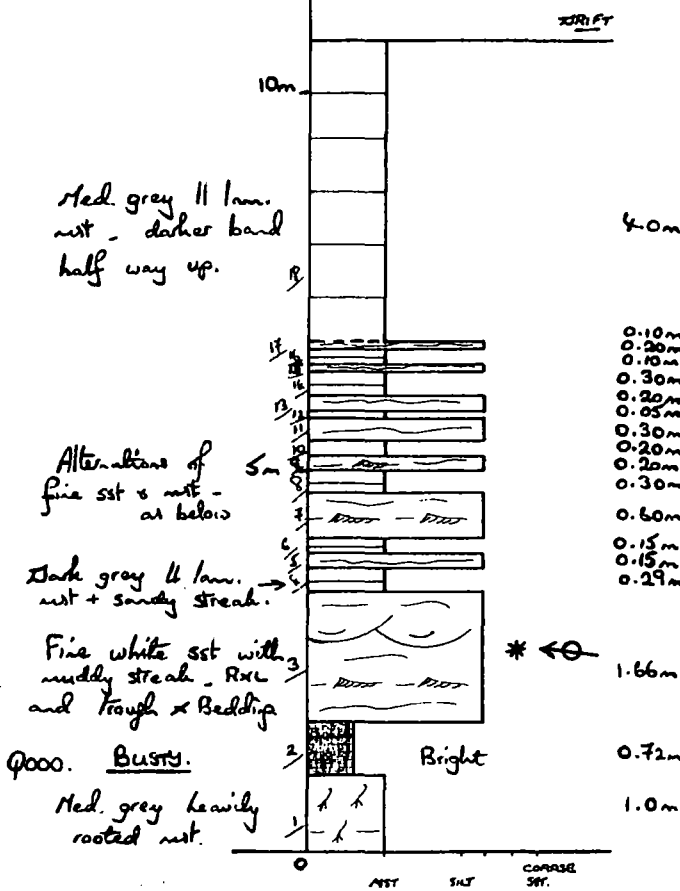
0.26m
0.36m
0.26m
0.36m

* DIRECTIONAL DATA :-

Unit 6 Cross bedding
Tabular 0.2 / 16 / 323° n = 1
Trough 0.3 / ? / 258° n = 1.

SECTION 210 -
DEBORAH Diii 16 S(18)

Cut trending 130° - northern
end of "dogleg" cut.



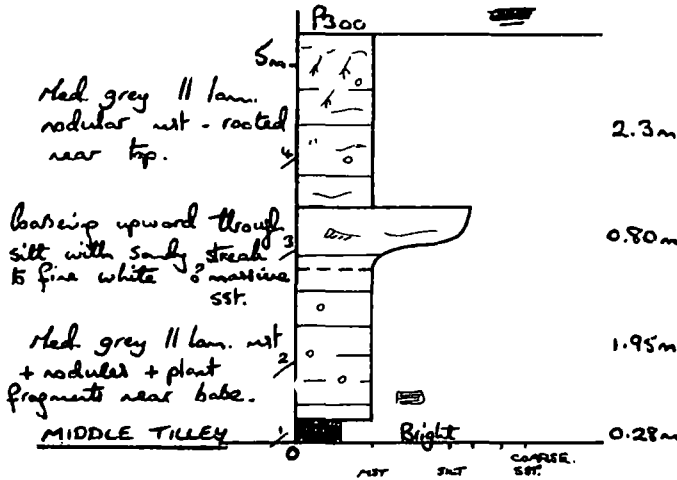
* DIRECTIONAL DATA:

Unit 3 - Trough x Bedding :- 0.15m/11/277
0.2m/10/290
n = 2.
θ = 28°
NB 1Poo not visible - apparently still present.

Far end of cut - coalig out
P200.

SECTION 212
- DEBORAH Bii 12

See Section 133.



NB Area Diii Cut 43 - Busty exposed -
- 1.8m thick in SE. end of wall →
0.7m at N.W. end - thinning toward
washout - undulating sst bands - at extreme
NW end str dip toward coal

SECTION 211 -
DEBORAH Diii 6(B)N

Med. grey ll lam.
nit with dark
band in middle
of section.

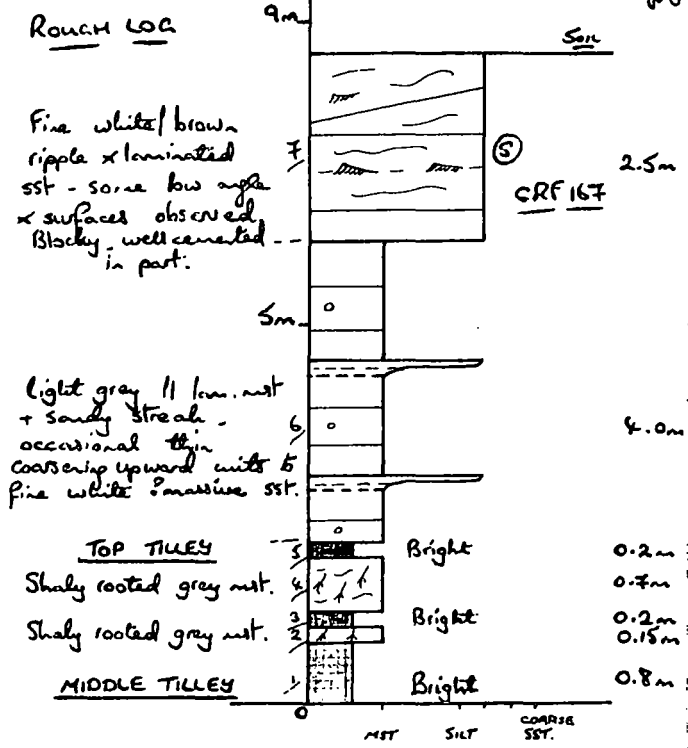
Interbedded fine white
ripple x laminated and
trough x bedding sst
with muddy laminae
and dark grey ll lam.
nit with sandy streak.

BUSTY

* DIRECTIONAL DATA

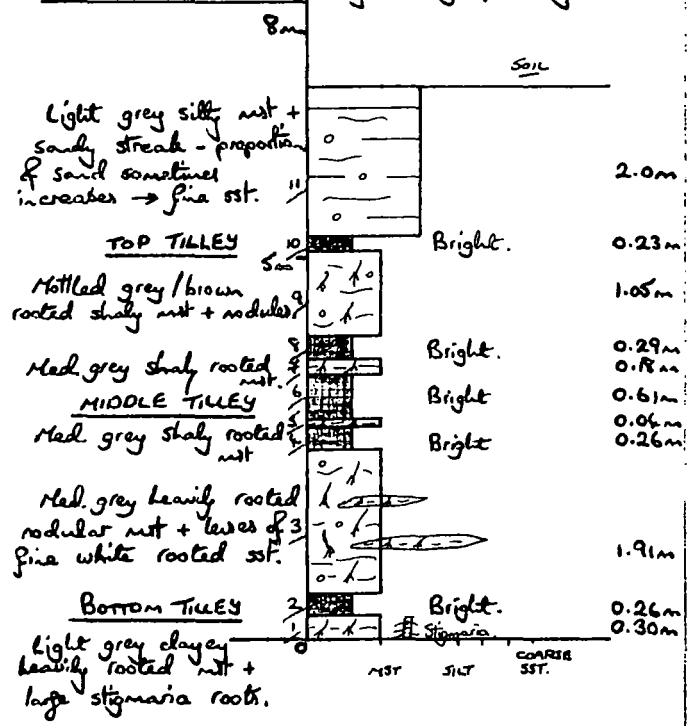
Unit 2 :- Trough x Bedding.
0.3m/10/265
0.3m/7/233
0.2m/10/215.
n = 3.
θ = 238° λ = 94°

SECTION 213 - MOWN MEADOWS - 4.



Units traceable along the face fairly consistent in thickness. 2 photos taken!

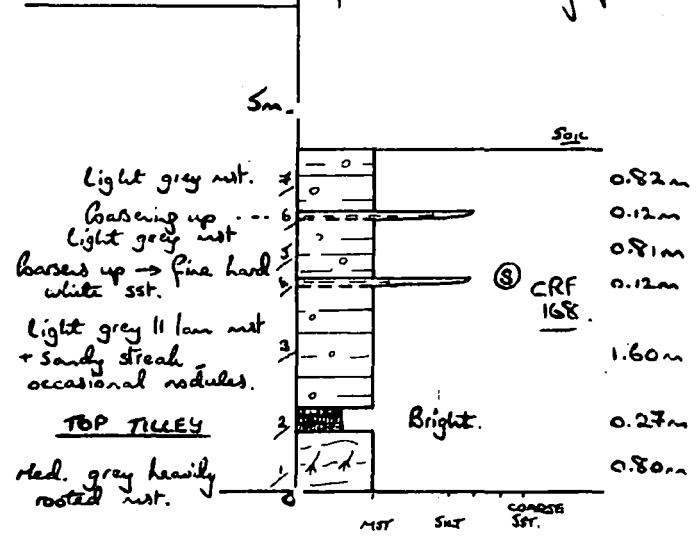
SECTION 214 - MOWN MEADOWS - 3



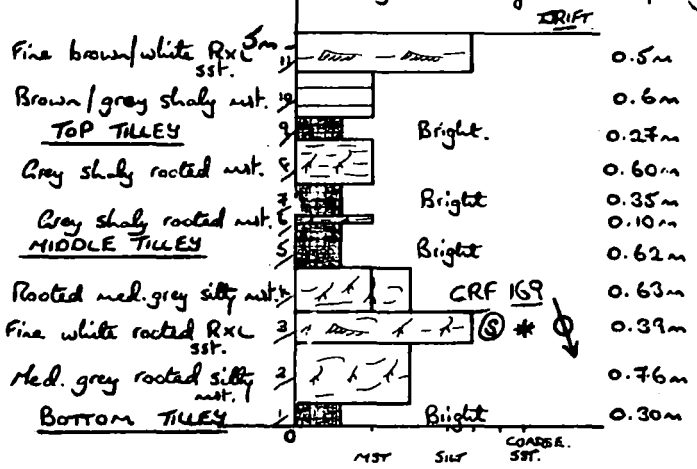
4 photos taken. Partings appear fairly consistent along the face. Height of wall increases to east - base of major sst visible at east end above in 3.5m mat.

Units of mat + fine sst traceable over $\approx 20m$ - max. distance between pillars. Cut trends $\rightarrow 180^\circ$ 2 photos.

SECTION 215 - MOWN MEADOWS - 3A



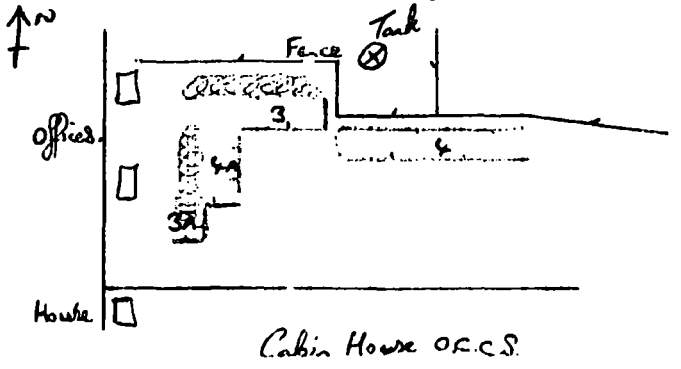
SECTION 216 - MOWN MEADOWS 3A



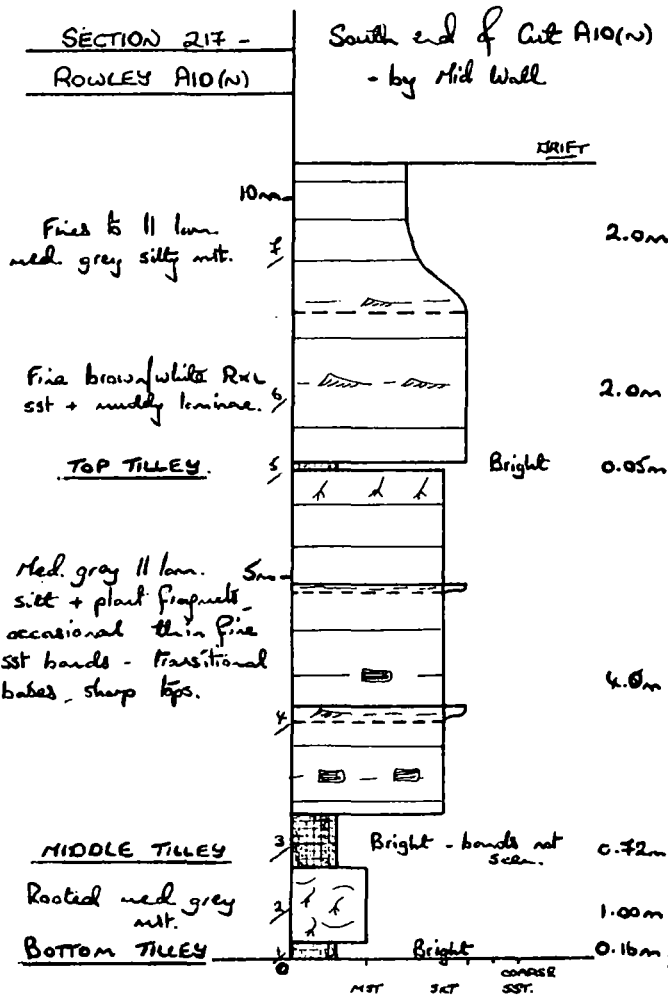
* DIRECTIONAL DATA: -

Unit 3 - Ripple x lamination $\rightarrow 147^\circ$. $n=1$.

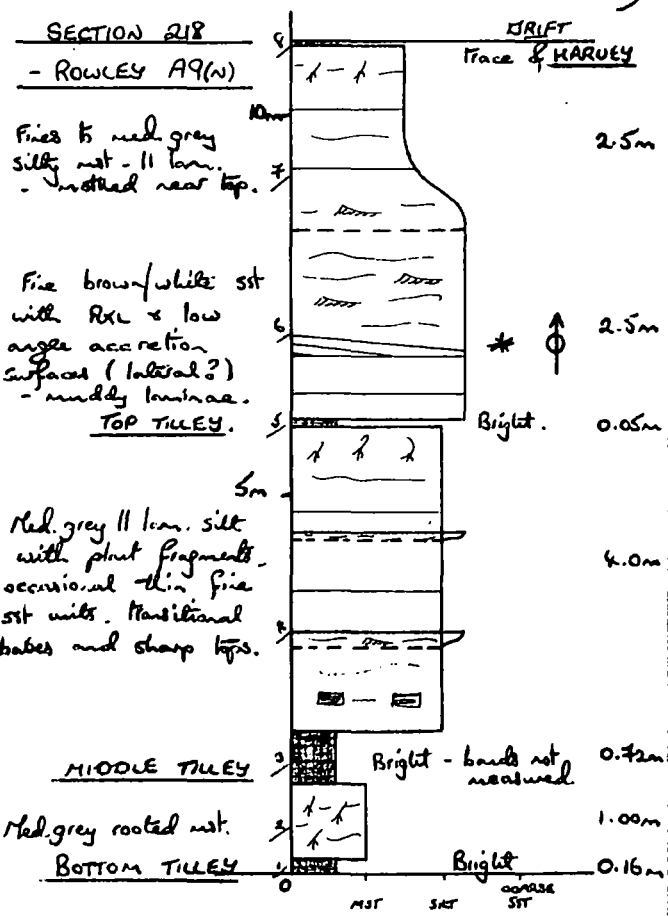
MOWN MEADOWS - Working as at 2.9.80.



Tectonic dip $\approx 2^\circ$ to East.



20m exposure at 4.9.80 - no facies variation. Large slump causing stability problems.



Section 218 taken 50m south of north end - trace of Harvey coil at top of face, though drift disturbed.

Washouts of previous cuts have nearly disappeared - one remnant at 30m south of north end - bedding in silt displays shallow channel structures - P300 wraps down.

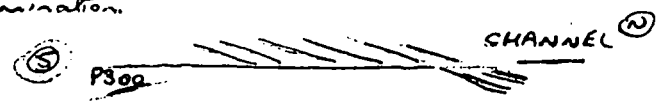


Possible lateral accretion surfaces on bottom of TTP, and more silty mt layers within "blends in" with silts below. Features ~10m wide. Upward end of channel, near source? Also, 45° inclined dislocation plane, through middle - small fault.

* DIRECTIONAL DATA:-

Unit 6 - low angle accretion surfaces
→ 35° $\alpha = 1$.

Apart from this sst displays only ripple & lamination.



40m south of 1st "washout" is 70m south of north end = remnant of another channel - again warping down of silt and overlying TTP over 10m width.

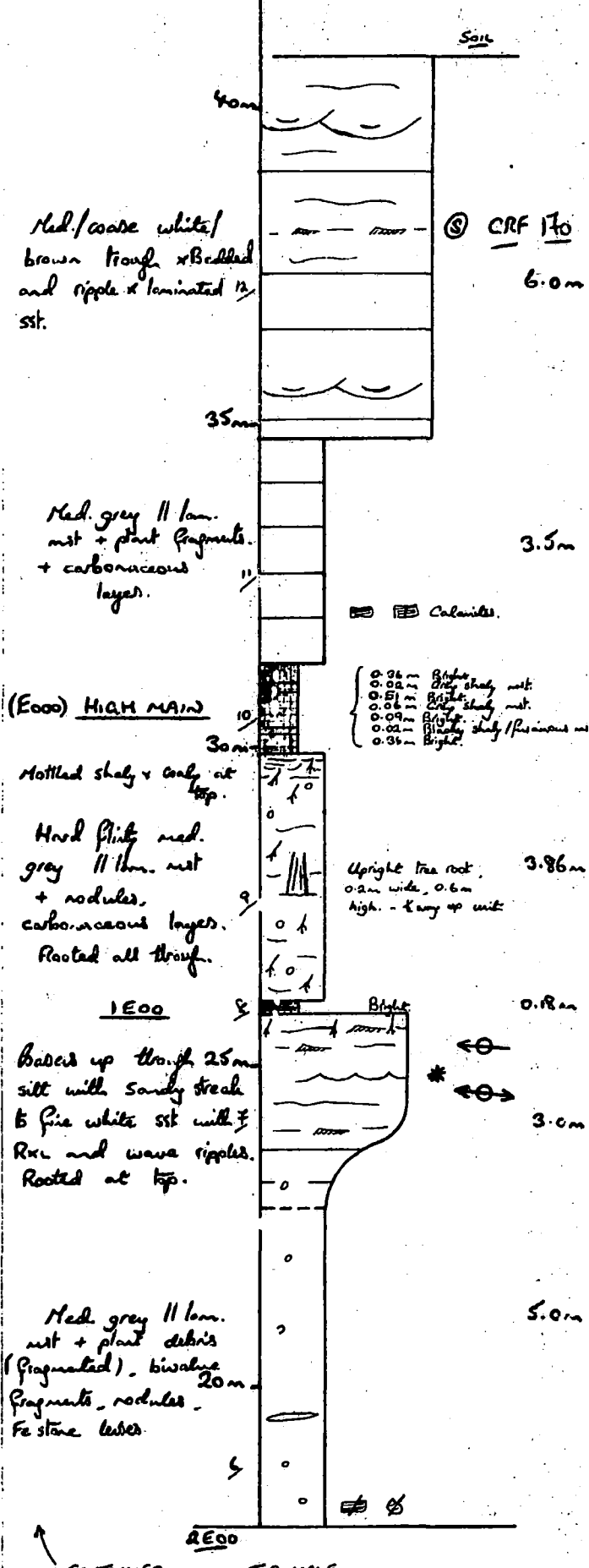
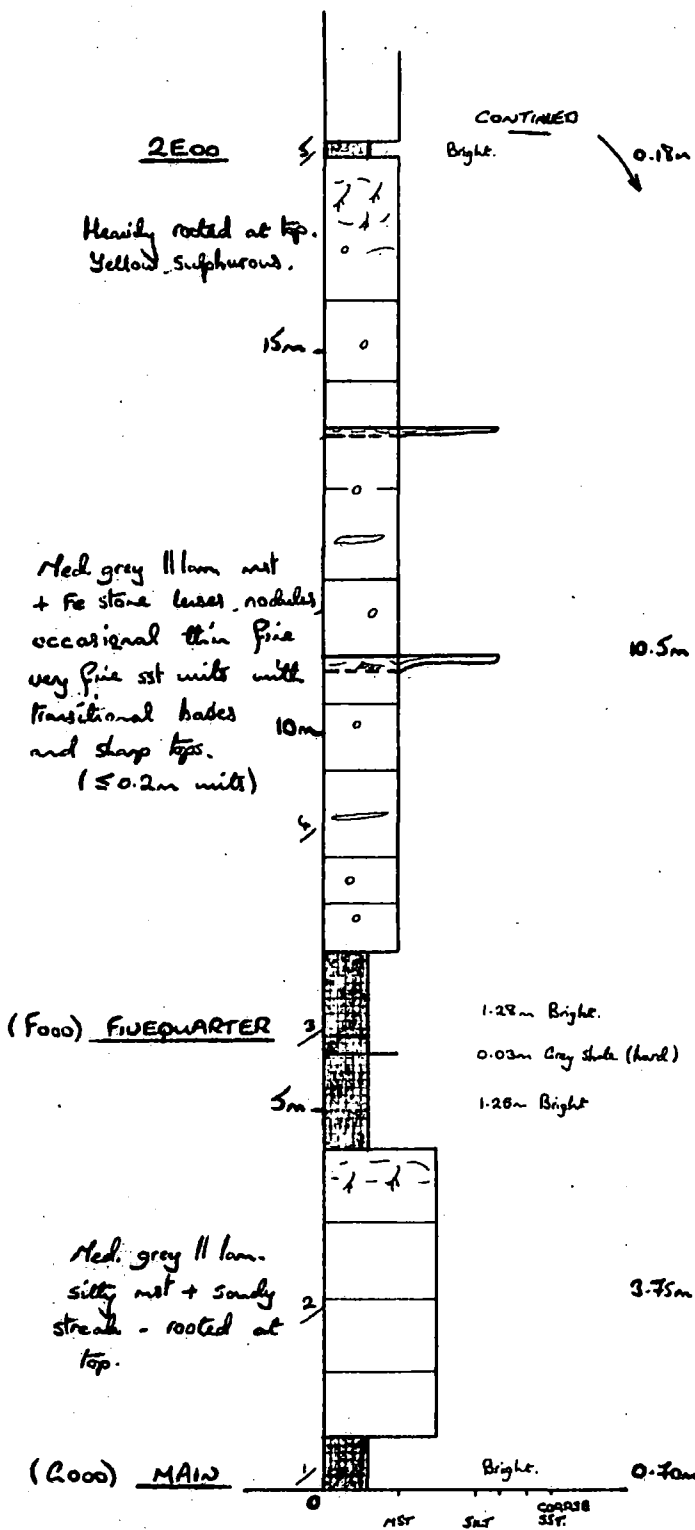


P300 dies out temporarily - more silt bands in TTP again, though not as pronounced involvement of TTP.

Total 8 photos of washouts.

NB Section 218 - TTP proper is cut out by interbedded silt/sst channel fill in area of "washouts" - merges upward and outward into silt/silty mt over Top Tilley Post.

Section 218 - between washouts, contains little of the interbedded facies.



* DIRECTIONAL DATA :-

Unit 7 - RXL → RBS° n = 1

Symmetrical sharp topped wave ripples
- 0.01m ↑, 0.05m ↓, internal detail visible

striking → 190° n = 1.

Total 6 photos, 1 sample.

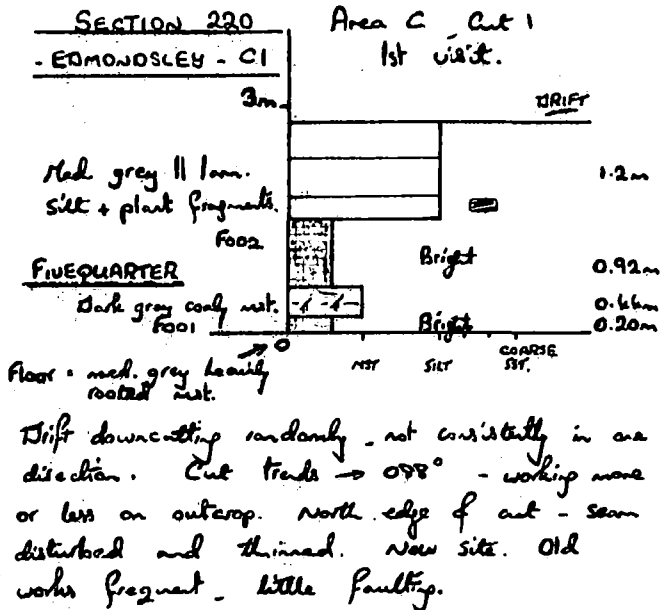
Second extension - Area A, Cuts 1 & 2.

lateral continuity of units difficult to assess.

l. High main bands are often discontinuous, grading in and out rapidly.

- 0.34m Bright shaly nit.
- 0.02m Bright shaly nit.
- 0.51m Bright shaly nit.
- 0.06m Bright shaly nit.
- 0.09m Bright shaly nit.
- 0.02m Bright shaly nit.
- 0.34m Bright.

CONTINUED TOP HALF



8.9.80. Further observations on Binchester Crags.

Simple channel section. Bivalve fragments and complete shells preserved in nodules, in fine interbedded facies.

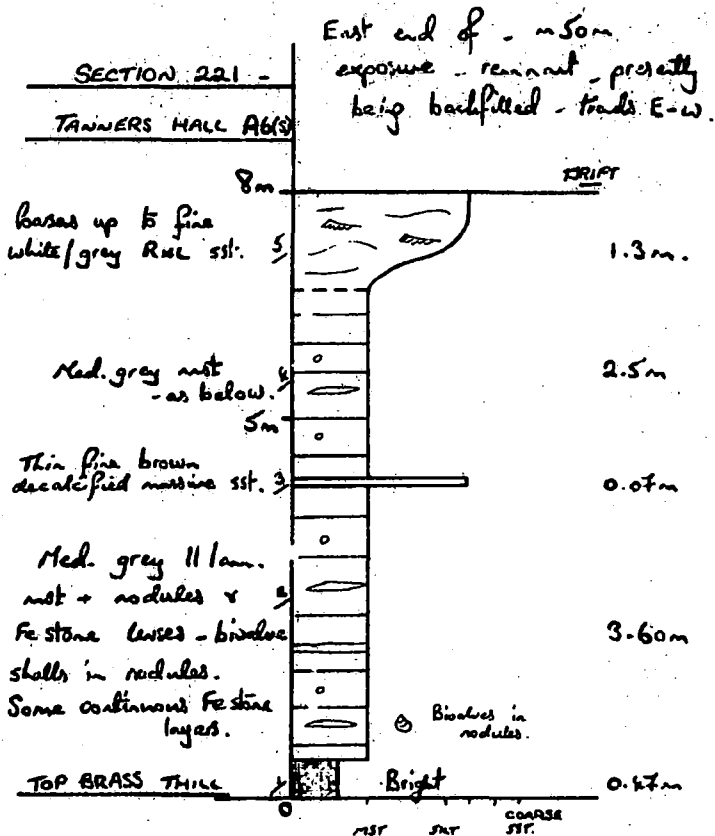
Around sst lenses - some roots round edges - surrounding sediment may well be rooted at these levels. \rightarrow lowering of water table. - implied by presence of stream channel. - less nodules at these levels.

3rd sst lens - fine layers between storeys are consistent with the interbedded facies, whereas the sst bands are erosive - proved simultaneous dev. of both facies. - small streams crossing a floodplain mostly under water, but not at this time. However, some ssts do continue out into the surrounding interbedded facies - fining and thinning outward. 3rd lens in sst lenses particularly continues out for some distance. Erosive contacts difficult to substantiate, and the lenses are very hard and possibly siderite cemented.

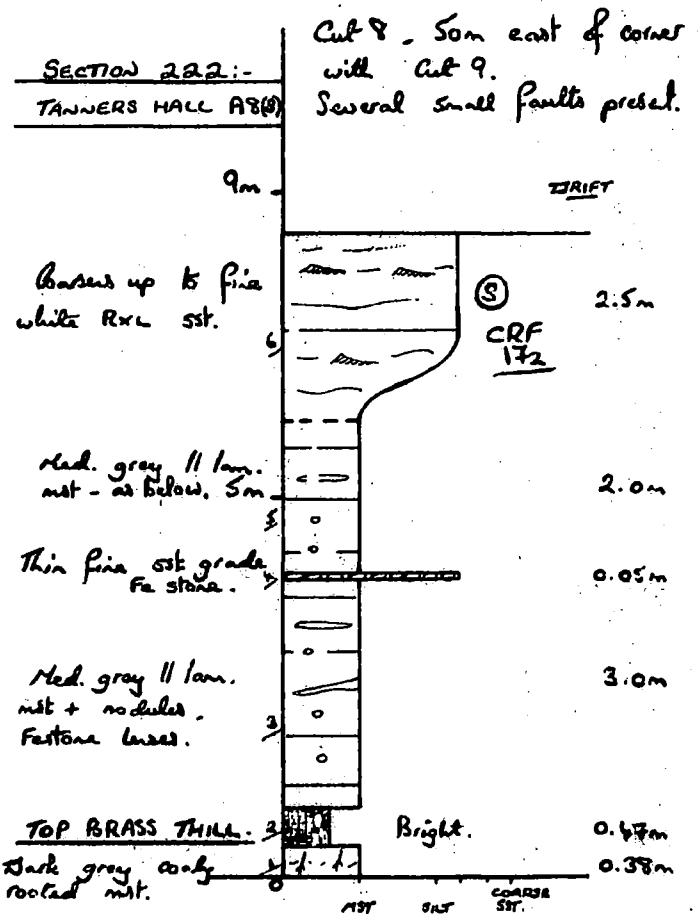
RAE reckons that they are large concretions. Raspberry. Siderite may have exploited the contrast in sediment, but the symmetrical arrangement of layers - thickest dev. in centre - and general appearance all suggest a different depositional environment.

S.A.M.P.E. - nodule + bivalve - CRF171

Stream at south end - discovery of Top Tilley seam in situ directly below major sst at top of section - need to measure thickness (with shovel). Also correlation of seams - "Top Middle & Bottom Tilley" row present all along face.



All units laterally persistent and more or less uniform in thickness.



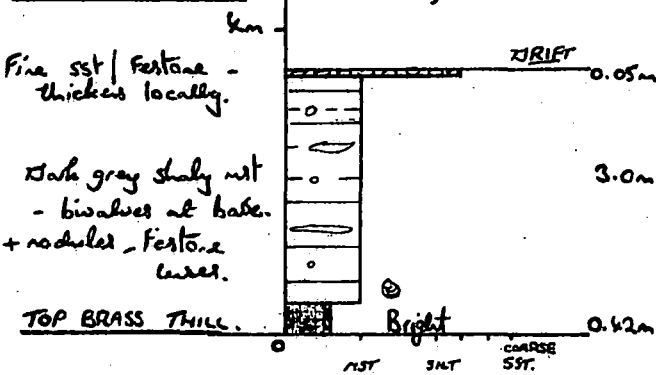
2 photos taken. NB 20m back - at level of thin sst/Fe stone - widens into a lens 0.2m thick - then thins again.

115m east of corner with cut 9 - start of large slippage - facies still the same, thicknesses exactly the same, except local thickening of thin sst to 0.15m. T.B.T. seam = 0.45m. Total of another 75m exposure along the face, the dragline pulling out remainder of cut, toward remnant of cut 6. Facies and thicknesses still exactly the same.

Cut trends → 097°.

Into cut 9 - first part trends → 125°. - distance 105m to first corner. Facies as before. 2nd part trends → 016°. Drift downcuts to ~ 3m over T.B.T. seam. At next corner, ~100m along, sst reappears in face.

SECTION 223 -
TANNERS HALL A9(9)



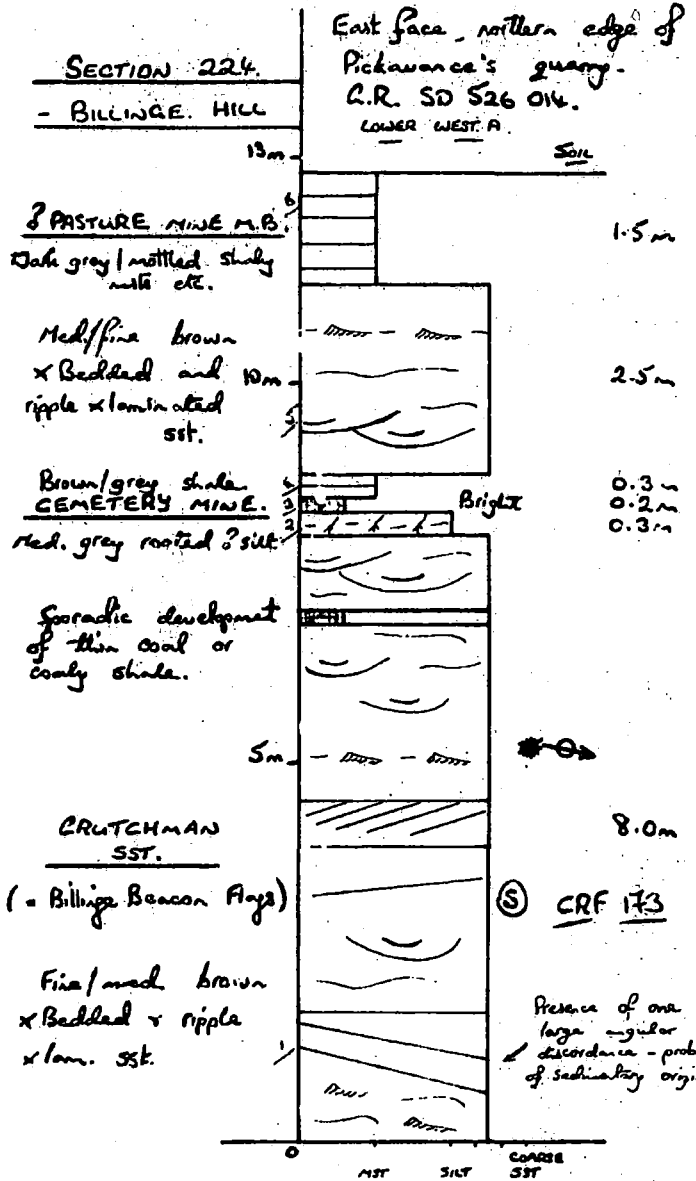
After this point, the thin sst is cut out for some distance to the north.

Cut continues round to NE corner of horseshoe:- facies and thicknesses very similar. Still coaly at NE corner.

LANCASHIRE TRIP
- 9-16/9/80. →

See Written Description

Rough Log



* DIRECTIONAL DATA: - (Corrected)

Unit 1 - Ripple x lamination → 125°, 172, 163, 112, 051, 152, 137, 074, 101, 112, 055 n = 11.

$\theta = 110.9^\circ$ $L = 80.1\%$

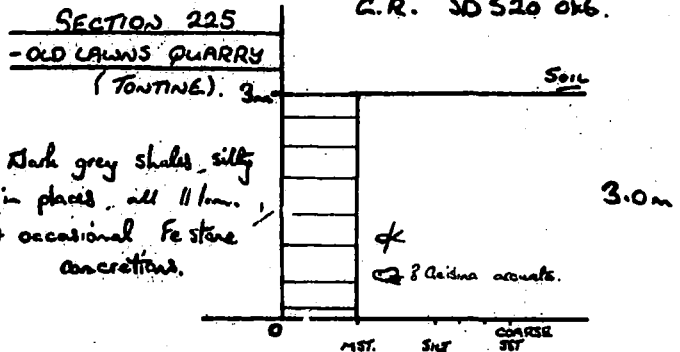
Unit 1 - Trough x Tabular x sets:-

1. 0.25m/20/022 2. 0.15/26/052 3. 0.2/17/225

4. 0.3/15/159. $\theta = 096.9^\circ$ $L = 20.5\%$ n = 6.

Overall - $\theta = 109.7^\circ$ $L = 64.1\%$ n = 15.

SEE DESCRIPTION



Equivalent of "Accrington Mudstones" MID. WEST. A.

CONTINUED

CONTINUED

More sst upward; units more frequent and thicker.

Coarsens upward to silt, with a series of coarsening upward cycles to fine med. crystalline white flinty sst + some roots, large vertical burrows, R.R., carb. laminae.

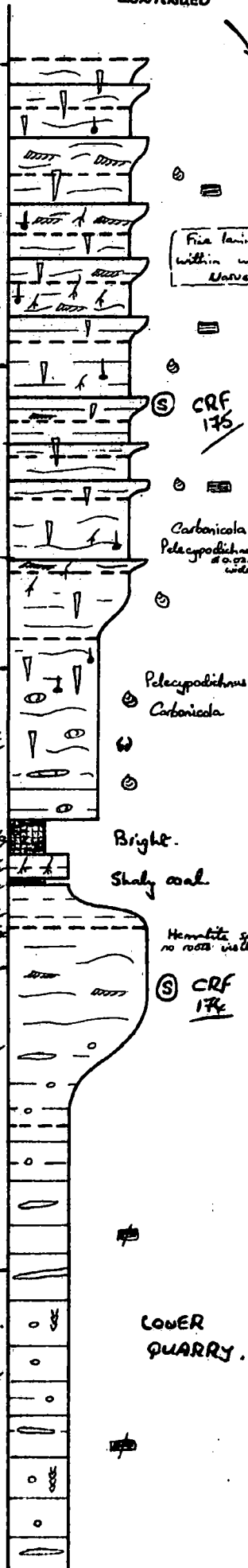
Red gray 11 lam. silty mts - hard - bivalve shells, some in place F + occasional siderite concretions

LOWER MOUNTAIN MINE
White/grey clayey mts
RAMBLER MINE

Fines up to brown/grey clayey sst - may be polygenic - originally bands of sst at top of sst. 10m burrows through light grey sst, still with nodules, to hard fine white flinty gasistroid sst - well-bedded, relict R.R. present

Dark grey shaly 11 lam. mts - siderite nodules & lenses - slight conc. in conc. development.

(SECTION 226)



CRF 175
CRF 176

9.55m

2.96m

0.56m

0.40m

0.03m

0.67m

3.30m

7.40m

LOWER QUARRY.

Bottom of SECTION

MSR SIL CARBON SST.

Coarsens to silt with small coarsening up cycles to fine white sst.

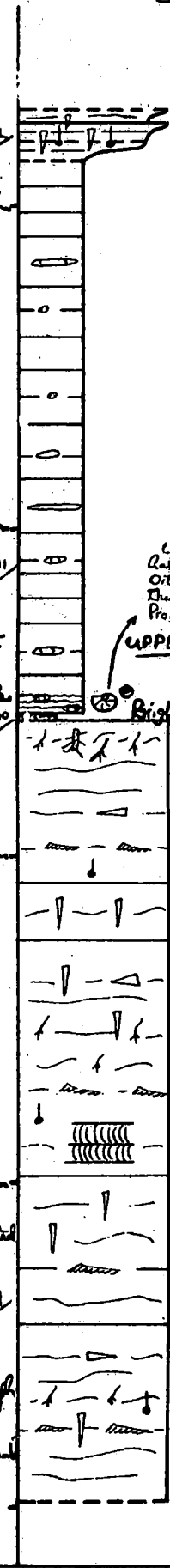
Dark grey shales with Fe stone nodules & lenses.

At base, black sooty shale with siderite concretions, abundant marine fossils.

Rooted at top, with large Stigmara roots.

BULLION MINE ROCK

Fine white flinty laminated though well cemented hard sst with varying proportions of mudily laminae - highly mic. in places. R.R., though all but destroyed by bivalve burrows, occasional roots.



0.82m
Pelecypodichnus

8.5m

UPPER QUARRY.
Lingula, Astrocrinus, Listri, Orthocrinus, Dumbarella, Productids

Bright. 0.05m

Stigmara

Calamites

12.0m

CRF 176

Planolites

Pelecypodichnus

CONTINUED

Lower and Upper Quarries - Composite log - CR
 SD 512048. Tectonic Dip 15/080.
 Lower quarry - east face → 007°. Upper quarry -
 east face → 338°. 10 h/w photos
 & samples. Other details - SEE DESCRIPTION.

* DIRECTIONAL DATA :- Unit 14 - Tabular
 x Set - 0.2m / 23/356° α = 1.

SECTION 226 -
 RAUENHEAD BRICKWORK
 QUARRY, UP HOLLAND.

TOP OF SECTION
 LOWER WESTPHALIAN A.

(Equivalent of)
 Warden Sst.

Dark grey 11 lam.
 shales + Fe stone nodules
 and 2 continuous
 0.1m Fe stone bands

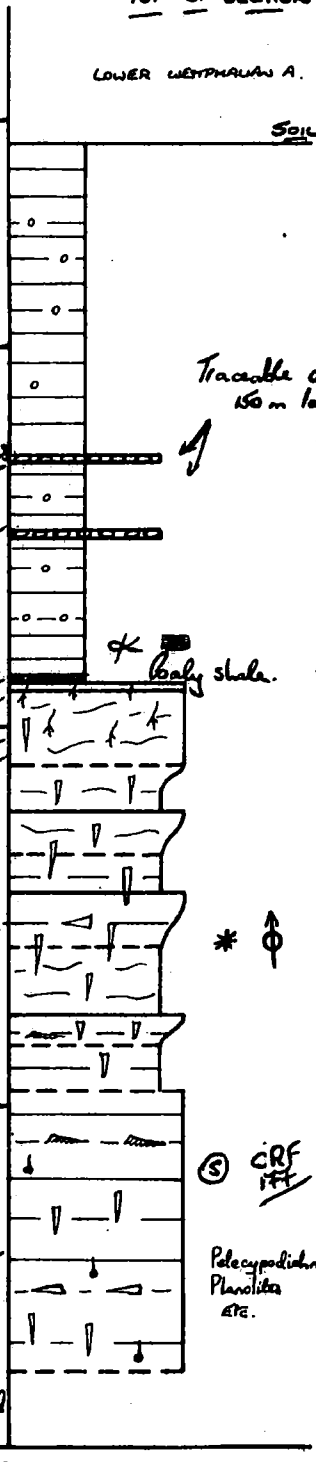
Shales papery at base.

INCH MINE
 Tough "ganister" at
 top 55m
 Clayey white/grey
 heavily rooted sst.

Interbedded silt
 and fine sst - as
 below in small
 coarsening upward cycles.
 Heavily bioturbated.
 Thickness increases to
 north.

INCH MINE
 ROCK.

Fine white RXL sst
 - lots of vertical and
 horizontal burrows -
 disturbed lamination -
 hard & flinty. Occasional
 silt partings



Tracable over
 150 m laterally.
 7.0m

CRF 178
 3.65m
 Plectyrodium
 Planolites
 etc.

CONTINUED.

SECTION 227 -
 ROUGHDALES BUFF
 QUARRY, ST. HELENS.

Composite log. Tectonic dip = 8/101.
 27m WESTPHALIAN C

Silt + sst interbedded
 - varying proportions of
 each - micaceous partings
 RXL - lenticular bedding

Med. grey shaly nit
 coarsening up to fine white
 RXL sst + nodules, laves
 of Fe stone

Fines to gray clayey
 nodular rooted hem. sst
 nit at top.

Muddy laminar
 tool marks. 20m

Fine white poorly
 cemented RXL sst
 - weathers a buff colour.
 Parting lamination present,
 and brecciation with
 dolomite mineralization

Brown grey shaly nit +
 soft brown hem./sid.
 concretions
 Dark grey shaly + coaly nit
 Mottled rooted light grey
 nit.

Mottled gray nit
 coarsening through
 silt → fine white sst
 - all rooted heavily.

Bright
 baby black shale.

Light gray mottled →
 buff nit + Fe stone
 nodules - laves, some
 formerly sst - heavily
 rooted at top.

Dark grey nit + nodules
 Med. grey nit + s.s. + nodules

Med. grey nit + s.s. →
 fine white RXL sst
 coarsening up to silt + s.s.
 Rooted grey nit + s.s.
 Fine white rooted RXL sst.

Fines up to gray nit +
 sandy streaks - rooted.

nit + s.s. coarsening up to fine
 white RXL sst + nit.
 Coarsening up to fine white
 RXL sst + sandy streaks.
 Dark gray nit + sandy
 streaks.

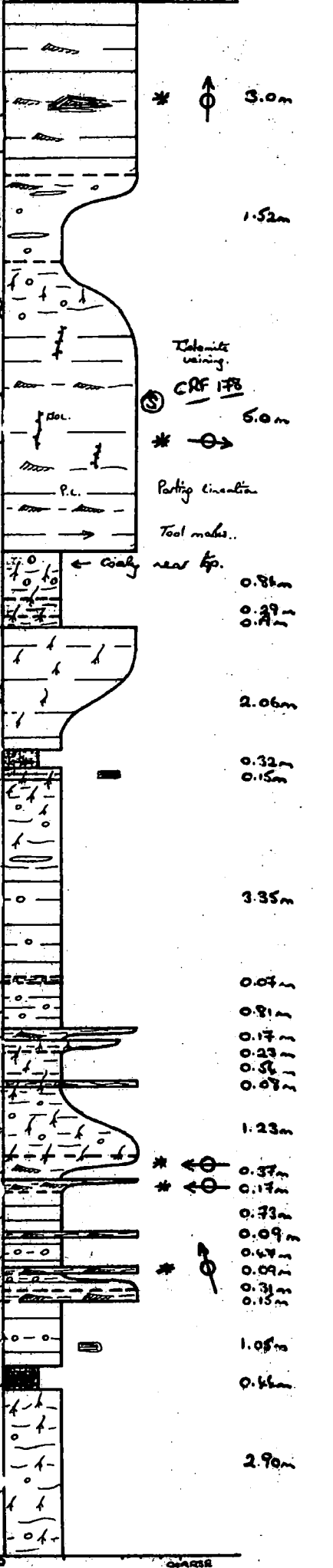
Fine white RXL sst.
 red grey 11 lam. nit
 Fine white RXL sst.
 Fines up to gray 11 lam nit.
 Fine white RXL sst.

red. grey 11 lam nit.

Hard dull banded coal.

red. grey heavily rooted
 clayey nit + nodules.

Base not seen.



Dolomite
 veining.
 CRF 178

Parting lamination
 Tool marks.

near top.

CRF 178



* DIRECTIONAL DATA :- SECTION 227.

SECTION 228 -

ROUNDALES LODGE
ST. HELENS QUARRY.
WESTPHALIAN G.

Tectonic dip 7/105.
O.R. S.J. 513919.
North of Lea Green Fault.
Erosive based sst limited in lateral extent to ~ 20m.

Based up to fine 20m white Rxl and plans asymptotic x bedded sst + muddy streak.

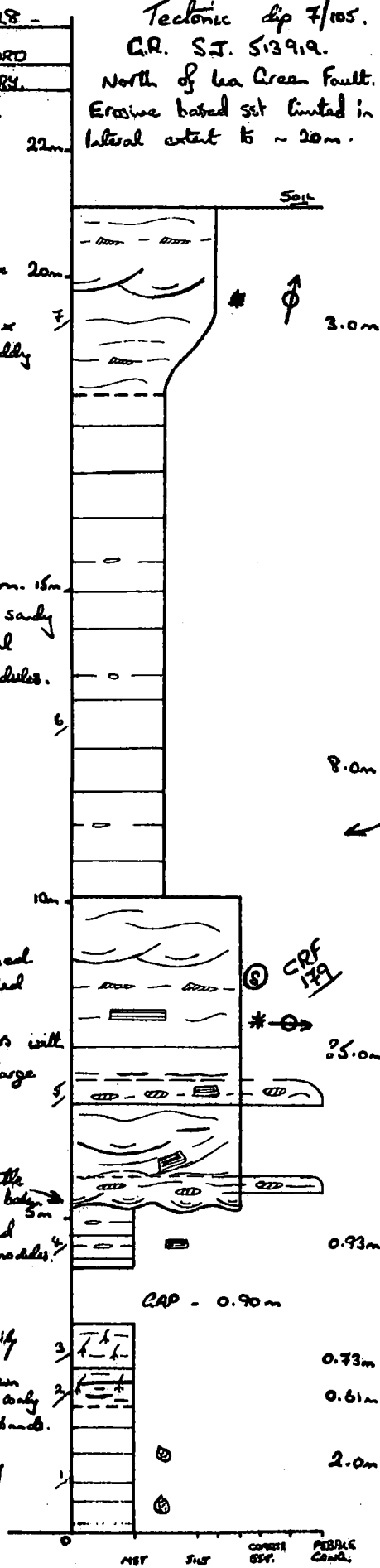
Light grey lam. 15m silty mt with sandy streak, occasional flat Fe stone nodules.

White/brown med grained x bedded and Rxl sst + conglomeratic layers with mt flakes and large plank fragments.

Series of very gentle shallow troughs at base of grey/brown mottled shaly mt + flat nodules.

Red grey heavily rooted mt. Dark grey mottled brown rooted shaly mt + sandy traces + thin coal bands.

Dark grey shaly mt + bivalves



- Unit 28 - Ripple x lamination → 003° n=1. $\Theta = 003^\circ$
 - Unit 26 - Ripple x lamination → 118°, 094°, 084° n=3. $\Theta = 099^\circ$ L=97.6
 - Unit 11 - Ripple x lamination → 258°, 294° n=2. $\Theta = 276^\circ$
 - Unit 10 - Ripple x lamination → 249°, 270° n=2. $\Theta = 275^\circ$
 - Unit 6 - Ripple x lamination → 339°, 032°, 315° n=3. $\Theta = 319^\circ$
 - Overall - $\Theta = 336.4^\circ$ L = 33.8% n=11.
- Section also logged in Wigan Coal. guide - agreement not complete! Composite log - several faces in quarry.

* DIRECTIONAL DATA :- SECTION 228.

- Unit 7 - Ripple x lamination → 006°, 013°, 354°, 045°, 022°, 023°, 024° n=7. $\Theta = 018.1^\circ$ L = 96.6%
- Unit 7 - Planar asymptotic x sets (0.1m+) → 007°, 050°, 008°, 352°, 051°, 020°, 050°, 011° n=8. $\Theta = 023.6^\circ$ L = 92.9%
- Unit 7 - Overall - $\Theta = 021.0^\circ$ L = 94.5% n=15.
- Unit 5 - Rxl → E + N - no measurement.
- Unit 5 - Plank fragments → 094°, 100° $\Theta = 097^\circ$
- Unit 5 - Trough x sets → 1. 0.1m x 0.3m → R/091° $\Theta = 091^\circ$
2. small → 089° $\Theta = 089^\circ$
3. series at base → 092° L = 100%
- Unit 5 - Overall. $\Theta = 093.2^\circ$ L = 99.8% n=5.
- Overall - $\Theta = 037.8^\circ$ L = 82.0% n=20.

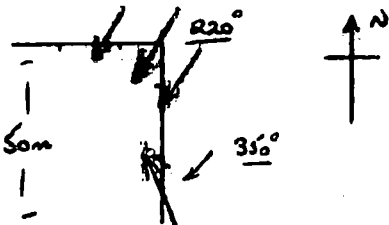
Crowbar visit to Binchester Crags.

1. Bottom Tilley in stream section is 0.22m Bright coal.
2. Top Tilley in stream section - full thickness not visible - presence of band not ascertainable - thickness estimated at 0.65m - allow Section 191 slightly.
3. Sst lenses in trough channel section - crowbar applied to top layer of 4th lense (b). - outcropping block removed - evidence still inconclusive - behind the block is a highly weathered clayey med. grey sand - sed. structures not preserved, but character totally different from enclosing sediment. 3rd lense does look concretary, but then all the lenses have been preferentially attacked by siderite and may have developed as concretions - But I still think that there is an underlying reason for the preferential cementation, and it is in the sedimentary history of the rocks as the lenses represent cross sections of small streams. CRF 180, 181, 182.

C.R. FIELDING - 18.9.80.

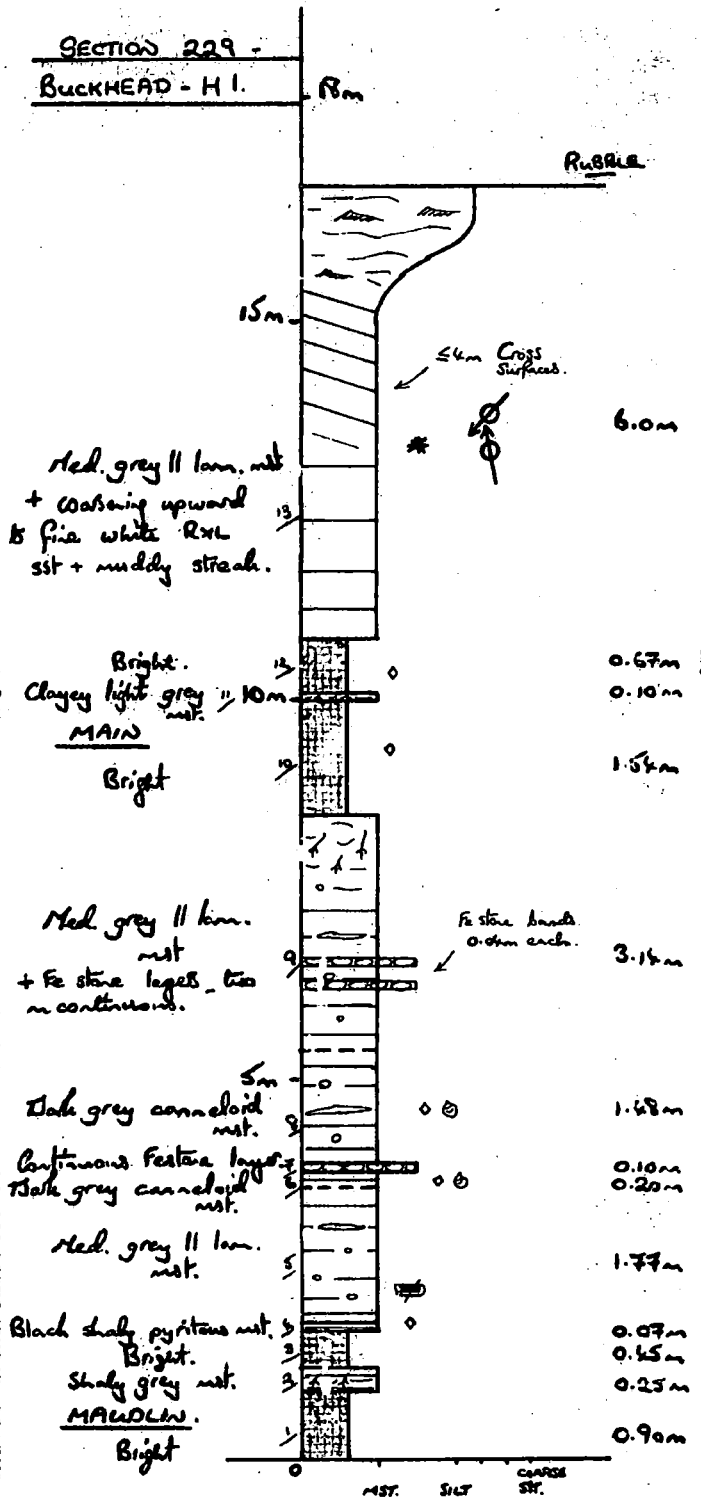
BUCKHEAD.

Area H - workings on Main and Maundlin still going - wall ~ 20m further back than on last visit. Angular discordance in mudstones over the Main is well exposed - but access not easy. 2 photos taken. Up to 4m height on cross surface. - dips toward 220°. - comes down nearly to level of coal. Another x face of smaller vertical extent (m 2m) occurs on the n-s wall - dipping in the opposite direction (→ 350°). This infers lake filling from several directions.



Area C - low Main Post - still reducing to coal on north side of fault. 3m of hard well cemented facies presently at base of section. Some larger x Bedding visible - more interleaving present in upper part of section. * Trough set 1.0m/23/100°. long wall tracks → 320°. Common occurrence of intermixed silt & sand, in varying →

SECTION 229 -
BUCKHEAD - H 1.

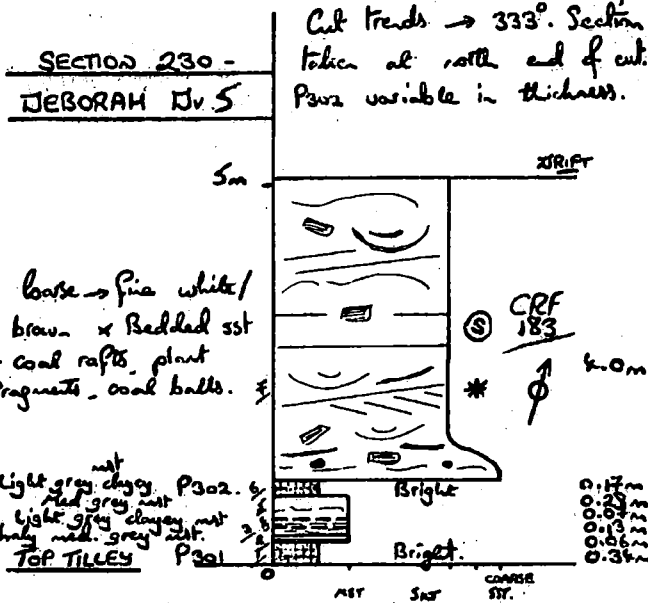


proportions - no systematic change in grain size up section. Muddy laminae common in sst. plant fragments, esp. Calamites.

NB Thickness between Main and coarsening upward sequence underestimated in section 205.

* DIRECTIONAL DATA :-
Unit 13 - large scale x faces dipping → 220° - 350°.

No samples, 2 photos.
Area B - presently removing drift.
Area A - quality complete - backfillings



* DIRECTIONAL DATA:-

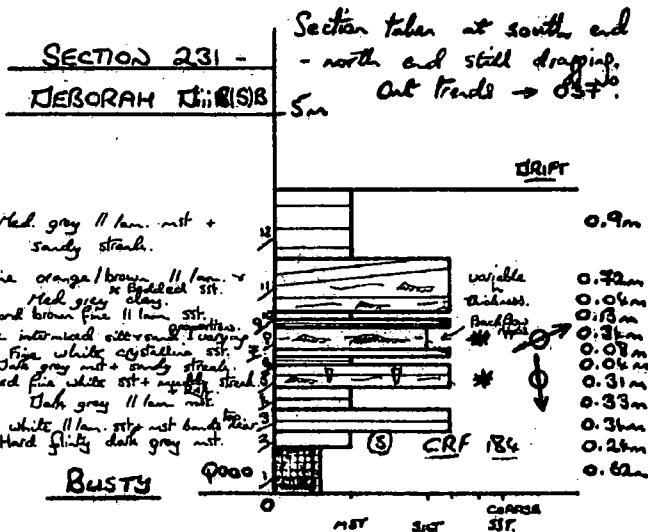
Tabular x sets: - 1. 0.1m/19/040 2. 0.15/29/030
3. 0.1/26/071 $\wedge = 3$. $\theta = 047^\circ$
 $L = 96\%$

Trough x sets: - 1. 0.1/20/018 2. 0.2/20/035
 $\wedge = 2$. $\theta = 027^\circ$

Planar asymptotic x sets: - 1. 0.1/10/356. $\theta = 356^\circ$
2. 0.15/12/336 3. 0.1/10/333. $L = 98\%$

Overall Mean - 018° $L = 91\%$ $\wedge = 3$

NB Rafts of coal in TTP $\leq 2m$ long. Part of previous cut exposes down to P300 - facies similar to previous cuts. Balls of coal present in TTP. \hat{c} rounded before trapped in sediment.

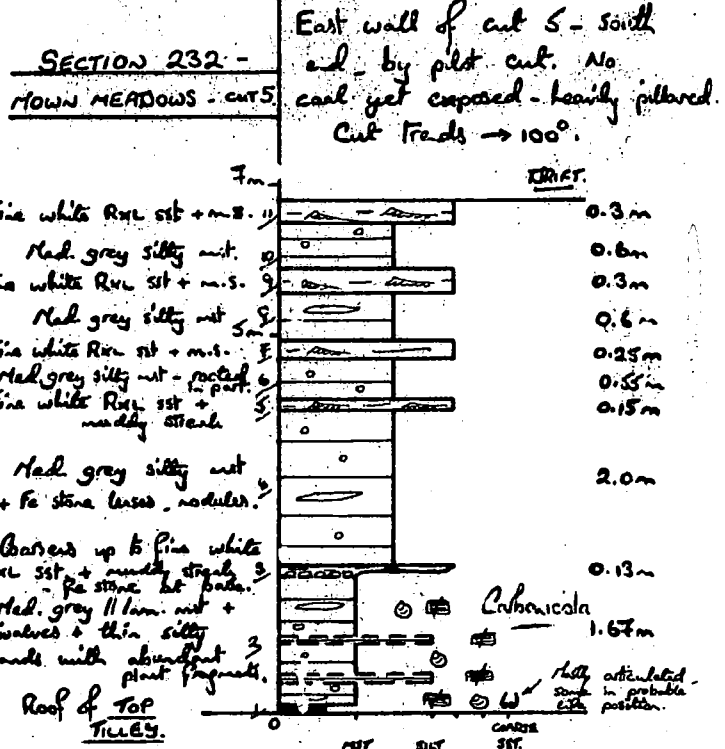


* DIRECTIONAL DATA:-

Unit 8 - Ripple x lamination $\rightarrow 064^\circ$, 070°
 $\theta = 067^\circ$ $\wedge = 2$.

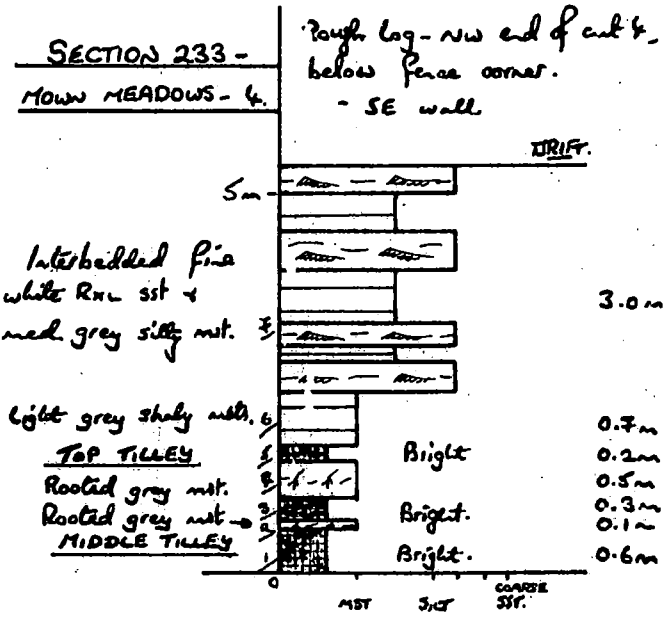
Unit 5 - Ripple x lamination $\rightarrow 175^\circ$ $\wedge = 1$.

NB Hard flint mt over Busty - lithology usually found at coal seam bands. All units laterally persistent along 40m of face - Unit 11 thickest to north. Dogleg cuts not presently working.

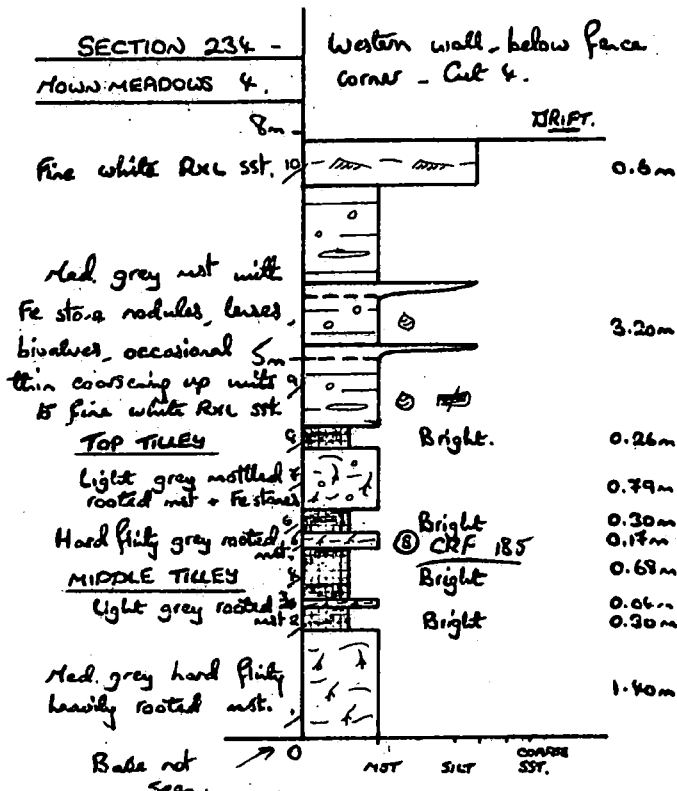


To south, thin pilot cut exposed similar rock. Sst units thicker along face to NW.

1st two units - visible on opposite face - thin drift cut out. Drift cuts down to south. Pilot cut $\approx 100m$ long. Presently cooling beneath fence corner at NW end of Cut 4.



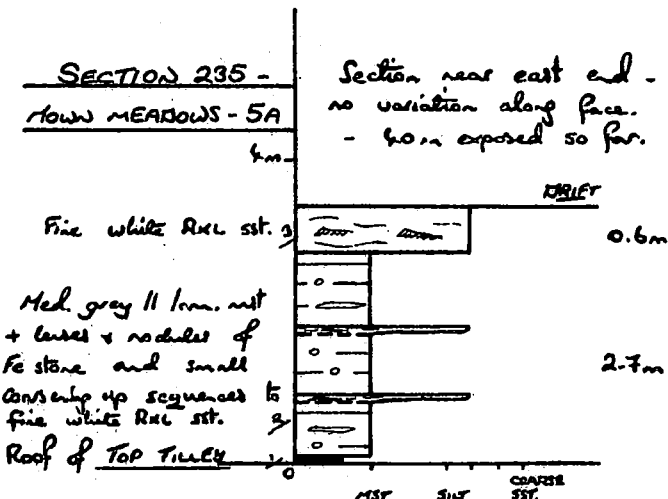
See also Section 234 - NW wall



- presently reducing to Bottom Tilley.

Lateral continuity of units difficult to assess, due to heavy old workings, but thin sst & sst/festone bands appear to fade away laterally, in some cases, - uppermost unit more continuous, and uniform, though the top is possibly truncated by drift.

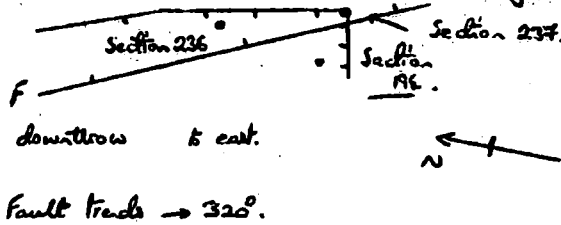
Cut 5A trends $\rightarrow 012^\circ$ - only roof of Top Tilley presently exposed.



Considerable shpping due to old workings.

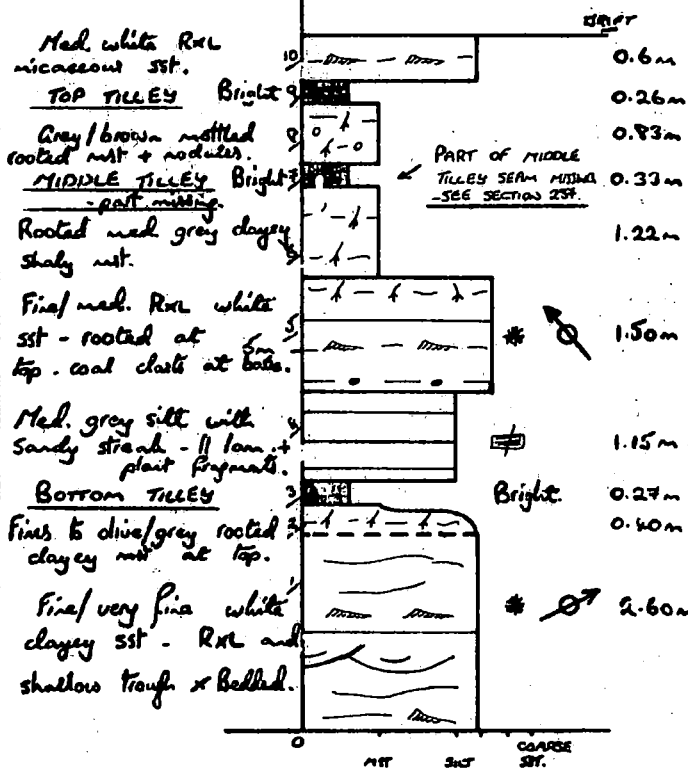
CABIN HOUSE

NB Section 194 Area B(w) - Bottom Rusty thickness is 0.82m. Now worked out at south end, presently dragging 40m to north, 20m south of corner. Sidewall ~ 10m further east than on last visit. Trends $\rightarrow 334^\circ$. New clearance exposes course of a fault - runs diagonally across the cut, bringing down the Tilley to the east - this makes part of Section 194 inaccurate, and alters the seam names along the face for the past two visits. "1P00" is Bottom Tilley.



Fault trends $\rightarrow 320^\circ$.

SECTION 236 - CABIN HOUSE - B(w) South end of long side wall - east of fault. Cut T6

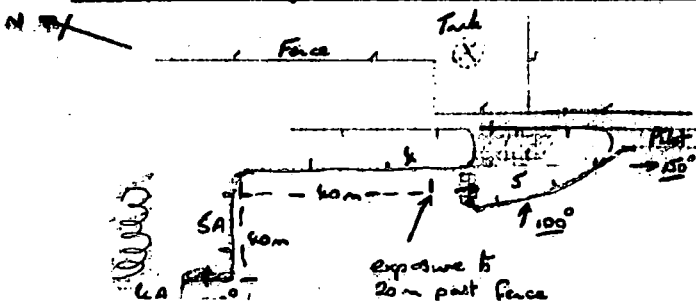


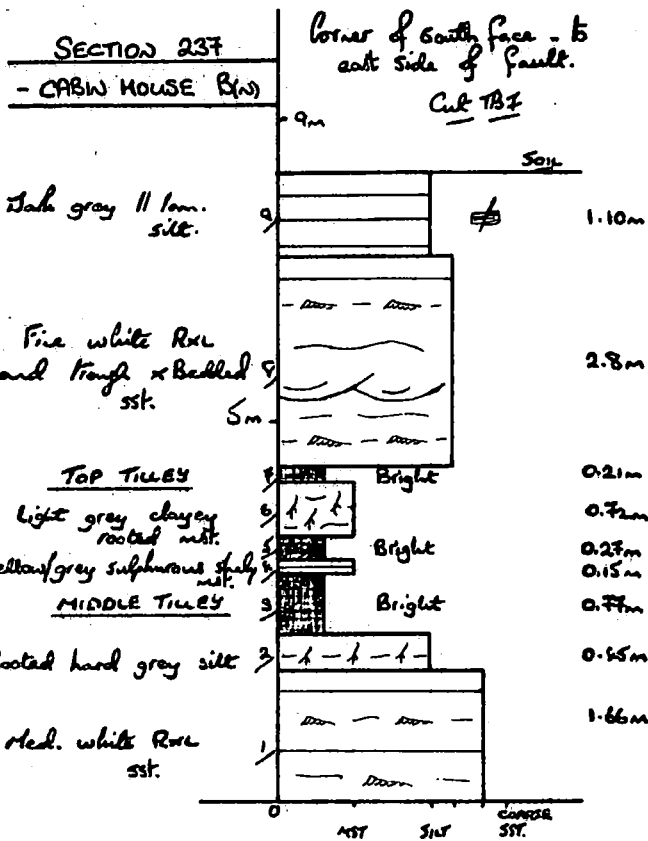
* DIRECTIONAL DATA:

Unit 5 - Ripple cross lamination $\rightarrow \theta = 318^\circ$
 $325^\circ, 307^\circ, 312^\circ \quad n = 3. \quad \underline{L = 98\%}$

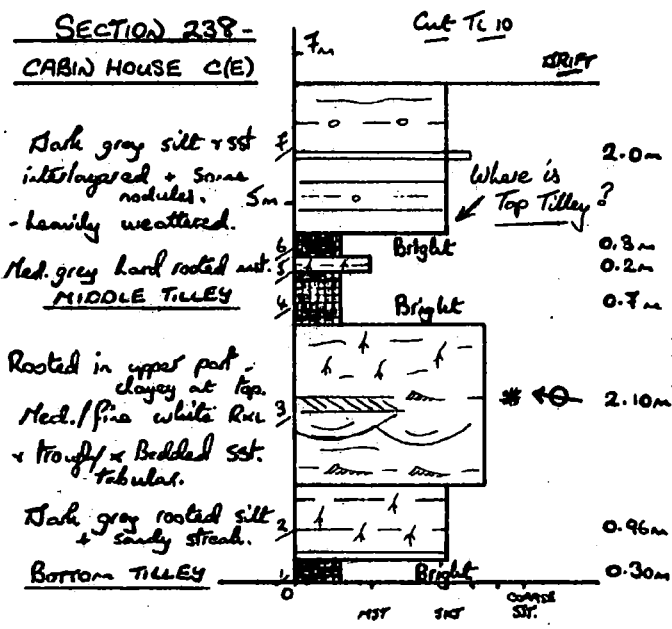
Unit 1 - Ripple cross lamination $\rightarrow \theta = 051^\circ$
 $349^\circ, 357^\circ, 107^\circ, 083^\circ, 072^\circ \quad n = 5. \quad \underline{L = 68\%}$

Unit 1 - Shallow trough & set. (0.1m) $\rightarrow 070^\circ \quad n = 1. \quad \underline{\theta = 070^\circ}$





Full exposure of Middle Tilley - not reduced by old workings. Area B(S) - platform on Middle Tilley from former visit still present - shortly to be bulldozed.



* DIRECTIONAL DATA :-

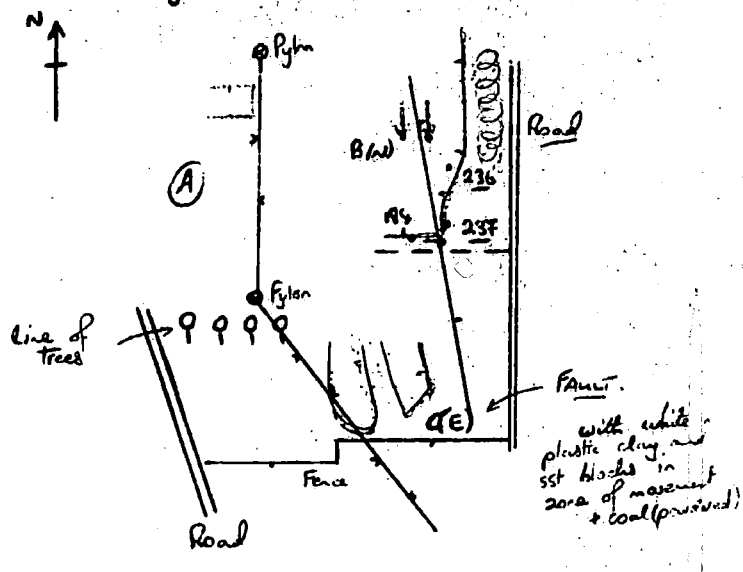
Unit 3 - Ripple x lamination → 30°
n = 1

Unit 3 - Small Tabular x sets →
309° - 267° n = 2.
θ = 288°

Overall - θ = 293° L = 95%

Section at NW end of cut.
Cut trends → 127°

Plan of workings - 24.9.80.



Area A - One Brochwell cut on from last visit - now only 20m from northern pylon - still dragging - inaccessible.

Area B(W) - on same cut as last time - more coal taken - dragging 40m north of S. wall - shortly before long wall corner. Fault crossing cut brings down Tilley to East - naming of same in previous sections is wrong - and Section 194 is in part inaccurate. Side wall now more or less sheer.

Area B(S) - platform of previous visit on Middle Tilley still present - shortly to be removed.

Area C(W) - as per last visit.

Area C(E) - One cut further on Middle / Bottom Tilley workings - remains of previous cut presently being tipped in.

Line of pylons trends → 163°. At pylon immediately to north of line of trees, change of direction to ~ 110°.

Measures over Brochwell - n lam 11 lam. med grey silt - sst above probably cut out by drift. Little lateral or vertical variability visible.

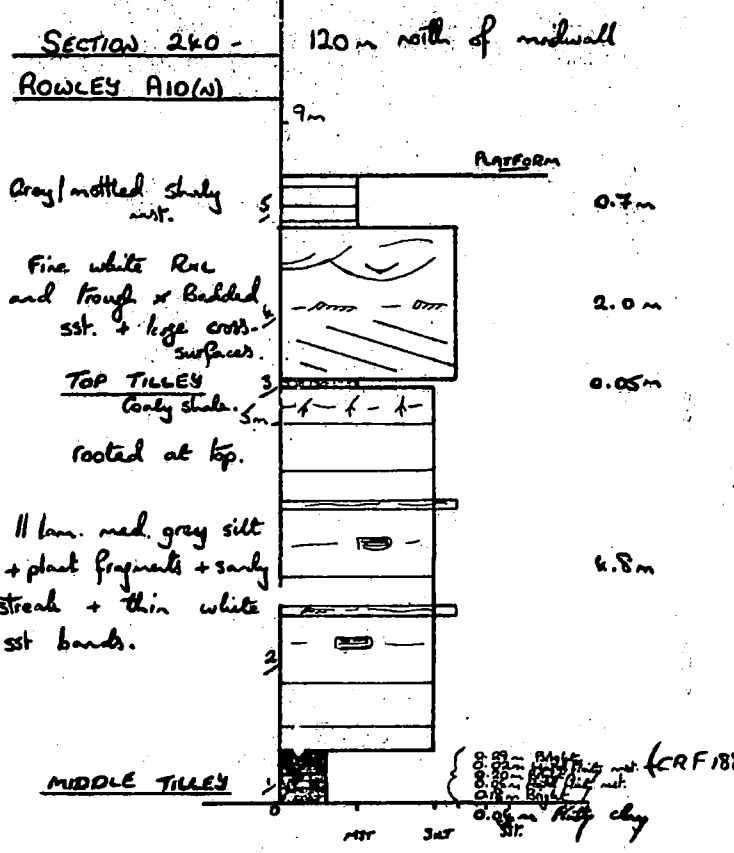
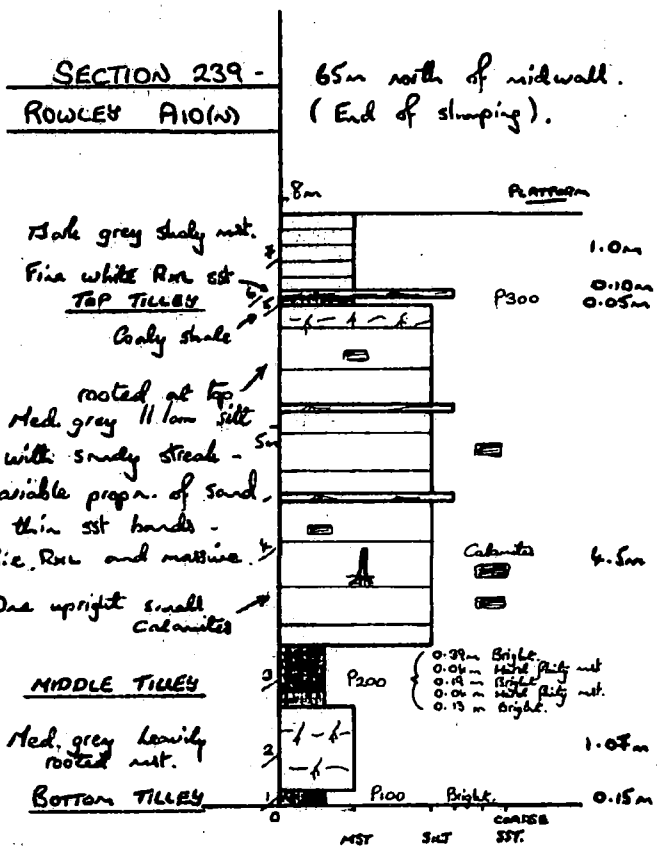
No samples or photos. Some day.

AB Cabin House - Sections affected by fault - now corrected :-

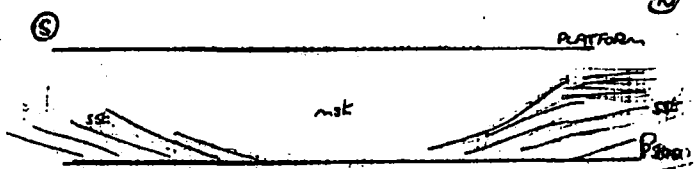
- 173, 174, 175 - 1.8.80.
- 194 - 27.8.80
- 201, 202, 203 - 28.8.80.

Long section.

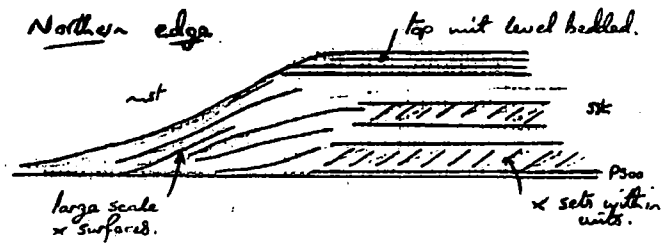
Correct sections - 236/7.



At this point - progressing to north - the Top Tilley Post wedges out more or less completely - place taken by dark grey shaly mt. - comes back ~ 55m along face. Possible channel bedding at margins of sst - 3 photos.

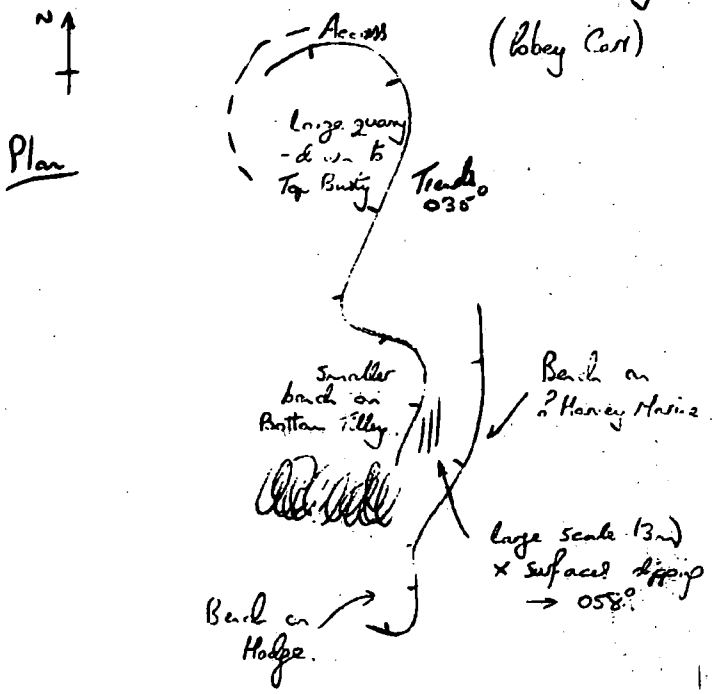


Facies otherwise very consistent along face to north - thin fine sst bands traceable to north. At 120m north of midwall - sst coming back in.



Further - 60m exposure is total 180m - dipline still working - facies display no variation in character or thickness along the rest of the face. Little x bedding or warping visible in TTP. sst bands in silt mt laterally persistent. Washouts? Above platform - another ~ 2m of silt & mt + some sst horizon (some discontinuous), thin trace of coal below

Tookills Quarry (lobey Cor)



Composite section - 241 - over - not complete on this visit. Total section Top Busty -> Harvey Marine +.

CONTINUED.

Light gray mst + sandy streak + Fe stone nodules + lenses - all rooted. 3.4m

Dark gray papery shales + coal traces. HOOPE 0.16m
Bright Hard sh. only ch. 0.13m
0.06m

Med. gray clayey rooted mst + nodules. 2.65m

Fine/med. white/brown Rxc and x bedded sst - only Rxc at top. 15m

CRF 187

* \rightarrow $n=13$

TOP TILLEY

Interbedded fine white x bedded sst and gray silty mst - rooted + nodules. Ledge x surfaces. 1.70m

CRF 186

0.09m
0.03m
0.06m
0.18m
0.11m

Fine/med. white/brown x bedded x Rxc sst - some muddy laminae. 1.91m

Med. gray shaly mst. Mottled rooted shale. MIDDLE TILLEY Rooted dark gray mst. Bright

Med. gray rooted silty mst \rightarrow fine brown mica sst up. 0.99m

BOTTOM TILLEY

Top rooted. 0.17m

Bright

* Horizontal fine sand beds Parallel Possible wave-influenced ripples. 5.7m

Silty mst + sandy streak - varying prop. of sand + nodules, burrows, lenticular bedding, ripple form sets coarsening up to fine white Rxc burrowed sst + vertical loading carb. laminae. 5m

Med. gray shaly mst + nodules. 0.31m

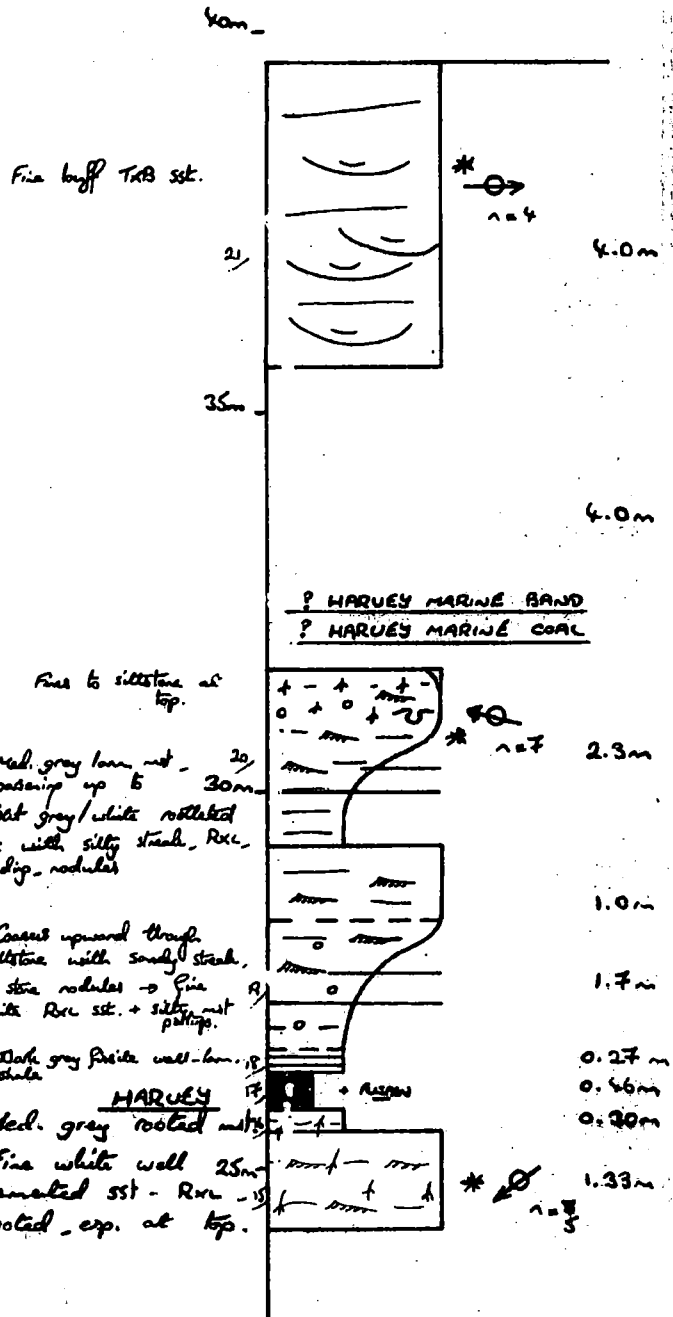
TOP BUSTY

Bright. 0.57m

Unit A contains a 30m wide, 1m high channel cross-section - further to the south - inaccessible.

SECTION 241
COBEY CARR QUARRY.

Composite section.



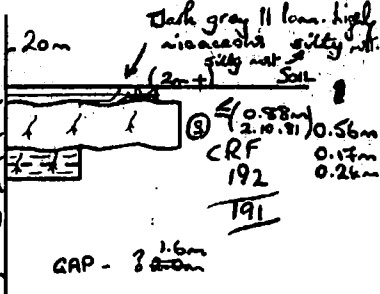
BESSY'S BANK QUARRY

SECTION 242 -

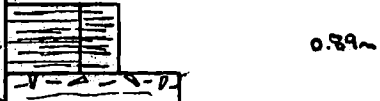
CASTLESIDE

GANISTER QUARRY.

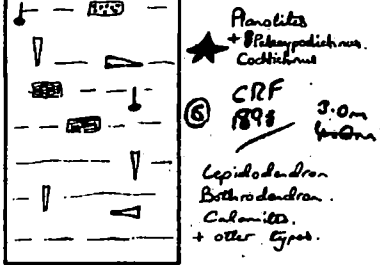
MAIN QUARRIES
 sst - rooted - ganister
 Hard flinty fine dark grey
 white/cryst
 Med. grey clayey rooted nit
 Probably same lithology



Dark gray shaly silty sst.
 Top heavily bioturbated.



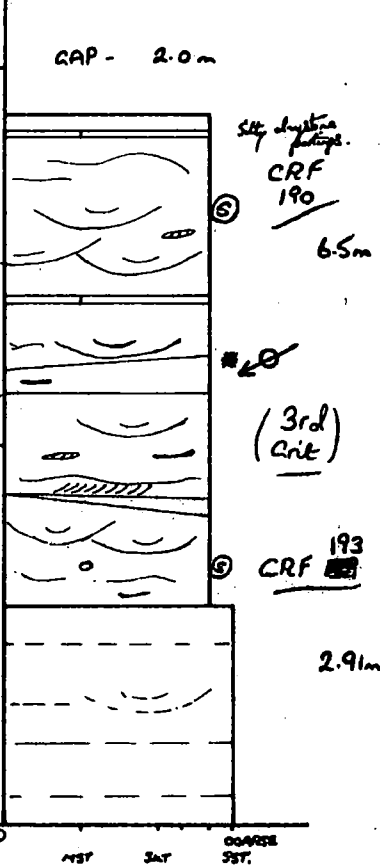
Hard dark gray flinty poorly laminated sst
 - fine grained - muddy laminae - abundant drifted plant debris
 ≤ 1m + long. + several types of trace fossils.



Cap - shales + ? coal

Red brown med. graind trough cross-bedded soft sst - containing occasional (0.1m) blocky grey nit intervals near top - coaly traces - occasional corroded Fe stone nodules, shale clasts, etc. partings - carbonaceous laminae.

base white soft crumbly poorly laminated sst with relict x Bedding - few structures preserved.



* DIRECTIONAL DATA :- Unit 2 - Trough

- x Bedding - $\lambda = 23$
- 0.4/16/258, 0.4/12/228, 0.25/10/288, 0.5/16/245,
- 0.5/6/252, 0.2/13/230, 0.6/14/267, 0.7/8/210,
- 0.3/12/235, 0.8/6/211, 0.5/10/199, 0.2/12/268,
- 0.1/10/246, 0.15/10/229, 0.3/12/237, 0.3/12/252,
- 0.1/8/240, 0.1/10/243, 0.3/9/230, 0.2/9/244,
- 0.1/12/267, 0.2/14/245, 0.15/12/263.

$\theta = 242^\circ$ $\phi = 94^\circ$ $\lambda = 23$

C.R. of main quarry = 076495 (N2)

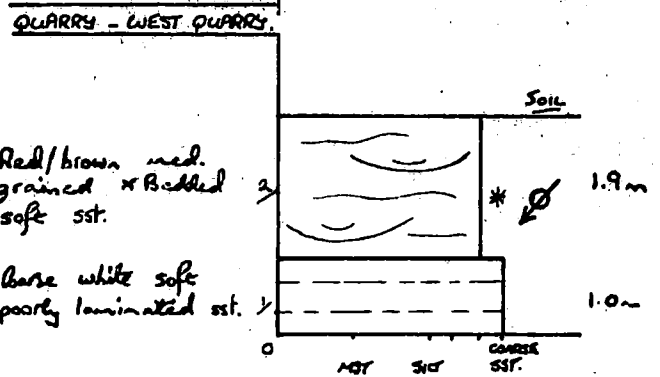
Face trends $\rightarrow 050^\circ$

Section 242 is composite.

Small quarry on west side of A68 - same levels 5m at Section 242 - C.R. N2 076493.

SECTION 243 -

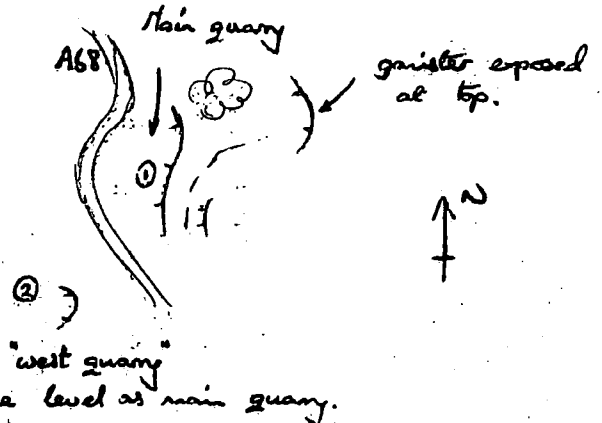
CASTLESIDE GANISTER QUARRY - WEST QUARRIES



* DIRECTIONAL DATA :- Unit 1 - Trough
 x Bedding - 0.2m/12/231 $\lambda = 1$

NB Junction between Units 1 & 2 is at various levels round the quarry - red oxidation has moved down into the coarse unit.

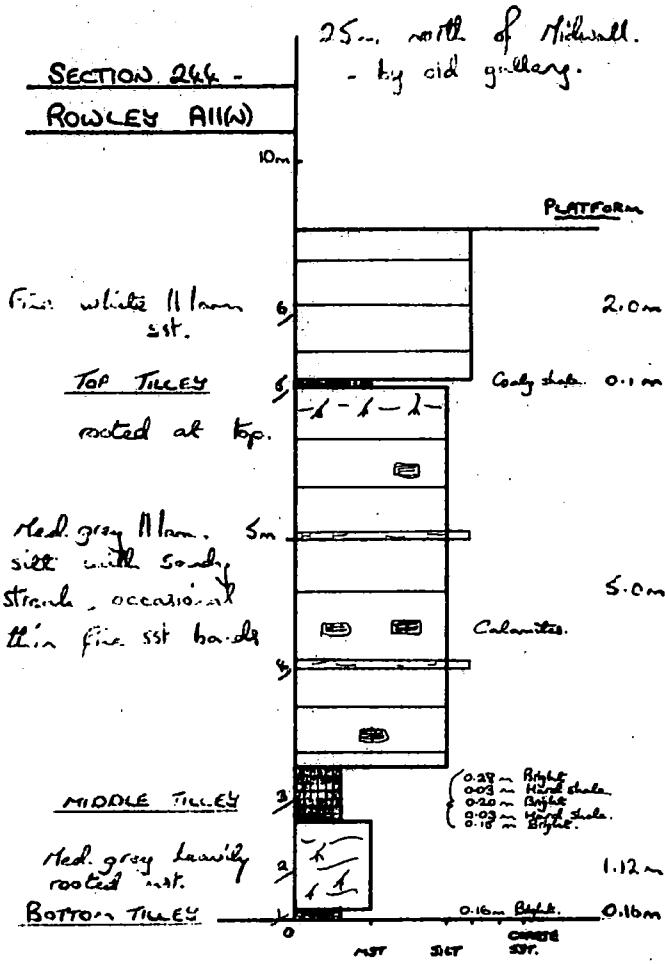
PLAN OF QUARRIES



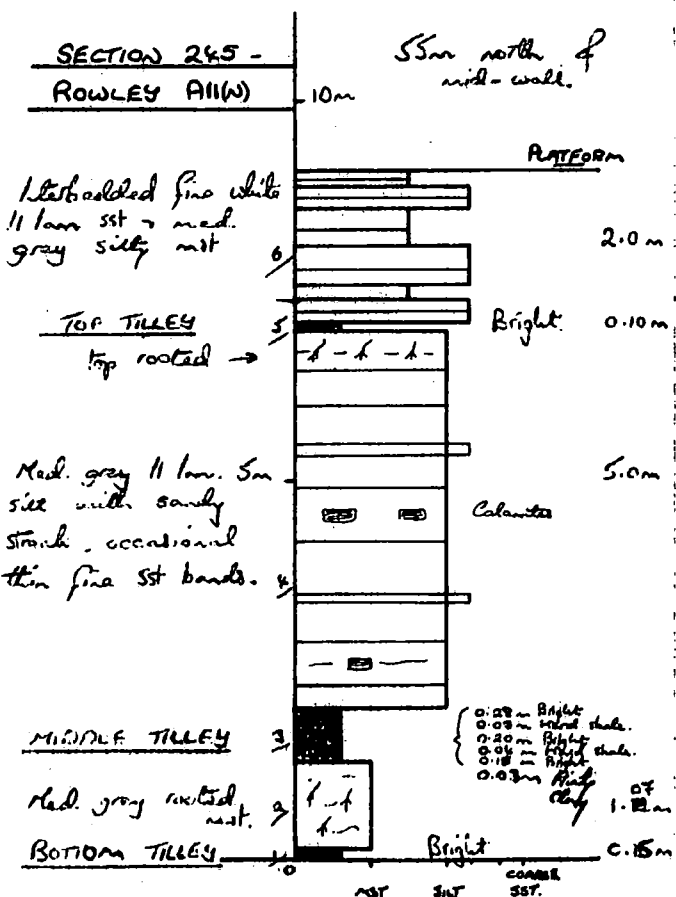
Notes Tectonic dip negligible - very slightly to east - doesn't affect x Bedding. Stratigraphic horizon uncertain - probably "3rd Lit" - between Quaternary & Kangaroo MB.

Trace fossils in Unit 3 - Pileopodichnus, Coelichnus, Alveopodichnus. Vertical burrows: horizontal trails - nearly sinusoidal + Paleocypridichnus - Planolites & 10mm diam.

NB Visit to Rowley 30.9.80

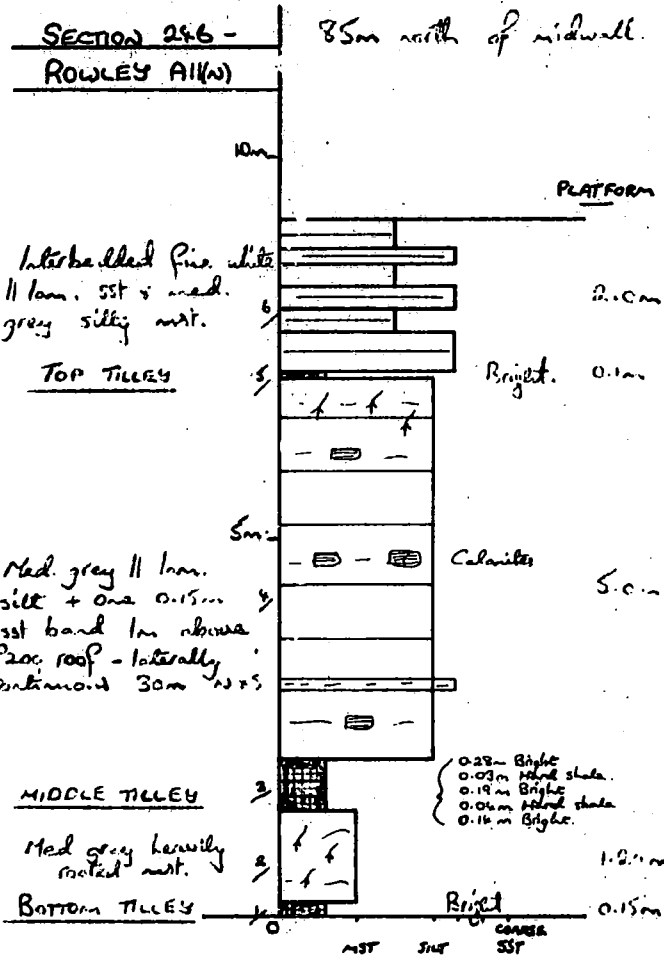


Sst bands in silt mat only very occasional. Marked uniformity in facies along face.

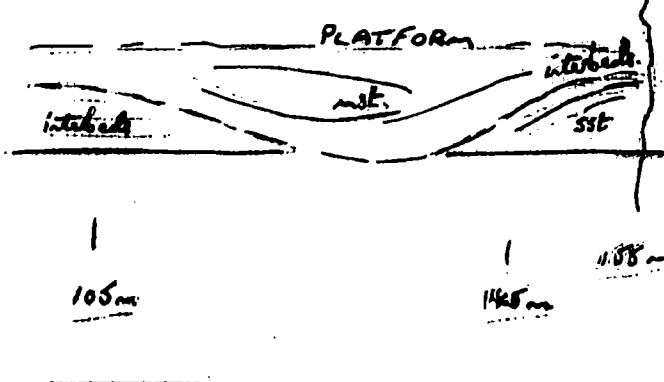


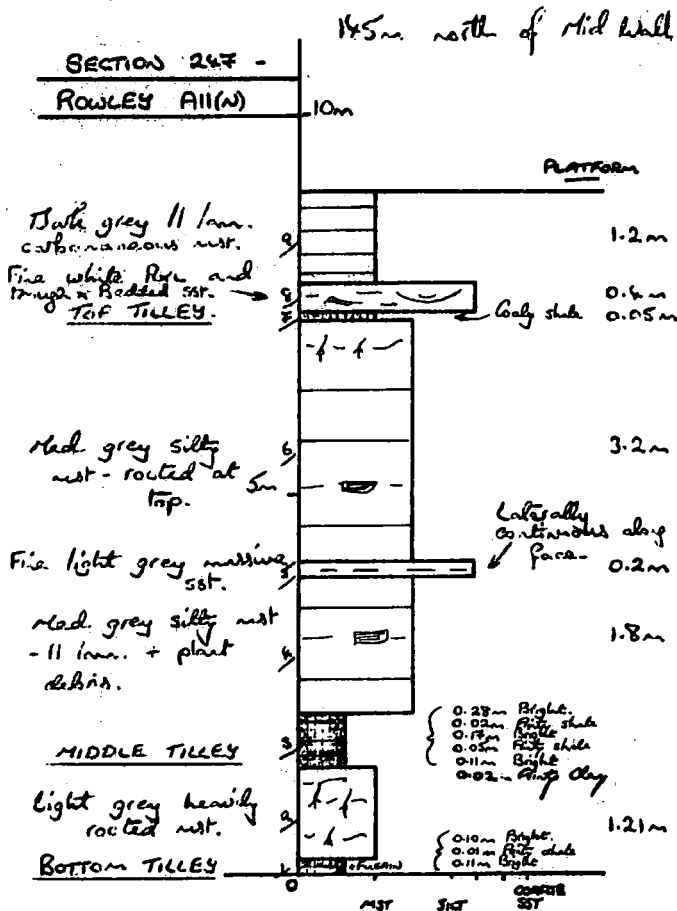
Intertbedded facies of Top Tilleys Post lies over the solid ssts to the south, cuts down to the north.

Channel structure in Tilt - sst - sst - mat - starts coming down 25m to south - centre 5m to north - interbedded facies continues to north.

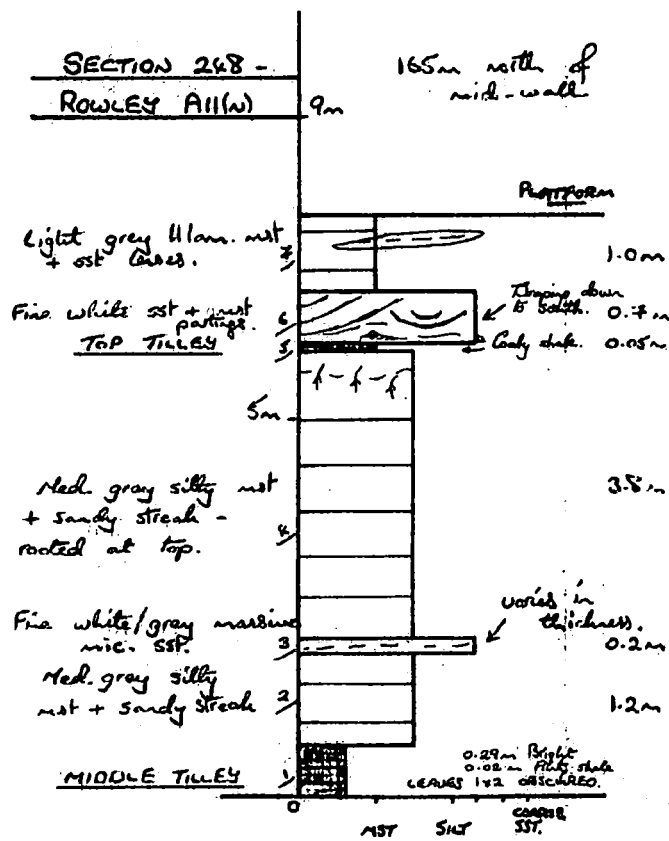


NB Presently - another 20m of exposure down to P100 - then 50m down to P200 - dropping at 135m north. At 105m north - mat cuts down over Top Tilleys Post - another shallow channel - continues for 50m to 145m - then solid sst comes back in - in middle of channel - lithology is med. gray mat - no sst or P300.

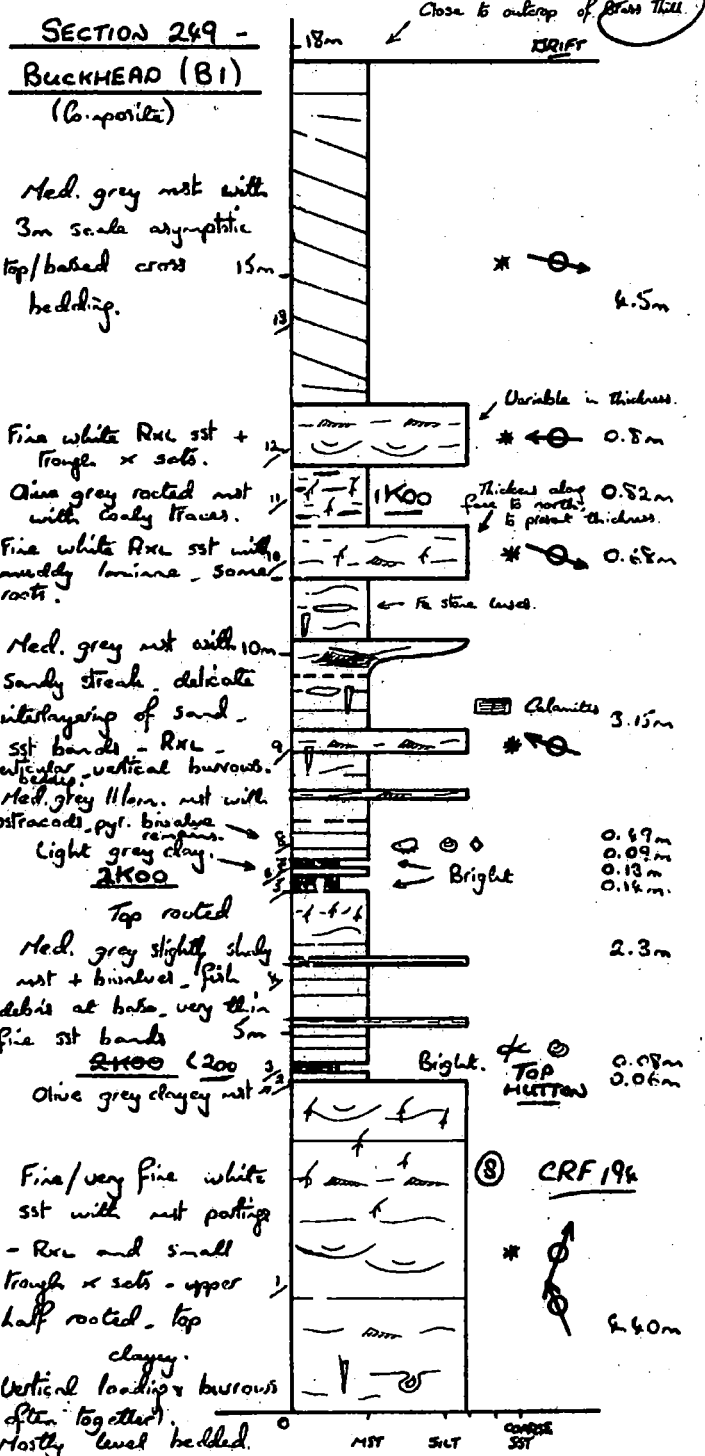




Top Tilley Post coming back in after 2nd washout. At this point, TTP sst has only very thin mst laminae - to north, thicker mst partings develop within the sst. Draping effect (down to south) in sst apparent for another 20m to north, 160m north - project step onto P200.



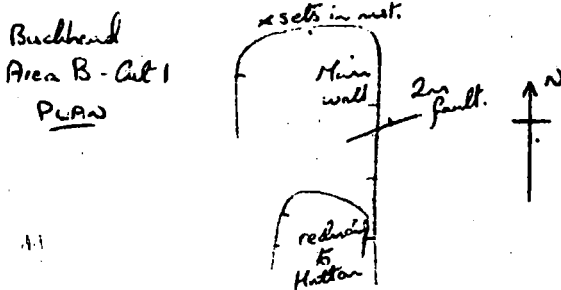
Unit 3 though laterally variable in thickness, is continuous along the face. Units 2 & 4 contain very thin fine laterally discontinuous sst bands along the face. Section continues for another 30m then pilot cut 30-40m to east of cut - facies very uniform along the face - thin sst unit laterally continuous. P300 grades into coal - TTP becomes 2m solid sst overlain by 1m med. grey silty mst + lenses of fine white sst. 2 colour slides taken.



DIRECTIONAL DATA - SECTION 249.

- Units 9-13
- Overall $\theta = 359^\circ$
 $L = 23\%$
- Unit 13 - 3m asymptotic topset/baked cross-sets $\rightarrow 112^\circ$ $\lambda = 1$
- Unit 12 - trough x sets 0.6m $\rightarrow 265^\circ, 287^\circ$ $\lambda = 2$ $\theta = 276^\circ$
- Unit 10 - ripple x lamination $\rightarrow 140^\circ, 115^\circ$ $\theta = 121^\circ$ $L = 92\%$
 $087^\circ, 112^\circ$ $\lambda = 4$
- Unit 9 - ripple x lamination $\rightarrow 330^\circ, 307^\circ$ $\theta = 336^\circ$ $L = 60\%$
 $117^\circ, 320^\circ, 351^\circ$ $\lambda = 5$
- Unit 1 - ripple x lamination $\rightarrow 020^\circ, 065^\circ$ $\theta = 031^\circ$ $L = 98\%$
 $017^\circ, 360^\circ, 030^\circ, 052^\circ$ $\lambda = 6$
- Unit 1 - Trough x set - 0.1m/22/335

OVERALL $\theta = 016^\circ = L = 46\%$

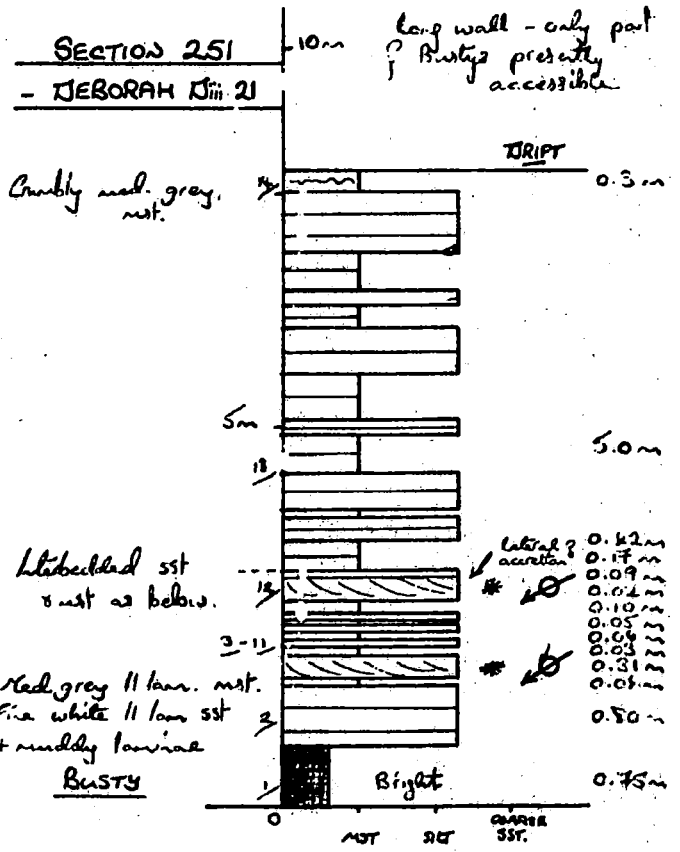
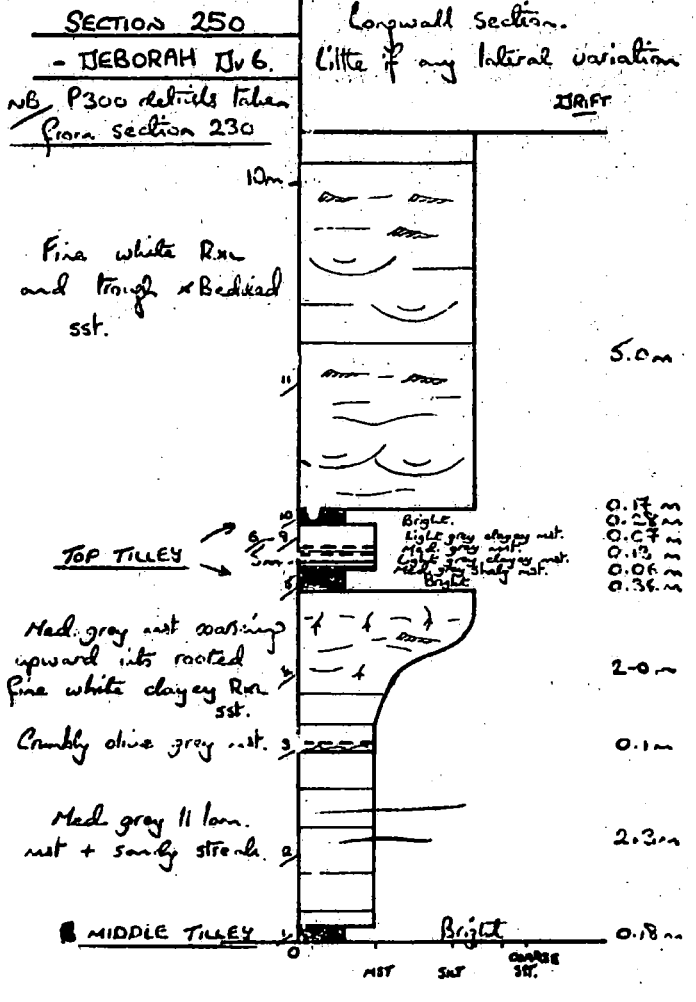


Under bottom of section, ~2m sets down to Hutton, exposed as pillars in bottom of cut. Top sst variable in thickness along face - no muddy laminae (sst beneath contains muddy partings) 1 column slide taken. Some of the thin fine sst bands are laterally persistent. Area C - still excavating to low main. Area H - presently digging new cut to main & Mainlin.

Afternoon - Jeborah

- Site progress -

- Area Jiii - Cuts 10, 19, 21
- Busty.
- Jiv 41, 40 - Top Tilley.
- Jv 6 - Tilley's
- Jiv 5 - Tilley's
- 8 - Harvey

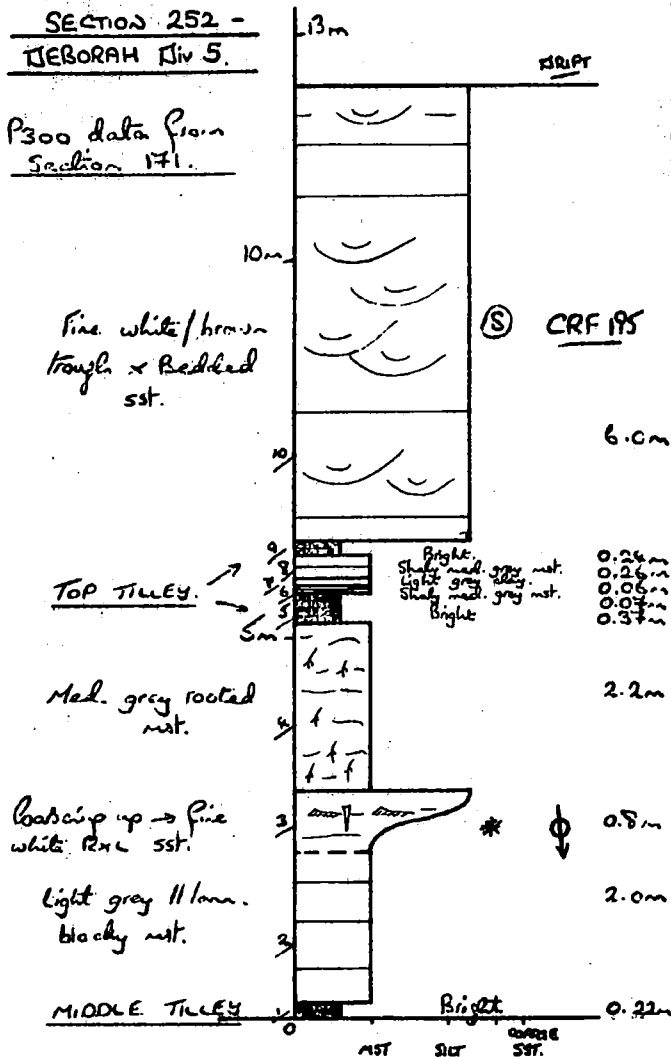


DIRECTIONAL DATA.

- Unit 12 - Trough x set 0.3m $\rightarrow 232^\circ$ $\lambda = 1$
- Unit 4 - Trough x set 0.3m $\rightarrow 224^\circ$ $\lambda = 1$
- No consistent direction of thickening or thinning - some

**SECTION 252 -
DEBORAH Div 5.**

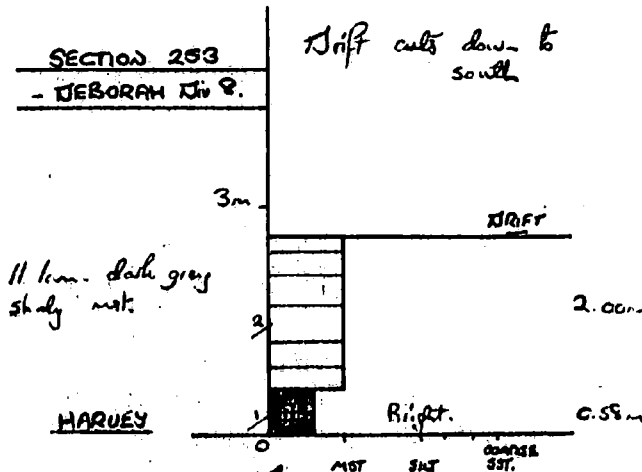
P300 data from
Section 171.



* DIRECTIONAL DATA :-
Unit 3 - R x L → 184°, 159°. n = 2.

Coarsening upward sequence is not readily apparent in outcrop. 1 colour photo taken. Cut trends → 200° - N. and at fault with 32m displacement - Buxty brought up to north - fault 11 to pylons, m 20m to east.

**SECTION 253
- DEBORAH Div 8.**

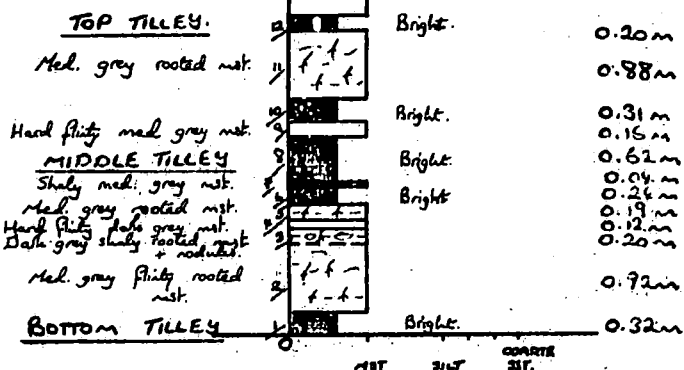


Bottom lam. obscured - 0.17m thick, separated by 0.10m mat parting.

**SECTION 254 -
MOWN MEADOWS - 6.**

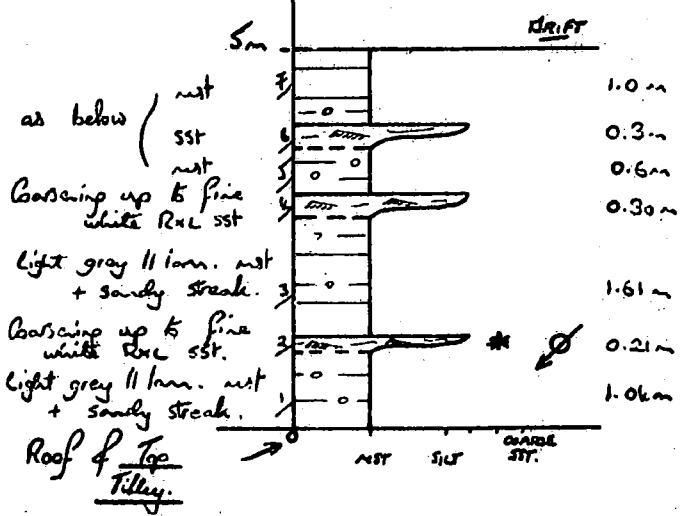
Interbedded med. gray 11 lam. mat x fine white 11 lam. sst - in ~0.3m units.

Light gray 11 lam. mat + sandy streak + nodules - leaves + layers of Fe stone. 5m

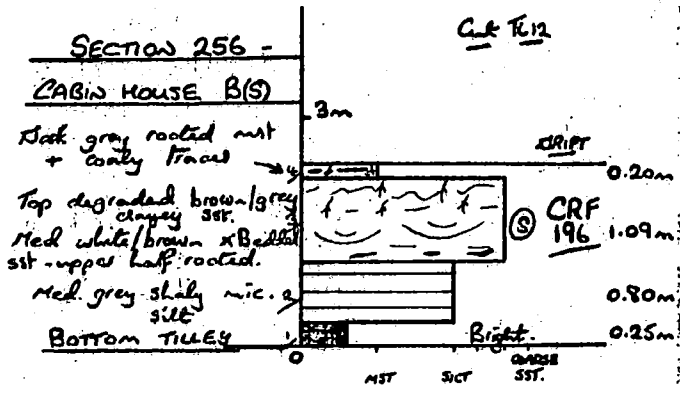


Cut 6 long wall - half wall along - trends → 095°. Considerable disturbance due to pilling. Little lateral visible variation - Cut trends diagonally away from the face.

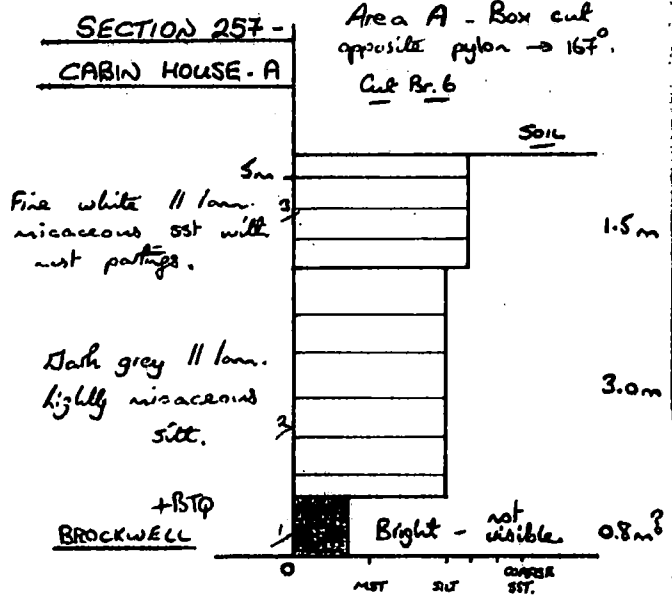
**SECTION 255
- MOWN MEADOWS - 7A**



* DIRECTIONAL DATA :-
Unit 2 - ripple x lamination → 230°, 251°, 213°, 228°. n = 6. Θ = 230° L = 97%
NB Facies laterally persistent over 10m of exposure.
No samples - 1 colour slide.

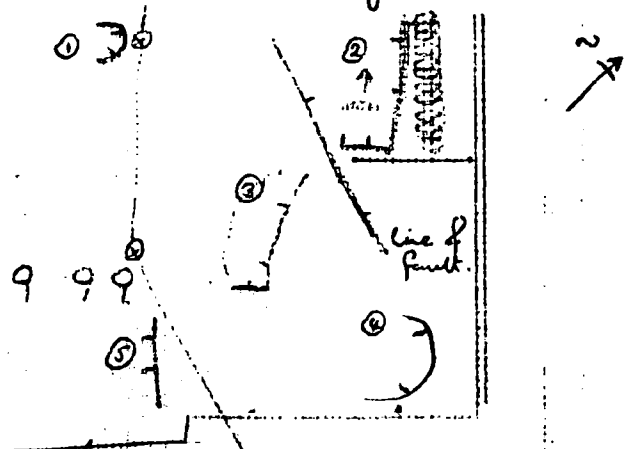


Shallow bank cut trending 164° - NB on south side of fault. Pillared exposure of basal coal. Little lateral variation along face - directional measurements not possible - cruddy outcrop.

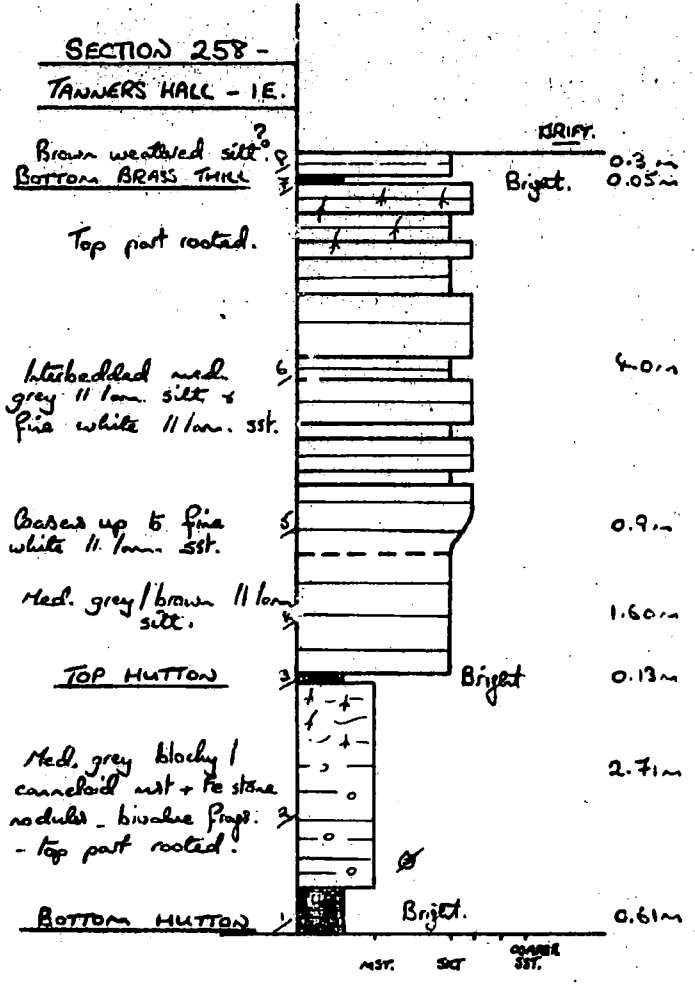


NB Presently reducing to coal

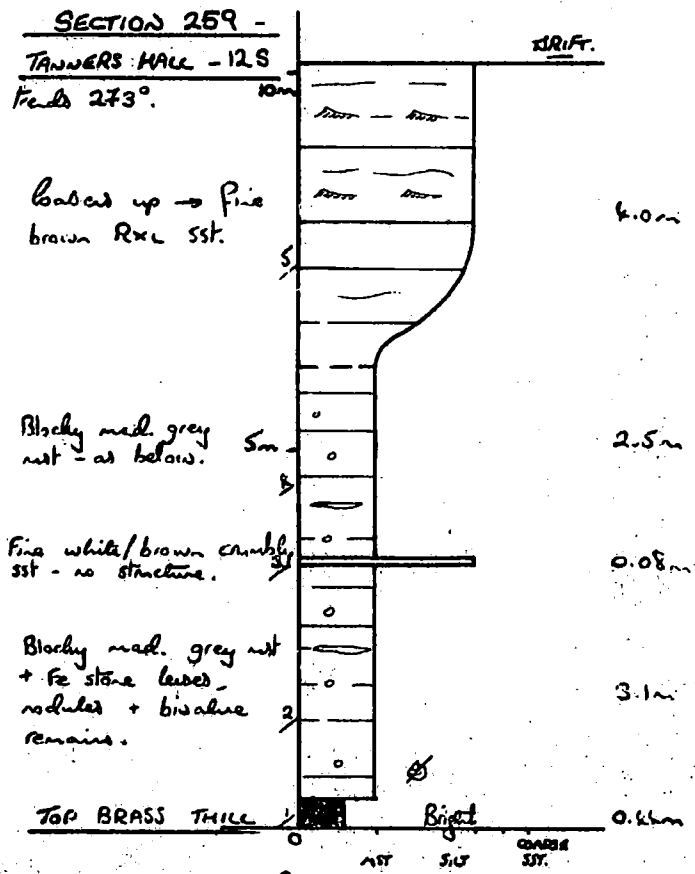
CABIN HOUSE - Workings - as at 4.11.80.



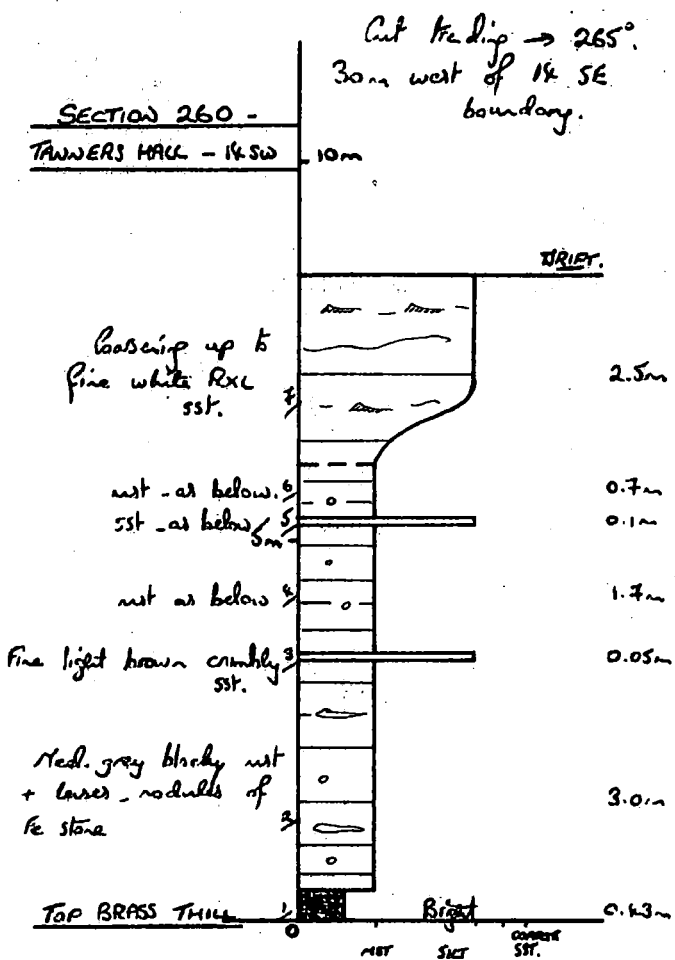
- ① Brockwell cut - under pylon.
- ② New cut to Tilley - still reducing.
- ③ Shallow platform on Bottom Tilley.
- ④ Outcrop working on ? Top Tilley - former Tilley workings back-filled.
- ⑤ New cut on Top Busty - right behind



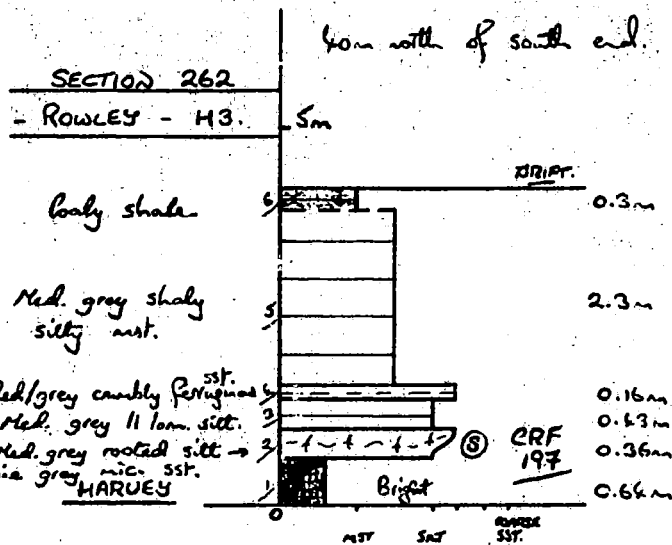
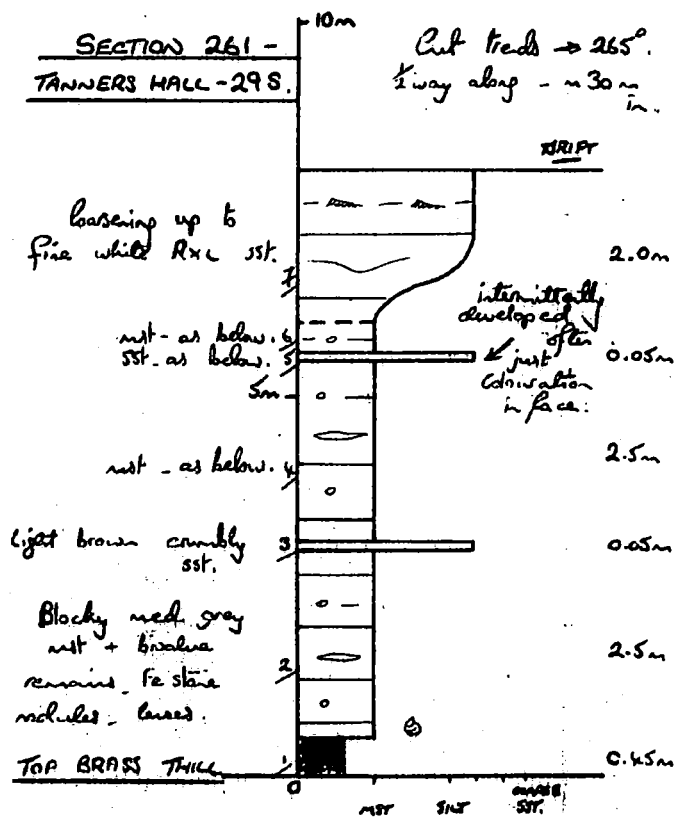
Roughly 1/2 way along wall - trendip → 170°. Individual sst. mat and thin bands traceable along the wall up to 50m in both directions. First cut in E. area - due to stilt working west.



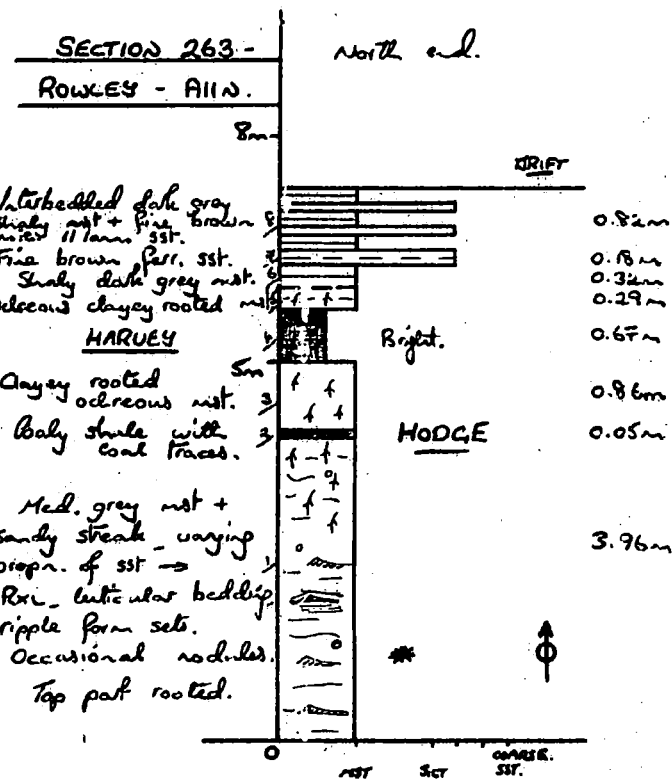
Position 50m west of bounding fault. Another ~30m



NB Second sst only becomes apparent ~10m west of boundary - continues for ~60m to west - but only just present in places.



Another ~40m exposure to north - probably dropping. Cut will possibly be renumbered 12, to coincide with the next Tilley cut - A12N now just starting reducing. Lateral variation above Harvey difficult to assess.

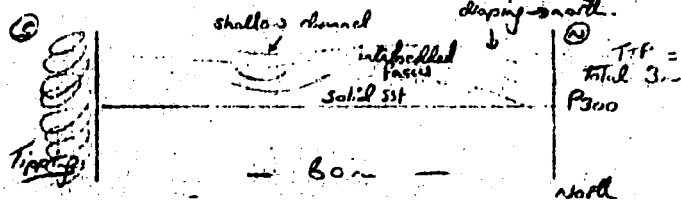


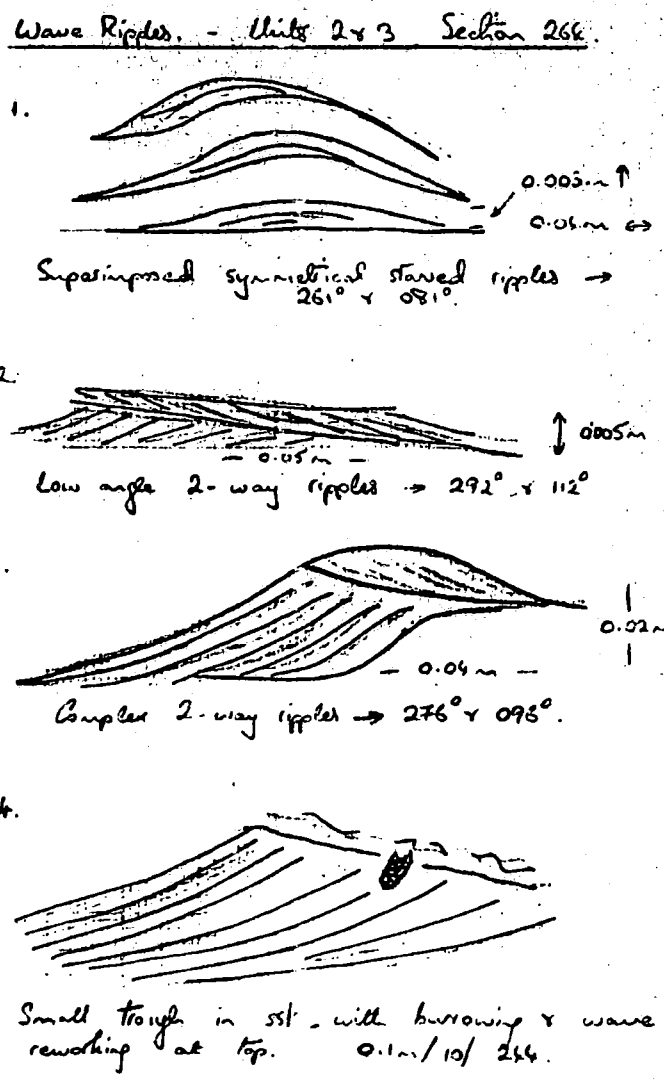
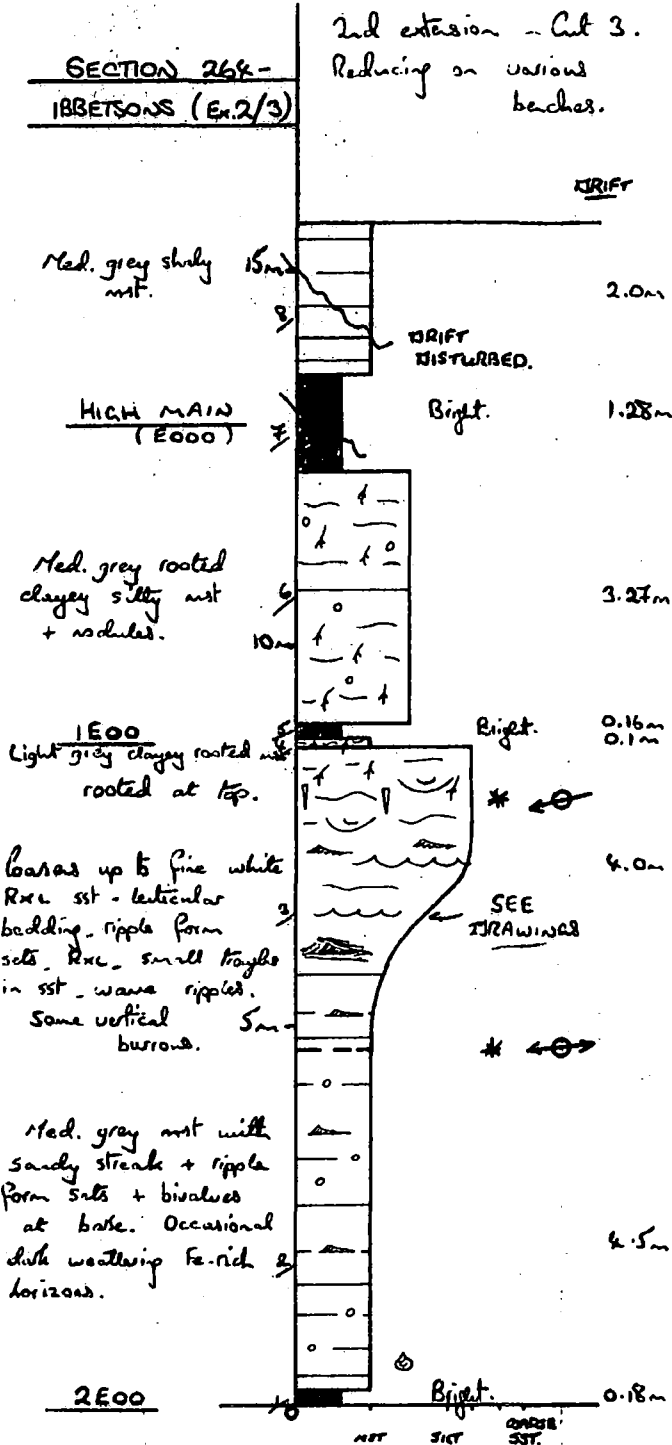
* DIRECTIONAL DATA:-

Unit 1 - RXL $\rightarrow 359^\circ$ $n=1$.

NB Under base of section = 3m of white RXL + trough x-bedded sst contain by interbedded white sst + grey nit = Top Tilley Post.

Cut stopped short due to heavy old workings.





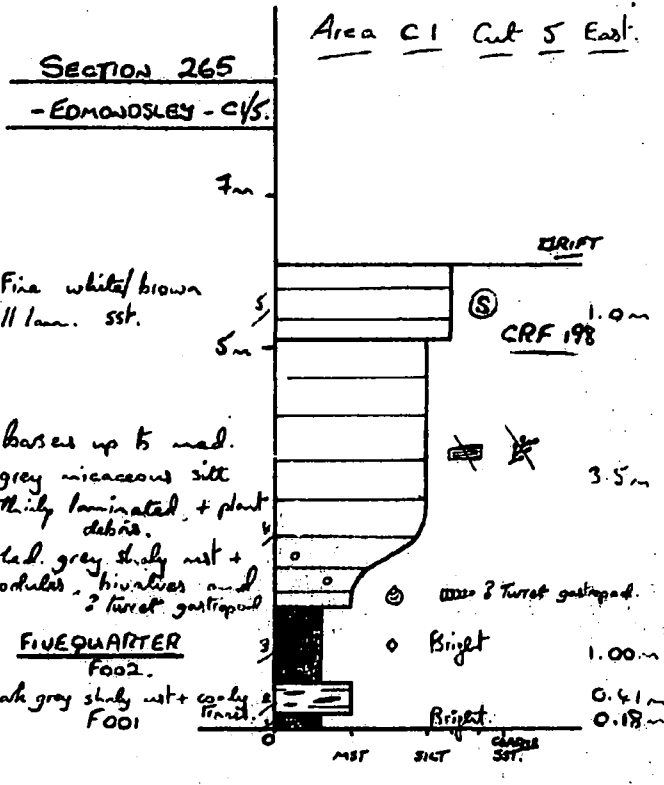
*** DIRECTIONAL DATA: -**

Units 2 & 3 - ripple form sets & RxL →
 101°, 077°, 055°, 051°, 055°, 291°, 261°, 081°
 272°, 112°, 276°, 096°, n = 12 θ = 078°/93°
 & 280°/98°

Unit 3 - trough & bedding
 0.1m/10/264 n = 1.

Overall θ = 078°/273° L = 93°/95°

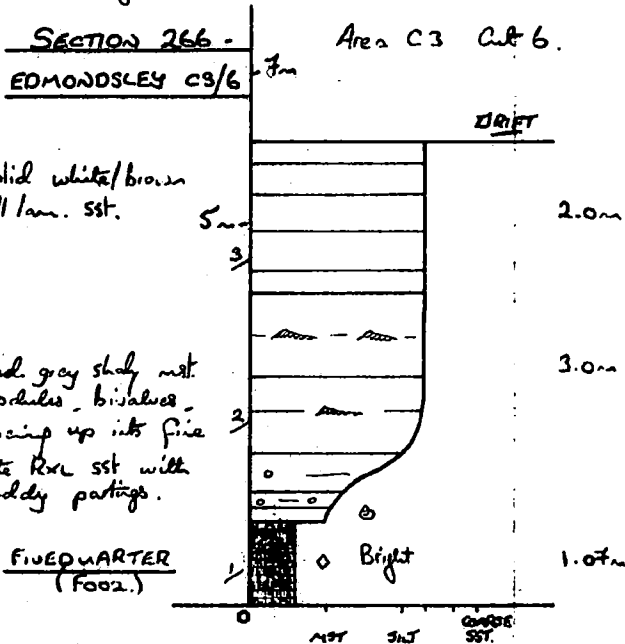
1 colour slide photo. No samples.
 Fivequarter in cut 2 probably being backfilled.
 See drawings of wave ripples.
 Little lateral variation visible.



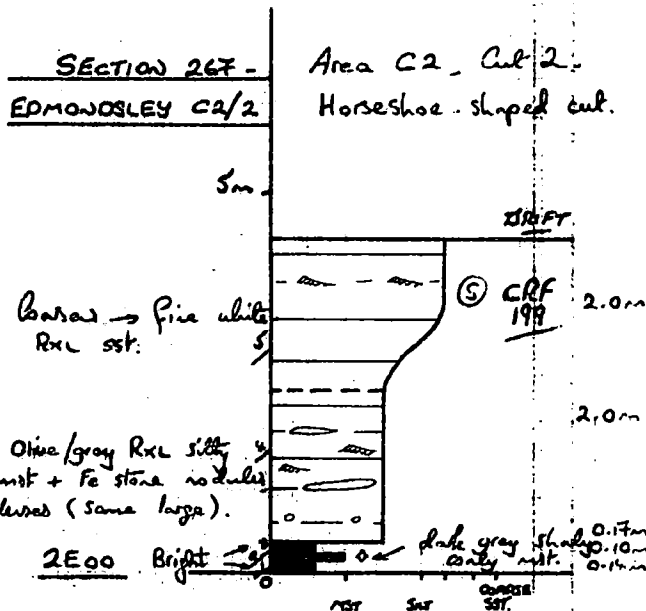
1 colour photo. Total ~ 100m long well exposed.
 little lateral variation - solid sst comes in at top below drift in places.

NB Area C subdivided C1 - middle
C2 - east
C3 - west.

Area C1 cut 5 (west) - Facies very similar to cut 5 (east) but mt → silt unit above five quarter rapidly coarsens into fine white Rxc sst with mt laminae and partings - then solid white/brown fine sst above. Coarsening achieved via thickening of sst bands and more frequent occurrence. Exposure not brilliant, due to collapse of old workings.

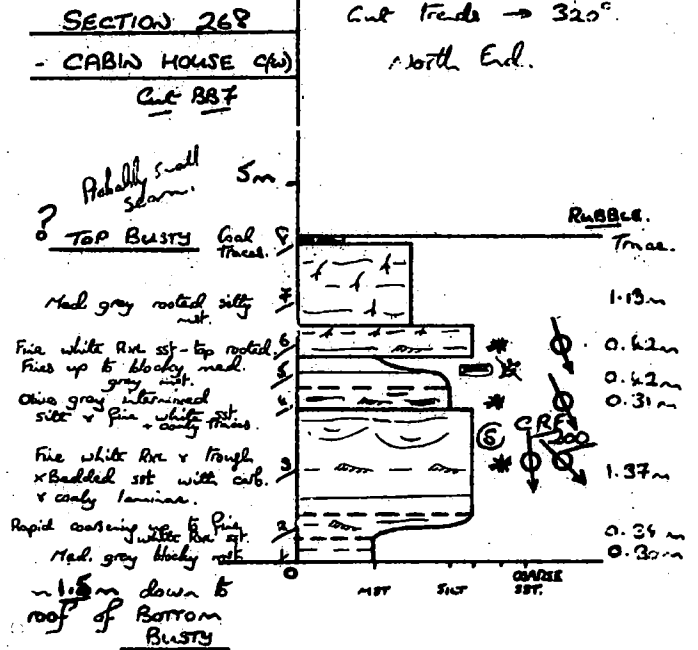


Presently working pillars at west end of cut - some tectonic disturbance also.



Top level presently working on site - 20yds back from 5/6 cuts.
Lateral variation not assessable.

Long cut to Bottom Busty - eastern margin of Area C(w).
Cut trends → 320°
North End.



* DIRECTIONAL DATA :-

Unit 3 - Rxc → 160°, 103°, 085°, 109°, 100°, 150°, 153°, 141°, 123°, 136°, 116°, 161°, 113° $\lambda = 13$
 $\theta = 127^\circ$ $\epsilon = 91\%$

Unit 3 - Trough x set 0.3m/15/173° $\lambda = 1$.

Unit 4 - Rxc → 143°, 155° $\theta = 149^\circ$ $\lambda = 2$.

Unit 6 - Rxc → 156° $\lambda = 1$.

Unit 3 Overall - $\theta = 130^\circ$ $\epsilon = 92\%$

OVERALL - $\theta = 134^\circ$ $\epsilon = 92\%$

Trough in Unit 3 is ~5m wide - ripple x lamination arranged in the cosets within the trough parallel. Planar erosional top to trough. Little facies variation visible along face.

Rest of site

Area B(w) - little further than last visit, on same cut. Rough section -

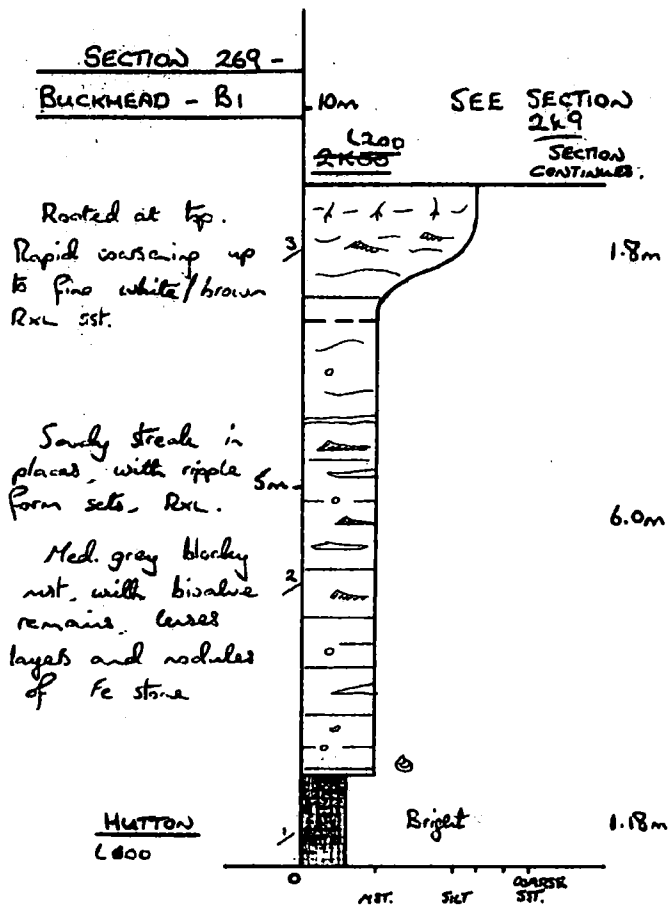
(Middle Tilley)	Margled coal etc.	2.5m
	sst	1.5m
(Bottom Tilley)	coal	0.3m
	mt	2.0m
	sst	2.5m

not accessible due to dragline working / colour slide photo.

Area B(s) - some platform on Bottom Tilley as per last visit.
Area C(E) - completely backfilled & restored. Eastern edge of C(w).

Small cut not accessible.

D.H. D.L. →



Same cut as per last visit - measures down to Hutton exposed at south end of cut - NB Section 269 taken half way along → north end of cut. Little lateral variation in facies. 1 colour slide photo.

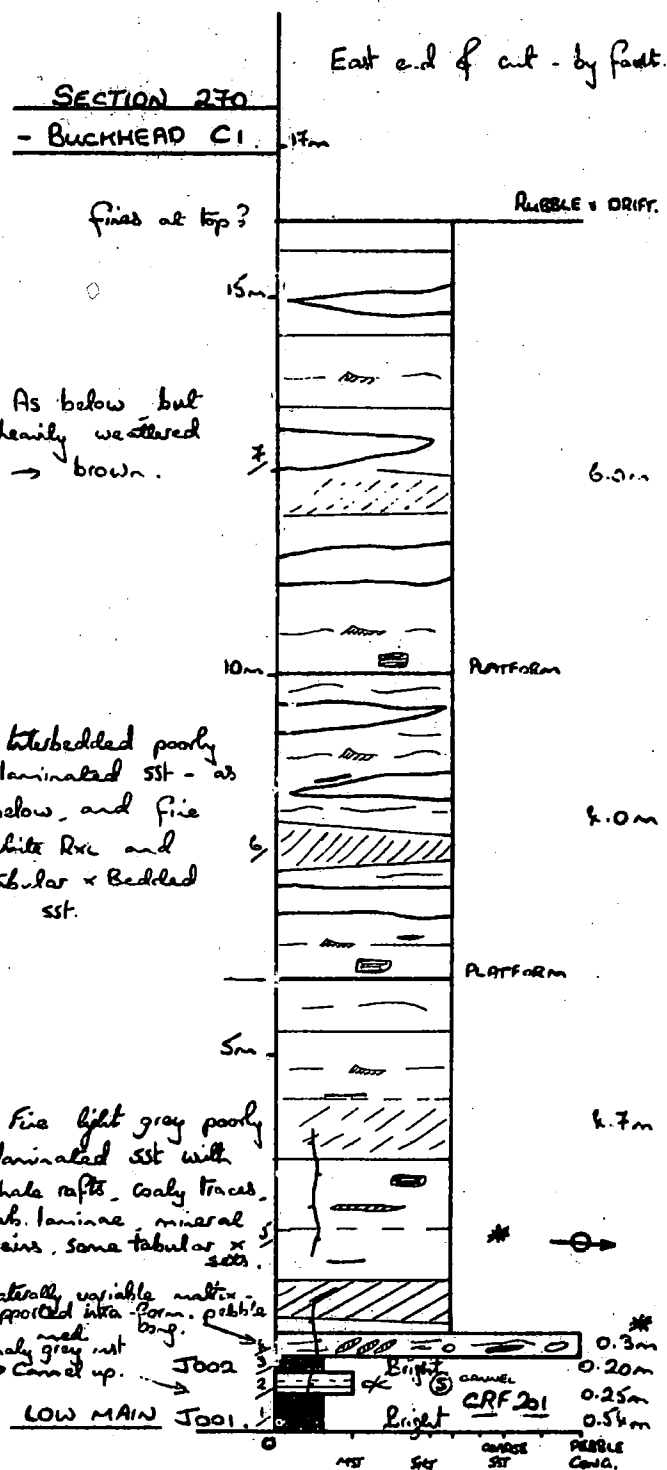
Matrix is the same light gray fine sst as the unit above. Planar - probably erosive base to the org. - directly over the coal. Maximum clast size 0.08 m long.

In sst above, some large shale clasts up to 1.0m long.

Passing through sst, and down to coal is a development of diagenetic and replacement mineral veins containing galena, fluorite, pyrite, ~~pyrochroite~~ ^{marcasite}. ^{CRF 201} - source possibly in nearby Cornfield Dyke = Cleveland Dyke Tertiary!

Presently coating low main at east end by fault. 2 colour slide photos - 1 of conglomerate, 1 parosoma. Film finished.

Area 6 - presently stripping drift, and low main post - working low main and other seams - steep dips involved



Interbedded poorly laminated sst - as below, and fine white Rxc and tabular bedded sst.

Fine light gray poorly laminated sst with shale rafts, coaly traces, carb. laminae, mineral veins, some tabular sst.

Laterally variable matrix supported intra-form. pebbles. Shaly med. gray sst → congl. up.

* DIRECTIONAL DATA :-

- Unit 5 - Tabular x Sst - $\theta = 094^\circ$
- 1. 0.6m/14/107 2. 0.3m/3/080. $\lambda = 2$
- both in lowest part of sst.
- 2. Unit 4 - Pebble Imbrication → 339°
- flow toward 159° .

Conglomerate - Matrix supported, ~ 3% clasts - fairly well rounded Fe stone, partly rounded sst, angular to subangular shale and peat - elongate clast imbricated, dipping → 339° , implying flow → 159° . Imbrication is largest and downward. Max. developed 0.3m but not present at all in places, lies directly over coal, had a very abrupt top - matrix

Area H - Cut 1 - Extension. Presumably dipping extension at NE end of cut to Main road. Maudlin - facies as before - little lateral variation - large scale foresets visible over Main.

Main. Bright coal 0.67m
Med. grey clayey mottled mt 0.07m
Bright coal 1.52m

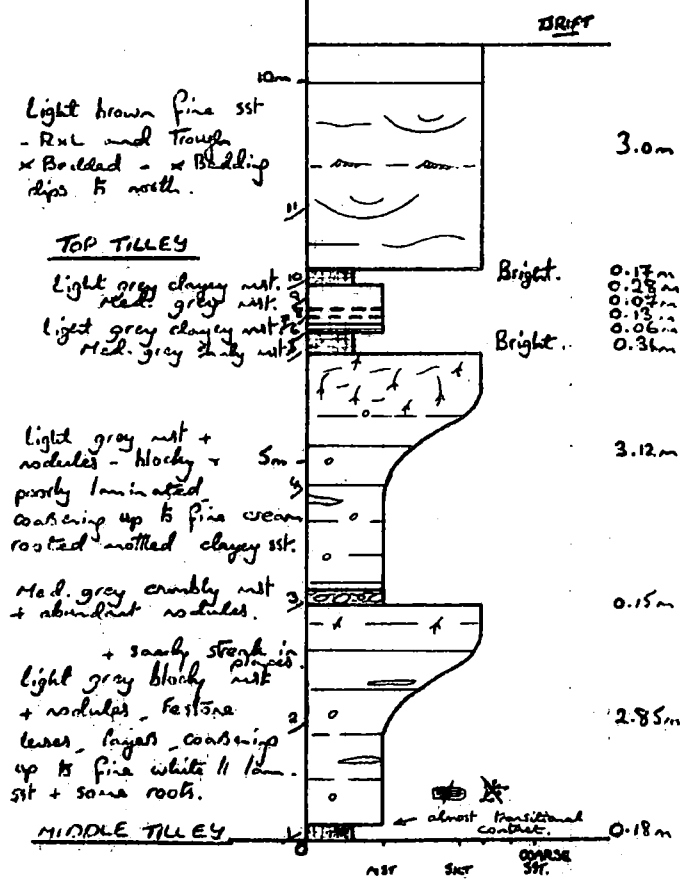
DIRECTIONAL DATA

* Large scale foresets in mt - 2 visible, dipping $\rightarrow 12.5^\circ$ and underneath $\rightarrow 22.2^\circ$. Steep tectonic dip 13/360.

Sequence - Main, then 5m mt with large scale foresets, ? coarsening up, thin coal stringer, fine sst & mt (5m), rooted mt, coal, med. grey mt (2m), then five quarter coal (1.03m) - drift disturbed. - should be 3 leaves.

SECTION 271 -
DEBORAH JV cut 7

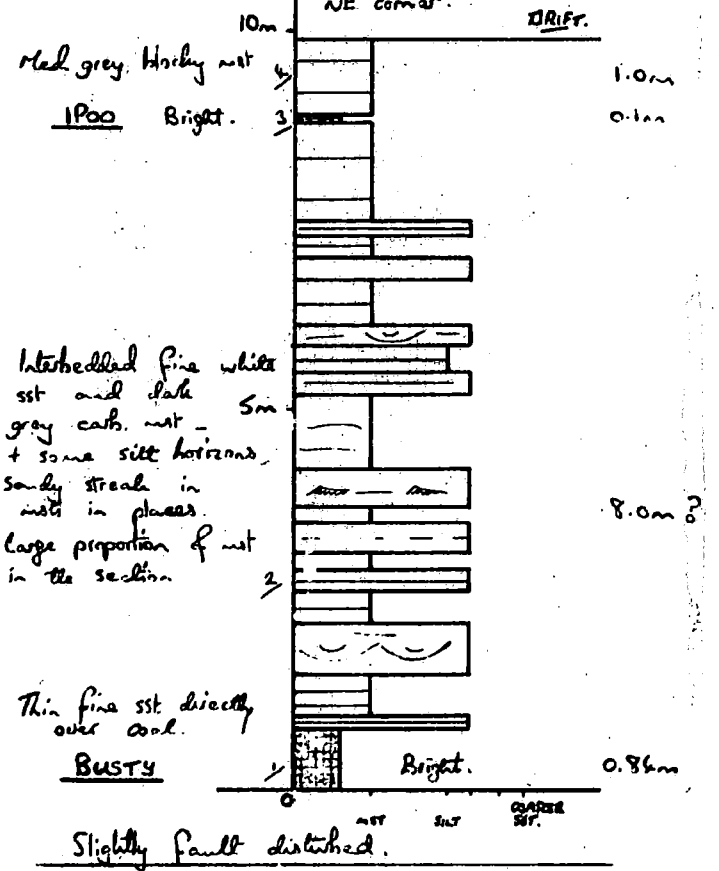
NB P300 data taken from Section 230.



Section taken half way along cut. - probably dragging at south end.

SECTION 272 -
DEBORAH Jiv 23 (S)

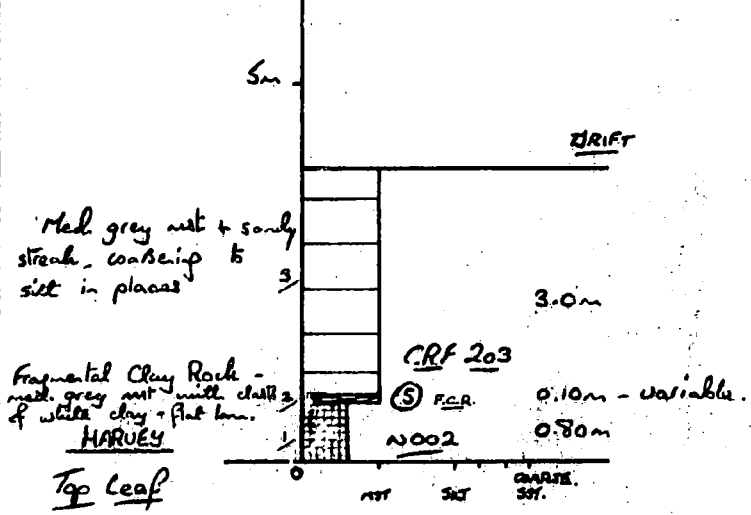
South end of cut - possibly dragging ~ 30m north. Approaching edge of washout. Coal thickness reduced at present NE corner.



SECTION 273 - OUER

SECTION 274 -
DEBORAH Jiv HARVEY

Side wall (N-S) - close to site boundary.



SAMPLE - F.C.R. - Clasts all "flatly laminated" up to $\leq 0.02m$ long. Northern end of cut marked by large fault - brings up IP00 & P100 to north. F. lies just over Harvey. Minor fault also in Harvey.

SECTION 273
- DEBORAH - Div 6

Cut trends → 333°
South end.

NB P300 data taken
from Section 171.

Fine white/brown
rough x Bedded
med RXL sst.

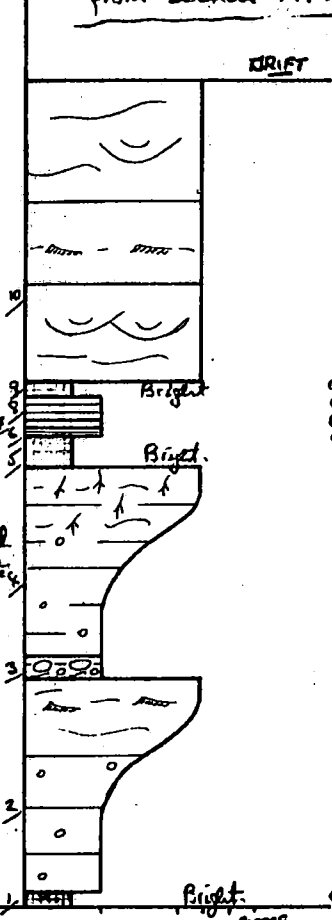
Shaly med. gray sst
light gray clay.
Shaly med. gray sst.
TOP TILLEY

Coarsening up from med.
gray sst → fine white
RXL sst - clayey -
mottled & rooted.

Crumbly med. gray
sst with abundant
nodules.

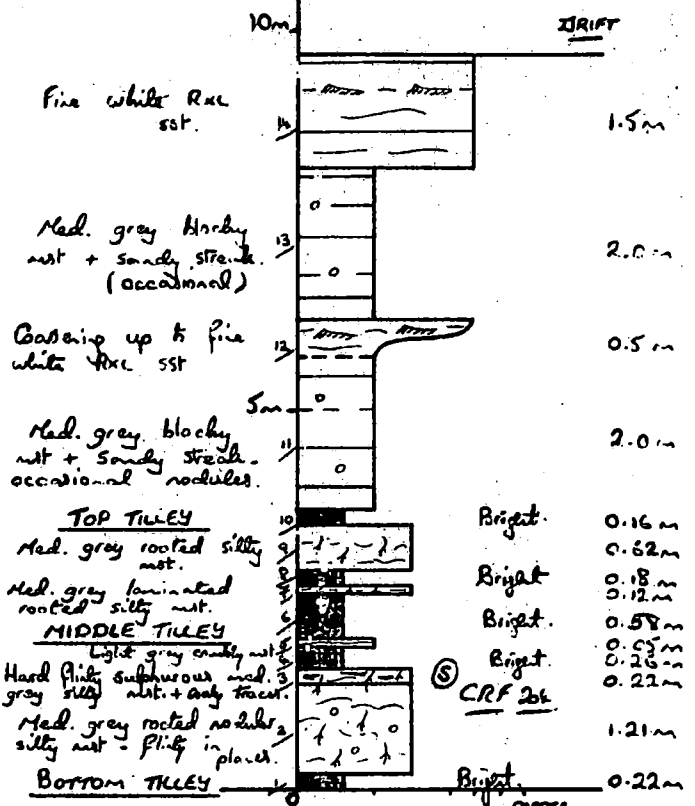
Med. gray blocky
poorly laminated sst
coarsening up to fine
white RXL sst

MIDDLE TILLEY

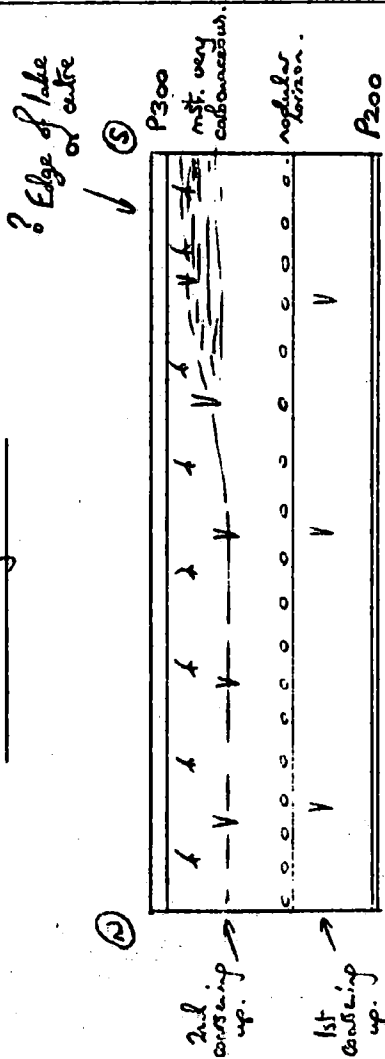


SECTION 275
- HOWN MEADOWS - 8.

Section taken near pilot cut
- trends → 260°

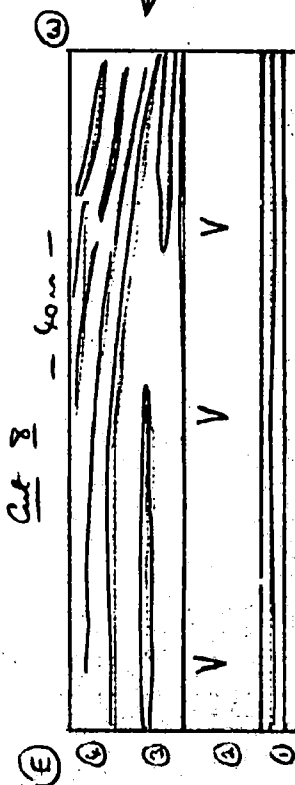


Section along Div 6

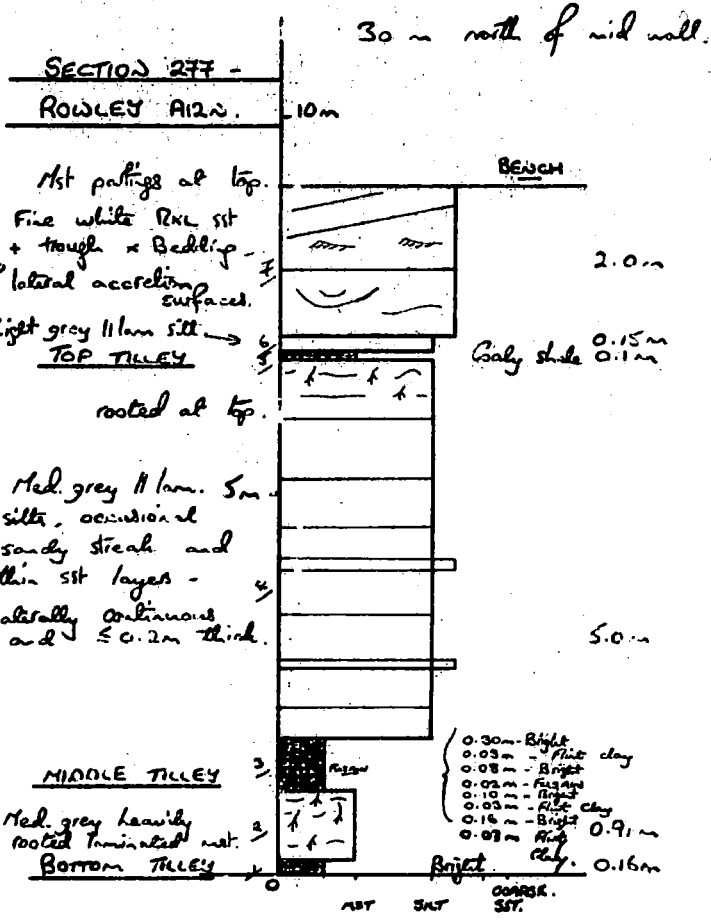
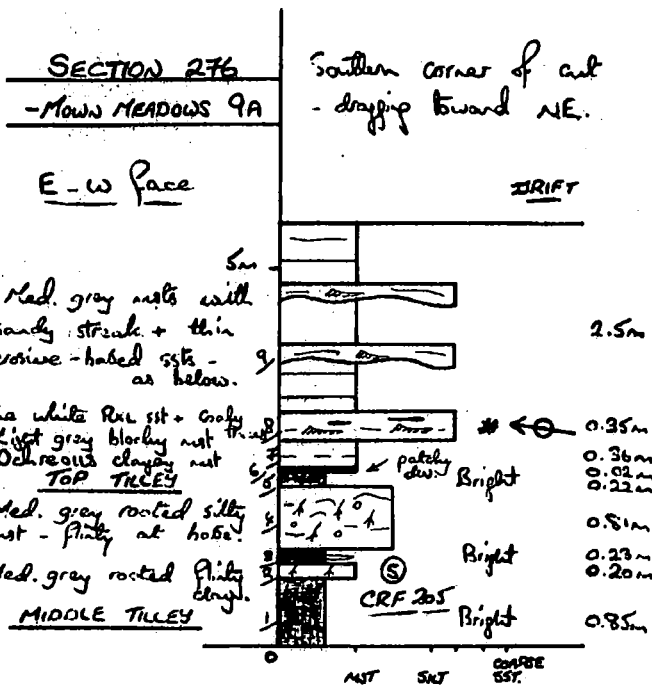


Overall thickness ~ constant.

Pretty - 5m along - 2/3 of cut dropped
Unit 13 decreases in thickness to west -
See drawing. Cuts getting shorter.



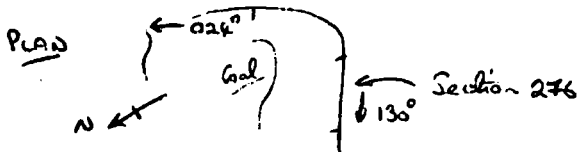
- (A) Fine white RXL sst, with sst laminae at east end and sst units at west end - downcutting to west, and also dipping to west.
- (B) Sst with sandy streak, occasional thin discontinuous sst layers at east end and one more continuous 0.15m sst at west end.
- (C) Sst with sandy streak, coarsening up to fine RXL sst.
- (D) Development of Middle & Top Tilley coals.
- (E) NB Pilot Cut (backfill) - exposure of Unit 13 is almost solid sst.



*** DIRECTIONAL DATA**

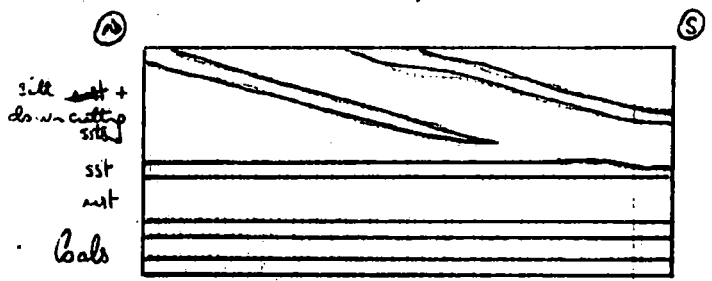
Unit 8 - Rxl $\rightarrow 306^\circ, 265^\circ, 303^\circ, n = 3.$
 $\theta = 292^\circ, L = 95\%.$

NB Unit 6 - laterally discontinuous.
Unit 7 - grades into silt on the N-S wall.
Unit 3 - 0.1m x 0.6m lens of very hard pyritous medium grade massive sst. - contained within seam - dark red/brown color.

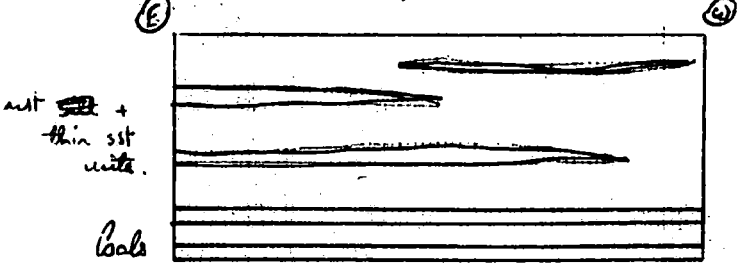


Drawings of Cut 9A.

a) North / South face.

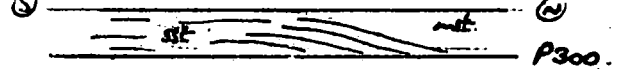


b) East / West face.

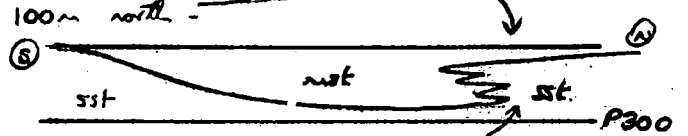


Correlation sst units + downcutting relationships difficult.

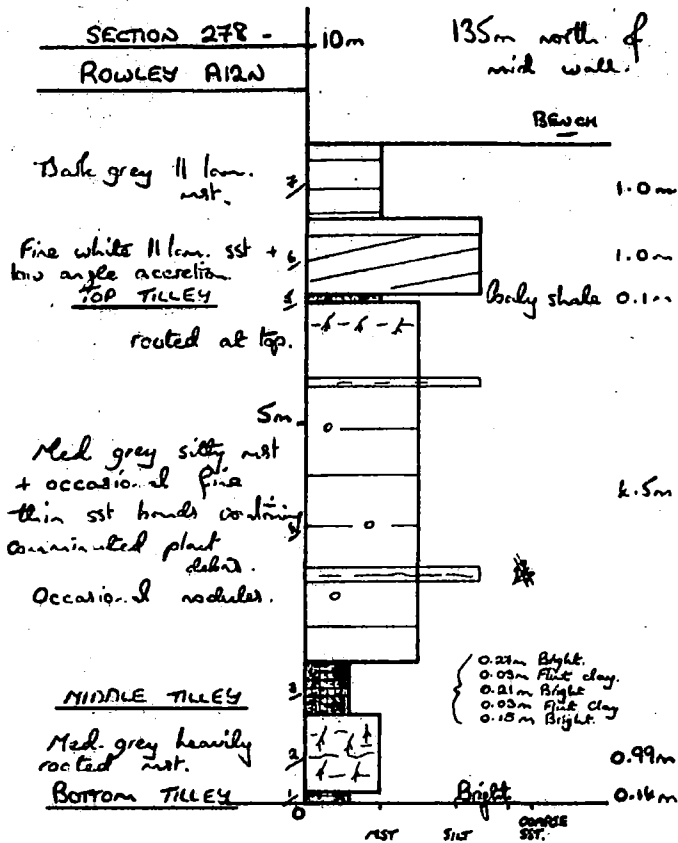
Pacing up cut - solid sst in Top Tilley Post from south end. From north - low angle accretion surfaces in sst, dipping to north - sst starts to wedge out, mt fill takes its place.



95m north - centre of mt channel - still 0.5m solid sst at base, then 2.0m dark gray 11 lam. mt + sst intercalations - asymmetric north edge (5m to north) - mt base does not rise up surface - layers of sst come in - interfingering contact.



100m north - solid sst again, with mt laminae.
135m - southern margin of 2nd mt channel fill - again, low angle accretion surfaces dipping to north - dark gray 11 lam. mt fill. - completely removes sst this time.



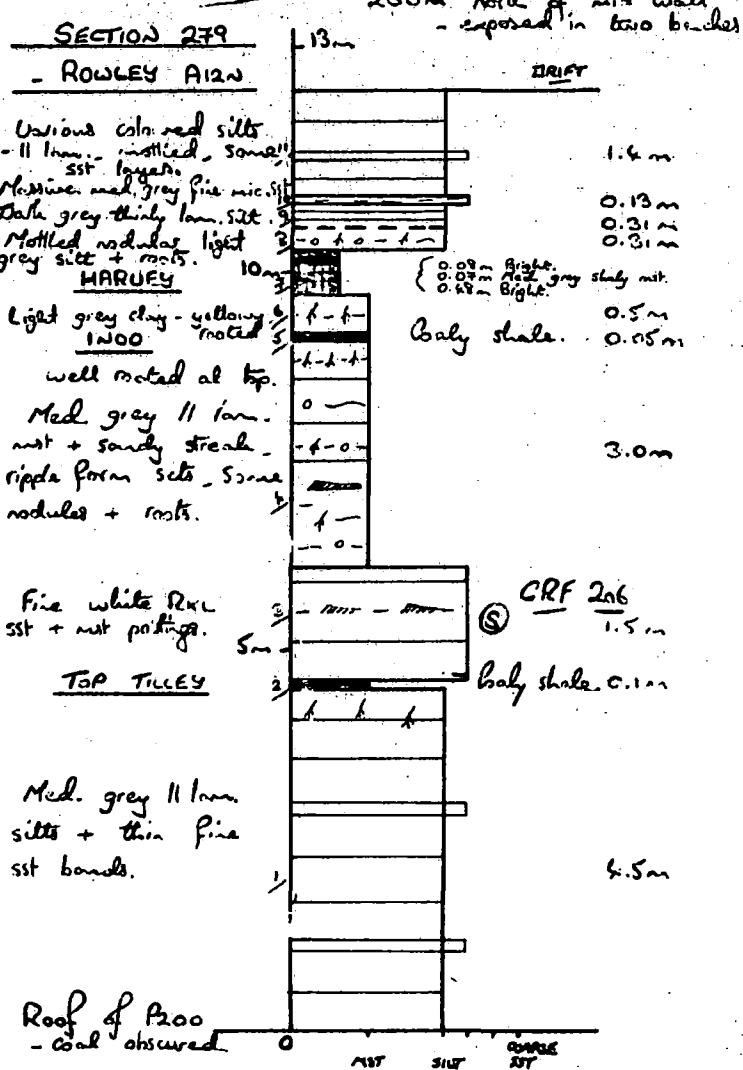
Sst completely cut out by 140m. At 175m sst starts to come back in - remains thin (0.3m) for another 10m - then begins to rise again. At 200m sst reaches full thickness again - c. 2.5m - some sst intercalations, especially at top - low angle accretion surfaces dipping to south. Sst continues with sst partings to present north end of cut. - dragging ~ 7m from north end.

At 235m - 1m sst then 1m nit - base of nit rises and disappears ~ 10m to north and south - another shallow channel?

Dark grey 11 lam. nit in fill.

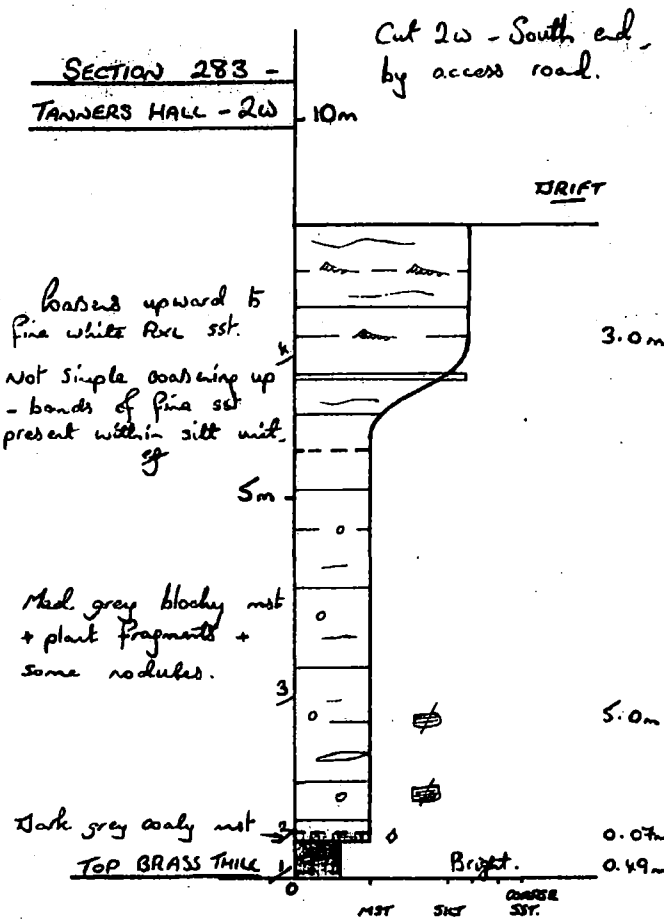
Presently dragging at 260m north. - 1.5m solid sst exposed as TPP.

Total 1 sample - no photos.

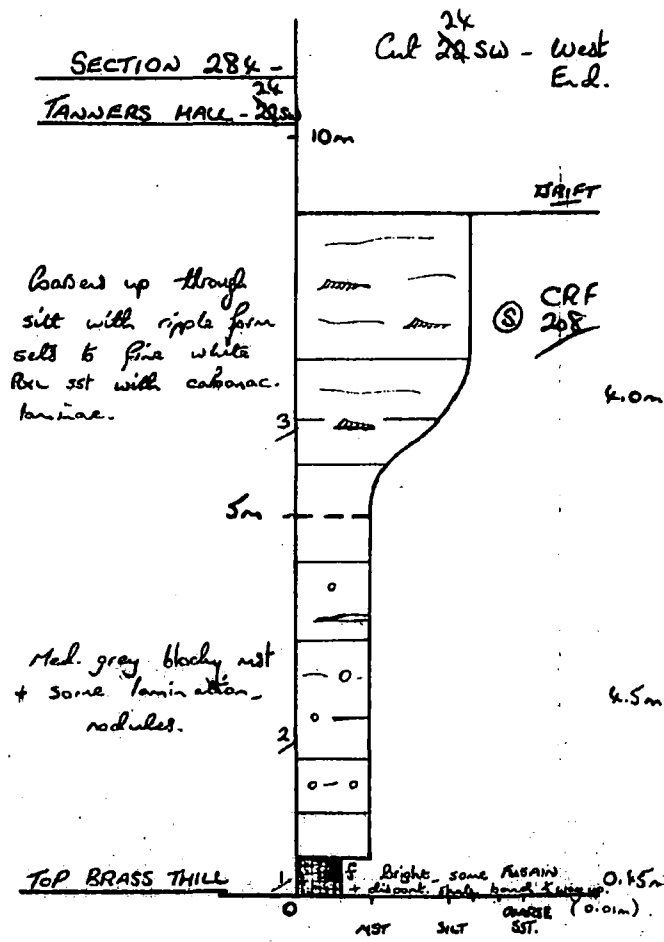


0.3m fine white crumbly massive sst below coaly shale (rooted) disappears at 260m - wedges out to north

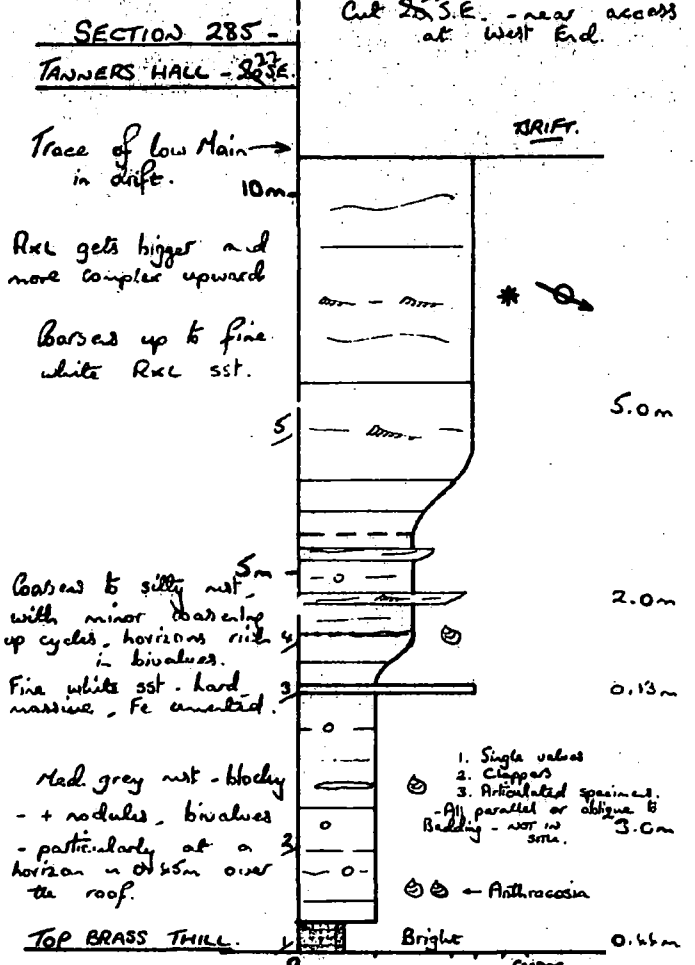
BSRC Field Trip - Northumberland
Coal Measures
- Section Sluce sst
Sample
CRF 207



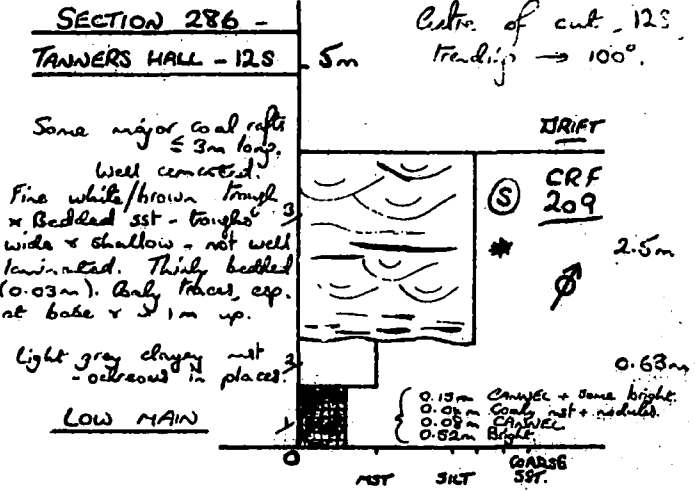
Total ~ 100m exposed - little lateral variation - 1 1/2 photo. Some bedding planes laterally traceable.



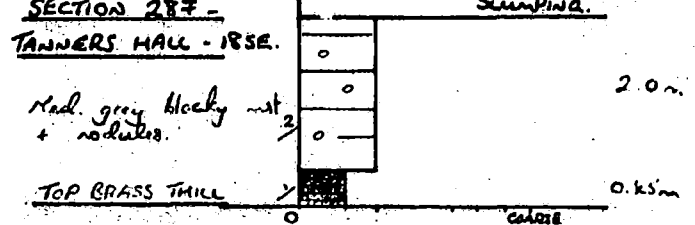
Little lateral variation - considerable slumping. Some dipping towards east - tallows?



*** DIRECTIONAL DATA :-** Unit 5 - Rxl $\rightarrow 127^\circ \quad \alpha = 1$.
Thin fine sst seems to die out to west.
Not simple coarsening up - several minor cycles.

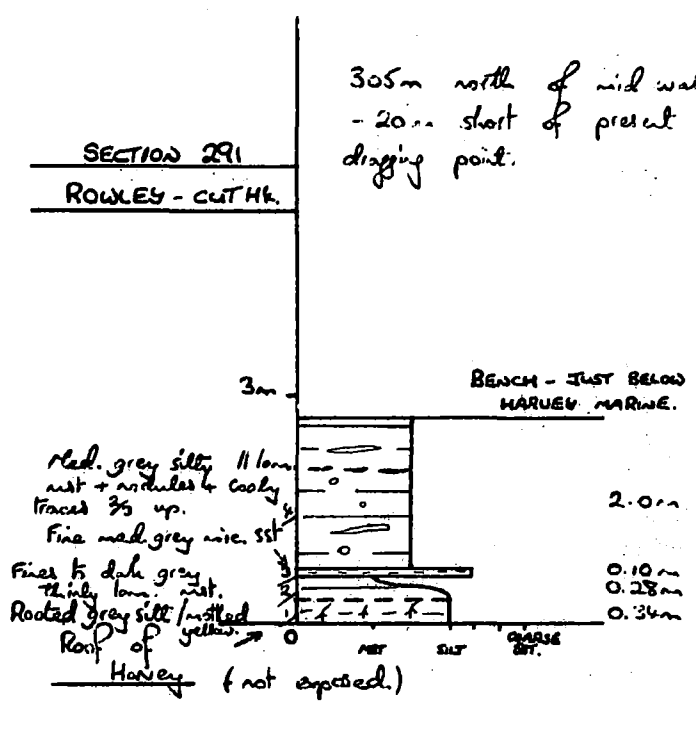
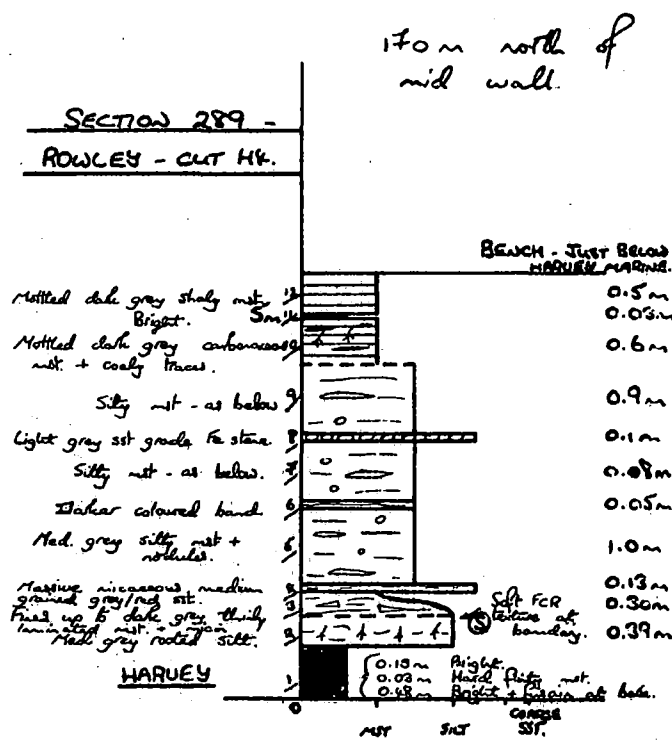
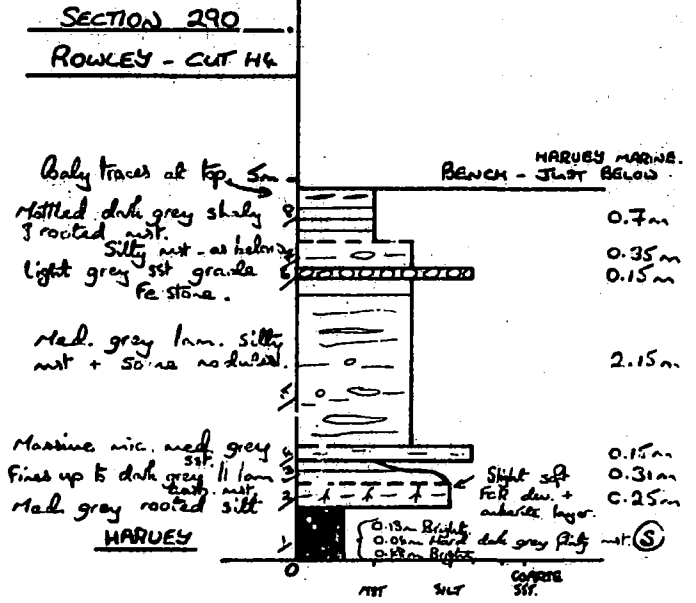
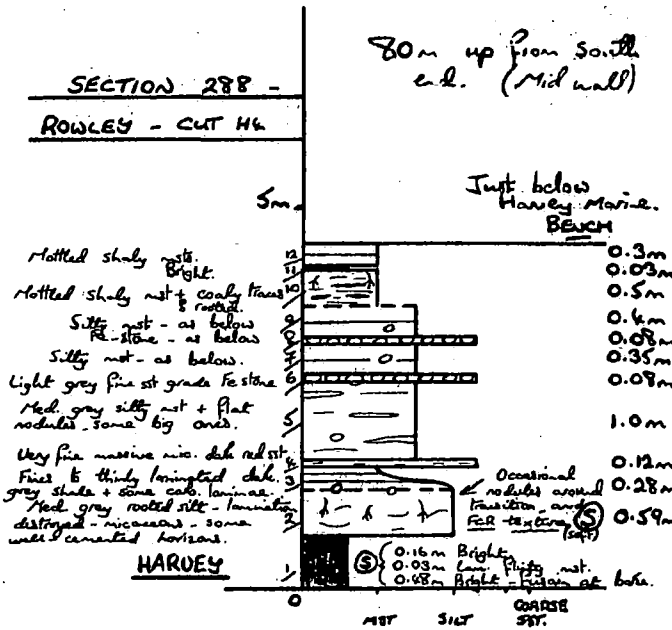


*** DIRECTIONAL DATA :-** Unit 3 - Trough x Beds
1. 0.5m/15/003 2. 0.3-1/16/043 3. 0.5m/14/035.
4. 1.0m/8/072. $\alpha = 4$. $\Theta = 038^\circ$ $\angle = 92^\circ$
Section at high angle to flow direction. Poor quality coal in this area.



Rowley - Cut A12N complete - just started dragging A13s - presently at south end.
 Harvey - Conlip Cut & - at north end.
 - pacing north from south end. (mid wall)

240m north of mid wall
 - close to cooling point -
 another 85m exposure - then dragging with 50m to take.

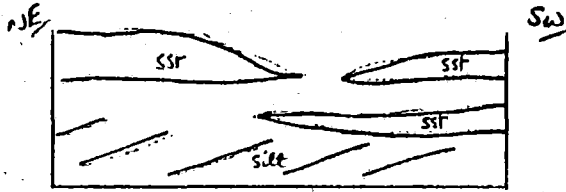


NB Transition between units 2-3 contains very thin laminae (1mm) of ashite + suprapel - never have to transition.

Total 2 4x6 photos & samples.
 Harvey Marine coal on beach above - conled out - no direct exposure - pappy dark gray shield ashite coal.
 No exposure in Cut A12N.

Trip to Deborah - Cut Div 42: - little exposure over P300 - drift sand cover. Div 24 - L shaped cut - along edge of washout. Div 7 - tipping Div 5 - presently reducing - access not possible. Div 8-9 Harvey seen last time.

(Div 24) Busty cut - starting at SW end and pacing to E. At SW end, close to Bassel edge \therefore coal highly drift disturbed - 1.02m shaly coal - with thin ridges often above in boulder clay. 55m down - solid cover starts to come in - coal appears washed out, though exposure is not very good - large proportion of sst in the section. 90m down - interbedded fine brown mic. sst with 11 lam. + abundant coaly debris and fairly blocky med. grey silt with coaly debris.

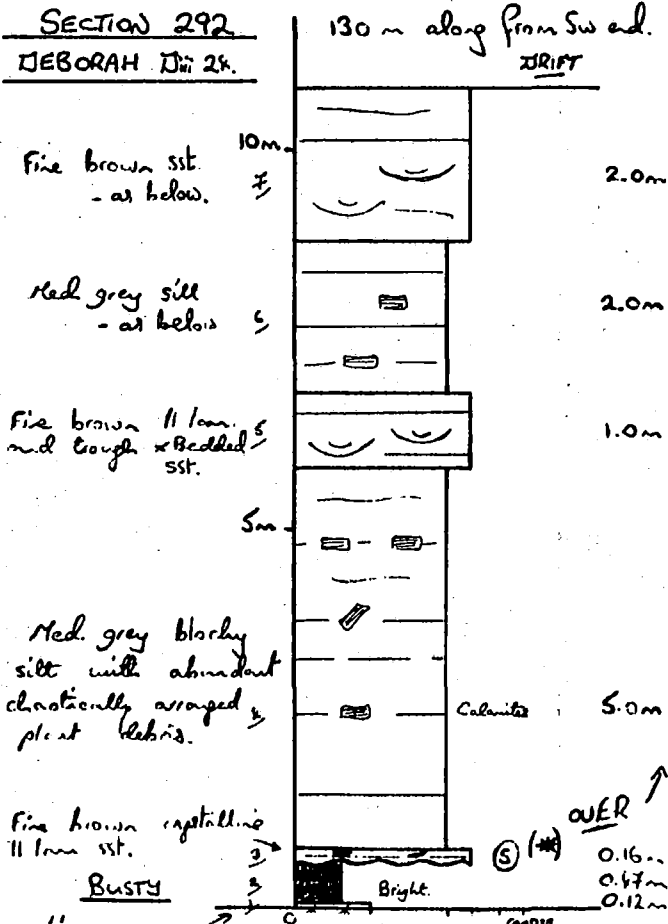


Slight draping of silts to N.E.

Mostly level bedding present.

At 130m - edge of washout - coal comes back in - section above all silt for 5m.

SECTION 292
DEBORAH Div 24.



Some draping of sediment toward NE. Exposure for another 50m, the draping - flooded under drapine. Coal thickens up, and over the coal is a development of thinly interbedded facies - levee deposits.

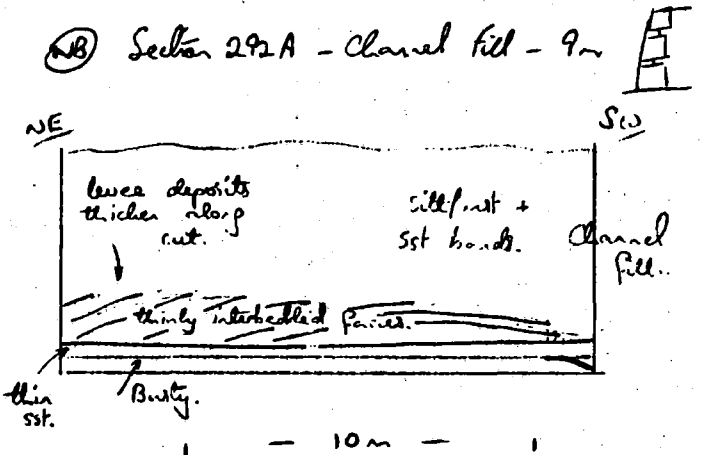
Directions in interbedded facies :-

*** DIRECTIONAL DATA :-**

- Trough x Sels 1. 0.05m/10/ 323
- 2. 0.1m/8/ 331 ~ 2
- $\theta = 327^\circ$
- Ripple x lamination - $278^\circ, 272^\circ$ ~ 2
- $\theta = 275^\circ$

- all from sst units - units $\leq 0.3m$ thick, mostly much less. Common thin nit drapes between sst units - also thicker nit units.

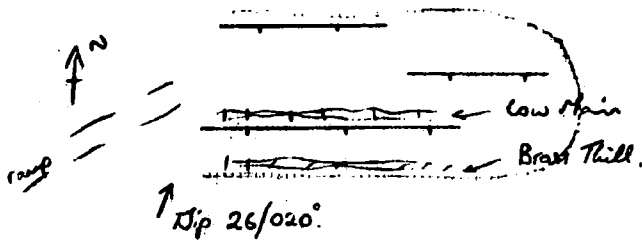
(NB) Section 292A - Channel fill - 9m



Interbedded facies - fine crystalline white RxL and 11 lam. sst with lamination partly destroyed by burrowing (SAMPLES) + med. grey blocky silt with abundant plant debris and coaly traces at all angles to bedding + dark grey carbonaceous nit. Silt and silty nit often with linear bedding (sandy streak) + ripple form sels. Interbedded unit thickens away from channel - and individual beds gain slightly in thickness. Burrows - several types present - straight horizontal, vertical, vertical curved, vertical straight, vertical U, vertical curved. See SAMPLES - mostly found at top of arch - all except horizontal tubular type. NB Configuration of levee - arched profile and draping off to NE - all within 10m. Thin sst directly over coal probably continuous - exposure not too good. Coal should return to normal thickness by end of cut. Sediment above - channel fill etc. - varies in grain size between nit x silt. Interbedded sst x silt (as in section 292) continues at the higher level down to the cut end. Cut 24 just touches the edge of the large washout.

BUCKHEAD

Area L ^{Cut 1} - measures around Brass Thill and low Main exposed in big face → 110°, steeply dipping ∴ section not completely exposed.



* DIRECTIONAL DATA - Unit k.

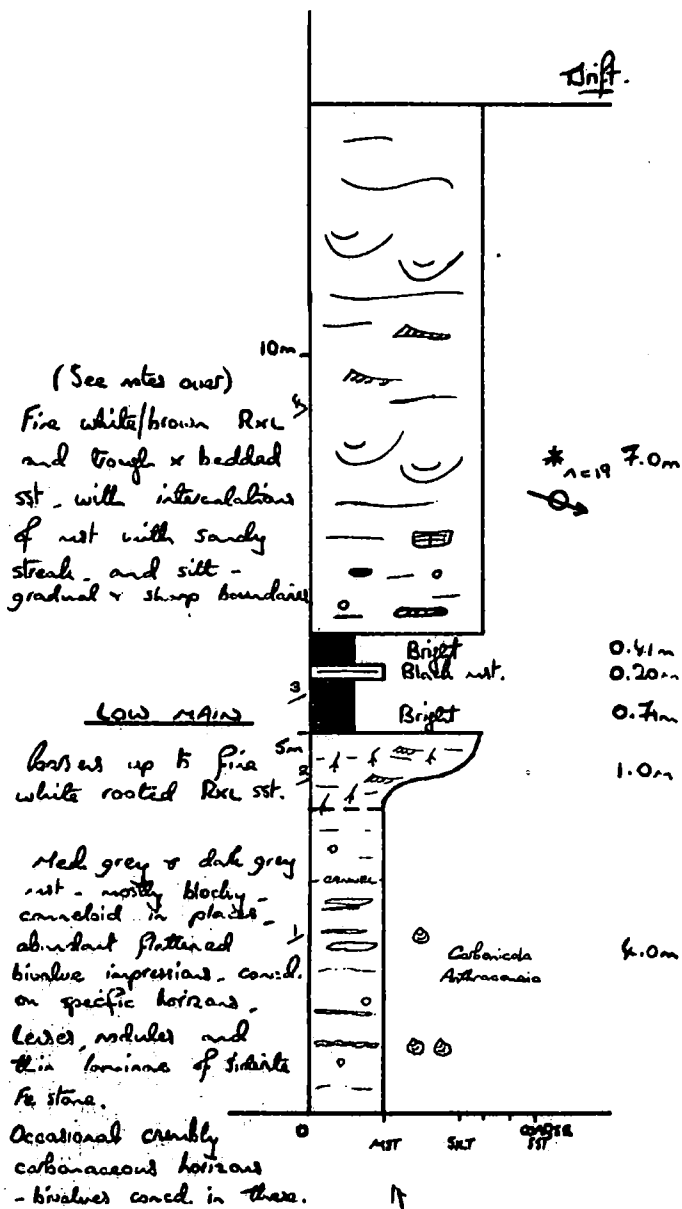
Ripple x lamination → 208°, 206°, 225°, 206°, 191°, 178°, 209° (near base) n = 7
 102°, 073°, 092°, 070°, 093° n = 5.

Trough x sets (3m wide) → 0.3m/30/081
 0.3m/38/039
 (10m+ wide) 0.5m/23/08k
 0.6m/28/069
 n = k

Ripple form sets → 107°, 089°, 117° n = 3.

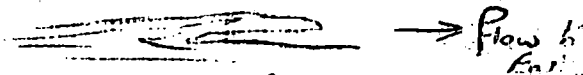
SECTION 293 -
BUCKHEAD - L1

Low Main → Brass Thill pating 11.50m.



Notes on low Main Post outcrop: - varies in grade from not with sandy streaks to fine brown sst - gradual and sharp contacts between units - some layers with very high concentrations of plant debris, coaly fragments and some rounded coal clasts - chaotic arrangement. Steep dip → measurement of vertical section not possible, but observations taken from near base of sst, upward. (Base not visible).

In lowest part of sst, much not with sandy streaks and heterolithic sediment - displaying Rxc → south (minor delta°), occasional solid sst units, mostly massive. Rxc with some store side preservation. Further up - mostly solid sst with wide shallow trough x bedding, carbonaceous laminae & layers with abundant plant debris and chaotic bedding → rapid deposition. Some patchy rounded shale clasts & rounded Fe-stone clasts + Fe stone concretionary growth. Some Fe rich layers. Patchy pyrite development. Lateral continuity of units difficult to assess. Rxc and ripple form sets in finer sediment. Some very small scale contorted laminae present - probably movement in direction of flow.

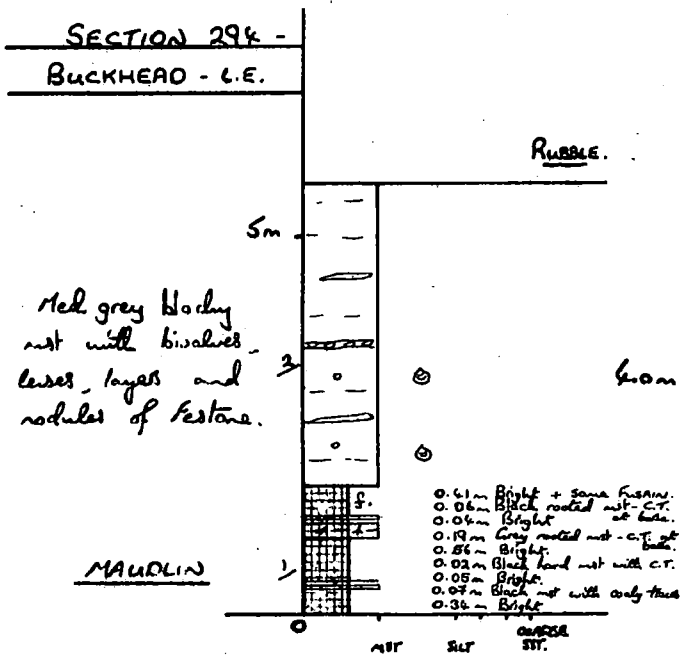


Horizontal axis plane to fold - closing to East.
 Current lamination present on sst in places. Upper level - solid sst. with carb. laminae at top of exposure - top of sst not seen - cut out by drift - possibly 10m exposure.

(Area H) - Laundry Extension - See over.

(Area H) - laundry extension - immediately to south of old pit heaps - working Maudlin, Main and Fivequater in pillars - mostly. Patchy exposure. Exposure of 3m low angle tabular x surfaces - base ~ 2m over Main roof - * dips $\rightarrow 067^\circ$. 1st at base \rightarrow fine white Rxl sst at top of x set.
 * DIRECTIONAL DATA - Rxl $\rightarrow 285^\circ$, 272° , 282° , 120° , 087° , 098°
 $\wedge = 6$.
 Rib & furrow $\rightarrow 043^\circ$ $\wedge = 1$.

Down to Maudlin - 2m seam with several soft rooted olive grey nit bands $\leq 0.1m$

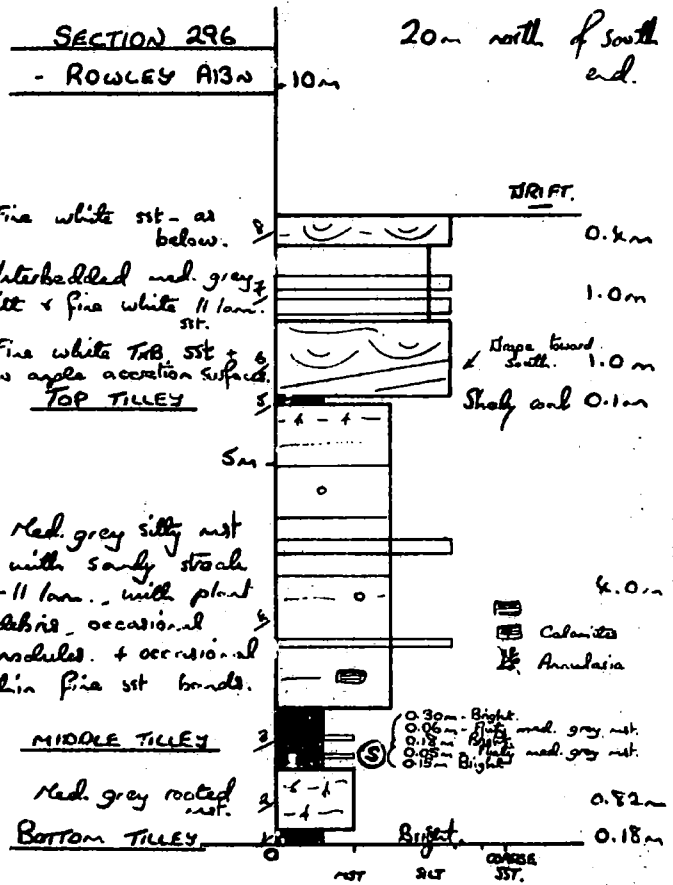
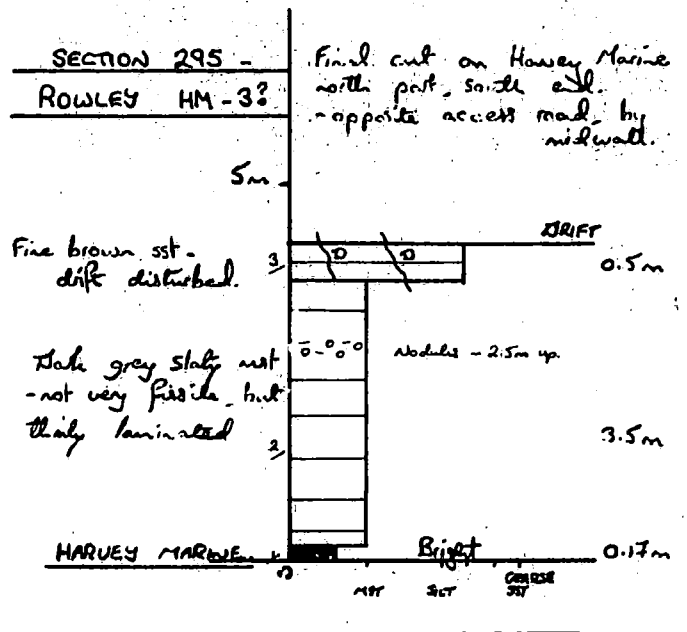


Northern end of area - exposure of Fivequater - detail -

- Roof - fine grey Rxl sst.
- 0.02m - soft gray sandy nit
- 0.95m - bright + some dull + pyrite.
- SAMPLE \rightarrow 0.05m - soft gray nit.
- 0.20m - Bright.
- 0.02m - Fusain + pyrite, coal traces.
- 0.20m - Bright + pyrite bands.
- 0.03m - Dark grey nit + coaly traces.
- 0.33m - Bright.

Area C - long cut to low Main and redneip to Brass Thill - detail left for next visit.
 Area B - (Mutton) - Cut 1 finished - presently reducing to second cut (also Cut 1).

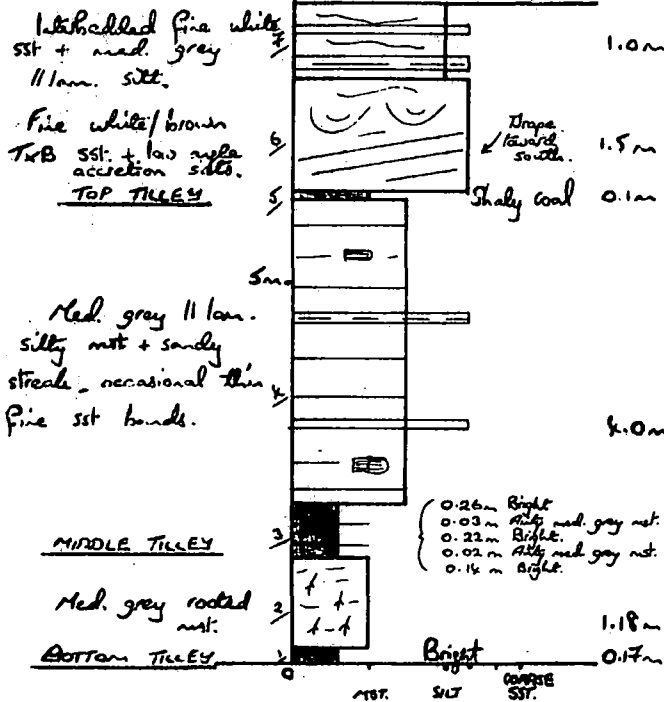
Total 1 sample - 7 photos.



Progressing along cut, measures between P1-P2 and P2-P3 are laterally very uniform - not so above P3. NB Cuts are getting shorter.
 50m north - interbedded facies starts to cut down gently - top sst dies out. 90m north - middle of "1st washout" - still 0.4m solid sst - then 2.2m interbedded facies. 110m north - 0.6m sst, then 1.0m interbedded facies. At 125m, 0.3m sst - 1.2m interbedded facies - dipping - start of second washout. Nit fill starts to come in at the very top. At 150m 0.2m sst then 2.0m nit - interbedded facies

At 200m sst starts to thicken up again. 215m - 0.6m sst then 1.2m interbedded facies, 0.3m nit. 230m - 1.5m sst, then 0.9m interbedded facies

SECTION 297
- ROWLEY A13N

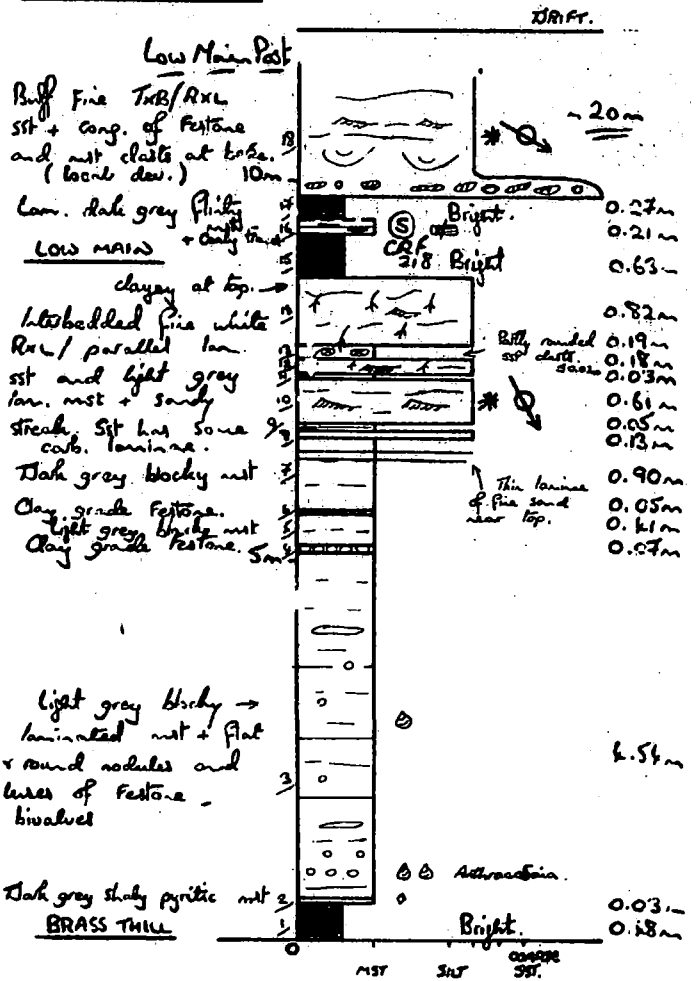


Sst and interbedded facies in roughly equal thickness to present end of cut - ~300m - possible presence of nit at top - from second without fill. Northern edge of second without displays sedimentary draping very similar in appearance to lateral accretion x silts. Sst starts to thin again at extreme north end of cut. Draping nearly complete.
Total 1 sample - to photos.

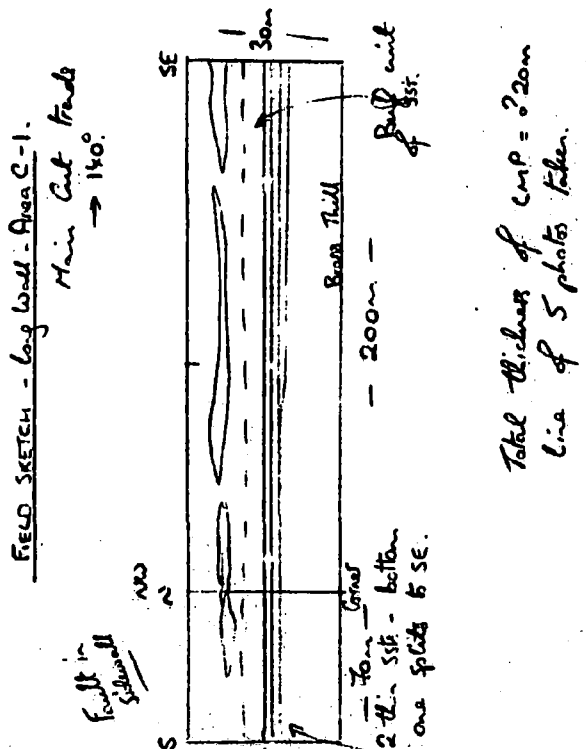
On south wall of cut, buff unit is quite massive, no basal cong. developed. Further up - some draping toward S.E. NB Single Brass Thill coal on north side of site. Lateral variation in facies limited - splitting of 1st sst over Brass Thill downcurrent (SE) - pods of massive sst in long face. Presently starting to reduce for second cut. Total 5 photos, 1 sample.

SECTION 298 -
BUCKHEAD - G1.

Composite section.



* DIRECTIONAL DATA. Unit 10 - Type B RXL → 163°, 186°, 158°. n = 3. Unit 18 - Trough cross-bedding 0.3-1.5/124°. (just above base) n = 1



Area B(w)

SECTION 299
- CABIN HOUSE B(w)

10m
Square cut exposing
Tilley - E-W wall -
Middle Tilley obscured by
old workings.

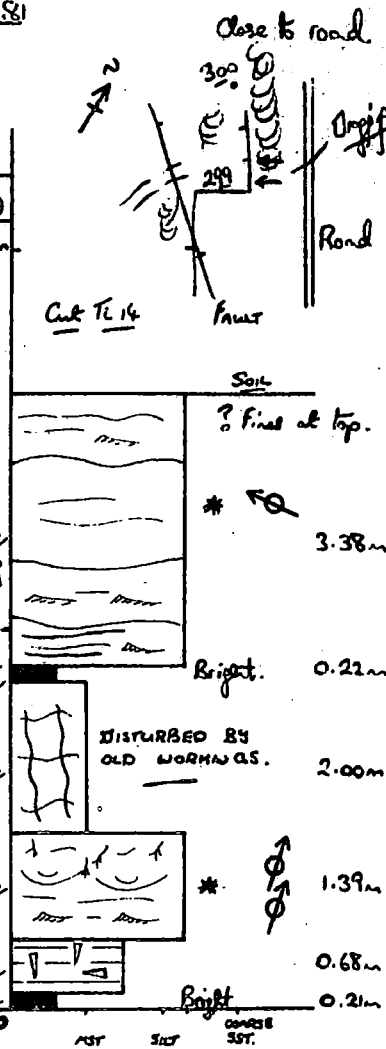
6
Fine white sst + carb.
laminar, coaly laminar
near base - Rxl -
silty mt partings, undulating
bedding surfaces.

TOP TILLEY

3
Mangled coal & scatter with
MIDDLE TILLEY.

3
Fine white TxB/Rxl
sst - top part rooted.

3
Med. grey silty mt - lam.
with sandy streak - sst pockets
BOTTOM TILLEY



Little lateral variation visible - much pillaring.

* DIRECTIONAL DATA :-

- Unit 3 - Rxl → 037° 005° n=2 (Type A/B)
- " - Trough - 0.2m/20/027° n=1
- Unit 6 - Rxl → 307° n=1 (Type A)

SECTION 300 -
CABIN HOUSE B(w)

Long wall 40m north of 299.
- under soil heaps.
Soil

13
8m
Fine white Rxl/TxB
sst with only laminar
& undulating bedding
surfaces.

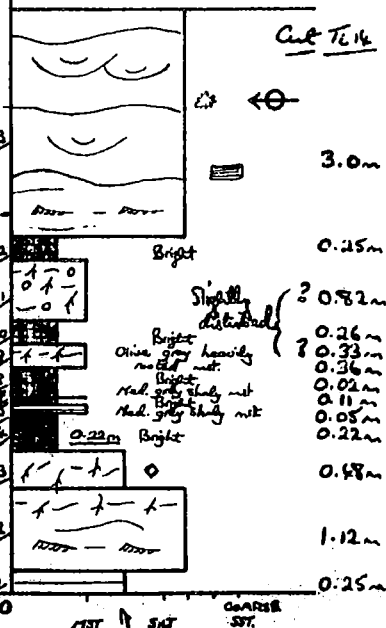
TOP TILLEY

11
Olive grey nodular
rooted mt.

MIDDLE TILLEY

3
Med. grey heavily rooted
slightly silty silty mt.
Fine white Rxl sst -
rooted at top.

1
Med. grey silty mt +
sandy streak

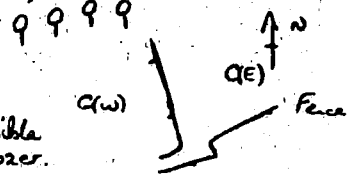


* DIRECTIONAL DATA :-

- Unit 13 - Troughs 0.2m/20/291
- 0.15m/20/262
- n=2

Probably not for to
Bottom Tilley.

Area A presently unproductive - Areas C(E), C(W), B(S)
complete except for boundary cut - see below.
Area C (E/W) - long cut → 330° to Top Busty.
- one cut further than last visit.



Access not possible
- manic bulldozer.

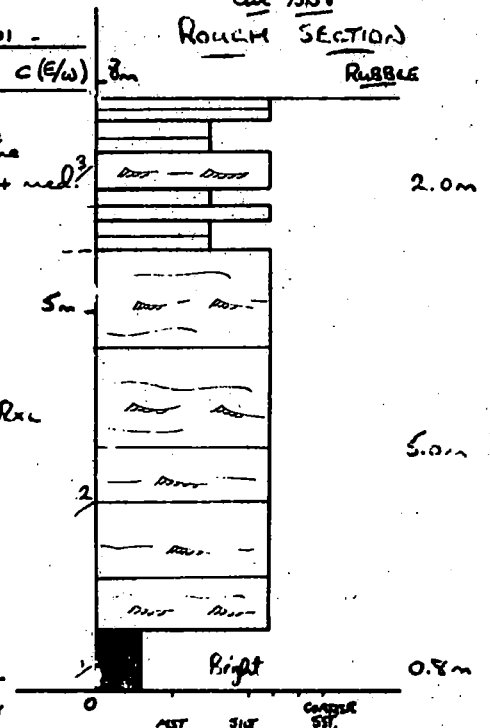
SECTION 301 -
CABIN HOUSE C(E/W)

Cut BBP
ROUGH SECTION
RUBBLE

3m
Interbedded fine
white Rxl sst + med.
grey silty mt.

5m
Fine white Rxl
sst.

TOP BUSTY
BOTTOM BUSTY



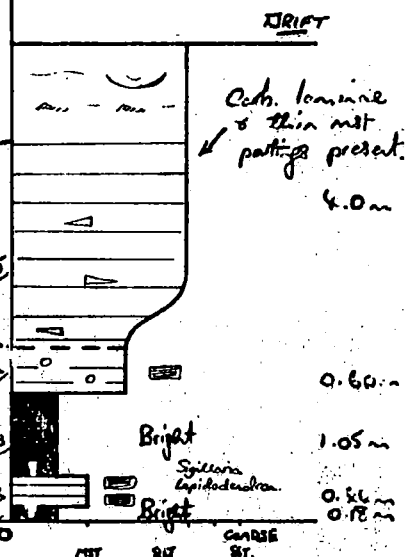
SECTION 302
- EDMONDSLEY C(W)

Centre of long wall - 200m long

7m
Coarsens rapidly to 5m
fine brown (Rxl/TxB
in upper part) sst -
mostly horizontal, lam.
med bedded -
horizontal furrows.
Fine scale || lam. present.
Dark grey silty mt, || lam.
+ plant fragments occasionally
nodules.

FIVEQUARTER

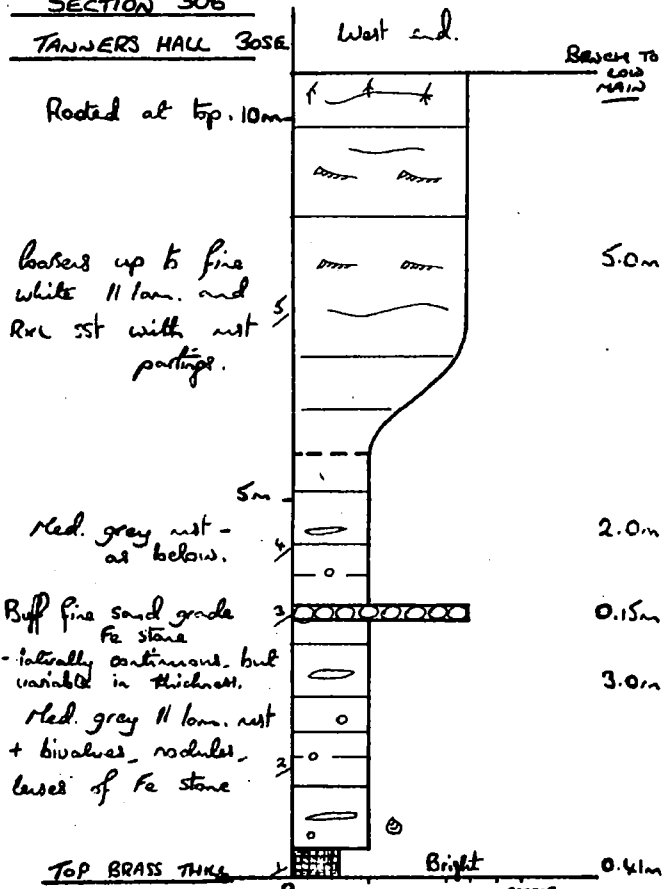
3
Med. grey shaly & rooted
mt + coaly streaks
numerous flattened
plant impressions.



Little lateral variation along 200m of exposure.

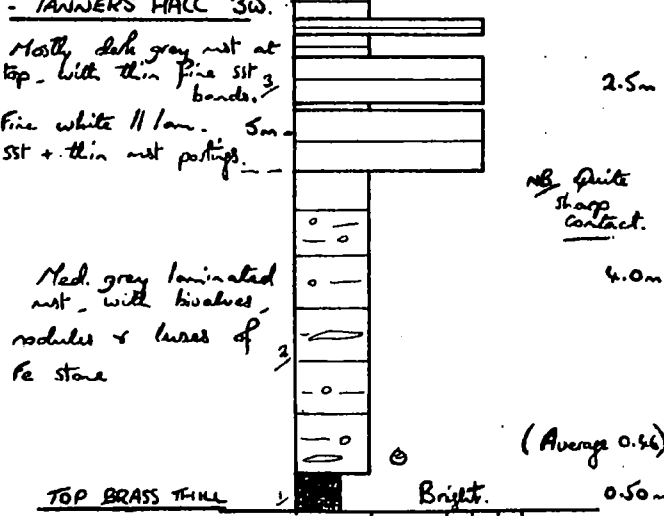
Section 305 - previous page - Cut 2E - long cut, still dragging - to north - probably ~ 150m up. 1 photo. Sst bands in unit 5 thin and split toward the south. Cut trends → 010°. Lateral variation otherwise negligible. Top Brass Thill worked more or less on outcrop, in small cuts to west. Cut 155 - low Main - on outcrop - just east of farm - low Main with drift above.

SECTION 306
TANNERS HALL 305E



West end of cut - near access road - trends E-W. Still dragging to east. Total ~ 100m exposure at present. No lateral variation.

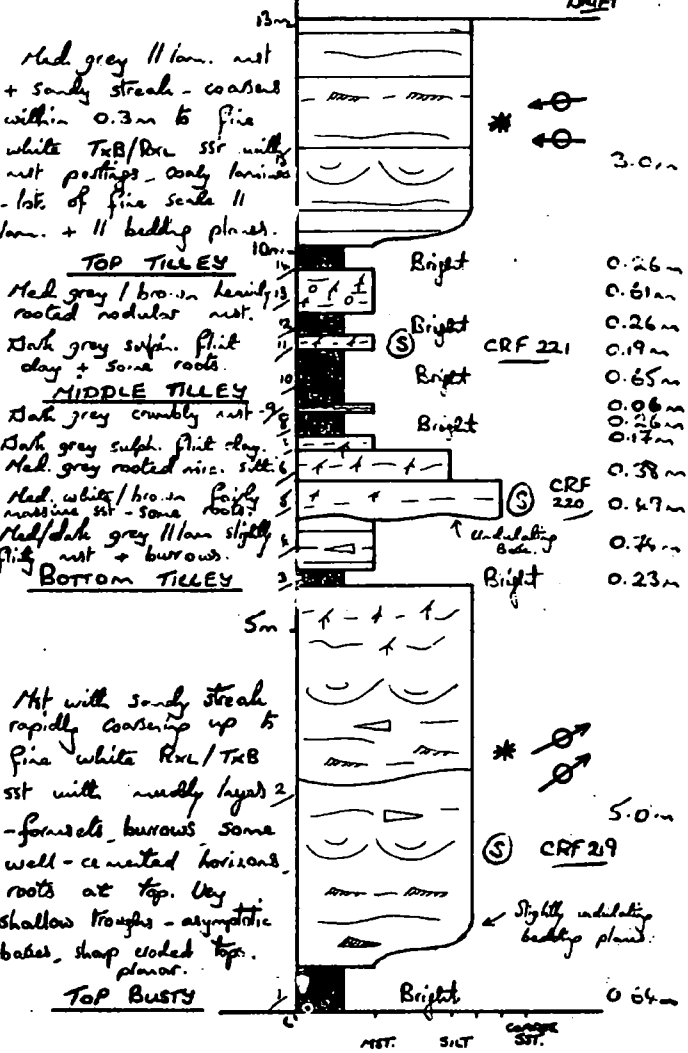
SECTION 307
- TANNERS HALL 3W.



Long N-S Cut - Section by right angle head in cut. Fault crossed cut at this point - down to NW.

SECTION 308 -
MOWN MEADOWS - 11.

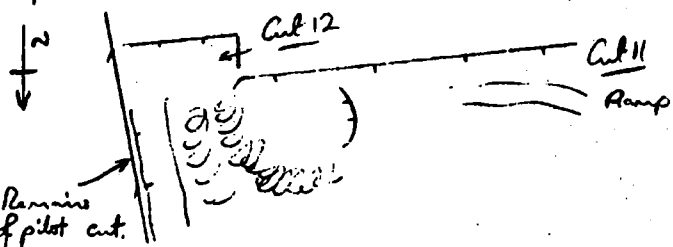
Composite Section.
Cut trends → 095°
DRIFT



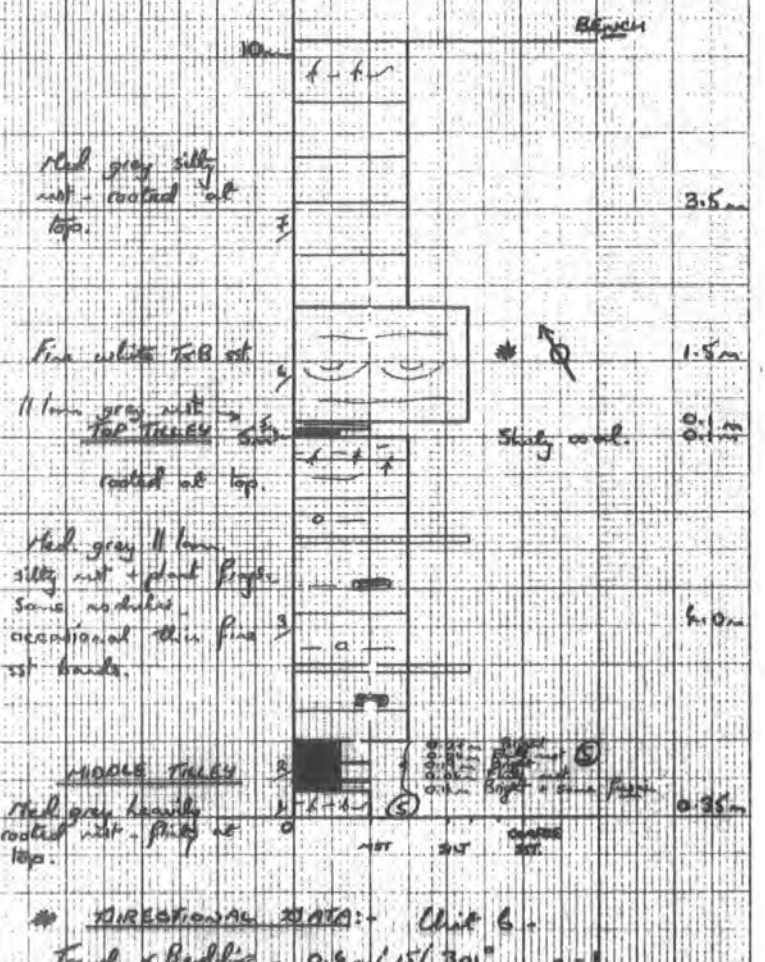
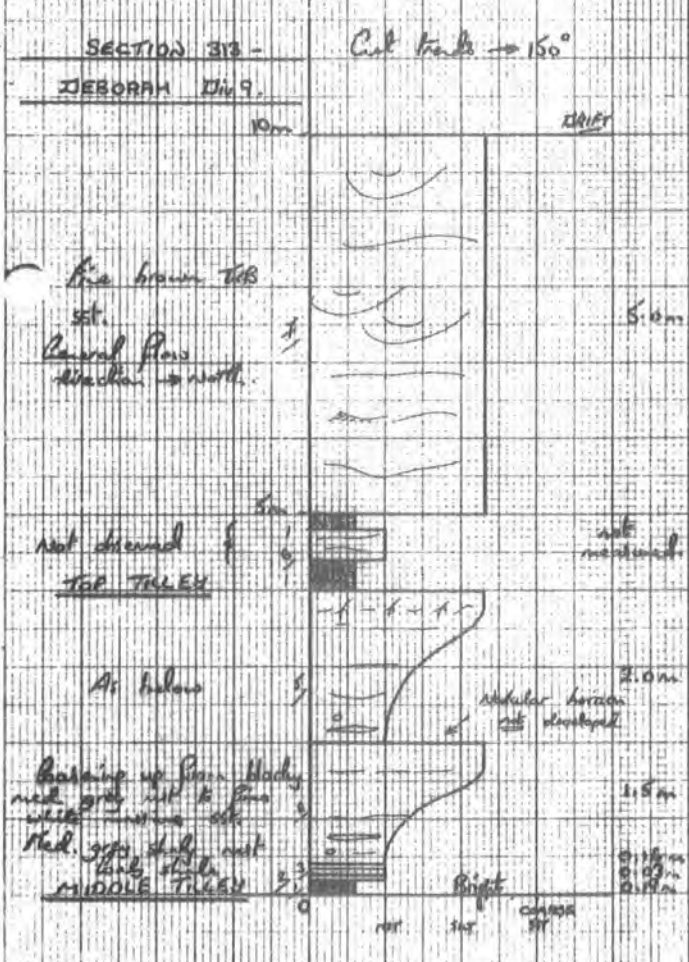
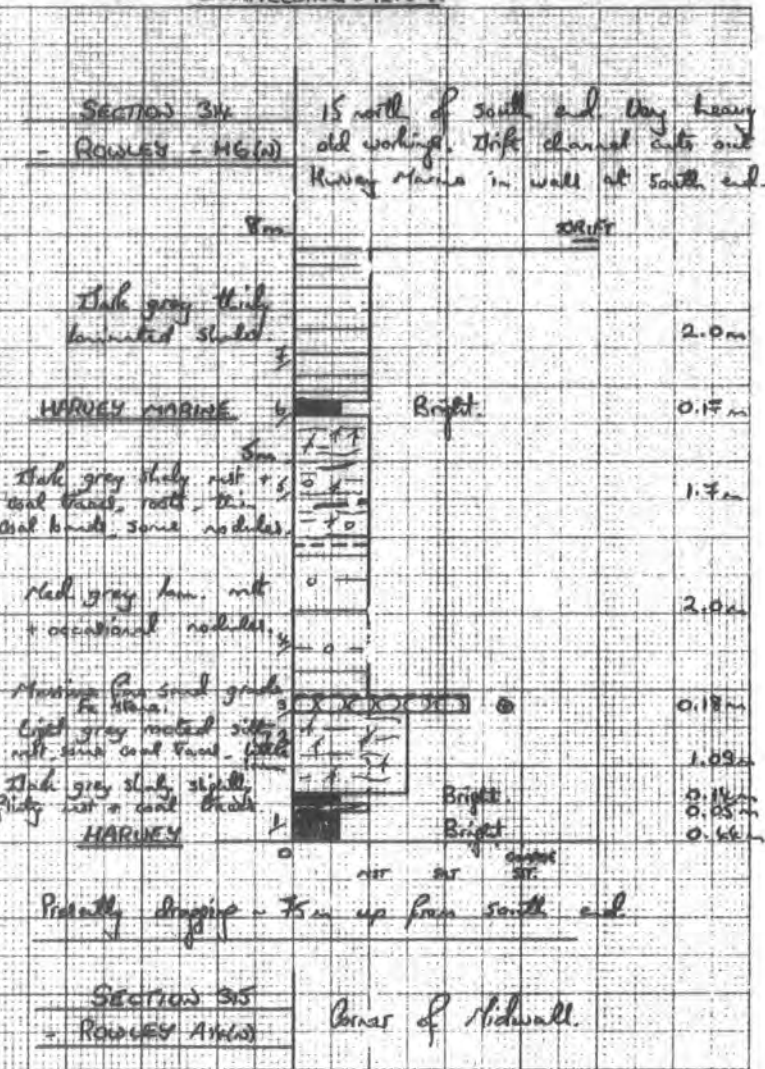
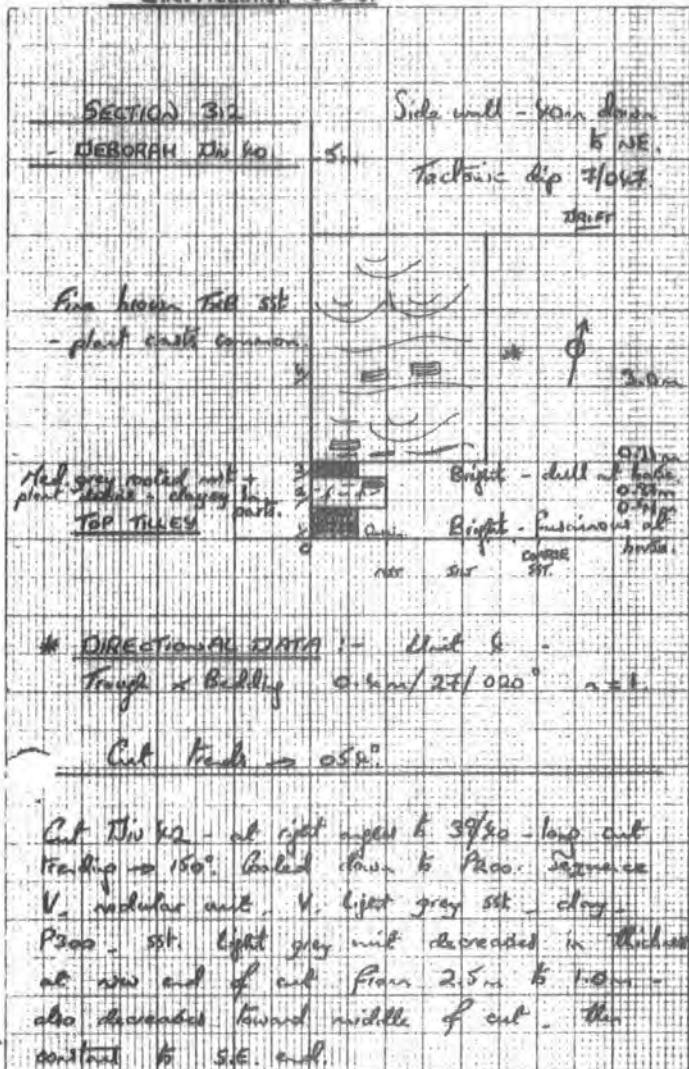
*** DIRECTIONAL DATA :-**

Unit 15 - RXL → 274° $\lambda = 1$ (Type A)
Trough x Bedding - 0.1m / 260° $\lambda = 1$.
Unit 2 - RXL → 037_022_068_066_078_062. $\lambda = 6$.
Trough x Bedding (0.1m) → 057°_035°_038° $\lambda = 3$.

Cut 11 now abandoned - being backfilled - originally went down to Bottom Busty. Total 3 samples. 2 photos.



Little lateral variation visible - but difficult to assess. Cut 12 just starting - cooling P200 at east end - dragging to west. In remains of pilot cut - ssts over P300 thin & grade out to the south - nothing measurable.



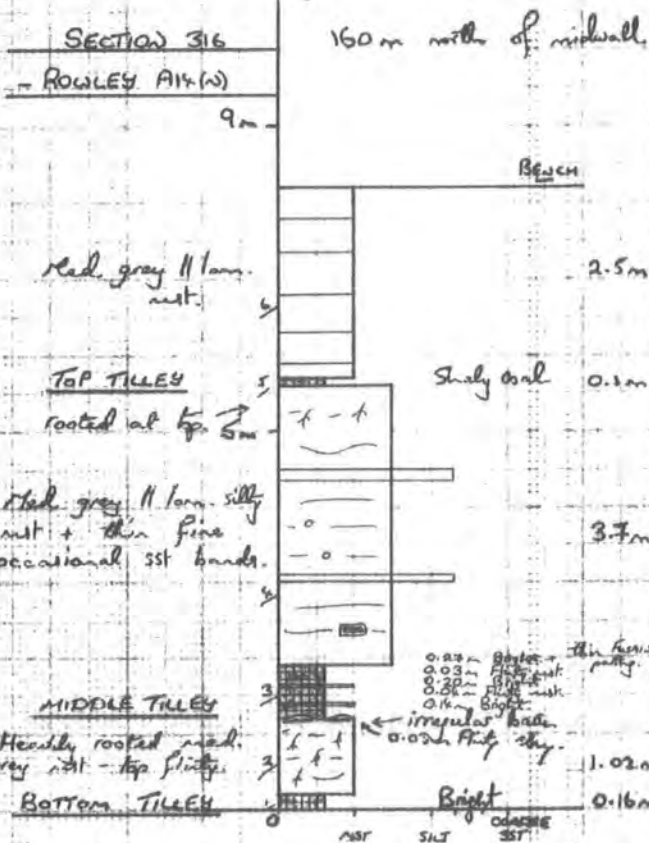
Very little lateral variation.
Cut Div 9 also exposed - exposed difficult
strata very similar to previous cuts

* **DIRECTIONAL DATA** - Unit 6 -
Trough & Bedding - 0.8m/15/301° n.e.

Notes - See Over

Notes - Section 315 - South end of long cut gives only partial exposure - little exposure of P200 due to slippage. ~ 5m piling to P300, then ~ 2.5m sst, ~ 2.5m silty mt with sst bands - then Harvey beach. Some trough x bedding visible in sst, but mostly // bedding planes. - sst thin to ~ 1.5m on midwall.

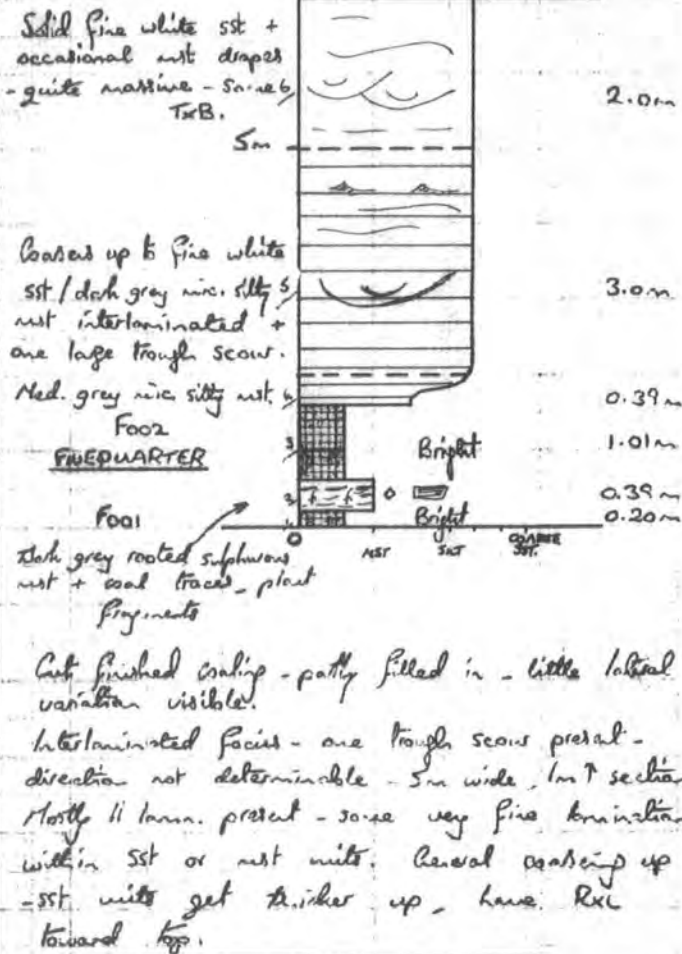
After 100m section completely obscured by tipping. At 150m exposure starts again. Lithology of over P300 is all med grey mt. At 160m fine white sst starts to come back in - rises up with ? lateral accretion sets. Presently dropping at ~ 230m north. Only another ~ 25m to drag.



At 160m sst starts to come back - rising up face - by 175m section all sst ~ 2.5m thick - continues this way to the present end of the cut - with drags to south present all along - ? lateral accretion. P300 thin shaly coal - persistent right along section. 3 photos. 2 samples.

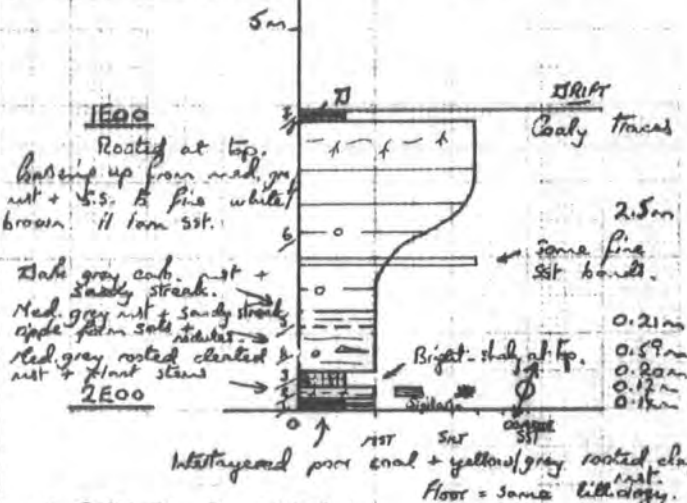
SECTION 317 - EDMONDSLEY C28.

Area C2(East) - Cut 8
50m east of middle access road.

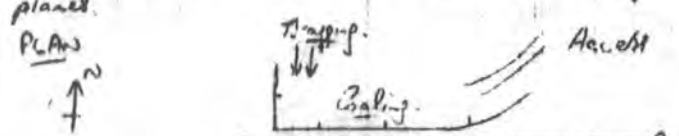


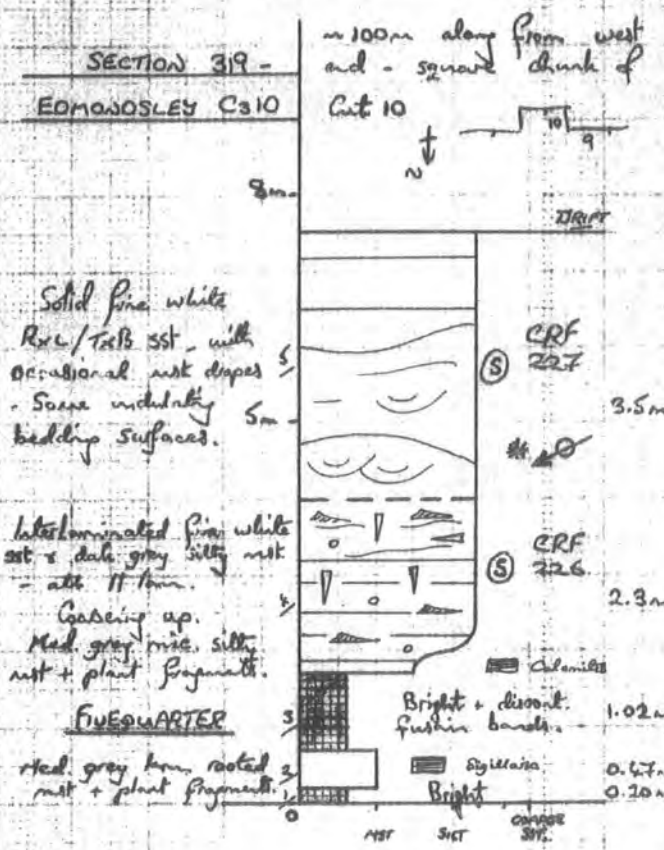
SECTION 318 - EDMONDSLEY C7

Cut 9 - side wall. E-W along southern edge of site.



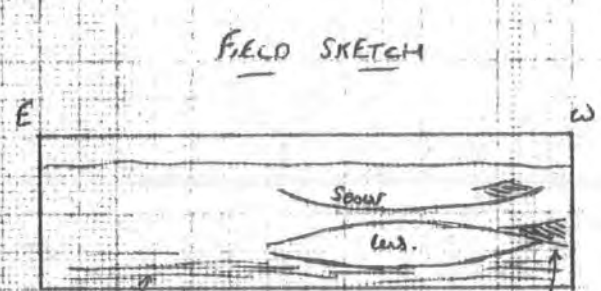
* DIRECTIONAL DATA :-
Unit 2 - orientated Sigillaria stems ->
208°, 241°, 210°, 180°, 217°, 201° n = 6.
- Plants all flattened impressions on bedding planes.





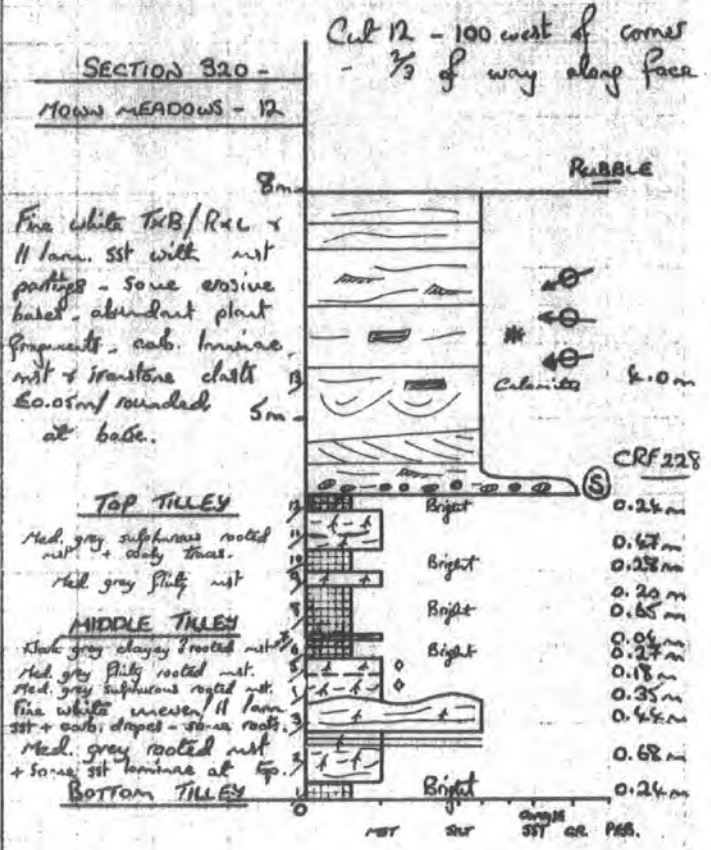
* DIRECTIONAL DATA :- Unit 5.
 Trough x Bedding :- 1. 0.6m/15/288°
 2. 1.0m/18/260° 3. 0.4m/1/287° n = 3.
 NB first two from west end of cut 9.

Interbedded facies - some ripple form silt - Rcc present - especially near the top of the nit. Horizontal & vertical burrows present. Some very fine interlamination - often uneven.

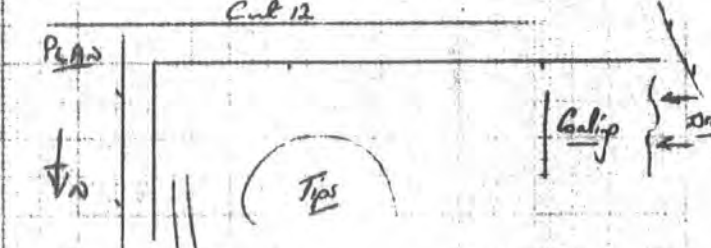


Bar-like forms and? channel scours present in sst.

Cut 10 still flat - with step in rubble - no new long sections presently exposed.



* DIRECTIONAL DATA Unit 13
 Trough x Bedding :- 1. 0.35m/26/214° 2. 0.8m/27/285° n = 2
 Rippled x lamination - 1. 288° 2. 283° n = 2
 Drifted plant remains - 1. 256° n = 1 (0.5m long Calamites stalk).

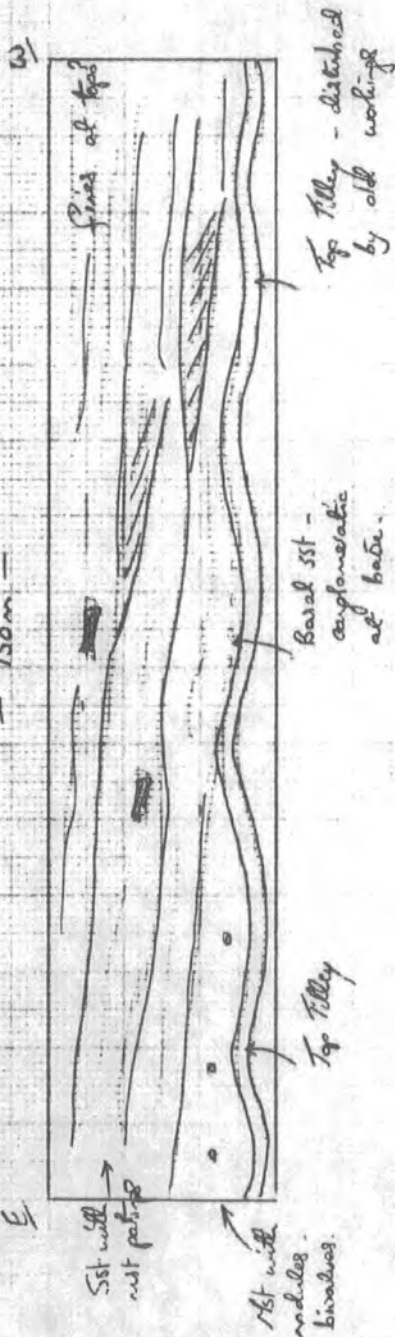


Access Presently digging at west end of cut - mostly coaled out - near ledge making site boundary - "Massive sst" appears to directly overlie Top Tiller, followed by interbedded facies. Cut trend → 260°. At east end of long wall - 1m nit with bivalves and nodules is overlain by interbedded fine sst + nit. By 50m along face, sst lies directly over Top Tiller - and does so for the rest of the section. Sst does not contain many measurable structures - occasional Rcc/Tsb. Some splitting of sst units along face to west. On east face - sst units don't change systematically in thickness - come and go. Sst mostly in units ≤ 1m thick - separated by med. grey tan nit partings - often 0.05m or less thick, clasts 11 lam. or uneven lamination + some Rcc/Tsb. Troughs increase in thickness downwards in spoon-shaped scours - have limited longitudinal extent.

Main Meadows cont.

Abundant plant remains present, especially *Calamites* stems - either preserved as flattened coaly impressions or sand-filled pit casts. Carbonaceous laminae common. Bottom of basal sst is conglomeratic - containing partly rounded clasts 60.05m of nit & ironstone. Apspt top to cong. layer. Matrix of this layer is med./ coarse sand grade. Bedding planes flat or undulating. Sst cut into nests - but not into ssis.

SKETCH OF FACE - CUT 12.



SECTION 321 -
IBBETSONS EX2.

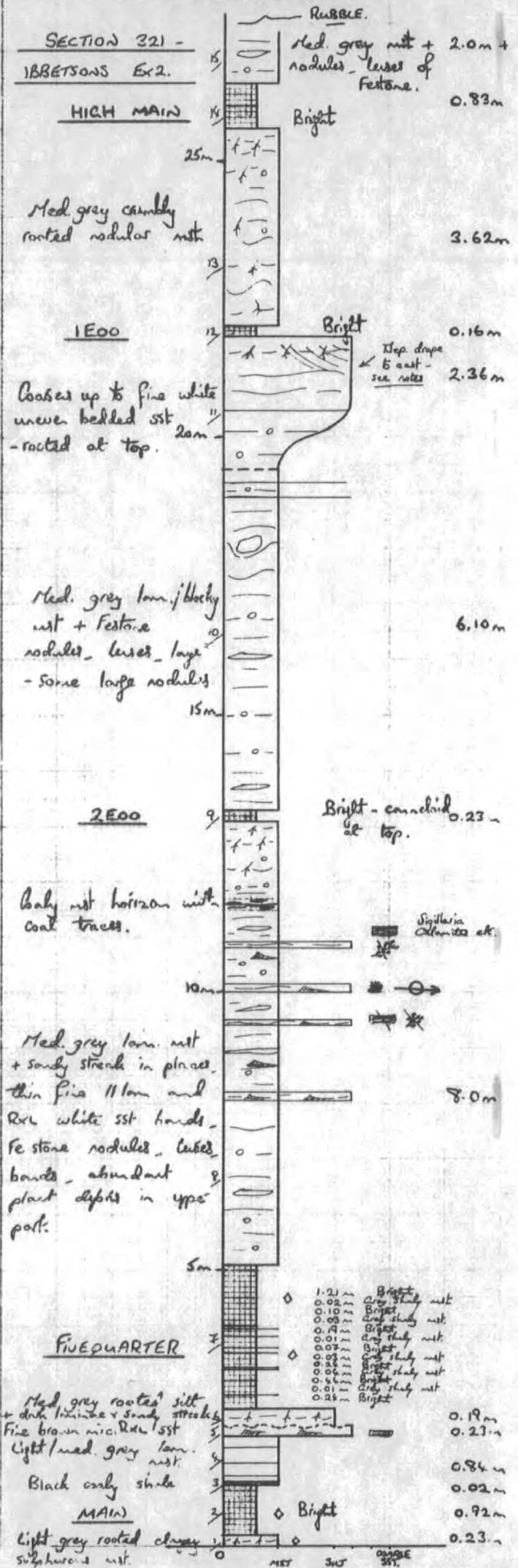
HIGH MAIN

1E00

2E00

FIVEQUARTER

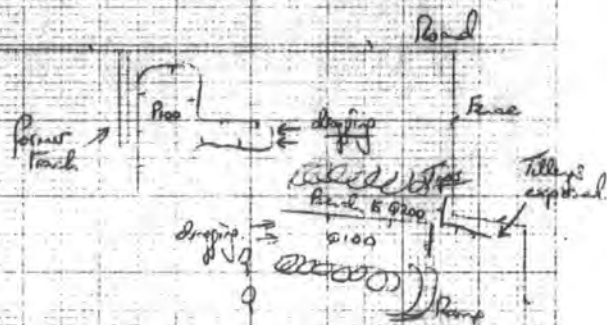
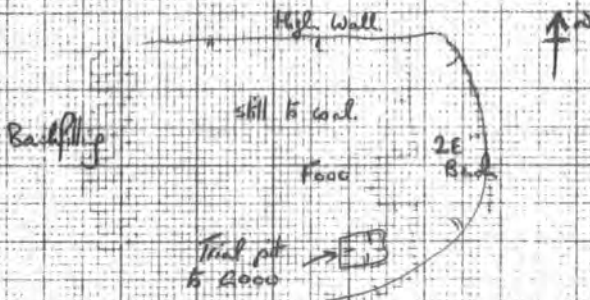
MAIN



Hobbsians - Section 321 - continued.

Section 321 is composite. See Plan.

PLAN OF WORKINGS



* DIRECTIONAL DATA - Unit 8

RXL → 100° n=1

Thin sst units in Unit 8 contain lenticular bedding and RCL - often very low angle. At top of section, High main part covered in with almost contact, but section is obscured by rubble. Sst below 1500 drops down to east at east end of high wall - 1m asymptotic silt. 2 photos of thin exposure.

Fines at top to 1/1 lam. med gray slightly flinty silt + Fe striae lenses.

Fine white sst. coarse sst/pobbles concn at 5m beds + clasts of sand/coal transition, shales 20-30m. Fines rapidly to fine sst with 1/1 lam. RCL, FeB, coarse laminae + west dipping, early lam.

TOP TILLES

Med gray flinty clay + rooted shaly silt.

MIDDLE TILLES

Shaly rooted med gray silt. Fine white rooted 1/1 lam. + massive sst + calc. drapes.

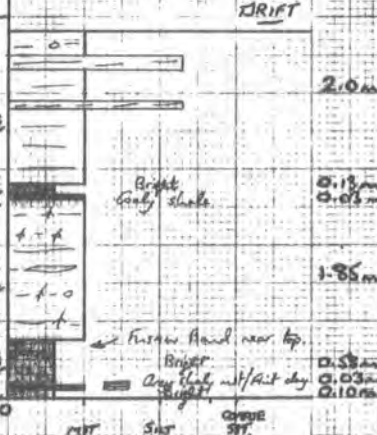
Tilley cut by fence - partly flooded. Area to north completely backfilled. Cut TE15

SECTION 322

- FARMERS HALL - 2E

North end of Cut 2E

Med gray/brown shaly silt with fine brown sst bands.



Bottom part of section disturbed by old workings.

* DIRECTIONAL DATA: - Unit 8

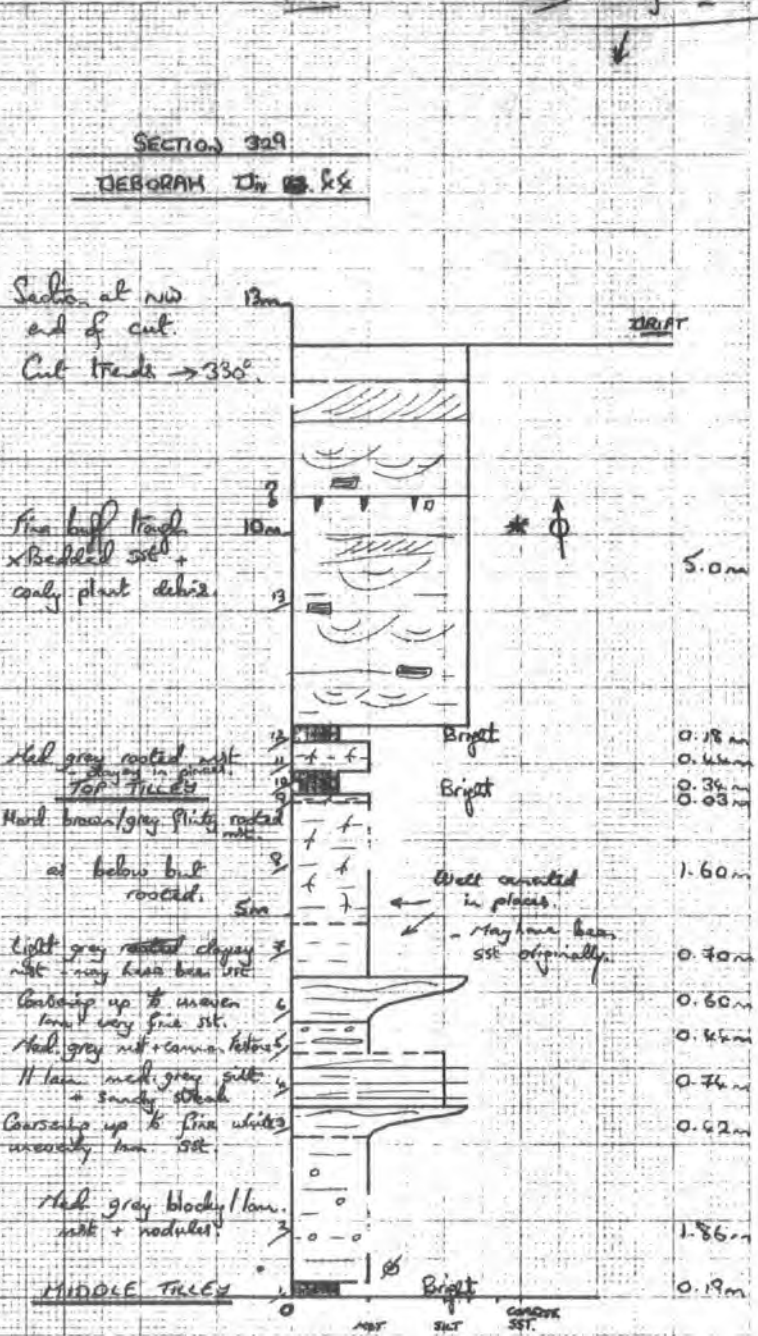
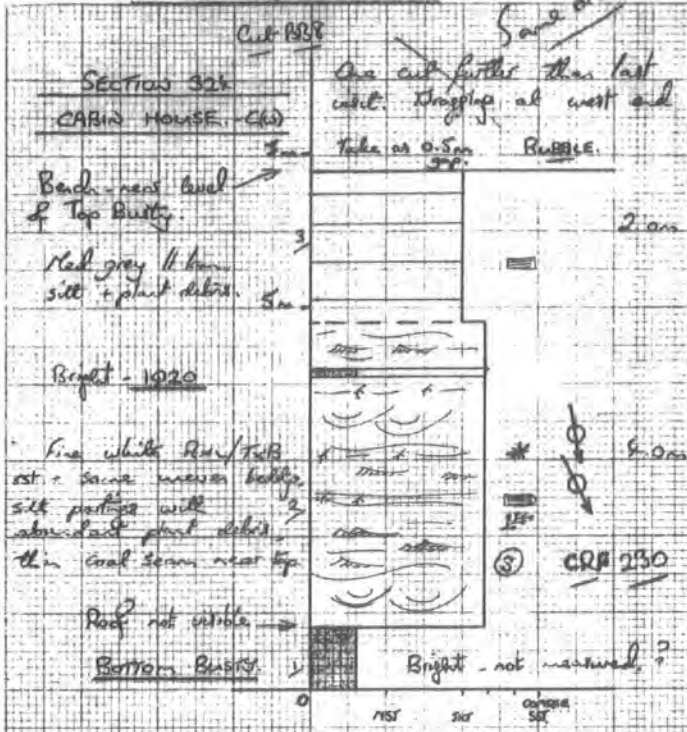
Trough x bedding = 0.2m/29/273° n=1

Ripple x lamination = 229°, 236°, 298°, 276° n=4

Some very low angle x silt present. Some evidence of overall dip to west in sst. In Unit 8, platy of coaly laminae + traced in basal part, carbonaceous drapes further up.

No lateral variation visible except thickness of Top Hutton - undulating. Bottom leaf of Bottom Hutton varies from 0.05 - 0.15m - and also varies in quality. Band varies from shaly gray silt to gray/brown flint clay - often early.

Cut 2E now finished - Cut 3E just started at south end. Situation otherwise exactly as per last visit - Cut 6W just starting.



* DIRECTIONAL DATA :-

Unit 2 - Trough x Bedding = 0.4m/17/161
 0.3m/20/173°
 Very wide shallow troughs - almost like planes asymptotic x silt.
 Unit 2 Ripples x lamination → 151° 160° 136°
 153° 146° 170° 131° 158° 177° 182° 156° 153°
 118° 162° 152° n = 15.

- RSL of 3 types - 1. Basals of Type A ripples ≤ 0.03m Lph.
 (climbing rippled)
2. Laterally overcutting ripples, some cross-sides preservation
3. Very low angle ripples

Very little coal present - heavily worked.
 Silt partings in sst - often rooted. Sst has abundant calc. droplets, also red FeO. Red laminae in RSL - weathering some fine grey net drapes also. Some sst beds 'structuralless' - well cemented. Beds 51m thick, mostly low.

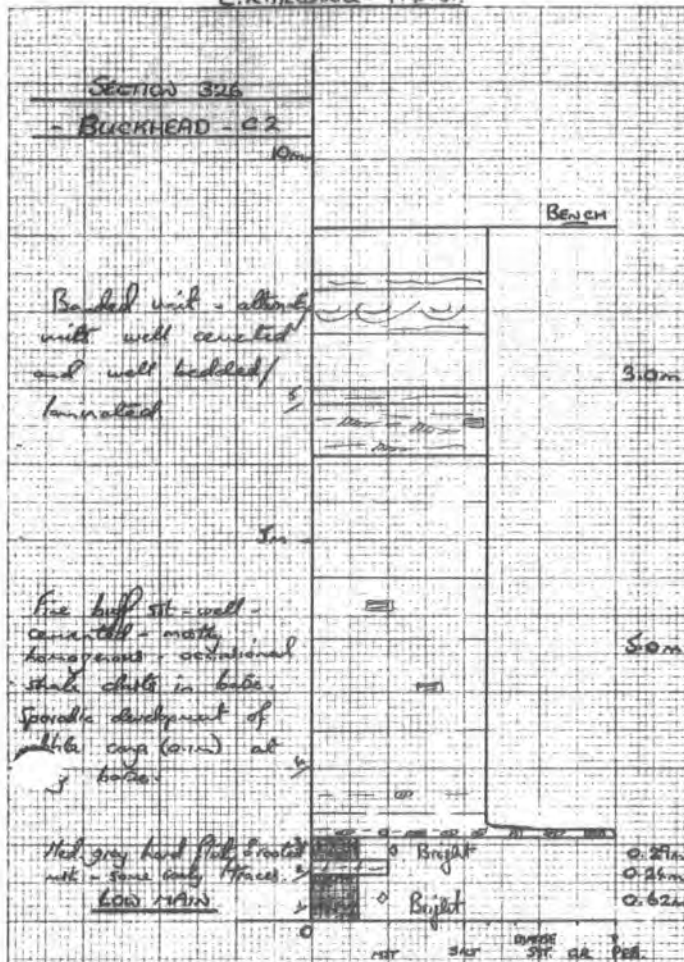
At corner of fence, east end of Bottom Bushy cut, backwall exposure of Tilley still visible though badly slumped and heavily worked. Sequence - Bottom Tilly, shales, st. shales, Middle Tilly - 2 layers with upper one - seems - the shales + rubble. Section down to Top Bushy mostly obscured.

Total 2 samples
 5 photos.

* DIRECTIONAL DATA.

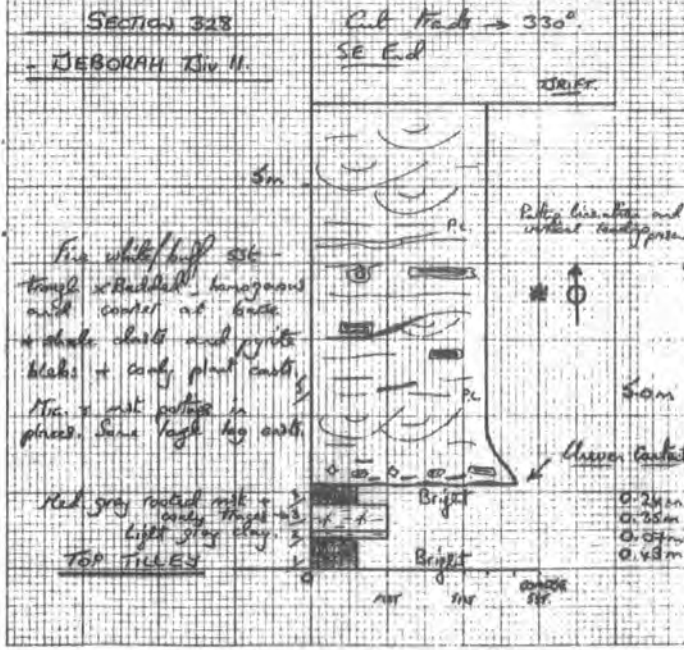
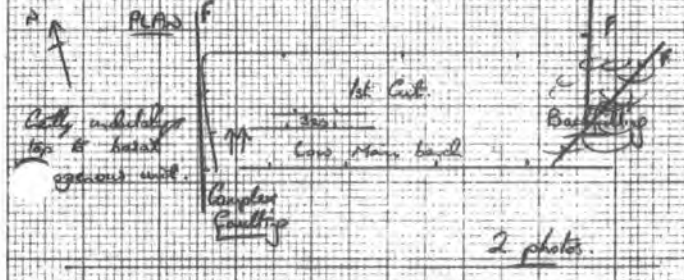
Unit 13 - Trough x Bedding
 1. 0.5m/15/ 839
 2. 0.3m/9/ 139
 3. 0.6m/22/ 006
 4. 0.2m/26/ 025°

Little lateral variation in facies.
 3 photos.



Long - composed of shale & ironstone cherts some well-fossiliferous - 50.05m across - only detrital present also. Matrix supported, though high chert concentration, no internal organization, abrupt top.

Few structures in lower homogeneous unit.

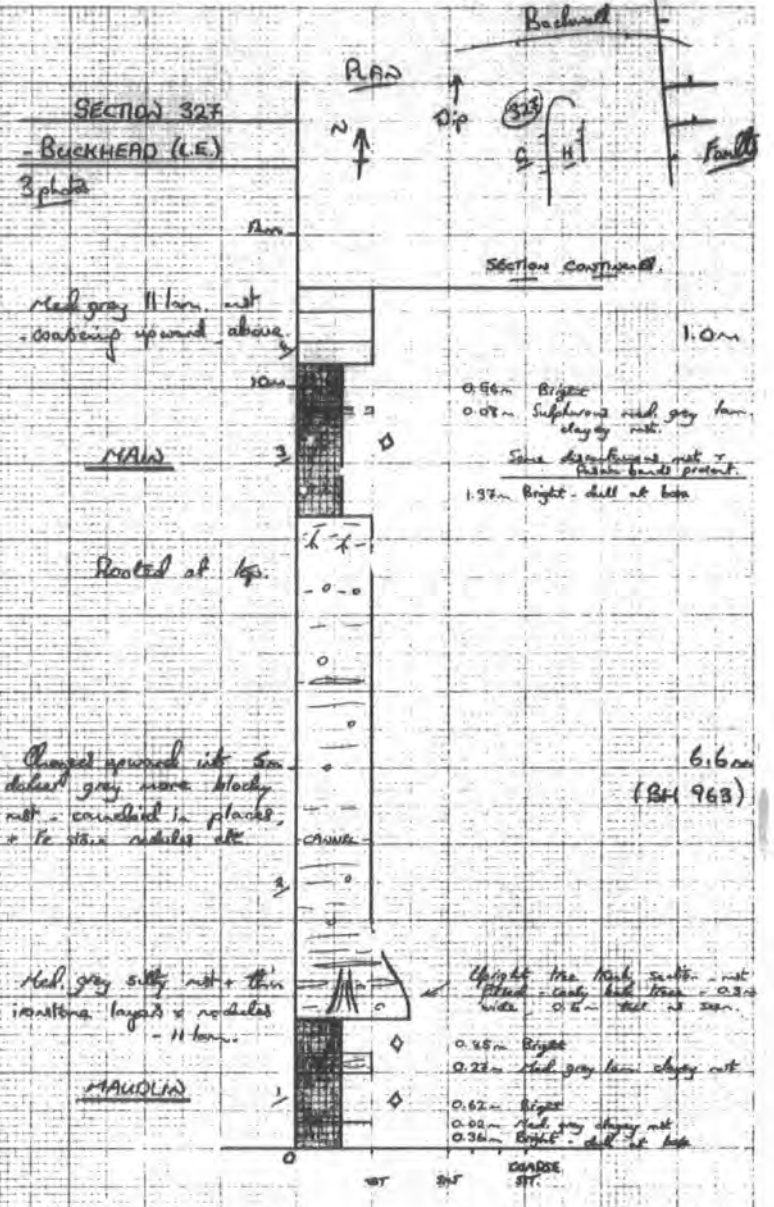


Fine white/buff st. - though bedded, homogeneous and coarse at base. + shale chert and pyrite blebs + early plant casts.

Thin & not polished in places. Some large log ends.

Red gray rooted mat & early 11 faces. Light gray clay.

TOP TILLEY



MAULIN to thin parting appears to be decreasing to east. Confirmed by boreholes. Section above MAIN disturbed by faulting.

MAULIN - bands laterally variable and discontinuous - by syndepositional faults particularly near top of seam, affecting top band.

Top of seam Band

Workings becoming very disturbed by faulting at north end of area. Freshwater being worked at outcrop - under pit leeps on northern wall. Coarsening up sequence over 11m still present, but no large fossils present. 2100 is ~ 0.3m thick.

*** DIRECTIONAL DATA**
Unit 5. TAB - 0.3m/15/352. N=1

NB Little lateral variation visible - only 50m uncovered so far. General direction of flow → NNE. Pitting limestone present. Block of st. under dogline with 2 Nodification Ooids on west slope - east. Spread defn - due to vertical bedding.

SECTION 329 - SEE BEFORE 325

SECTION 330
- WEAR CORGE (a)

3m

Outcrop @ - see map - South of Prebends Bridge, on west bank of Wear.

Thinly laminated fine brown sst + Rxl

Well cemented fine brown Rxl sst + small coarse surfaces - micaceous partings + roots.

*** DIRECTIONAL DATA :-**
Unit 2 - Rxl → 07° n=1
Unit 1 - Rxl → 089° 100° 132° n=3

Position 2m from top of bank. Probably top of some sst body exposed above Prebends bridge.

SECTION 331
- WEAR CORGE (a)

3m

Half way up bank, 2m south of 330 - just above path. Slightly lower level.

CRF 231

+ tab + bedded
Fine brown Rxl sst - plant casts, load marks, barrens, shaly shales at base + only traces

Dark gray - black calc. shales + coal streaks, some sst laminae.

Interbedded med gray Rxl sst + thin fine brown Rxl sst with mic./carb partings - all rooted.

*** DIRECTIONAL DATA :-**
Unit 3 - plant cast (dip) → 067° n=1
Unit 3 - tabular x sst 0.2m/19°/100° n=1

SECTION 332
- WEAR CORGE (h)

3.0m

West side of 3rd re-entrant large o.a. carrying small stream. Upper half of bank.

Thinly laminated sst

Rxl / tabular x bedded fine brown sst - some thinly laminated with.

Rxl fine sst + loaded beds. 3
Beds + dark gray shales

Silt layers predominant toward top - rooted + nodules - lenticular bedding.

Fine brown sst thin laminated micaceous sst - some hard well cemented layers - some developing large concretions

*** DIRECTIONAL DATA :-**
Unit 1 - Rxl - 099° 063 096 076 086 106° 050 088 035 n=9
Unit 1 - Rxl - "secretion" layers - 031 353 365 09° n=6

CRF 9.4.81

SECTION 333
- HOWN MEADOWS-13

East end of Cut 13.

Bully distributed by old workings.

1st drapes, lots of sm. 1 km x low angle dipping to west.

Loose gray crudely laminated sst passing up into fine gray Rxl/TAB sst

TOP TILLEY
Black sandy shale + coal streaks
Rooted nodular med gray sst - commonly hard + splits at top.
Hard shaly gray/brown rooted sst

MIDDLE TILLEY
Light gray drapes etc.
Superficial gray hard shaly sst - rooted.
Beds not seen.

Unit 6 - Coal → some locally thickened by lens of dense pyritic sst in middle of lens + small concretions also there.

*** DIRECTIONAL DATA :-** Unit 10
Rxl → 228° 257° 271° n=3

SECTION 332
- WEAR CORGE (h)

3.0m

West side of 3rd re-entrant large o.a. carrying small stream. Upper half of bank.

Thinly laminated sst

Rxl / tabular x bedded fine brown sst - some thinly laminated with.

Rxl fine sst + loaded beds. 3
Beds + dark gray shales

Silt layers predominant toward top - rooted + nodules - lenticular bedding.

Fine brown sst thin laminated micaceous sst - some hard well cemented layers - some developing large concretions

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Unit 1 - Rxl - 099° 063 096 076 086 106° 050 088 035 n=9
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CRF 9.4.81

SECTION 333
- HOWN MEADOWS-13

East end of Cut 13.

Bully distributed by old workings.

1st drapes, lots of sm. 1 km x low angle dipping to west.

Loose gray crudely laminated sst passing up into fine gray Rxl/TAB sst

TOP TILLEY
Black sandy shale + coal streaks
Rooted nodular med gray sst - commonly hard + splits at top.
Hard shaly gray/brown rooted sst

MIDDLE TILLEY
Light gray drapes etc.
Superficial gray hard shaly sst - rooted.
Beds not seen.

Unit 6 - Coal → some locally thickened by lens of dense pyritic sst in middle of lens + small concretions also there.

*** DIRECTIONAL DATA :-** Unit 10
Rxl → 228° 257° 271° n=3

SECTION 333
- HOWN MEADOWS-13

East end of Cut 13.

Bully distributed by old workings.

1st drapes, lots of sm. 1 km x low angle dipping to west.

Loose gray crudely laminated sst passing up into fine gray Rxl/TAB sst

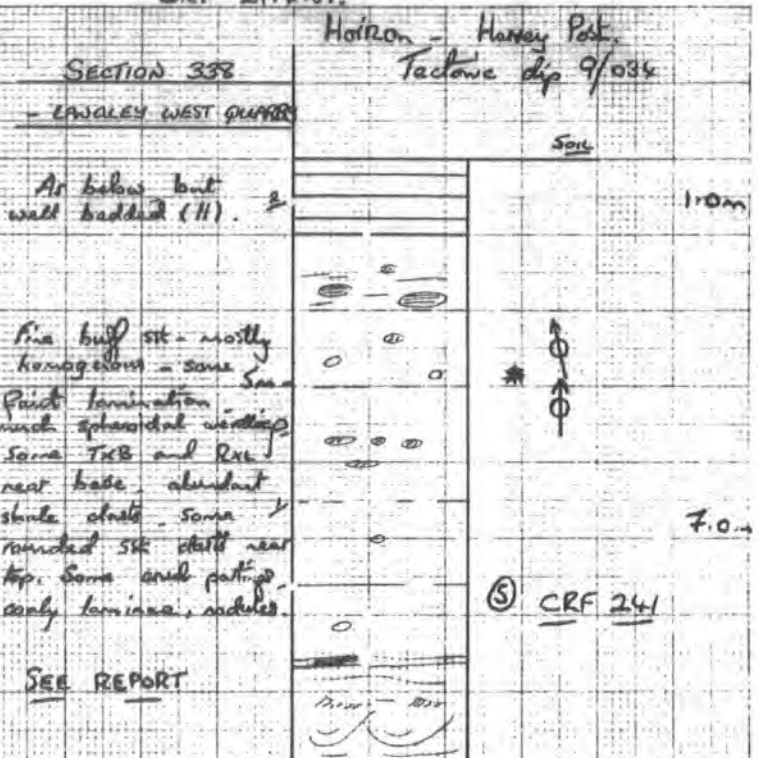
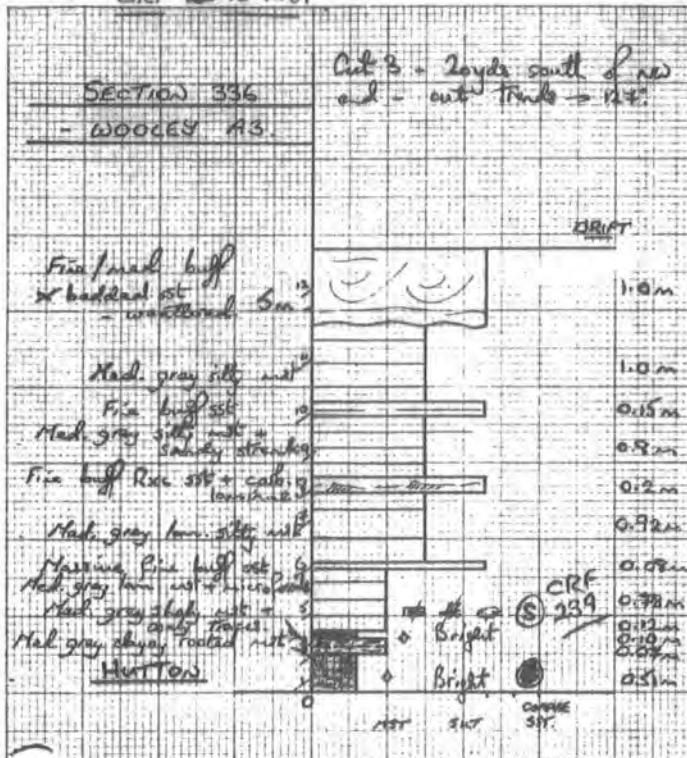
TOP TILLEY
Black sandy shale + coal streaks
Rooted nodular med gray sst - commonly hard + splits at top.
Hard shaly gray/brown rooted sst

MIDDLE TILLEY
Light gray drapes etc.
Superficial gray hard shaly sst - rooted.
Beds not seen.

Unit 6 - Coal → some locally thickened by lens of dense pyritic sst in middle of lens + small concretions also there.

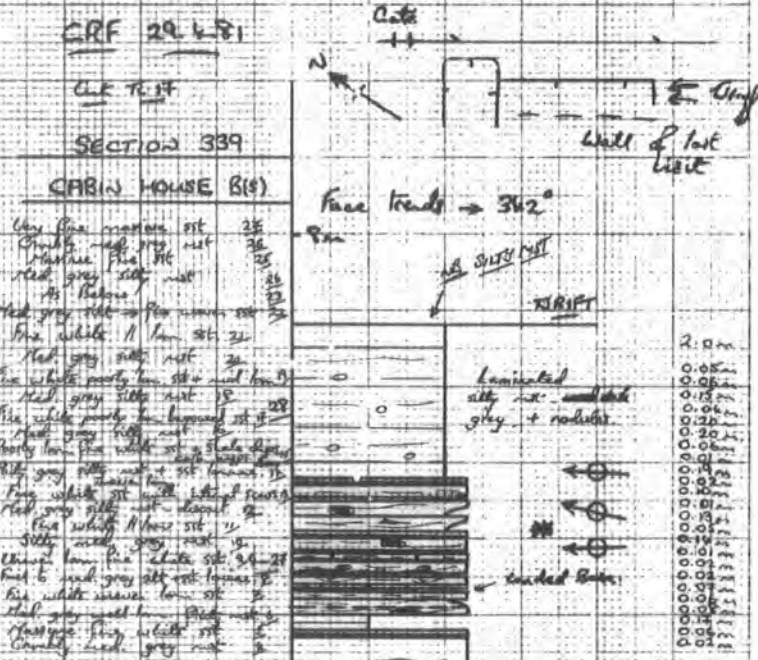
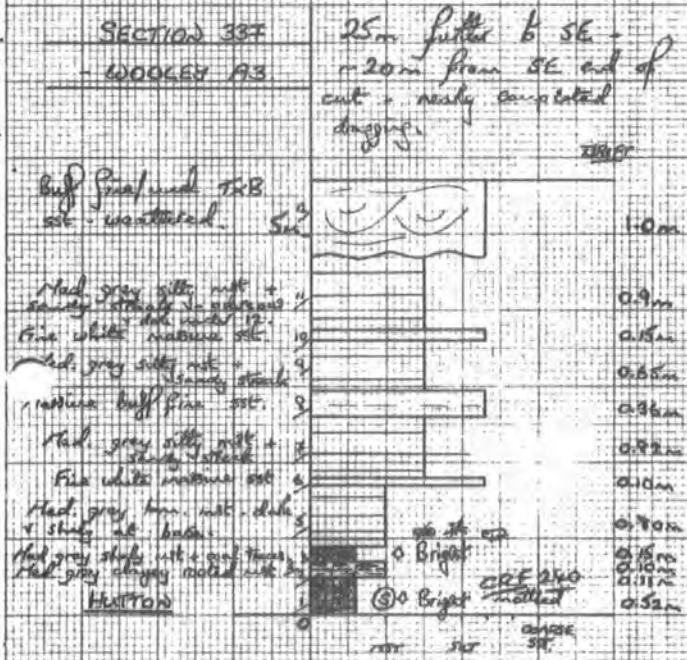
*** DIRECTIONAL DATA :-** Unit 10
Rxl → 228° 257° 271° n=3

NOTES - SEE OVER



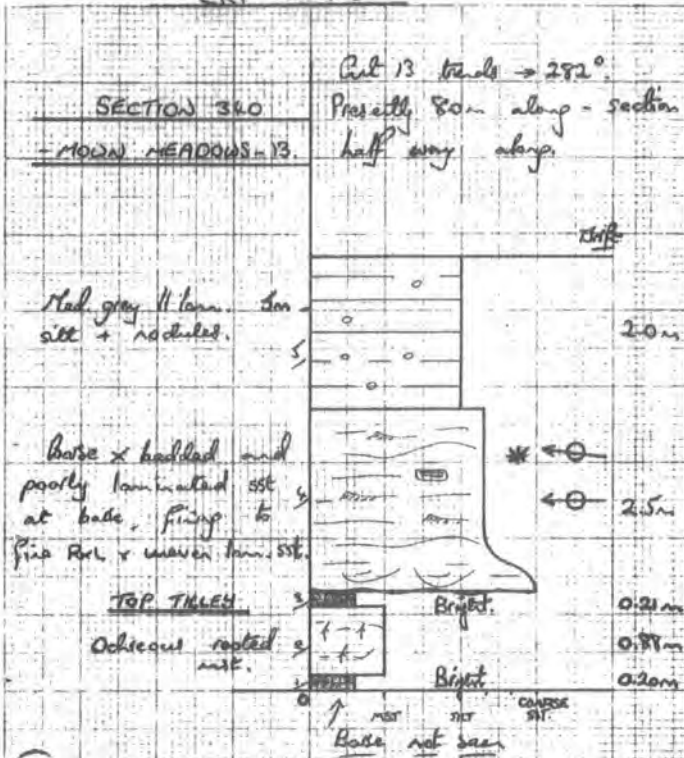
Cut is a four layer silt bands laterally continuous and were at first constant in thickness along the cut. Cuts 1 & 2 were largely on outcrop and badly disturbed

*** DIRECTIONAL DATA**
Trough x set - 0.3m / 24 / 338, n=1
RXL - 320°, 020°, 011°, n=3



Note - Section 339 lots of low angle x surfaced present - but amplitude wide troughs probably → undulating bedding observed on weathered outcrop. Units logged change in character & thickness laterally very rapidly. Some similarity to rhythmically bedded strata exposed at Ebsworthy though more silt. Some normally graded thin silt units present.

*** DIRECTIONAL DATA:**
Ripple x lamination → 299°, 260°, n=2
Trough x set 0.3m / 10 / 275 n=1
Elongate spond - fill 265° n=1
Some loaded bases to silt units. RXL mostly Type A low angle & Type A bedded sets.



*** DIRECTIONAL DATA:**

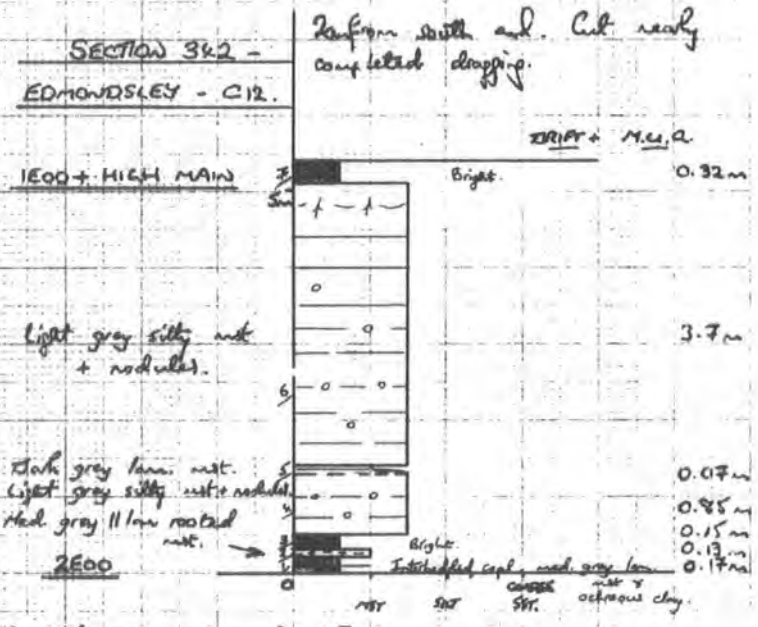
Trough x Set - 0.2m/31/288. n=1

Ripple x lamination - 267. n=1

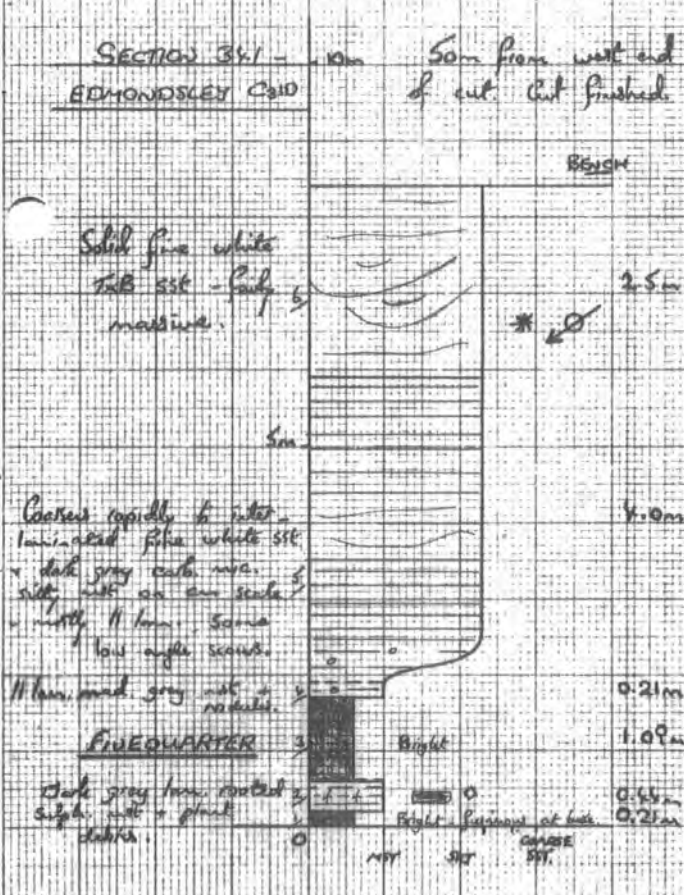
NB In eastern corner of cut, draping effect of sst layers down to south - oblique to flow direction.

Lateral variability impossible to assess.

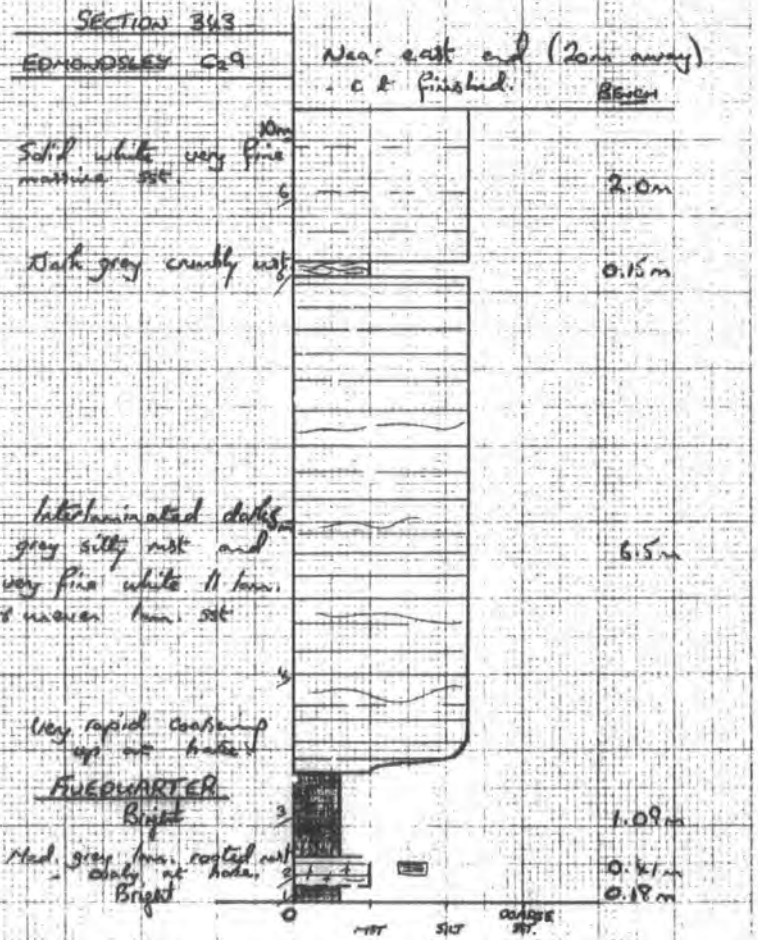
At east end of cut, several large $\leq 20m$ wide troughs, $\leq 2m$ deep, in the upper solid sst facies - direction different to assess - very oblique to face, one $\rightarrow 231^\circ$. Underneath, in interstratified facies, trough-like scours also occur, with the upper parts infilled by solid sst, and occasionally overlain by more interstratified sediment - 2m upward - major trough mentioned above. Basal parts of erosive units RCL and chaotically bedded.



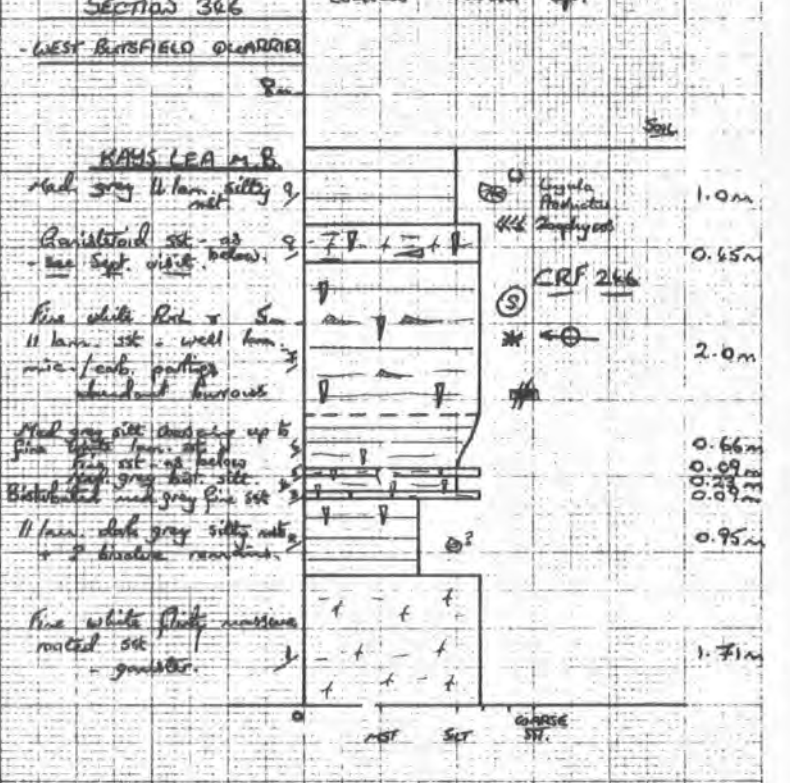
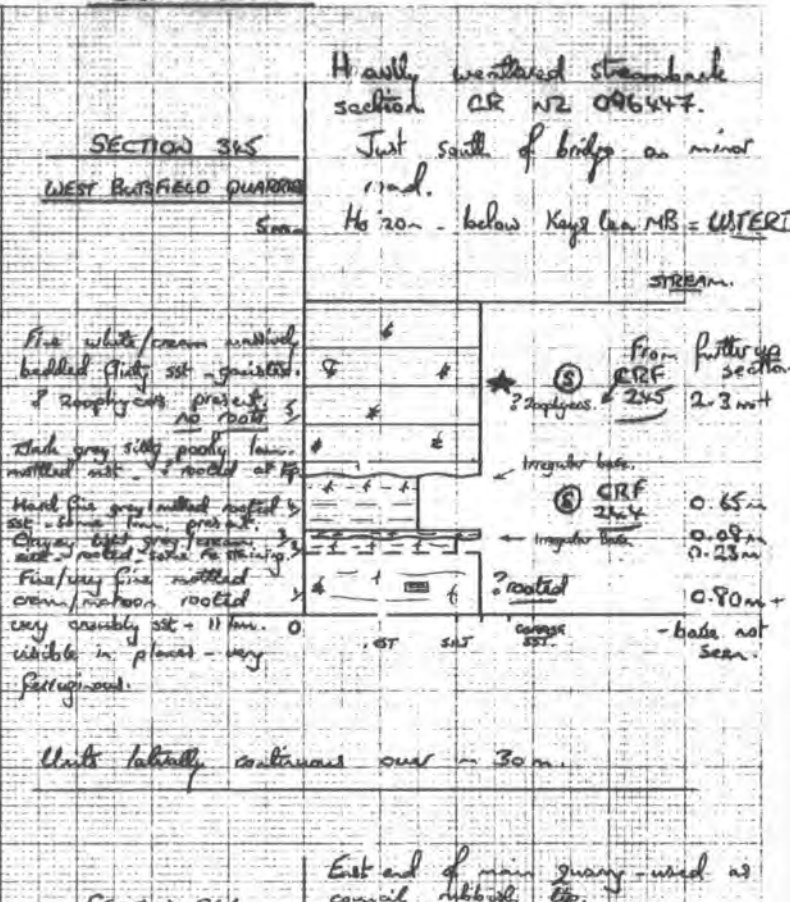
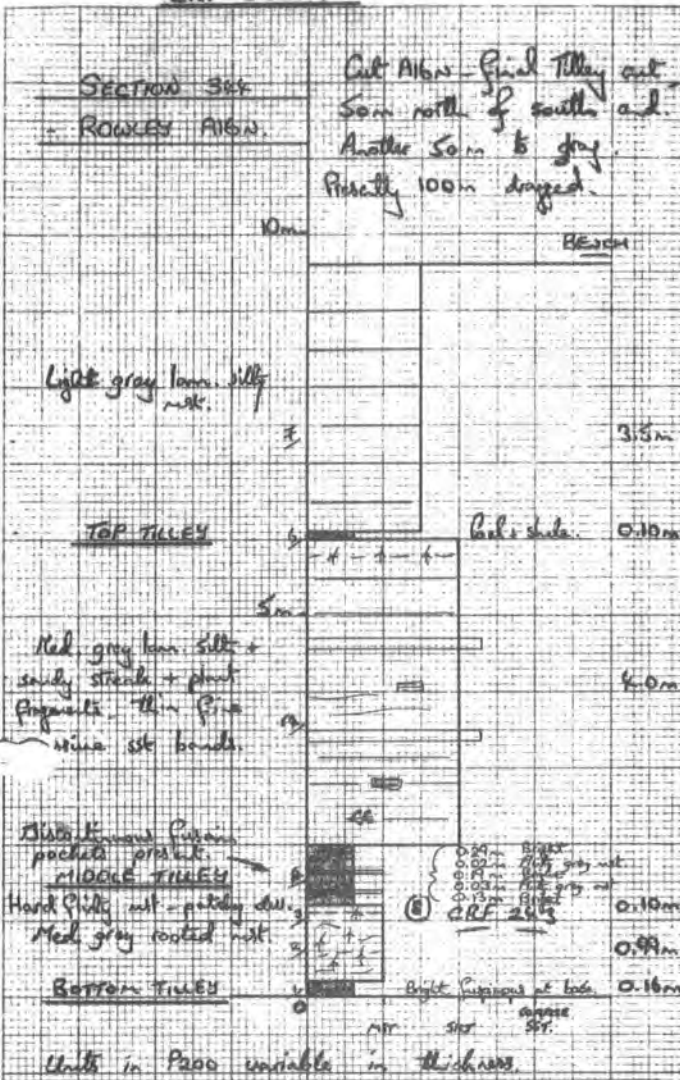
Ochreous yellow clay floor.
Sharp diff. contact at south end of cut.



DIRECTIONAL DATA: - Unit 6 at east end of cut - Trough x set 2m/1/231. 320m wide.



Very rapid coarsening up to base



* DIRECTIONAL DATA - Unit F. Rippled x lamination.
 $\rightarrow 297^\circ - 263^\circ - 206^\circ \quad n=3$

Units traceable with constant thickness along quarry face for ~ 200m. Unit F interbedded with shales to west. 200m further east, along old linear quarry - sinusoidal bedding traces in silts - trough x bedding in silts (Unit F).

* $0.25m/24/183 \quad 0.5/23/190 \quad 0.2m/19/192 \quad n=3$

Sst med. grained mt fine. Top part of underlying sequence contains smooth-topped waves - influenced rippled striking 292° . $0.02m \lambda$. $\leq 0.05m \lambda$. Top gneissified 0.7m thick underlain by a thin cream coloured clay with ferruginous nodules. Kays Lea M.B. = WESTFIELD.

Second part of Area C!

SECTION 347

BUCKHEAD (R)

LOW MAIN RUBBLE - BENCH TO

DIRECTIONAL DATA:- Section 348.

? sst layers at top - obscured.

x - x - x

Unit 4 - large scale foresets $\rightarrow 152^\circ$ $n=1$

Unit 4 - RxL $\rightarrow 183^\circ, 220^\circ, 229^\circ, 180^\circ$ $n=k$

5m

Blocky to laminated med. grey mst + Fe-stain, nodules & lenses, abundant bivalves in bottom 1m.

From

Exposure does not permit detailed observation of sequence above 2F00, but sst developed, thin 1F00 mts & disturbed finegrained under old pit heaps.

BRASS THIN

0.73m

① ② Cherty Carbonates

Bright, with abundant pyrite and calcite

mst sst COARSE SST

Bivalves - some in situ (burrowing position), some clippings - majority disarticulated.

SECTION 348

BUCKHEAD (L.F.)

Sidewall of Laundry Extension $\rightarrow 348^\circ$ toward east end of pit heaps.

SECTION CONTAINS HEAVY FAULTING.

Had grey blocky mst.

1.0m

Bright 2F00

0.3m

Had grey blocky mst developing sandy streak and coarsening up to very fine white RxL sst with large scale foresets.

10m

x - x - x

1.0m
0.3m

9.0m

5m

3m

Had grey lam. clayey mst.

0.65m

Variable thickness

0.11m

MAIN

Bright

1.50m

mst sst COARSE SST

SECTION 349 -

TOP OF SECTION

TERRACE PT. -> AMROTH

NB 10.0 m exposure

Total - 48.6 m section

CONTINUED

9.0m

6.5m

10.0m

1.30m

0.12m

0.80m

0.15m

0.70m

0.75m

0.40m

1.75m

0.27m

1.0m

3.0m

0.7m

1.0m

(9.0m)

Coarse to med. grey silty mt - some large conc. in conc. shales - horizontal spacing quite regular - circular or oval in plan. 3-4 conc.

Med./dark grey mt - fine in places, with non-sens. brachiopod and plant fossils. Some small nodules. Plant debris mostly Calymene stalks.

Fine med. dark grey silt with granular texture.

SUBSERVATION M.B.

Bright

Med. grey silt with Type C fossils - about structural fossils - as below.

Well cemented silt texture.

Silt fine to med. grey silt with shaly ripple x lamination - injection pipes of st. fossil casts and collapse deformation structures with chaotic bedding. Cxcl. Type B & C commonly 0.5m x 0.2m x 0.1m. Near top of unit - structural ripple - Type C - A = 0.10m x 0.05m.

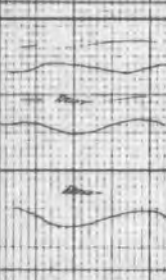
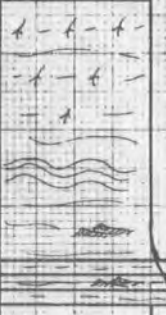
Collapse structures concentrated at base of cxcl. unit.

Fine grey silt with shaly ripple x lamination + structure at base.

Fine grey silt with ripple x lamination - Type A fossils. Non-sens. shaly ripple - mostly sharp top - ripple bases 0.01m x 0.02m. Small troughs 0.02m wide. Uniform structure in ripple.

Fine grey silt with irregular bedding - ripple x lamination (Type A). Variable direction in ripple.

BASE OF SECTION.



Calymene submarginata

4.0m

2.0m

0.70m

4.0m

FAREWELL ROCK

4.0m

Fine brown x bedded st - 50cm - 2k chert 50.10m. mt shales and large log casts at base of 4.0m. Some not parting. Silt is well bedded. Has a flat base. Large scale bedding with smaller log scale silt within.

Dark grey coaly shale + abundant plant fragments, occasional nodules occur on the right up.

Bright shaly silt. Fine at top, colour darker. Heavily rooted over fine grey silt. Some fine ripple marks. In conc. in fossil at base. No at top. Biot. coaly silt in roots, generally fine ripple marks. Med. grey rooted silt + abundant spherosiderite cracks. Root with granular silt. Root shaly. Coarsens up into coarse silt with R.C. (Type B) & (Type C) fossils. Photos near base, locally near top. Dark grey shale with plant fragments.

Light grey botryoidal and rooted silt with K. stria nodules - originally well lam. - coarsens 1/4 up to very fine grey applied silt.

Black coaly rooted brown mt

Fine to med. grey silt - becomes rooted.

Med. grey / brown fine silt with ribbed furrows in lower part + large calcareous granules - the Type A ripple x lamination further up. - mutually cross cutting silt. Some locally exp. in siltar horizons.

Fine grey silt with silt parting - sharp rippled contacts - silt has bedded (undulating) load casts and detached load beds of silt in a silt matrix. - no consistent cleavage direction - series of loaded units. Consolidated horizon overlain by flat lam. silt with local K. stria layers.

Coarsens to med. grey silt with K. stria nodules x bases - some carbonate lamination.

CRF 248

CRF 249

CRF 267

Load beds 40.50m across

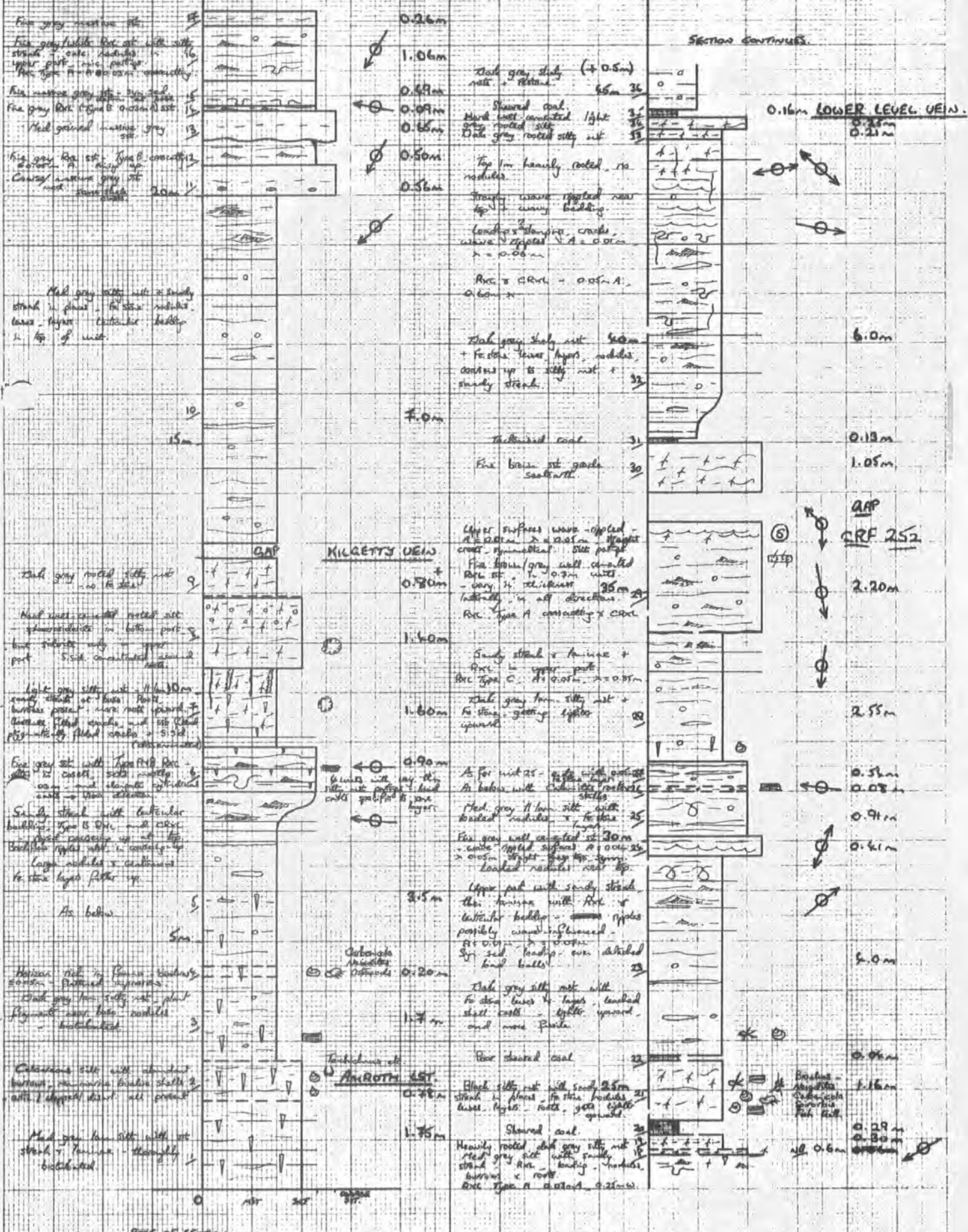
Tectonic dip 14/215 but variable

SECTION 950 -

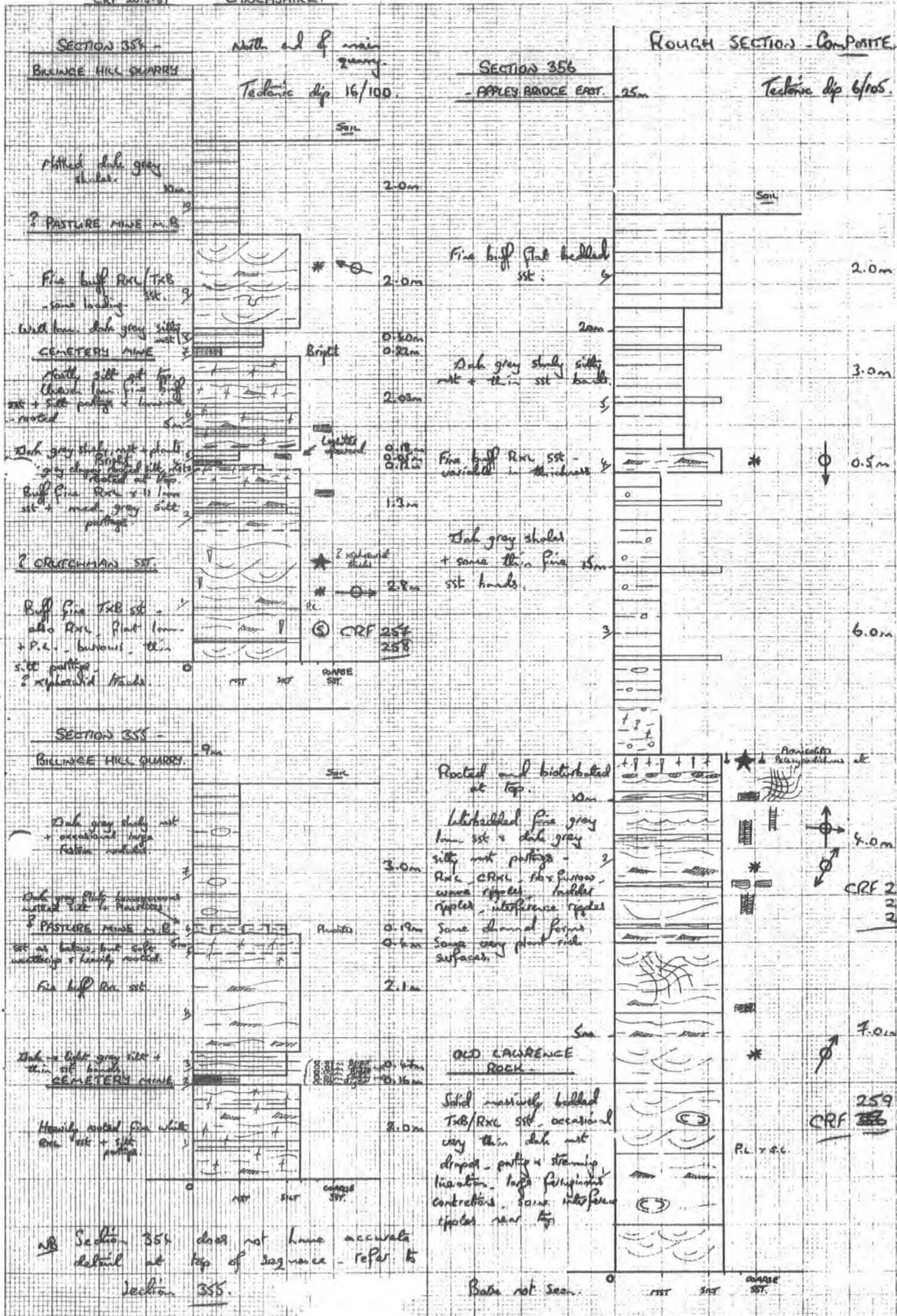
ANROTH - WISEMANS BR.

Continued →

Section continues.



BASE OF SECTION



SECTION 354 -

North end of main quarry.
Tectonic dip 16/100.

SECTION 356

- APPLBY BROOGE EAST. 25m

ROUGH SECTION - Composite.

Tectonic dip 6/100.

BRINCLIFFE HILL QUARRY

Soil

Flattened dark gray shale.

10m

2.0m

? PASTURE MINE m.s.

Fine buff RxL/TxB sst. - some loading.

9m

2.0m

Fine buff flat bedded sst.

2.0m

With low dark gray siltstone

CEMETERY MINE

8m

Bright

0.40m
0.22m

2m

Dark gray shaly siltstone + thin sst bands.

3.0m

Mostly siltstone top. Lower low fine buff sst + silt partings + laminae - rooted.

6m

2.03m

Fine buff RxL sst - variable in thickness

0.5m

Dark gray shaly silt + shaly gray clayey shaly siltstone - rooted at top. Buff fine RxL + 1/2 low sst + med. gray silt partings.

5m

1.3m

Dark gray shaly + some thin fine sst bands.

6.0m

? CRAFTERMAN SST.

Buff fine TxB sst. - also RxL, flat lam. + P.L. - burrows, thin silt partings. ? xylaroid tracks.

0

2.8m

SECTION 355 -

BRINCLIFFE HILL QUARRY

9m

Soil

Rooted and bioturbated at top.

10m

Dark gray shaly silt + occasional large flat iron nodules.

7m

3.0m

Interbedded fine gray lam. sst + dark gray silt + silt partings -

4.0m

Dark gray shaly siltstone instead silt to sandstone. ? PASTURE MINE m.s. sst. as below but silt weathering + heavily rooted.

5m

Amolite

0.19m
0.4m

RxL CRXL. fib. furrows, wave ripples, ladder ripples, interference ripples. Some channel forms. Some very plant-like surfaces.

CRF 260
261
262

Fine buff RxL sst.

3m

2.1m

OLD LAWRENCE ROCK

7.0m

Dark - light gray silt + thin sst bands. CEMETERY MINE

3m

2.0m

Solid massively bedded TxB/RxL sst. - occasional very thin dark silt drapet - parting + streaming lamination. Large ferruginous concretions. Some interference ripples near top.

259
CRF 258

Heavily rooted fine white RxL sst + silt partings.

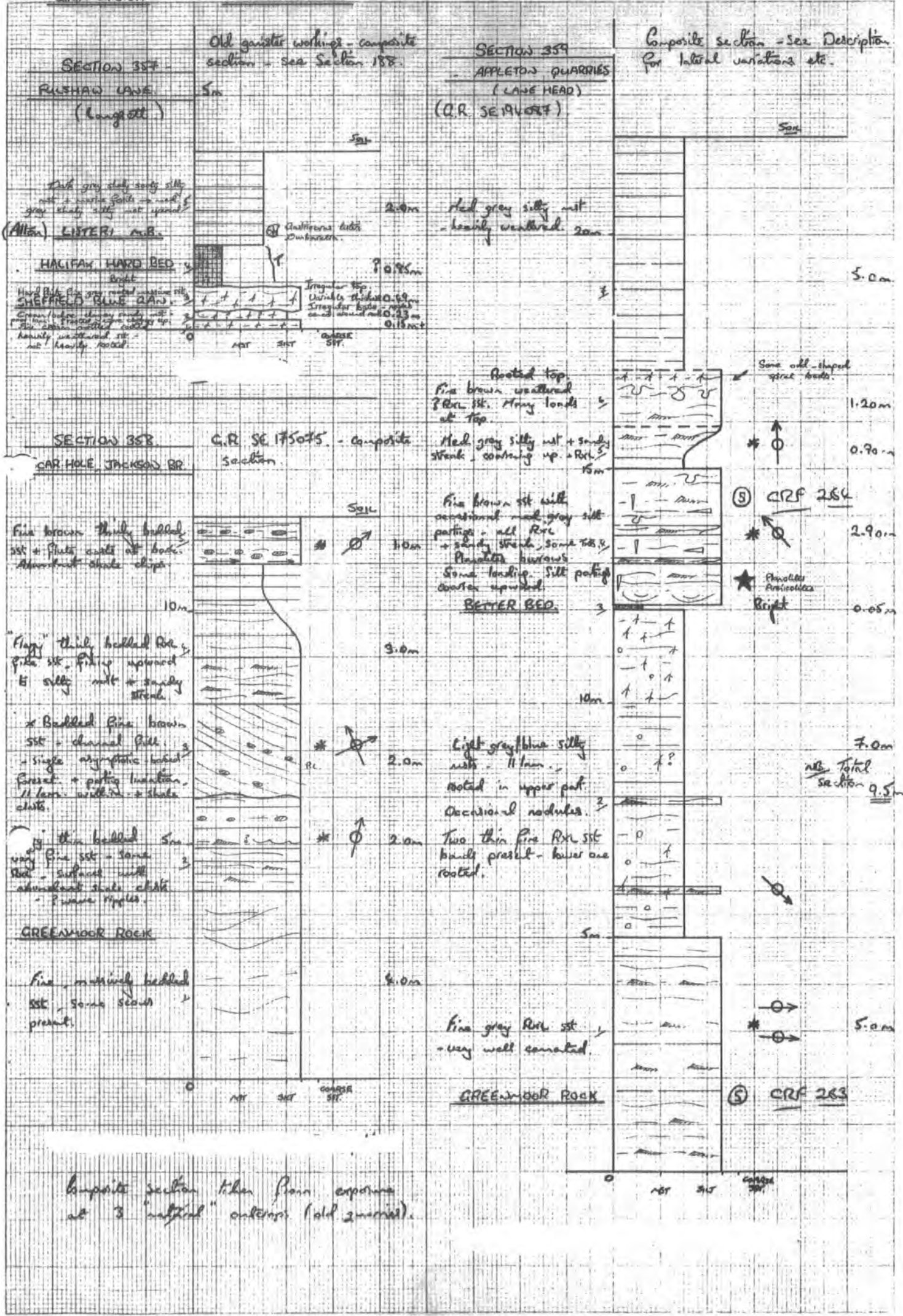
1m

0.16m
0.16m

Section 356 does not have accurate detail at top of Lawrence - refer to Section 355.

Beds not seen.

CRF 257
258



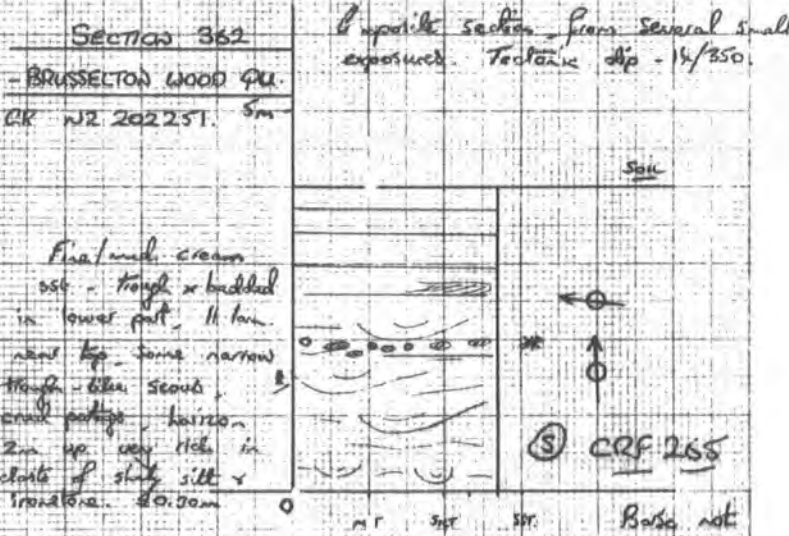
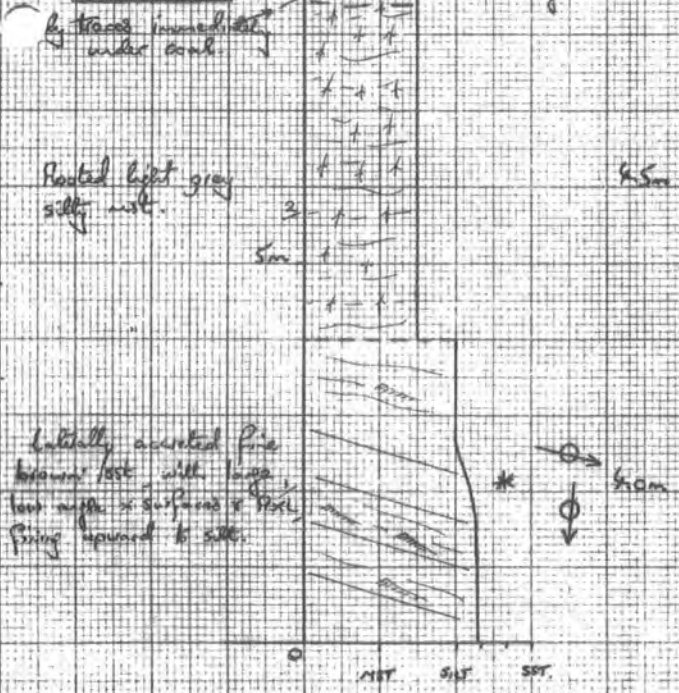
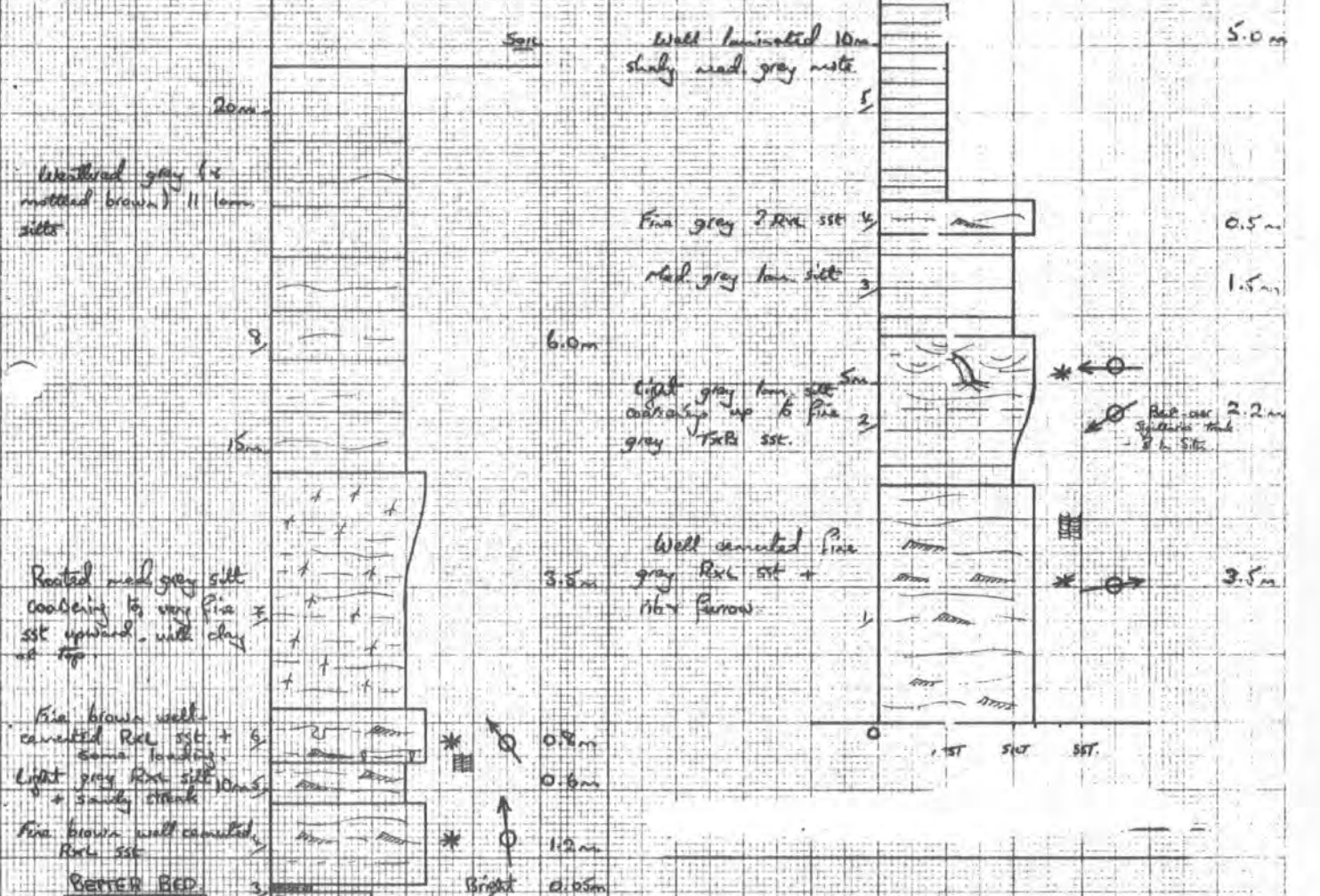
SECTION 361 -
SHEPHEYS NORTH QUARRY

Section along South face -
see Description for lateral variations.

SECTION 360 -
SHEPHEYS SOUTH QUARRY
(CR SE 197088)

Section at east end of
quarry - see Description
for lateral variations

(CR SE 197088)



- * DIRECTIONAL DATA
- ① Trough x Bedding - $0.2 \text{ m} / 25 / 28^\circ$ $\alpha = 1$
 - ② narrow trough - like scours $\rightarrow 385^\circ$ $\alpha = 1$

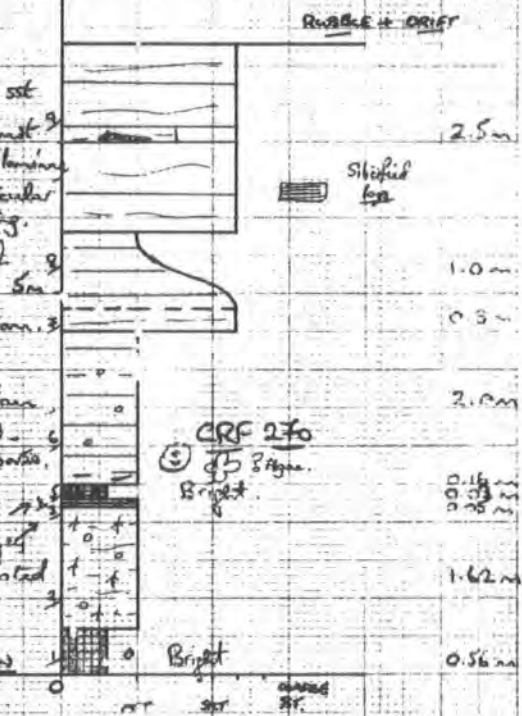
(CRF 266 - Burnhope)

Cut 11 East - exposure of Foss and overlying sediments - true thickness of seam not determinable due to heavy gullwing. Over - rapid coarsening up from silt to rhythmically alternating silty silt & fine white sst - all 11 lam. Abundant large *Rhynchonella* fragments present in sst layers. Section - in 5.5m interstratified pairs. 2m silt sst thin crumbly sst. 2m fine brown sst -> bench. Sequence slightly different in upper part at west end of cut but heavily weathered and drift disturbed.

Cut 4w - by cut trending -> 30°
- Section 30m from NW end. Several small faults. Well-preserved old workings.

SECTION 368

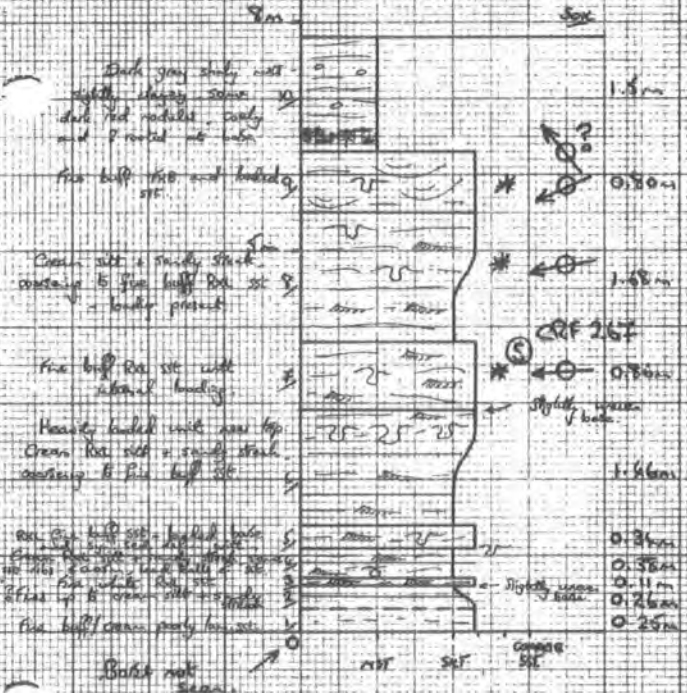
- TANNERS HALL (NW)



CRF 1681

SECTION 366 - ELBOW HILL QUARRY

New face - composite section
Main probably not far below base of section.



Fine gray & white sst with thin silt sst partings - silty sst laminar sandy streaks - lenticular bedding.

Fines to lam. med. & gray sst. 5m

Fine white poorly lam. sst.

Med. gray sst - lam. slight dev. of nodules - coal traces - silty at base.

TOP HUTTON

Black sandy shale light gray blocky nodules light gray blocky nodules nodular sst.

BOTTOM HUTTON

ht sst continues along face to SE with - constant thickness - another one starts to wedge in - (above) - approaches 50m along - thickens to + 0.3m by 100m further - not simple thickening - comes and goes. Also thin (0.01m) discontinuous dev. of sandy streaks above Top Hutton. 1 photo.

SE end - ~ 2.5m sst section by cuts for 0.5m - thin dark horizon - Bottom Brass Thill probably. Two sst still present - but section above second one is mostly silt in lower part. Several occurrences of bed-over tree stumps in roof of Bottom Hutton 0.05m ahead of sst dev. on Top Hutton roof at west end, as well as in floor.

Cut SE probably exposing Top's Bottom Hutton. Sw & 3w expose Brass Thill. Sw just stated - only 30m exposure - dipping to south.

All cut 3w open - coal removed, but standing in heaps. At boundary of two cuts, small step fault.

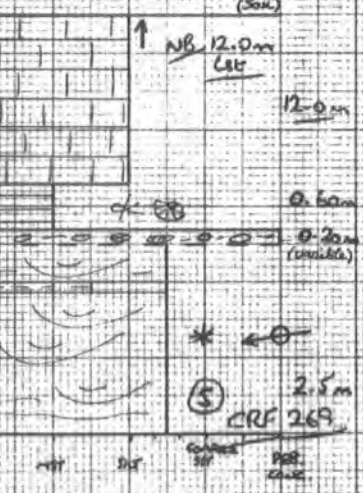
Cut 3w trends -> 020° for first 150m - then swings round to east. Little lateral variation visible - seam apparently thicker in this cut than elsewhere. Thin well-sorted sst previously present 2m up is no longer - several thin (50.05m) Fe stain bands occur.

DIRECTIONAL DATA - Sea Description.

NB A wind of silt -> fine sst upward wedges in below the dark shale at the south end of the face - ? rooted, with Type B RRL 5.0.05 - A -> 010° with high directional variance. Reached 0.7m thickness at south end.

SECTION 367

MORRIS QUARRY



Section 369 - OVER

Fine red buff large scale sst with occasional massive partings.

10m north of south end

SECTION 369

TANNERS HALL SW

9m

DRIFT

Gravel up to fine white
Rte + minor lam. sst
+ silt partings with
horizons at top - p. idiom.
Contains interstratified
sand.

Med. grey blocky mt.
banded at base. Pectens
nodules, fossils, layers
throughout.

TOP BRASS THICK

Bright

0.50m

MT Sst coarse sst.

Interbedded fine st.
as below - med. med.
gray silt + sandy streak
- Rte + fine lam. sst
Prominent sst ribs near
base, but mostly
silt above.

Fine brown/white well
cemented sst + Rte
some uneven bedding
- Some thin silt drapes
occur by erosion
surfaces with 50.1m
relief.

Rooted nodular med.
gray silty mt. as below.
Fine gray poorly lam.
sst.

Med. gray/brown Rte
silt / v. fine sst.
Some uneven bedding
present.

SECTION 370

TANNERS HALL SE

12.0m along from north
end.

BRASS - TOP
BRASS THICK

10m

Dark gray silty mt.

BOTTOM BRASS THICK

Bright

0.1m

Med. gray ll lam.
rooted silt.

2.0m

As
Below

mt

2.0m

sst

0.5m

Med. gray lam. mt.
fine white poorly lam. sst.

0.4m

0.22m

Med. gray finely lam.
mt.

1.89m

TOP MUTTON

Bright

0.15m

MT Sst coarse sst.

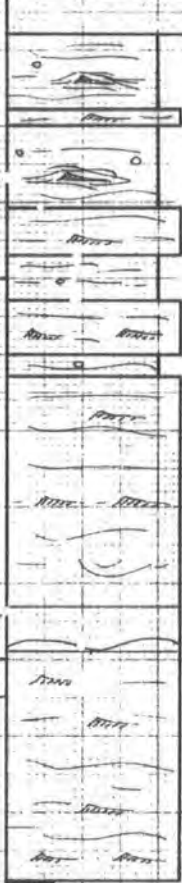
Bottom sst. wedges in 100m from north end -
thickness to 0.1m by 150m along then constant - all
other sst. - constant. Total = 310m end length.
Cut oriented N-S. Presently reducing top →
Bottom Mutton at South end.

SECTION 371

GURLEY PARK BURD

2m

Composite Section
See description.



CRF 277

Bright

0.16m

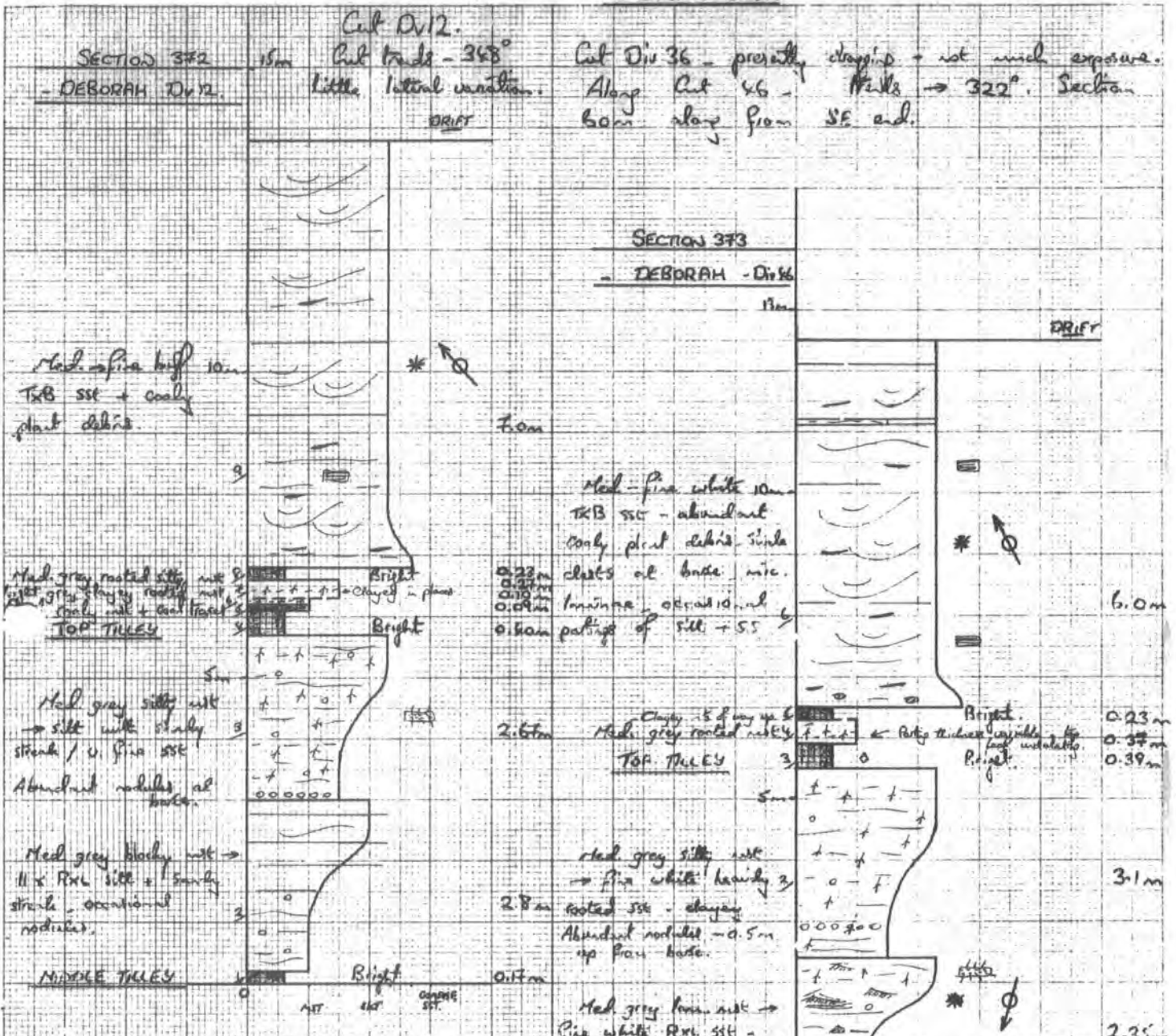
1.45m

0.21m

3.40m

1.60m

CRF 276 - Newbottle



* DIRECTIONAL DATA :-
 Unit 9 - Trough x Bedding
 0.8m/360, 0.5m/342, 0.2m/316, 1.0m/306
 Fairly large scale TxB present.
 50m north in Cut Dv13 (only down to P300) TxB -

* MIDDLE TILLEY
 Roof of P300

* DIRECTIONAL DATA :-
 Unit 6 - Trough x bedding
 0.7m/366, 0.5m/333, 0.6m/307, n = 3

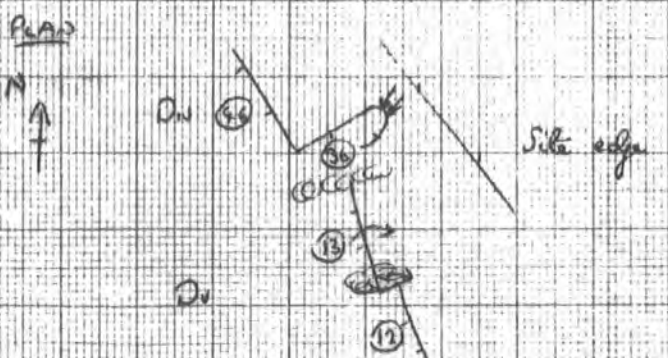
Unit 1 - Rex Type, P = 0.01-2m after h. angle
 → A0, 213, 223, 185, n = 4

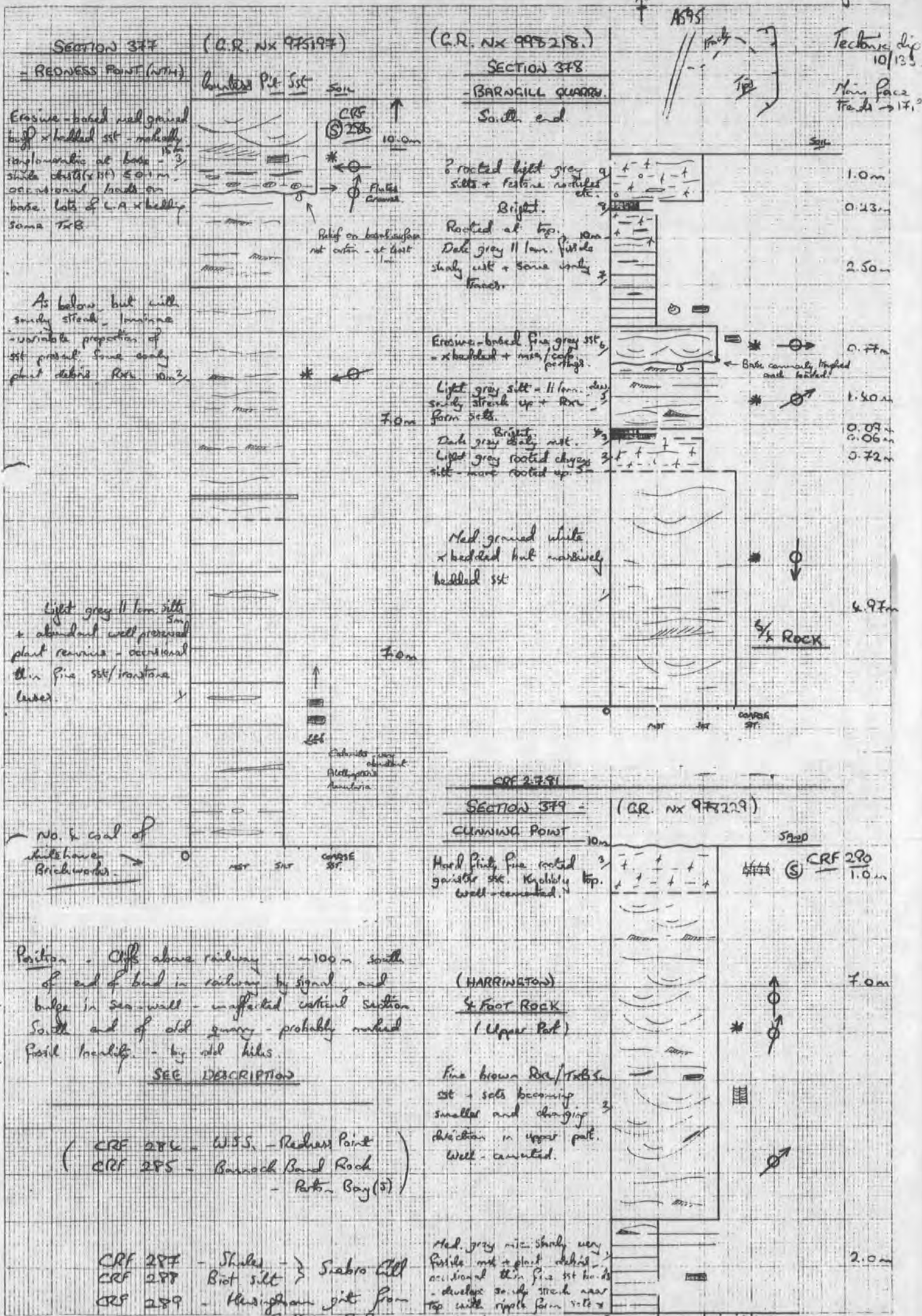
Presently working - Dv12-13, Div 36 & 36, Area C, west end.

Top sst is massive in places, but commonly well bedded - more so than in area Dv. - abundant TxB in both areas. Little internal variation.

Area B/C Extension - under power lines - fragmentary exposure of Tilley - since P300 exposed at north, but by south wall (m100-) level of drift is down to 1m above P200.

Site now only working Tilley in Area D, spot from B/C Extension above.

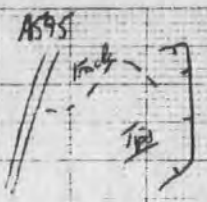




SECTION 377

(G.R. NX 975197)

(G.R. NX 995218)



Tectonic dip 10/135
Main face tracks → 17°

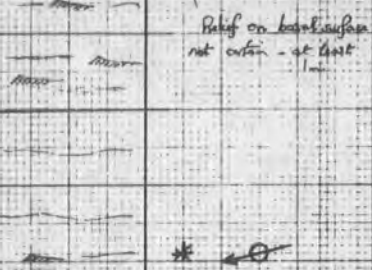
REDNESS POINT (W.M.)

Contorted Plat. Sst. Soil

Erosion-bored and graded
high x bedded sst - markedly
irregular at base - 15m
siltstone (x 1/2) 50m
occasional beds on
base. lots of C.A x bedding.
Some TrB



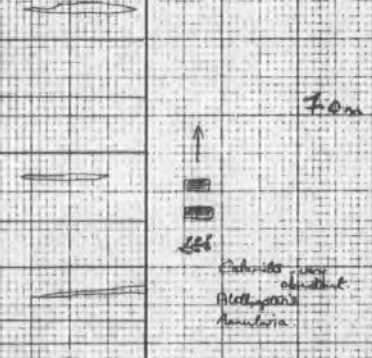
As below but with
sandy streaks - laminae
- variable proportion of
sst gravel. Some early
plant debris. Tot. 10m³



Light grey 11 lam silt
+ abundant well preserved
plant remains - occasional
thin fine sst/ironstone
lenses.



No. 6 coal of
shale lower
Brickearth



Position - Cliffs above railway - ~100m south
of end of bed in railway by signal, and
bulge in sea-wall - unaffected vertical section
South end of old quarry - probably marked
Posid locality - by old hills.
SEE DESCRIPTION

- CRF 286 - W.S. - Redness Point
- CRF 285 - Barnack Band Rock - Porton Bay (S)

- CRF 287 - Shales - } Siabro Gill
- CRF 288 - Biot silt } Siabro Gill
- CRF 289 - Hingham gite } from

SECTION 378

BARNHILL QUARRY

South end

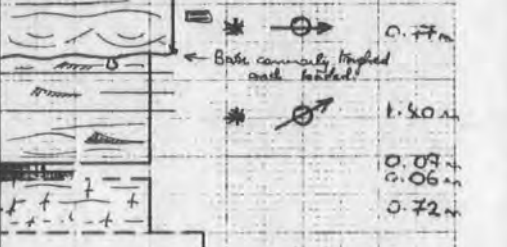
? rooted light grey
silt + Festina nodules etc.
Bright.
Rooted at top.
Dark grey 11 lam. silt
shaly with some sandy
lenses.



Erosion-bored fine grey sst
- x bedded + mica/calc
partings.

Light grey silt = 11 lam. silt
sandy streak up + 2m
from silt.

Dark grey shaly sst.
Light grey rooted clayey
silt - most rooted up.



Med. grained white
x bedded but massively
bedded sst



SECTION 379

CUNNINGHAM POINT

(G.R. NX 975229)

Hard finely fine rooted
gavister sst. Kynohite top.
well cemented.



(HARRINGTON)
4 FOOT ROCK
(Upper Part)

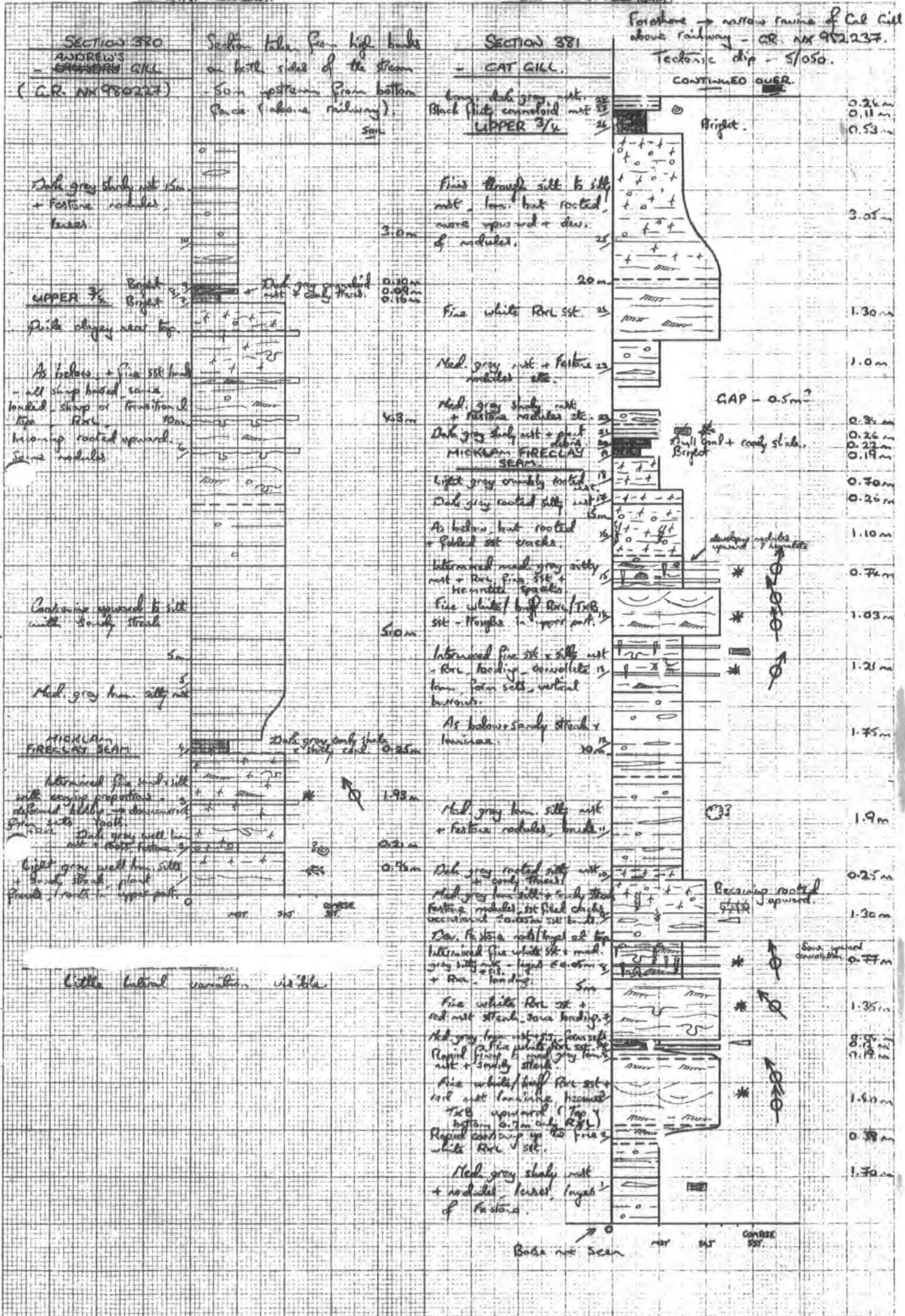


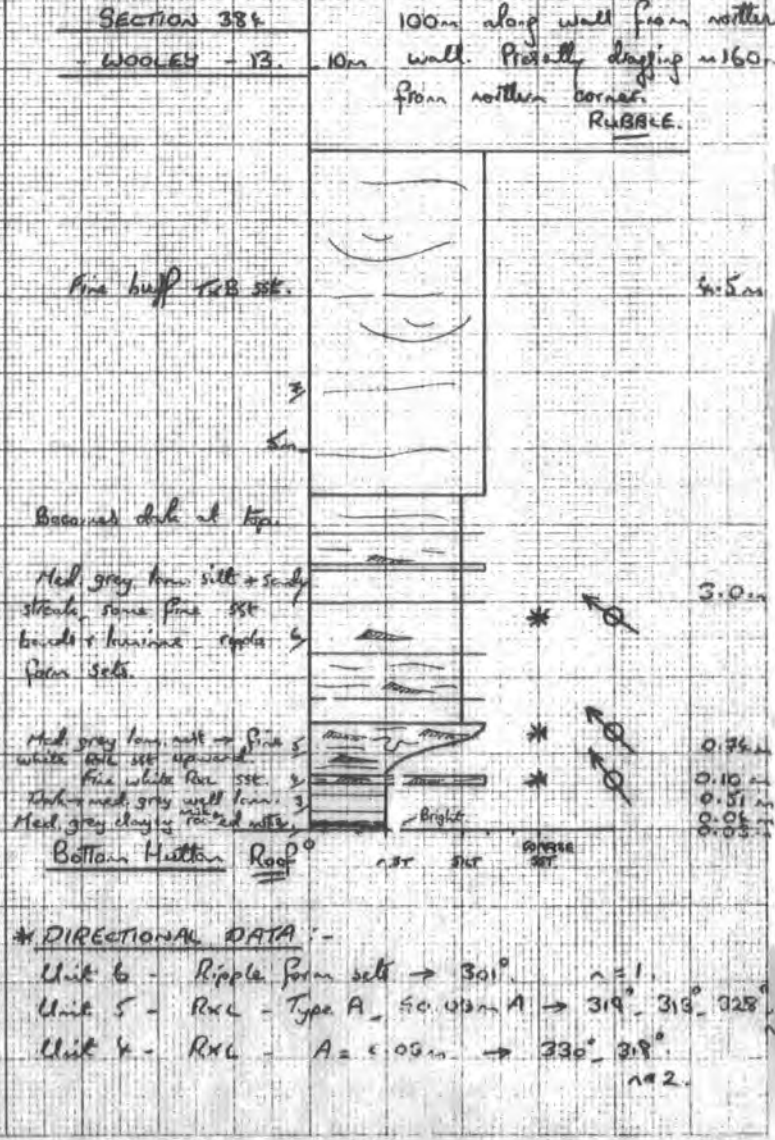
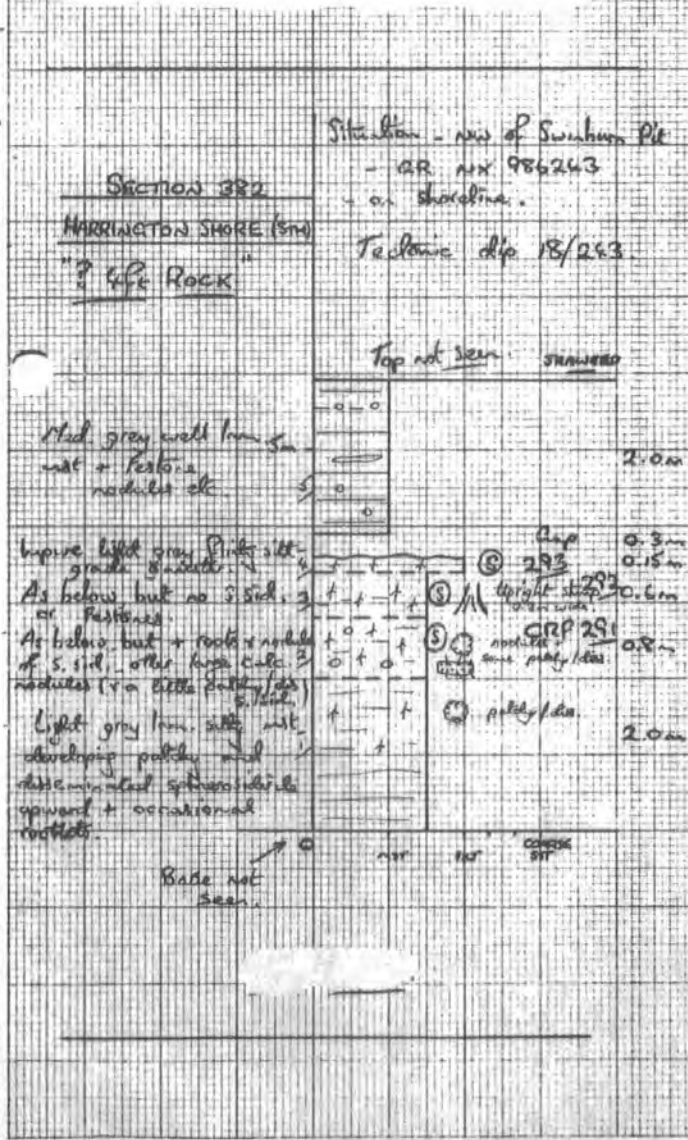
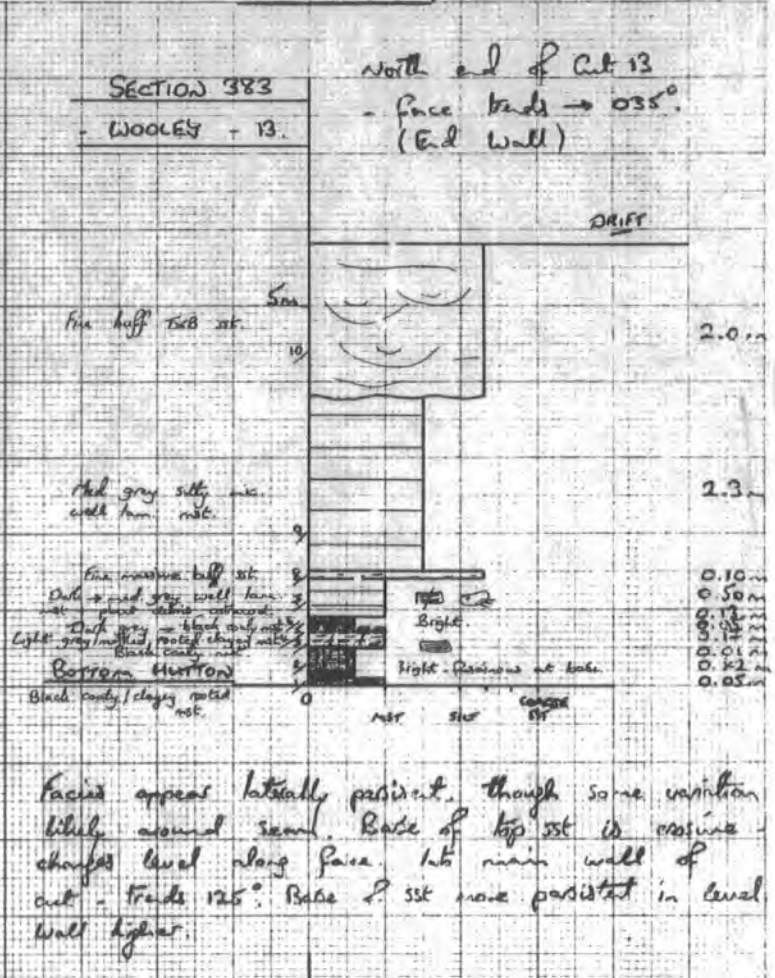
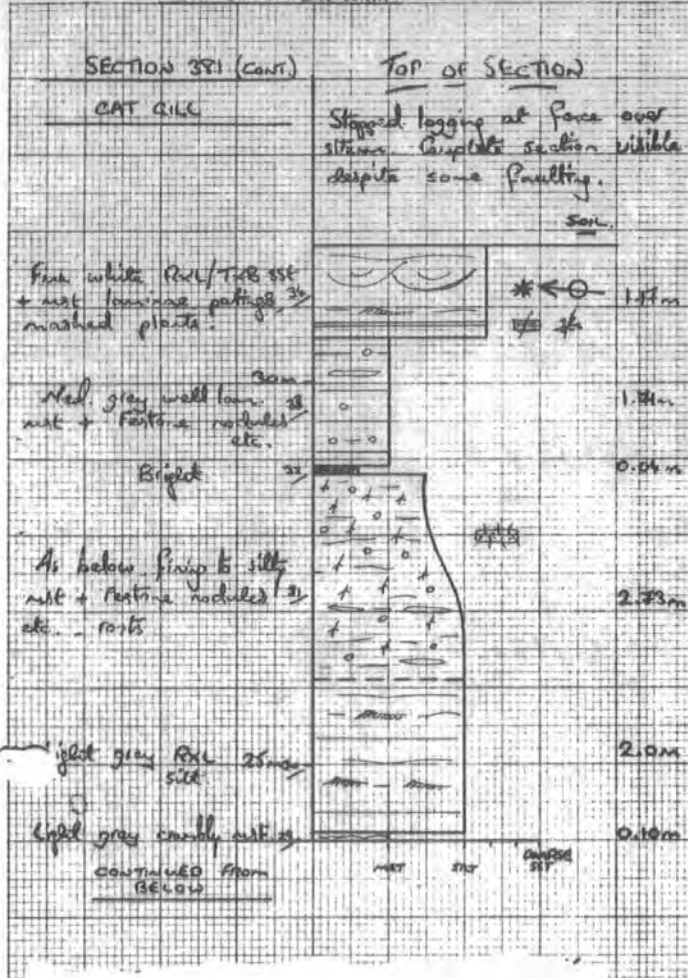
Fine brown Red/Tabs
sst - silt becoming
smaller and changing
direction in upper part.
Well cemented.



Med. grey mic. shaly very
fossiliferous + plant debris
occasional thin fine sst beds
- develop sandy streak near
top with ripple form silt



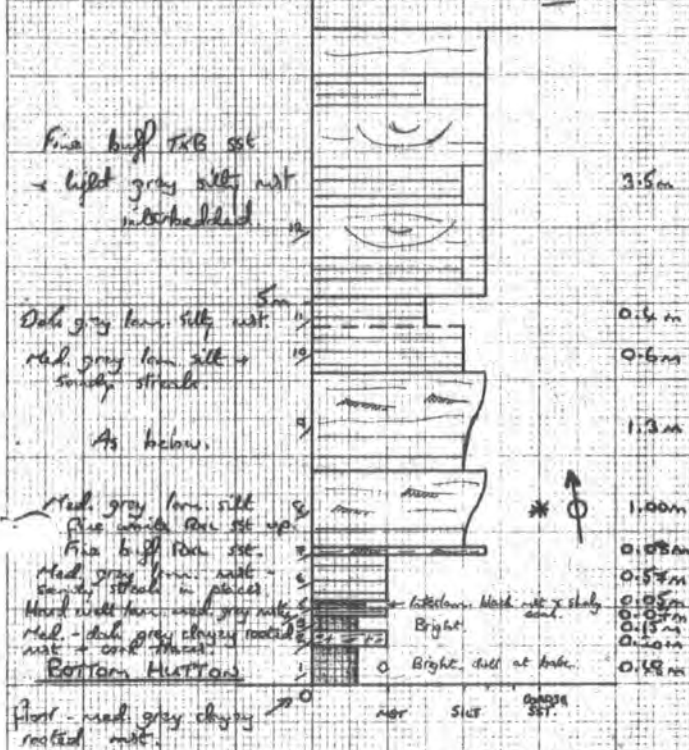




Cut 12 approx. 120m north of south end. Cut trends \rightarrow $30k^\circ$ - about \times way along length of cut.

SECTION 385
- WOOLLEY - 12

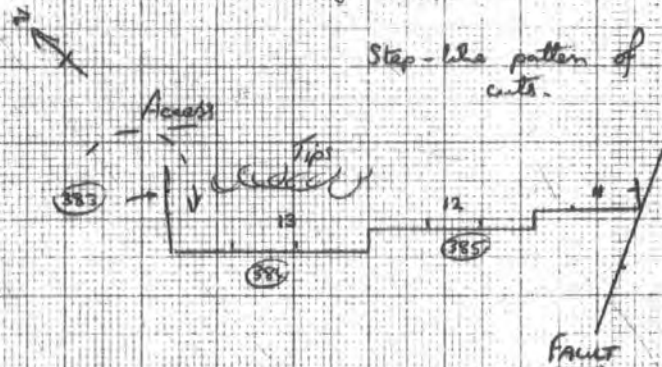
DRIFT



* DIRECTIONAL DATA :- Unit 9 -
RXC $\rightarrow 345^\circ$ $n = 1$.

Facies very persistent laterally & uniform - upper weathering up units picked out well. Top sst - may actually be composed at least 50% of silt with - exposure difference to access. 2 photos from extreme south end. Exposure in Cut 11 now masked by tipping.

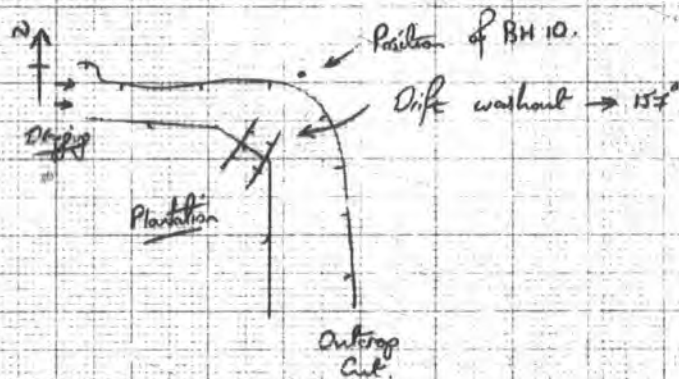
PLAN Working cuts 12 & 13. Cut 11 covered out and being backfilled.



CRF 296
5
6
Butterwell
7/7/81

LANGLEY - 1st visit. (See Site Plan).

Site recently started working. Presently working Main (C.000) at western edge of site - on outcrop cut - Area A, Cut 1. - runs parallel to site boundary - just outside a drift washout.

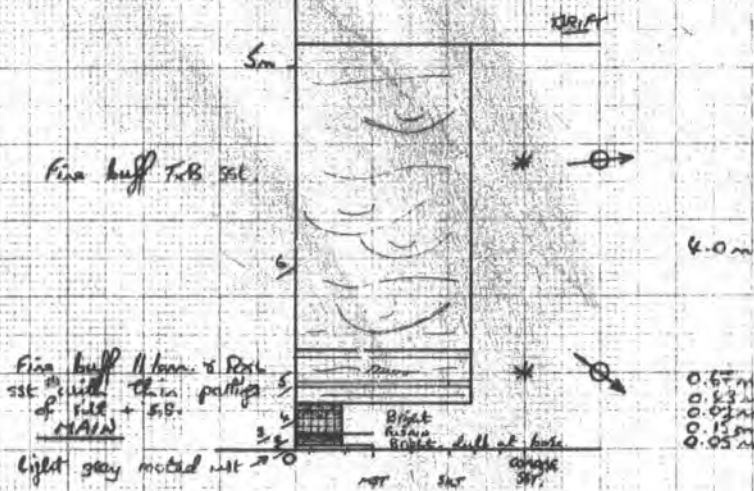


Base of Main is apparently 0.10m shaly coal - before bright starts. Formerly a conch band exposed at this level - now not present. Main is overlain by a thick sst at this level - though at this point is somewhat disturbed by drift cover. Old workings present - and occasional small faults. To west - Coal is overlain by 0.6m interbedded ? interbedded fine white sst & med. gray silt + sandy streak. then $\leq 5m$ buff fine T&B sst. (RXC present also)

* DIRECTIONAL DATA :- Trough \times bedding
 $0.5m/21/10^\circ$, $0.4m/21/060^\circ$ $n = 2$

Out wall bedding $\rightarrow 126^\circ$ - sst outcrop increased to 6m over coal
184m along from corner.

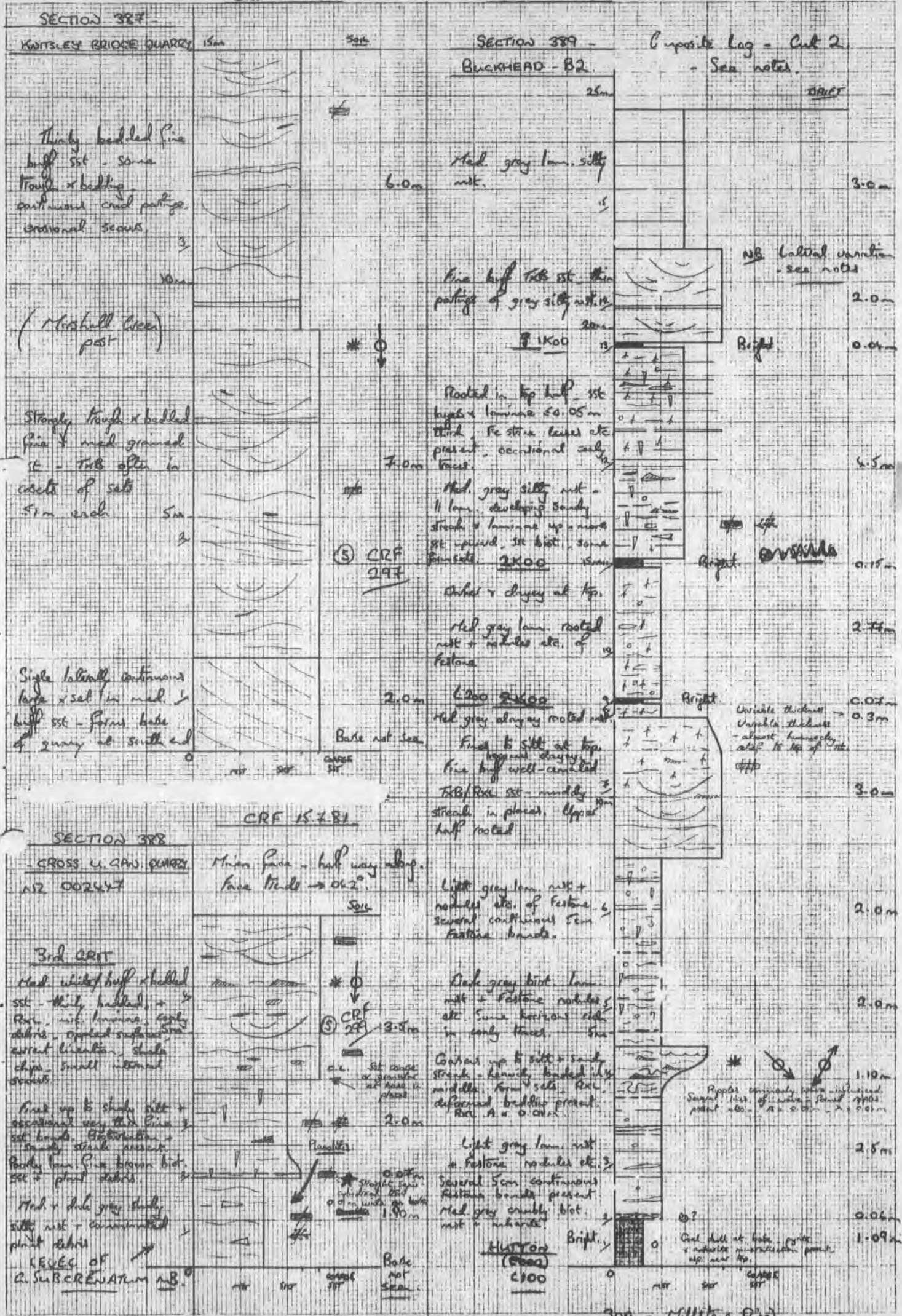
SECTION 386
- LANGLEY - A1



* DIRECTIONAL DATA

Unit 6 - Trough \times bedding - $1.0m/16/048^\circ$ $n = 1$.
Unit 5 - Ripple \times imbrication - Type A, $\leq 0.02m$ A
 $\rightarrow 130^\circ$ $n = 1$.

Lateral variation difficult to assess - heavy old workings and proximity to drift cover.
Section continues for another 200m + to SE.



Rough Composite log

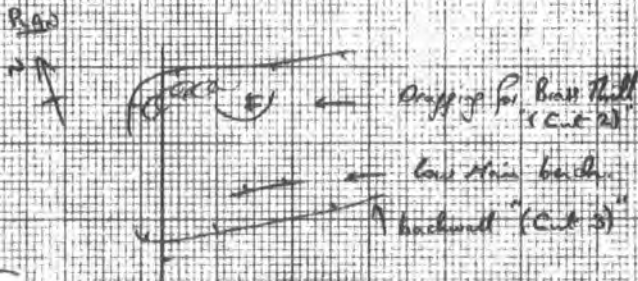
Section 389 taken in two parts - lower half near south end of cut, and upper half near north end - working benches. Where section taken for uppermost part - ie northern end of west wall - uppermost sst is 2.0m followed by 3.0m silty mt, but thickness vary - undulating top to sst. The sst also thin - undulating top - as a large rippled surface. The mt under the top coal appears to coarsen to solid fine sst along thin wall for 0.5m, then 0.2m mt, then coal.

Sketch of north wall



Mt over sst dipping \rightarrow East.
Cut walls trend \rightarrow 090° is 090° .

Area C - still working low stn & Brass Thill - little continuous exposure.



Wynneworth Fault

In SW corner north of fault section exposed complete - 8m piling between B.T. & C.M. - 0.3m sst under coal then 0.6m mt + thin sst layers - then mt down to Brass Thill. 100m back to east - 0.3m/0.6m light gray mt of coal low stn - below sst - more or less continuous. Sst appears to be very massive with little structure displayed except some 11 lam/banding in 3m up. Cong horizon not present.

Area below - possibly within or east end of old colling trap - about to dig a cut to east, above Mandella outcrop. At northern end, bottom of hole Mandella is badly detached - main is as normal but several faults occur. Little local exposure.

SECTION 390
PROVENI QUARRY

DRIFT

CRF 305
⑤ 5.0m

Essex-based fine buff. Rte sst with mic/arb. laminae & partings. Cut out coal completely in place. * Rte \rightarrow chert

Bottom Brass Thill ⑥ Bright coal - lower half detached. 1.20m

Red gray silty mt + silt - lam. & well-preserved plant remains, especially in festina - no lules. Rooted at top. ? 10cm

Rooted laminae also present - 75% of way up the section. One upright thin stem present visible - low down below.

⑦ Bright coal 0.10m 0.51m

⑧ Light gray clayey rooted silty mt 0.02m 0.05m

⑨ Bright coal 0.26m 0.78m

⑩ mt grade southeast with low thin coal seams. 1.5m

* DIRECTIONAL DATA: Unit \neq Rte \rightarrow 04.0° $n = 1$

Bottom coal of ? Hutton contains thin discontinuous clayey mt & fusulin bands. The floor contains flattened large Sigillaria stalks, oriented in all directions. In main silt unit - diverse flora (i.e. some large plants) includes Lepidodendron, Sigillaria, Botrydendron, Althoptera, Neuropteris, Sphenophyllum, etc. Disturbance in lower part of Brass Thill attributable to glacial pull - movement possibly along intra-seam clay parting.

Cliff by old kiln - 100m east of main rock. See Description.

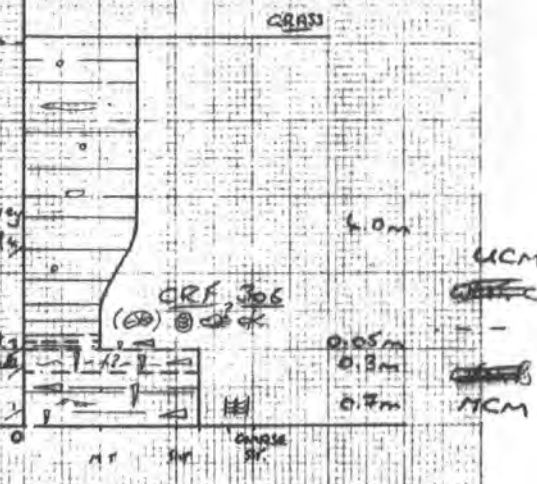
SECTION 391
CORKHURCH ROCK

Sundland (CR No 362585) 5m

Red gray lam. mt with marine fossils parting up into light gray thin silt with occasionally small festina bands.

Down Hill M.B. ① Heavy bedded & rootlets. Fine white sst.

② Fine white Rte. bit. sst - mic/arb partings & thin mt partings

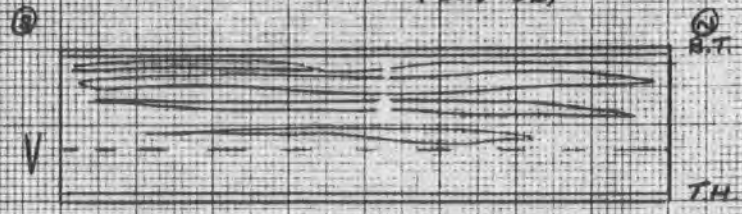


Downhill M.B. - Top = CAMBRIAN M.B.

Notes. Section 396. Area B 2E00 Cut is one step ahead and above F000 cut - also trending → NW. will probably work back in sequence.

Also exposed but not examined in detail - 2E00 Area C Cut 1/2 East, 1 West.

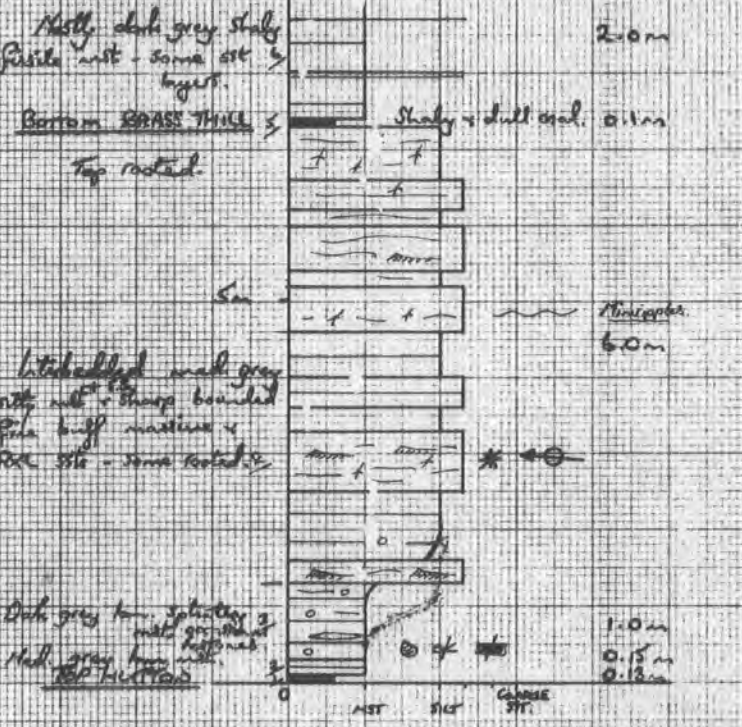
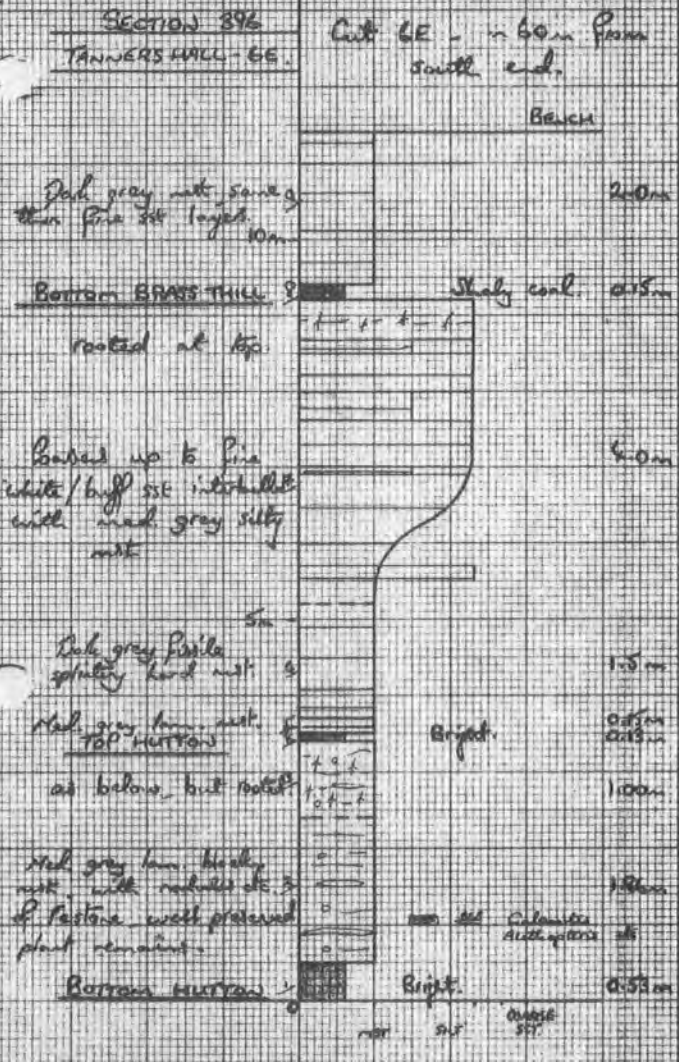
IBRETSONS Still working Main & Fivequarter - now close to site boundary at east end. Worked out High Main 2E00 & 1E00 benches close to east end - and Fivequarters (pillars only) - 50m from boundary Exposure patchy - no detailed observation. Facies appear very similar to previous cuts.



Ssts often wedge in and out along the face → transport to east or west. Facies otherwise displaying little lateral variation. 2 colour photos. Drift cuts down to level of Bottom Hutton at extreme north end of cut. (Drift washout also still present at extreme south end).

CRF 19.8.81

SECTION 397 100m west of east end - before start of step faulting. to Top Basin Basin Thill.



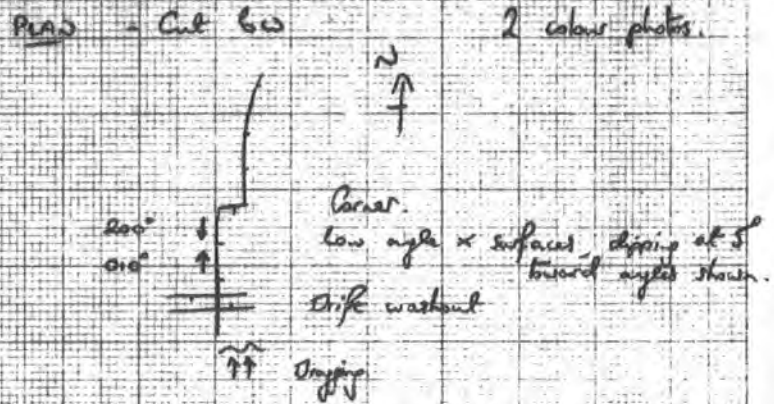
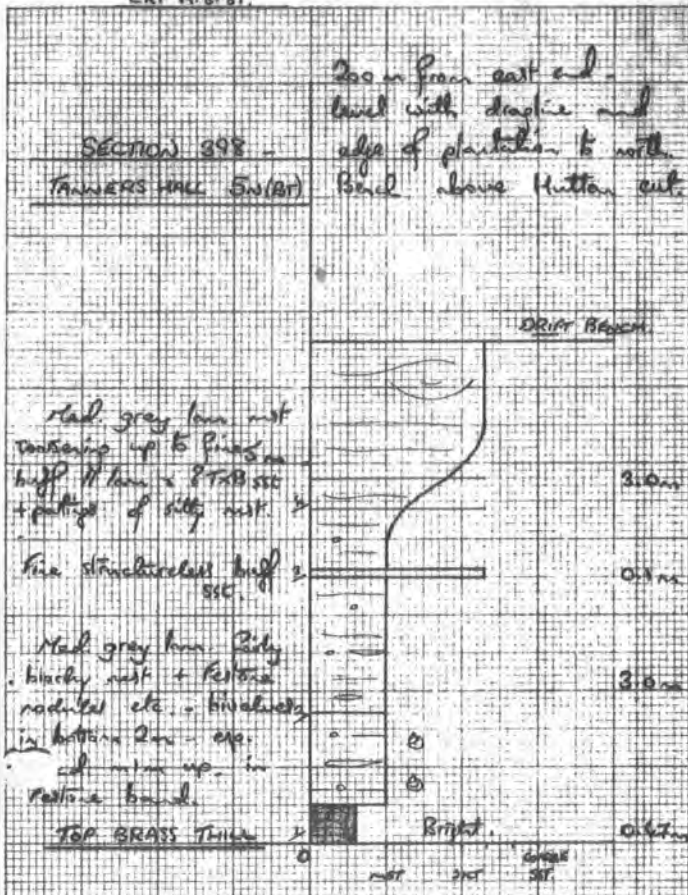
* DIRECTIONAL DATA: - RxC - Type A - $A = 0.01/2 = 0.005$ - ascle. single sets. $n = 5$. $\theta = 282^\circ$ $L = 97^\circ$ $n = 5$

At east end of Cut 6E - by curve in face - sst over T.H. appear to come in after only 10m. Some along - mat is less dark coloured over T.H. 100m along start of step faulting - note dark silty and hard again. In mat to lot sst, but mat coarser somewhat up to lot sst, then interbedded sst & silty mat - some horizons rooted. Chopped surface to + sandy streak. loose sst block. At 200m west - just start of step faulting - dragline presently working.

Sst units appear more persistent laterally, although exposure does not allow continuous observation.

Long north-south cut - coars above Hutton. Sand reached a minimum in the middle of the cut, decreasing on either side. Some from north end similar facies and thicknesses - sst less in and out. lowest level of sst in middle of face - come in progressively higher to north and south.

CRF 308 Vandy Hill

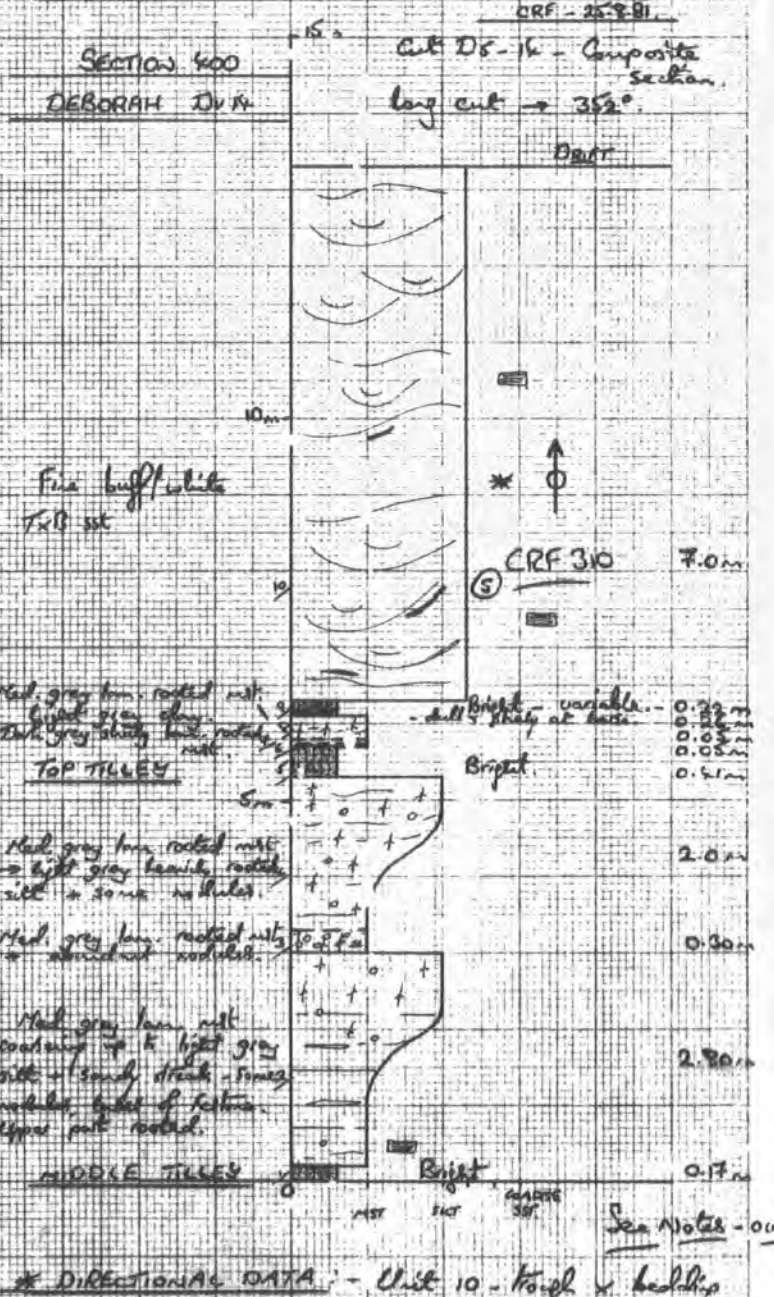
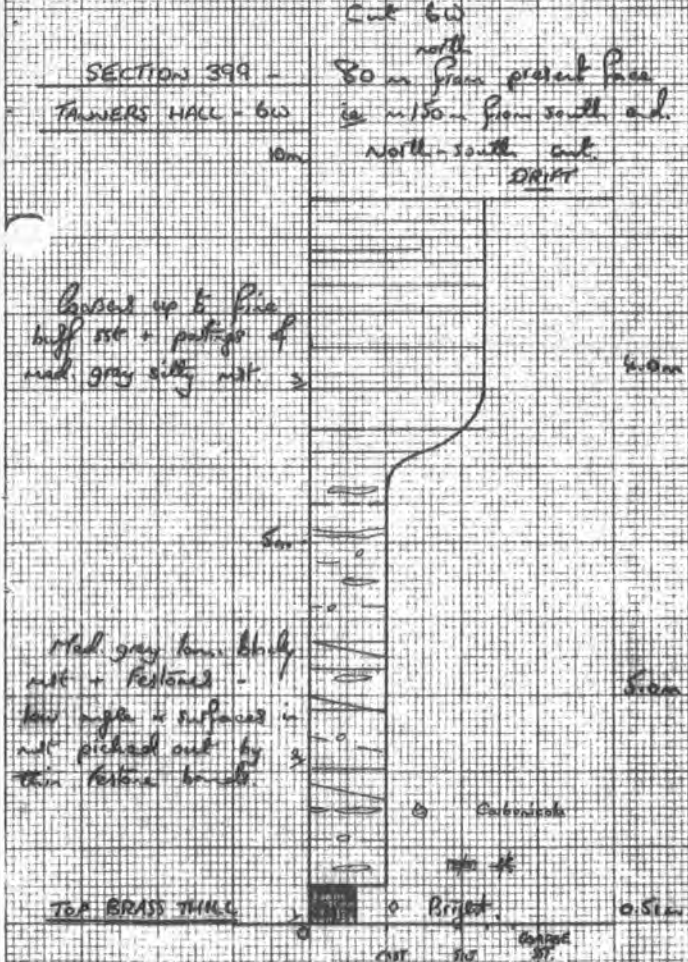


low angle false bedding has a channel-like form - when viewed from a distance - appears fairly symmetrical in the face - is 50 m wide, 2-3 m high - lithologies consistent right across the feature - no change at all.

little lateral variation otherwise.

NB Areas south and south-east / SW are completely finished, and infilled.

The thin silt thin along the face to the west (100 m further exposure), and also slightly to the east. These long E-W cuts with eventually extend across to the new edge of the site - boundary with incline opposite.

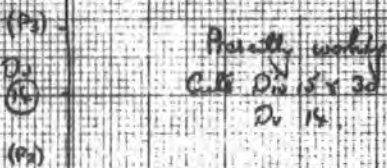
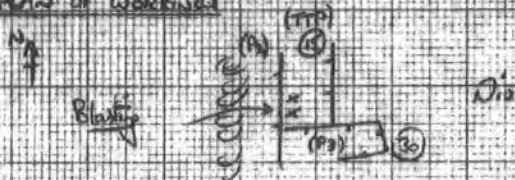


* DIRECTIONAL DATA: - Unit 10 - trough x bedding
0.6m/355°, 1.0m/010°, 1.3m/018°, 1.3m/352°, 0.7m/352° n=5.

Deborah - 25.8.81

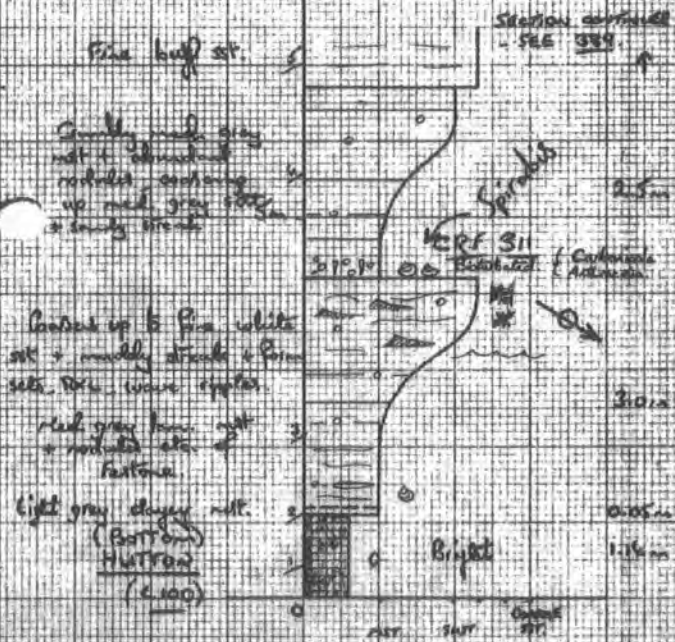
Section 300 - Notes - Section 300 is a composite
 - bottom part exposed near south end of out,
 upper part near north end and middle.
 TSS in T.P. is wide low angle troughs - probably
 from truncated bases of troughs. Sst contains
 common ^{small} calciferous fauna - 11 mm and
 low angle cutting within troughs.
 lateral variation - cut is limited to some
 modulation in P302 level - under 500.

Plan of workings

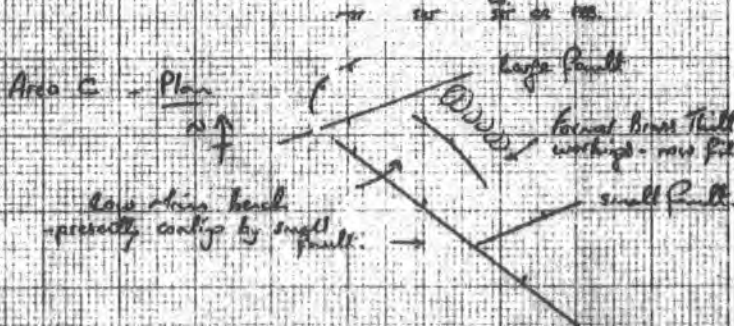
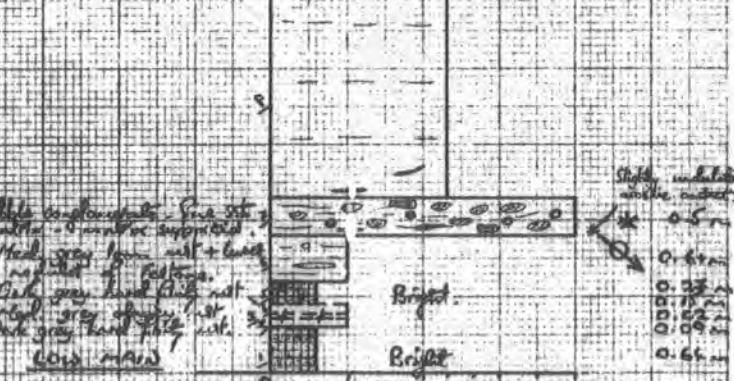
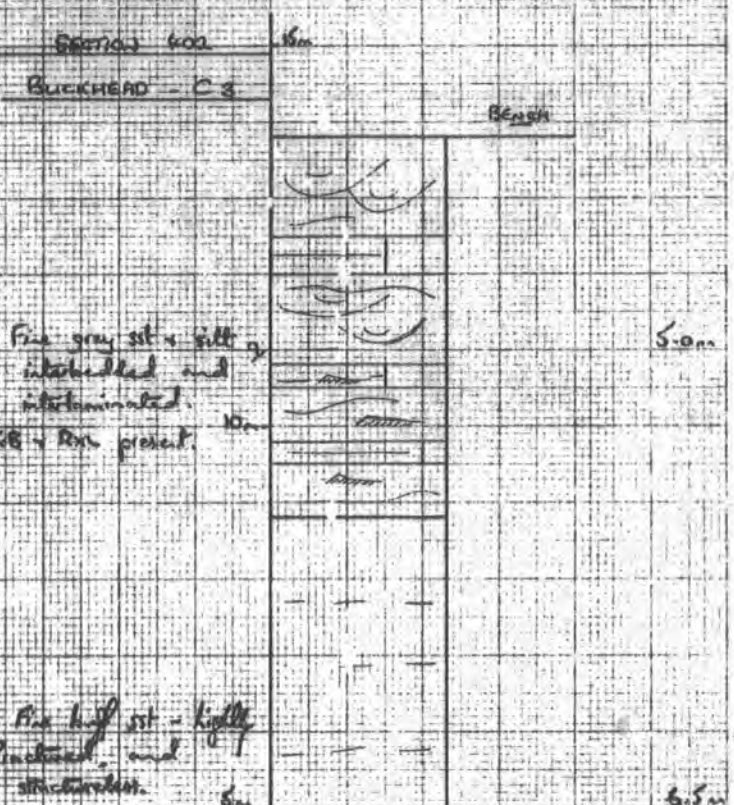


Partly reduced to P300 - sst heavily fractured due
 to blasting - access not possible. Sst 1-5 - thick
 bank - the - 2m note - trace of T. Harvey
 just below diff. show slide.

SECTION 301
 - BUCKHEAD - B2



Section 301 - wave rippled only imperfectly developed
 - isolated wave-influenced form sets, mostly.
 Occurrence of ? *Pezomachus* or *Spirorbis* in base of Unit
 & also distributed + rich in bivalves.
 2 photos.



* DIRECTIONAL DATA - Unit 3 -
 - Rx - Type A, A = 0.01m.
 → 118°, 136°, n = 2. θ = 127°, n = 2

Area B - situation similar to Unit 3 - see above.
 long cut to Hutton → 360°
 see above.

Notes - Calc. horizon - pebbles 2-3.0m of sst + waste in
 at all angles - supported in a matrix of fine buff
 sst - some clasts rounded - well rounded - mostly only
 partly rounded. Calc. layers is discontinuous - commonly
 lens shaped -
 * DIRECTIONAL DATA
 Core stratification of pebbles - interbedded, dipping → 326°
 in westward.

Buckhead Area C continued

Under level of low flow, two thin sst. concs. structures within mainly ll's uneven lamination with muddy streak. disturbed by rooting - no ROL visible. 2 photos.

Area L.E. - Handlin at bottom of hole now soaked out - at east end of colling tips - being backfilled. Presently working on flow half way down ramp. - Fragmentary exposure.

At top - big E-W cut into Area J along thimble outcrop - presently within along from west end. No exposure at present.

Examination of tension cracks over Area C.

CRF 26.8.81

SECTION 603

BARNWELL QUARRY

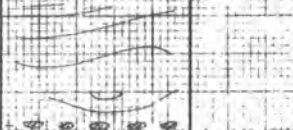
(Pashow) Composite section

C.R. N2 3265x0

See Description

5m

Soil



Fine/med buff bedded sst with horizons containing abundant shale chips $\leq 0.05m$. Occasional mud parting.



CRF 312

6.0m

Red white sst with abundant mic/corals & laminae $\leq 0.005m - 11mm$ waves form. ROL.



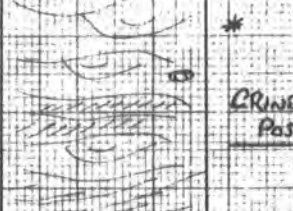
0.15m

Med gray 11 lam. sst - heavily weathered at top.



6.5m

Med well-sorted med. buff sst - TSB, two cycles of bedding, commonly in coasts - largest x sst exposed near base.



CRINDSTONE POST

6.0m

SECTION 606

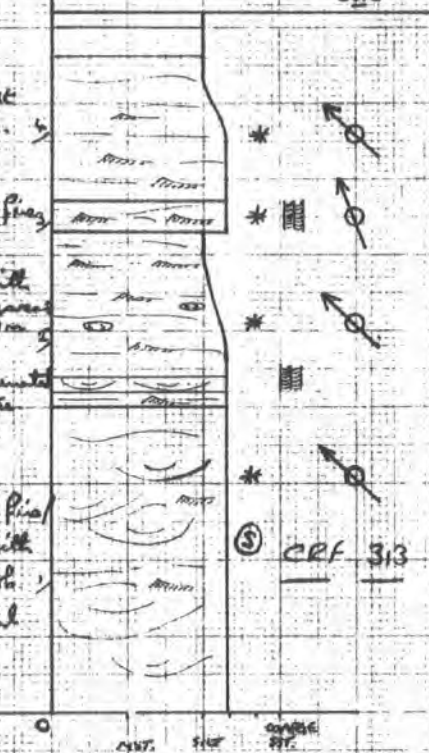
OFFERTON HEIGHTS

Composite section

C.R. N2 344562

See description

Soil



2.5m

0.35m

2.3m

4.0m

CRF 313

Hard well-sorted fine / med TSB sst with some ROL mic/corals, laminae, occasional mud parting.

Above Bottom Hebburn Fall coal. Horizon - between Wearmouth & Cumbhill rbs.

CRF 2.9.81

SECTION 606

Fingwater outcrop cut

LANGLEY A1 (Foot)

5m

RUBBLE

Med gray shaly sst with

0.7m

FIVEQUARTER Foot 5

Briget 0.87m

Med. dk gray mottled shaly near top - mottled coars & others in places - some only found.

1.27m

Med gray & mottled shaly 3 - med - cont traces & thin beds - mottled sst in places.

Shaly coal 0.15m

Shaly coal 0.75m

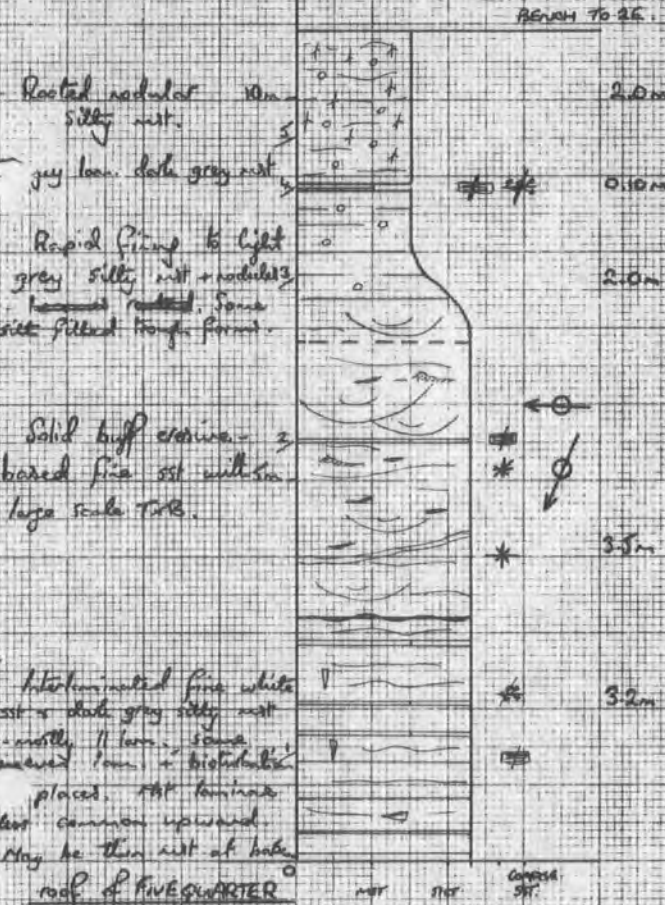
Shaly coal 0.25m

Outcrop cut - worked in two benches - bottom 2 leaves in 1st bench, then top one. Coal thicknesses probably reduced, and quality also, due to its proximity to outcrop. Top leaf however heavily worked away from outcrop. Worked on bench above main cuts. NB 3 leaf pattern to coal.

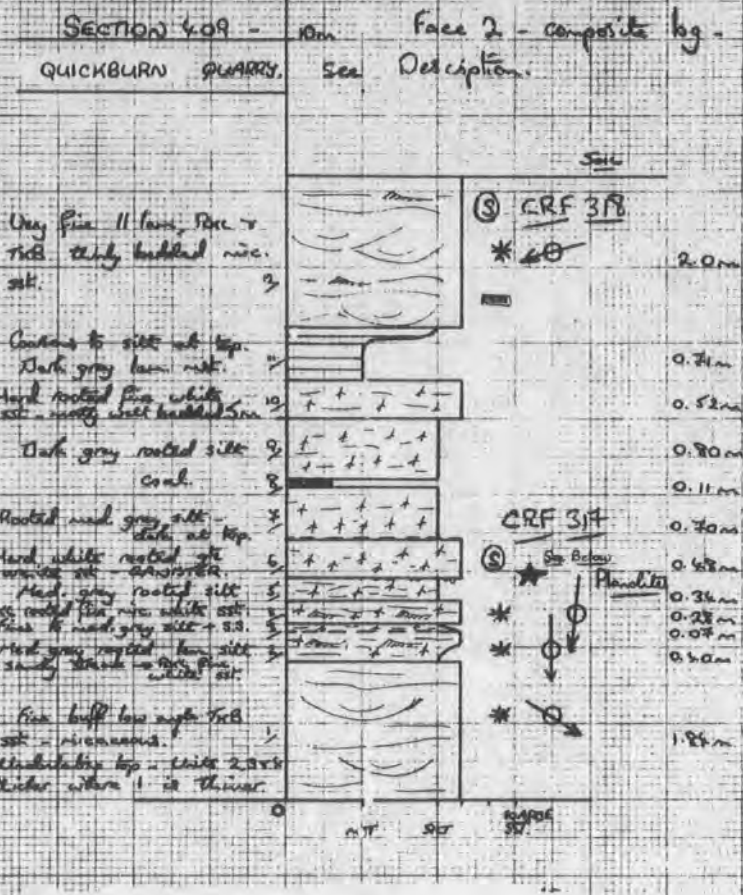
Horizon - between Ryhope rbs & Wearmouth coal

Area C - small island of 1000 x 5000 left.
 0.40m light → 0.96m light gray clay, mottled
 silt & red in places → 0.70m pulverised coal &
 shale fragments. - lithology probably partly due to
 glacial movement. Limited exposure - 20m high
 "face" trending → 315°
 Above cut 216 west. 2E00 being worked
 ? almost at outcrop - curtain by Rm light gray
 silt + sandy streaks.
 Cut 16 west - face not presently exposed - but
 section above is.

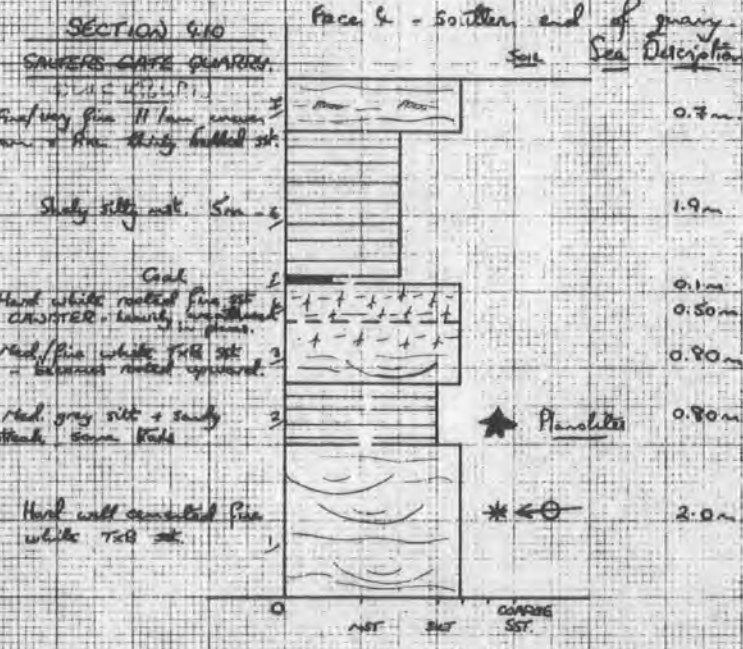
SECTION 405 -
 EDMONDSLEY CLW.



DIRECTIONAL DATA: - Unit 2 - TxB.
 0.9/200, 1.0/209, 0.4m/233, 0.3m/202°
 n = 4, $\theta = 211^\circ$, $\epsilon = 97^\circ$
 Unit 2 - Rm Type A, A = 0.01m → 235, $\lambda = 1$, $\theta = 235$
 Level of sst base varied along cut, but old working
 present → difficult to assess relief on contact
 Sst (Unit 2) has thin calc. mic. laminae with
 comminuted plant remains, almost interlam. in
 places & in infills of some small troughs.
 In firing unit, some silt-filled trough forms
 present. Thin silt near top of section is
 laterally persistent. 2E00 coal lies on bench
 above top of section.
 Area B cuts as per last visit. Area C
 middle and east under restoration.



Unit 2 & 3 only 0.32m together in places where
 Unit 1 is thicker in topographic high.
 Base of Unit 6 is knobby and displays some
 - straight tracks - hyporehals on base



Area B cuts as per last visit. Area C
 middle and east under restoration.

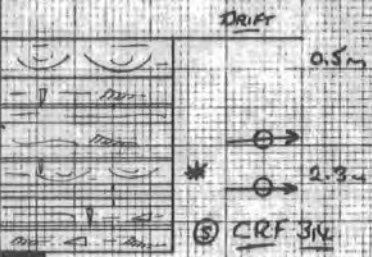
SECTION 407
LANGLEY A & EAST

Sm East end cut - just below
sinuous outcrop line - heads
→ 223° (SE end of long cut)

SE

Perpetual
end
Sharp but
not vertically
arrived beds
solid sst

Solid fine buff T&B sst. 3
Interbedded/interlamined
fine white fine 11's under a line
sst + dark gray calc. silt.
not locally bioturbated
in places. Some small
low angle x silt.



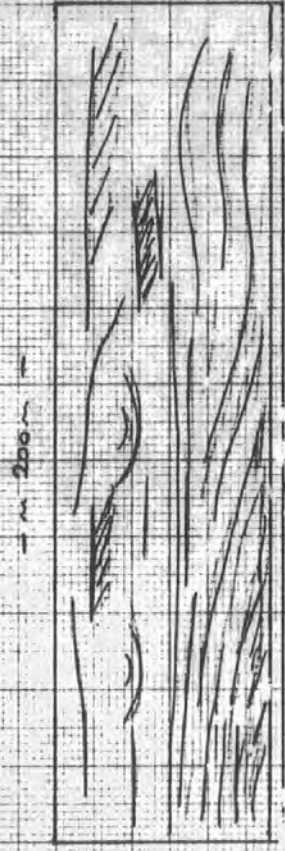
MAIN 1
Bryozoa 0.56m

Floor - light gray clayey
rooted mat.

* DIRECTIONAL DATA :-

Unit 2 - TXB - 0.1m/080° n=1 θ=080°
Unit 2 - RVC - A=0.01m → 106, 131, 073, 073, n=5
θ = 095°
L = 97% n=6

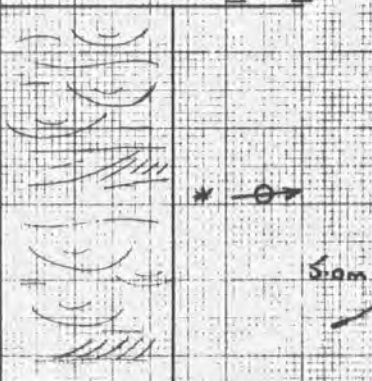
LANGLEY P & E



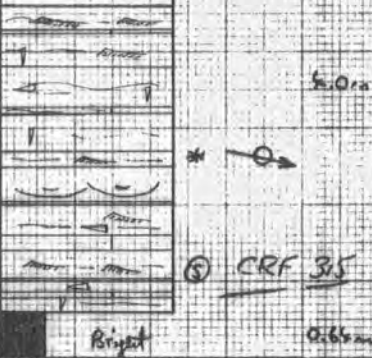
SECTION 408
LANGLEY A & EAST

Main part of cut W.E
~ 4-500m long face, thick
Near south end → 102°
BEACH - DRIFT

Solid buff T&B
fine sst.



Interbedded/
interlamined fines
→ above (500')



DIRECTIONAL DATA :-

Unit 2 - TXB - 1.5m/092, 1.0m/076, 1.0m/076
0.7m/081 n=4 θ=081° L=99%
Unit 2 - RVC → 112, 121, 113, 104, 093, n=5
θ=109° L=99% n=5.

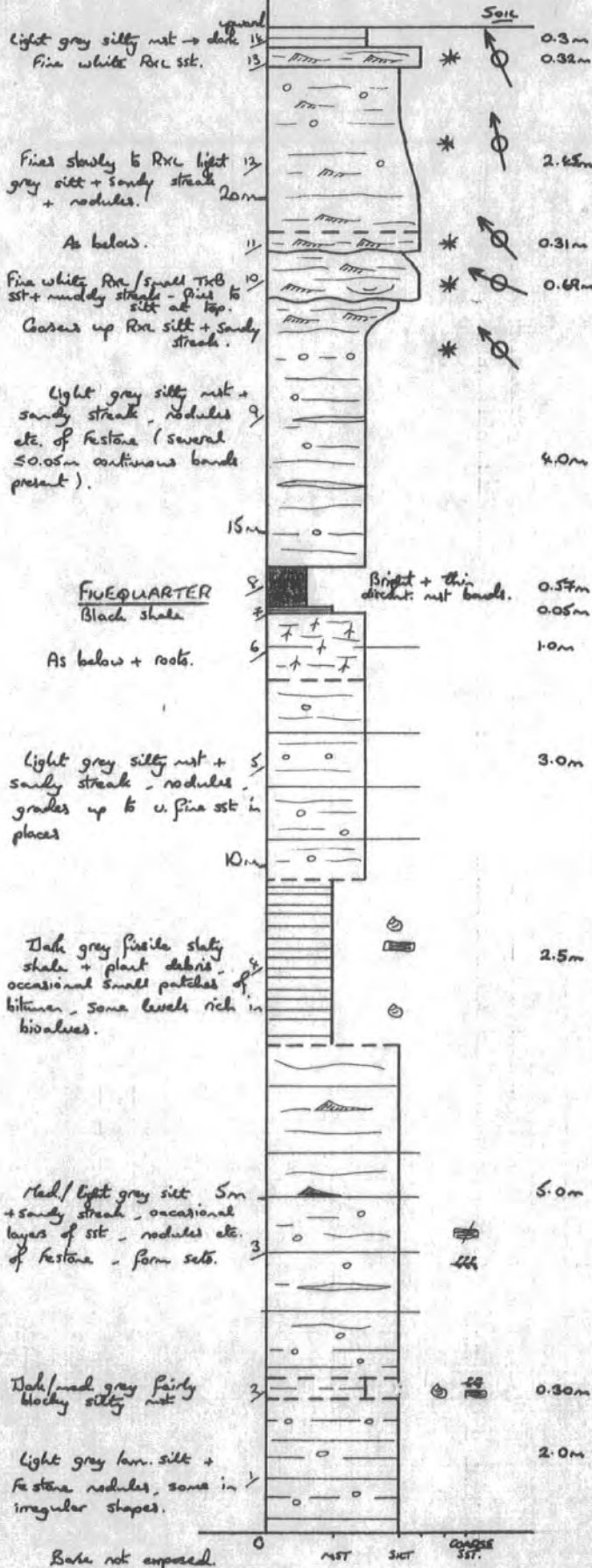
Example of vertical burrows exposed (also vertical
and horizontal tubular ones).



Locally dipping and coarser near south end of cut
- not far from smaller cut. Bottom 1m of interbedded
face is 11 bedded, then 2.5m low angle x bedded with
dipping down to SE, becomes flat-lying and undulating near
SE end of cut. Top 0.5m flat-lying also.
Sketch covers only first ~ 200m of cut - to first corner.
3 photos taken in SE of corner is a log in the canal
of the main seam - max. thickness of interbedded unit -
corresponds to minor of dipping beds like a large
lense sequence.

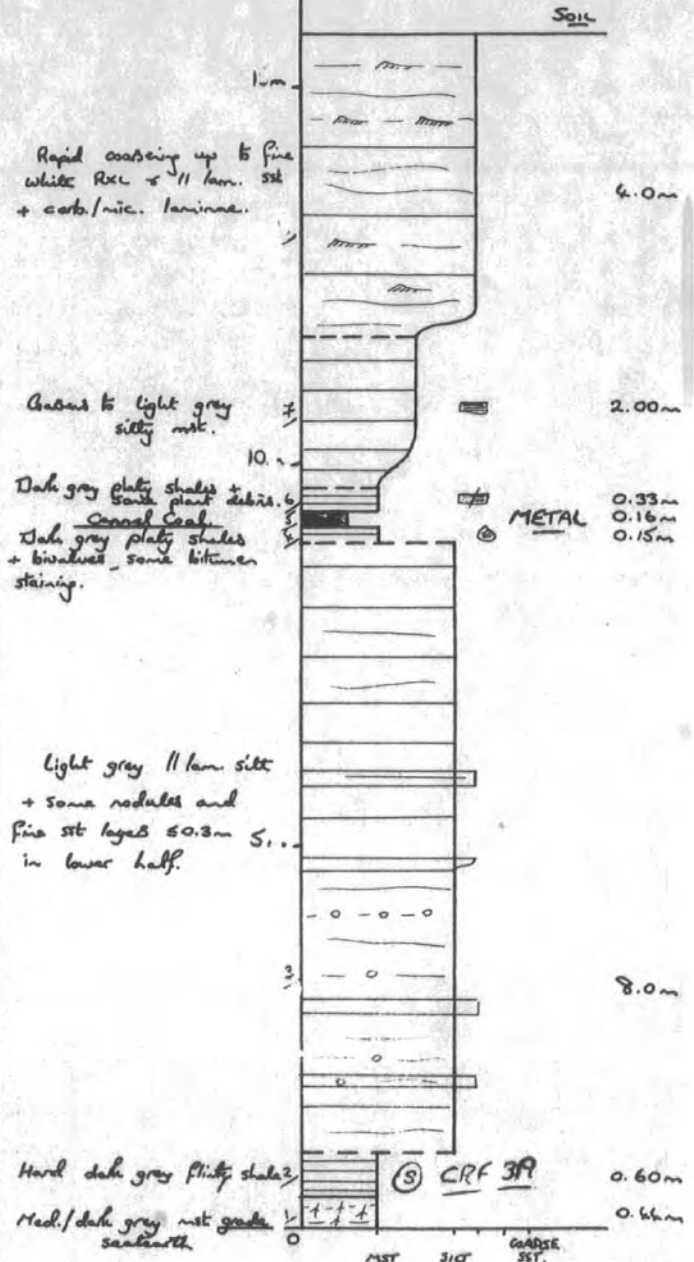
SECTION 411
CROSSLEY BRICK QUARRY

- 25m Composite log -
see Description.
Tectonic dip 5/347.

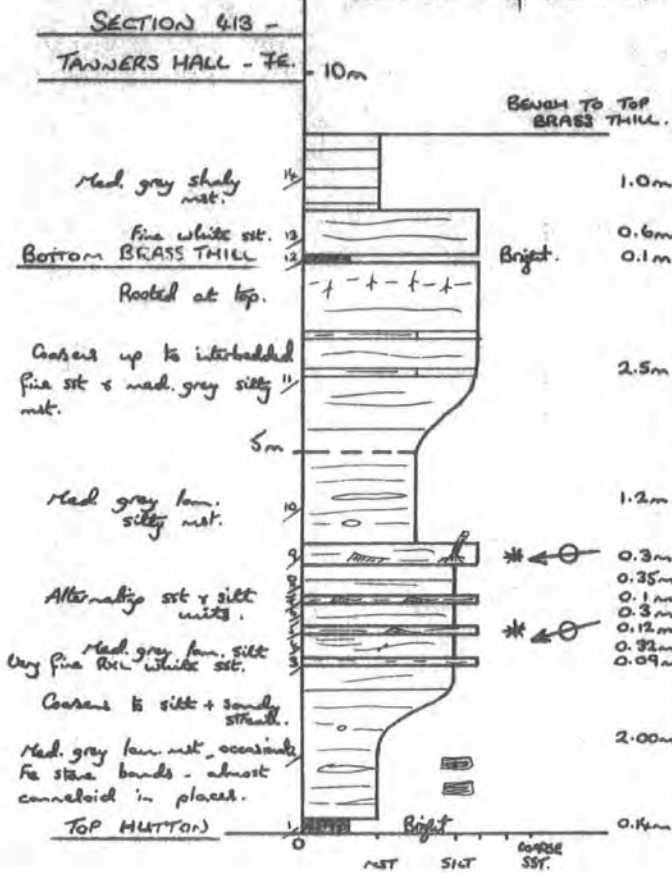


SECTION 412 -
AUCKLAND PARK

CR N2 218301 - east bank
of River Aunlees. - riverside
crag Tectonic 11/333
level - above Fivequarters seam



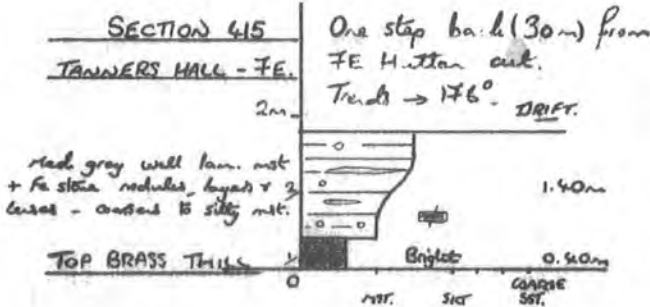
60m north of south end.



* DIRECTIONAL DATA :-

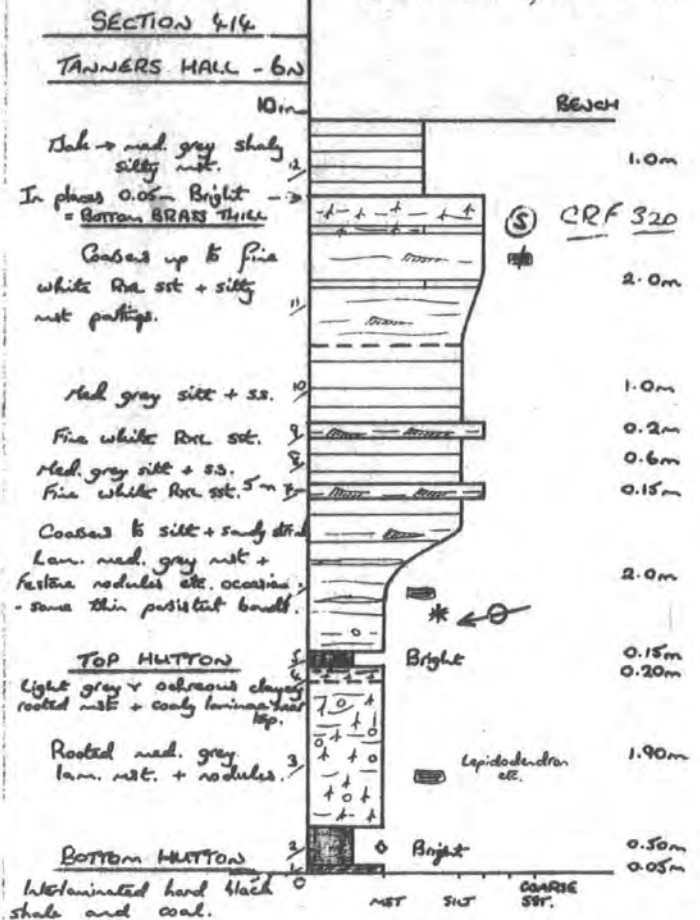
Unit 9 - Bed-over Calanoid, in silt - 1, 0.02m
 + 0.2m → 218°, 2, 0.02m + 0.3m → 295°, n=2.
 $\Theta = 257^\circ$ n=2
 Unit 5 - Rxl A=0.02m → 252, 264, 241.
 $\Theta = 252^\circ$ L=99% n=3

Unit 7 die out within 20m to the north.
 Apart from this, facies remains very persistent laterally - thinning of some ssts to the north.
 Presently dropping ~130m north of south.
 In places, drift cuts down below level of T.B.T. - outcrop must be quite sinuous.
 NB Site rates 37, 748 593 - 1, 202 510 - 31, 446.



Section taken near north end of cut - drift cuts down to north end → outcrop. Little or no lateral variation - some thin feature bands are very continuous.

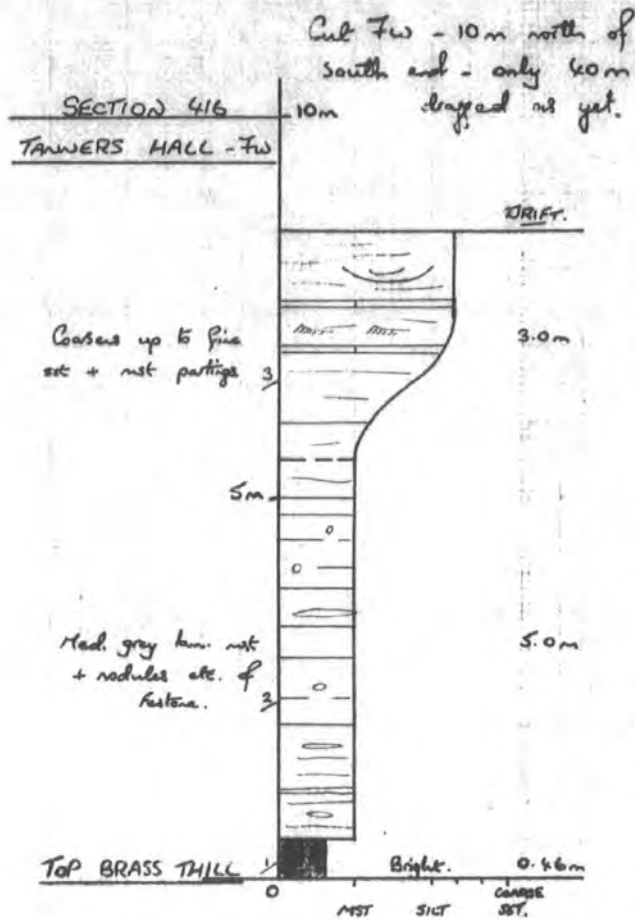
Cut 6N - trends → 313°.
 80m NW of SE end.



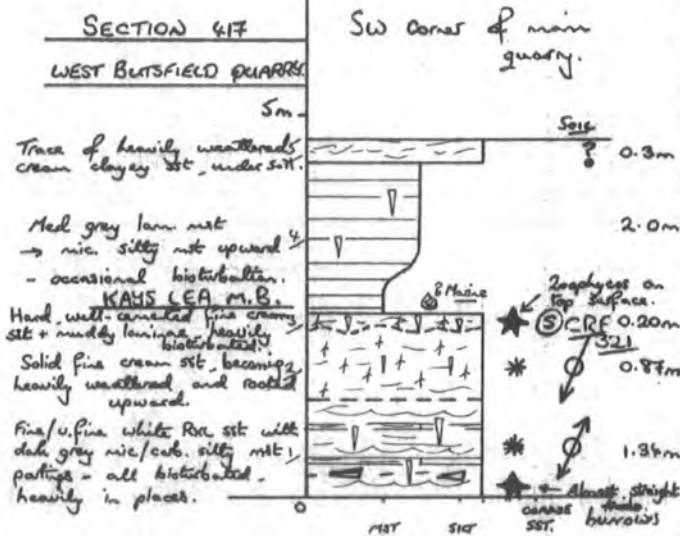
* DIRECTIONAL DATA :-

Unit 6 (further along face) - orientated plant debris
 → 247° (n=1), $\Theta = 247^\circ$ (n=1)
 150m along face - over Top Hutton = 1.5m met 11, 0.4m sst, 0.6m silt, 0.3m sst, then as before.
 250m along face - Hutton 1-2 parting reduced, now into area of old workings. Sequence over Top Hutton - 1.5m met, 0.3m sst, 0.6m silt, 0.4 sst + met laminae, 1.2 silt then coarsening up unit. Lapidodendron prints in met from Hutton 1-2 parting. Plant debris in met above Top Hutton → 247°. Met gradually coarsens with sandy streak & laminae. Form sets visible.
 600m along - far end of cut, just before downcutting drift channel over Top Hutton - 1.5m met, 0.15m sst, 0.5m silt, 0.1m sst, 1.5m silt then coarsening up sequence.
 At end of cut - roadway, the old cut further to west - last cut taken off incline site - also numbered W on T.H.!
 - two thin ssts still visible.

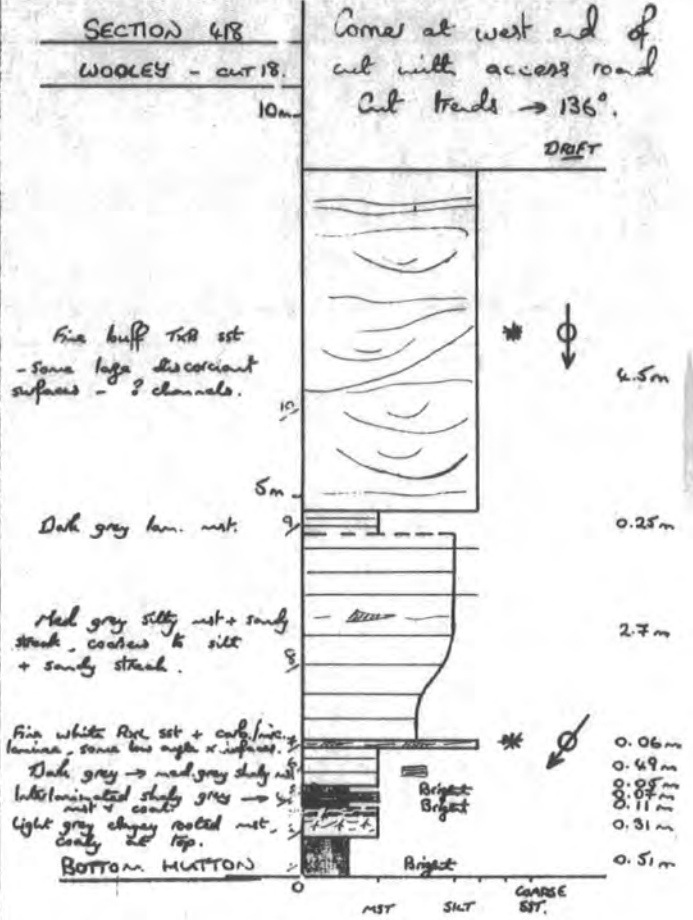
SECTION 415



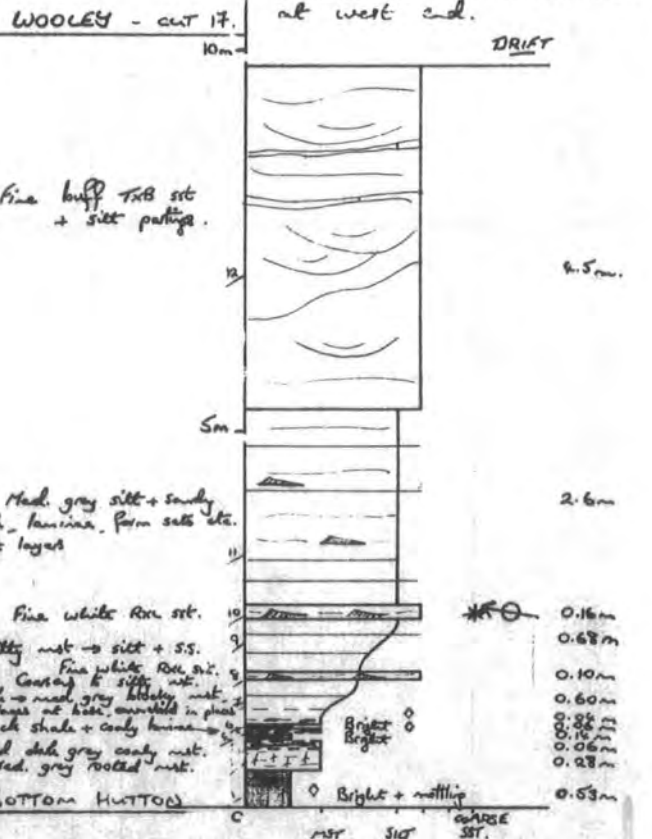
Cut joins onto north end of bw (seen on last visit) - re mst channel form - section appears more or less symmetrical - possibly orthogonal. - 2 photos.



- CRF 325 - Humber Hill.
4 - Fellside
3 - Sharp Hill
2 - Foggyhaze



* DIRECTIONAL DATA:-
Unit 10 - Trough x Bedding - on access road. - 0.3m/173, n=1.
Unit 7 - Rm Type A, A ≤ 0.02m → 235, 225, 205, 212, 230. n=5.
θ = 223° n=5 L = 98%

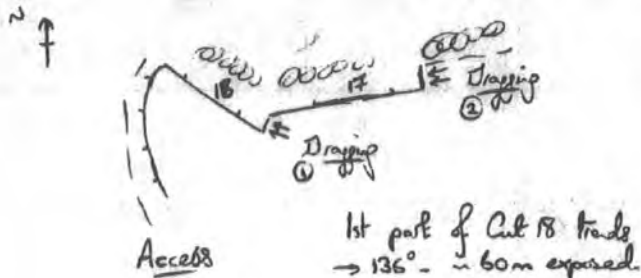


* DIRECTIONAL DATA - See Over

* DIRECTIONAL DATA from Section 419 - Unit 10

RxL → 279°
 + 275°, 312, 296 further east along face.
 θ = 290° - ε = 97% - η = %

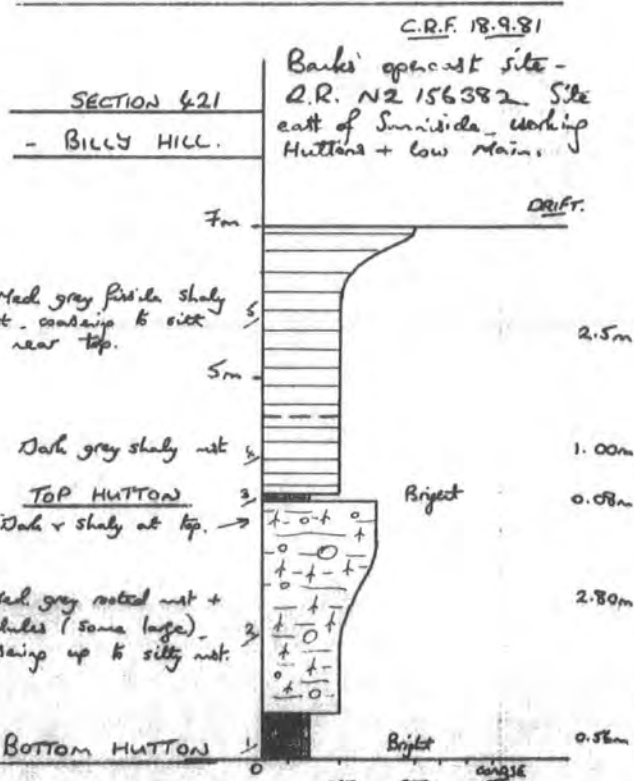
Plan of workings - Presently working Cuts 17-18.



From 1st dragline, ~150m exposure of Cut 17 before 2nd dragline - 50-100m more to drag. Section 419 taken ~80m east of 1st dragline.

In Cut 18 - thin ssts vary in thickness occasionally - along the face - but are persistent right along the face - definitely thicker to the east of Section 419.

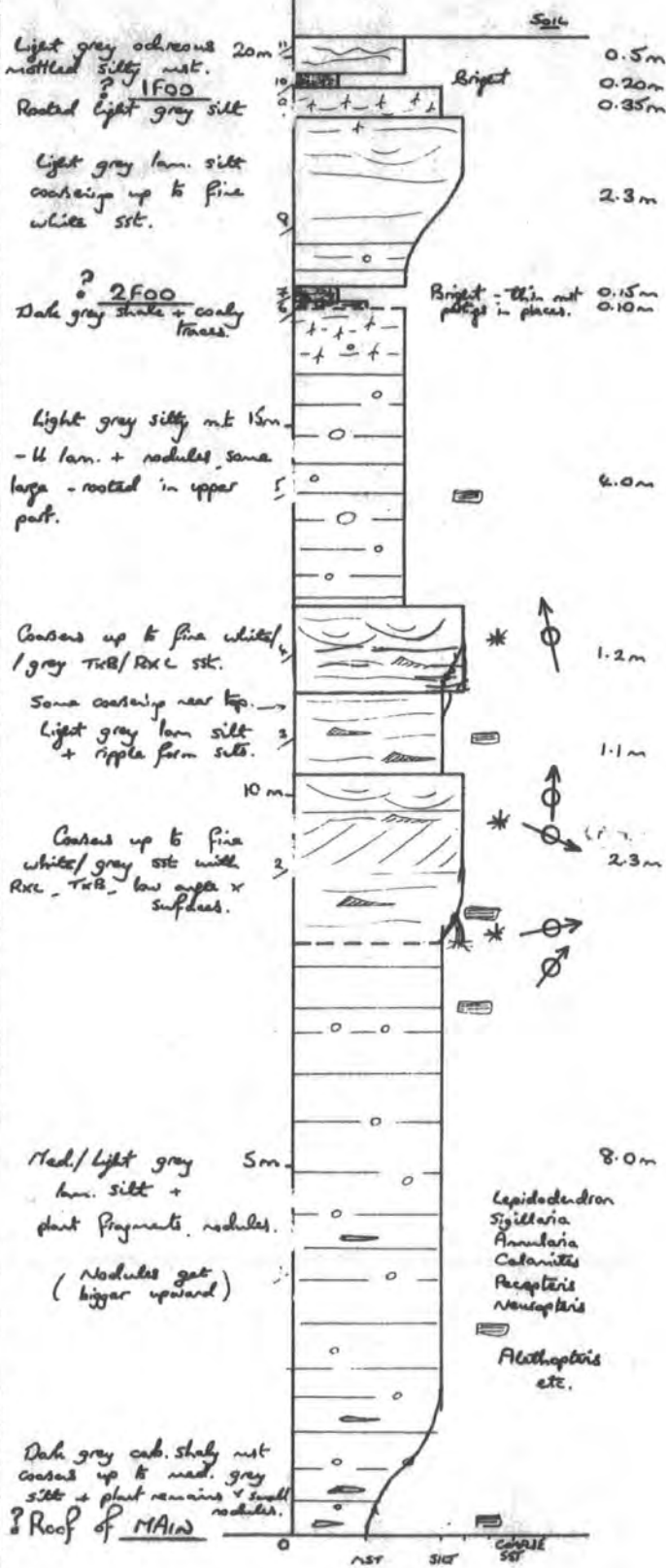
To east, along cut, further thin sst comes in above the 2nd one - 0.7m up - 0.10m thick - dies out westward - hardly present by position of Section 419. Toward east end, 2nd thin sst is 0.25m thick - and coarsens up at the base. 3rd sst is 0.15m thick - thickening to the east. Sense of ripple x lam. in thin ssts is difficult to determine - uneven lamination also present.



Present working cut - trending E-W - situated ~50m north of a fault (E-W) bringing down low main to the south. Cut ~150m long - little or no lateral variation visible.

SECTION 420 - WHITEHALL SHALE QUARRY.

Corrections made 2.10.81

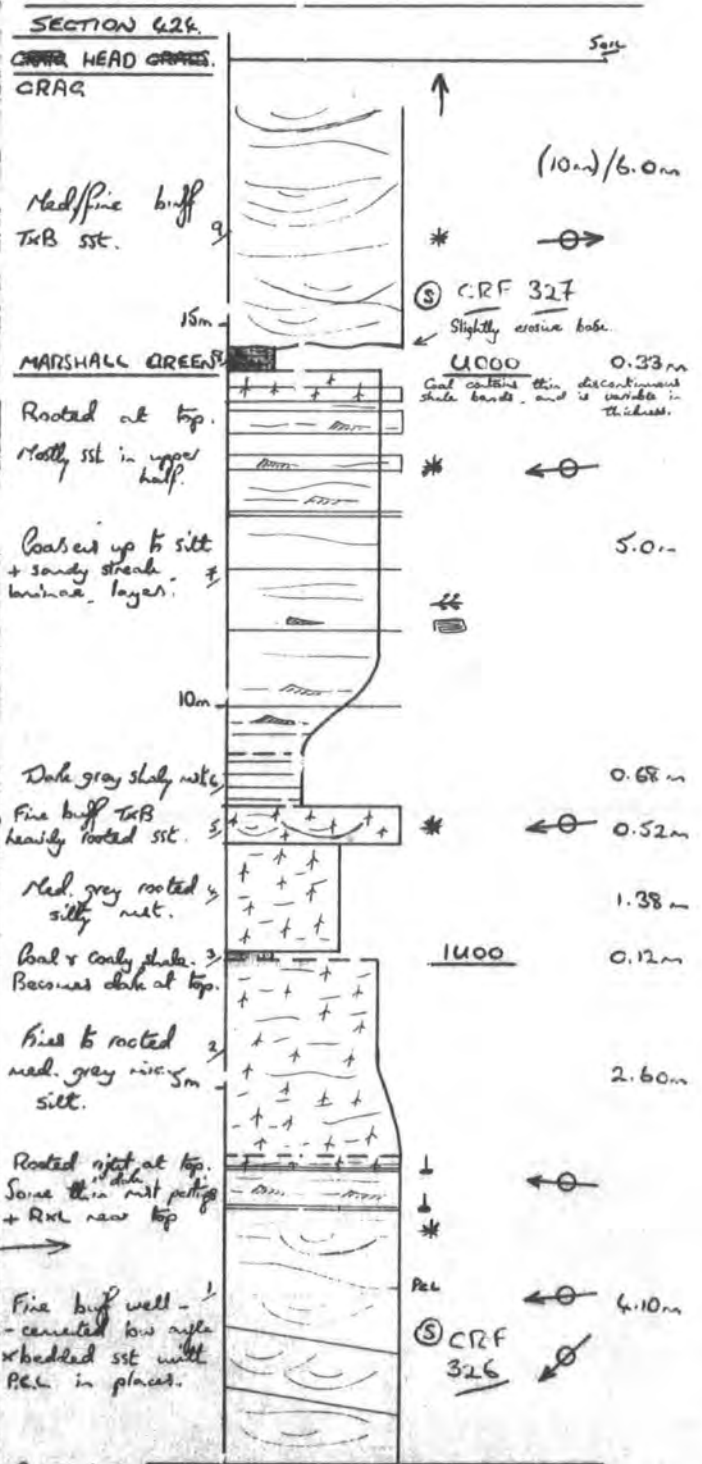
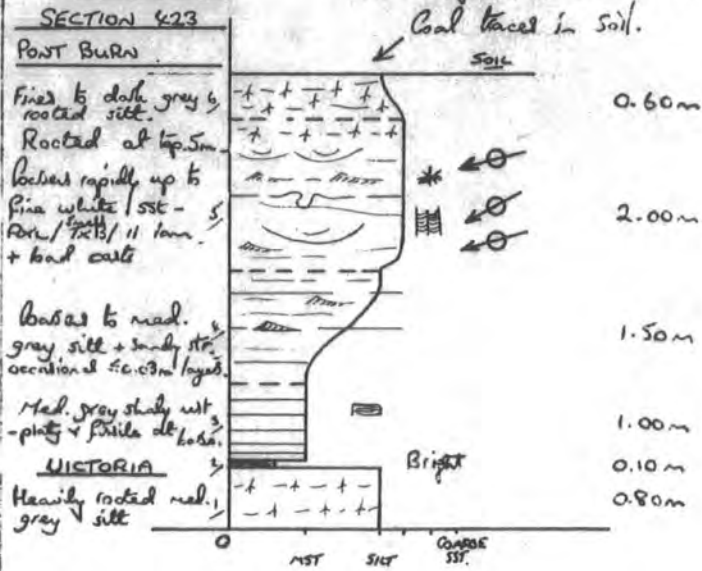
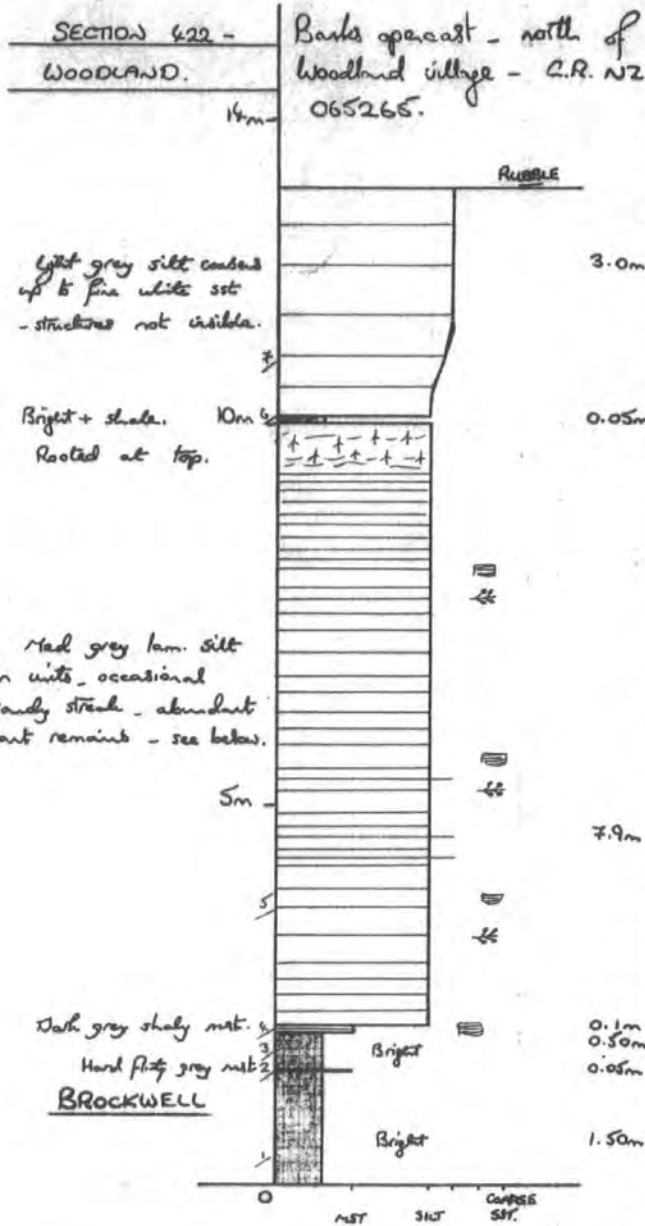


West end of Whitehall Quarry.

CRF 18.9.81

CRF 29.9.81

Post Burn 100m upstream of
Pont Bridge. C.R. NZ 157562



Section logged in western area of site - deep
N-S trending cut - 70m long.

Plant remains very abundant and well
preserved in the silts - several types - Calamites,
Pteridophores, etc.

Silt is laminated in 10-20cm packets, separated
by 50.005m dark gray clayey mt partings
- packets become thinner near the top.

Gives the section a flaggy appearance.

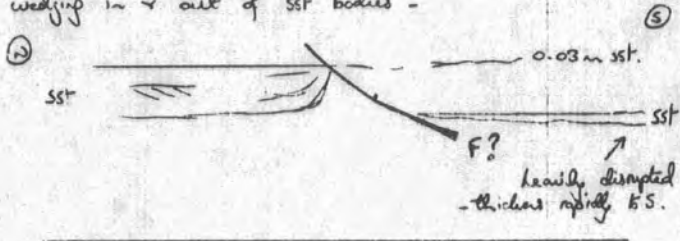
To the east of the western area (field
containing offices) is a smaller field also
containing Brockwell - similar section exposed.

Twenty metres to west of corner - 3 small faults, then to west, section above top coal for 3m ↑ contains 80% sst layers - $T \times B \rightarrow 193^\circ$ - layers mostly $\leq 0.5m$ thick, up to coarse grade sand.

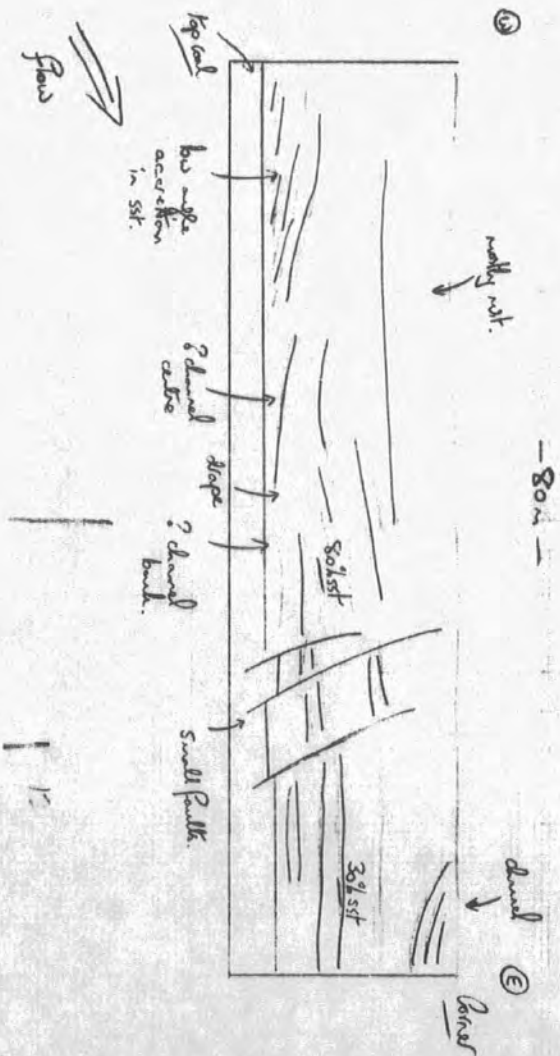
In base blocks of rooted sst + net, scattered for top coal - sst filled, slightly foliated cracks - having almost polygonal pattern in plan view.

On E-W face - increase in proportion of sst to ~80% reflects either bands of crevasse channelling - unlikely over 3-4 m extent? - or channel margin.

Possible? growth fault present - with rapid wedging in & out of sst bodies -



SKETCH OF E-W WALL.

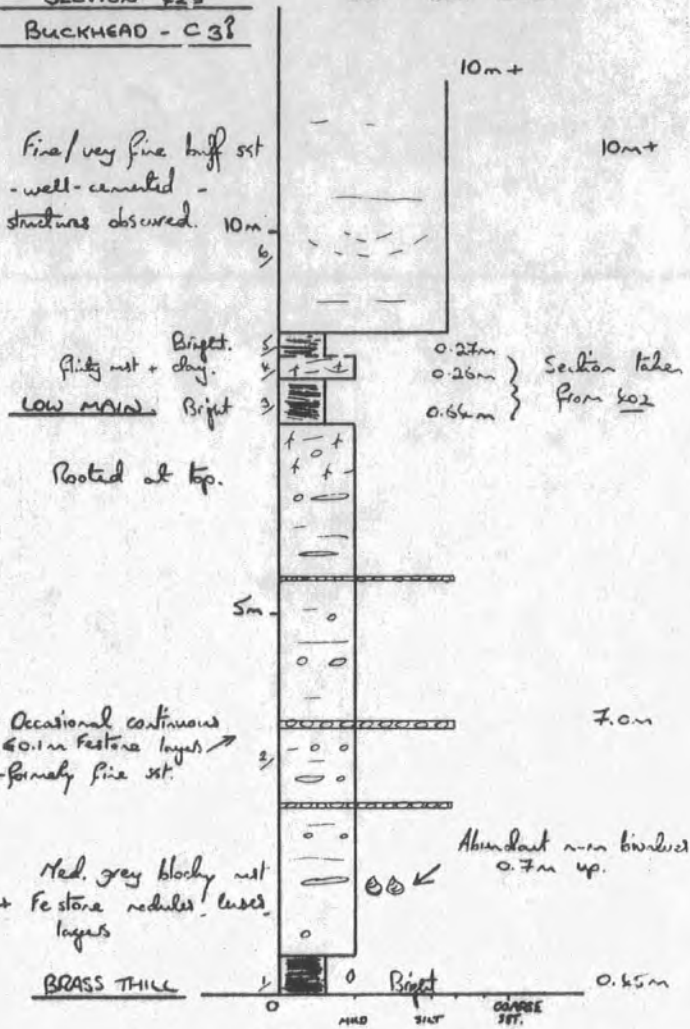


NB The thin granular ssts are not present toward the western half of the E-W face.

1. No. of sst & samples.

SECTION 42^{1/2}
BUCKHEAD - C3?

Section at NW end of long cut - short wall.



Present excavations probably one cut back from previous visit - low main being reduced on next step up. - cutting across former silt cut at east end. NB Above Brass Thill - lack of thin ssts beneath low main seam, as in earlier cuts - appear to wedge out to SW. Ssts appear to come in at NE end of present exposure, across a small fault. Access not possible to low main.

- CRF 332 - Keestone Gravel
- 333 - Cockfield Reaches
- 334/5 - Spittal Foreshoreshore
- Berwick
- C. Carb.

SECTION 42⁷ -

Spittal Foreshoreshore
- not presented

CRF 3.2.82 - LANGLY cont.

Box cuts - no channel margins presently exposed, though perhaps exposed to east.

TxB \approx 0.8m/095, 2.0m/058, 2.0m/116, 1.0m/103, 1.0m/091, 0.8m/056, 2.0m/106. n = 7

Many sets have complex form - of one set - lined set in basal part

SECTION 434 10m Central part of cut.

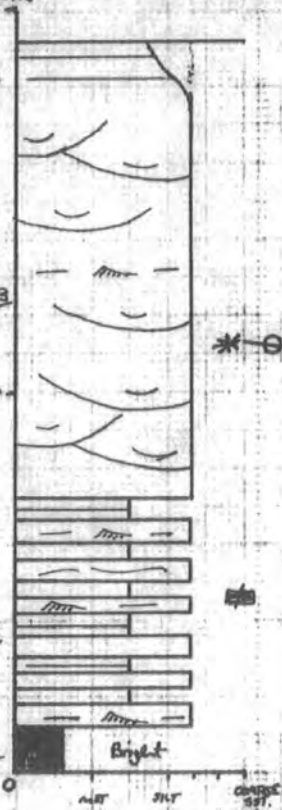
LANGLY A10

Fine at top, becomes shaly.

Fine buff TxB sst

Interbedded fine-grained sst + dark calc. silty claystone - as for previous sections.

GOOD - RAW



Section very consistent over ~100m exposure - dipping to east. TxB - 0.8m/112, 0.3m/100, 0.4m/128, 0.6/099, 0.6/101, 0.8m/065, 0.4m/085 n = 7

Main coal is markedly variable in thickness over the site - also thickened in one area by the dev. of an extra unit of carbonoid + shaly coal in the base of the seam. Unit starts ~200m from east end, extends for ~100m to east - combined thickness up to 1.06m (average 0.66m) C.R. 421000 → 421100. Unit reported in Col 8 for the first time - patchy, but present in Cols 9 + 10

CRF 438 - Flints claystone
- County RE
Kereslay.

SECTION 435 - NOT PRESENTED.

CRF 18.5.82.

COBES CARR QUARRIES (TOOHILLS). Completion of Section 2&1 and additional notes.

1. Sequence above Top Bushy - bottom 0.3m or so is composed of rhythmically laminated dark + light claystone - 1-3mm interlamination. RxC → 021, 028, 062, 139, 176. n = 5.

Subsist appears to be derived from SW + WASH.

2. Over Middle Tilly - ? intertidal accreted channel deposit. Top 1m or so is siltstone in grade. RxC only in upper part of deposit. TxB confined to lower part.

TxB 0.1m/155, 0.2m/140 (0.6m wide) - 0.3m/118, 0.5m/100

RxC Type A - A = 0.01-2mm → 179, 126. Total interval = 2.5m approx.

Siltstone partings with sst laminae + logs, ≤ 0.5m thick, contained within the sst member.

Near north end of main face - sst member takes a flat-lying interbedded character - typically alternations of 15-20cm sst, 2-7cm dark silty mst.

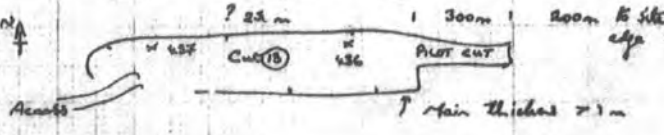
Siltstone member thickness - fills channel profile

Sequence thin → 2.5m to north. - 50m from north end - 10m x 1m sst-filled channel form.

E-W face channel fill looks like a clay plug, and appears to trend → 060° - 20m wide perhaps

Main face - 200m long. At south end - parting reduces to ~2.5m where low-angle x sets are exposed - sequence mostly siltstone, with sst bands. Channel profile visible in part - see notes from previous visit. Overall impression is of a complex meander belt dev.

CRF 27.5.82. LANGLY OCCS



SECTION 436 5m west of edge of pilot cut.

LANGLY Cut 13

Distributed coaly mst. 5
Fines to 11 lam. rooted by siltstone

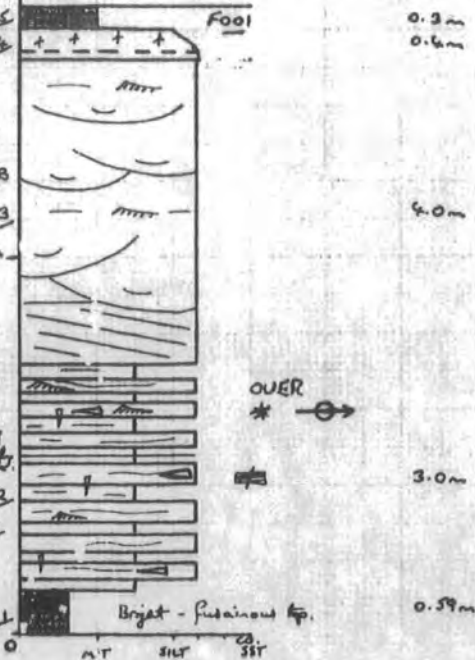
Fine white/buff TxB sst.

Basal 2m is a single x set → 085° SW

Interbedded dark/med. gray silty poorly lam. silty mst + sst. + fine white sst

3 - typically 10-15cm sst, 3-5cm dark mst.

GOOD - RAW



Thickest of lower sediments varies little along the face - possibly thicker very gradually to the west.

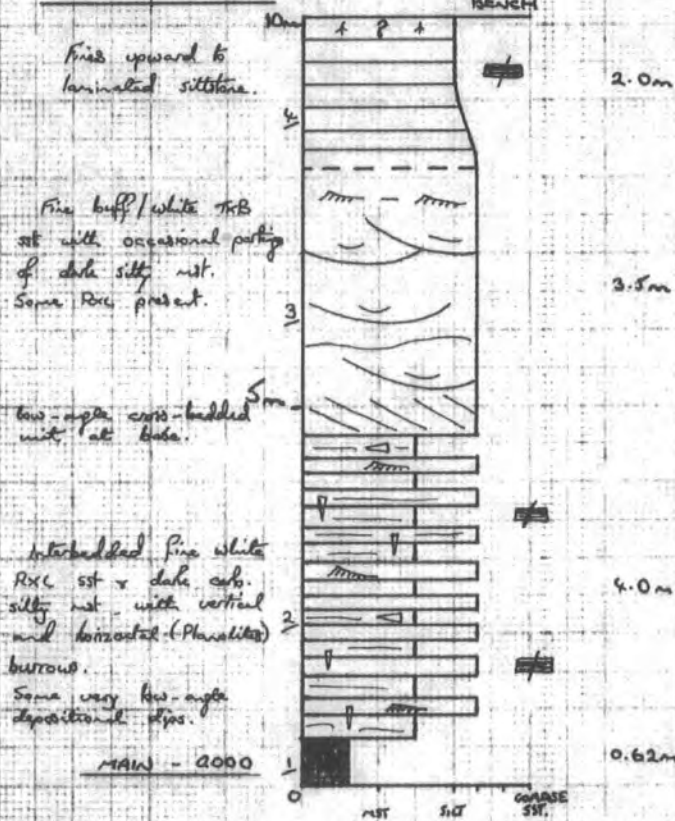
* RCL → 093, 105, 102, 084, 065, 100, 077, 108. n=8

Ripple forms sole present in places - and long, straight, bifurcating synaeresis coals ≤15cm long, 3-5mm wide - composed of sst set in silty mat matrix. No roots in sequence.

Where rain coal thins, the basal unit is either gray shale (50% ash) with some roots + coaly traces - or concretion coal (15-20% ash) at base of seam proper. Canal layer typically 0.20m thick and discontinued. Often shaly coal only present under rain. Rain coal itself? 2-3% ash.

SECTION 437
LANGLEY Cut 13

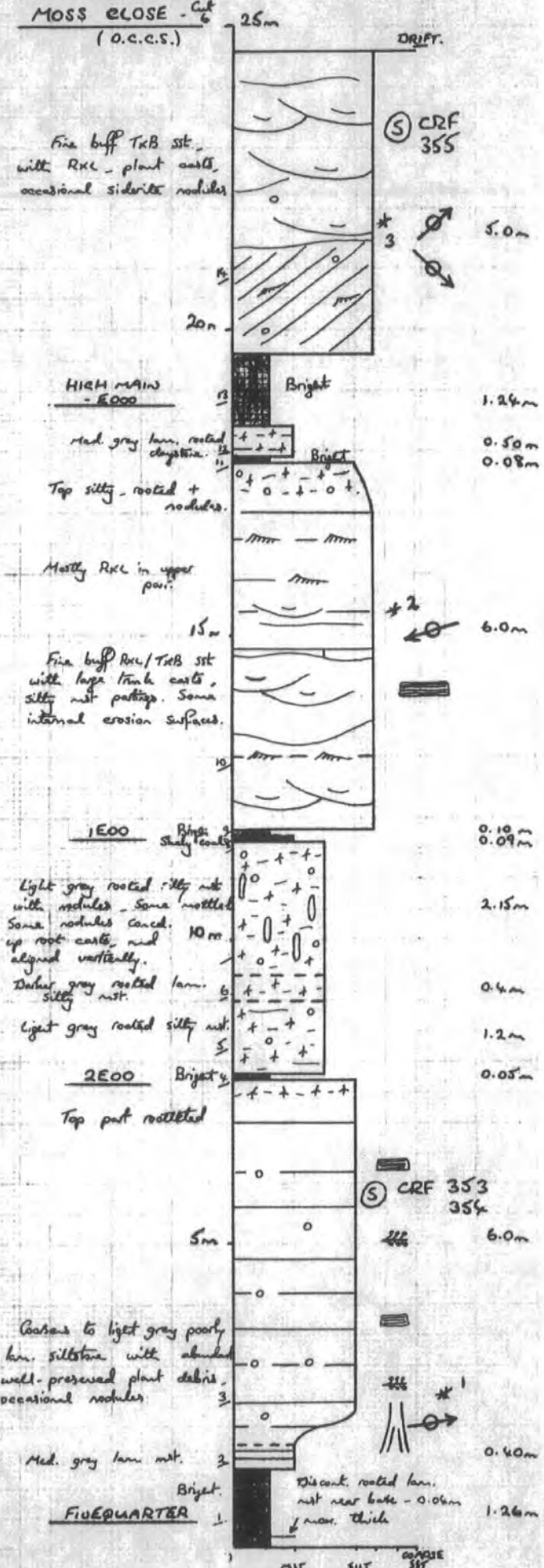
Towards west end of cut.
- by access road.



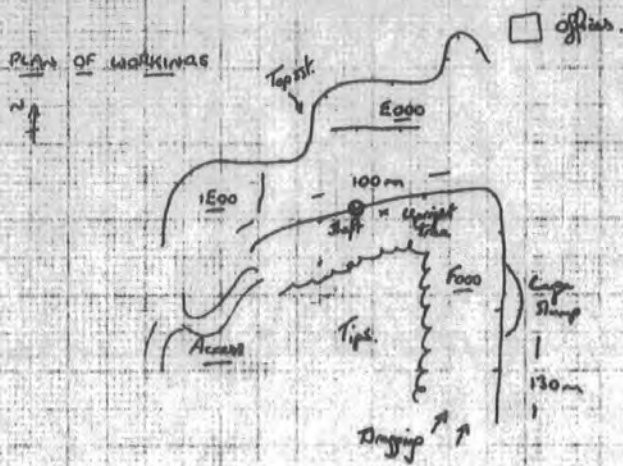
Top bench - extraction of Fivequarter coal - only 10m back from rain cut - similar to faces exposed on previous visit. Presently, no access to coffin cuts.
1 sample of synaeresis crinoid sst - CRF 352.
2 colour prints.

SECTION 438
MOSS CLOSE - Cut 6
(O.C.C.S.)

Composite section.



DETAILS - See Over.

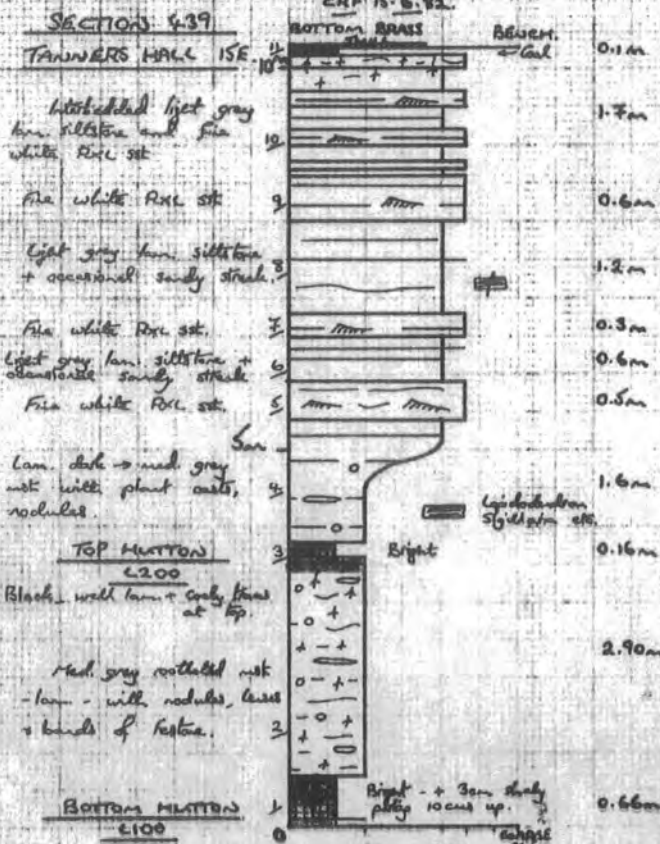


Cuts advancing eastward with time, large-scale shoring and old workings causing disturbance of strata.

DIRECTIONAL DATA

- #3 3m low angle cross-bedding / steepened by drift movement 27/27, associated with RCL → 135°, 141, 132. Large sets have asymptotic bases and steep tops. Another similar set of surfaces are associated with RCL → 05, 041, 011, 029, 048, 028, 023 $\Delta = 7$. Large sets dip → 33°.
- #7 TCB 0.6m/300. RCL Type A, AS 0.05m, → 240, 244, 282, 275, 258, 232, 247. $\Delta = 7$.
- #1 In situ, inclined thin strips, perhaps 3.6m tall at least 1.60m preserved. - dip → 73/253 in paleosol → 073°. Half hole cast and inner sit pits cast.

In situ occasional $\pm 0.03m$ partings of shale commonly not are present. Seam partings change considerably across the site - F000 - 2E00 parting increases to what.

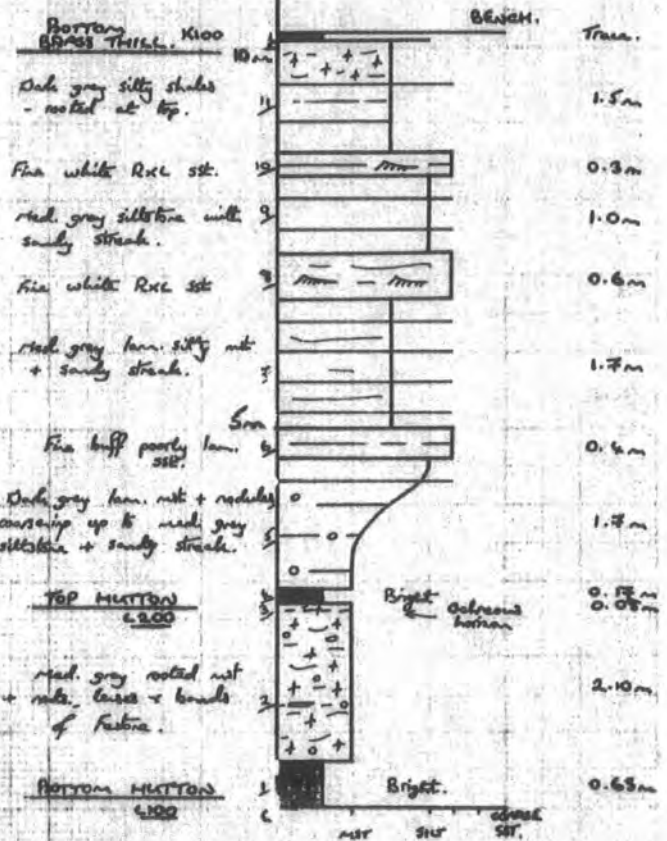


Cut 15E - 150m north of south end - dipping 30m

2 photos of Cut 15E taken. Small step fault with 25cm throw 10m south of section. Fault at south end of cut also. Sets persistent along cut mostly - but thin to the south - bottom one dies out gradually within 50m. Drift and fault cut out at south end of cut. Cuts now not as long as previously - due to an area of faulting and heavy old workings.

SECTION 440 TANNERS HALL 14E

To north of previous section, and of uncorrected faulted/worked area. Cut ~70m long. Section 50m north of south end.



In Unit 5 - just to south of Section - another sst wedges in → 0.3m within 30m - 0.5m from first sst (Unit 6). Unit 6 + 8 both thicken to south. 1 photo taken.

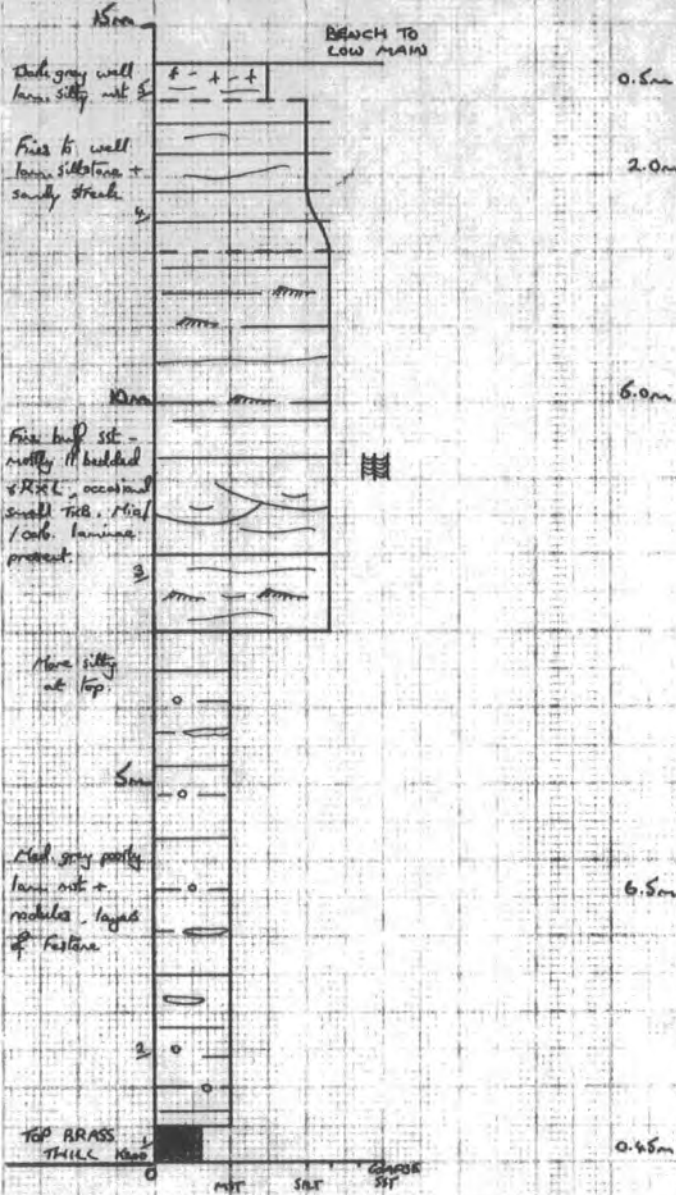
Surface of L100 is bent and buckled towards southern fault - in previous cut - the seam was draped vertically over the fault - still silt at the time of displacement?

Round to north end of site - working then long cuts to Brass Thill coals. Cut 9a - long cut trending 305° - exposed Top Brass Thill, and overlying strata up to bench of low main. Advancing upward sequence of former cuts is now a sharply-banded sst.

Section 441 - over.

SECTION 441
TANNERS HALL 9N

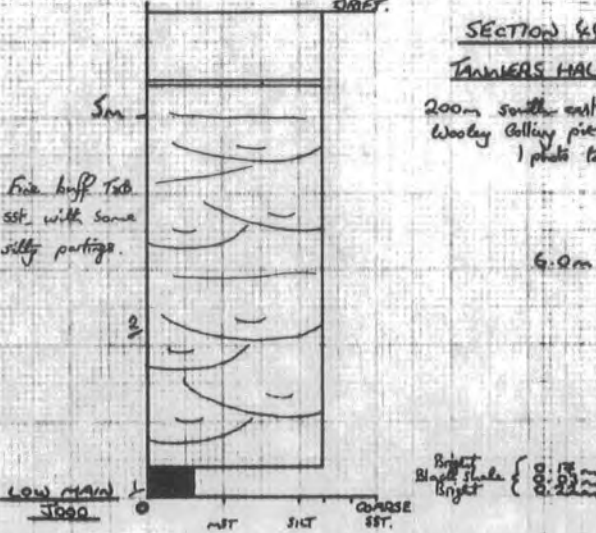
Section taken by 3m
step fault - 150m east
of west end.
2 photos taken.



Sst thin to 2.5m thick at extreme NW end of cut, over a distance of about 50m - some low angle x-surfaces present - at the same time, the overlying siltstone interval is represented by 4.0m shales - the top 2.5m of which is rooted. (ie sst fine through silt to rest). low rain present as trace - beneath old colliery workings. Further SE, where down-thrown by 3m fault, worked on top bench.

SECTION 442
TANNERS HALL 11N

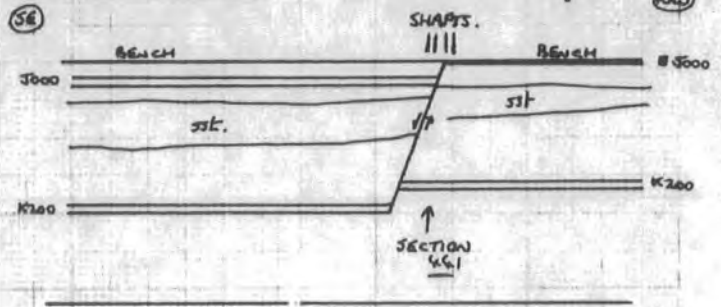
200m south east of Woolley Colliery pit head.
1 photo taken.



Coal and overlying sst exposed along length of cut 11N with little variation - 6m or so of sst. Sense of TB difficult to achieve - no palaeo-orient data taken.

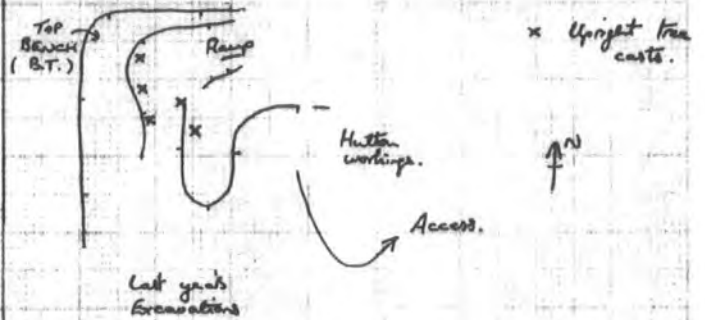
SKETCH OF CUT 9N

Total ~ 800m length.



PHOENIX QUARRY, CRAWCROOK.
G.R. NZ 135 628.

First visited July 198. - See Rough log of Section 390



Presently working almost at backline of NW site limit, excavating to Hutton coals.

Section 443 - OVER.

NOTES In siltstone of Unit 4, nodules seem to be concentrated at regular intervals - in thin horizons spaced 30-40cm apart.

In NW part of workings, casts of 1/2 upright, in situ trees -

1. 1m ↑, 0.3m wide, inclined 15° → 097°.
2. 2m ↑, 50.3m wide, " → 075°.
3. " " " Upright
4. " 0.4m wide " "
5. " 0.3m wide " "

All rooted into same horizon - just at top of horizon containing sharply-based sst bands - though few roots appear to be preserved - all lycopods, rooted horizontally. All rooted into a thin, nodule-rich horizon above the sst. - probably established after ? crevasse sand deposition in middle of sequence. - ? shallow water required for lycopod establishment.

Black shale
Bryoz

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SEDIMENTOLOGY AND STRATIGRAPHY
OF THE DURHAM COAL MEASURES,
AND COMPARISONS WITH OTHER BRITISH COALFIELDS

by

CHRISTOPHER ROWLAND FIELDING, B.Sc.

A thesis submitted to the University of Durham
for the degree of Doctor of Philosophy

Department of Geological Sciences

October 1982



APPENDIX 2 - PETROGRAPHIC DATA

a) SANDSTONES

N.B. Petrographic details of many lower Westphalian quartz arenites and ganisters not given here may be found in Percival (1981).

Sample/Strat.level	Environment	Size/ Sorting	Detrital Quartz	Fsp	Heavy Mins.	Mica R.F.s	Qtz.cement Hem.stain Ill./Kaol.	Others + Comments
CRAC HEAD - SECTION 424 CRF 326 - LOWER SST.	MINOR CHANNEL		60.5%	1.25%	0.25%	2.5%	6.75% 5% 18.25%	$\lambda = 400$ 6% Authigenic Opaque.
QUICKBURN QUARRY - SECTION 409 CRF 318 - TOP SST.	MAJOR CREVASSE	2.82 ϕ \pm 0.87 F.S. MOD.	62.5%	1.25%	-	1.5% 1.5%	3.75% 5% 17%	$\lambda = 400$ 5.5% Authigenic Opaque.
QUICKBURN QUARRY - SECTION 409 CRF 317 - CANISTER	? REWORKED SPLAY / / PODZOLIC SOIL	2.74 ϕ \pm 0.65 F.S. MOD.	71.75%	-	0.75%	-	2.25% - 23.25%	$\lambda = 400$ 2% Authigenic opaque
QUICKBURN QUARRY - SECTION 409 CRF 316 - ABOVE QAN. CLAY	MAJOR CHANNEL	2.09 ϕ \pm 1.06 F.S. POOR.	65.25%	1.5%	0.25%	1.5% 0.5%	3.25% 2.75% 20.25%	$\lambda = 400$ 4.25% Authigenic Opaque
WEST BUTSFIELD - SECTION 346 CRF 246 - UNDER KAYS LEA NB.	MINOR DELTA FILL + MARINE INCURSION	3.11 ϕ \pm 0.67 U.F.S. MOD.	56%	1%	-	3.25% 0.25%	4.75% 2.5% 18%	$\lambda = 400$ 12.75% Vermicular Kaolinite 1.5% Auth. Opaque *
WEST BUTSFIELD - SECTION 345 CRF 245 - BUTSFIELD CANISTER	CHEVIER RIDGE	2.82 ϕ \pm 0.49 F.S. WELL.	82%	-	0.5%	-	12.5% 4.5% -	$\lambda = 200$ 0.5% Siderite.
VIEWLY HILL - CRF 308 - TOP OF SST.	REWORKED CHANNEL DEPOSIT.	1.62 ϕ \pm 0.35 M.S. WELL	87.75%	-	0.5%	-	8.75% 0.5% 2%	$\lambda = 400$ XRD \rightarrow QTZ/KAOLINITE/ /SIDERITE
VIEWLY HILL - CRF 307 - THIRD CRIT	MAJOR CHANNEL	1.78 ϕ \pm 0.83 M.S. MOD.	66.5%	-	0.25%	0.5%	3.25% 1.25% 24.75%	$\lambda = 400$ 0.5% Authigenic opaque phase.
QUARRY WOOD - CRF 301 - THIRD CRIT	MAJOR CHANNEL	2.79 ϕ \pm 0.69 F.S. MOD.	63.25%	1%	0.75%	4% -	7% 11.75% 12.25%	$\lambda = 400$
CROSS'S UPPER QAN. QUARRY - SECTION 388 - CRF 299 - THIRD CRIT	MAJOR CHANNEL	1.41 ϕ \pm 0.69 M.S. MOD.	71.5%	0.5%	2%	0.75% -	4.5% 5.5% 15.25%	$\lambda = 400.$
BESSY'S BANK - SECTION 242 CRF 192 - LR QTZ. ARENITE	? REWORKED SPLAY/ / PODZOLIC SOIL	3.12 ϕ \pm 0.65 U.F.S. MOD.						SEE PERCIVAL 1981
BESSY'S BANK - SECTION 242 CRF 189 - THIN SST.	SUBAQUEOUS LEVEE	3.28 ϕ \pm 0.72 U.F.S. MOD.	? 80%					
BESSY'S BANK - SECTION 242 CRF 190 - THIRD CRIT	MAJOR CHANNEL	2.33 ϕ \pm 0.89 F.S. MOD.	56%	0.5%	1.5%	2.25% 0.25%	2.75% 18.75% 17.50%	$\lambda = 400.$ XRD \rightarrow QTZ/KAOL./ MUSCOVITE.

* CRF 246 - XRD ANALYSIS INDICATES THE PRESENCE OF
QUARTZ, KAOLINITE, MUSCOVITE, FELDSPAR, AND CHAMOSITE.

Sample/Strat.level	Environment	Size/ Sorting	Detrital Quartz	Fsp	Heavy Mins.	Mica R.F.s	Qtz.cement Hem.stain Ill./Kaol.	Others + Comments
COREY CARR - SECTION 241 CRF 186 - ABOVE MID-TILLEY	MINOR CHANNEL		59%	0.5%	—	2% —	13.5% 0.5% 22.5%	n = 400 0.5% Auth. Opagne 1.5% Uesm. Kaolinite
BUCKHEAD O.C.C.S. - SECTION 425 CRF 330 - ABOVE BTM. TILLEY	CREVASSE SPLAY		66.5%	0.5%	—	0.25% —	13.5% — 11%	n = 400 2% Pyrite/Marcasite 6.25% Dolomite
CABIN HOUSE O.C.C.S. - SECTION 256 CRF 196 - ABOVE BTM. TILLEY	CREVASSE SPLAY		52.75%	—	—	1.5% 0.25%	14.25% 1% 2.5%	n = 400 2.25% Auth. Opagne 3% Uesm. Kaolinite
BWCHESTER CRACS - SECTION 192 CRF 155 - ABOVE TOP BUSTY	OVERBANK		12.5%	—	—	2% —	— — 1.5%	n = 200 5% Auth. Opagne 79% Siderite
CABIN HOUSE O.C.C.S. - SECTION 075 CRF 099 - ABOVE TOP BUSTY	CREVASSE SPLAY		60%	0.5%	1%	1% —	10% 0.5% 26%	n = 200 1% Auth. opagne.
CABIN HOUSE O.C.C.S. - SECTION 308 CRF 219 - ABOVE TOP BUSTY	CREVASSE CHANNEL		49%	—	0.75%	1.5% —	4.75% 2% 30.5%	n = 200 1.5% Auth. Opagne 1% Siderite
DEBORAH O.C.C.S. - (SECTION 292) CRF 205 - ABOVE BTM. BUSTY.	SUBAQUEOUS LEVEE.	3.04φ ± 0.54 U.F.S. MOD.	53%	—	—	3.75% —	7% — 16.5%	n = 400 0.5% Uesm. Kaolinite 20% Siderite.
DEBORAH O.C.C.S. - SECTION 130 CRF 132 - ABOVE BTM. BUSTY.	CREVASSE CHANNEL	2.75φ ± 0.59 F.S. MOD.	70.75%	—	1%	0.5% —	3.25% — 17%	n = 400 7.5% Calcite
DEBORAH O.C.C.S. - SECTION 137 CRF 125 - ABOVE BTM. BUSTY	CREVASSE SPLAY	3.15φ ± 0.59 U.F.S. MOD.	61.5%	—	—	3% —	9% — 19.25%	n = 400 1.75% Auth. Opagne 5% Siderite
COCKFIELD REEVES - CRF 333 - ABOVE BUSTY.	MAJOR CHANNEL		60.25%	4.25%	—	1.25% —	3.75% 1.5% 20%	n = 400 8.5% Auth. opagne 0.5% Uesm. Kaolinite.
CABIN HOUSE O.C.C.S. - SECTION 154 CRF 137 - ABOVE BOTTOM BUSTY	CREVASSE SPLAY		42%	0.25%	—	2.5% —	8.25% — 13%	n = 400 1.5% Uesm. Kaolinite 32.5% Siderite
MIDDRIIDGE - SECTION 367 CRF 269 - ABOVE BROCKWELL	MAJOR CHANNEL		71.25%	4%	0.5%	— 1.25%	12.25% 0.5% 8.5%	n = 400 0.75% Auth. Opagne 1% Uesm. Kaolinite.
GREENFIELD No. 1 - CRF 302 - UNDER MARSHALL GREEN	MAJOR CHANNEL		76.5%	1%	—	— —	8% 1.5% 11.25%	n = 400 1.25% Auth. Opagne 1.5% Uesm. Kaolinite
GREENFIELD No. 2 - CRF 303 - TOW LAW CANISTER	? CREVASSE SPLAY/ PODZOLIC SOIL	3.28φ ± 0.78 U.F.S. MOD.	82%	—	0.75%	— —	12.25% — 3%	n = 400 2% Authigenic Opagne
CRAC HEAD - SECTION 424 CRF 327 - MARSHALL GREEN +	MAJOR CHANNEL		56.5%	2%	—	1% —	6.75% 3.5% 25.25%	n = 400 5% Authigenic Opagne

Sample/Strat.level	Environment	Size/ Sorting	Detrital Quartz	Fsp	Heavy Mins.	Mica R.F.s	Qtz.cement Hem.stain Ill./Kaol.	Others + Comments
WEAR GORGE, DURHAM - DC 2 - LOW MAIN POST.	MAJOR CHANNEL	3.32 ϕ \pm 0.53 U.F.S. MOD.	41.75%	0.5%	0.25%	1.25%	11.75% - 37.5%	n = 400 7% Auth. Opague.
FINCHALE PRIORITY - DC. 1 - LOW MAIN POST	MAJOR CHANNEL	2.59 ϕ \pm 0.90 F.S. MOD.	42%	2%	-	- 1%	10% 1% 37%	n = 400 7% Auth. Opague.
LAWLEY WEST - SECTION 338 CRF 241 - ABOVE HARVEY M.B.	MAJOR CHANNEL	3.10 ϕ \pm 0.64 U.F.S. MOD.	71.25%	0.25%	-	0.25%	10.75% 0.5% 12.25%	n = 400 5.5% Auth. Opague 1.75% Verm. Kaolinite
ESH WINNING O.C.C.S. - SECTION 040 CRF 087 - ABOVE HARVEY	CREVASSE SPLAY		38%	-	0.25%	1.75%	6% 6.75% 6.25%	n = 400 37.25% Dolomite 3.5% Auth. Opague 0.25% Verm. Kaolinite
MOWN MEADOWS O.C.C.S. - SECTION 215 CRF 168 - TOP TILLEY +	? MINOR CREVASSE.		38.75%	0.25%	0.25%	0.25%	8% - 15.25%	n = 400 1.25% Auth. Opague 36% Siderite
CABIN HOUSE O.C.C.S. - SECTION 323 CRF 229 - TOP TILLEY +	PROXIMAL MAJOR CREVASSE.		74%	-	-	-	18.75% 0.25% 6.75%	n = 400 2.25% Auth. Opague
DEBORAH O.C.C.S. - SECTION 133 CRF 126 - TOP TILLEY +	MAJOR CHANNEL		61.5%	1%	-	0.25%	10.5% 0.25% 24.5%	n = 400 2.25% Auth. Opague.
ROWLEY O.C.C.S. - SECTION 135 CRF 127 - TOP TILLEY +	CHANNEL.		63.75%	0.25%	-	0.5%	11.75% - 16.25%	n = 400 5.5% Siderite 2% Auth. Opague.
ROWLEY O.C.C.S. - SECTION 073 CRF 097 - MIDDLE TILLEY +	THIN CREVASSE IN EXTREME SOUTH.		17.75%	-	-	1.25%	10.25% 0.25% 13%	n = 400 3.75% Auth. Opague 53.75% Siderite
ROWLEY O.C.C.S. - SECTION 010 CRF 062 - MIDDLE TILLEY +	INJECTION INTO PEAT SEAM.	2.82 ϕ \pm 0.71 F.S. MOD.	56.75%	-	0.25%	0.5% 0.25%	10.75% - 27.75%	n = 400 1.25% Auth. Opague 2.5% Verm. Kaolinite CEMENT-SUPPORTED.
ROWLEY O.C.C.S. - SECTION 087 CRF 109 - MIDDLE TILLEY +	MINOR CREVASSE CHANNEL.	2.02 ϕ \pm 1.06 F.S. Poor	58.75%	0.25%	0.75%	0.25%	8.5% 3% 20.25%	n = 400 Auth. Opague 8% Verm. Kaolinite 0.25%
ROWLEY O.C.C.S. - SECTION 091 CRF 111 - MIDDLE TILLEY +	CHANNEL BANK	2.38 ϕ \pm 0.64 F.S. MOD.	62%	-	-	0.5%	12.5% - 17.5%	n = 200 5.5% Siderite 1.5% Auth. Opague 0.5% Verm. Kaolinite
ROWLEY O.C.C.S. - SECTION 026 CRF 079 - MIDDLE TILLEY +	CHANNEL FLOOR	3.33 ϕ \pm 0.65 U.F.S. MOD.	52.5%	0.5%	0.25%	2.25%	8.25% - 23%	n = 400 1.75% Verm. Kaolinite 10% Siderite *
ROWLEY O.C.C.S. - SECTION 087 CRF 110 - MIDDLE TILLEY +	CREVASSE SPLAY FROM NORTH	3.04 ϕ \pm 0.48 U.F.S. WELL.						Heavily cemented by finely crystalline Siderite.
ROWLEY O.C.C.S. - SECTION 083 CRF 105 - MIDDLE TILLEY +	CREVASSE SPLAY FROM SOUTH	1.74 ϕ \pm 0.52 M.S. MOD.	70.5%	-	-	-	11% 1.25% 8%	n = 400 8.25% Dolomite 1% Auth. Opague

* CAF 079 - also 1.5% Authigenic Opague.

- NOTES
- Analyses are given for a representative sample of Westphalian A sandstones, and for a small number of Westphalian B major channel sandstones.
 - Sorting coefficients have been significantly affected by diagenesis.
 - Recrystallization of matrix and of quartz grains decreases irregularly through the succession from Westphalian A - C.
 - Feldspar is mainly plagioclase, with occasional alkali varieties, including microcline, and is generally partly altered to kaolinite.
 - Heavy minerals are mainly zircon, tourmaline, rutile and opaques, with rare sphene, garnet, pyroxene.
 - Mica (white mica) is of muscovite or illite composition.
 - Rock fragments are metamorphic polycrystalline quartz and intraformational shale and siltstone .

Xray Diffraction analyses indicate that the Westphalian sandstones are predominantly composed of quartz, with minor proportions of disordered kaolinite, illite or muscovite, siderite, feldspar and dolomite.

Sample/Strat.level	Environment	Size/ Sorting	Detrital Quartz	Fsp	Heavy Mins.	Mica R.F.s	Qtz.cement Hem.stain Ill./Kaol.	Others + Comments
IBBETSONS O.C.C.S. - SECTION 031 CRF 080 - HIGH MAIN POST	MAJOR CHANNEL	2.62 ϕ \pm 0.68 F.S. MOD.	70.25%	0.25%	—	0.25% 1.5%	4% 2% 16.25%	n = 400 5.5% Auth. Opague
FELLSIDE QUARRY - CRF 324 - LOW MAIN POST	MAJOR CHANNEL	2.35 ϕ \pm 0.59 F.S. MOD.	62.5%	2.25%	0.25%	2.5% —	7.25% 4.75% 14.75%	n = 400 5% Auth. Opague 0.75% Urem. Kaolinite
INCLINE O.C.C.S. - SECTION 006 CRF 057 - LOW MAIN POST	MAJOR CHANNEL	2.88 ϕ \pm 0.65 F.S. MOD.	40.75%	3%	—	2.25% —	9% — 27%	n = 400 17% Siderite 1% Auth. Opague
CROXDALE QUARRY - SECTION 122 CRF 120 - LOW MAIN POST	MAJOR CHANNEL	2.49 ϕ \pm 0.78 F.S. MOD.	47.5%	6.25%	0.5%	1.5% —	12% 1.5% 23.25%	n = 400 6.75% Auth. Opague 0.75% Urem. Kaolinite

KAOLINITE CLAYROCKS - PETROGRAPHIC DESCRIPTION
(with particular reference to samples from Rowley O.C.C.S.)

Hand Specimen - black/grey/brown coloured, texture ranges from homogeneous "clastic claystone" to the Fragmental Clayrock lithology (dark claystone matrix with blebs of buff-coloured kaolinite), and through amalgamation of kaolinite blebs to a homogeneous kaolinite rock. Contacts with enclosing lithologies appear sharp ; exclusively associated with coal seams, and generally occur as 0-5cm thick bands or lenses within coals. Often continuous laterally over a few kms, but may die out or bifurcate.

Thin Section - composed largely of kaolinite; in addition to the blebs of crystalline kaolinite, much of the "groundmass" appears to be kaolinite. Separating areas of kaolinite are occasional laminae of organic matter, scattered quartz grains and mica flakes. The rock may be laminated, due to preferred orientation of finely crystalline kaolinite plates and organic material. Kaolinite crystals (up to 6mm) are often vermiform, and display undulose or hexagonal extinction. Rootlet impressions are recognizable as (often circular) areas of admixed small kaolinite crystals and opaque organic matter, and rootlet hairs may be seen as thin strings of opaque organic material.

Quartz grains show a variety of shapes and sizes (up to Imm) - often poorly sorted. Apart from micas, virtually no other grain types are present. Occasional soft-sediment deformation features occur; microfaults, loading and injection.

b) KAOLINITE CLAYROCKS

Sample	CRF 243	CRF 059	CRF 067	CRF 086	CRF 188	CRF 058	CRF 184	CRF 185
Kaolinite Crystals	1.5%	3.3%		8.25%	3.5%	3.25%	—	5%
Graupen	—	11.3%		16%	47%	54.75%	31.5%	67%
Laminated Microcrystals	—	—		—	0.5%	0.75%	—	—
Groundmass	52.5%	57.7%		37.5%	28.25%	25.25%	35.25%	17%
Pseudomorphs	—	—		—	—	—	—	—
Qtz. grains	1.5%	18.7%		4%	0.75%	5.75%	0.25%	0.5%
Qtz. veins	1.5%	—		—	—	—	—	—
Heavy Mins.	—	0.3%		—	—	0.25%	—	—
White Mica	—	0.3%		—	0.25%	—	0.25%	—
Brown organic material	5.5%	1%		0.25%	—	—	1%	4%
Black organic material	37.5%	7.3%		34%	19.75%	10%	31.75%	6.5%
Comments	n = 200 MOD. WELL- LAMINATED	n = 300	GRAUPEN 5 mm long Gradational Boundaries.	n = 400	n = 400 Many Graupen have diffuse boundaries	n = 400	n = 400 LAMINATED LITHOLOGY.	n = 200 AMALGAMATED KAOLINITE MASSES.

Xray Diffraction analyses indicate that the kaolinitic claystones are composed almost entirely of organic matter, quartz and well-ordered kaolinite.

N.B. "Graupen" are irregular aggregates of microcrystalline kaolinite - granules.

Sources of samples.

CRF 243 - ROWLEY O.C.C.S. - MIDDLE TILLEY - SUB P201 - SECTION 344.
 CRF 059 - ROWLEY O.C.C.S. - MIDDLE TILLEY - P201/2 - SECTION 008
 CRF 067 - ROWLEY O.C.C.S. - MIDDLE TILLEY - P202/3 - SECTION 019
 CRF 086 - ROWLEY O.C.C.S. - MIDDLE TILLEY - P202/3 - SECTION 037
 CRF 188 - ROWLEY O.C.C.S. - MIDDLE TILLEY - P202/3 - SECTION 240.
 CRF 058 - ROWLEY O.C.C.S. - MIDDLE TILLEY - P202/3 - SECTION 007
 CRF 184 - DEBORAH O.C.C.S. - ABOVE BOTTOM BUSTY - SECTION 231
 CRF 185 - MOWN MEADOWS O.C.C.S. - MIDDLE TILLEY P202/3
 - SECTION 234

LIST OF ENCLOSURES

1. Scale drawing of sandstone exposure at Greenfield No. 1 Quarry
2. Cabin House/Mown Meadows O.C.C.S. - Site Plan
3. Rowley O.C.C.S. - Site Plan
4. Deborah O.C.C.S. - Site Plan
5. Deborah O.C.C.S. - Bottom Busty to Bottom Tilley interval
6. Detailed longitudinal sections from Rowley O.C.C.S. Area A, Tilley excavations (Sheets A and B)
7. Deborah O.C.C.S. - Top Busty to Middle Tilley interval
8. Deborah O.C.C.S. - Middle to Top Tilley interval
9. Buckhead O.C.C.S. - Site Plan
10. The Tilley seams and enclosing strata at Buckhead O.C.C.S. Area L.E.
11. Esh Winning O.C.C.S. Final Extension - Site Plan
12. Wooley O.C.C.S. - Site Plan
13. Tanners Hall/Wooley/Incline/Billy Hill O.C.C.S.'s - Hutton to Brass Thill interval
14. Tanners Hall O.C.C.S. - Site Plan
15. Langley O.C.C.S. - Site Plan
16. Langley O.C.C.S. - Main to Fivequarter interval
17. Edmondsley O.C.C.S. - Site Plan
18. Edmondsley O.C.C.S. - Fivequarter to 2E00 interval

APPENDICES

1. Graphic sedimentary logs
2. Petrographic data

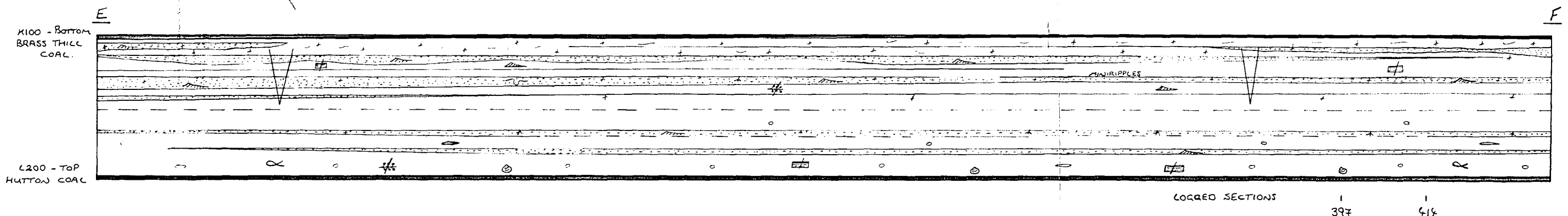
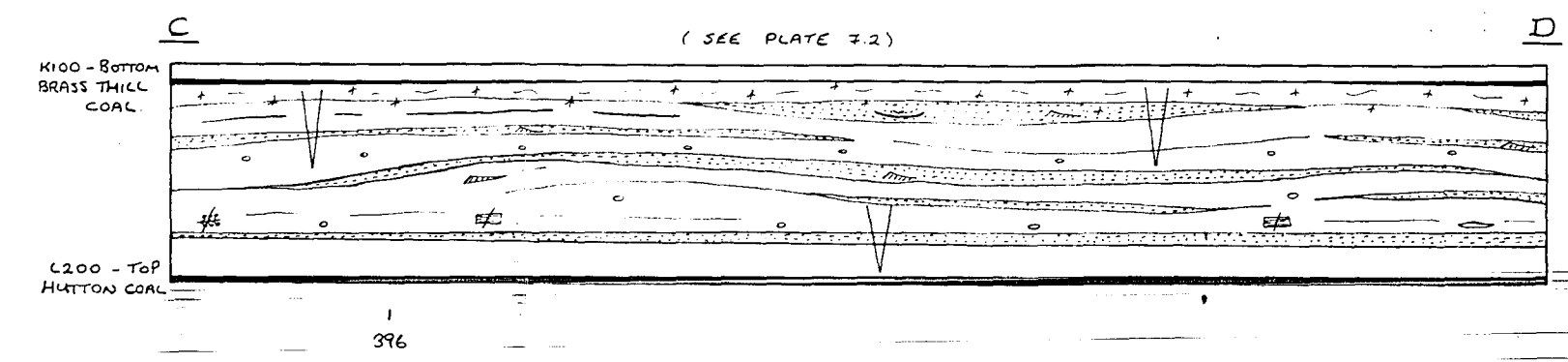
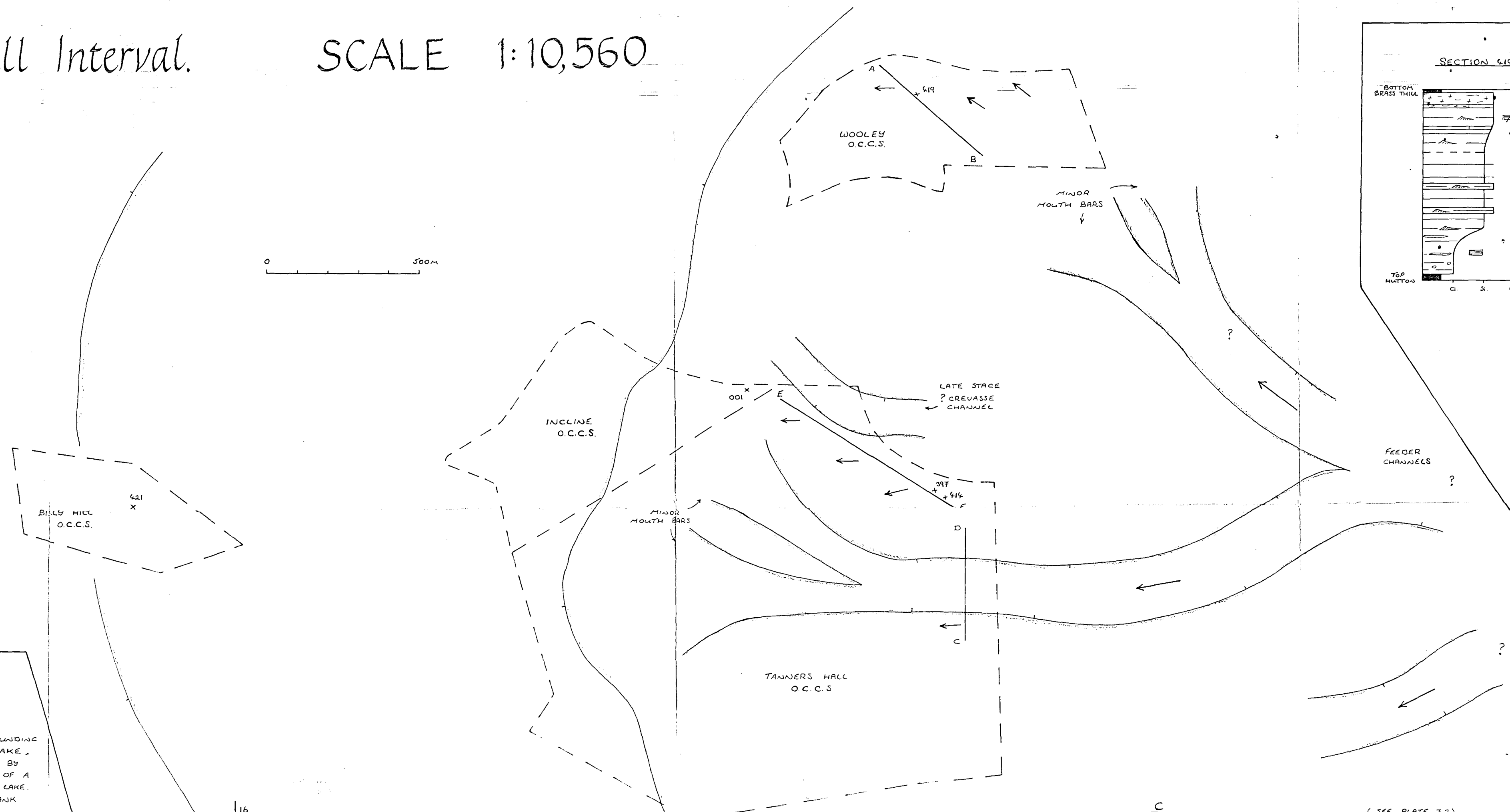
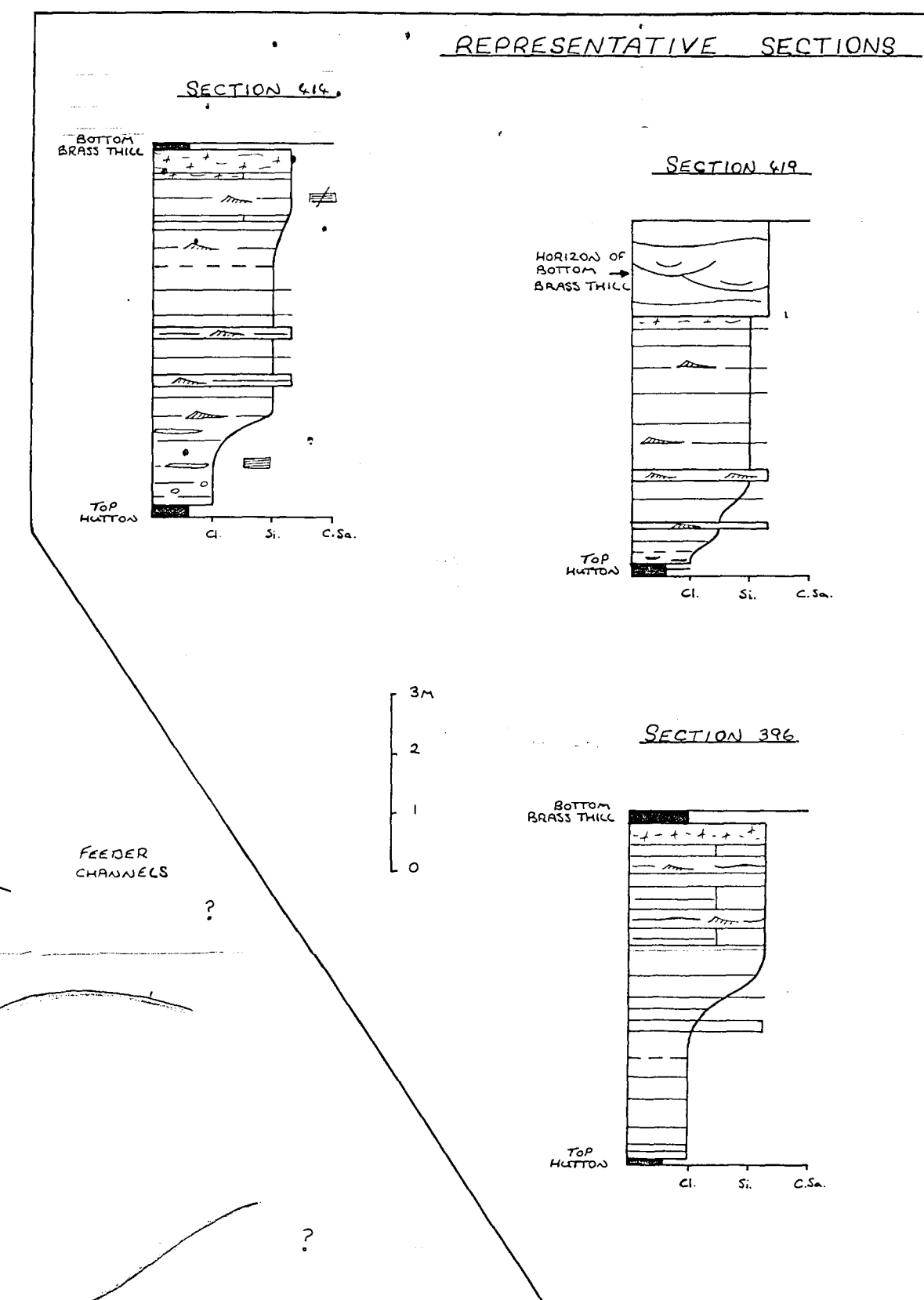
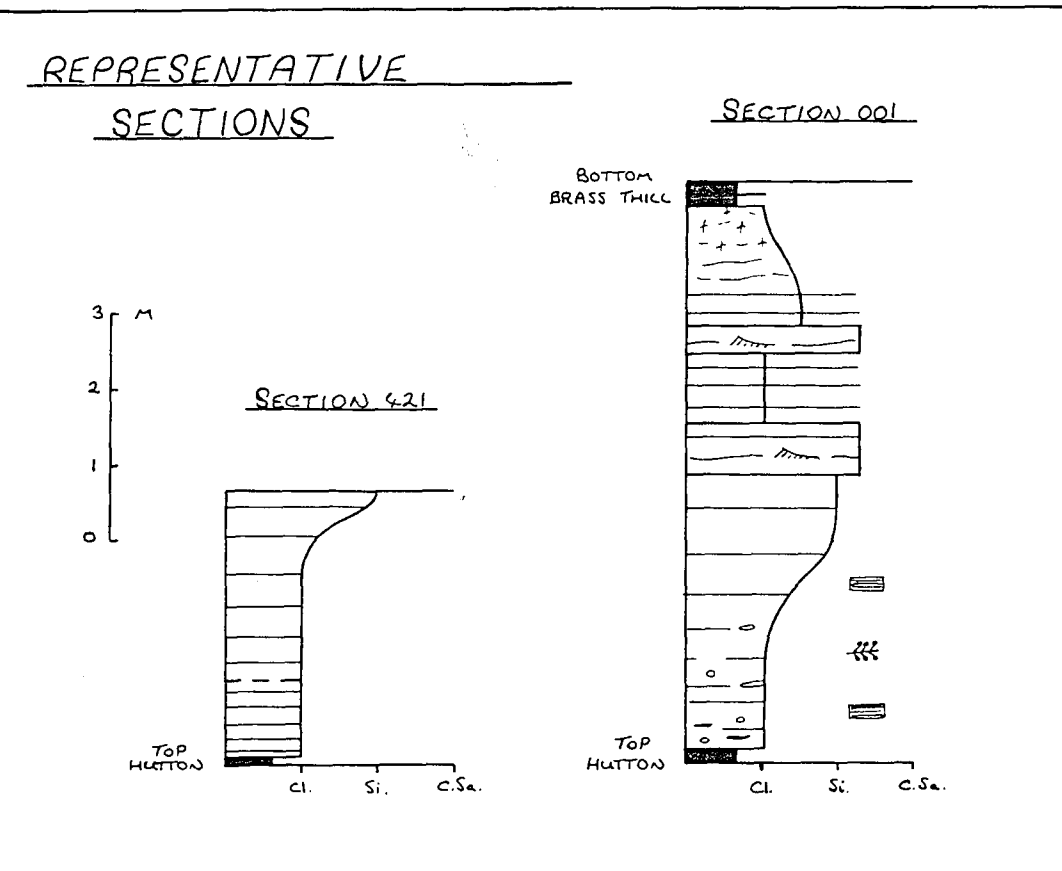
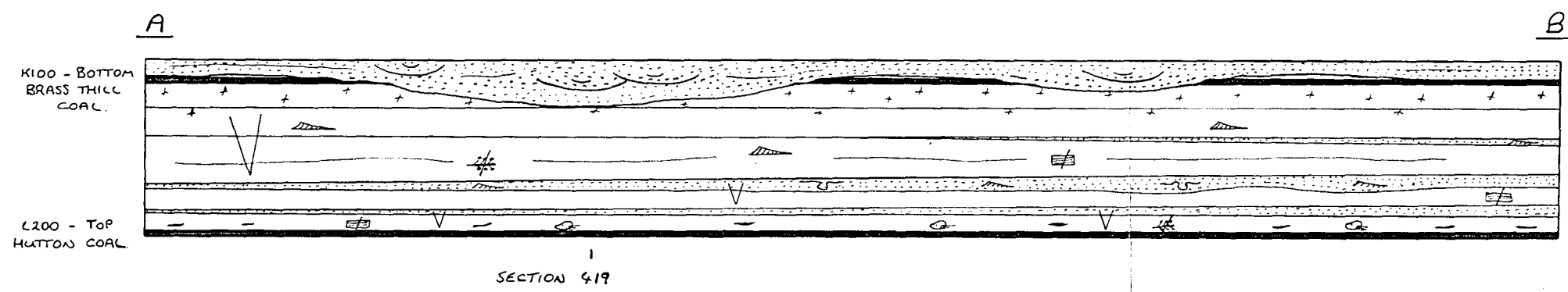


ENCLOSURE 13 TANNERS HALL / WOOLEY / INCLINE BILLY HILL O.C.C.S.s

Hutton to Brass Thill Interval.

SCALE 1:10,560

0 50m 100m



NOTES AND LEGEND

THE TOP HUTTON - BOTTOM BRASS THILL INTERVAL IN THE AREA SURROUNDING TANNERS HALL O.C.C.S. IS INTERPRETED AS THE FILL OF A SHALLOW LAKE, UP TO 6M DEEP. FOLLOWING AN INITIAL PASSIVE PHASE CHARACTERISED BY FALLOUT OF CLAY GRADE MATERIAL FROM SUSPENSION, PROGRADATION OF A MINOR DELTA SYSTEM WAS RESPONSIBLE FOR COMPLETELY WALLING THE LAKE. THIS MINOR DELTA INITIATED BY CREVASSEING OF A MAJOR CHANNEL BANK SOME 350M TO THE EAST OF TANNERS HALL (SEE PL. 7.5)

- PLAN SCALE 1:10,560
- OPENCAST SITE LIMIT
 - LINE OF LONG SECTION X-Y
 - LOGGED SECTION
 - GENERALISED PALAEOCURRENT DIRECTION
 - SPECULATIVE PALAEOCURRENT DIRECTION
 - SPECULATIVE CONTOURS ON MINOR DELTA DEPOSIT (TAGS FACE DOWNWARD)
 - CHANNEL MARGINS (MOSTLY SPECULATIVE)

LONG SECTIONS SCALE 1:2000 HORIZONTAL 1:2000 VERTICAL 1:200
STANDARD SYMBOLS USED, + SANDSTONE, ▽ COARSENESS - UPWARD SEQUENCE

VERTICAL SECTIONS SCALE 1:100 STANDARD SYMBOLS USED.



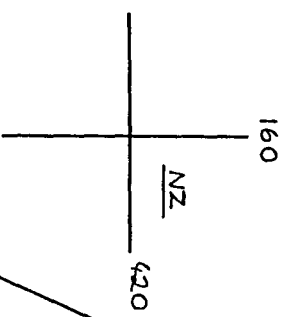
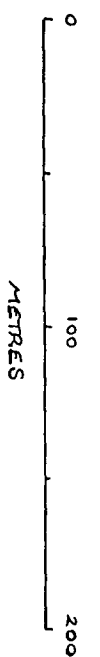
LEGEND	
	LIMIT OF EXCAVATION
	AREA A CONTIGUOUS TO IMPAVED SEAM
	AREA B CONTIGUOUS TO MUTTON SEAM
	AREA C CONTIGUOUS TO LOW MAIN SEAM CONTIGUOUS TO BRATT'S THICK SEAM
	AREA HILLY CONTIGUOUS TO FUSQUIMETER SEAM
	CONTIGUOUS TO MAIN SEAM
	CONTIGUOUS TO REDUCED SEAM
	CONTIGUOUS TO THICK SEAMS
	AREA L CONTIGUOUS TO LOW MAIN SEAM CONTIGUOUS TO BRATT'S THICK SEAM
	WORKING AREA (NO CUT AND FILL/REBUILT)
	X-141 LOCATED SECTION

ENCLOSURE 4 DEBORAH O.C.C.S. SITE PLAN

SCALE 1:2,500

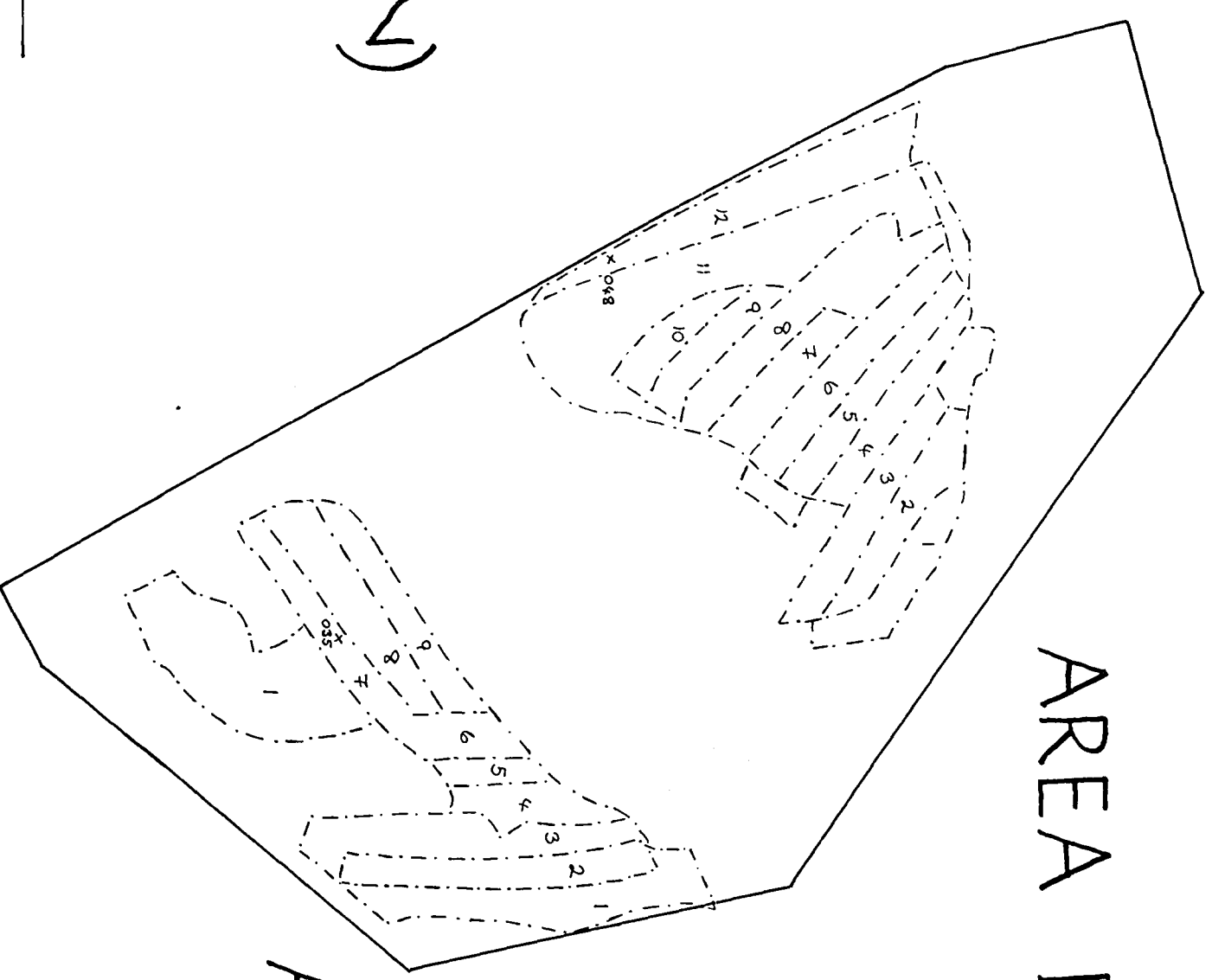


ENCLOSURE 3
 ROWLEY O.C.C.S. SITE PLAN
 SCALE 1:2,500

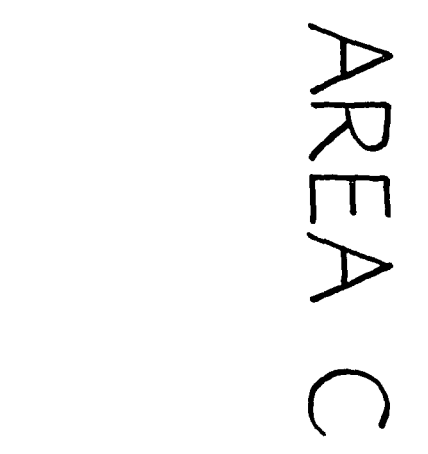


AREA A(N)

AREA A(S)



AREA B



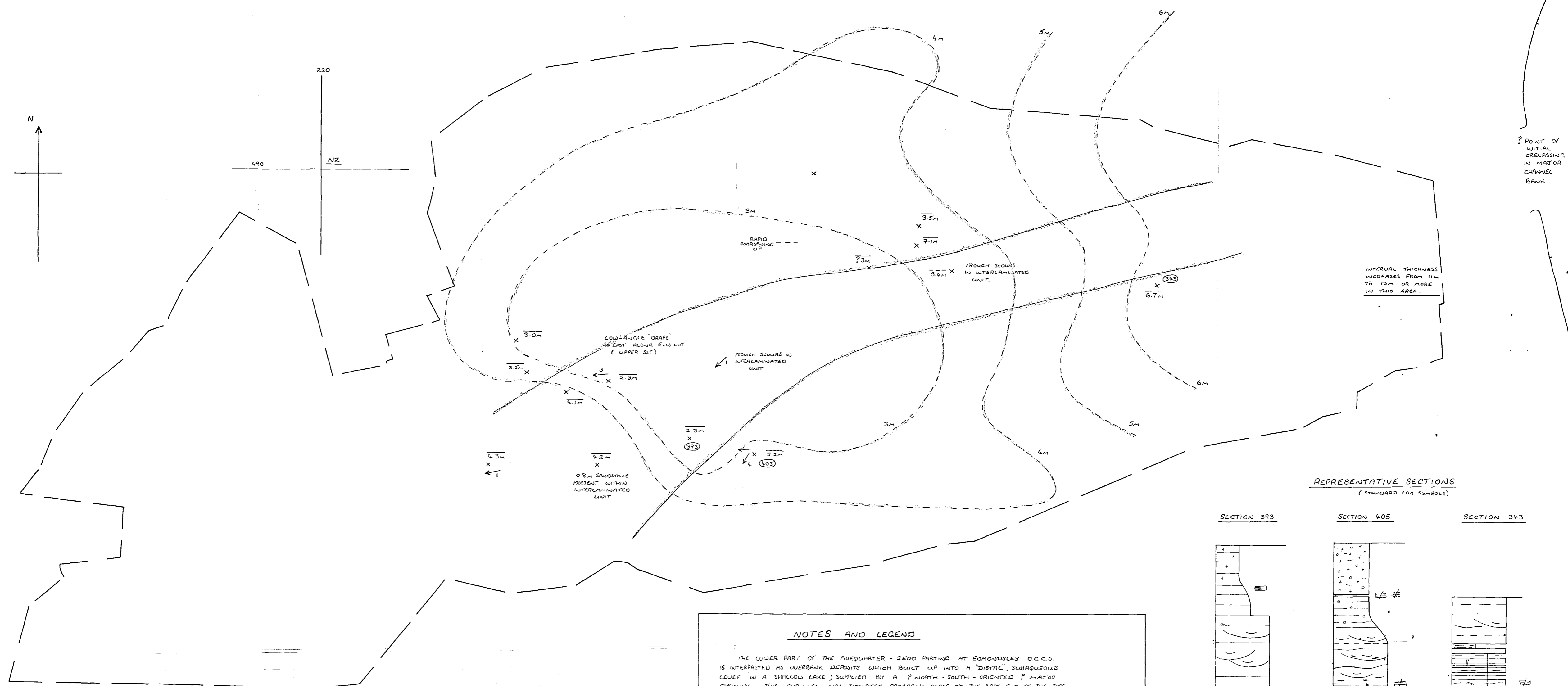
AREA C

LEGEND	
	LIMIT OF EXCAVATION
	WORKINGS IN HARVEY MARINE SEAM
	WORKINGS IN HARVEY SEAM
	WORKINGS IN TILLEY SEAMS
	WORKINGS IN BASTY SEAMS
	LOCATED SECTION
	CURT NUMBER

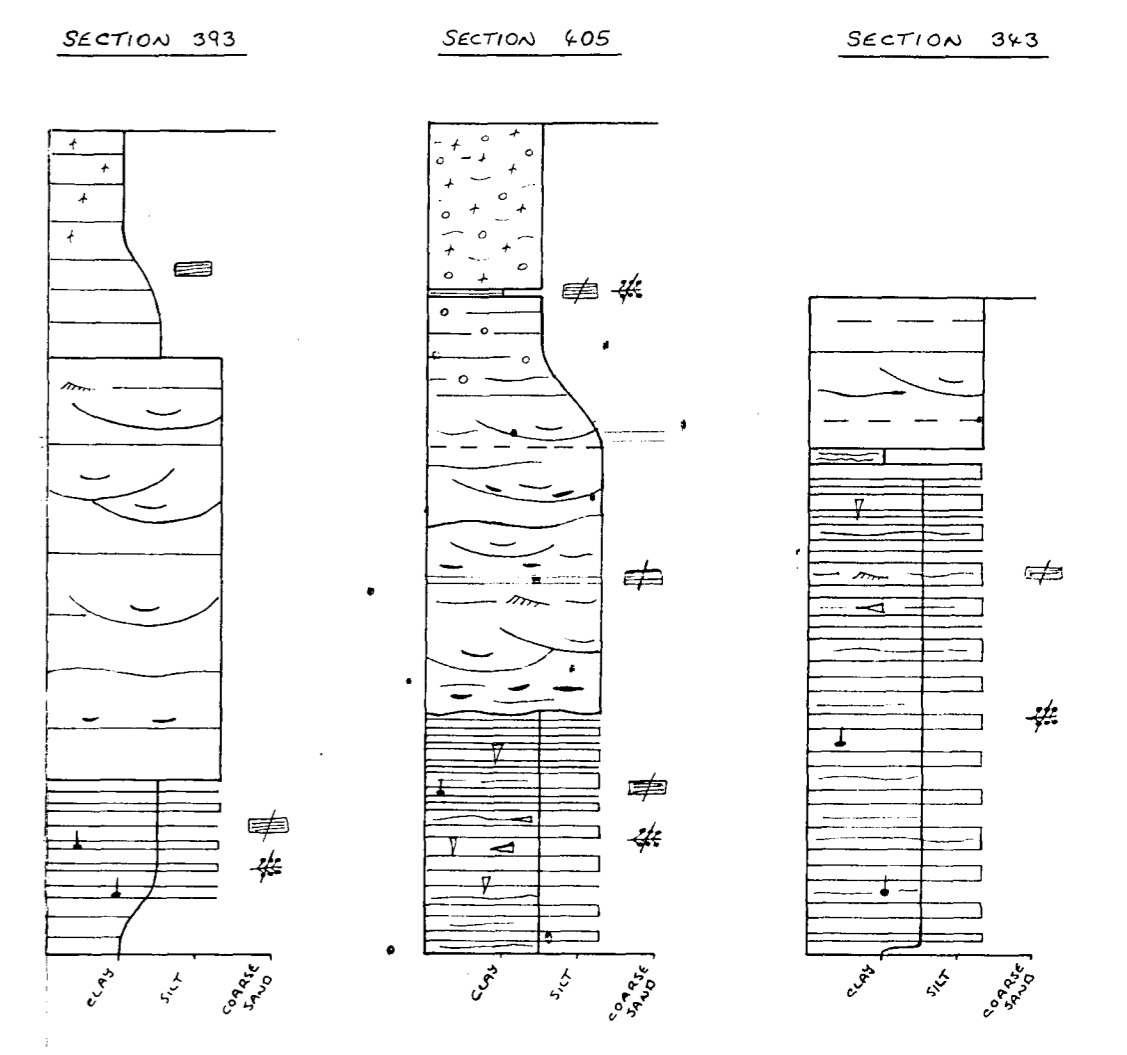
ENCLOSURE 18 EDMONDSLEY O.C.C.S.

Fivequarter to 2E00 Interval.

SCALE 1:2,500



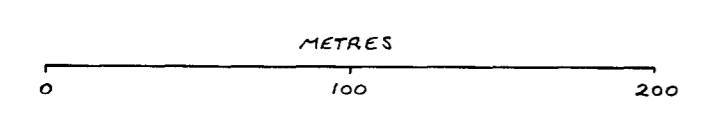
REPRESENTATIVE SECTIONS
(STANDARD LOG SYMBOLS)



NOTES AND LEGEND

THE LOWER PART OF THE FIVEQUARTER - 2E00 PARTING AT EDMONDSLEY O.C.C.S. IS INTERPRETED AS OERBANK DEPOSITS WHICH BUILT UP INTO A "DISCAL", SUBAQUEOUS LEVEE IN A SHALLOW LAKE; SUPPLIED BY A ? NORTH - SOUTH - ORIENTED ? MAJOR CHANNEL. THIS CHANNEL WAS SITUATED PROBABLY CLOSE TO THE EAST EGO OF THE SITE. CHANNEL BANK BREACHING, POSSIBLY IN THE SAME POSITION AS EARLIER MAJOR CREVASSES, LED TO EROSION OF PART OF THE OERBANK SEQUENCE AND DEPOSITION OF A MAJOR CREVASSE SPILAY LOBE; THE CHANNELIZED AXIS OF WHICH WAS ABOUT 100M WIDE, WHICH PROGRESSED WEST-SOUTH-WESTWARD INTO THE LAKE (PERHAPS 8-10M DEEP). FINAL INFILLING OF THE LAKE WAS COMPARATIVELY PASSIVE, AND ACHIEVED FOLLOWING INCOMPLETE ABANDONMENT OF THE SPILAY LOBE.

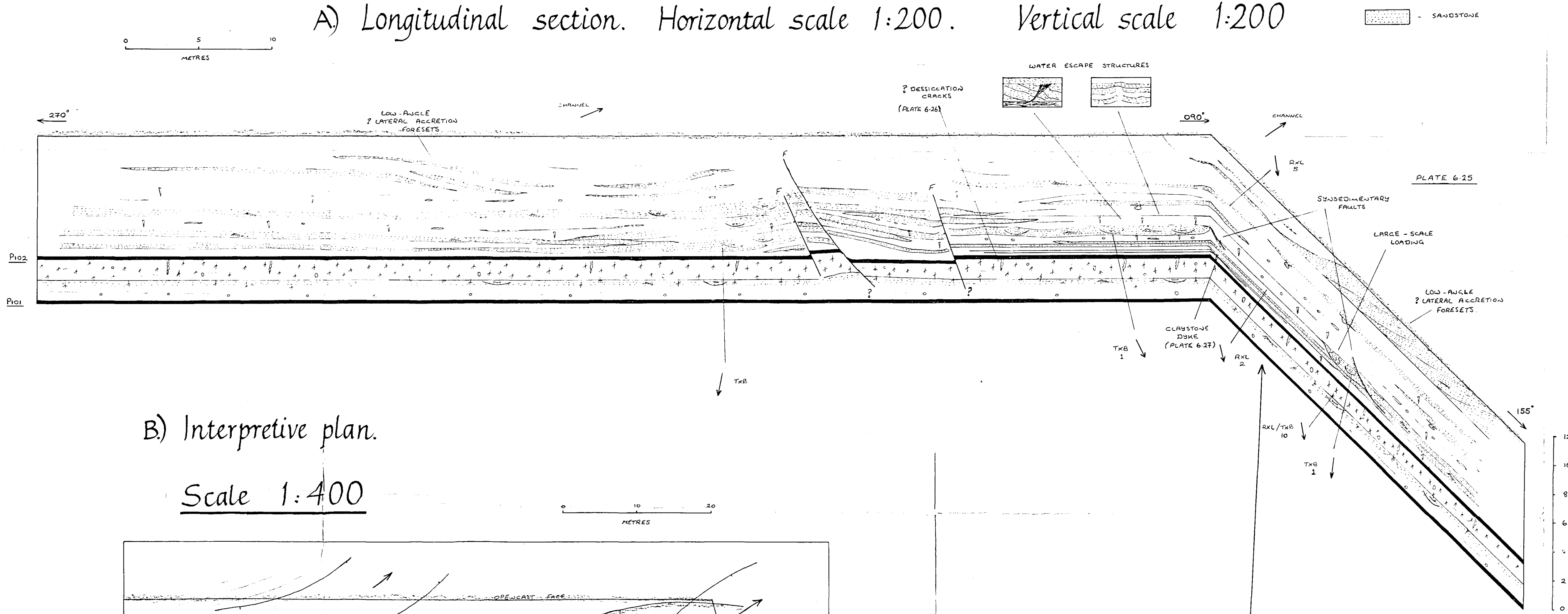
- | | | | |
|-------|--|------|--|
| --- | LIMIT OF EXCAVATION | → | PALEOCURRENT VECTOR MEAN, WITH NO. OF DATA |
| ----- | LIMIT OF ARAI ZONE ON CREVASSE SPILAY LOBE, DEFINED BY PRESENCE OF LARGE TROUGH SCARS. | X | LOCATED SECTION |
| --- | ISOPACH OF INTERLAMINATED OERBANK/LEVEE UNIT | 2.3m | THICKNESS OF INTERLAMINATED UNIT, WITH APPEARANCE OF UPPER CONTACT |
| | | a | TRANSITIONAL |
| | | b | SHARP |
| | | c | EROSIVE |



ENCLOSURE 10

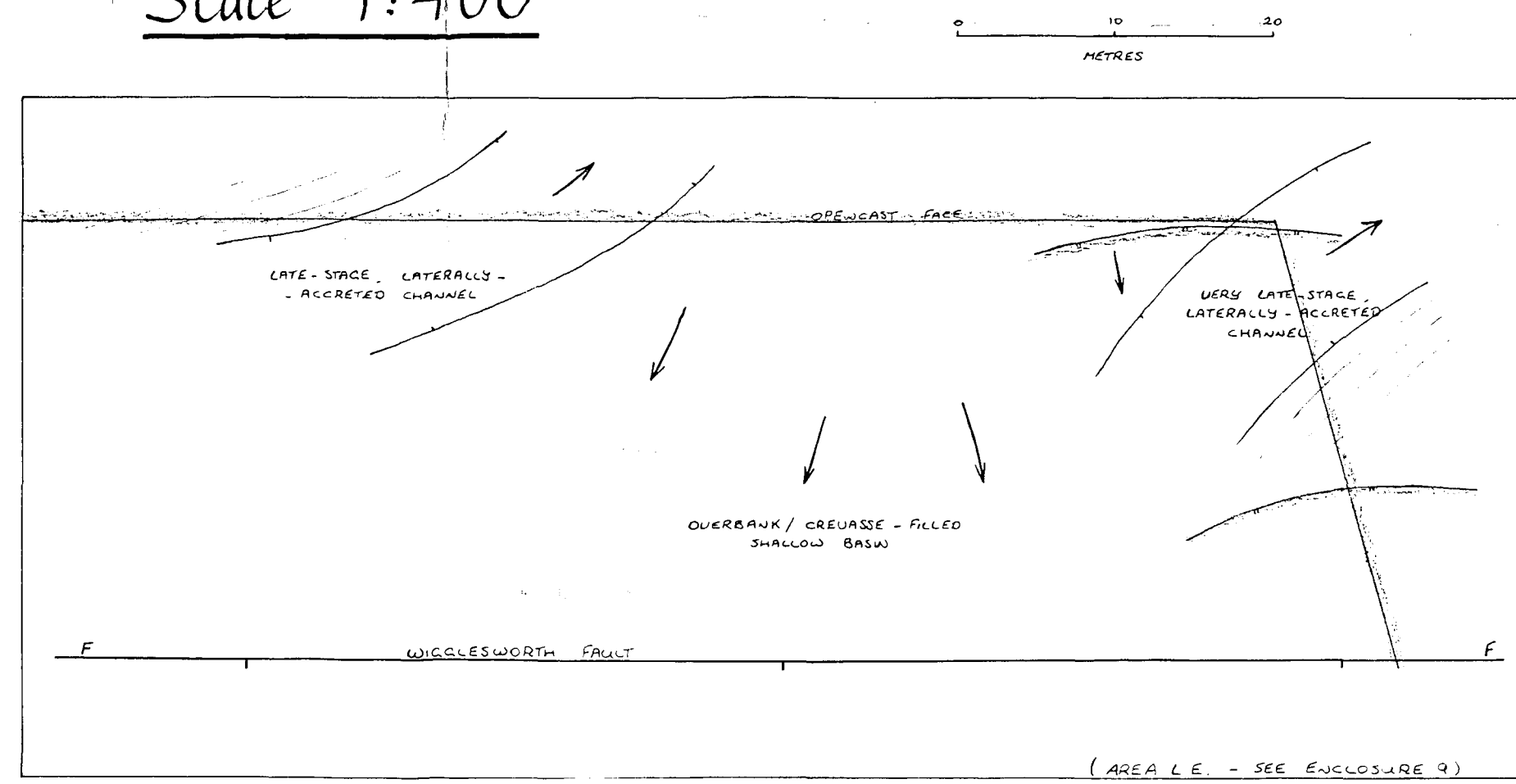
The Tilley seams and enclosing strata at Buckhead O.C.C.S. (Area L.E.)

A) Longitudinal section. Horizontal scale 1:200. Vertical scale 1:200



B) Interpretive plan.

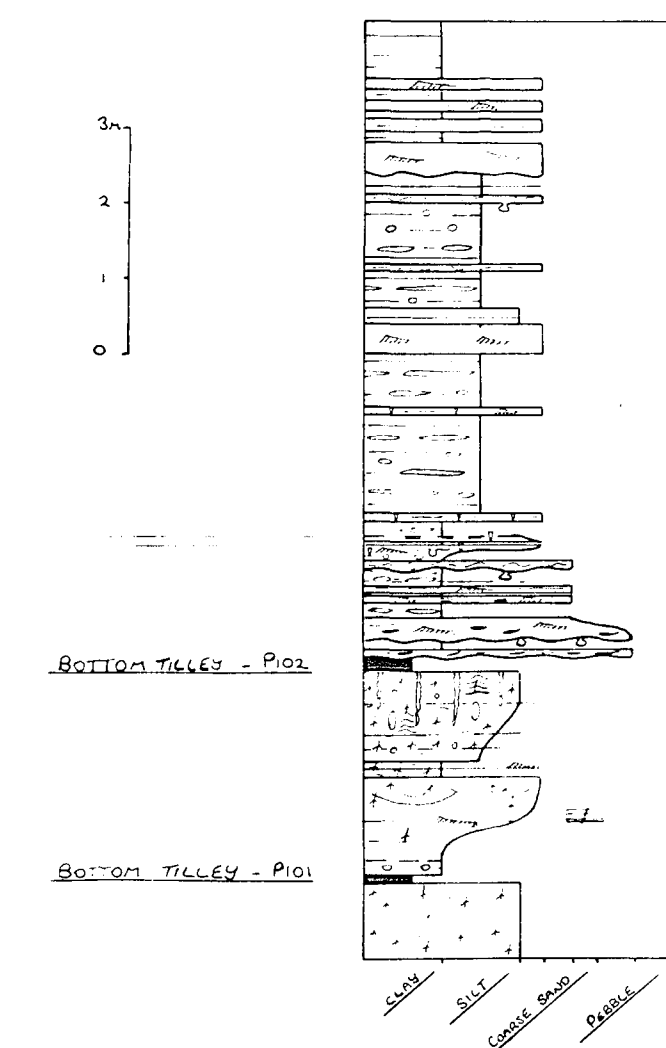
Scale 1:400



LEGEND

- OBSEQUENT OUT-WASH
- APPROXIMATE MAJOR CHANNEL MARGINS WITH LATERAL ACCRETION SURFACES
- ESRIC SENSE/SECONDARY FAULTS
- GENERALISED DIRECTION OF PALEOFLOW

SECTION 425 (SEE APPENDIX 1) STANDARD LOC SYMBOLS USED



ENCLOSURE 6

SHEET B

Detailed longitudinal sections from Rowley O.C.C.S.

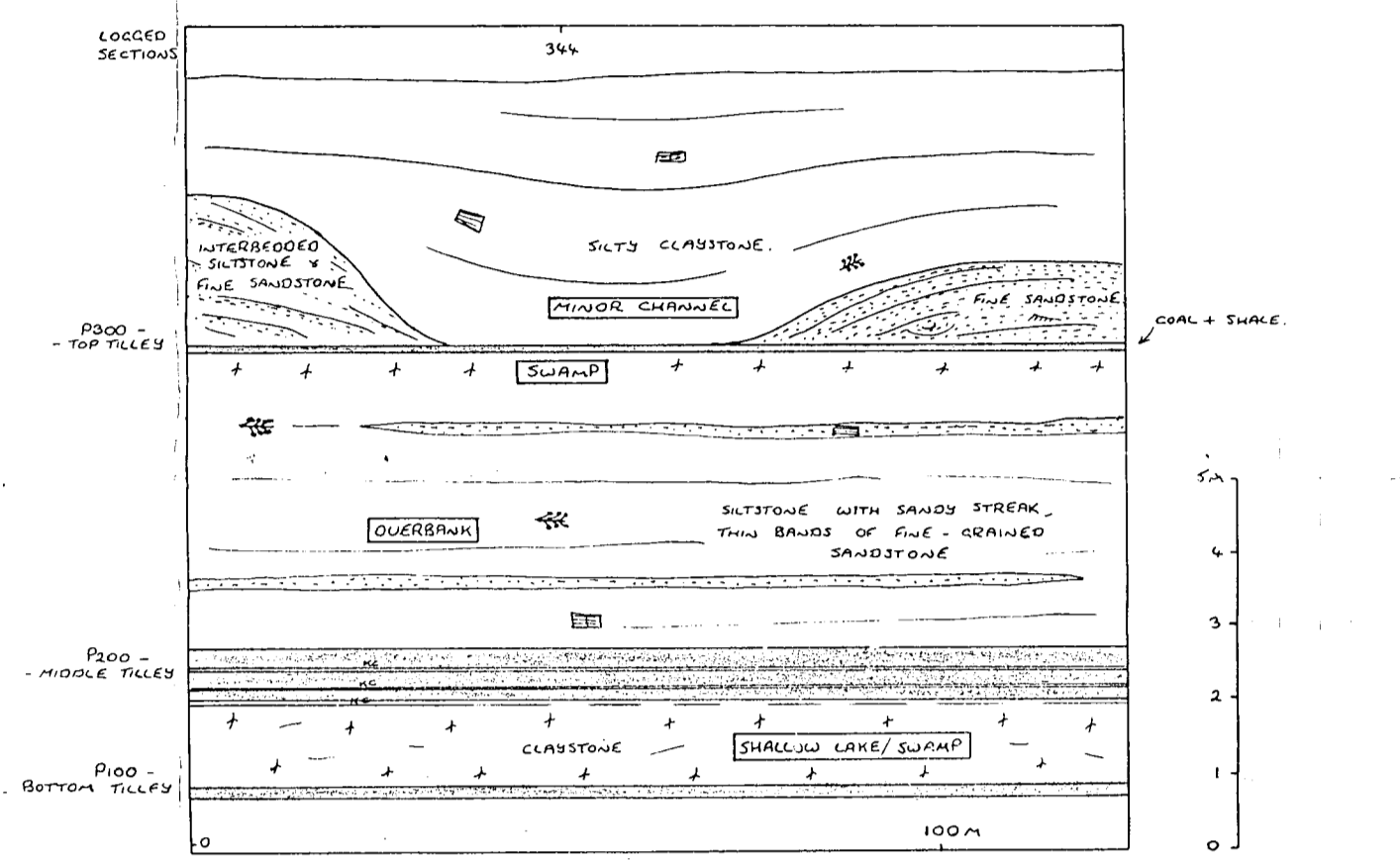
Area A : Tilley excavations

SCALE Horizontal 1:1,000 . Vertical 1:100

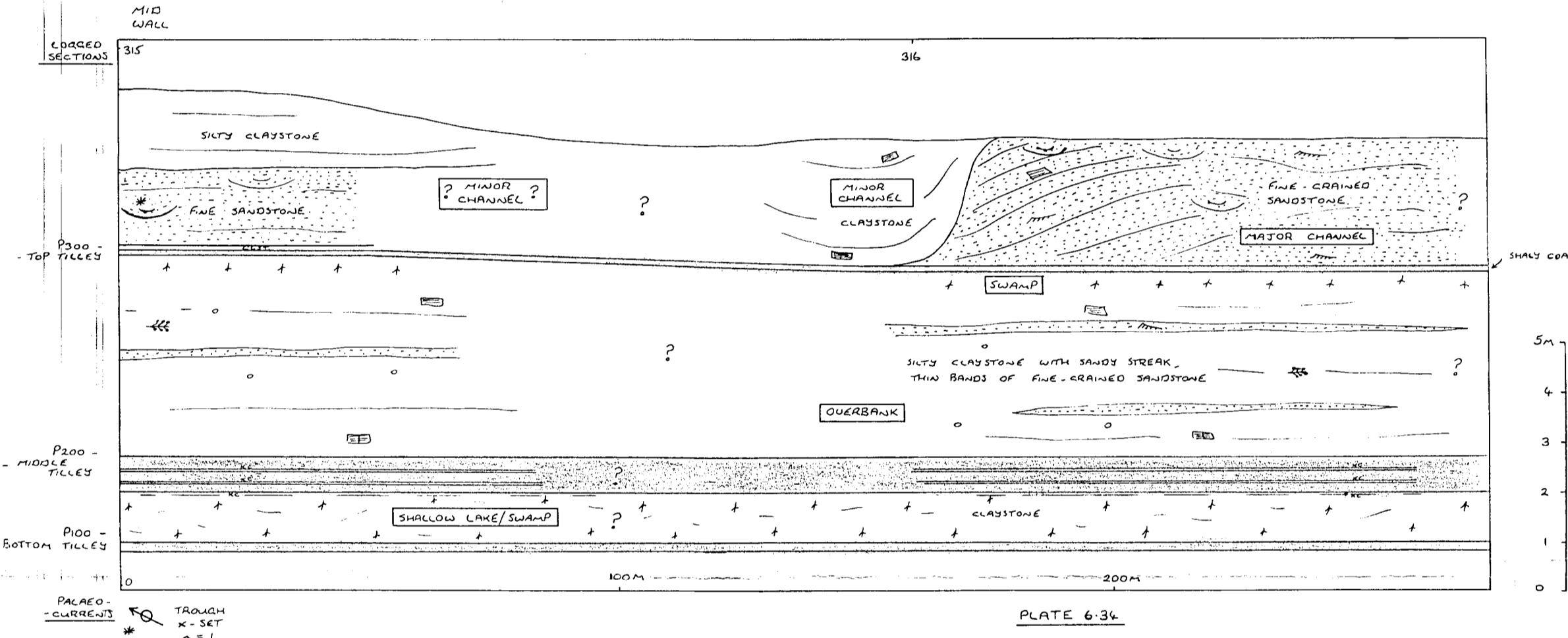
SOUTH

NORTH

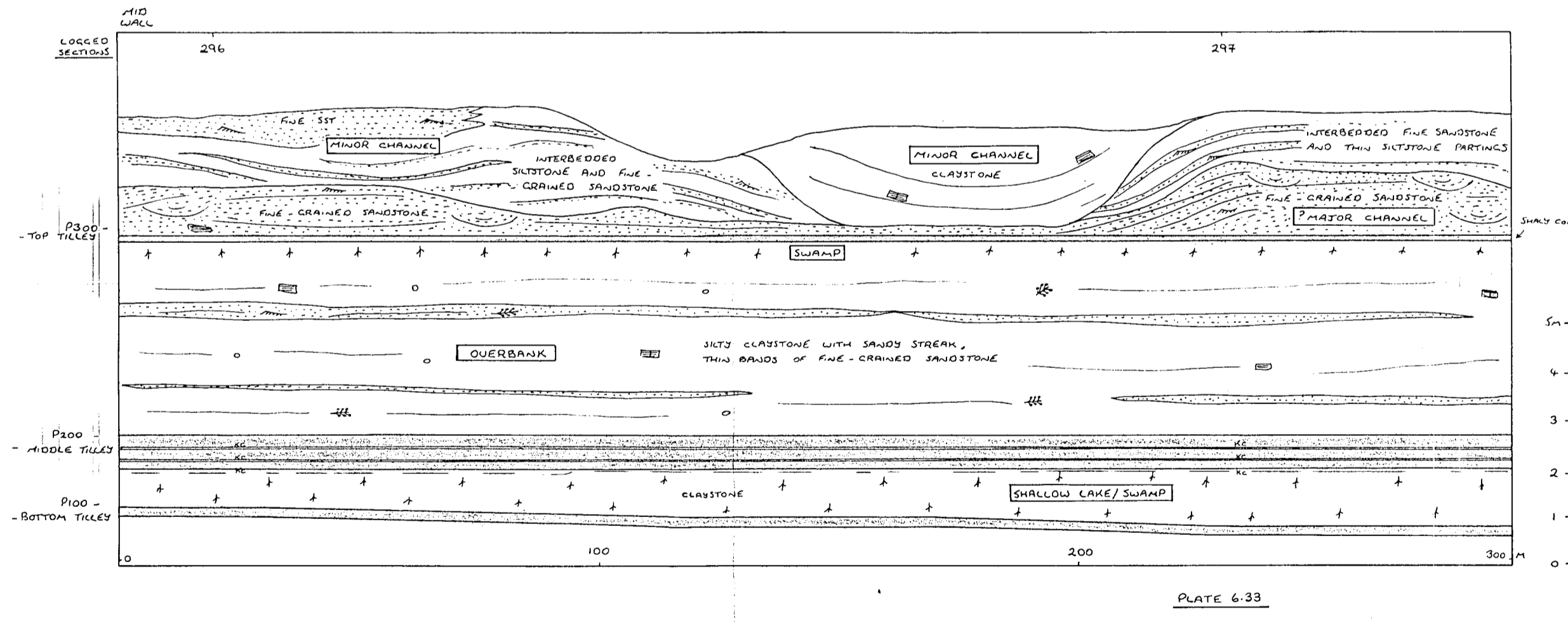
A 16 N



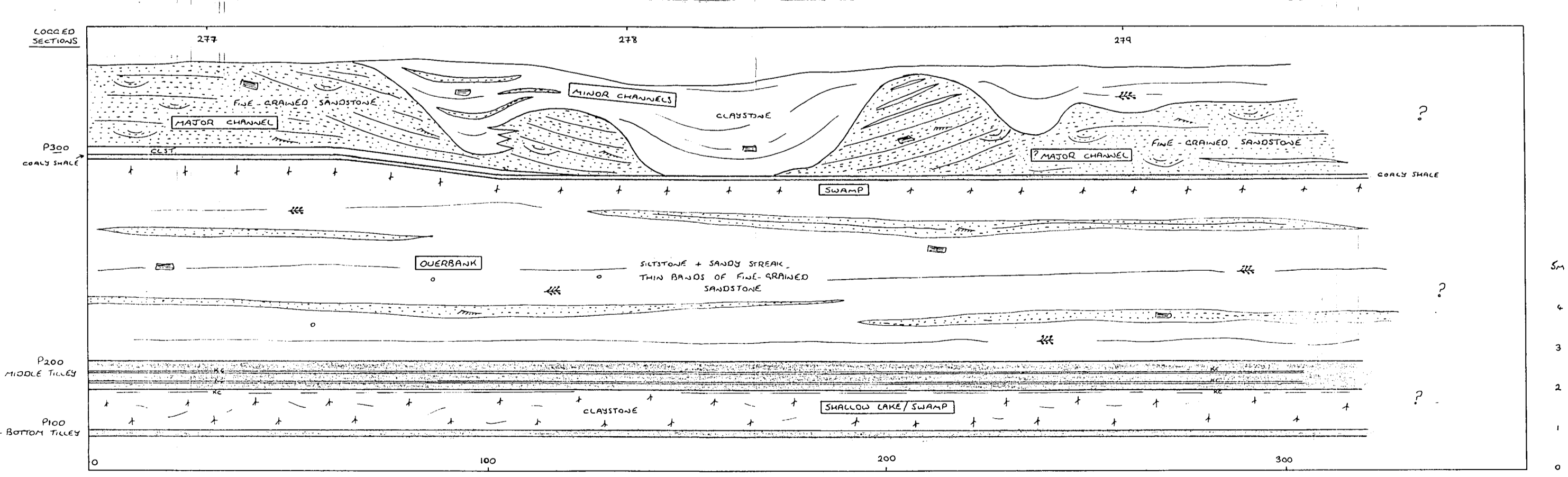
A 14 N



A 13 N



A 12 N

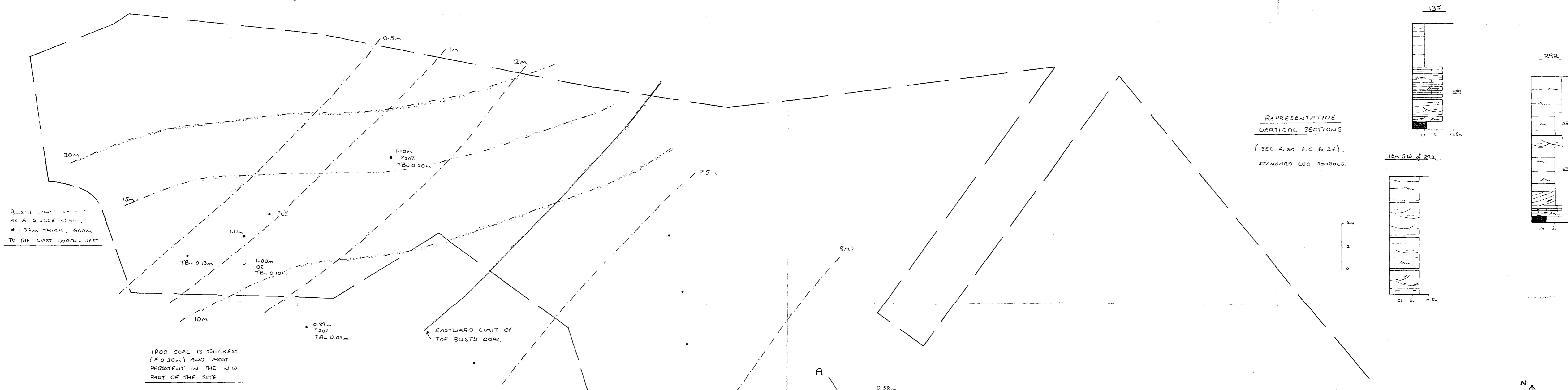


ENCLOSURE 5.

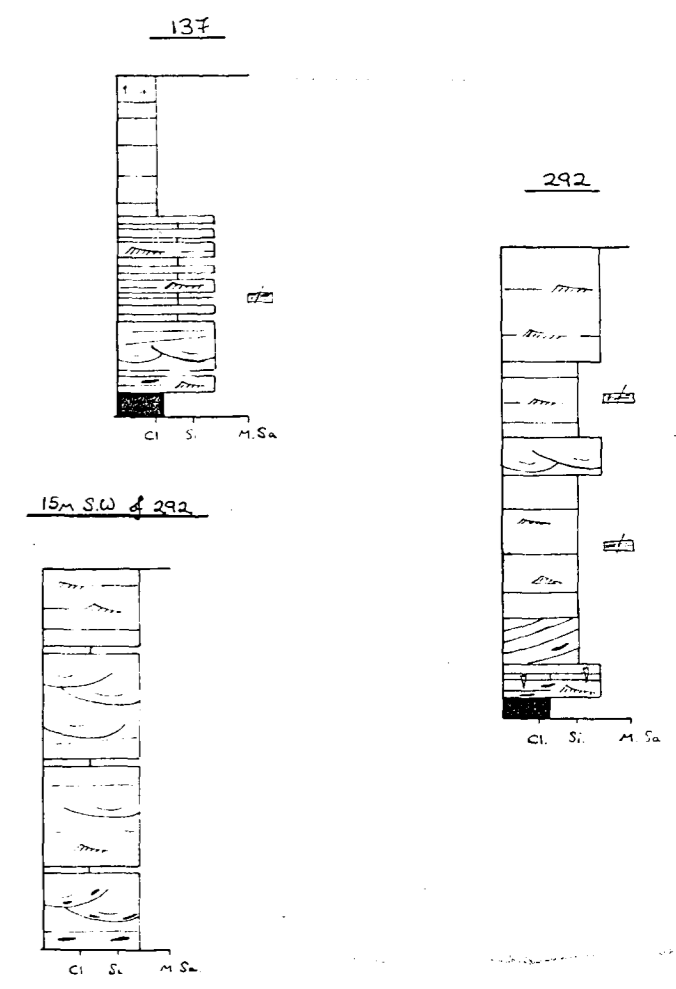
DEBORAH O.C.C.S.

Bottom Busty to Bottom Tilley Interval

SCALE 1:2,500

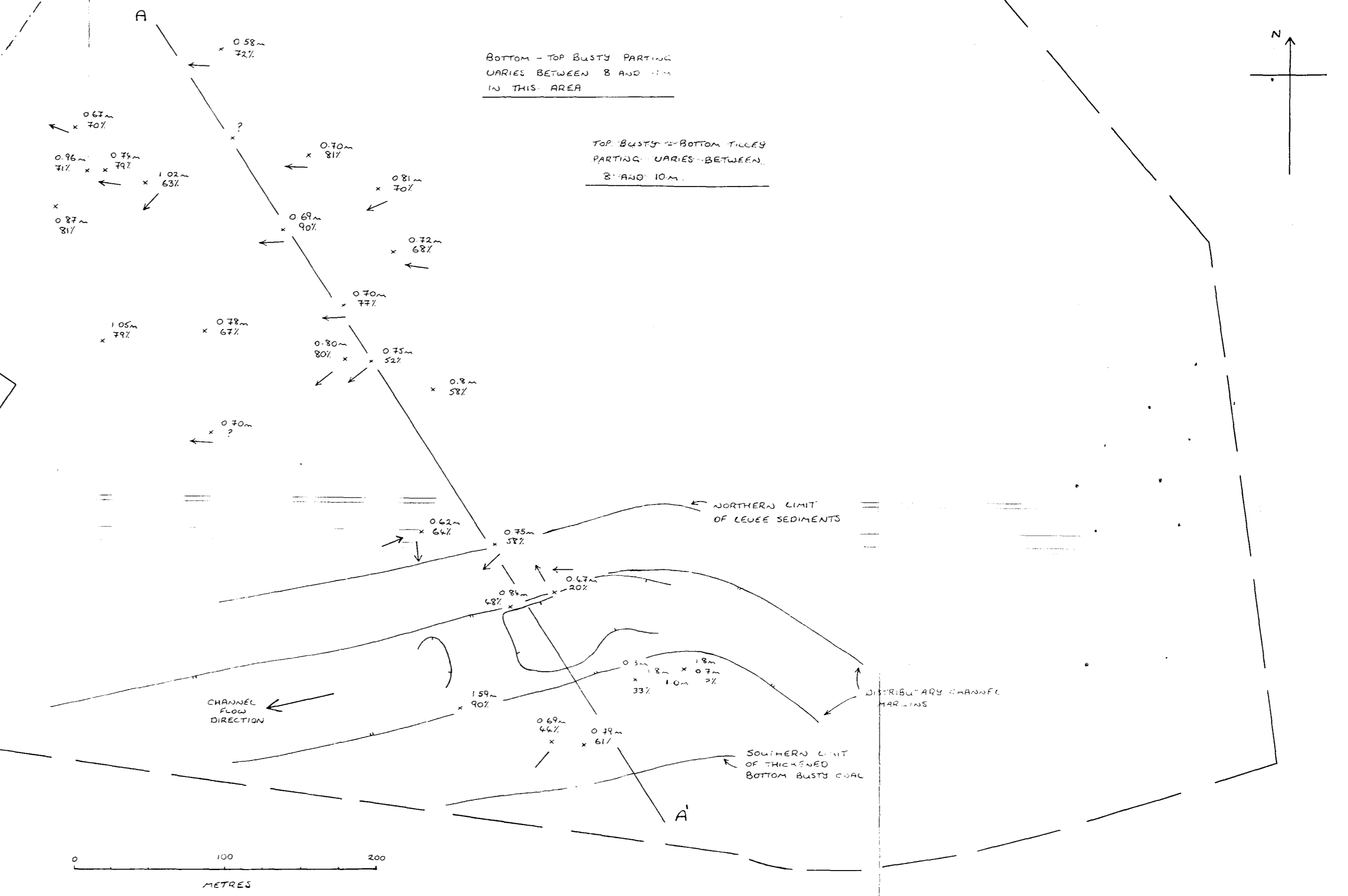
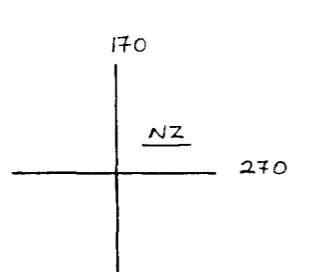


REPRESENTATIVE VERTICAL SECTIONS (SEE ALSO FIG 6.27) STANDARD LOC SYMBOLS

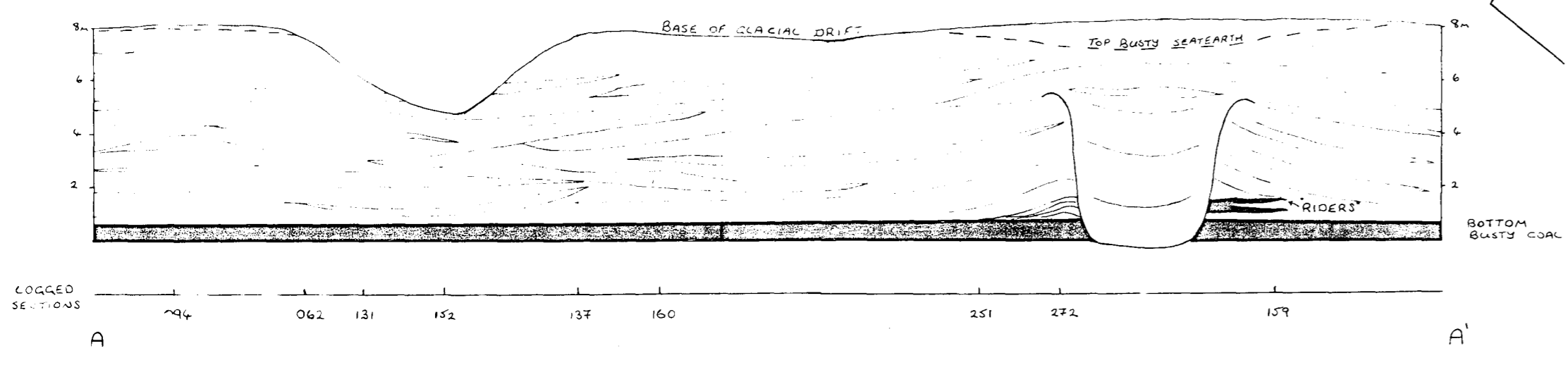


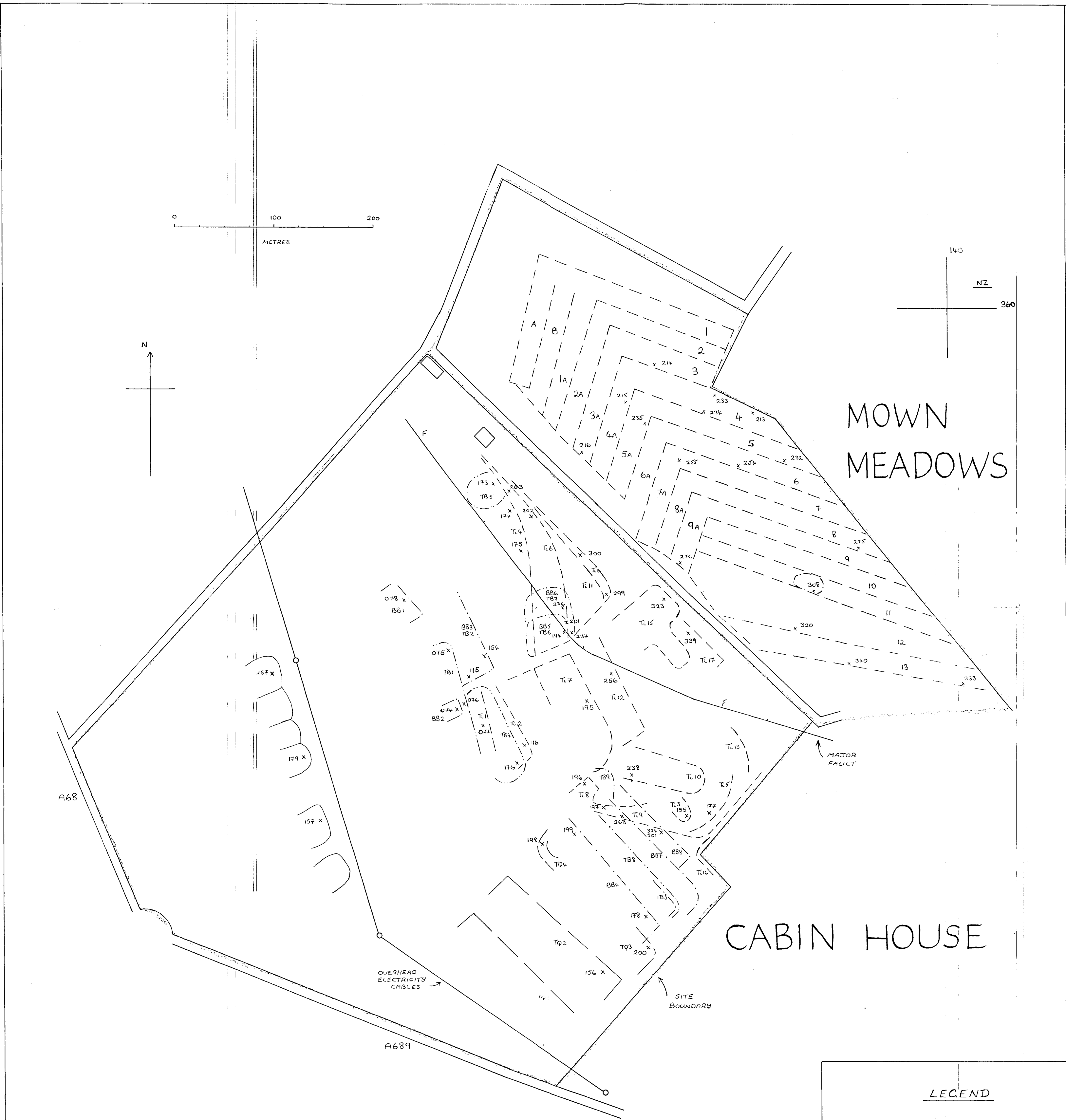
LEGEND

- LIMIT OF EXCAVATION
- A—A' LINE OF LONG SECTION A-A'
- ISOPACH OF TOP BUSTY - BOTTOM TILLEY INTERVAL
- ISOPACH OF BOTTOM - TOP BUSTY INTERVAL
- WASHOUT IN BOTTOM BUSTY COAL
- BOREHOLE
- x LOGGED SECTION, WITH 1. BOTTOM BUSTY THICKNESS 2. PERCENTAGE SANDSTONE IN BOTTOM - TOP BUSTY INTERVAL 3. TOP BUSTY THICKNESS
- PALAEOCURRENT VECTOR MEAN, FROM CROSS-BEDDING AND CROSS-LAMINATION
- PALAEOCURRENT VECTOR MEAN, FROM CUTTER MARKS
- (ALL PALAEOCURRENT DATA FROM BOTTOM - TOP BUSTY INTERVAL)



Generalized longitudinal profile along the line A-A'
Horizontal scale 1:2500. Vertical scale 1:200



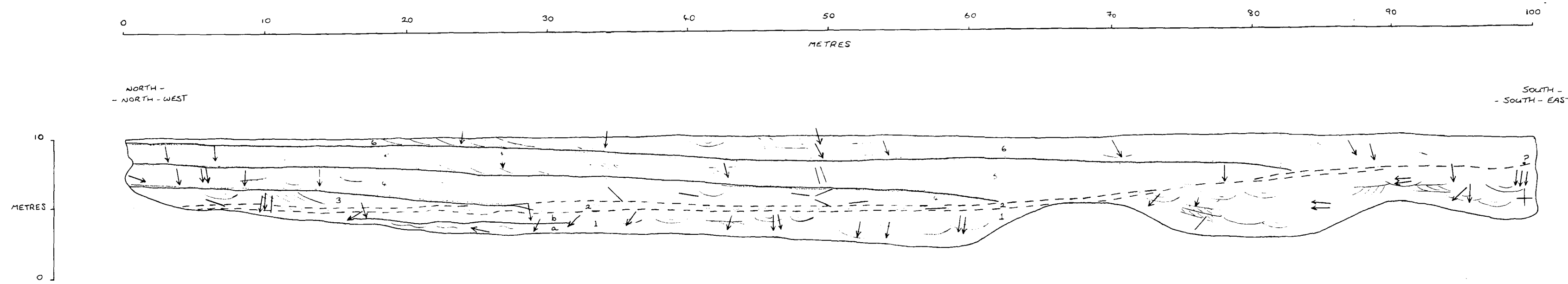


ENCLOSURE 2
 CABIN HOUSE / MOWN MEADOWS
 O.C.C.S. - SITE PLAN
 SCALE 1:2,500

LEGEND	
---	WORKINGS IN TILEY SEAMS
---	WORKINGS IN TOP BUSTY SEAM
---	WORKINGS IN BOTTOM BUSTY SEAM
---	WORKINGS IN THREQUARTER SEAM
---	WORKINGS IN BROCKWELL SEAM
231 x	LOGGED SECTION
10	CUT NUMBER - MOWN MEADOWS
T.5	CUT NUMBER - CABIN HOUSE

ENCLOSURE 1. SCALE DRAWING OF SANDSTONE EXPOSURE AT GREENFIELD NO1 QUARRY

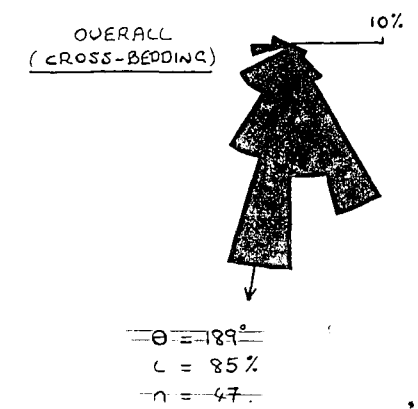
SCALE 1:250



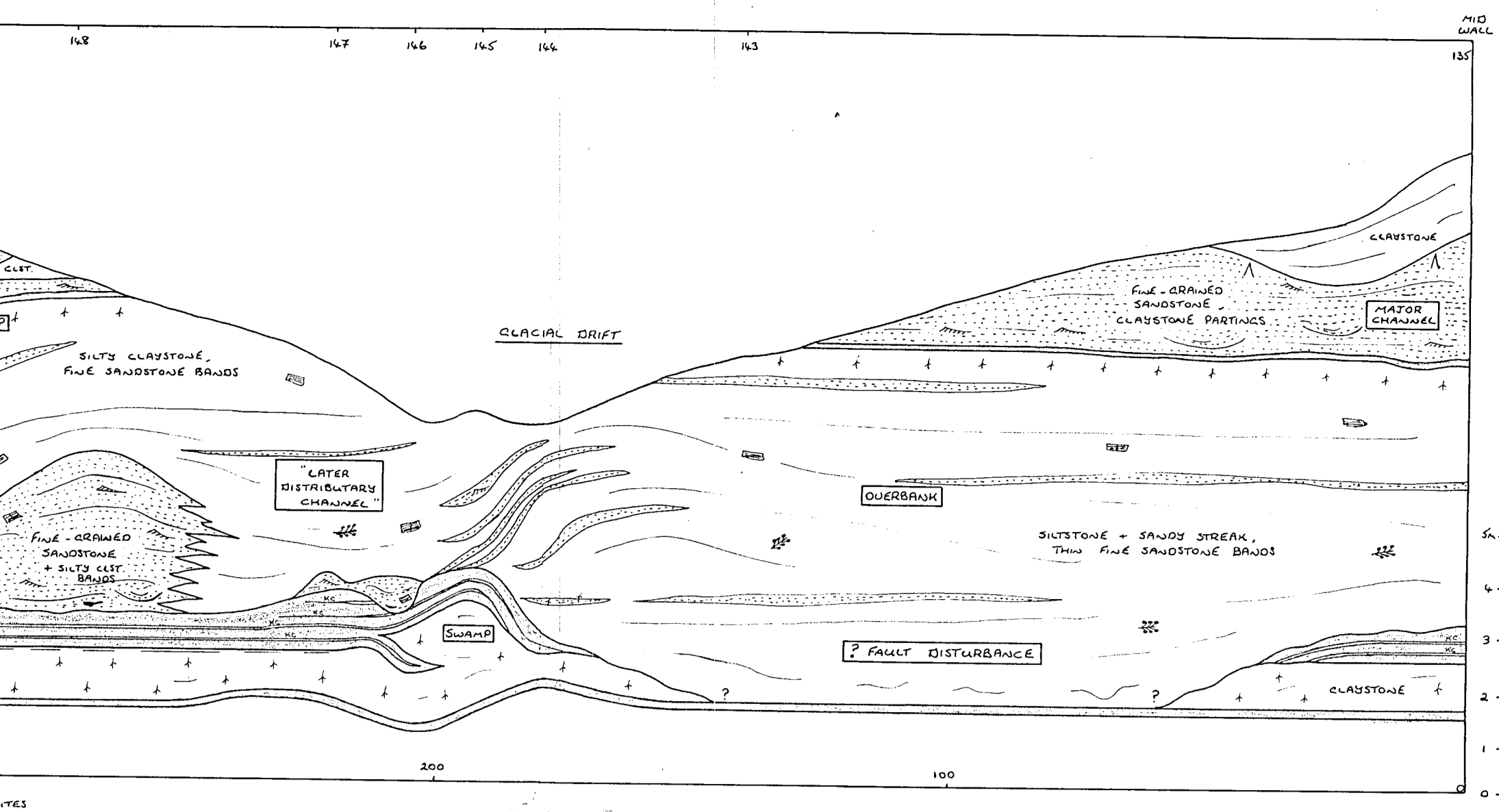
- KEY**
- BOUNDING SURFACE
 - CHAOTIC UNIT
 - IRREGULAR BEDDING
 - TROUGH CROSS-BEDDING.
 - CROSS-BEDDING ORIENTATION
 - PLANT CAST ORIENTATION
 - LITHOLOGICAL UNIT NUMBER (SEE TEXT)

- NOTES**
- 1 LOCATION OF QUARRY - G.R. NZ 095413.
 - 2 STRATIGRAPHIC HORIZON - IMMEDIATELY BELOW MARSHALL CREEK COAL (L000) - C WESTPHALIAN A
 - 3 QUARRY FACE TRENDS $\rightarrow 331^\circ$, IS SLIGHTLY OBLIQUE TO PALAEOFLOW DIRECTION
 - 4 TECTONIC DIP IS 7° TOWARDS 119° , APPROXIMATELY
 - 5 SEE TEXT, CHAPTER 6.3.2.3 AND PLATE 6.4.

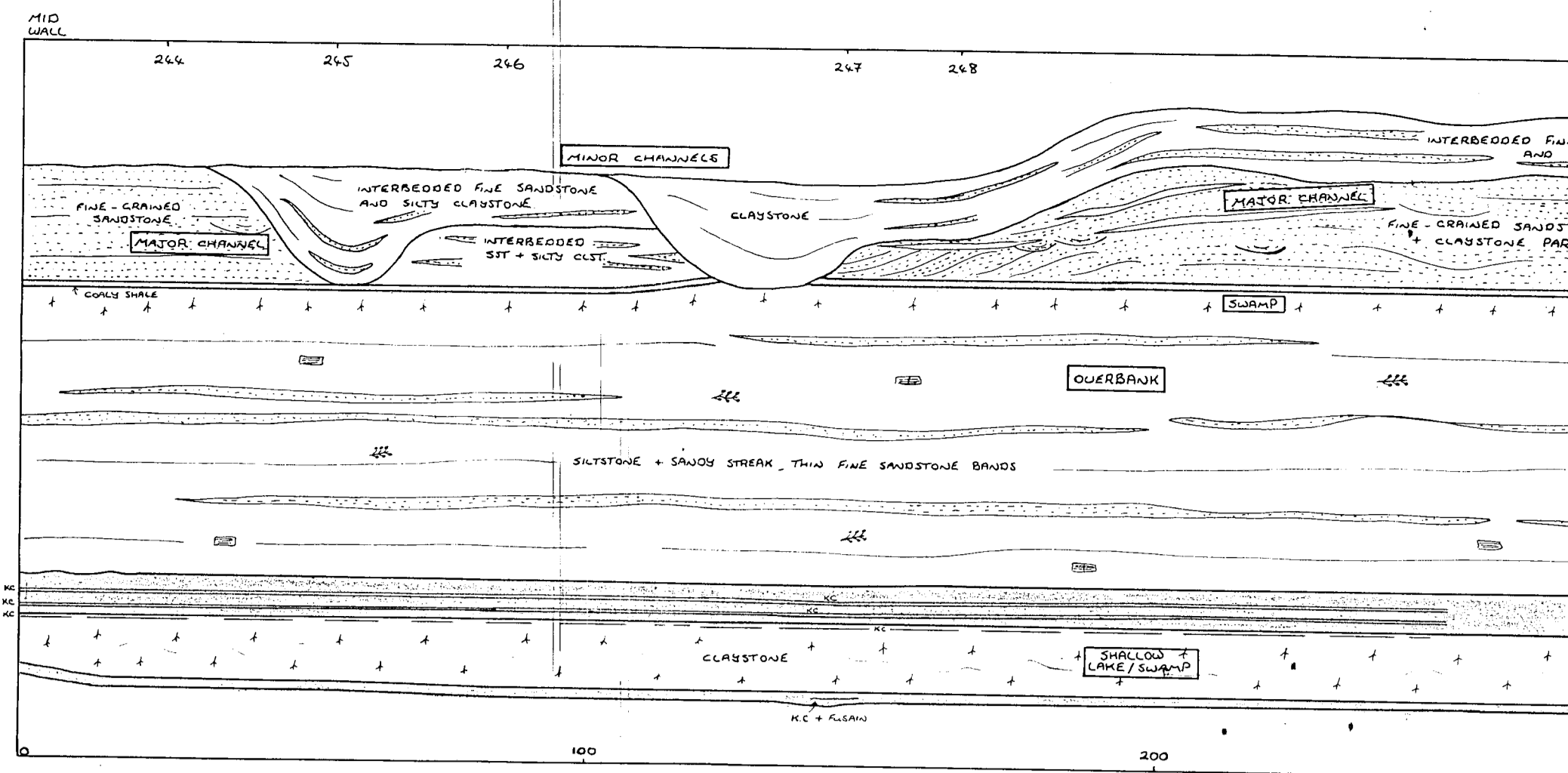
- PALAEOCURRENT DATA**
1. CROSS-BEDDING
- UNIT 6 :- $\theta = 164^\circ$, $L = 96\%$, $n = 8$
 - UNIT 5 :- $\theta = 169^\circ$, $L = 99\%$, $n = 5$
 - UNIT 4 :- $\theta = 160^\circ$, $L = 93\%$, $n = 6$
 - UNIT 3 - NO INFORMATION.
 - UNIT 2 :- CHAOTIC UNIT.
 - UNIT 1 :- $\theta = 210^\circ$, $L = 87\%$, $n = 28$
2. PLANT CASTS
- $\theta = 181^\circ$, $L = 58\%$, $n = 14$



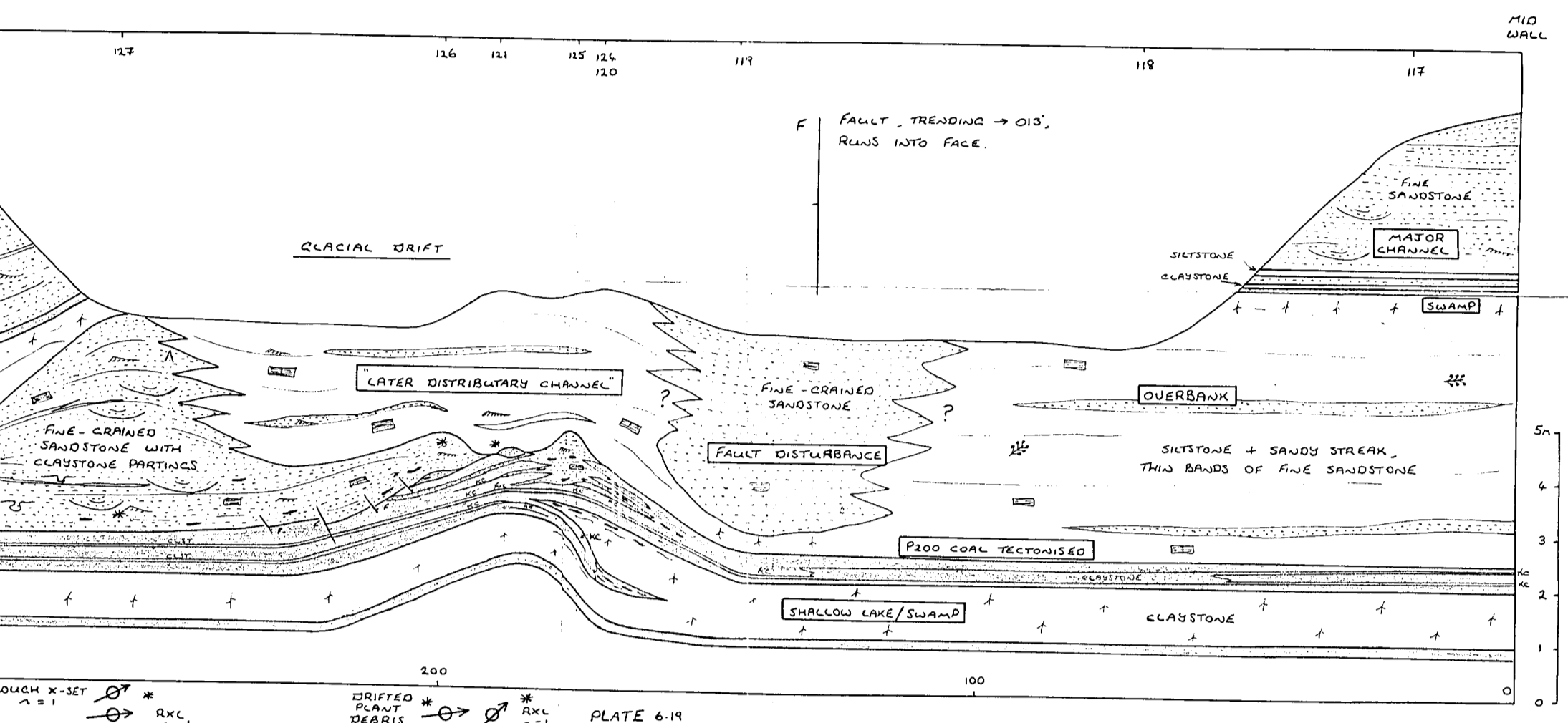
A8s



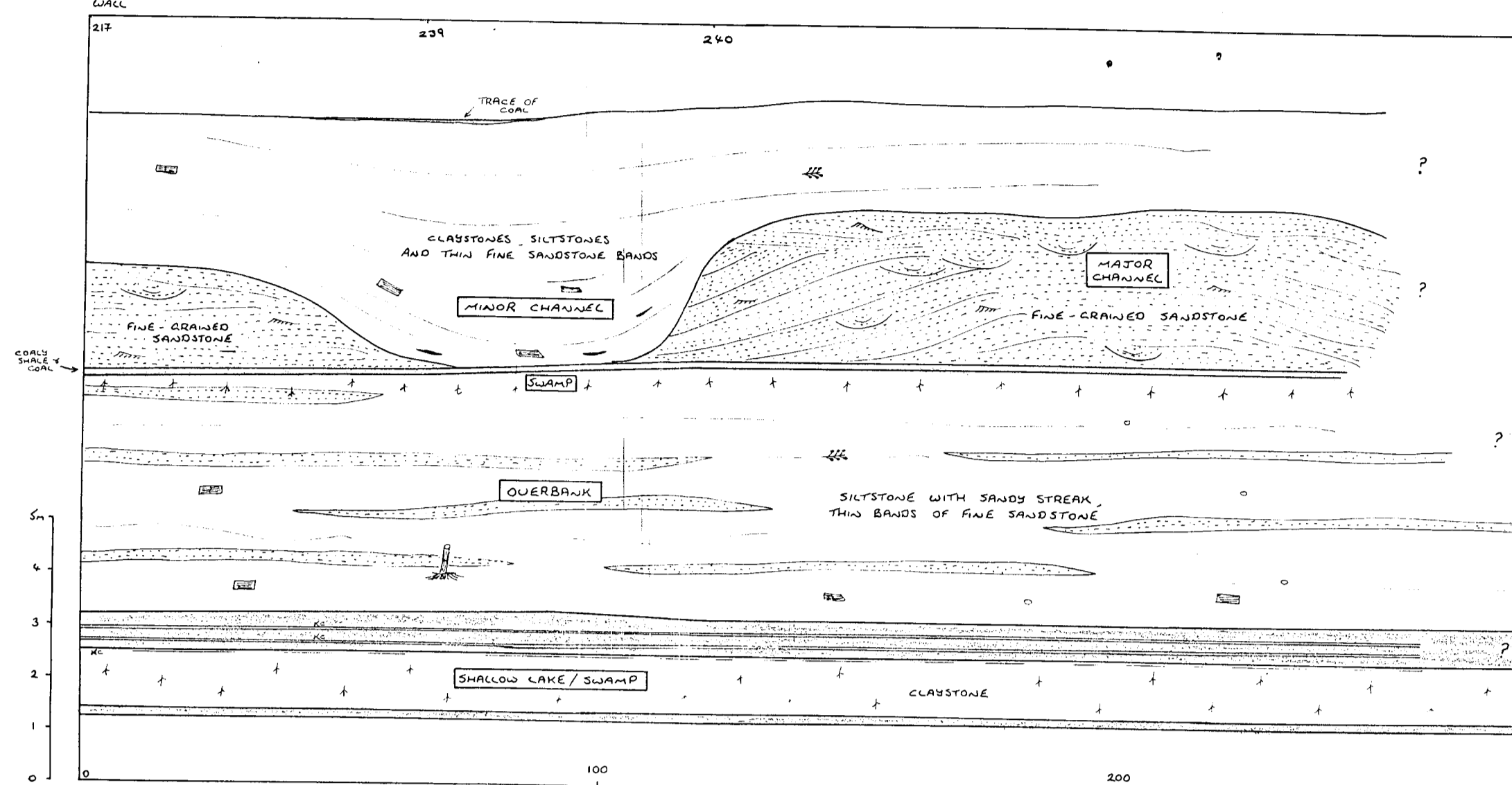
A11N



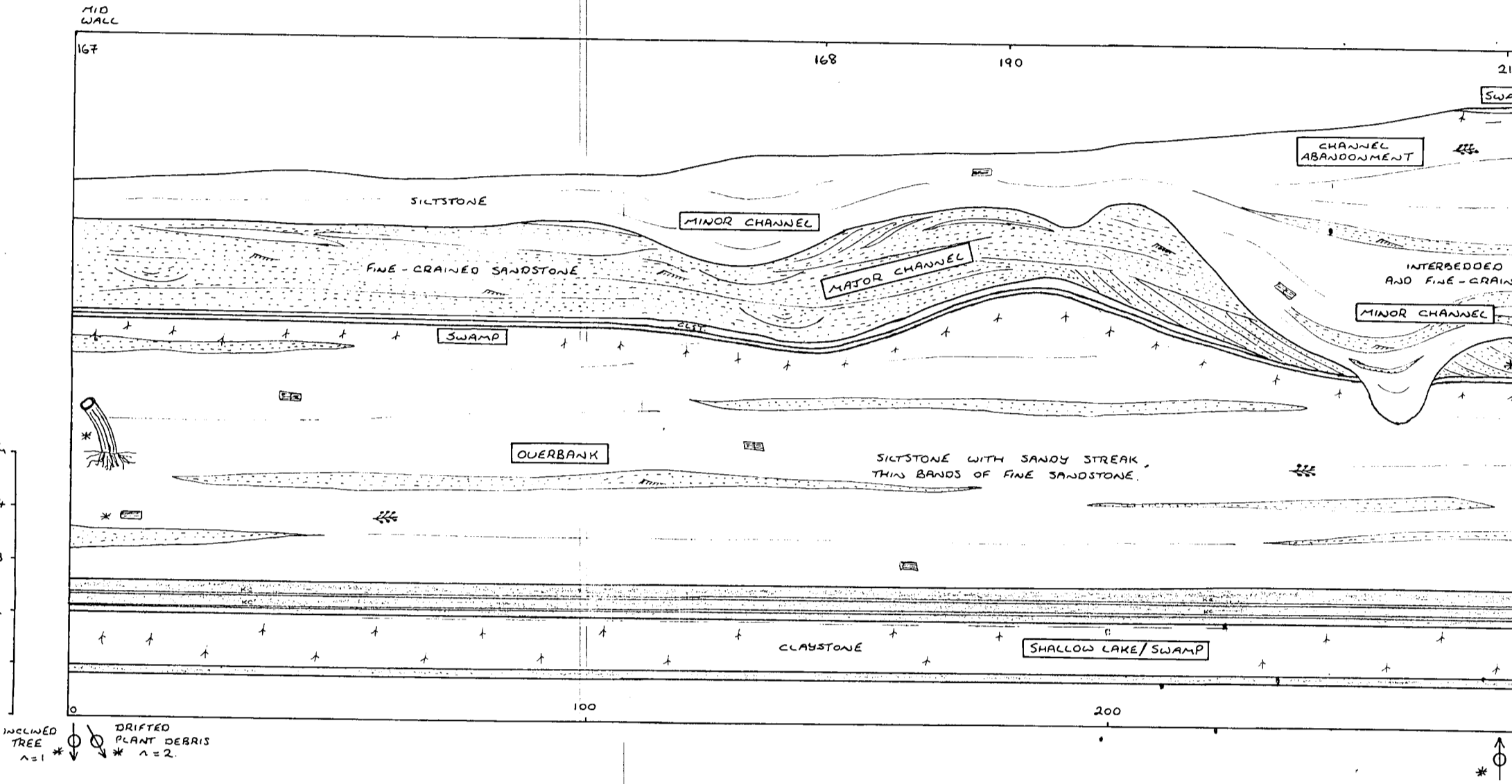
A7s



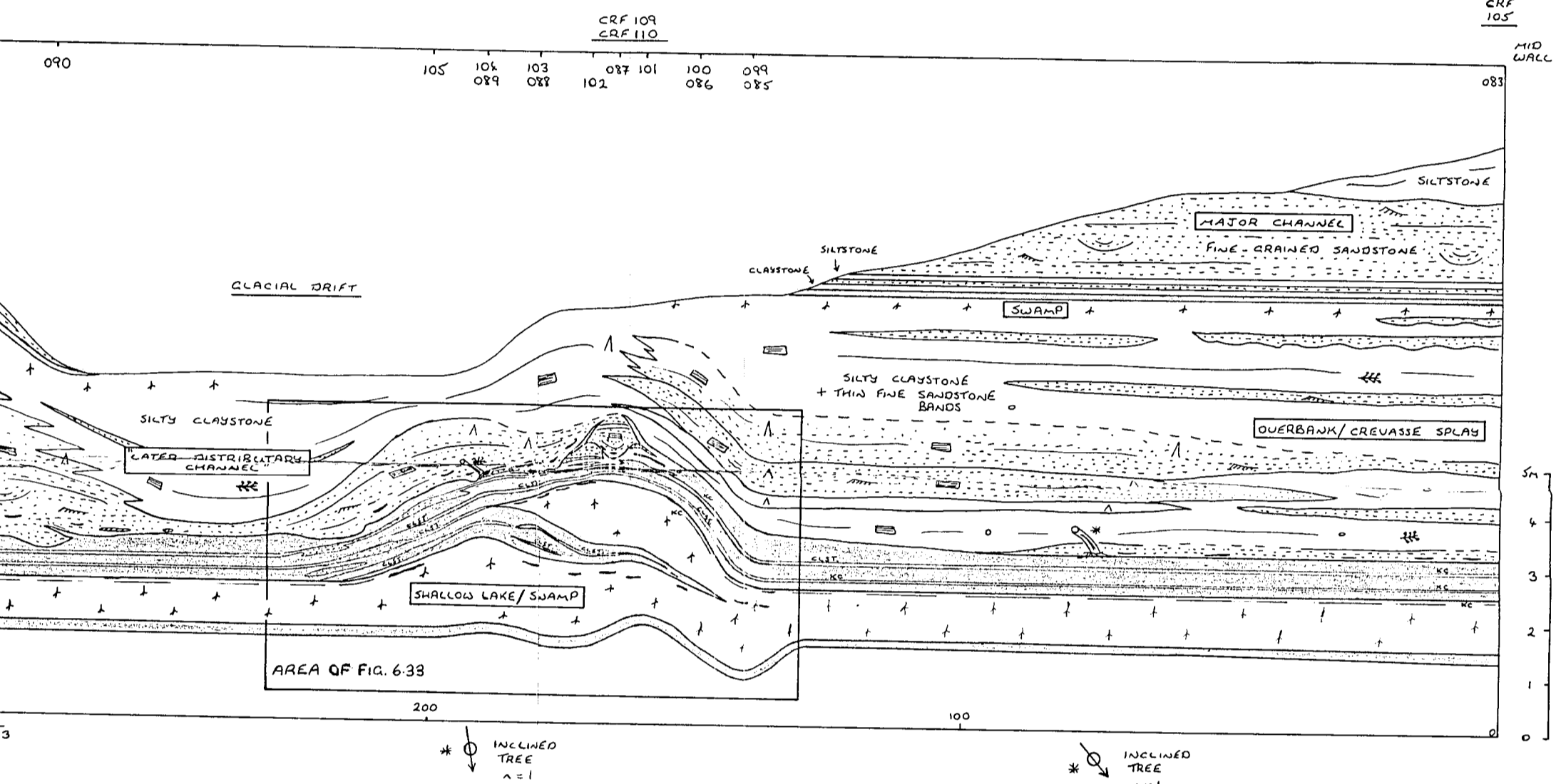
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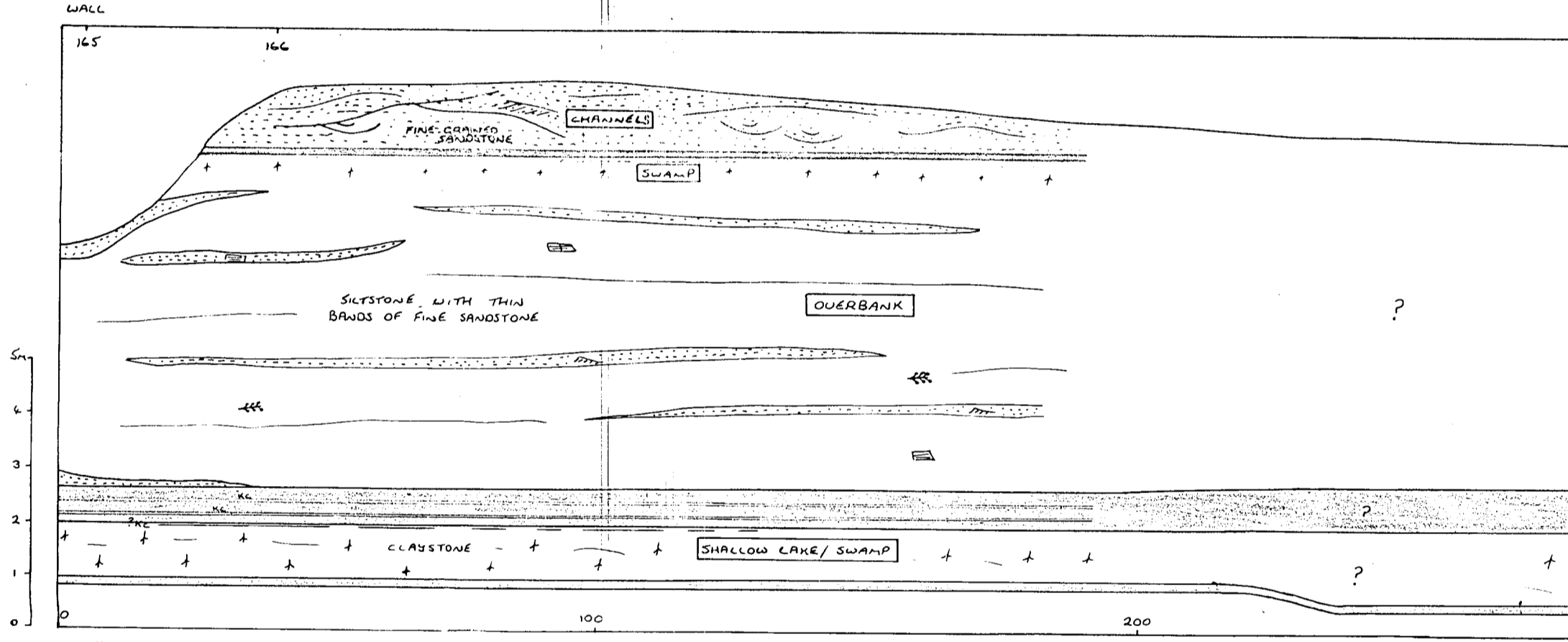
A9N



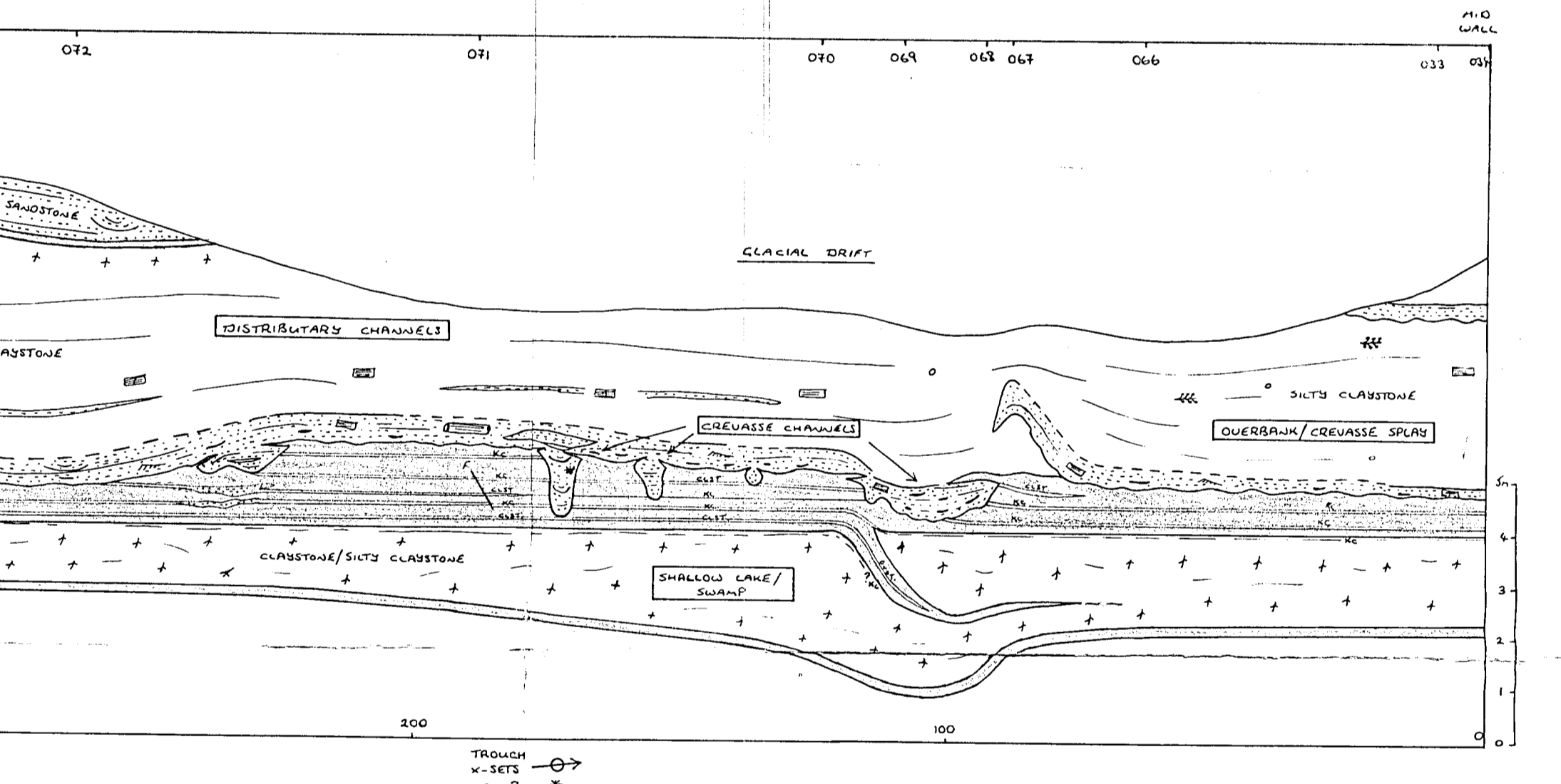
A6s



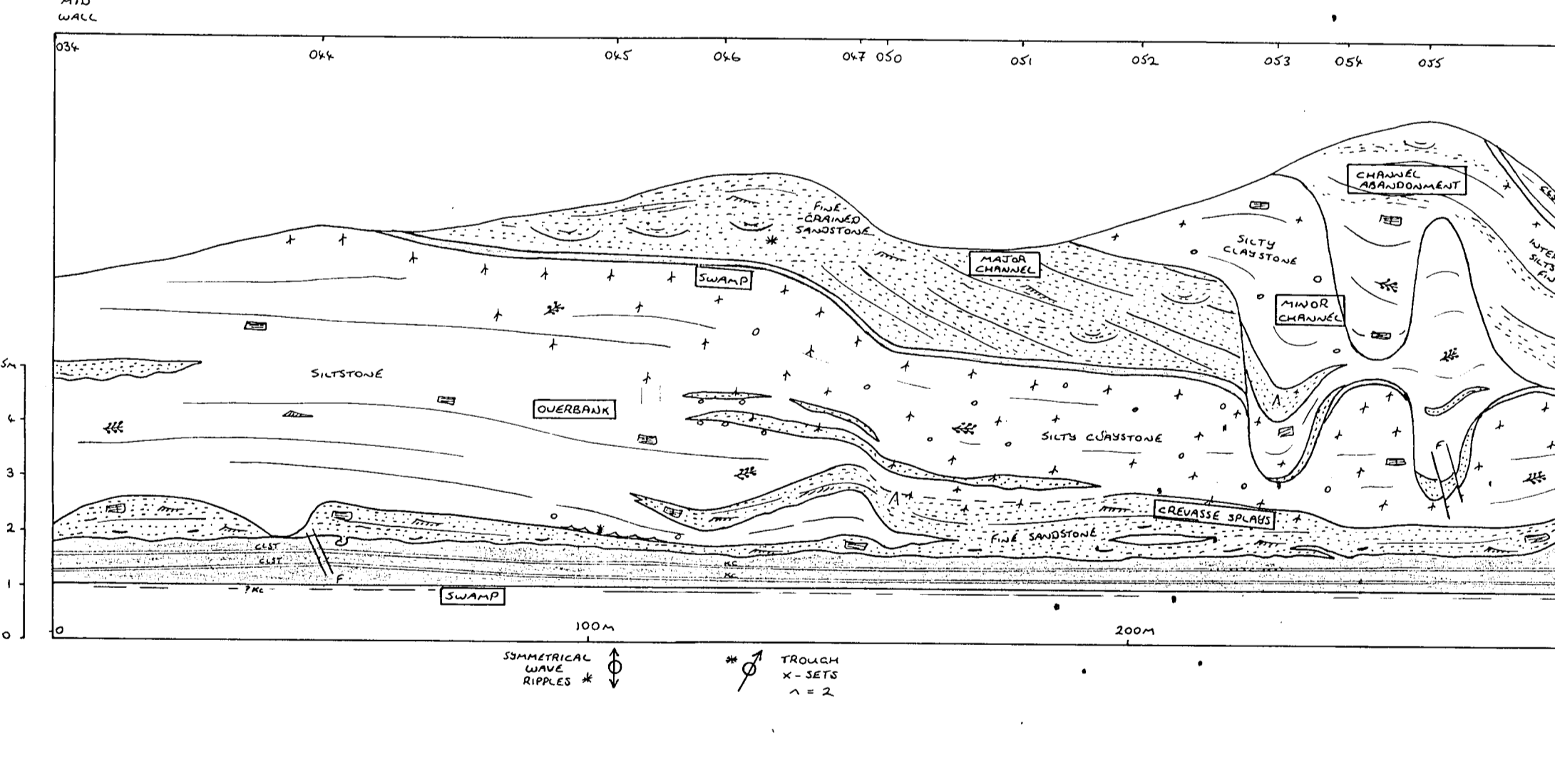
A8N



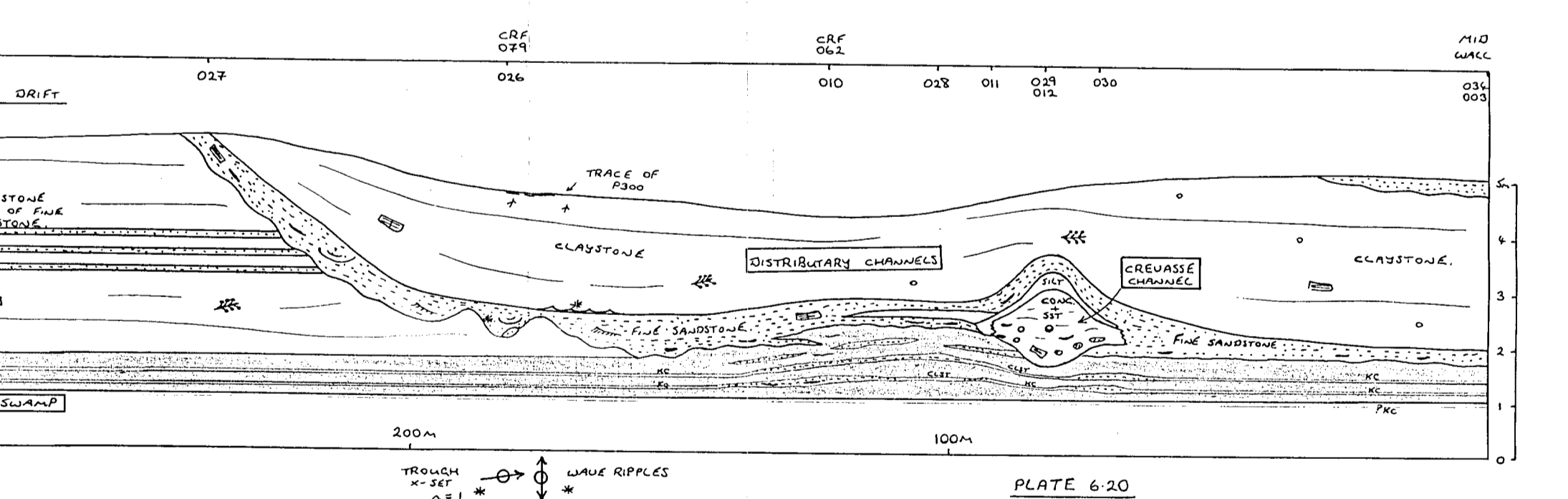
A5s



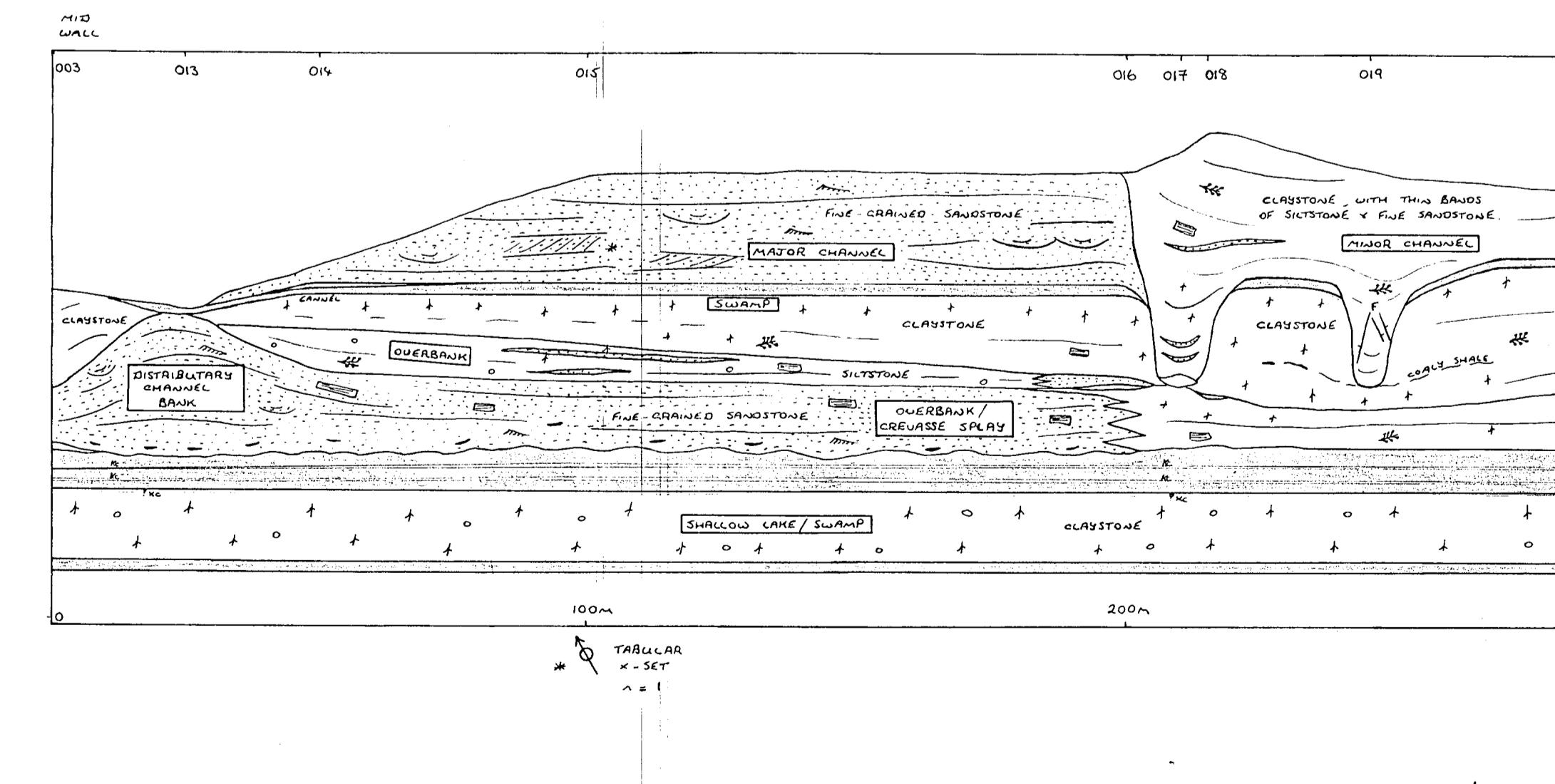
A6N



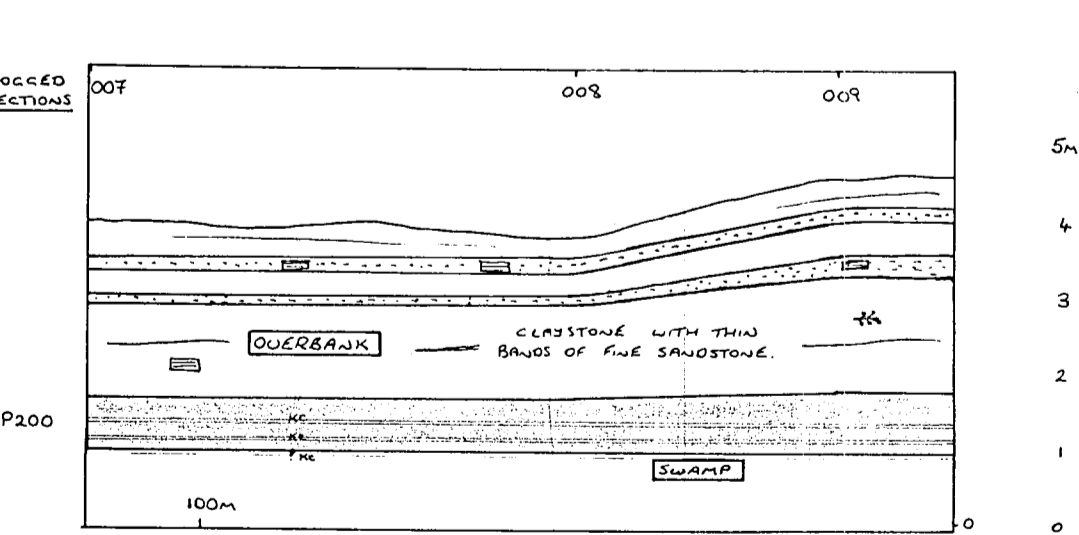
A4s



A5N

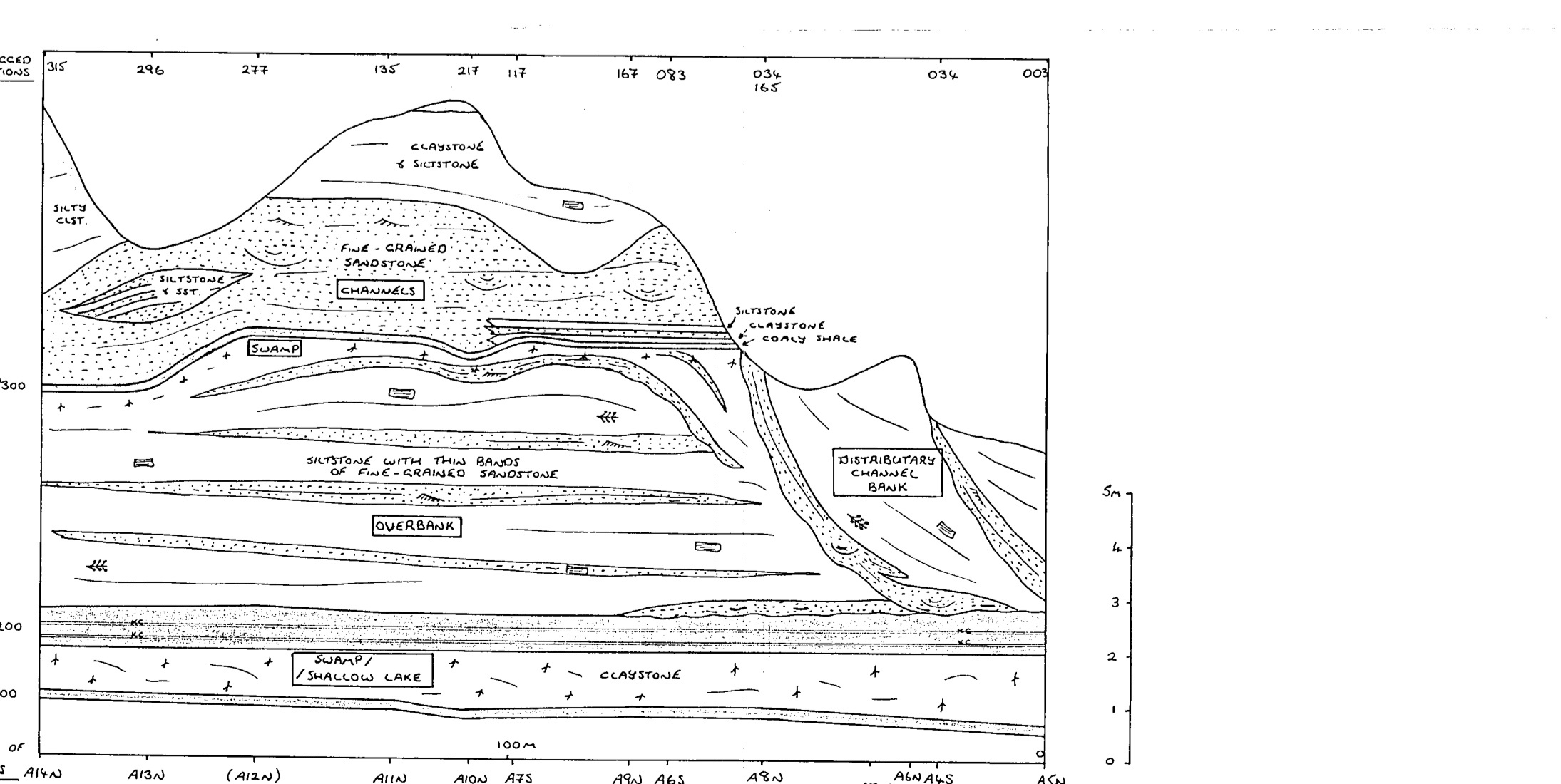


A4s



MIDWALL

WEST EAST



ENCLOSURE 6 SHEET A
 Detailed longitudinal sections from Rowley Area A. Tilley excavations
 SCALE. Horizontal 1:1,000. Vertical 1

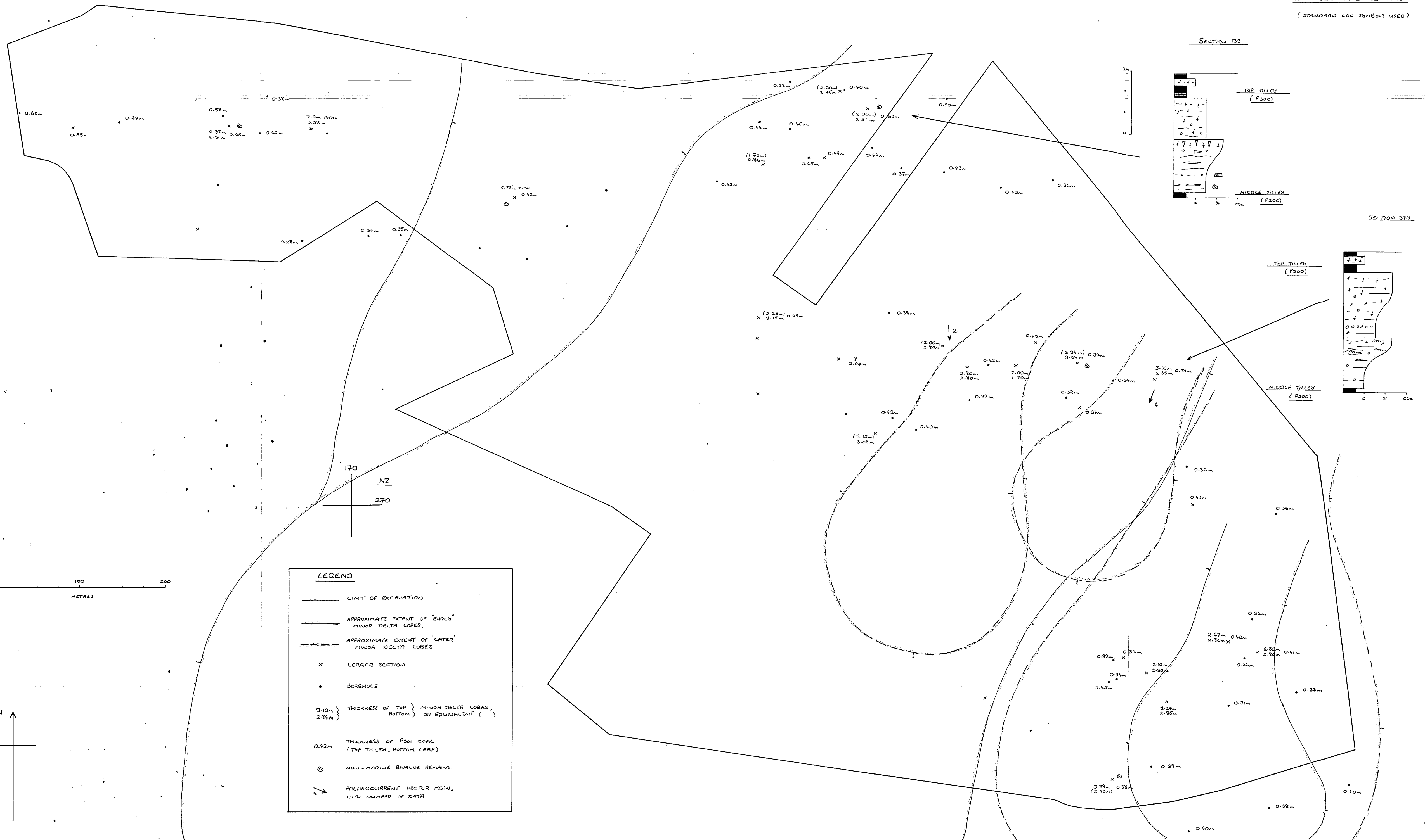
NOTES

EACH LONG SECTION SHOWS THE STRATA EXPOSED ALONG A GIVEN 'CUT', AND REPRESENTS A COMPILATION OF MEASURED VERTICAL SECTIONS, SKETCHES AND OTHER FIELD DATA. EXACT POSITIONAL RELATIONSHIP OF CUTS ARE SHOWN ON ENCLOSURE 3.
 THE LONG SECTIONS ARE ARRANGED IN SUCH A MANNER AS TO SHOW THE RELATIVE POSITION OF CUTS AND EXTERNAL MORPHOLOGICAL CHANGES AS REPRESENTED BY POSTHOLE, USING THE 'MIDWALL', I.E. THE BOUNDARY BETWEEN AREAS A10 AND A11; AND THE 'MIDDLE TILLEY CORNER', AS REFERENCED POINTS.
 PLACING SHEET B ABOVE THE BENT-HAND COLUMN OF SHEET A GIVES THE COMPLETE OVERLAP IN THE CORRECT SEQUENCE.
 STANDARD LOG SYMBOLS ARE USED. + SANDSTONE. - SHALE. CLASTIC = CLASTICITY. OVERBANK = ENVIRONMENTAL INTERPRETATION.
 SAMPLES NUMBERED ABOVE SECTION ARE DESCRIBED IN APPENDIX 2.
 VERTICAL SECTIONS AND OTHER FIELD DATA ARE CONTINUED WITHIN APPROX. 1.

ENCLOSURE 8 DEBORAH O.C.C.S. Middle to Top Tilley Interval

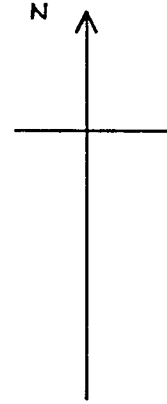
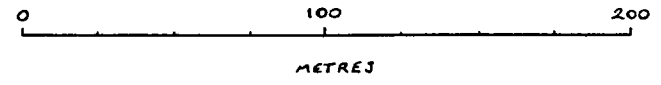
SCALE 1:2,500

REPRESENTATIVE SECTIONS
(STANDARD COC SYMBOLS USED)

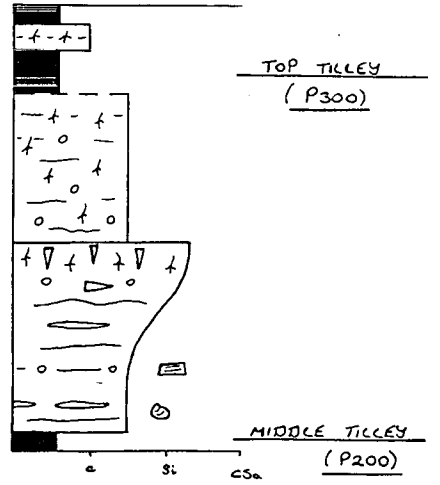


LEGEND

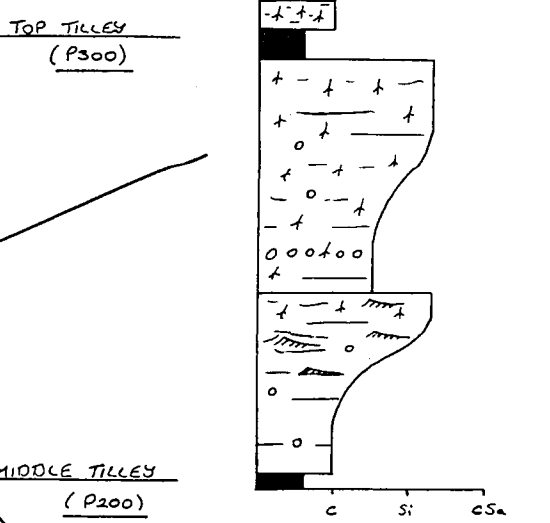
- LIMIT OF EXCAVATION
- - - - - APPROXIMATE EXTENT OF "EARLY" MINOR DELTA LOBES
- - - - - APPROXIMATE EXTENT OF "LATER" MINOR DELTA LOBES
- x LOGGED SECTION
- BOREHOLE
- 3.10m } THICKNESS OF TOP } MINOR DELTA LOBES,
2.85m } BOTTOM } OR EQUIVALENT ()
- 0.42m THICKNESS OF P301 COAL (TOP TILLEY, BOTTOM LEAF)
- ⊙ NON-MARINE BIVALVE REMAINS
- ↖ PALAEOCURRENT VECTOR MEAN, WITH NUMBER OF DATA



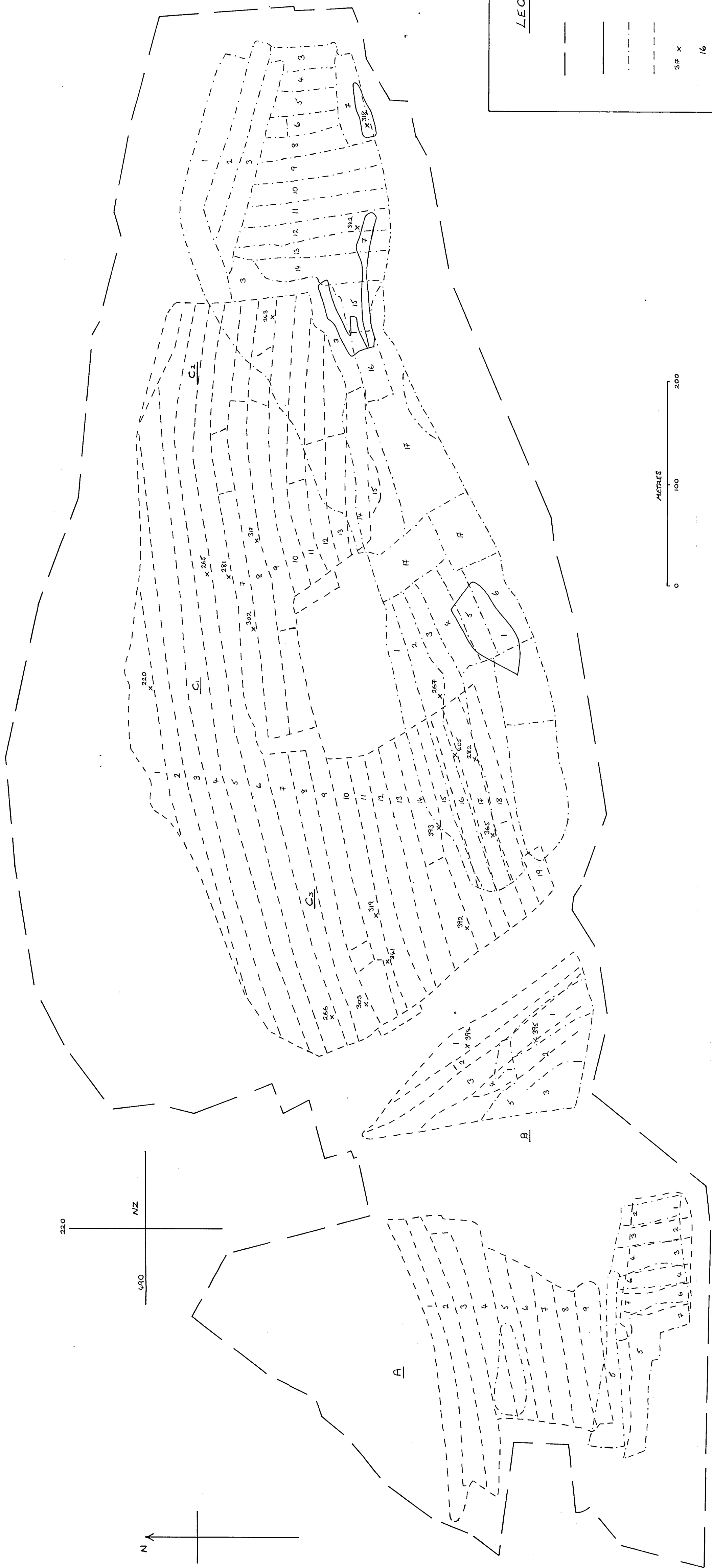
Section 133



Section 373

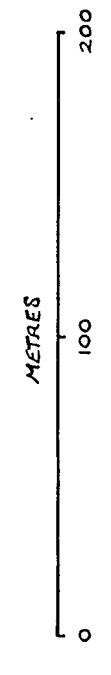


ENCLOSURE 17 EDMONDSLEY O.C.C.S. SITE PLAN SCALE 1:2,500

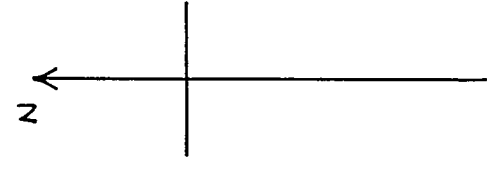


LEGEND

- LIMIT OF EXCAVATION
- WORKINGS IN HIGH MAIN SEAM
- WORKINGS IN 2000 SEAM
- WORKINGS IN FIREQUARTER SEAM
- 31F X LOCATED SECTION
- 16 CUT NUMBER
- C1 WORKING AREA



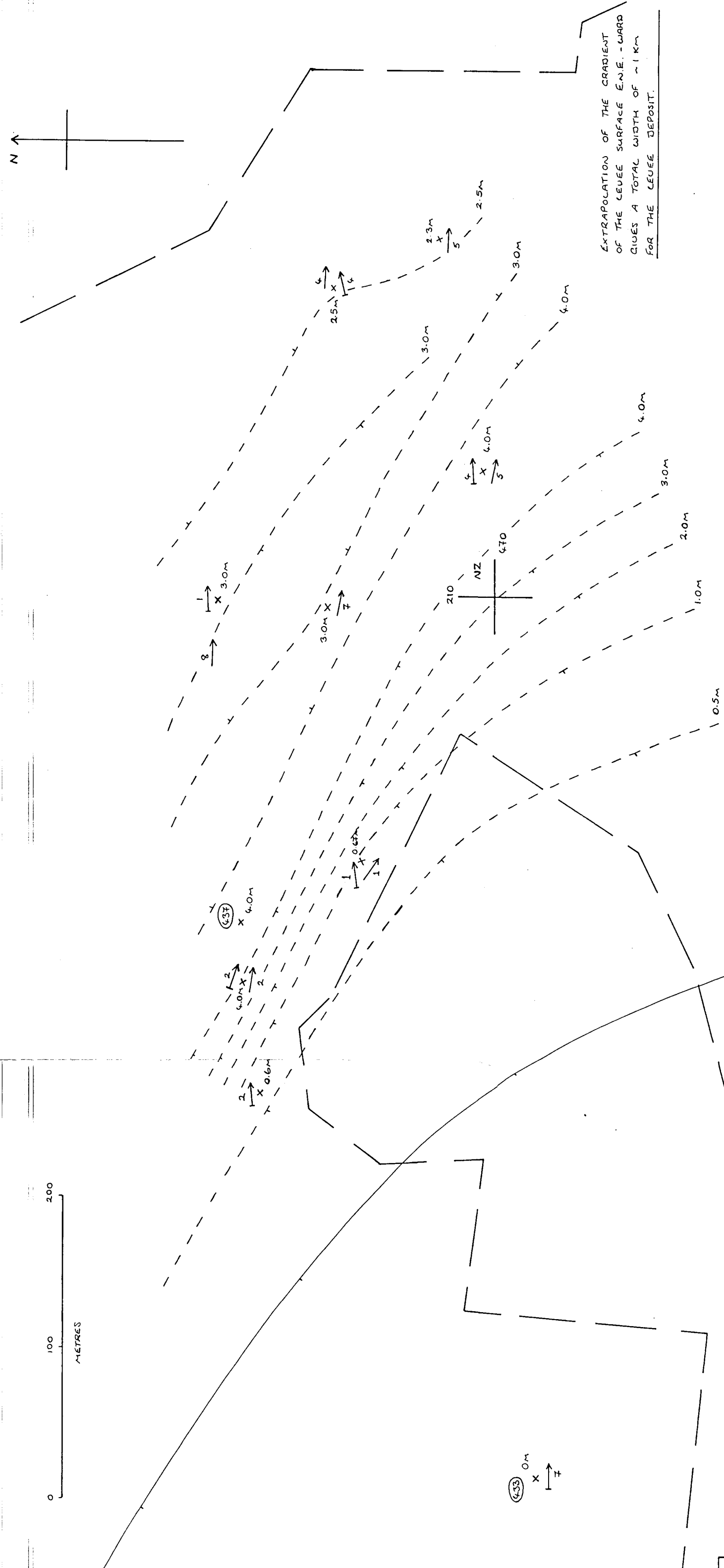
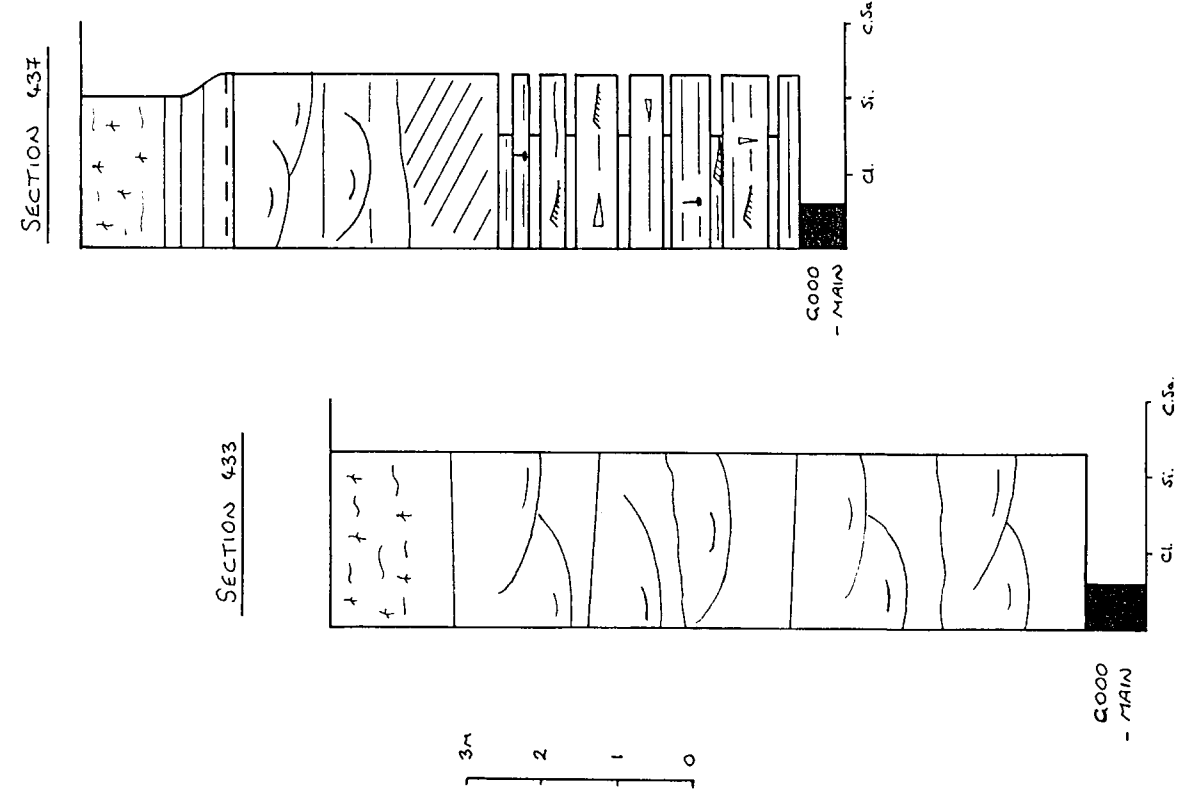
NZ
2210
640



ENCLOSURE 16 LANGLEY O.C.C.S

Main to Fivequarter Interval. SCALE 1:2,500

REPRESENTATIVE SECTIONS
(STANDARD LOG SYMBOLS)



EXTRAPOLATION OF THE GRADIENT OF THE LEVEE SURFACE E.N.E. -WARD GIVES A TOTAL WIDTH OF ~1 KM FOR THE LEVEE DEPOSIT.

BOREROLE RECORDS INDICATE THAT CHANNEL SANDSTONES OCCUPY THE ENTIRE INTERVAL FOR AT LEAST 1 KM TO THE WEST.

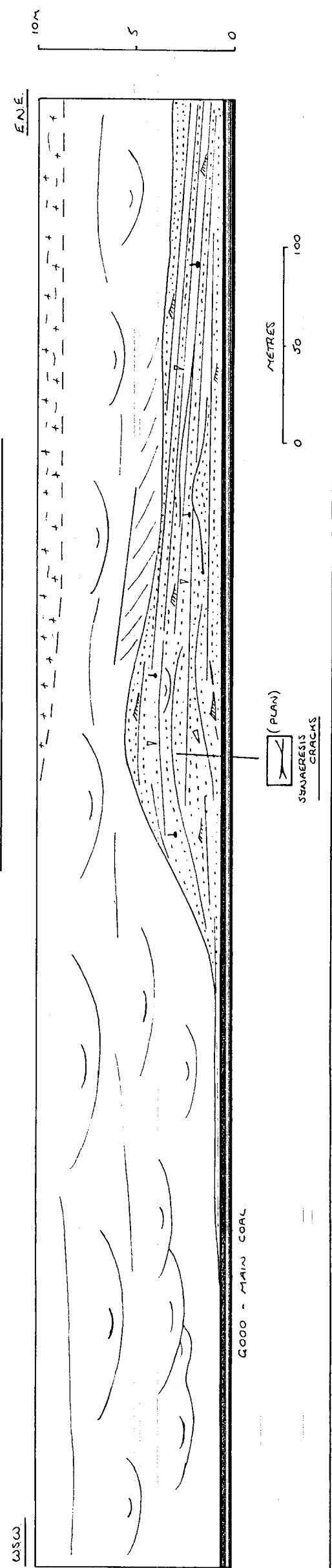
NOTES AND LEGEND

THE MAIN-FIVEQUARTER INTERVAL AT LANGLEY O.C.C.S IS INTERPRETED AS THE RESULT OF SEDIMENTATION IN MAJOR CHANNEL AND CHANNEL MARGIN LEVEE ENVIRONMENTS. THE MAJOR CHANNEL, INFERRRED FROM BOREROLE RECORDS TO HAVE BEEN SIMULOUS AND 2-3 KMS WIDE, FLOWED TOWARDS THE SOUTH-EAST AND DEPOSITED A LEVEE UP TO AT LEAST 4m HIGH AND ABOUT 1km WIDE ON THE OUTER, EROSIIVE BANK OF A RIGHT-HAND BEND. THIS LEVEE WAS ENTIRELY SUBSEQUENT.

A MAJOR CREVASSE EVENT THEN BREACHED THE CHANNEL BANK, CREATING A NEW CHANNEL TO FLOW EASTWARD OVER THE PREVIOUSLY-DEPOSITED LEVEE, BUT NOT LEADING TO COMPLETE ACQUISITION OF THE OLD CHANNEL COURSE.

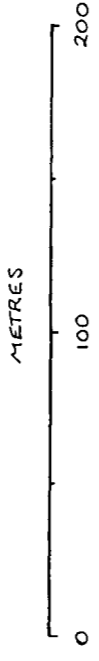
- LIMIT OF EXCAVATION
- - - ISOPACH OF LEVEE SEQUENCE (TAGS POINT TOWARD THINNER SEQUENCE)
- 3.5m X LOCSED SECTION, WITH THICKNESS OF LEVEE SEQUENCE.
- ↑ PALAEOCURRENT VECTOR MEAN FOR
- 6 a) CHANNEL SANDSTONES
- b) LEVEE SEDIMENTS, WITH NUMBER OF DATA.

COMPOSITE, WSW-ESE, LONGITUDINAL SECTION ACROSS THE AREA OF STUDY.
SCALE - HORIZONTAL = 1:2500, VERTICAL 1:250

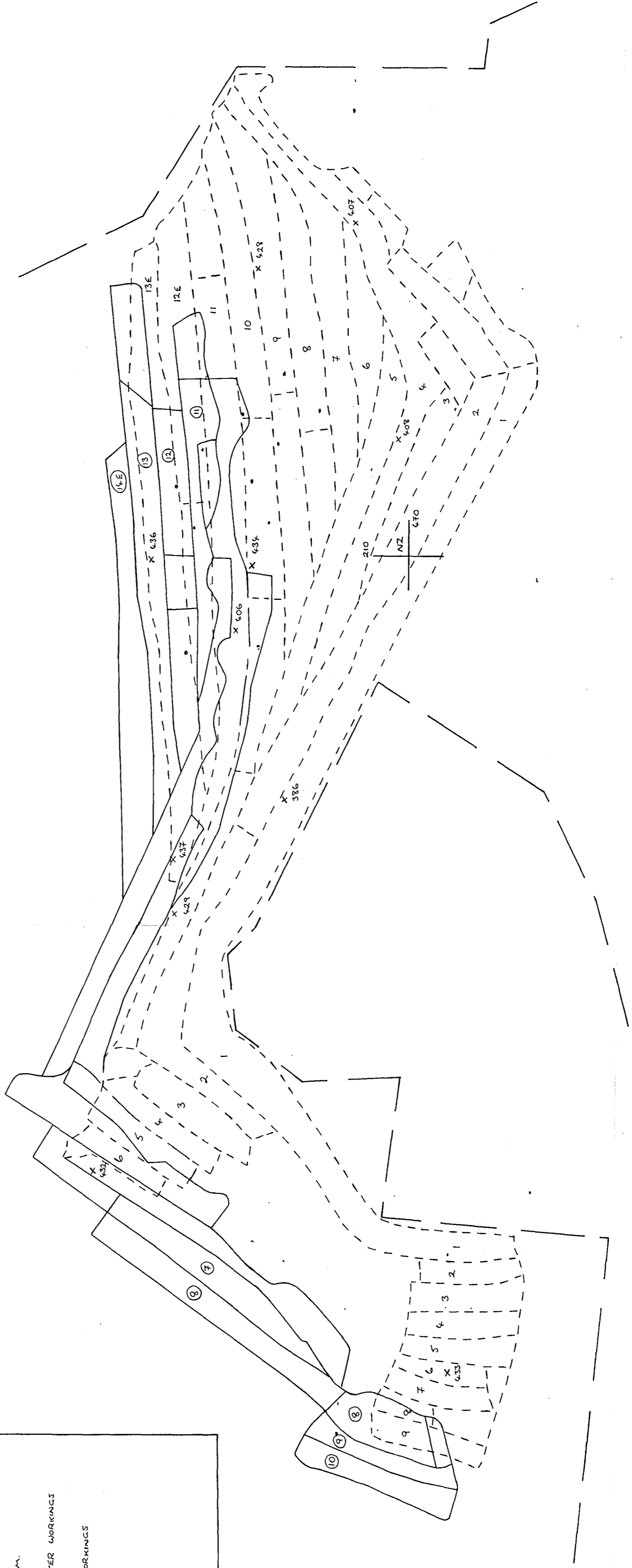


ASB SECTION IS SCHEMATIC.
--- LEVEE SEQUENCE.
--- OTHER SYMBOLS STANDARD

ENCLOSURE 15 LANGLEY O.C.C.S. SITE PLAN SCALE 1:2,500

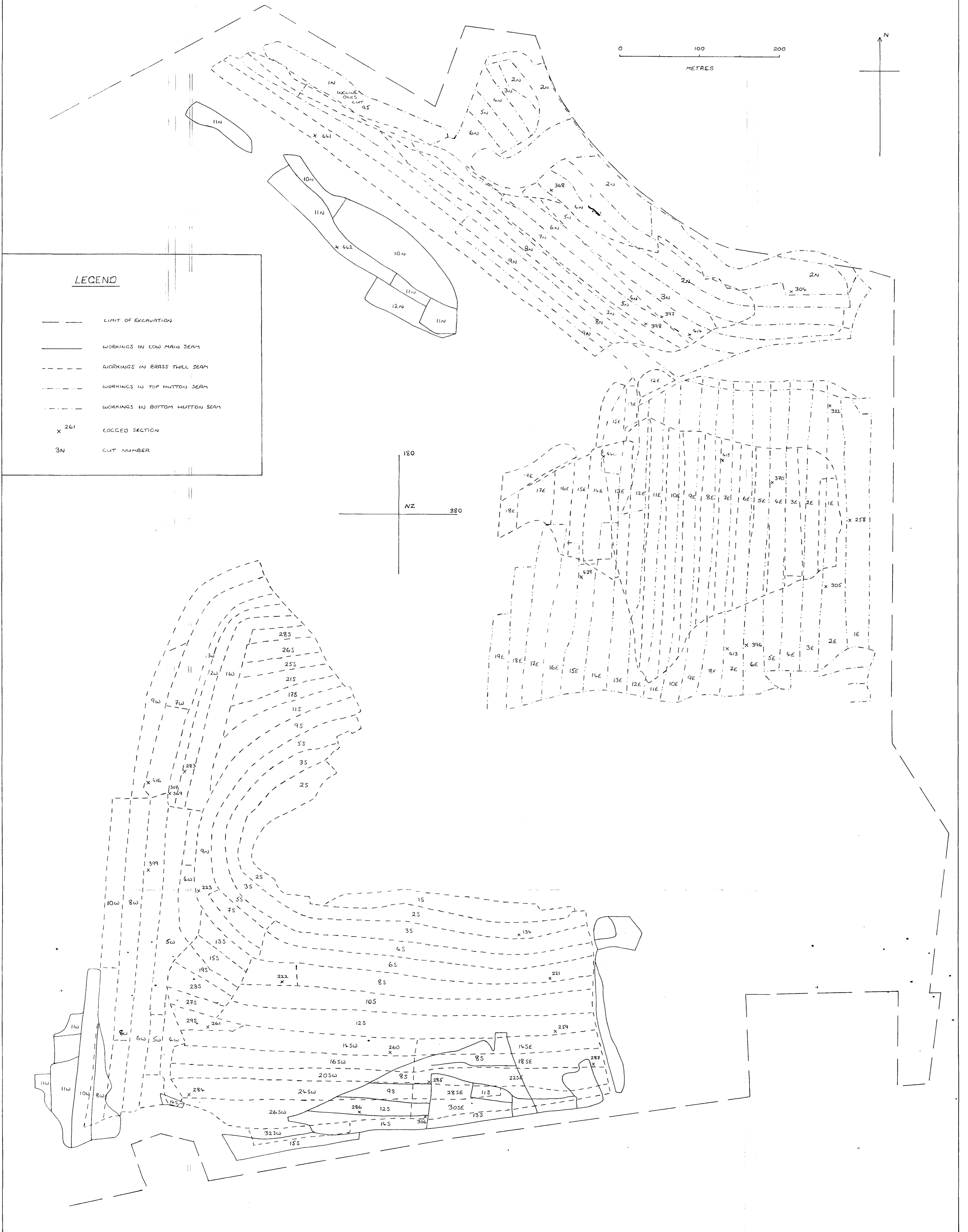


<u>LEGEND</u>	
—	WORKINGS IN FUEQUARTER SEAM
- - -	WORKINGS IN MAIN SEAM.
⑩	CUT NUMBER - FUEQUARTER WORKINGS
4	CUT NUMBER - MAIN WORKINGS
241 X	LOGGED SECTION
— · — · —	LIMIT OF EXCAVATION



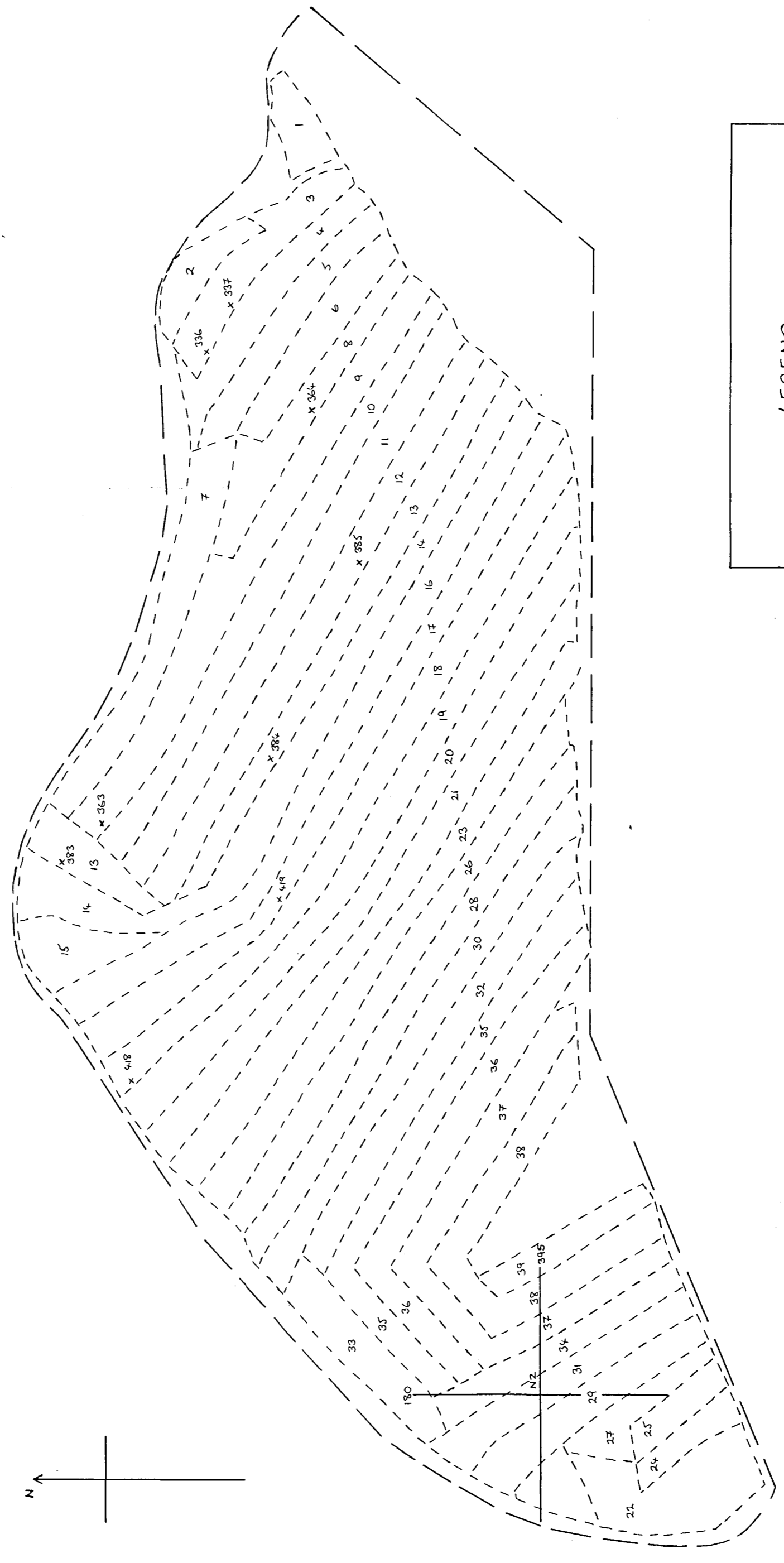
ENCLOSURE 14 TANNERS HALL O.C.C.S.

SITE PLAN. SCALE 1:2,500



ENCLOSURE 12 WOOLEY O.C.C.S.

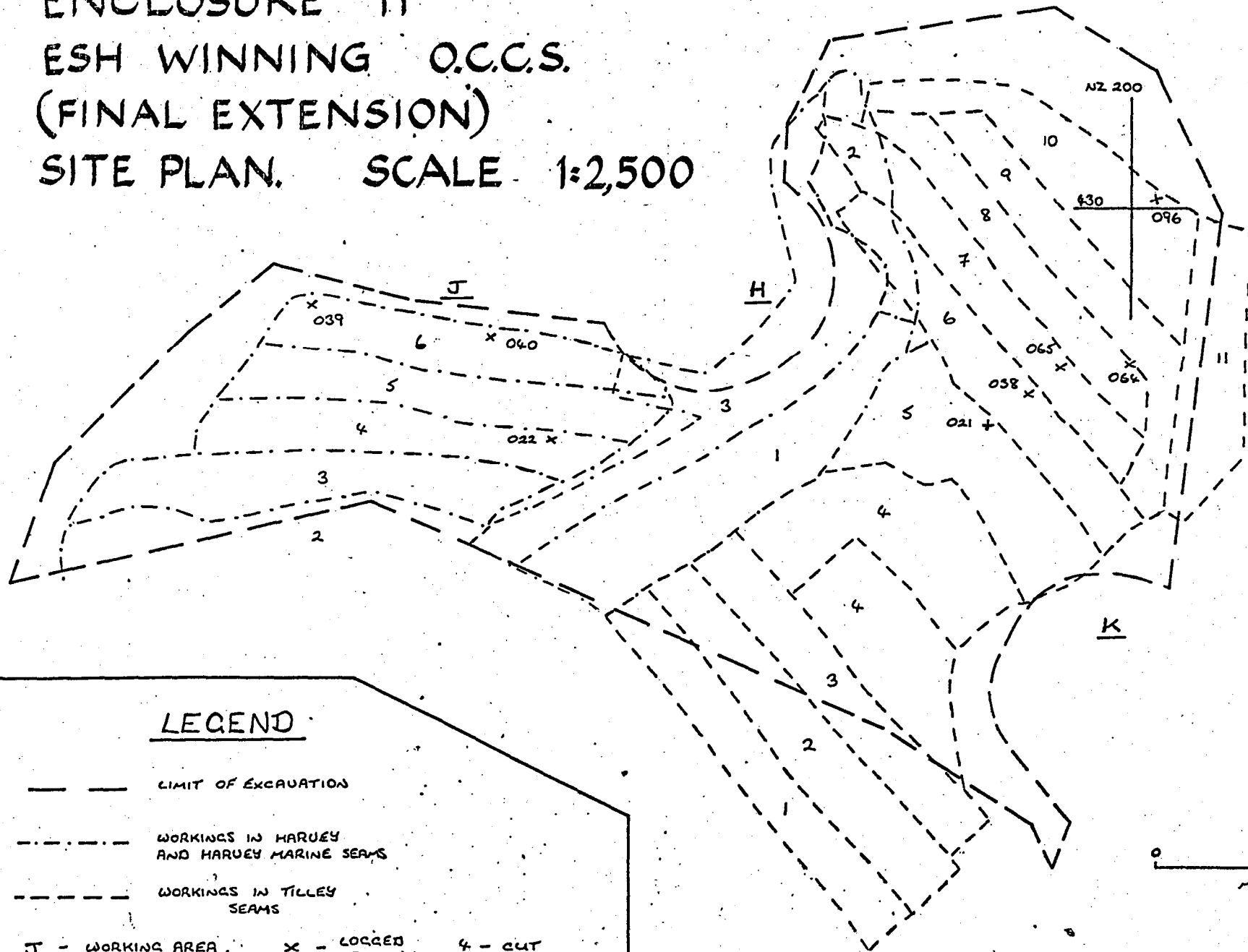
SITE PLAN. SCALE 1:2,500



LEGEND

---	LIMIT OF EXCAVATION
---	WORKINGS IN HUTTON SEAMS
35	CUT NUMBER
X 361	LOCATED SECTION

ENCLOSURE 11
 ESH WINNING O.C.C.S.
 (FINAL EXTENSION)
 SITE PLAN. SCALE 1:2,500



LEGEND

- — — — — LIMIT OF EXCAVATION
- WORKINGS IN HARUEY AND HARUEY MARINE SEAMS
- - - - - WORKINGS IN TILLEY SEAMS
- G - WORKING AREA
- X - LOGGED SECTION
- 4 - CUT NUMBER.