AML Report 4436
Copy sent to Dr C. Smith

Site No. 1470

REPORT ON SOILS FROM THE 1981 AND 1982 EXCAVATIONS AT HOLYHEAD MOUNTAIN CIRCLES, ANGLESEY.

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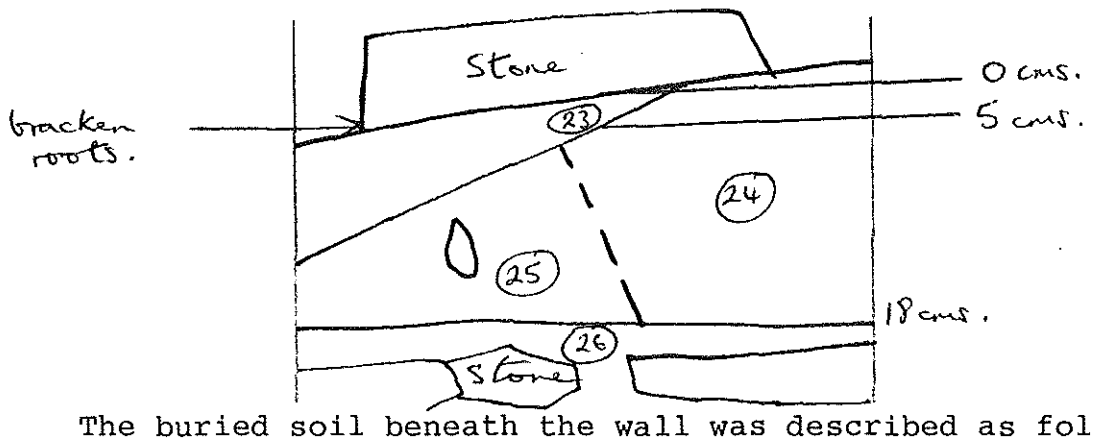
An introduction to the excavations (directed by Dr. C. Smith) at the Ty Mawr Hut-Circles, Holyhead, Anglesey, and the soils of the area has been given in earlier reports (Keeley, 1979 and 1980; Smith, 1984). Further excavation was carried out in 1981 and 1982, concentrating particularly on the Ancient Field System - South and East Areas (Smith, forthcoming). The excavated areas are shown in Figure 1 and the sequence of excavation in Figure 2.

During the 1981 excavations soils associated with 5 areas of the site were investigated, as follows:
1) A field wall of the ?earliest phase
2) The first enclosure phase
3) Below a hut wall
4) The second enclosure phase
5) The lower field boundary

1) Field Wall - ?Earliest Phase (20 below 31).



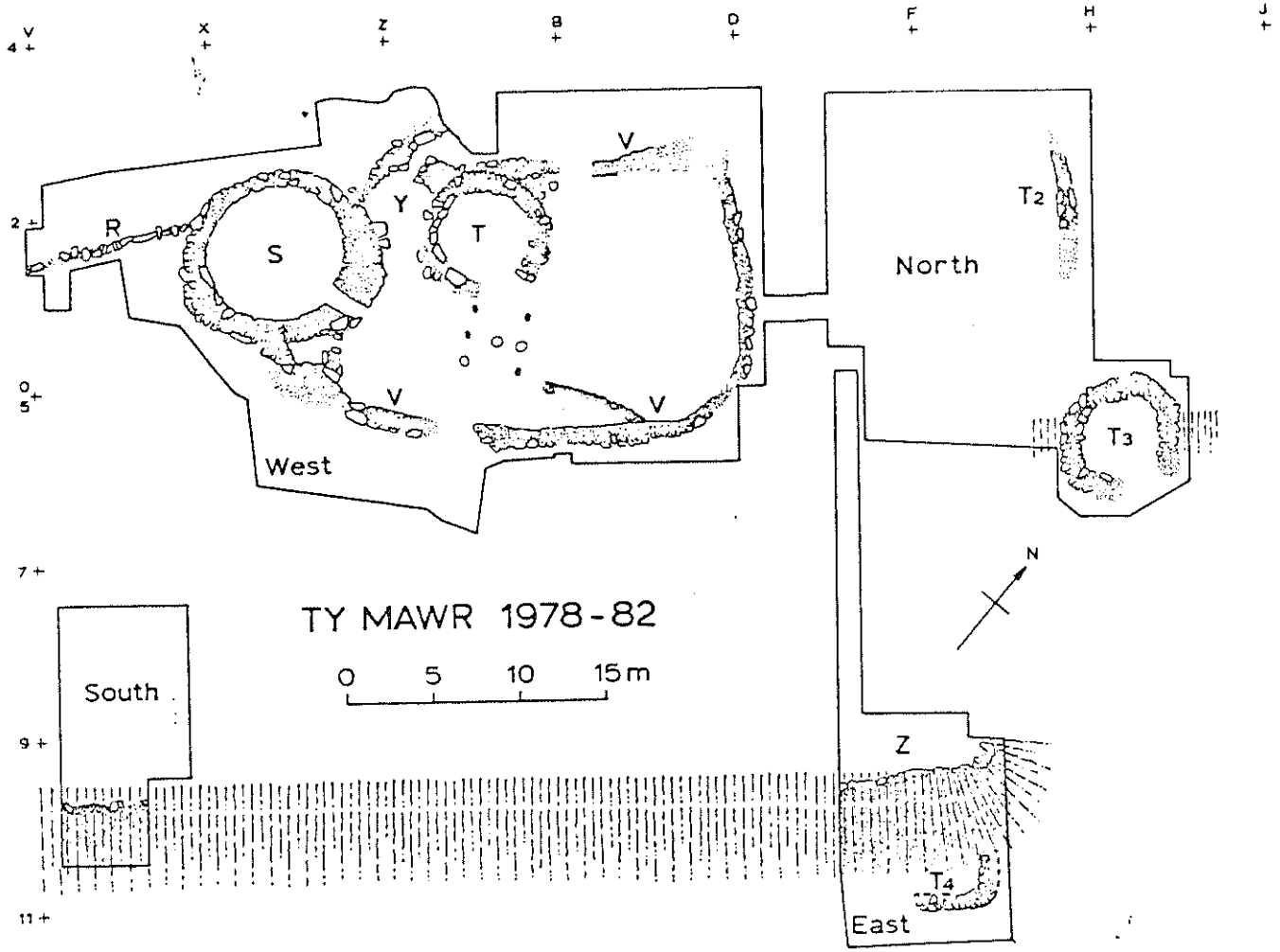
The buried soil beneath the wall was described as follows:

0-5cms. was dark greyish brown (10YR4/2) moderately friable coarse sandy loam with moderate medium subangular blocky structure. A few fine rusty mottles occurred in root channels. Roots were few, coarse to fine fibrous, and stones few, gravel.

5-18cms. was very dark brown (10YR2/2) friable medium to fine sandy loam , slightly siltier and more humic than the layer above, without mottles and containing common stones (gravel) and roots (coarse to fine fibrous).

Below 18 cms. was mixed pale brown (10YR6/3) and dark greyish brown (10YR4/2) moderately friable coarse loamy sand with weak medium subangular blocky structure. Common coarse distinct strong brown (7.5YR5/6) mottles occurred. Stones (gravel) and charcoal fragments were common; roots absent.

Samples 23 to 26 were taken, as shown in the sketch. The soil appeared to be a Brown Ranker.


V
X
Z
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D
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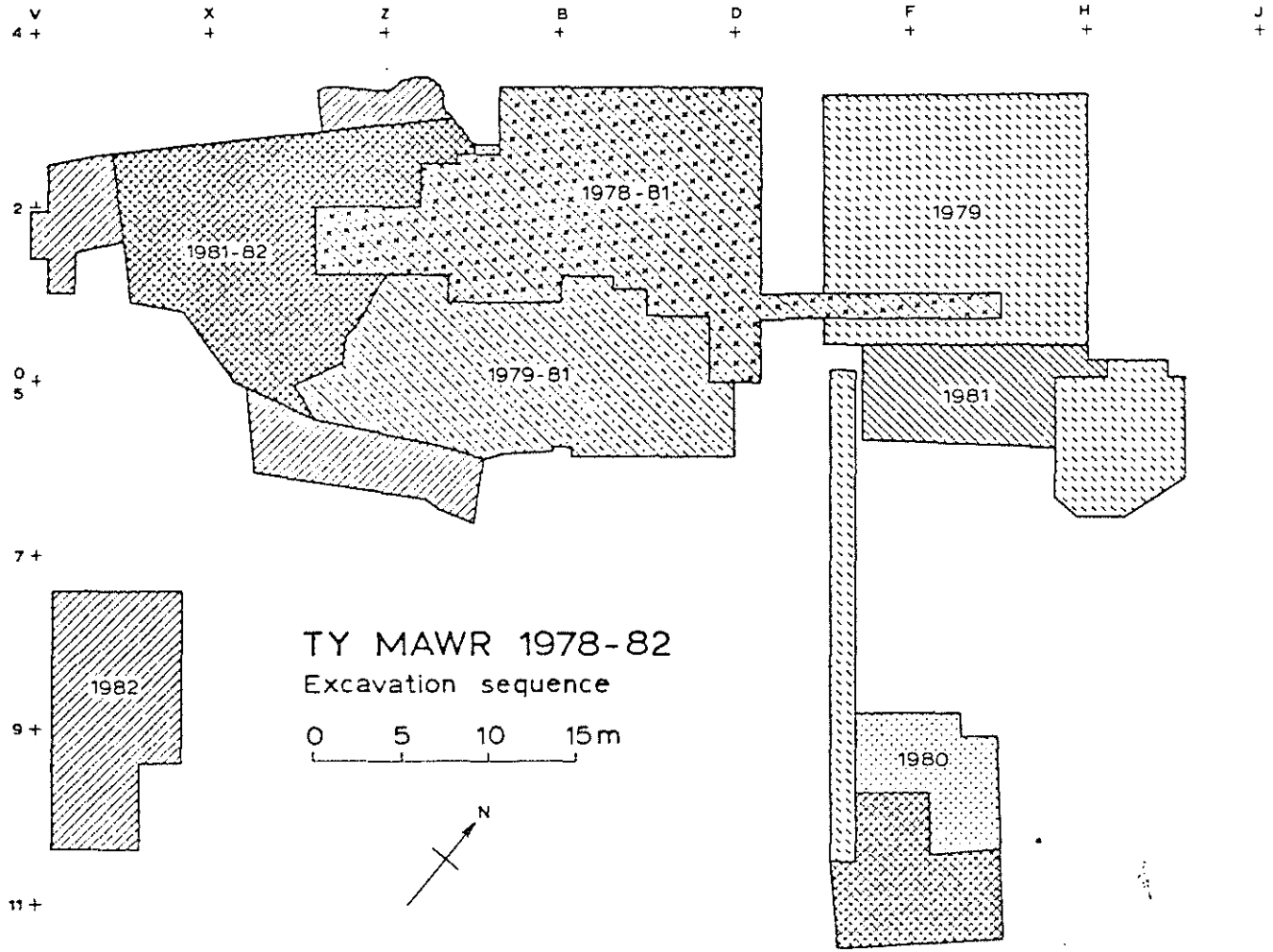
TY MAWR 1978-82
0 5 10 15m


V
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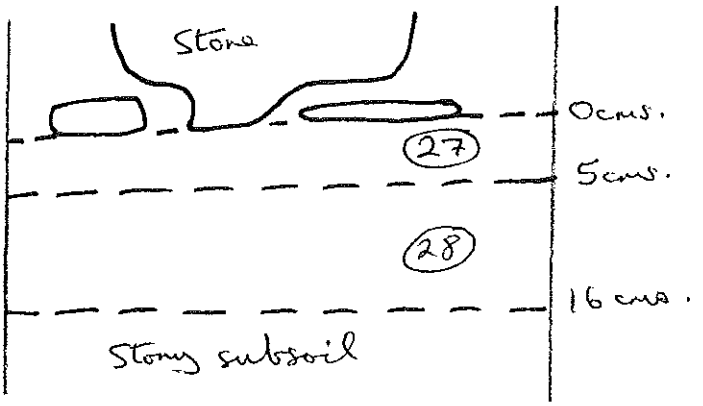
5
7
9
11
1978-81
1979
1981-82
1979-81
1981
1982
1980
TY MAWR 1978-82
Excavation sequence
0 5 10 15m
N

Fig. 2

2) First Enclosure Phase (20 below 16).



The soil buried beneath the enclosure wall was described as follows:

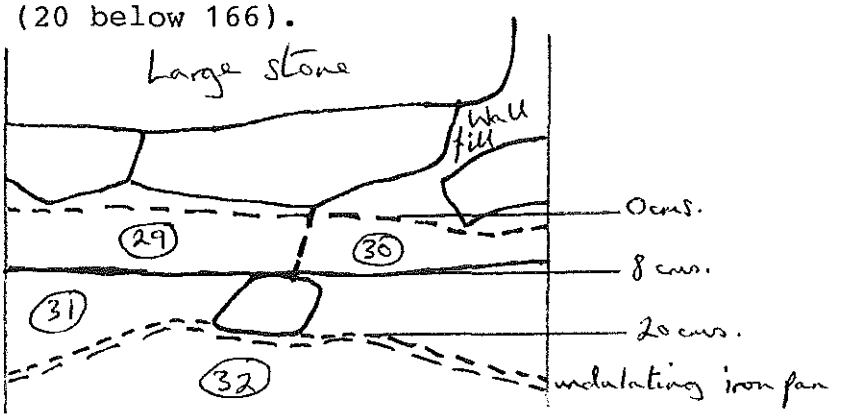
0-5cms. was very dark greyish brown (10YR3/2) friable coarse sandy loam with moderate medium subangular blocky structure. Rare fine rusty mottles occurred in root channels and charcoal fragments were present. Stones were few (gravel) and roots common medium to fine fibrous.

5-16cms. was dark brown (10YR3/3) friable fine sandy loam with moderate medium subangular blocky structure. Stones were common - gravel and some large boulders. Roots were few fine fibrous and occasional medium distinct strong brown (7.5YR5/6) mottles occurred.

Below 16cms. was very stony (about 80%) with a moderately friable, structureless, dark yellowish brown (10YR4/4) fine sandy loam matrix. Roots were absent.

The soil appeared to be a Brown Ranker. Samples 27 and 28 were taken as shown in the sketch.

3)Below Hut Wall (20 below 166).



The wall fill was dark, silty, rather humic material, containing many roots, which appeared to be soil material washed down between the stones, and the soil buried beneath the wall was sampled as shown in the sketch and described as follows:

Sample 29 was brown/dark brown (7.5YR4/4) friable fine sandy (silt) loam with moderate medium subangular blocky structure. Stones were few, gravel to small, roots abundant medium to fine fibrous and charcoal fragments were present.
Sample 30 was very dark brown (10YR2/2) friable medium sandy loam

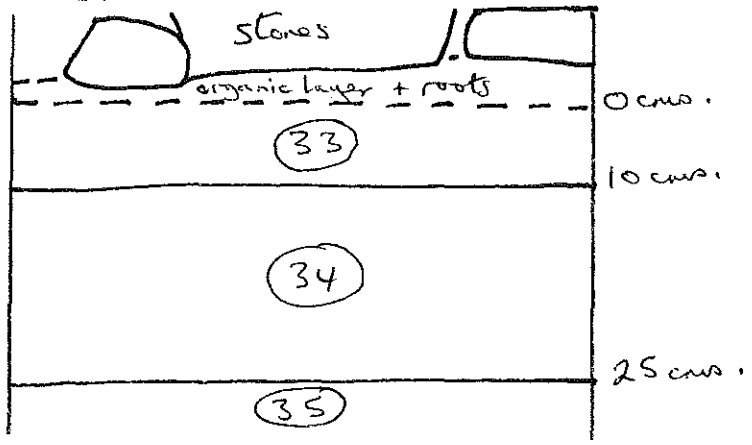
with moderate medium subangular blocky structure. Mottles were absent.

Sample 31 was dark yellowish brown (10YR4/6) friable medium sandy loam with moderate medium subangular blocky structure. Roots were few, fine fibrous and a few small stones were present.

Sample 32 was mixed yellowish brown (10YR5/6) and strong brown (7.5YR4/6) friable medium loamy sand with weak medium subangular blocky structure. Roots were absent.

Between 31 and 32 was an undulating iron pan, with pockets of grey material, which was probably a post-depositional feature.

4) The Second Enclosure Phase (20 under 43).



An organic layer containing roots occurred immediately below the stones of the wall and underlying this was a buried soil, which was described as follows:

0-10cms. was brown/dark brown (10YR4/3) friable coarse sandy loam with moderate medium subangular blocky structure. Occasional fine rusty mottles were seen and some pale grey patches. Roots were common medium to fine fibrous and stones few, gravel to small.

10-25cms. was dark yellowish brown (10YR3/6) friable coarse sandy loam with moderate medium subangular blocky structure. Stones were common, gravel to small, and roots few fine fibrous. Common medium distinct strong brown mottles occurred.

Below 25cms. was brownish yellow (10YR6/6) (with about 40% coarse distinct strong brown (7.5YR5/6) mottles) moderately friable coarse loamy sand with weak medium subangular blocky structure. Stones were common, gravel to large; roots absent. Occasional patches of manganese oxide mottling and some darker material from above were noted.

Samples 33 to 35 were collected as shown in the sketch.

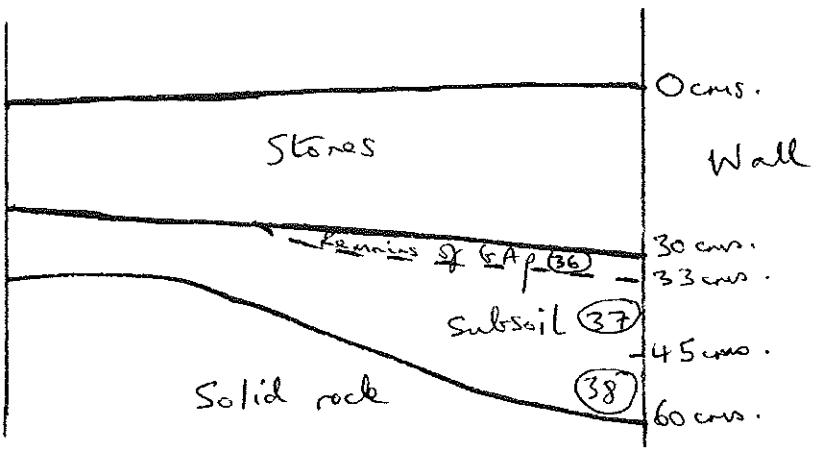
5)Lower Field Boundary (67).

The buried soil appeared to have been truncated. The remains of the bAp horizon consisted of dark brown (10YR3/3) friable fine sandy loam with common fine distinct rusty mottles in root channels and moderate medium subangular blocky structure. Stones

were few (gravel), roots few medium to fine fibrous, and occasional charcoal fragments were noted.

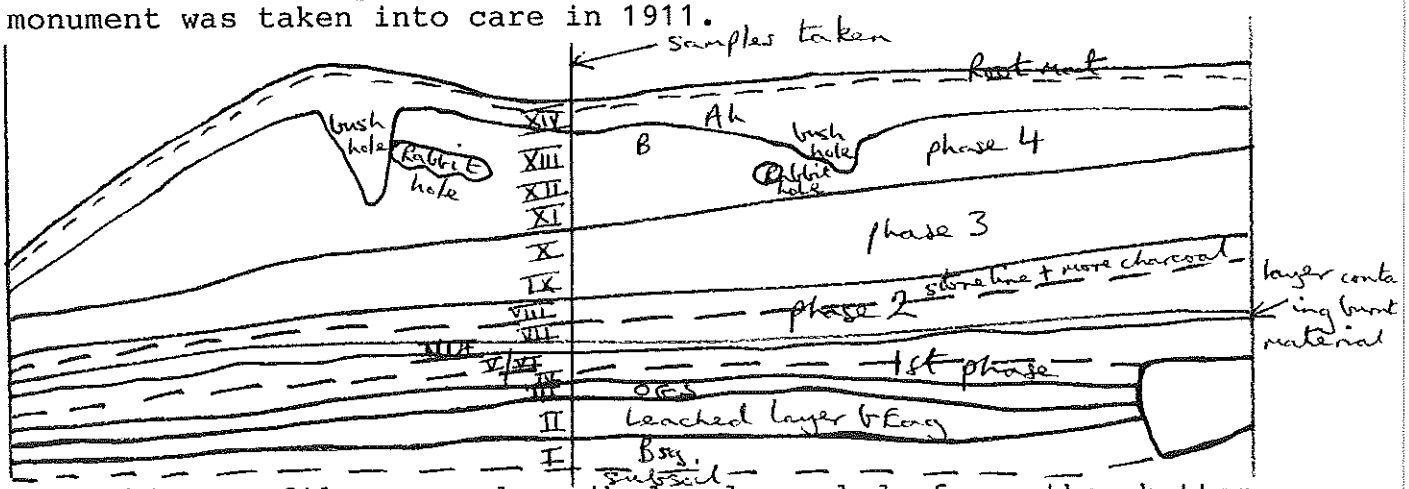
The subsoil, which may have consisted (at least in part) of colluvium, was yellowish brown (10YR5/4) friable medium sandy loam with abundant coarse to fine distinct strong brown (7.5YR5/6) mottles and moderate medium subangular blocky structure. Stones were common, gravel to medium; roots few fine fibrous. Root channels, and what may have been relict earthworm burrows, contained darker material from above.

Samples 36 to 38 were collected as shown in the sketch.



Structure Z

In 1982 soils associated with Structure Z, a section across which is shown in Figures 3 and 4 , were examined and a profile through the lynchet is described in detail below. It was rumoured that the "terraced fields" associated with the hut circles at Ty Mawr were last ploughed early in this century, before the monument was taken into care in 1911.



This profile was described and sampled from the bottom upwards, as shown in the sketch. Earthworm activity was evident throughout the profile, except at the base - possibly because the original soil was too acid.

The buried subsoil was yellowish brown (10YR5/6) moderately friable coarse sandy loam with moderate medium angular blocky structure. Stones (mainly schist fragments) were 40%, gravel to large; roots absent. Between 30 and 70% coarse, distinct to diffuse, strong brown (7.5YR4/6) mottles were noted - these were very variable downslope, presumably because of variations in

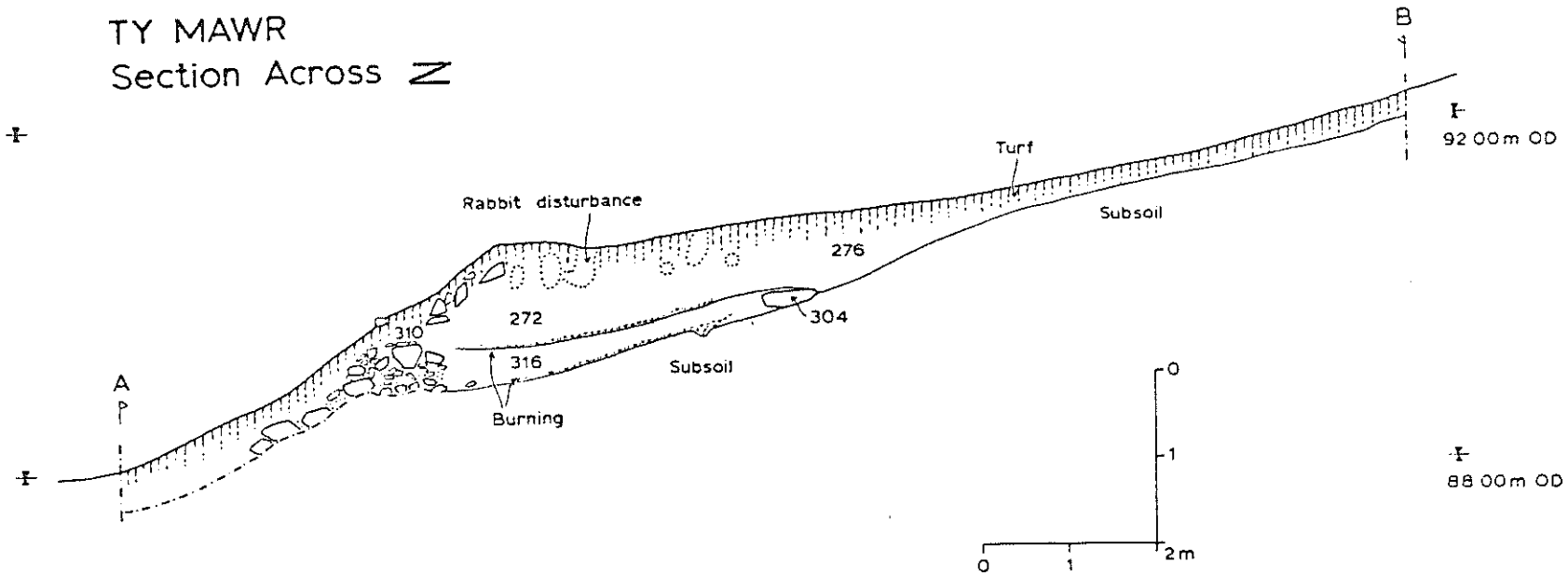
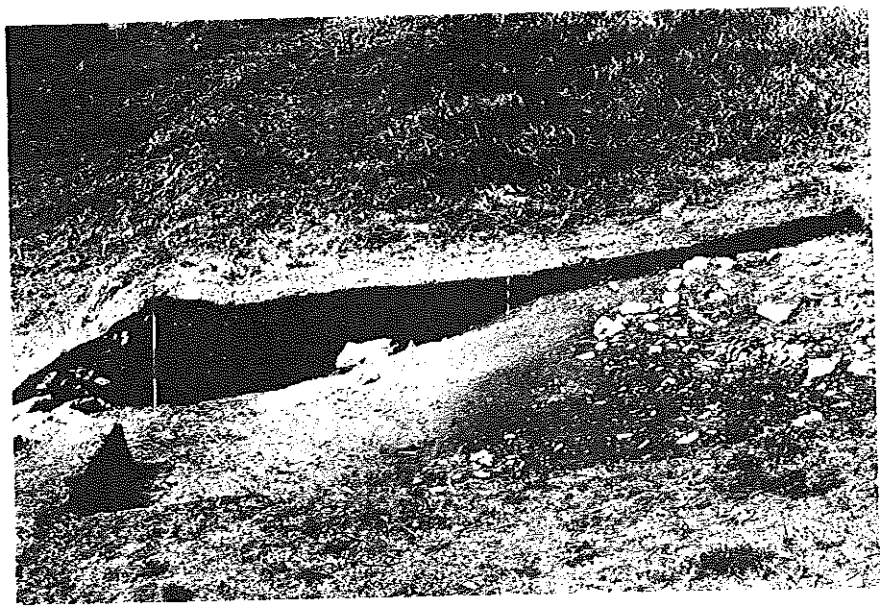

TY MAWR
Section Across Z
B
92 00m OD
Turf
Rabbit disturbance
Subsoil
276
272
304
310
316
Subsoil
A
Burning
0
1
88 00m OD
0
1
2m

Fig. 3

Figure 4.



drainage.

The bEag horizon was light yellowish brown (10YR6/4) moderately friable coarse sandy loam, possibly containing slightly more silt than the subsoil, with moderate medium blocky structure. About 30% strong brown (7.5YR4/6) (distinct with diffuse edges) and occasional 7.5YR5/8 mottles were noted. Occasional charcoal fragments occurred, stones were 30% gravel to large and rare fine fibrous roots were seen. In places the horizon was much paler in colour (e.g. very pale brown, 10YR7/4), presumably due to an increase in gleying intensity.

The old ground surface (bAp) had plough marks, which extended down into the subsoil thereby incorporating bAp material into the lower horizons. This buried plough soil consisted of dark brown (10YR3/3) weakly friable coarse sandy (silt) loam with weak medium subangular blocky structure. A few charcoal fragments and medium to fine fibrous roots were noted. Stones were 20% gravel to large and occasional fine distinct strong brown (7.5YR5/6) mottles were seen in root channels.

The OGS was buried by 4 phases of plough wash. The first (lowest) phase consisted of dark yellowish brown (10YR4/4) weakly friable, moderately firm coarse sandy (clay) loam, slightly plastic and with weak medium subangular blocky structure. Stones were 30% gravel to medium, including quartz fragments, common small charcoal fragments were seen and roots were few, medium to fine fibrous. Rare strong brown (7.5YR5/8) medium distinct mottles were associated with weathering sandstone fragments. All phases of the plough wash were similar, in that they contained mixed rounded and angular medium size stones in the upper half of the layer.

The second plough wash phase was similar in colour and texture to the first but had slightly better structure (moderate medium subangular blocky), was moderately friable and contained many charcoal fragments, some of which were large. Roots were common medium to fine fibrous and stones 30% gravel to medium, including a vague line of medium size angular stones at the top of this layer. Mottles were absent.

The third phase was similar to the second but slightly stonier in the lower part of the layer. The top of this layer appeared to contain some darker material from above. Earthworm activity became very intense at this level (sample X).

The fourth phase was brown/dark brown (10YR4/3), mixed with about 20% dark yellowish brown (10YR4/4), friable medium sandy clay loam with moderate medium subangular blocky structure. Roots were many, coarse to fine fibrous and occasionally woody; stones were about 20% gravel to medium. Occasional strong brown (7.5YR5/8) medium distinct mottles were noted. Vague stone lines and many charcoal fragments were seen.

The modern soil was developed in the 4th. plough wash phase and thus the top of this layer effectively formed the modern subsoil. The modern Ah horizon (which was overlain by a root mat), consisted of friable, fairly humic, very dark brown (10YR2/2) medium sandy clay loam, slightly siltier than below, with strong

medium to fine subangular blocky structure. Roots were abundant, fine to coarse fibrous and occasionally woody; stones 10% gravel to medium.

Ploughing during the 1st. World War of the stabilised vegetated soil (Ah horizon) probably led to the darker, more humic, nature of the 4th. phase of the plough wash. It is likely that a long period had elapsed between the 1st.WW ploughing and any previous cultivation of this soil. The 1st., 2nd. and 3rd. phases of plough wash were essentially similar, with some mixing of material from the 4th. phase with the top of the 3rd. phase due to increased earthworm activity. There was a prominent layer of burnt material at the top of the first phase of plough wash. It is likely that the original (pre-plough wash) soil supported vegetation similar to that found on the site today (i.e. plants suited to growing on relatively shallow acidic soils).

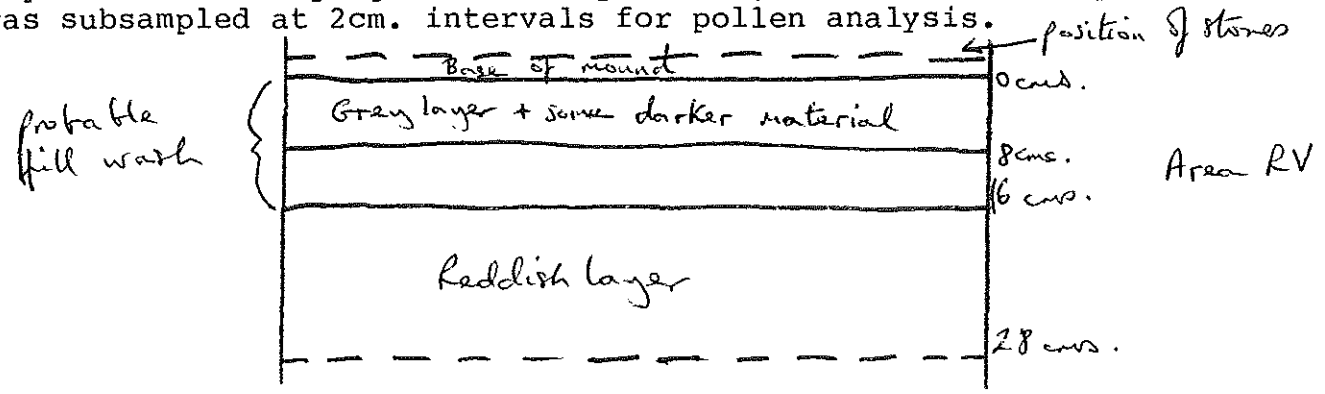
The following samples were collected from Structure Z:

Sample No.	Excavator's No.	Depth cms.	Horizon
HK XIV	233	5-14	Modern Ah
HK XIII	232	14-28	Modern B
HK XII	231	28-42	4th. phase of
HK XI	230	42-56	plough soil
HK X	229	56-68	3rd. phase of
HK IX	228	68-80	plough soil
HK VIII	227	80-89	Stone line with more charcoal
HK VII	226	89-95	2nd. phase
HK VIA	225	95-102	Burnt layer
HK VI	224	102-107	1st. phase of
HK V	223	107-116	plough soil
HK IV	222	116-122	"
HK III	217	122-130	OGS
HK II	216	130-139	Leached/gleyed horizon
HK I	215	139+	Subsoil

In addition, 4 subsamples were taken of the OGS for pollen analysis, i.e. 221(A)122-124cms.,220(B)124-126cms.,219(C)126-128cms.,218(D)128-131cms.

Buried Soil Below Burnt Mound

Layers were distinguished as shown in the sketch. Samples were taken from the upper (HKA, 0-8cms.) and lower (HKB,8-16cms.) bAp horizon, which probably consisted of hill wash, and the top of the underlying reddish layer (HKC, 16-20cms.). The profile was subsampled at 2cm. intervals for pollen analysis.



ANALYTICAL RESULTS

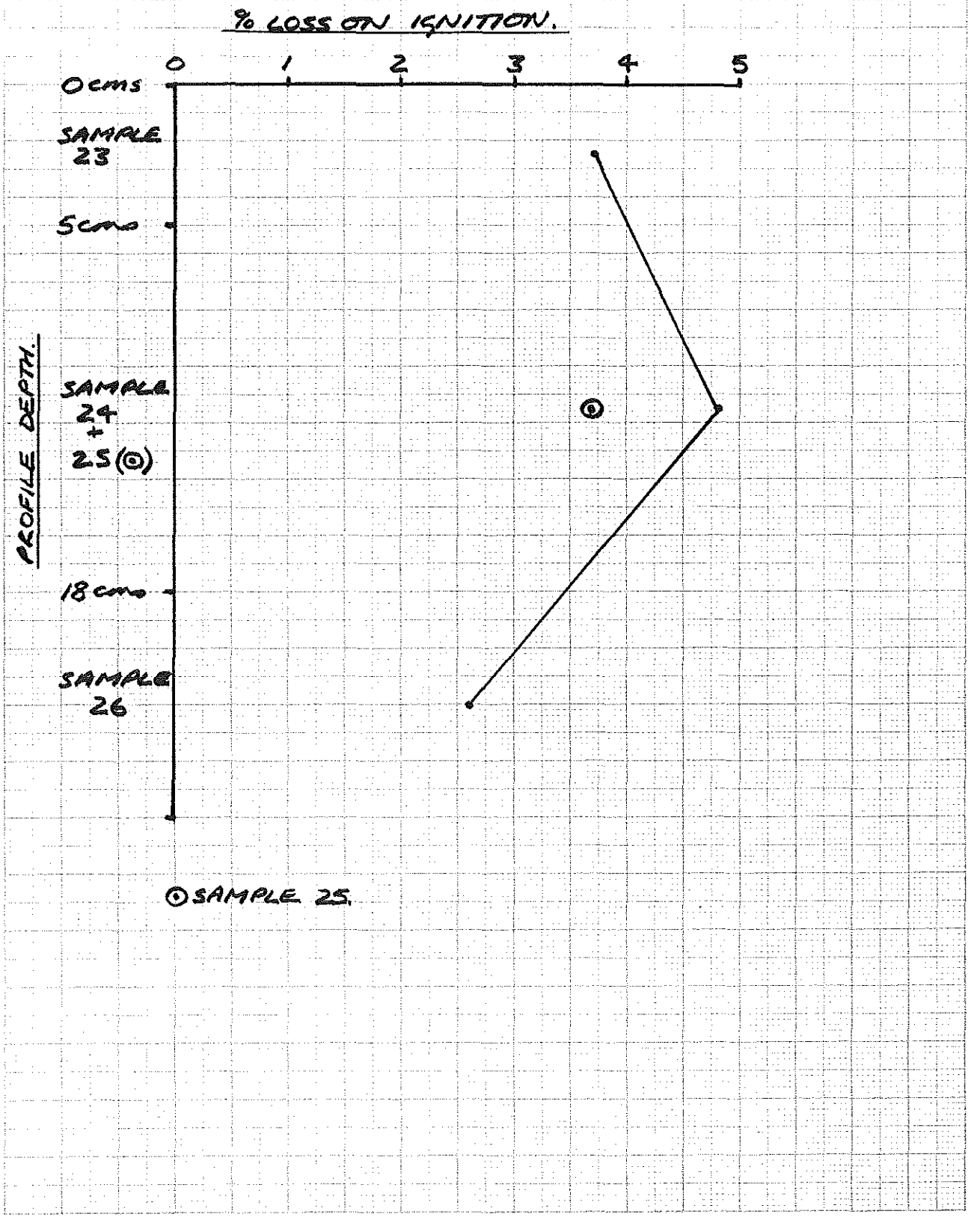
1) For samples from 1979 (The Trench) - addendum to A.M.L. Report No. 3087.

Sample No.	Depth cms	Sand %	Silt %	Clay %	l.o.i. %	pH
Profile 1						
I	0-5	78	20	2	33.3	
II	5-7	72	24	4	13.8	
III	7-20	71	24	5	11.1	
IV	20-35	58	36	6	7.6	
V	35+	58	36	6	8.0	
Profile 2						
I	5-10	62	34	4	11.5	3.7
II	10-25	60	40	0	7.9	4.2
III	25-35	53	43	4	3.3	4.1
IV	35+	58	40	2	3.3	4.4
Profile 5						
I	0-10	66	30	4	13.6	
II	10-30	62	38	0	4.6	
III	30-47	62	34	4	3.8	
IV	40-50	61	37	2	2.8	
V	47-60	61	39	0	2.7	
VI	60+	64	35	1	2.6	

2. For samples from 1981:

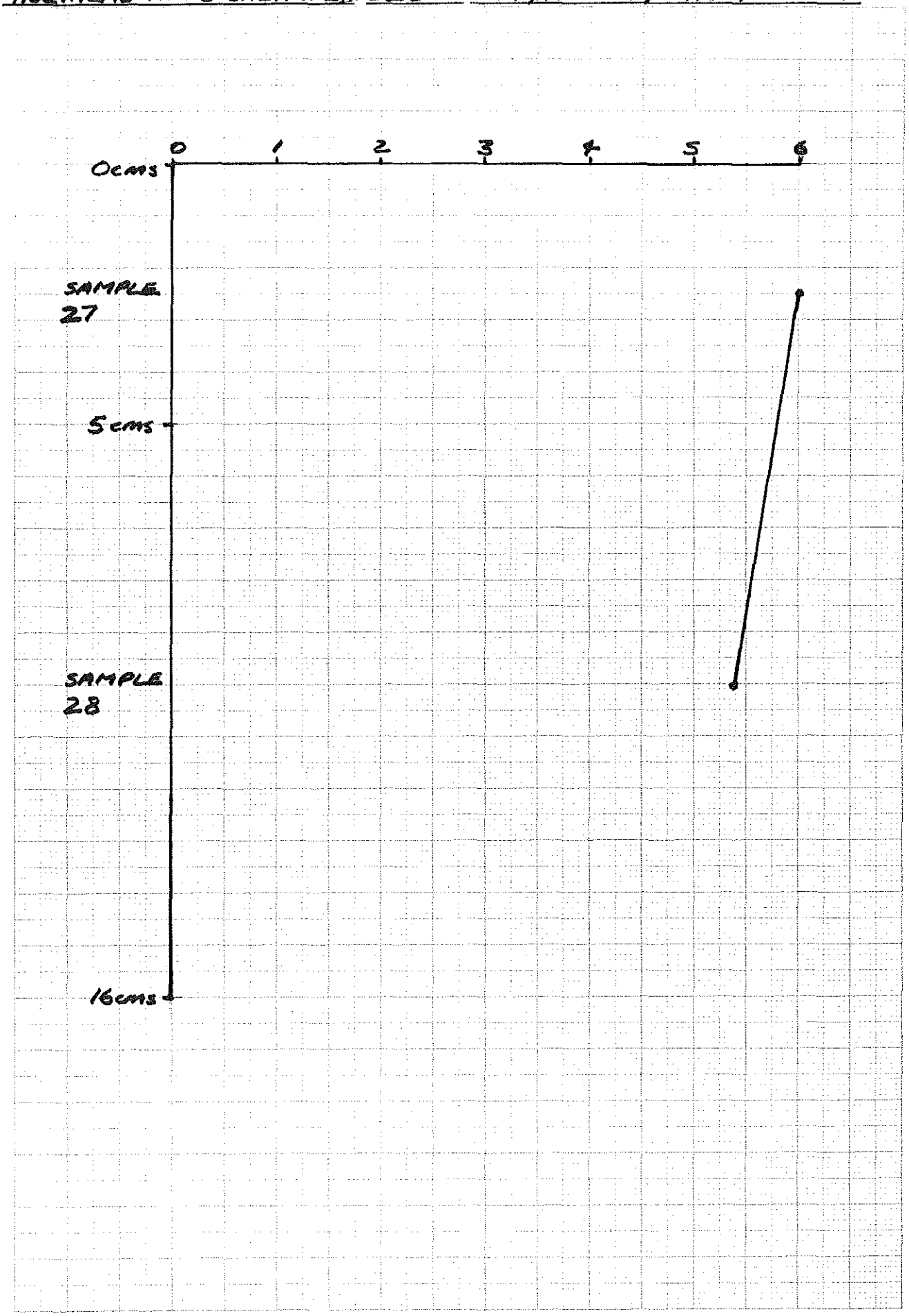
Sample No.	Depth cms.	Sand %	Silt %	Clay %	l.o.i. %	
1)Field wall - ?Earliest phase (20 below 30). See Figures 5 and 6						
23	0-5	43.2	48.4	8.4	3.7	
24	5-18	39.0	45.2	15.8	4.8	
25	5-18	48.8	37.0	14.2	3.7	other side of section
26	18+	40.8	45.4	13.8	2.6	
2)First enclosure phase (20 below 16). See Figures 7 and 8.						
27	0-5	35.0	47.0	18.0	6.0	
28	5-16	37.2	44.8	18.0	5.4	
3)Below hut wall (20 below 166). See Figures 9 and 10.						
29	0-8	54.8	33.4	11.8	8.5	
30	0-8	45.2	38.4	16.0	7.2	other side of section
31	8-20	42.3	40.2	18.1	5.3	
32	20+	37.4	44.6	18.0	1.8	
4)Second enclosure phase (20 under 43). See Figures 11 and 12.						
33	0-10	46.8	37.2	16.0	4.6	
34	10-25	50.8	35.4	13.8	4.6	
35	25+	46.6	39.6	13.8	2.5	
5)Lower field boundary (67). See Figures 13 and 14.						
36	30-33	47.2	36.6	16.2	5.5	
37	33-45	37.4	44.4	18.2	3.2	
38	45-60	39.4	44.8	15.8	2.1	

HOLYHEAD. H.M.C. '81. SITE 1. ORGANIC MATTER: % LOSS OF WEIGHT ON IGNITION 375°C



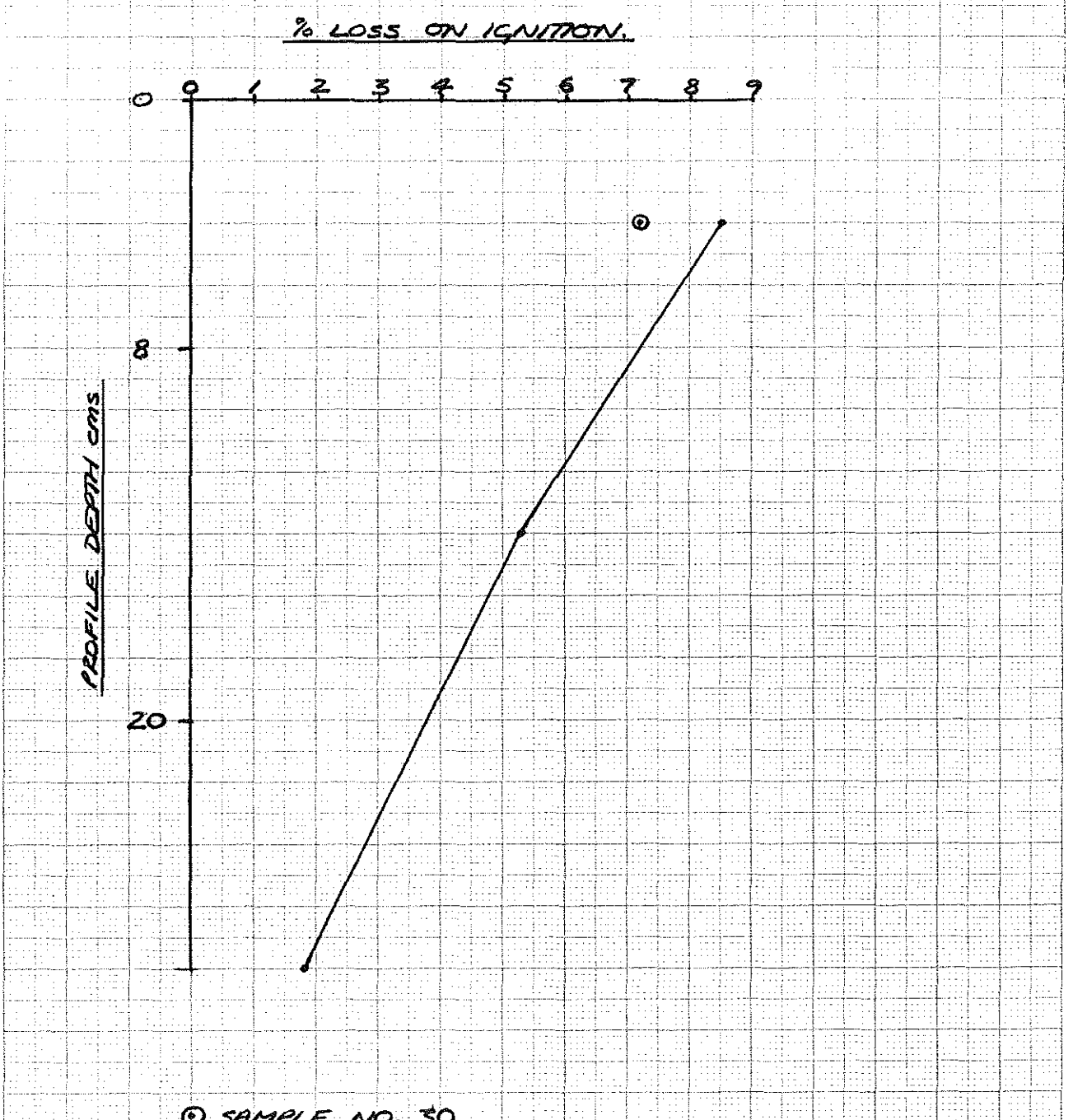
HOLYHEAD. H.M.C. '81. SITE 1.

HOLYHEAD. H.M.C. '81. SITE 2. % LOSS OF WEIGHT ON IGNITION, 375°C.

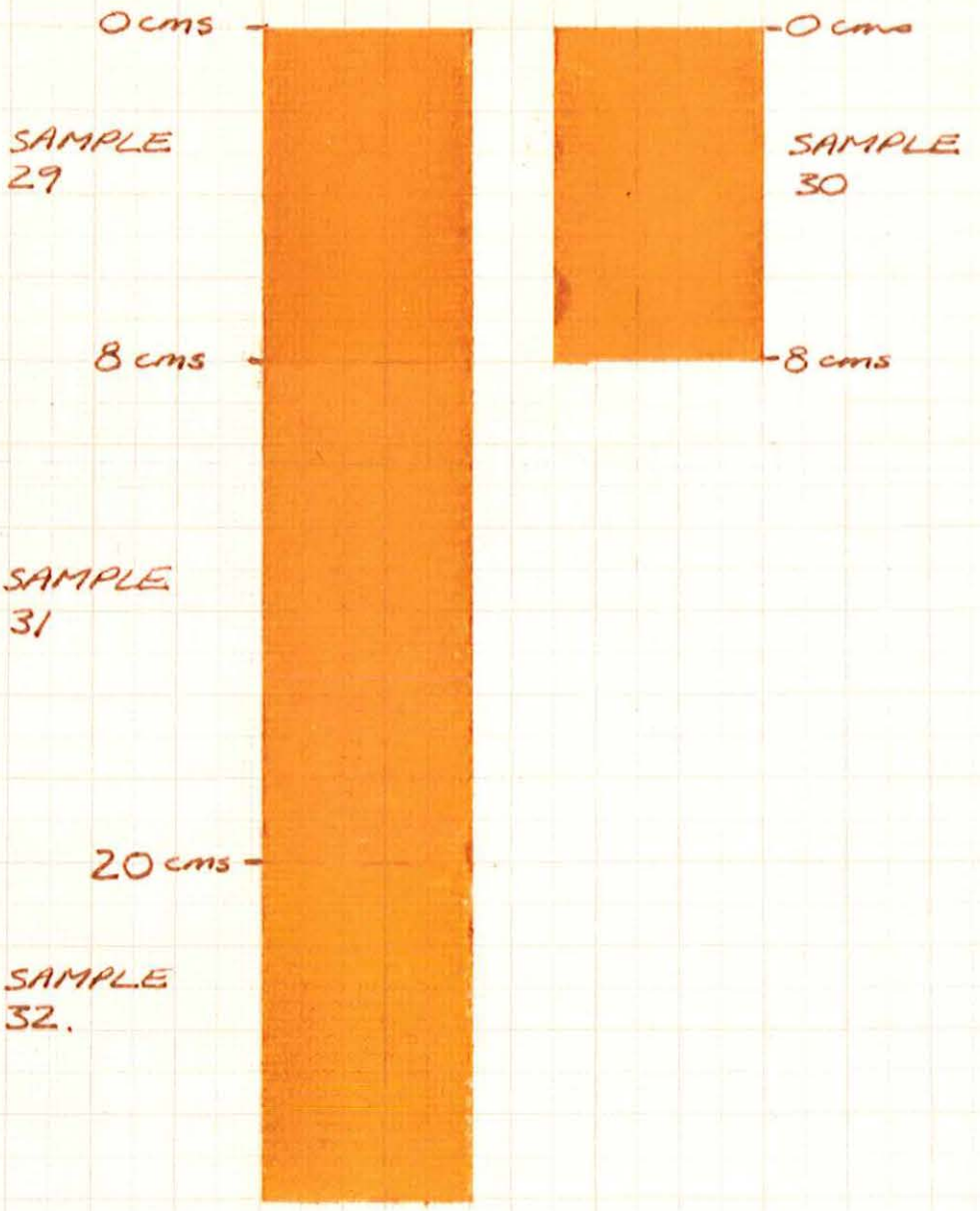


HOLYHEAD. H.M.C. '81. SITE 2.

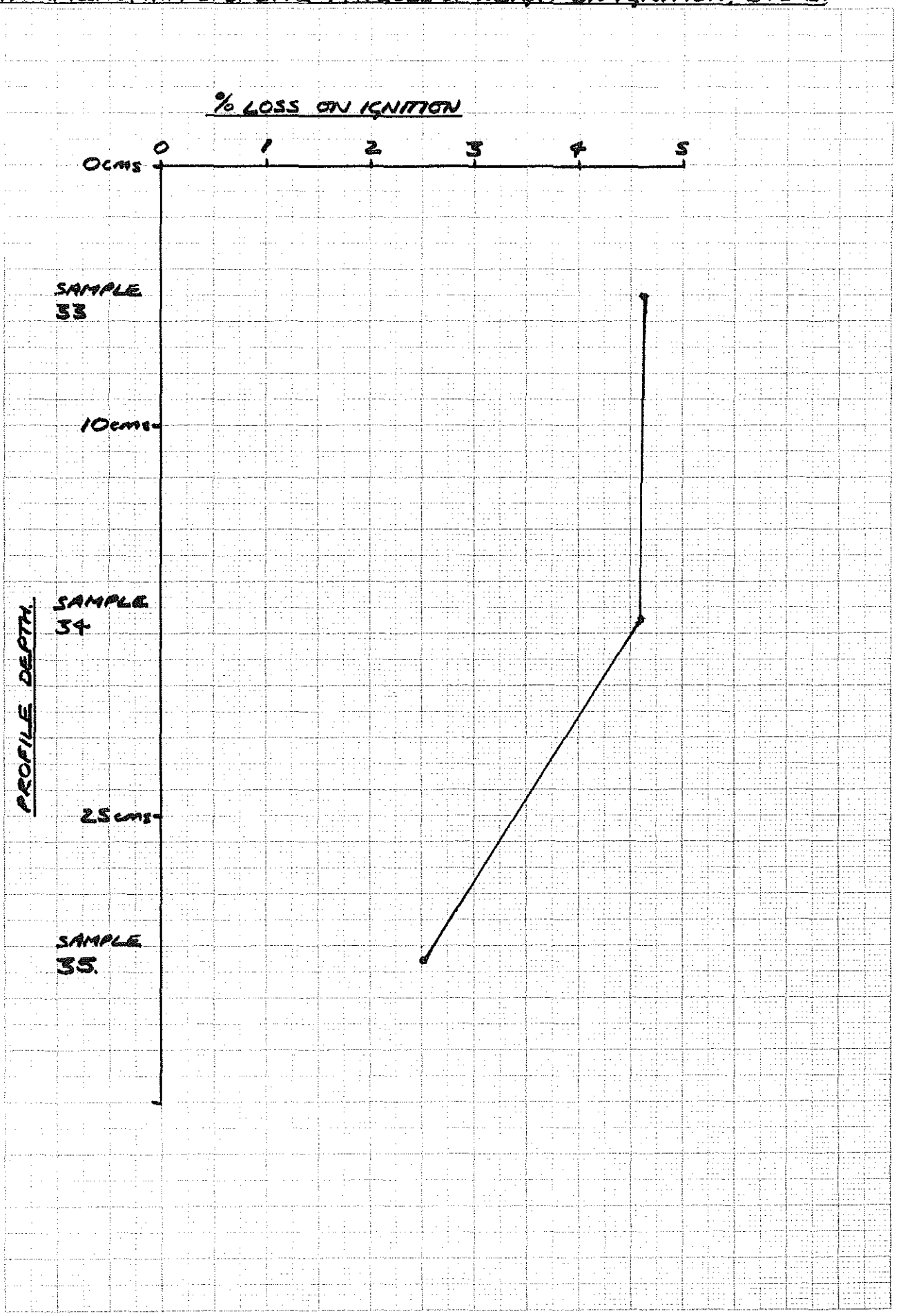
HOLYHEAD H.M.C. 81. SITE 3: ORGANIC MATTER. % LOSS OF WEIGHT ON IGNITIO
375°C



HOLYHEAD H.M.C. 81. SITE 3

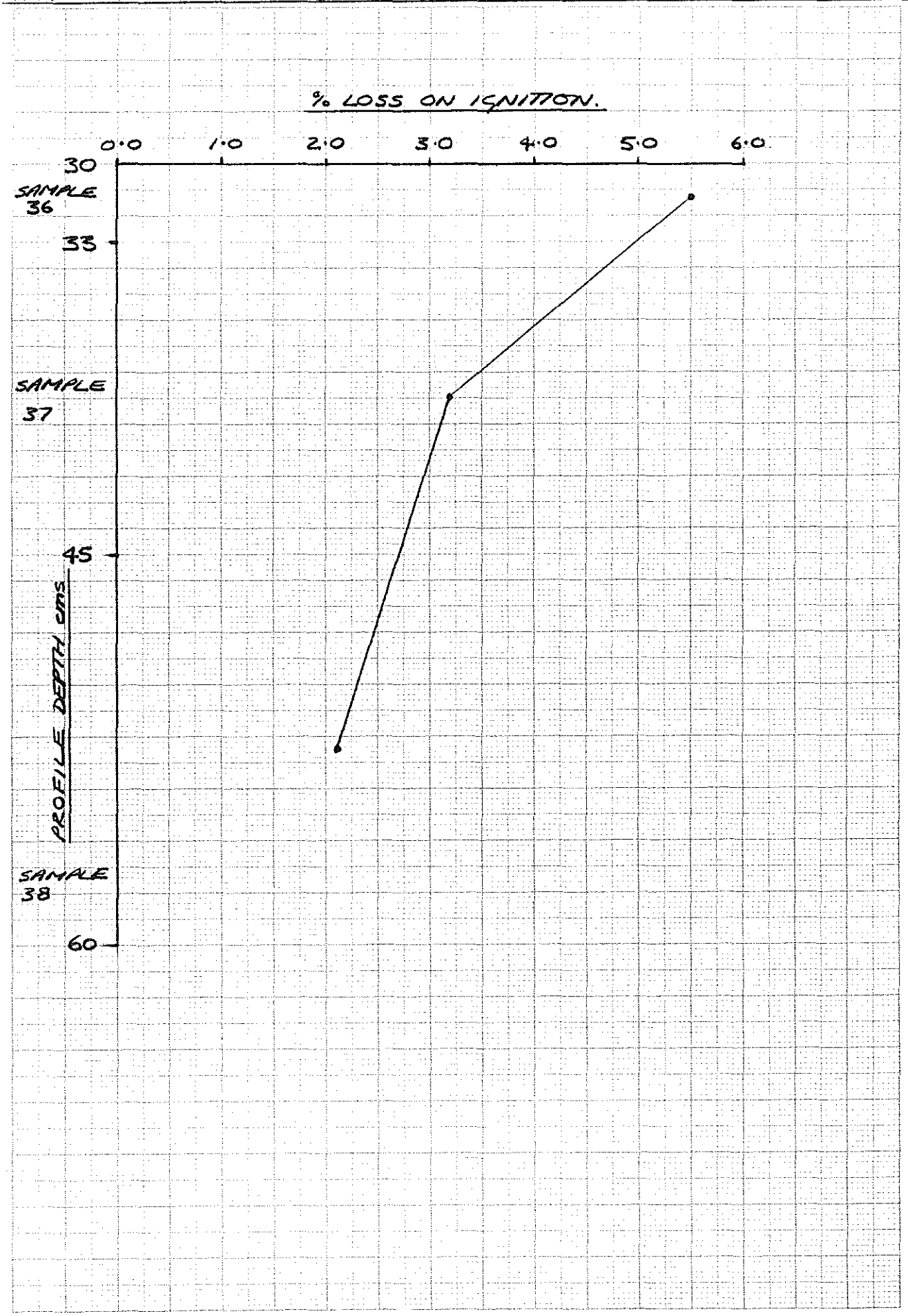


HOLYHEAD. H.M.C. '81. SITE 4. % LOSS OF WEIGHT ON IGNITION, 375°C.

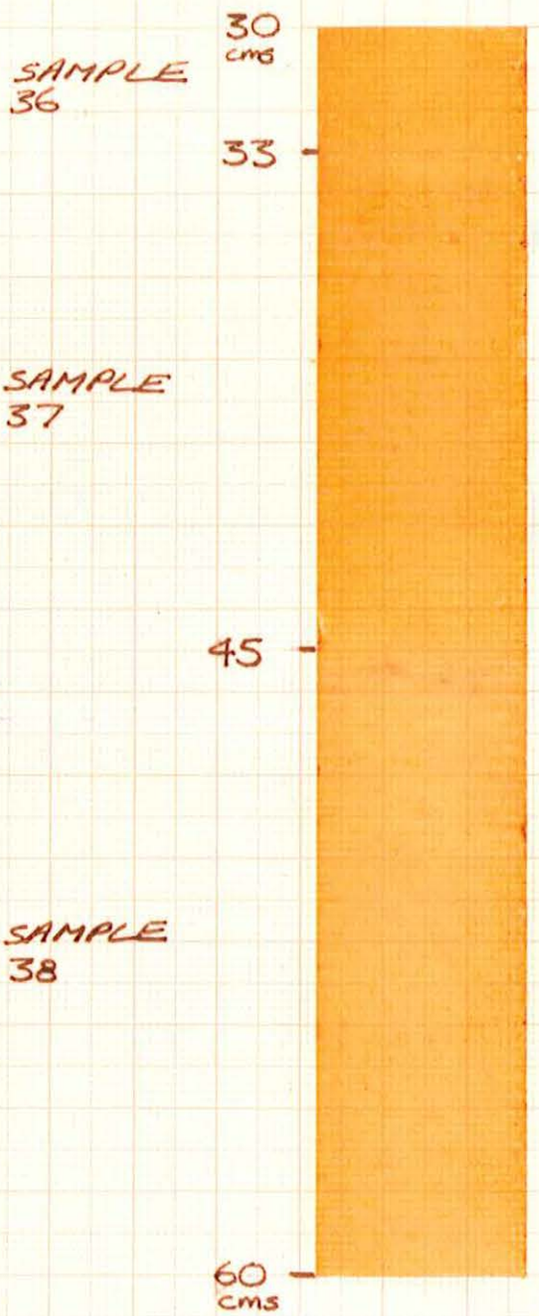


HOLYHEAD H.M.C. '81 SITE 4.

H.M.C. SITE 5: ORGANIC MATTER: % LOSS OF WEIGHT ON IGNITION 375°C



H.M.C.: SITE S.



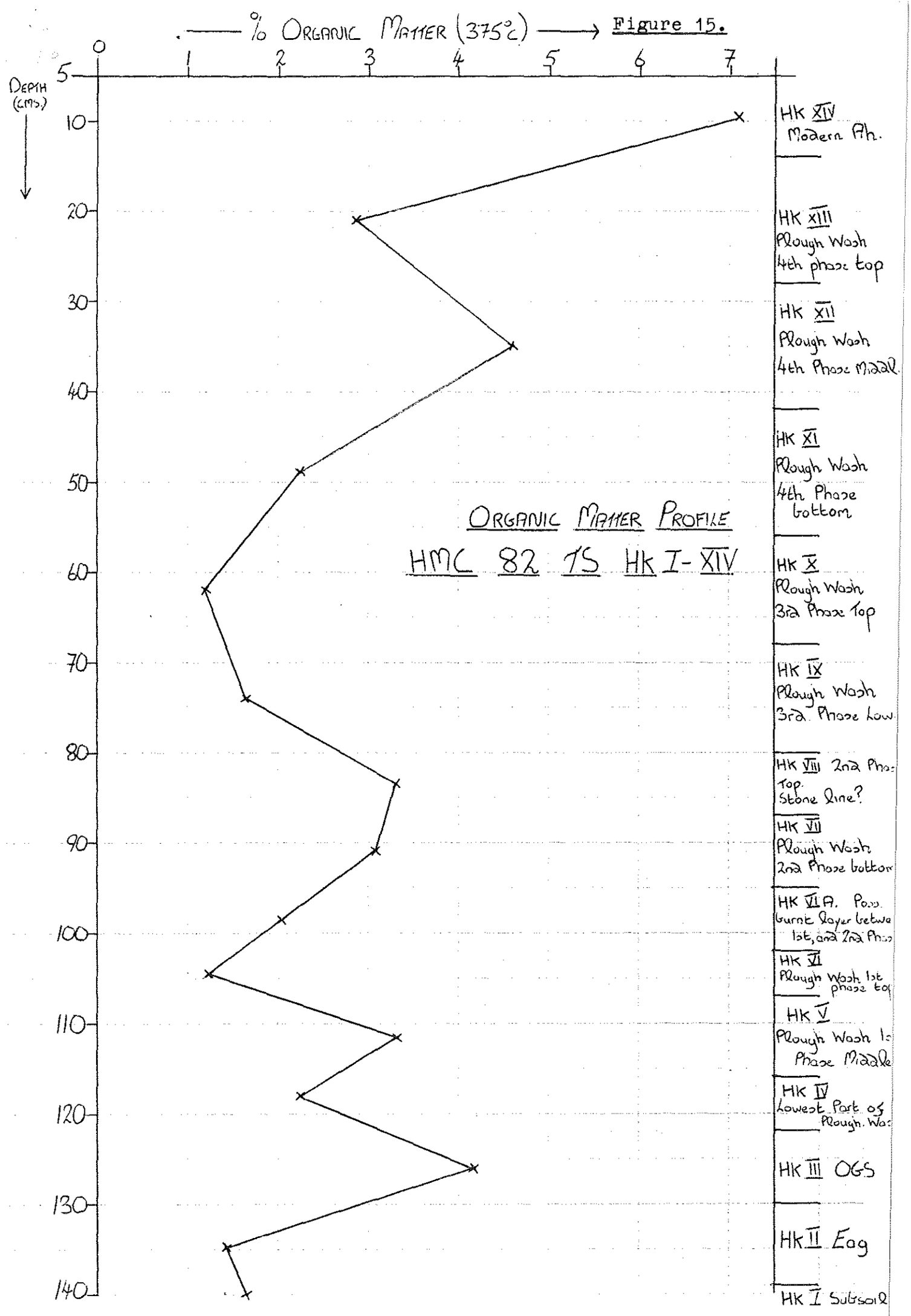
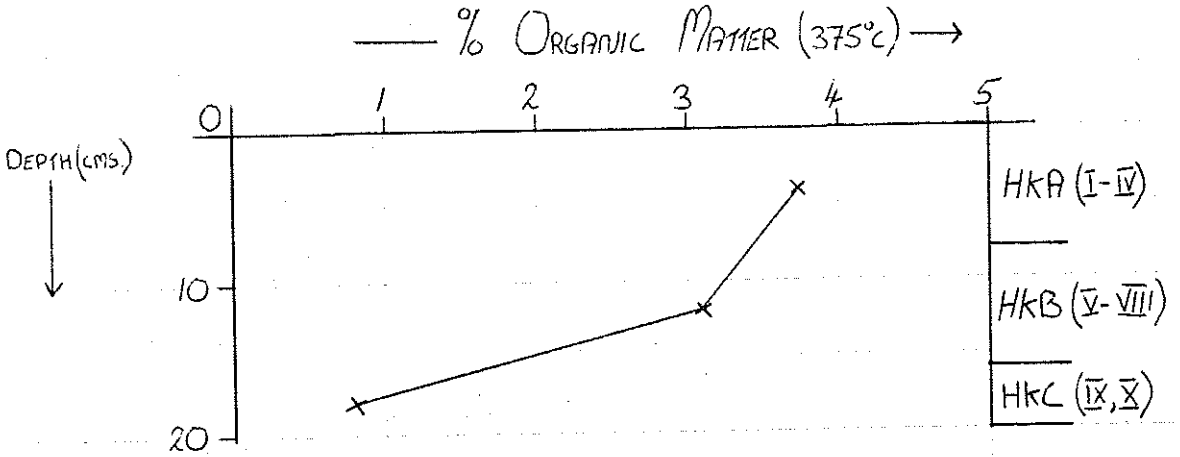

% Organic Matter (375°c) →
Figure 15.
0
1
2
3
4
5
6
7
Depth (cms.)
5
10
20
30
40
50
60
70
80
90
100
110
120
130
140
Organic Matter Profile
HMC 82 TS Hk I-XIV
Hk XIV Modern Ah.
Hk XIII Plough Wash 4th phase top
Hk XII Plough Wash 4th Phase Middle
Hk XI Plough Wash 4th Phase bottom
Hk X Plough Wash 3rd Phase Top
Hk IX Plough Wash 3rd Phase Low
Hk VIII 2nd Phase Top Stone line?
Hk VII Plough Wash 2nd Phase bottom
Hk VI A. Poss. burnt layer betwe 1st, and 2nd Phas
Hk VI Plough Wash 1st phase top
Hk V Plough Wash 1st Phase Middle
Hk IV Lowest Part of Plough. Was
Hk III OGS
Hk II Eag
Hk I Subsoil

Figure 16.

Organic Matter Profile

HMC 82 RV Buried Soil Below Burnt Mound



3. For samples from 1982:

Sample No.	Depth cms.	Sand %	Silt %	Clay %	l.o.i %	Excavator's No.
Structure Z See Figure 15.						
XIV	5-14	49.6	37.0	13.5	7.1	233
XIII	14-28	42.9	38.8	18.4	2.9	232
XII	28-42	41.7	39.6	18.8	4.6	231
XI	42-56	44.4	38.0	17.6	2.3	230
X	56-68	46.4	38.0	15.6	1.2	229
IX	68-80	50.4	32.0	17.6	1.6	228
VIII	80-87	46.4	36.0	17.6	3.3	227
VII	87-95	41.6	43.6	14.8	3.1	226
VIA	95-102	51.2	34.0	14.8	2.0	225
VI	102-107	59.2	26.0	14.8	1.2	224
V	107-116	56.8	28.4	14.8	3.3	223
IV	116-122	55.2	30.0	14.8	2.3	222
III	122-130	55.2	30.0	14.8	4.2	217
II	130-139	59.2	26.0	14.8	1.4	216
I	139+	54.8	30.4	14.8	1.6	215
Area RV - Below burnt mound See Figure 16.						
HKA	0-8	52.0	27.6	20.4	3.7	234/7
HKB	8-16	Not Determined			3.1	238/41
HKC	16-20	54.0	26.0	20.0	0.8	242/3

COMMENTS

1)1981 Samples

The soil underlying the ?earliest phase of the field wall was a very shallow Brown Ranker, which appeared to have been considerably disturbed prior to burial. Sample 24 was quite different from the adjacent Sample 25, containing less sand, more silt and slightly more organic matter, suggesting that this was a very mixed deposit.

The soil beneath the first phase of the enclosure wall was also a very shallow Brown Ranker, the topsoil of which contained charcoal fragments and appeared to have been disturbed prior to burial. The soil buried by the second enclosure phase was less disturbed and showed signs of podzolisation.

Another very shallow soil occurred below the hut wall, having an iron pan which was probably post-depositional (due to changes in the soil drainage regime following burial). Sample 29 was more sandy, with less silt and clay, than Sample 30, indicating considerable disturbance of the upper part of the profile prior to burial.

The lower field boundary buried a truncated soil of variable depth, apparently derived from hill wash and disturbed prior to burial.

In general there were no large variations in sand, silt and clay contents of these soils, which reflect the local parent material. The soils tended to be shallow, sometimes gleyed (probably a predominantly post-burial phenomenon) and showing signs of podsolisation and pre-burial disturbance. The buried topsoils were fairly organic, similar to modern soils in the area, and probably supported vegetation similar to the present day.

2.1982 Samples

The buried soil associated with Structure Z was a shallow stagnopodzol similar to other buried soils on the site. The nature of the bAp horizon was confirmed by the presence of plough marks, some of which extended into the subsoil. An increase in organic matter content corresponded with the presence of the old ground surface (OGS), as shown in Figure 15, and variations in particle size distribution reflected the variable composition of the 4 phases of plough wash. Increases in organic matter at certain depths in the profile no doubt co-incide with a build up derived from vegetation stabilising the plough wash surface. The most interesting point is, of course, that these shallow soils were cultivated, although it is not clear what crops were grown or when and for how long cultivation took place. Even with terracing, soil erosion would have quite a problem, as evidenced by the build-up of plough wash behind the field wall.

The very low loss on ignition value for the reddish layer buried beneath hillwash in Area RV suggested that this material may have been burnt and thus represent remains of human activity prior to construction of the mound. The hill wash may have accumulated very rapidly and certainly appeared to consist of rather mixed material.

CONCLUSIONS

Findings for soils examined in 1981 and 1982 were similar to those made in 1978 and 1979, i.e. the buried soils were generally shallow, often gleyed and showed evidence of disturbance and podzolisation. In general these soils were similar to present-day soils in the area, which is not surprising in view of the exposed location of the site and the fact that buried soils at the nearby Neolithic site of Trefignath (Keeley, 1981) were also similar to adjacent modern soils. The soils of the fields below the huts were clearly cultivated but one can only speculate about the crops which may have been grown and the length of time the fields were in use. In the absence of results of pollen analyses, being undertaken by J. Greig, further interpretation of the soil profile data is not possible at this stage.

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