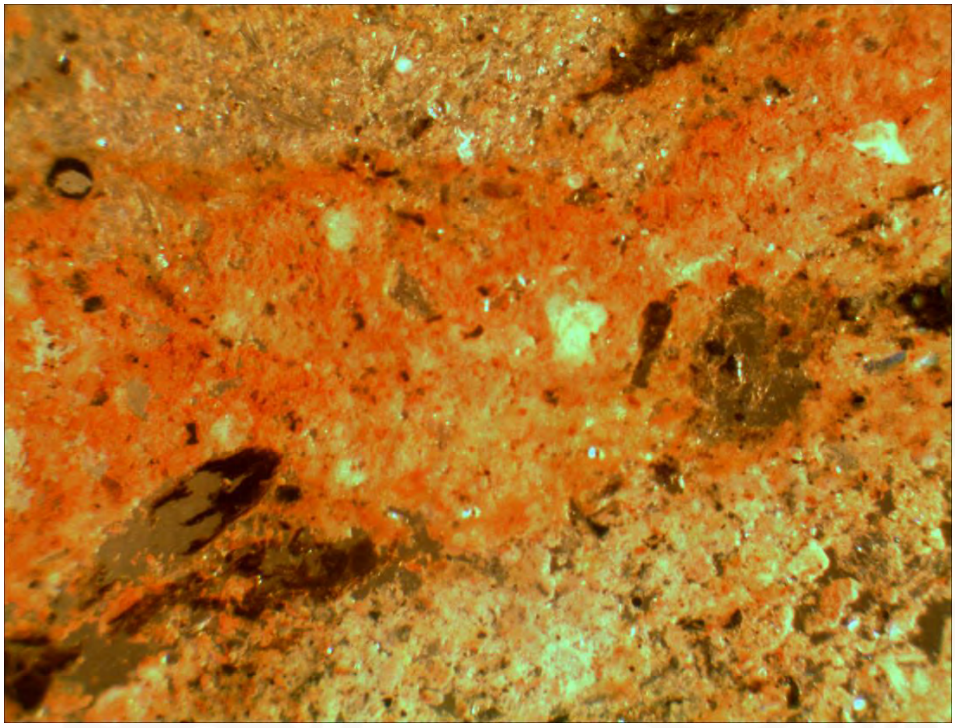
MINJASAFNIÐ Á AKUREYRI
AKUREYRI MUSEUM

# Gásir Post-Excavation Reports

## Volume 3



*Sólveig Guðmundsdóttir Beck and Michéle Hayeur Smith*
*Foreword by Orri Vésteinsson*

Fornleifastofnun Íslands
FS466-010714
Reykjavík
**2011**

*Cover image: A lens of rubified earth in oblique incident light (OIL) from layer 35.20.*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**Formáli**

Orri Vésteinsson

Frá því að uppgrefti á Gásum lauk sumarið 2006 hefur verið unnið jafnt og þétt að úrvinnslu rannsóknarinnar. Fyrri hluti þess ferlis felst í margvíslegum sérfræðigreiningum og kemur nú út þriðja heftið með skýrslum um greiningar á því sem fannst við uppgröftinn. Þar með erum við skrefi nær lokahluta úrvinnslunnar sem felst í mótun endanlegra ályktana og skrifum á lokaskýrslu.

Í þessu hefti á Sólveig Guðmundsdóttir Beck allar skýrslurnar fyrir utan eina sem gerð er af Michèle Hayeur-Smith. Gásaverkefnið hefur átt því láni að fagna að hafa fengið til liðs við sig unga og upprennandi vísindamenn sem beita nýjustu tækni og aðferðum við að greina leifar sem fyrri kynslóðir fornleifafræðinga gat aðeins dreymt um að hægt væri að krefja sagna um fortíðina. Þær sýna vel hvaða árangri nákvæm gagnaöflun á vettvangi getur skilað þegar sýnin eru greind af nákvæmni og hugvitssemi.

Fyrsta skýrsla Sólveigar er lokagreining hennar á örformgerðarsýnum sem tekin voru við uppgröftinn. Greiningin staðfestir aðrar vísbendingar um að aðeins var búið í búðunum árstíðabundið og að á milli stóðu þær opnar fyrir veðri og vindum. Örformgerðargreining á ösku- og gólflögum sýnir að á Gásum hefur mór verið aðaleldsneytið þó einnig hafi verið brennt viði og þangi. Allur bruninn sem ummerki sást um í örformgerðarsýnunum er af venjulegum matareldi. Ekkert fannst í sýnunum sem benti til að herbergin hafi gegnt mismunandi hlutverkum eða að einhver sérstök starfsemi hafi farið fram í þeim önnur en að fólk hafðist þar við og eldaði sér mat.

Önnur skýrsla Sólveigar fjallar um steina úr uppgreftinum, bæði gripi úr steini og steina sem tíndir hafa verið upp og bornir til Gása. Greining hennar mun koma að miklum notum við frekari rannsóknir á gripasafninu en hún sýnir líka að á Gásum var hátt hlutfall af innfluttum steini (>50%) miðað við t.d. Mývatnssveit á víkingaöld (þar sem hlutfallið var <30%). Þetta helgast að stærstum hluta af innfluttum gripum á borð við bökunarhellur en líka mögulega af því að kjölfesta úr skipunum hafi orðið eftir í búðunum. Þá vekur athygli að íslenskir steinar eru einkum frá næsta nágrenni Gása og enginn utan Norðurlands, en steinar sem fundust í víkingaaldarbólstöðum í Mývatnssveit voru mun víðar að reknir og gæti þetta bent til að Gásakaupstaður hafi lítið verið sóttur af fólki úr öðrum fjórðungum.

Þriðja skýrsla Sólveigar fjallar um gjall og hroða sem fannst við uppgröftinn. Allmörg eldstæði komu í ljós og talsvert magn af hroða sýnir að í þeim hefur mó verið brennt og eldurinn brunnið við háan hita, um 800 °C, hærri en þarf til venjulegrar matseldar. Þó er ekki útilokað að hroðinn sé afleiðing af óvenjuheitum matareldum og er ekki hægt að túlka hann sem vísbendingu um iðnað eða sérhæfða frameliðslu af einhverju tagi. Járn hefur mögulega verið brætt og smíðað á Gásum, en hafi það verið í litlum mæli, mun minni en búast hefði mátt við. Mögulegt er að blý hafi verið brætt þar en ótvíræðar vísbendingar fundust um bræðslu kopars, og er mögulegt að meirihluti gjallsins standi í sambandi við koparsmíði. Vel getur hugsast að þessar niðurstöður gefi fyrst og fremst hugmynd um hvað fór fram í búðunum sjálfum. Uppgröfturinn náði ekki nema að mjög litlu leyti út fyrir búðirnar og má vel vera að járnbræðsla og / eða smíði hafi farið fram annarsstaðar á svæðinu.

Michèle Hayeur-Smith vinnur að umfangsmikilli rannsókn á íslenskum verfnaðarleifum og hefur gert frumgreiningu á vefnaði sem fannst á Gásum og fylgir skýrsla hennar með hér. Þessi greining mun nýtast við frekari greiningu gripasafnsins í heild auk þess sem Hayeur-Smith mun gera grein fyrir túlkun sinni á vefnaðinum frá Gásum byggða á samanburði við aðrar leifar frá miðöldum.

Við úrvinnslu Gásarannsóknarinnar er unnið eftir áætlun sem sett var saman 2006. Vegna fjárskorts hefur verkið gengið hægar en vonir stóðu upphaflega til en þó mjakast það áfram og smátt og smátt falla brotin saman og myndin skýrist sem hægt er að draga upp af Gásakaupstað á miðöldum. Skref í þá átt hafa þegar verið tekin með tveimur greinum sem birtust á árinu 2011:

- Orri Vésteinsson, Sigríður Þorgeirsdóttir & Howell M. Roberts (2011): ‘Efniviður Íslandssögunnar. Vitnisburður fornleifa um einokun og neyslu.’ *Upp á yfirborðið. Nýjar rannsóknir í íslenskri fornleifafræði,* ritstj. Orri Vésteinsson, Gavin Lucas, Kristborg Þórsdóttir & Ragnheiður Gló Gylfadóttir, Reykjavík, 71-93.
- Orri Vésteinsson (2011): ‘Kaupskipahöfnin Gásir í Eyjafirði.’ *Skírnir* 185(vor), 145-54.

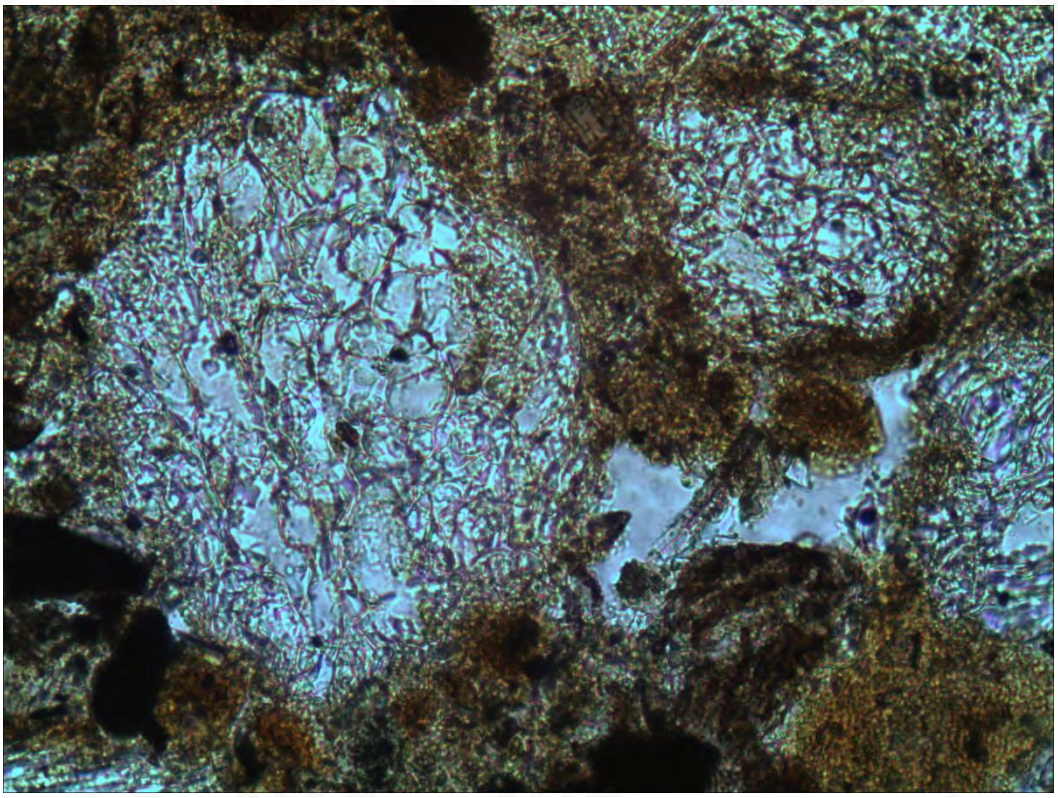
Enn þá eru ekki öll kurl komin til grafar í sérfræðigreiningum þó þeim hafi með þessari útgáfu fækkað mjög sem út af standa. Lítið þarf til að ljúka þeim og standa vonir til að hægt verði að byrja á ritun lokaskýrslu í byrjun árs 2012.

## Part One

# The Micromorphology of the Gásir Trading Booths.

Sólveig Guðmundsdóttir Beck

# The Micromorphology of the Gásir Trading Booths



**By Sólveig Guðmundsdóttir Beck**

## Contents

## Introduction

In the years 2001-2006 an extensive excavation took place in the north of Iceland at a place called Gásir on the west coast of Eyjafjörður. In written sources from the 12th to 14th centuries Gásir is mentioned in connection with trade and transport to and from Iceland but these sources do not give any major insight into the overall history, function or age of this important historical trading site. To remedy this lack of information the Akureyri Museum and the Institute of Archaeology in Iceland got together and opened up two large areas (together just under 1200 $m^2$ in size) at Gásir, targeting a large section of what was presumed to be trading booths (area A) and remnants of a church (area B). As excavation in area A progressed, two clusters of sunken feature buildings, or booths, divided by a trackway appeared. It is now clear that the two clusters were largely made up of a number of deep pits dug down into the ground, reinforced and sometimes divided by low turf walls (stone walls and floors rare) and benches of turf. These structures will from now on be referred to as booths. It has been speculated in view of post holes found within the booths that they may possibly have been covered with a timber frame and a tent or other temporary covering over the top of the low turf walls. Within the booths extremely complex sequences of floor and occupation deposits, repeated temporary hearth placement and re-use were also recorded. These booths have now been interpreted as seasonal/temporary, often multifunctional (dwelling, industrial, storage, meeting), spaces or shelters that were used for brief periods, abandoned, re-used, repaired and repeatedly modified throughout the history of Gásir. At the end of the excavation in 2006, area A had been excavated to depths of 1-2 m (Roberts ed., 2006). More detailed descriptions and other information about the project and the archaeology can be found in excavation reports produced by the Institute of Archaeology in Iceland (Roberts ed., 2002; Roberts ed., 2003; Roberts ed., 2004; Roberts ed., 2005; Pálsdóttir and Roberts eds., 2006; Roberts ed., 2006; Pálsdóttir and Roberts eds., 2007; Roberts ed., 2010; Vésteinsson ed., 2008). All of these archaeological features and layers excavated in area A are preceded by a tephra layer from Hekla that has been identified as being from about 1300 A.D. (H-1300). More archaeological features and layers have been identified below the H-1300 tephra on site but these remnants await investigation at a future date. No unequivocal evidence of activity has been found in area A post-dating the 14th century although a few artifacts can possibly be dated to the 15th century (Sigurgeirsson, 2002; Roberts ed., 2006).

As the excavation at Gásir is now finished extensive post excavation work is underway. Artefact conservation and classificaton, study of faunal and insect remains,

analysis of industrial residues and myriads of other detailed analyses of samples and data are important in order to understand the full extent of all the different activities that took place at this important trading site. Micromorphology is one of the methods being used to achieve this goal. Micromorphology is the microscopic study of soils and sediments where the component parts, or contexts, remain undisturbed. A 30 µm thick sample section is mounted on a thin glass slide and analyzed with a polarizing microscope. Such sections can provide information which is often not visible to the naked eye e.g. material sources, soil texture, microstratigraphy, pedoturbation, distribution of micro-artifacts and other anthropogenic inclusions (Simpson, et al., 1999; Guttmann, et al., 2003; Rapp and Hill, 2006).

In a few places in area A where an especially complex build up of floors and hearth materials was observed within the booths samples were taken for micromorphological analysis (Roberts ed., 2006). Observations and analysis of these samples are the main focus of this report. Subsequently, now that the site has been classified as a seasonal trading post what can we expect to find in the sediments sampled? If the booths were abandoned over the winter or even up to a few years without a roof, the sediments will certainly have been affected by processes such as waterlogging, wetting and drying, freeze-thaw and bioturbation. These processes can create complex microfabrics. As an example spongy microfrabrics and channel structures generally indicate heavy bioturbation, platy structures are often connected with freezing and thawing, and angular and subangular blocky structures with wetting and drying (Vliet-Lanoë, et al., 1984; Courty, et al., 1989; FitzPatrick, 1993; Simpson & Barrett, 1996). Judging from the nature of the archaeological and pedological evidence exposed it would also be expected to find turf collapse from walls, leveling layers, truncations, and possibly influx of aeolian materials from the coast and hinterland deposited during abandonment. Was accumulation of occupational deposits rapid or slow? What are the deposits comprised of? Floor deposits are known to have distinctive compacted massive to platy microstructure, often with strong horizontal alignment of elongated components and planar voids (Courty, et al., 1989; FitzPatrick, 1993; Gé, et al., 1993). Floors also often contain remnants of unburned fuel and fuel ash, food debris and other inclusions connected to the buildings function as well as assorted debris tracked in from the outside (Milek, 2006). Special thanks is owed to Dr. Karen B. Milek for her guidance in the execution of this project as well as to Dawn Elisa Mooney for her charcoal identification.

## Site context and geology

The medieval trading site at Gásir is situated in the north of Iceland on the west coast

of Eyjafjörður on Upper Miocene bedrock formations just southeast of the Hörgá estuary (Roberts ed., 2006; Jóhannesson and Sæmundsson, 2009). The remains of the trading site are found at an elevation between 1-7 m above sea level in an area overgrown by grass and low shrub. On the coast to the north, east and southeast of Gásir boggy areas and salt marshes are protected from the distructive forces of the open sea by barren sandbars and mudflats. Further to the south and southwest the land rises sharply up to 16 m above sea level. In this area the land has today been leveled and tilled for pastureland and hay production (Roberts ed., 2006). Judging by a coring survey done by Dencker and Rieck (2002) the soils and sediments in close vicinity to the Gásir site seem to be layered Andosols (Jóhannesson, 1988; Shoji et al., 1996; Arnalds, 2004) comprised of fine grained in situ soil formations/topsoils above and between lenses of tephras and coarse wind blown sediments inland and/or water deposited sediments close to the shore. The materials are freely drained to waterlogged, with grain size ranging from silts and silt loams to sandy loams, loamy sand and sand, to gravel. Many of the core samples also contained traces of anthropogenic inclusions such as peat ash and charcoal. Coring depth ranged from 50 cm down to almost 3 m. The tephra layers found in soil profiles in the vicinity of the Gásir site include Hekla 3 (ca. 2900 B.P.), Hekla 1104 A.D., Hekla 1300 A.D. and Vatnajökull 1477 A.D. (labeled “a” layer) (Sigurgeirsson 1996, 2002). On site tephra layer H-1300 has been positively identified in situ beneath structures and associated features excavated as well as within turf used in wall construction. Tephra V-1477 has not been positively identified in turf walls and no in situ tephra layers have been identified above the excavated remains (Sigurgeirsson, 2002; Roberts ed., 2006).

## Sampling

The micromorphology samples were taken from three bulk sections in the years 2005 and 2006 by Dr. Karen B. Milek. The samples were removed from the soil in Kubiena tins, rectangular aluminum boxes, to make sure the soil structure remained intact and then wrapped securely to prevent loss of water during storage and transport (figure 1). The sampling method is described in Courty et al. (1989).

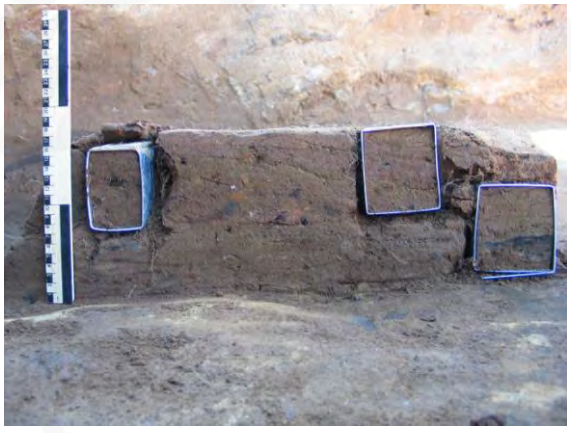


*Figure 1 - Samples 05-06 to 05-08 taken in central living area [1766], view to the west.*

Five samples were taken in 2005 from two bulk sections where floors and other occupational deposits are thought to have accumulated in possible central living areas. Samples 05-06 to 05-08 (figure 1) were taken from floor layers in booth [1765] about 3 m east of booth [2397]. Samples 05-39 and 05-40 (figure 2) were taken from occupation layers [2409] about 2 m east of contemporary booth [2396]. In 2006 five samples 06-34 to 06-38 were taken from a bulk section in booth [2397] in the southwest corner of area A (figure 3). Three distinct occupation phases were identified inside the booth (figure 4). Phases 1 and 3 were sequences of trampled floors and peat ash layers indicating possible seasonal occupation periods. Samples 05-35, 05-36 and 05-38 were taken from phase 1 and samples 06-34 and 06-37 were taken from phase 3. A stonebuilt hearth was in the north corner of the booth but it seems to have been in use only during phase 1. Phase 2 was a clear episode of possible aeolian sand deposits, turf collapse and stone deposition, indicating a period of temporary disuse or seasonal abandonment. No samples were taken from that sequence.

*Figure 2 - Samples 05-39 and 05-40 taken in central living area [2409], view to the north.*

*Figure 3 - Bulk section in booth [2397], hearth clear in the north corner.*

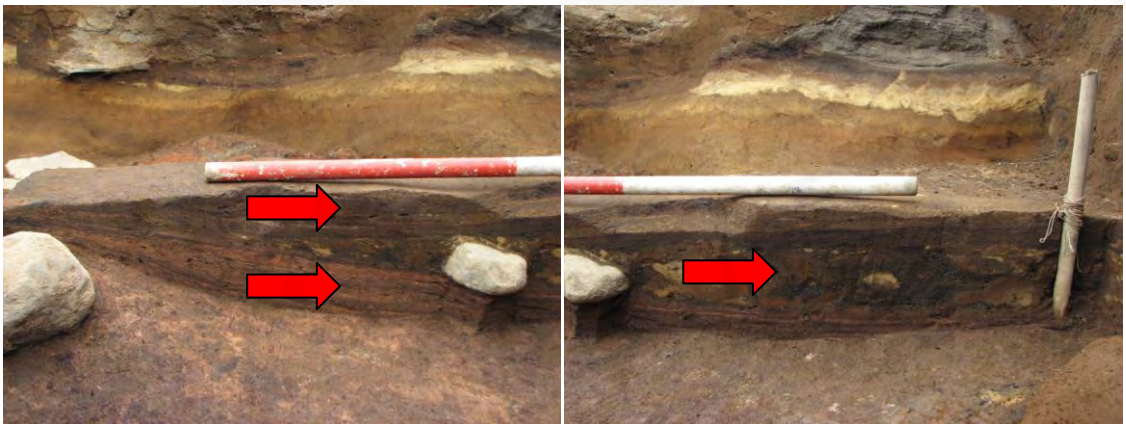


*Figure 4 - North-south bulk section in booth [2397], pictures taken to the east, phase 1 bottom left arrow, phase 2 right arrow, phase 3 top left arrow.*

## Methodology

The samples were processed at the Laboratory of Mineralogy, Petrology and Micropedology at Ghent University in Belgium. The methods used at Ghent University are a compilation of more than 40 years of experience of the Soil Thin Section Laboratory under the direction of professor George Stoops. Detailed descriptons of sample preparations and their development can be found in the paper *Guidelines for Preparation of Rock and Soil Thin Sections and Polished Sections* by Clement A. Benyarku and Prof. George Stoops (2005). A general description of the processing of the Gásir samples can be read below.

First, water was completely removed from the soil blocks by acetone replacement. Samples were impregnated with unsaturated polyester resin under vacuum and were given five to six weeks to allow gradual gelling and polymerisation. Full curing to hard plastic blocks was achieved by heating the samples for 5-7 days at 40°C in an oven. Sections of the hardened blocks were then fastened with resin to glass slides and presectioned to about 2 mm with a trimsaw. The sections were then ground down to 30 µm or less on a automatic abrasive disk. Finally the thin sections were covered with thin glass cover slips also attached with resin.

The thin sections are all about 7,5 cm long (thickness of deposits sampled) and about 4,5 cm wide. They were first examined macroscopically with the naked eye and a Leica MZ6 stereomicroscope, then analysed microscopically with JPL-1350 and XPL-1500 polarising microscopes at magnifications ranging from x40 to x400 in plane-polarized light (PPL), cross-polarized light (XPL) and oblique-incident light (OIL). The sections were described in detail at x40 magnification unless otherwise stated using standardised descriptive terminology provided by Bullock, et al. (1985), Courty, et al. (1989) and FitzPatrick (1993). Descriptions were recorded in standard semiquantitative summary tables (see appendix) with microstratigraphic unit X.1 always at the bottom of each thin section.

## Results

### *Occupation layers [2409] just east of booth [2396] - samples 05-39 and 05-40*

The occupation layers in group [2409] were excavated directly east of booth [2396] in an area about 3 m wide and 4-5 m long. The booth had multiple occupational phases with thin floor layers and hearths. Deposits [2409] are thought to be contemporary with at least some of the occupational phases within the booth. During the excavation multiple temporary hearths were discovered within the sampled area along with many thin floor layers, post and stake

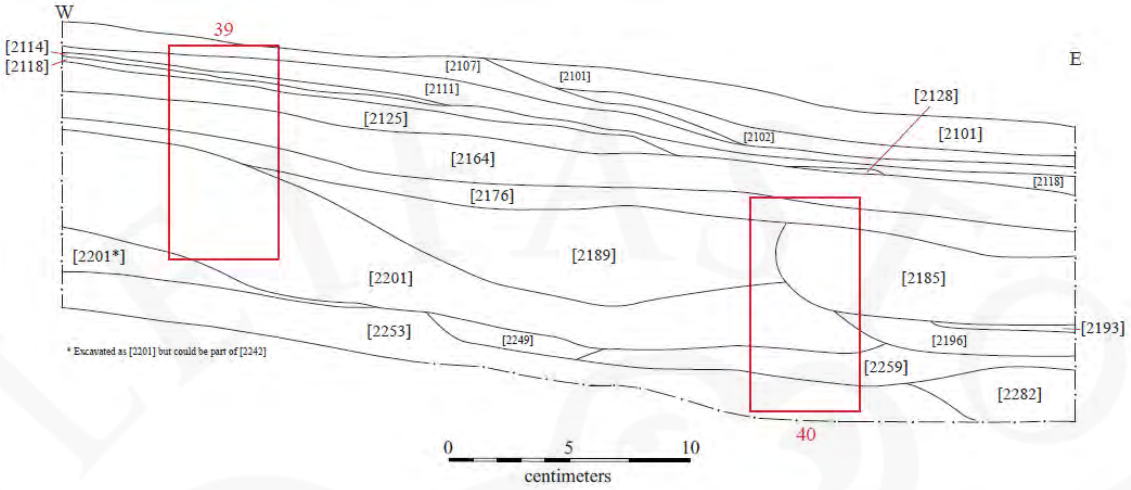



*Figure 5 - Section drawing of the sediment bulk (south face) from floor layer group [2409] showing micromorphology samples 05-39 and 05-40 (see figure 2)*

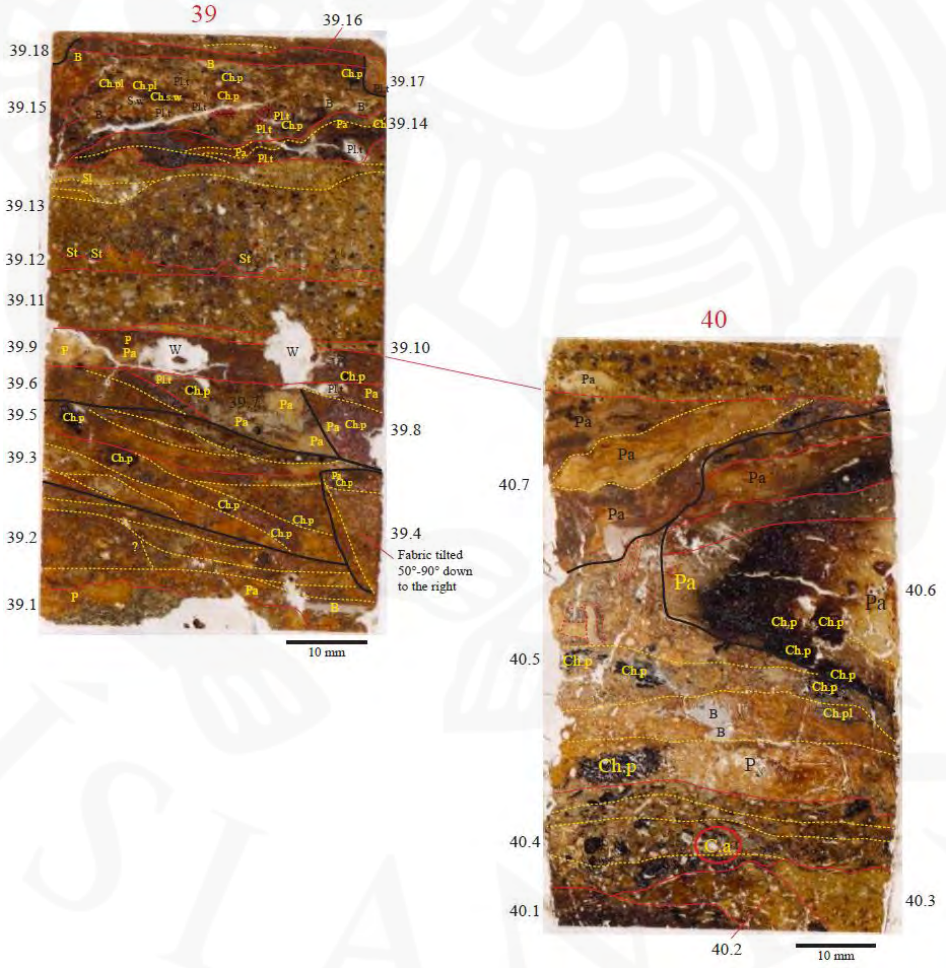



*Figure 6 - Thin sections 05-39 and 05-40*
*B=bone, C.a=calcareous ash, Ch.p=charred peat, Ch.pl=charred plant tissue, P=peat, Pa=peat ash, St=stone, W=worm channels, red lines=boundaries, black lines=possible truncations*

*Table 1 – Descriptions and interpretations of layers in thin section 05-40.*

| Unit | Context | Important Features | Interpretation |
|---|---|---|---|
| **40.1** | **[2253]** | Thickness +3-4 mm, very dark brown to black unsorted silt loam, microstructure subangular blocky with slightly elongated peds, upper boundary clear to diffuse irregular anthropic, lower boundary unknown, layer disappeares towards the middle of thin section, about 2,3 cm long, total void space 5-10%, organic staining heavy to very heavy, matrix heavily masked by organic staining and charcoal, pockets of very dark gray compacted peat ash, one or two larger carbonized organics identified as fibrous peat, fuel ash slag mostly translucent gray apart from one large black vesicular globule (bright pinkish red in OIL). | Loamy soil mixed with anthropogenic debris, layer seems fairly undisturbed by bioturbation, compacted occupation surface/floor, microsturcture could suggest exposure to wetting and drying but to little material is seen in thin section to interpret in any detail. |
| **40.2** | **[2253]** | Thickness +2-4 mm, redish gray brown to dark redish gray brown unsorted silt loam, upper boundary clear to diffuse smooth and curved anthropic, total void space 10-20%, organic staining weak to moderate, clear iron nodules and heavy red iron staining in matrix, heavy bioturbation, clear loose granular excremental infilling of larger channels, rich in redish brown to red plant material, moderately to strongly decomposed. | Possible collapse of building materials, heavily bioturbated and possibly at some point waterlogged, possible occupation hiatus. |
| **40.3** | **[2253]** | Thickness +2-9 mm, redish graybrown fine silt loam, upper boundary clear irregular anthropic, total void space 10-20%, red and dark red iron staining and iron nodules in matrix 2-5%, weak organic staining, clear clusters of circular and oval redish brown spores (<50 µm in diameter) in matrix <2%, phytolits 5-10%, diatoms <2%. | Sterile soil or turf with traces of anthropogenic debris, possible leveling layer or turf collapse, bioturbated. |
| **40.4** | **[2259]** | Thickness 1-1,5 cm, grayish and redish brown to grayish and redish dark brown to very dark brown and black silt loam, total void space 10-20%, organic staining weak to very strong, indentifiable charred organics mostly peat flakes and single plant tissue fragments but also a few fragments of wood charcoal (a few identified as birch), moderate bioturbation, diatoms mostly in small pockets of peat ash, plant tissue redish light brown to redish brown in PPL, brown to dark brown in OIL, moderately to strongy decomposed, one or two possible fish bone fragments and traces of tiny flakes of burned bone. A few larger sand grains rubified or pinkish bright orange in OIL, iron nodules and weak iron staining of matrix <2%. **40.4.1:** One pocket of strongly crystallitic (XPL) calcareous ash and charcoal, <2% of layer 40.4, no identifiable charred organics, chamber structure due to bioturbation, mostly worms. | Rough, dark colored mixture of anthropogenic debris, mostly peat ash, charcoal and traces of wood ash and burned bone, along with loamy soil and plant tissue . Faint changes of color in OIL and charcoal fabric could suggest more than one lens or a deposition sequence, a few small inclusions of soil similar to 40.2 and 40.3. Occupation surface, bioturbated, the only layer that contains clear remnants of wood ash. Most likely due to poor preservation of calcareous ash in acid soils. |
| **40.5** | **[2201]+ [2196]** | Thickness 10-30 mm. This whole context is very disturbed by bioturbation, both root and worm disturbance. Jumble of weakly to strongly rubified (OIL) brown to redish brown and dark brown organic rich (PPL) silt loam, charcoal fragments and peat ash with a few larger charcoal fragments, roots and calcined bone, very spongy structure with clear worm channels and chambers and remnants of excrement, weak to moderate organic staining, at bottom of context there is a large organic rich peat flake (23x6-8 mm) with <5% mineral content, plus a large fragment of carbonized peat (11x4 mm) with similar mineral content, both aligned parallel to lower boundary. Due to heavy bioturbation and slight damage to thin section this layer was not described in detail as materials and boundaries are very hard to discern (see context layers 2201 in thin section 39). | At least three possible occupational surfaces rich in anthropogenic debris topped by some kind of filling or dump. Strong bioturbation and root action suggests a hiatus in deposition. These badly preseved deposits are partly truncated by deposits 40.6. |
| **40.6** | **[2185]** | This layer was not described in detail but is comprised of layers of peat ash and carbonized peat with horizontally aligned fabric but a strange radiating color/charring affect. | Peat ash and carbonized peat. Possible filling of a temporary hearth. Has possibly been truncated at the top before it was covered by 40.7. |
| **40.7** | **[2189]** | Thickness 2-30 mm, this layer was not described in detail (see descriptitons 39.6-39.9) but is largely comprised of thick multicolored diatom rich peat ash lenses with traces of carbonized plant tissue. Layer is covered by context [2164]. | Peat ash lenses, at least three distinct deposits or burning events (?). Possible filling of temporary hearth. |

*Table 2 – Descriptions and interpretations of layers in thin section 05-39.*

| Unit | Context | Important Features | Interpretation |
|---|---|---|---|
| **39.1** | **[2242]** | Thickness +5 mm, lower boundary unknown, upper boundary clear irregular anthropic. Matrix of very fine unsorted sandy silt loam, no grain >0,3 mm. Rich in black volcanic glass, only tiny traces of bright orange dots in OIL, iron staining rare. Faint whitish brown to faint redish brown plant tissue moderately to very strongly decomposed. **39.1.1:** Peat aggregate 30-40% of layer in thin section. Grayish brown to redish dark brown poorly sorted silt. Spongy to weakly fibrous. Weak to moderate organic staning. Redish brown to very dark brown plant tissue moderately to strongly decomposed, faint orange brown to bright orange in OIL, stronger towards the outer edges of the aggregates, mineral content at least 2-5%. | To little of this particular layer can be seen in section to make any significant interpretation but it could possibly be aeolian sediment with small fragments of peat flakes at the upper surface. |
| **39.2** | **[2201]** | Thickness 8-14 mm, mottled silt loam, unsorted, upper boundary fairly clear smooth to irregular anthropic, possible sharp truncation, tilts about 20° down towards the right of thin section, moderate to very strong organic staining, total void space 5-10%, one large calcined bone fragment, peds and other components all fairly small, pockets and lenses of pure peat ash small, unoriented and rare, slight difference in fabric in lowest part of layer where longer peds and plant tissues are more strongly aligned parallel to boundaries. | Coarse mixture of loamy soil, peat ash, charcoal, charred plant tissues and charred peat flakes. Little concrete evidence of trampling but structure is fairly massive and elongated components seem to be moderately to strongly aligned parallel to an unknown fairly horizontal upper boundary . No very clear large single dumping events. Bioturbated. Faint variations in color and fabric suggest the layer is made up of at least four horizontal lenses that have possibly been truncated at upper boundary suggesting a leveling or cleaning event. Occupation horizon likely enriched in fuel ash from a temporary hearth close by. |
| **39.3** | **[2201]** | Thickness 6-11 mm, multicolored mottled to lensed fine silt loam, upper boundary clear smooth anthropic, total void space 5-10%, organic staning weak to very heavy, lenses tilt 5-25° down towards the right of section. Almost all charred organic material bright orange to dark pinkish red (rare) in OIL. Mostly long slithers of charred amorphous plant tissue along with a few fibrous peat flakes but diatoms and phytoliths are <2%. | Two distinct layers 39.3 and 39.5 with multiple fairly clear lenses and pockets of fuel ash and charcoal within them, very similar in material content, 39.3 is distinguished by two separate truncations, one below at lower boundary and towards the right side (truncation 39.4). Possible occupation horizon likely enriched by fuel ash from a temporary hearth close by, bioturbated. |
| **39.4** | **[2201]** | Thickness 15 mm, upper boundary a fairly clear irregular anthropic cut, left boundary a clear smooth anthropic cut, multicolored mottled fine silt loam, total void space 5-10%, weak to very heavy organic staining, width in section about less than 1 mm at the bottom to about 8 mm at the top, the cut is covered by a thin peat ash layer just below another truncation between 39.5 and 39.8. Longer plant tissues are all moderately to strongly aligned perpendicular to the horizontal boundaries except in the top 2 mm where they are strongly parallel to the upper boundary. Clear peds along the left side of the cut tilt 50-90° down towards the right of thin section. Plant tissue structure faint to clear, all charred, brown to very dark brown in PPL, bright orange to gray in OIL. Layer cuts 40-60° down towards the right side of section through layers 39.2, 39.3 and 39.5. | Cut and a filling, possibly of a temporary hearth. Filling mostly charred fibrous peat flakes, charcoal and tiny pockets of peat ash. |
| **39.5** | **[2201]** | Thickness 1-5 mm, multicolored mottled to lensed fine silt loam, upper boundary a clear fairly smooth anthropic truncation, total void space 5-10%, organic staning weak to very heavy, lenses tilt 5-15° down towards the right of section. Almost all charred organic material brigh orange to dark pinkish red (rare) in OIL. Mostly long slithers of charred amorphous plant remnants. Identifiable charred organics mostly fibrous peat flakes. Diatoms and phytoliths rare in matrix, one large lens of peat ash similar to peat ash 39.7.1 (see description table). | Two distinct layers 39.3 and 39.5 with multiple fairly clear lenses and pockets of fuel ash and charcoal within them, very similar in material content, 39.5 is distinguished by a truncation at the upper boundary, layer seemingly covers truncation and filling 39.4 towards the right edge of thin section. Possible temporary hearth deposits, bioturbated. |
| **39.6** | **[2201]** | Thickness 1-5 mm, thins out towards the right almost in the middle of the section, mottled fine silt loam, upper boundary clear to diffuse smooth to irregular anthropic, total void space 2-5%, very heavy organic staning, very similar to layer 39.2 except darker colors, more massive and longer components more strongly aligned parallel to boundaries, layer excavated as part of [2201]. | Coarse mixture of silt loam, peat ash, charcoal, charred plant tissue and charred peat flakes/aggregates. Possible occupation surface, compacted, weakly bioturbated, could possibly be truncated by 39.7 but not quite clear. |
| **39.7** | **[2189]** | Thickness 1-7 mm, mottled fine silt loam, thins out towards the left end of the section, upper boundary fairly clear, smooth anthropic, organic staining very weak to heavy. For mixed matrix see general description 39.6. **39.7.1:** Peat ash, diatom rich. **39.7.2:** Peat ash, a few vesicular fuel ash globules with very few melted diatoms, mass of silica most likely largely phytoliths. **39.7.3:** Peat ash, fuel ash slag rich. | Large irregular pockets and lenses of peat ash in a matrix similar to 39.6, remnants of phlobaphene tissue on surface of the layer, most likely root cork or tree bark, weakly bioturbated, possible temporary hearth deposit. Layers 39.7 and 39.8 separated by a knife-sharp cut. |
| **39.8** | **[2189]** | Thickness 7-8 mm, width in section 5-10 mm, mottled fine silt loam, upper boundary clear smooth anthropic, left boundary a knife-sharp cut that tilts about 60° down towards the right. Layers 39.7 and 39.8 separated by a cut. | Mostly charred black fibrous peat, pockets of peat ash with diatoms intact and charcoal, remnants of phlobaphene tissue on surface of the layer, most likely root cork or tree bark, birefringent mineral content <2%, possible temporary hearth deposit. Possible occupation hiatus between 39.8 and 39.9. |
| **39.9** | **[2189]** | Thickness 4-6 mm, mottled fine silt loam, upper boundary clear smooth to mildly wavy anthropic, unsorted, total void space 2-5%, heavy to very heavy organic staining, very little identifiable unburned plant tissue, all charred and/or heavily decomposed, one large lens/ped of pure gray peat ash rich in diatoms similar to peat ash 39.7.1, two large worm chambers cut through layer but very little clear excrement remnants. **39.9.1:** Large peat aggregate, fine silt loam, poorly sorted, poor in diatoms, mineral content 2-5%, plant tissue redish very light brown to dark brown, moderately to strongly decomposed. | Rough mixture of loamy soil, trampled peat ash, charred peat flakes and slithers of plant tissue, plus one large aggregate of unburned peat. Occupation deposit, very clear, dark and compact upper boundary, massive microstructure to faintly elongated subangular peds, plus very little void space could indicate trampling, the subangular peds and weakly spongy structure could indicate wetting and drying along side bioturbation. |

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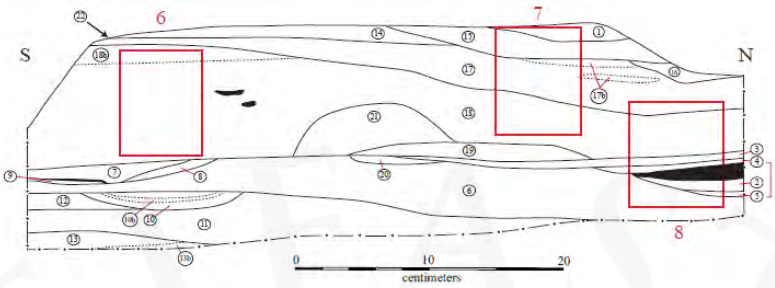
| **39.10** | **[2176]** | Thickness 0,4-1,2 mm, grayish brown poorly sorted fine silt loam, upper boundary clear to diffuse, irregular anthropic, total void space 10-15%, organic staining weak to moderate, no identifiable charred organics, all charcoal very small fragments, no identifiable plant tissue, plant material strongly decomposed, one clear fungal sclerotia, broken up, bright orange flakes in OIL rare, very few diatoms, small pockets of ash, most likely peat ash, fuel ash slag translucent gray to dark gray vesicular globules. One or two flakes of charred peat most likely from lower layer mixed in due to worm disturbance, dark redish brown iron nodules and faint iron staining of matrix <2%. One large subrounded ped of redish light brown soil similar in texture but clearly different from groundmass. | Possible aeolian soil mixed with traces of anthropogenic debris. Farely fine grained layer, no distinct alignment of elongated components. Possible occupation hiatus. Large worm chamber cuts layer in half in section. |
| **39.11** | **[2176]** | Thickness about 6-7 mm, grayish and redish brown to grayish dark brown sandy silt loam, unsorted, sand grains up to 2 mm in length and 1,5 mm in width, upper boundary clear to diffuse smooth anthropic, total void space 5-10%, moderately to heavy organic staining, small flakes of redish to dark brown plant tissue moderately to strongly decomposed, diatoms very rare, phytoliths mostly stems, fuel ash slag translucent gray and spongy to vesicular. Bright orange grains (OIL) in matrix rare, a few larger sand grains bright orange to bright pinkish red (OIL), one fragment of charred organic tissue identified as possible fibrous peat, iron nodules in matrix <2%, very faint iron staining, very little clear excremental material. 1-2 pockets of material similar to 39.10, most likely due to bioturbation. | Sandy soil mixed with anthropogenic material such as charcoal, fuel ash slag and tiny charred bone chips, Leveling layer and possible makeshift floor/occupation deposit, fairly compacted, bioturbated. |
| **39.12** | **[2164]** | Thickness 0,5-3 mm, fine, orange brown fine silt loam, upper boundary clear to diffuse and irregular to strongly bulbous pedological, total void space 5-10%, iron staining and nodules 2-5%, weak to moderate organic staining, very little redish and orange brown organic material, strongly decomposed, traces of tiny charcoal fragments. | Thin lens of aeolian sediment with traces of anthropogenic debris, strongly disturbed by worm action and mixed with layer 39.13. Possible occupation hiatus. |
| **39.13** | **[2164]** | Thickness 7-17 mm, mottled silt loam to sandy silt loam, unsorted, sand grains up to 2 mm in length and 1,5 mm in width, upper boundary clear to diffuse irregular to wavy anthropic, total void space 10-20%, moderate to heavy organic staining, clear plant tissues rare and small, light to dark redish brown and moderately to strongly decomposed, diatoms rare, mostly in small gray pockets of peat ash, a few pockets of soils similar to 39.12 and 39.14, most likely due to bioturbation, a few larger sand grains partially to wholly bright pinkish orange in OIL <2% and traces of bright orange flecks in matrix, dark red iron nodules and staining in matrix 2-5%, traces of charred fungal sclerotia. Towards the upper boundary the matrix is finer silt loam and slightly more rich in fuel ash slag, one small lens **39.13.1** very similar to 39.12 towards the left of thin section close to upper boundary, about 1 mm below a thin lens **39.13.2** of fuel ash mostly comprised of translucent gray fuel ash slag globules (see description table, described at x100). | Loamy and sandy soil mixed with anthropogenic materials such as charcoal, fuel ash slag, peat ash and tiny charred bone chips. Strongly disturbed by bioturbation, possibly contaminated with organic rich material from layer 39.15, expecially towards the middle of the thin section, possibly more than one layer but their boundaries are unclear due to bioturbation, top 5 mm rich in fuel ash slag globules. Leveling layer and possible makeshift floor/occupation deposit. |
| **39.14** | **[2125]** | Thickness 1-5 mm, multicolored poorly to unsorted mottled and lensed fine silt loam, upper boundary clear to diffuse very irregular anthropic, total void space 5-10%, moderate to very heavy organic staining, unburned plant tissue mostly decomposing root epidermis and partial cortex, one possible wood charcoal fragment identified, otherwise charcoal mostly carbonized plant tissue, most likely remnants of fibrous peat, diatoms and phytoliths largely intact and unoriented but towards the left end of section fuel ash slag is more frequent in one or two lenses, carbonized and strongly decomposed slithers of plant tissue strongly aligned parallel to each other, mineral material in the peat ash seems to be from <2% up to 5-10% (rare). Matrix largely masked by heavy and dark organic staining so biomineral quanitities might be underestimated. | Multiple lenses and pockets of dark peat ash and carbonized plant tissue, little evidence of compaction, occupation deposit/peat ash dump. Possibly connected to or derived from a temporary hearth in the vicinity. |
| **39.15** | **[2125]** | Thickness 2-10 mm, multicolored unsorted silt loam, upper boundary clear to diffuse, smooth to irregular anthropic, total void space 10-20%, organic staining moderate to heavy. Clear irregular lamination. Fabric tilts down to the left from 0° through to 70° at a 5 mm wide part at left end of section (see thin section fig.). Layer rich in small pockets of peat ash, unburned fragments of plant tissue (e.g. root fragments (cork/epidermis/cortex), leafs, peat flakes, sea weed), unburned plant tissue (20-30%) redish light brown to redish brown, weakly to moderately decomposed, identifiable carbonized organics included peat flakes and sea weed along with other unidentifiable plant tissues (5-10%) and burned fish bone (5-10%). Unburned peat fairly void of mineral content, rich in phytoliths and diatoms. Layer also contains two small incongruous and unoriented fragments of laminated floor deposits rich in peat ash. Upper corners of layer cut by layers 39.17 and 39.18. | Layer very rich in organic materials, little evidence of compaction, multiple layers/many little dumping/ depositional events, only layer where clear both unburned and burned remnants of sea weed bladders and fish bones were found, bioturbated, occupational deposits/fuel ash dump. Possibly connected to or derived from a a temporary hearth in the vicinity. |
| **39.16** | **[2118]** | Thickness 1-2 mm, very dark colored unsorted silt loam, upper boundary clear fairly smooth anthropic, layer abruptly truncated at each end by layers 39.17 and 39.18, total void space 2-5%, organic staining moderate to very heavy, elongated components strongly to very strongly aligned parallel to boundary, planar voids parallel and perpendicular to boundary, matrix very compacted, compaction and heavy organic staining mask the matrix and make identification of components difficult, diatom and phytolith measurements are probably underestimated, identifiable carbonized organics mostly plant tissue and fibrous peat. | Very similar material to 39.15 but more compacted, possibly a heavily trampled upper surface of 39.15 after hearth was abandoned, rather difficult to identify in places where 15 ends and 16 begins. |
| **39.17** | **[2118]** | Thickness 4-5 mm, width in thin section 2-3 mm, light brown to dark grayish brown poorly sorted silt loam, lower boundary a cut into 39.15 and 39.16, upper boundary clear smooth anthropic, organic staining weak to moderate, total void space 2-5%, traces of bone, elongated components moderately to very strongly aligned perpendicular to the horizontal. | Filling rich in peat and plant tissue, not possible to interpret any futher due to lack of material. |
| **39.18** | **[2118]** | Thickness +0,5-4 mm, upper boundary unknown. Material very similar to 39.16 matrix but much less compacted and lighter in color. | Not possible to interpret due to lack of material. Layer not described in detail. |

holes (Pálsdóttir and Roberts eds., 2006). A graphic representation of the thin section samples can be seen in figures 5 and 6. Descriptions of important features and a general interpretation of the microstratigraphic units present in the sections can be found in tables 1 and 2. Over 25 different layers and lenses were analysed in two thin sections. For detailed descriptions of each microstratigraphic unit see table A1 in the appendix.

### *Occupation layers in booth [1765] - samples 05-7 and 05-8*

Booth [1765] was positioned about 3 m east of booth [2397] (see below). Booth [1765] was about 3,4x2,5 m (8,5 $m^2$) in size, subrectangular and just under 2 m deep. Several occupational surfaces were excavated within it comprised of microlaminated floors, temporary hearth deposits, post holes and subsquare and subround pits of unknown function (Roberts ed., 2005). A graphic representation of the thin section samples taken from these occupational deposits can be seen in figures 7 and 8. Descriptions of important features and a general interpretation of the microstratigraphic units present in the sections can be found in tables 3 and 4. Over 20 different layers and lenses were analysed in two thin sections. For detailed descriptions of each microstratigraphic unit see table A2 in the appendix.

Originally three thin section samples (05-6, 05-7 and 05-8) were taken from the occupation sediments (see figure 7) but only sections 05-7 and 05-8 were described. Section 05-6 was not analysed in any detail due to time restrictions and bioturbation and reworking of the soils within the sample. About 4 layers were identified in that section. The layers were all excavated as contexts [1840] and [1851] but connecting them conclusively with context [1851] in thin sections 7 and 8 was not possible. Bottom layer 1 was reworked silt loam rich in peat and peat ash containing globules of melted silica, diatoms and phytoliths. Layer 2 is a rough mixture of sandy silt loam and sand with little if any anthropogenic inclusions. Layer 3 is a lens of silt loam rich in gray peat and/or turf ash. The layer is heavily reworked by worm action evident by large worm channels rich in loosely packed excrement. Pockets and lenses of peat ash at different burning stages and globules of melted silica are common. Layer 4 (context [1840]) is seemingly pure silt loam. These layers could represent collapsed turf structures and possiby sandy aeolian sediments deposited during a hiatus in occupation. The sandy sediment could also have been present within the turf when it was brought to the site as building material.




1. Dark yellowish brown clayey silt with orange flecks = [1648]
2. Dark brown silt, topped by black silt (edge of hearth) = [1885]
3. Very dark grayish brown coarse silty sand = [1868]
4. Dark yellowish brown sandy silt = [1881]
5. Dark grayish brown silt with 30% charcoal flecks (=ash) and 30% pink flecks, = [1885]
6. Dark yellowish brown clayey silt with c.2% charcoal flecks and 2% pale brown flecks = [1889] + [1905]
7. Dark yellowish brown silt (possibly ash)
8. Dark gray silt with 40% charcoal flecks (ash)
9. Yellowish red silt (ash) directly below a lens of charcoal
10. Brown clay

10b. Lens of pale brown clay

11. Dark yellowish brown clayey silt with c.2% charcoal flecks, 2% pink flecks, 2% redish brown flekcs, 2-5% pale brown flecks = [1905]
12. Dark yellowish brown clayey silt, turf = [1875]
13. Dark brown silty clay, 5% reddish brown fleck and a lens of reddish brown (13b)
14. Multicoloured, dark brown clayey silt with 2-5% charcoal flecks, 2% pale brown flecks, 2% orange flecks, 1% gray flecks (similar to 13)
15. Dark brown clayey silt, 2% charcoal flecks = [1650], [1674] and [1677]
16. See number 1
17. Horizontal lensing visible, but boundaries not continous, mainly dark brown clayey silt with 1% charcoal flecks, lens of paler brown (17b) = [1773], [1780], [1825] and [1827]
18. Mottled, dark yellowish brown clayey silt with 5% charcoal flecks, 5% reddish brown silt, 1% pink flecks, 2% pale brownflecks = [1840] and [1851]

18b. Upper part of 18 excavated as [1840] but not clearly visible in section, lower edge marked by dotted line

19. Dark brown sandy silt = [1862]
20. Dark yellowish brown silt = [1881]
21. Dark yellowish brown silt with 1-2% charcoal flecks, 5% pink peat ash flecks, 5% pale brown flecks, 1-2% grey flecks= [1858]+[1859], peat ash lens
22. Peat ash and silt dump not visible in section = [1779]

*Figure 7 – Section drawing of sediment bulk in booth [1765] showing the positions of micromorphology samples 05-6 to 05-8*

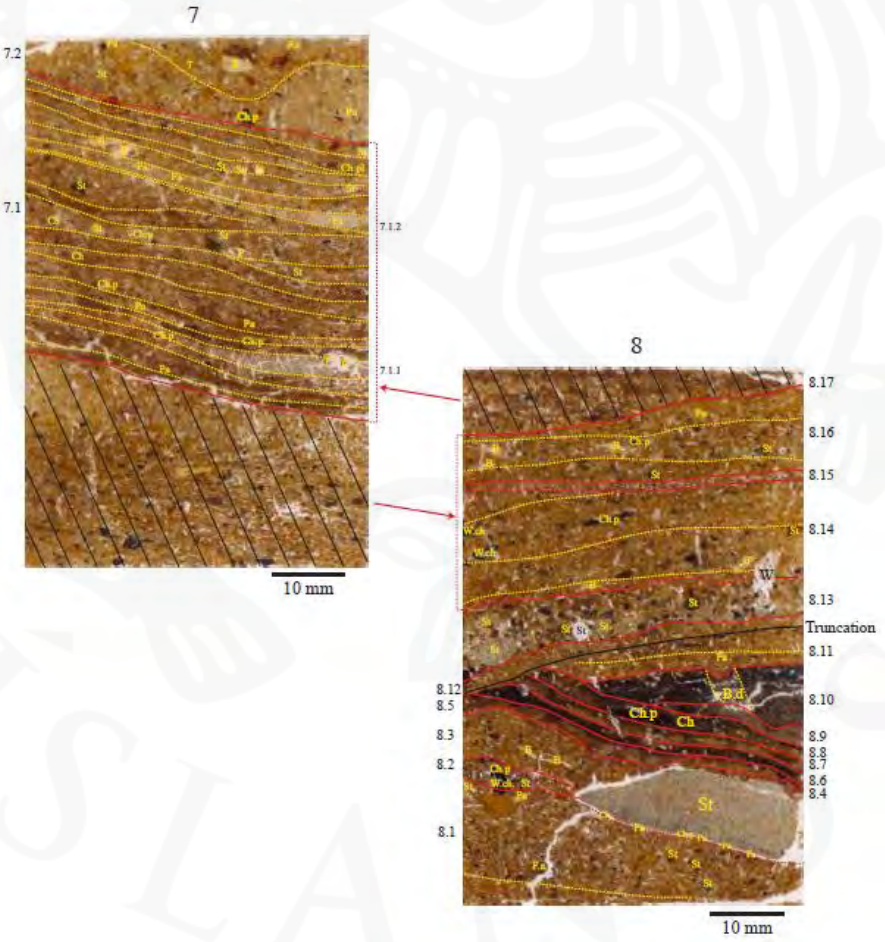



*Figure 8 - Thin sections 05-07 and 05-08 from sediment bulk in booth [1765]*
*B=bone, B.d.=biological disturbance, Ch=charcoal, Ch.p=charred peat, F.a.=fuel ash slag, Pa=peat ash, St=stone, W.ch.=wood charcoal, W=worm channel*

*Table 3 – Descriptions and interpretations of layers in thin section 05-7.*

| Unit | Context | Important Features | Interpretation |
|---|---|---|---|
| **8.1** | **[1889]+ [1905]** | Thickness 0,5-2 cm, redish brown and brown to dark brown and grayish dark brown silt loam, unsorted, upper boundary diffuse irregular to smooth anthropic and tilts about 10-15° down towards the right of thin section (0,5 cm thick at the right end, 2 cm thick at the left end), weak to moderate organic staining of matrix, fuel ash slag translucent gray to dark gray and black vesicular globules, plant tissues scarce and strongly decomposed, no identifiable charred organics, small grayish brown pockets (no thin lenses) of peat ash here and there in groundmass, <2% sand grains and smaller sand and silt fragment bright redish pink and orange in OIL. | Rough mixture of natural soil with <5% fine anthropogenic inclusions and highly digested strongly redish light brown fine subrounded peds of reworked soil (2-5%). Bioturbated. Possible levelling layer or turf collapse. Layer could possibly be divided in two close to the lower edge of thin section but material at the lower edge is very similar, only slightly darker |
| **8.2** | **[1889]+ [1905]** | Thickness 0,5-4 mm thick, thins out towards a large angular basalt pebble in the middle of thin section, upper boundary diffuse to clear irregular anthropic, total void space 20-25%, moderate to heavy organic staining, plant tissue rare and moderately to highly decomposed, charred organics identified as fibrous peat charcoal and possible wood charcoal, beneath a large basalt fragment which is counted as part of layer 8.3 there is a thin lens of <0,5 mm thick pockets of peat ash, slithers of charred plant tissue and peat and charcoal fragments strongly aligned parallel to the lower boundary of the pebble. | Coarse mixture of peat charcoal, peat ash, fuel ash slag and silt loam. Very thin occupation layer, very little evidence of trampling. Bioturbated. |
| **8.3** | **[1889]+ [1905]** | Thickness 0,5-1,1 cm, layer tilts about 10-20° down towards the right of thin section, upper boundary clear irregular anthropic, total void space in soil matrix 10-20%, no clearly identifiable charred organics, weak to moderate organic staining, no clear dominant orientation of basic soil components, 50-60% of layer a large gray basalt pebble about 3,1 cm long and 0,2-1 cm thick (description of layer only describes the soil matrix). | Fairly natural silt loam mixed with traces of peat ash, fuel ash slag and charcoal, no lenses, only a few small pockets of peat ash. Possible leveling layer. Bioturbated. |
| **8.4** | **[1885]** | Thickness 1-2 mm, multicolored lenses and pockets of silty peat ash, layers tilt about 10° down towards the right of thin section, upper boundary clear irregular anthropic, total void space 10-15% due mostly to biological disturbance, weak to very heavy organic staining, some lenses contain slithers of redish dark brown amorphous plant materials strongly aligned parallel to boundary and each other, slithers faint orange to dark brown in OIL, highly decomposed and/or charred, most charcoal material identified as charred peat and plant tissues, very similar to layer 8.8. | Multiple heterogenous peat ash lenses and pockets mixed with charcoal, charred peat flakes and traces of charred bone fragments. Filling of a temporary hearth. Bioturbated. |
| **8.5** | **[1885]** | Thickness 1-3 mm, layer tilts about 10-25° down towards the right of thin section, upper boundary clear irregular anthropic, total void space 0-10%, weak to very heavy organic staining, black amorphous organic material bright orange in OIL, matrix partly masked by organic staining. | Peat ash lenses, most likely more than one dumping event even though material is very similar. Filling of a temporary hearth. Bioturbated. |
| **8.6** | **[1885]** | Thickness 1-2 mm, layer tilts about 10-25° down towards the right of thin section, upper boundary clear irregular anthropic, very heavy organic staining, total void space 2-10%, matrix very heavily masked by organic staining and charcoal, small part of charred plant material bright orange to pinkish red in OIL, layer very rich in charred peat and peat ash. | Peat ash lenses. Filling of a temporary hearth. Bioturbated. |
| **8.7** | **[1885]** | Thickness 1-2 mm, layer tilts about 10-25° down towards the right of thin section, upper boundary clear irregular to smooth anthropic, total void space 0-10%, moderate to very heavy organic staining, compared to layer 8.5 this one contains <2% black amorphous organic material that is bright orange in OIL, matrix partly masked by organic staining, somewhat disturbed by worm action. | Peat ash lenses. Filling of a temporary hearth. Bioturbated. |
| **8.8** | **[1885]** | Thickness 1-3 mm, multicolored lenses and pockets of silty peat ash, layers tilt about 10-25° down towards the right of thin section, upper boundary clear irregular anthropic, total void space 10-15%, weak to very heavy organic staining, some lenses contain slithers of redish dark brown amorphous plant materials strongly aligned parallel to boundary and each other, slithers faint orange to dark brown in OIL, highly decomposed and/or charred, most charcoal material identified as charred peat and plant tissues, very similar to layer 8.4. | Multiple peat ash lenses and pockets mixed with charcoal and charred peat flakes. Filling of a temporary hearth. Bioturbated. |
| **8.9** | **[1885]** | Thickness 1-3 mm, very fine greenish gray to brown silt loam, layer tilts about 10-25° down towards the right of thin section, upper boundary diffuse to clear irregular anthropic, 30-40% of matrix angular to subangular greenish gray volcanic glass, total void space about 2-5%, organic staining weak to moderate. | Very similar to layer 8.10, possibly the same material only less compacted and less rich in charcoal and organic staining. Filling of a temporary hearth. Bioturbated. |
| **8.10** | **[1885]** | Thickness 0,1-1 cm, very fine greenish gray to dark brown silt loam, upper boundary clear smooth anthropic, total void space about 20-25%, 10-20% of layer reworked by biological disturbance, 10-20% of matrix angular to subangular greenish gray volcanic glass, charcoal seems to be mostly charred plant tissue, very little bright orange in OIL, weak to heavy organic staining, upper part of layer much richer in charcoal than lower part. | Fuel ash. Fuel seems to have been peat or organic rich turf very rich in tephra/aeolian soil. Filling of a temporary hearth. Bioturbated. |

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| **8.11** | **[1881]** | Thickness 1-4 mm, gray to grayish brown and brown to redish and dark brown to very dark brown silt loam, unsorted, upper boundary very diffuse irregular anthropic, total void space 10-20%, weak to moderate organic staining, plant tissue rare, highly decomposed and dark orange red, identifiable charred organics most likely spongy charred peat, weak iron staining and iron nodules in matrix <2%, layer possibly more than one lens but very unclear, hinted at by darker color and sligthly higher concentration of charcoal fragments aligned strongly parallel to boundary, thins out towards the left in section due to possible truncation, a darker lens near and at the upper boundary. Excavated as context [1881] but most likely not directly connected to layers above. | Rough mixture of soil, peat ash pockets and <1 mm charcoal. Possible levelling layer to cover the temporary hearth when it wasn´t used anymore. Layer can possibly be divided in two close to the lower edge of thin section but material very similar, possible trampling at upper boundary. |
| **8.12** | **[1881]** | Thickness 2-3 mm, brown and faint redish brown to dark brown silt loam, upper boundary clear irregular anthropic, weak to moderate organic staining of matrix, total void space 10-20%, mostly spongy and chambers and channels due to worm disturbance, bright pinkish red sand grains in OIL very rare, iron staining and nodules in matrix <2%, one small flake of calcined bone in matrix, charcoal unidentifiable, only one large flake of plant tissue identified as possible charred bark, traces of fuel ash slag. | Fairly clear natural soil with traces of anthropic inclusions such as tiny charcoal fragments, one calcined bone fragment and possible fuel ash slag. Bioturbated. Possibly aeolian sediment. |
| **8.13** | **[1868]** | Thickness 0,6-1 cm, brown to dark brown loamy sand, upper boundary diffuse irregular anthropic, total void space 2-5%, sorting bimodal or moderately sorted sand, sand grains up to 8 mm long and about 4 mm thick, weak to moderate organic staining, one or two small pockets of peat ash (similar to 8.16) in between sand grains, silt matrix very reworked by bioturbation. | Very little, if any, trampling, Traces of anthropogenic inclusions. Bioturbated. Possibly aeolian sediment or levelling layer. |
| **8.14** | **[1851]** | Thickness 5-9 mm, upper boundaries diffuse to clear irregular to fairly smooth anthropic, unsorted, weak to moderate (heavy rare) organic staining, total void space about 10-20%, clear iron panning suggests more than one smooth boundary and suggests that the layer had at least three different horizons, only two wood charcoal fragments positively identified as birch, other identifiable charcoal flakes most likely charred fibrous peat, iron panning strongly parallel to boundaries, very similar to 8.16. | Possible occupation deposits. Certainly a damp or waterlogged environment but unclear when iron translocation took place. Mostly soil mixed with lenses and pockets of peat ash, small charcoal flakes, charred bone fragments and globules of fuel ash slag. Spongy structure and common worm channels suggest much bioturbation. Little influx of anthropogenic debris. |
| **8.15** | **[1851]** | Thickness 1-1,5 mm, redish dark brown to very dark brown silt loam, very loose sponge to crumb structure, upper boundary clear irregular to smooth anthropic, moderate to heavy organic staining, total void space 30-45%, plant material strongly decomposed, slithers moderately to strongly parallel to boundary, at least 5-10% of layer excemental (possibly much more). | Sterile soil with only traces of anthropogenic inclusions. Layer highly disturbed by worm action. Possible occupation hiatus and exposure to the elements. |
| **8.16** | **[1851]** | Thickness 0,8-1,2 cm, redish brown to very dark brown silt loam, upper boundary fairly clear irregular to smooth anthropic, unsorted, weak to moderate (heavy rare) organic staining, total void space 10-20%, structure a complex mix of massive, spongy, subangular blocky and platy structure, iron panning along upper boundary, larger charcoal fragments identified as charred fibrous peat, iron panning strongly parallel to boundaries, very similar to 8.14. | Possible occupation deposits and/or leveling layers, microsturcture might suggest exposure to wetting and drying and possibly freeze-thaw. Certainly a more damp or waterlogged environment but unclear when iron translocation took place. Mostly soil mixed with lenses and pockets of peat ash, small charcoal flakes, charred bone fragments and globules of fuel ash slag. Little influx of anthropogenic debris. Spongy structure and common worm channels suggest much bioturbation. |
| **8.17** | **[1851]** | Thickness <0,5 mm, gray to very dark brown silt, upper boundary clear irregular anthropic, weak to very heavy very dark brown to black organic staining, diatoms 60-70%. | Lens of fairly homogenous peat ash rich in unmelted diatoms, most likely a single dumping event, bioturbated. Could be a virgin floor lens in occupation sequence 7.1 (see table 4) |

*Table 4 – Descriptions and interpretations of layers in thin section 05-8.*

| Unit | Context | Important Features | Interpretation |
|---|---|---|---|
| **7.1** | **[1650], [1674], [1677], [1773], [1780], [1825], [1827]** | Thickness of context about 4 cm in thin section, boundary between 7.1 and 7.2 fairly clear irregular to smooth anthropic, layer comprised of multiple 0,2-5 mm thick lenses of silt loam and peat ash mixed with charcoal, plant tissue and fuel ash slag, difficult to distinguish between many lenses due to thinness and similar matrix, at least 25-30 lenses within layer 7.1 (not all marked in figure 8), boundaries between them are diffuse to clear, smooth to irregular anthropic, total void space 20-30%, organic staining weak to moderate. Lenses lean 5-20° down to the right of thin section, lenses can mostly be distinguished by color in PPL (grayish brown, redish brown, dark brown and very dark to blackish brown) as well as in OIL (caramel browns and grays with shades and speckling of orange). Slight changes in fabric and content also helped in the analysis, a few thin peat ash lenses and pockets in between larger lenses. All plant tissue fragments are small, redish to dark brown and moderately to strongly decomposed, two or three identified as peat flakes, charcoal mostly unidentifiable and very small but a few were identified as charred plant tissue and fibrous peat flakes, one flake of phlobaphene containing tissue (most likely bark), as well as one charred fungal sclerotia globe, fuel ash slag translucent gray to transluscent yellowy gray vesicular globules, rubified bright orange and bright redish pink flecks in groundmass and grains in OIL <2%, traces of H3/H4 aggregates <2%. Two distinct layers within sequence 7.1 were described specially as 7.1.1 and 7.1.2 (see description table A2). **7.1.1:** An organic rich lens about 0,5 cm above lower boundary, fine silt loam to fine loamy sand, moderately to poorly sorted, no grains >0,5 mm, sand grains mostly greenish gray and black volcanic glass fragments, lens 0,5-4 mm thick, total void space 20-30%, organic staining very weak to heavy, thickest towards the right end of thin section. Redish brown to brown and red plant tissue moderately to strongly decomposed. A large worm chamber at righ end, remnants of peat/plant tissue within it. **7.1.2:** A pure whitish gray peat ash lens about 1 cm below upper boundary, total void space 10-20%, lens 0,5-2 mm thick, thickest towards the right end of thin section, mostly elongated to mildly vesicular melted silica or fuel ash slag, unmelted diatoms and phytoliths rare but present both individually as well as in one or two thin lenses parallel to boundary within 7.1.2. Excavated as contexts [1650], [1674], [1677], [1773], [1780], [1825] (turf) and [1827] (gritty). | Many thin floor lenses, most <2 mm thick, layers not very rich in anthropogenic debris, 2-3 possible pauses in deposition. No clear evidence of heavy trampling but weak platy structure could suggest some compaction, 7.1.1 remnants of fairly pure to sandy peat, most likely used as fuel. Large part of layer 7.1.1 most likely strongly digested by worms, especially towards the right of section. Lens 7.1.2 a single homogenous depositional event of peat ash. All lenses bioturbated to some extent. |
| **7.2** | **1648** | Thickness +1,5 cm, mostly grayish to dark brown silt loam, unsorted, upper boundary unknown, total void space 10-20%, very weak to rare partial heavy organic staining of matrix, all larger charcoal fragments identified as spongy to fibrous charred peat, only one fragment larger than 1 mm in length, charred bone fragments mostly <1 mm in lenght and unidentifiable, one large charred bone fragment >1 mm most likely mammal. One clear lens <0,5 mm thick and smaller aggregates of yellowy light brown tephra dotted with black <2%, 2-5% sand grains in matrix bright orange to bright redish pink in OIL, clear excremental remains in worm channels and chambers 2-5%, small pockets and lenses of brownish and whitish gray peat ash <2% rich in intact diatoms and phytoliths, matrix rich in fuel ash slag 5-10%, weakly yellowy gray vesicular globules <1 mm in diameter, most plant tissue strongly decomposed and amorphous, only one fragment of fresh root tissue found in section. | Coarse mixture of soil, tephra (H3), peat ash, charred peat flakes, fuel ash slag and charred bone fragments. Mild iron staining and nodules in groundmass, moderate to strong partial iron staining around worm channels and within plant and bone fragments. A thin tephra lens and iron panning hint at possible boundary and therefore more than one layer but very unclear. Strongly disturbed by bioturbation. Most organic staining likely due to decomposing plant tissue and charred peat flakes. Most likely turf collapse and/or possibly levelling deposits. Possible abandonment phase. |

## *Occupation layers in booth [2397] - samples 06-34 to 06-38*

Booth [2397] was excavated in 2005 and 2006 (Pálsdóttir and Roberts eds., 2006; Pálsdóttir and Roberts eds., 2007). The booth was subrectangular, about 2 m long, 1,4 m wide (2,8 $m^2$) and up to 1,3 m deep. One large storage pit [2326] was excavated in the west end of the room. Three distinct occupation phases were identified inside booth [2397] during the excavation in 2006. Phases 1 and 3 are sequences of trampled floors and peat ash layers indicating possible seasonal occupation periods. Samples 05-35, 05-36 and 05-38 were taken from phase 1 and samples 06-34 and 06-37 were taken from phase 3. A stonebuilt hearth [2844] was in the north corner of the booth but it seems to have been in use only during phase

1. Phase 2 in between was a clear episode of possible aeolian sand deposits, turf collapse and stone deposition, indicating a period of temporary disuse or seasonal abandonment. A section drawing and a graphic representation of the thin section samples can be seen in figures 9, 10 and 11. Descriptions of important features and a general interpretation of the microstratigraphic units present in sections 06-34, 06-36 and 06-38 can be found in tables 5, 6 and 7. For detailed descriptions of each microstratigraphic unit see tables A3, A4 and A5 in the appendix. Over 60 different layers and lenses were analysed but unfortunately due to this high complexity of the cultural sediments the recorded planar stratigraphy does not coincide perfectly with the stratigraphy recorded in section (see figure 9). Therefore all the context numbers listed in tables 5 to 7 should be taken with a grain of salt.

***Phase 1 – Thin sections 06-35, 06-36 and 06-38***

✓ *Thin section 35 – About 40-50 cm south of hearth [2844]*

Thin section 35 was not described in detail except for a few observances of its general content. At least 27 layers of brown to dark brown and blackish brown, pinkish and redish pink to rusty red silt loams and sandy silt loams were identified which measured from 0,5 mm up to 10 mm thick (see figure 10). The sediements are comprised of miriads of peat ash lenses and layers of unsorted soils of brown to dark redish brown silt loams and sandy silt loams rich in pockets and inclusions of peat ash, decomposing and carbonized plant tissues and peat flakes. Most of the layers exhibit loose to close porphyric related distribution of groundmass with only weak to moderate organic staining. All elongated inclusions are moderately to strongly aligned parallel to depositional boundaries. The deposits are strongly influenced by the presence of hearth [2844] in the northern corner of the booth. Most of the groundmass contains materials rubified to bright orange and pinkish red colors in oblique incident light (OIL) due to burning. Boundaries between layers are all diffuse irregular to wavy and clear smooth to wavy anthropic. A few layers could only be distinguished from the others by color in OIL, especially layers 35.7 and 35.8 which were seperated easily by faint orange brown and gray (35.8) to very bright orange (35.7) colors.

Total void space in the section seems to be about 5-15%, mostly partially to unaccomodated planes (2-5%), spongy and vughy voids and chambers (2-5%), complex packing voids (<2%) and channels (<2%). One of the more noticable aspect of the void distribution in the section are the voids formed due to peat flakes shrinking after deposition (2-5%). The layers are also clearly disturbed by biological activity with small worm channels and chambers (2-5%) distributed all over the section, especially in layers 35.17, 35.21 and

35.22, but not so strongly as to disturb or mask the original laminar structure of the sediments to any great extent.

Layers 35.5, 35.12, 35.14, 35.21 and 35.23 are mostly lenses of pure peat ash dumps. The peat ash is gray, brownish light gray, redish gray and redish dark gray in plain polarized light (PPL) and bright orange to silvery gray in OIL. The ash is very rich in randomly distributed phytoliths and diatoms, both oblate and pennate (up to 40% diatoms). One layer however, 35.19, has large concentrations (20-25%) of fuel ash slag or melted silica towards the right end of the section. The slag is comprised of vesicular silica globules (<0,5 mm in diameter), gray to black in color in PPL, silvery gray to bright orange in OIL. That layer also seems to have larger amounts of partially melted diatoms and phytoliths.

Identifiable organic materials, both burned and unburned, were mostly fibrous to spongy peat flakes and slithers of bark, or phlobaphene rich tissue (<2%), along with fragments of unidentified, moderately to strongly decomposed, plant tissue (5-10%). Most of the larger peat flakes are found in the lower 2,5 cm of the section in layers 35.1-35.3 although smaller peat flakes can also be found in many layers throughout the section. The peat flakes seem unburned to lightly carbonized. The flakes range in size from 1-12 mm in length and 0,5-5 mm in width. The unburned peat is brown and redish brown to very dark brown in PPL and light to dark brown and silvery gray in OIL. The peat flakes are made up of 40-70%, moderately to strongly decomposed, organic material (slithers of plant tissues) which are weakly to very strongly aligned parallel to each other. About 10-20% of the fabric are spongy and planar voids and 2-10% are fine silt loam. The peat is rich in diatoms (2-5%).

All carbonized plant tissue, or charcoal, is very fragmented (<5 mm in size, 5-10%). No clear wood charcoal fragments were found in the section. Only one clear charred bone fragment (3x1,5 mm) was identified in layer 35.15 during this cursory analysis along with one or two very small flakes, <0,5 mm in width, in the groundmass of said layer.

✓ *Thin section 36 - About 60-70 cm south of hearth [2844]*

At least 17 layers of brown and redish brown to dark brown, pinkish and redish pink to rusty red silt loams and sandy silt loams were identified which measured from 0,5 mm up to at least 8 mm thick (see figure 10). The section contains myriads of peat ash lenses and layers of unsorted soil rich in pockets and inclusions of peat ash, decomposing and carbonized plant tissues and peat flakes. The deposits are clearly influenced by the presence of hearth [2844] in the northern corner of the booth. A summary of important features and interpretations can be seen in table 5. A detailed description of each microstratigraphic unit can be found in table A3 in the appendix.

*Table 5 – Descriptions and interpretations of layers in thin section 06-36 from phase 1.*

| Unit | Context | Important Features | Interpretation |
|---|---|---|---|
| 36.1 | No context no. | Thickness +7 mm, lower boundary unknown, matrix mostly composed of silt, small crystal fragments (mostly plagioclase), tephra grains and volcanic glass, slight iron staining of groundmass <2%, organic staining rare, a few lenses and pockets of material similar to 36.2 within layer, no anthropogenic inclusions. | Fine silty soil, bioturbated. |
| 36.2 | No context no. | Thickness 1-4 mm, lower boundary clear, irregular, sedimentological, upper boundary of 36.2/36.3 the same, groundmass mostly natural redish brown silty clay loam (see 36.1) compacted crumb structure, peds weakly to moderately stained with iron 2-5%, no anthropogenic inclusions. | Fine silty soil, bioturbated. |
| 36.3 | No context no. | Thickness 4-9 mm, lower boundary of 36.3/36.1 is diffuse to clear, irregular sedimentological, matrix mostly composed of silt, lava and tephra fragments, crystal fragments (mostly plagioclase) and volcanic glass, very few anthropolocial inclusions most likely from layer 36.4 or immediate area. Mild iron staining within peds similar to peds in 36.2, 5-10%, layer has been disturbed towards the left of the thin section where it is a mixture of layers 36.1, 36.2 and 36.3, iron staining mostly concentrated in that area. | Fine silty soil, disturbed, possibly by soil organisms or human activity, possible levelling layer, vegetation cover most likely removed during the contruction of the building. |
| 36.4 | No context no. | Thickness 4-5 mm, lower boundary clear, wavy anthropic, rare organic staining, rich in phytoliths and diatoms with their structure mostly intact, still some charred organic material present. **36.4.1:** Large aggregate in lense 36.4 towards the right end of the thin section, heavy organic staining, burned soil and organic material dark brown to black in PPL, bright orange in OIL, diatoms and phytoliths mostly intact, no identifiable wood charcoal fragments. Burned soil and plant material, most likely poorly burned peat. **36.4.2:** Large aggregate of peat ash in lense 36.4 towards the right end of the thin section, mild organic staining, rich in non-metallurgical slag, slag mostly melted/deformed phytoliths and diatoms. | Virgin floor, peat ash, most likely one or two dumping events or depositional episodes. |
| 36.5.1 | No context no. | Thickness 3-5 mm, lower boundary clear, wavy/irregular anthropic, some sand and tephra grains show signs of rubification around the edges and/or the whole way through (dark/blackish red and glittery in OIL), matrix consists of burned soil fragments (rubified/orange brown in OIL), volcanic glass and melted silica, small crystal and volcanic rock fragments and tephra grains, all plant and organic material is burned black and/or decomposing with longer strands aligned strongly parallel to boundary, phytoliths, diatoms and non-metallurgical slag (melted silica) are mostly in small pockets and thin lenses of peat ash (see description 36.4). | Floor layer, made up of materials discarded and/or spread from the hearth and natural soil, fuel most likely peat and possibly plant material. |
| 36.5.2 | No context no. | Thickness 2-3 mm, lower boundary diffuse to clear, seen best in OIL due to rubification of layer 36-5a, straight to mildly wavy anthropic, orange-red iron and brown organic staining of matrix very mild, phytoliths, diatoms and non-metallurgical slag (melted silica) are mostly in small pockets and thin lenses of peat ash (see description 36.4), wood identified mostly bark (phlobaphene containing tissue), aggregates (2-5%) are dark brown badly burned peat fragments (bright orange in OIL, diatoms and phytoliths visible within) and rubified soil aggregates and sandgrains that also show heavy rubification in OIL. | Floor layer, made up of materials discarded and/or spread from the hearth and natural soil, fuel most likely peat and possibly plant material. |
| 36.5.3 | No context no. | Thickness 1-2 mm, only about 12 mm in length in thin section, lower boundary clear, straight to wavy anthropic, for description and features see 36.5.2. | Floor layer, possibly truncated, very similar to 36.5.2 and 36.6. |
| 36.6.1 | No context no. | Thickness 3-6 mm, lower boundary diffuse, irregular anthropic, hard to identify lower boundary as layer 36.5.2 is very similar to 36.6, 20-30% of layer is lenses and/or pockets of peat ash (see description 36.4), a few small aggregates of decomposing unburned peat (spongy, redish brown, diatoms clear), one large badly burned peat aggregate (redish brown (PPL), bright orange (OIL), layered, diatoms visible), plant remains mostly roots and leaves or unidentifiable, small fragments of bark/phlobaphene containing tissue visible, only a burned fragment of fungal sclerotia indentifiable in the burned organic matter, red iron and brown organic staining of matrix very mild. | Floor layer, made up of materials discarded and/or spread from the hearth and natural soil, layer could be 1-2 lenses of similar material but it´s hard to tell as layer has possibly been partially bioturbated and possible weathering. |
| 36.6.2 | No context no. | Thickness about 5 mm, lower boundary clear, a few sand grains show signs of burning <2% along side clear burned soil aggregates 2-5% of matrix = rubified in OIL, plant material moderately to strongly decomposed, wood fragments mostly bark/phlobaphene containing tissue, aggregates of unburned and slightly burned decomposing peat 2-5%, very mild organic staining, chambers most likely worm holes/channels, organic staining very mild. | Floor layer, layer could be 1-2 lenses of similar material, mixture of soil, fragments of burned soil, decomposing plant material and peat ash, bioturbated and possibly modified by weathering. |
| 36.7 | No context no. | Thickness 2-5 mm, lower boundary clear, wavy anthropic, a mixture of natural soil, burned soil fragments and peat ash with pockets and lenses of pure peat ash (see 36-4), lenses strongly parallel to boundary, diatoms and phytoliths mostly intact in pockets and lenses of peat ash, a few globules of melted silica and deformed diatoms and phytoliths scattered within the layer, no identifiable plant material. | Floor layer, made up largely of materials discarded and/or spread from the hearth and natural soil, fuel most likely peat and plant material. |

| | | | |
|---|---|---|---|
| **36.8** | **[2753]?** | Thickness 4-6 mm, lower boundary clear, wavy anthropic, layer contains; slithers of decomposing unburned peat (10-20%) = strongly decomposed plant/organic material and partially intact phytoliths and diatoms, a lens (5-10%) of charred black peat about 0,5 mm in thickness with visible (<2%) phytoliths and diatoms and a clear lens of clean peat ash (see 36.4) about 1-1,5 mm in thickness with a sharp wavy anthropic boundary 10-20%, wood fragments mostly phlobaphene containing tissue or bark, plant remains moderately to strongly decomposed, mild organic staining, one large vesicular globule in layer (5-10%), melted redish black fuel ash slag, melted silica, redish black (PPL), glittery black to bright orange (OIL). | Floor layer, very similar to 36.7, bioturbated and possibly modified by weathering. |
| **36.9** | **[2748]/ [2753]?** | Thickness 6-7 mm, lower boundary clear, relatively smooth anthropic, mixture of burned soil and peat ash with gray, grayish- and blackish-brown pockets and lenses of pure peat ash (see 36.4), lenses strongly parallel to boundary, diatoms and phytoliths mostly intact in pockets and lenses of peat ash, a few globules of melted silica and deformed diatoms and phytoliths scattered within the layer, no identifiable plant material, 3-4 subangular aggregates of dark redish brown burned soil, ultra fine, bright orange and dotted in OIL <2%. **36.9.1:** Thickness 1-4 mm, 27 mm in length in thin section, boundaries clear, irregular wavy anthropic, black lens of charred peat/organic material within 36.9, no rubification of grains or groundmass, black with a glittery aspect in OIL, most aspects of the lens are masked by charred organic material. | Floor layer, largely made up of materials discarded and/or spread from the hearth, peat ash lenses in a mixture of soil, burned soil fragments and peat ash. **36.9.1** most likely a single dumping/depositional event of charred peat on the floor of the booth. |
| **36.10** | **[2748]** | Thickness 3-5 mm, lower boundary clear, mildly wavy anthropic, mixture of peat ash, unburned decomposing peat fragments (2-5%) and soil, small lens of peat ash (see 36.4) 2-5%, organic material moderately to strongly decomposed, diatoms and phytoliths are mostly in pockets and lenses of peat ash but also in small amounts in the matrix, their silica sceletons mostly intact although globules of melted silica can be found scattered in the matrix and within the peat lenses, very mild organic staining. | Floor layer, very similar to 36.9, bioturbated and possibly modified by weathering. |
| **36.11** | **[2748]** | Thickness 1-2 mm, about 2,5 cm long in thin section, lower boundary clear, mildly wavy anthropic, organic staining rare, small fragments of burned soil and organic material. **36.11.1:** Thickness 1-2 mm, about 2,4 cm long in thin section, lower boundary clear, mildly wavy anthropic, with <2% small pockets/lenses of 36.11, very mild organic staining, small fragments of burned soil and organic material. | Floor lens of peat ash very similar to 36.4, most likely a single dumping/depositional event. **36.11.1:** Floor lens of peat ash, most likely a single dumping/depositional event. |
| **36.12** | **[2748]** | Thickness 1-4 mm, lower boundary clear, mildly wavy anthropic, fine matrix a mixture of silt, burned soil, pockets and lenses of peat ash, traces of volcanic glass, crystal fragments and sand and tephra grains, diatoms and phytoliths mostly in one lens of peat ash (see 36.4 and 36.4.1) but also in trace amounts in matrix, larger tephra grains and sand particles are rubified in OIL (<2%) due to burning, wood fragments mostly phlobaphene containing tissue or bark, two slightly charred fungal sclerotia within layer, burned bone fragments <2%, organic staining rare. | Floor layer, largely made up of materials discarded and/or spread from the hearth, peat ash lenses in a mixture of soil, burned soil fragments and peat ash, upper section of the layer is more porous possibly due to weathering and bioturbation. |
| **36.13** | **[2746]** | Thickness 5-6 mm, lower boundary clear, mildly wavy anthropic, massive compacted layer made up of a mixture of burned soil and peat with lenses and patches of peat ash (see 36.4 and 36.11 and 36.11.1), very little identifiable organic material, all wood fragments phlobaphene containing tissue or bark, larger sand and tephra grains show rubification due to fire <2%, small lens of yellowish brown silt with black tephra grains and small crystal fragments, 0,5 mm in thickness close to upper boundary, matrix shows no rubification, dark gray in OIL, while larger black tephra grains are glittery orange, 2-5%. | Floor layer, largely made up of materials discarded and/or spread from the hearth, peat ash lenses in a mixture of soil, burned soil fragments and peat ash, weakly bioturbated. |
| **36.14** | **[2734]** | Thickness + 12 mm, lower boundary clear, mildly wavy anthropic, upper boundary unknown, diatoms and phytoliths mostly intact in lenses and patches (see 36.4), lenses 200-1000 µm in thickness, very mild organic staining, fine matrix a mix of phytoliths, diatoms, tephra grains, volcanic glass and small crystal and lava fragments, larger lava fragments show slight rubification due to burning, two larger aggregates of redish black burned soil 5-10%, bright orange and black in OIL. | Floor layers, largely made up of materials discarded and/or spread from the hearth, peat ash lenses in a mixture of soil, burned soil fragments and peat ash, little compaction by trampling, strongly bioturbated. |

✓ *Thin section 38 – About 70-80 cm south of hearth [2844]*

At least 19 layers of unsorted brown and redish brown to dark brown and redish dark brown silt loams and sandy silt loams were identified which measured from 0,5 mm up to at least 9 mm thick (see figure 10). The sediments are fairly rich in pockets and inclusions of anthropogenic debris e.g. peat ash, decomposing and carbonized plant tissues and peat flakes. Two or three clear peat ash lenses were also found within the section. The deposits are fairly poor in fuel ash materials originating from hearth [2844] in the northern corner of the booth compaired with sections 35 and 36. A summary of important features and interpretations can be seen in table 6. A detailed description of each microstratigraphic unit can be found in table

A4 in the appendix.

*Table 6 - Descriptions and interpretations of layers in thin section 06-38 from phase 1.*

| Unit | Context | Important Features | Interpretation |
|---|---|---|---|
| 38.1 | [2736] | Thickness +3 mm, redish to dark brown sandy silt loam, unsorted, lower boundary unknown, total void space 2-5%, upper boundary clear smooth anthropic and very dark brown (see below), 2-3 small pockets of peat ash (2-5%) with diatoms and phytoliths intact similar to 38.9, one large pocket of pure peat ash/fuel ash slag (5-10%) fairly rich in iron staining/nodules (see description 38.1b), transluscent gray globules of fuel ash slag scattered throughout groundmass (2-5%), largest slag globules 0,2-0,5 mm in diameter, weak organic staining, iron staining/nodules weak to moderate, some of the sand grains (<2%) show distinct bright dark redish and pinkish to orange color in OIL, both partially and/or whole grains; at upper surface there is a <0,25 mm thick, dark brown to dark gray lens of peat ash (see 38.15.1), bright orange in OIL, disappears towards the right in section due to unknown disturbance, no voids, heavily compacted. | Sandy soil mixed with pockets and fragments of fuel ash slag and peat ash, upper surface is clear and seems somewhat compacted, very little and fragmented charcoal, peat ash scattered at surface/upper boundary, bioturbated, occupational surface. |
| 38.2 | [2736] | Thickness 1-2 mm, dark brown silt loam, upper boundary clear irregular anthropic, unsorted, total void space 5-10%, lens dies out towards the left in the center of the section, contains one or two small pockets of pure peat ash, moderate organic staining, a few sandgrains partially to wholly bright red to pink and orange in OIL. | Loamy soil mixed with peat ash and fuel ash slag, bioturbated, occupation surface. |
| 38.3 | [2736] | Thickness 2-5 mm, redish dark brown to very dark brown sandy silt loam, unsorted, upper boundary mostly clear smooth to irregular anthropic, total void space 10-20%, weak to moderate organic staining, pocket of fuel ash slag <2% (see description 38.1.1), largest slag globules 0,2-0,5 mm in diameter, upper and lower boundaries are clear due to 0,2-0,4 mm thick lenses of peat ash similar to 38.14 and 38.15b, bright orange in OIL, towards the left end of layer in section there is a fragment 2-5% of decomposing unburned plant tissue and a half eaten black and charred plant tissue <2%, within the matrix there are also 2-5% small lightly charred and decomposing peat flakes, larger sand grains <2% are partially bright orange in OIL. | Thin lens of sandy soil sandwitched betwen lenses of peat ash, large separate dumping/depositional events, bioturbated, occupation surface. |
| 38.4 | [2736] | Thickness 0,5-2 mm, dark brown silt loam, upper boundary clear smooth to irregular anthropic, see description 38.14. | Peat ash lens, bioturbated. |
| 38.5 | [2736] | Thickness 1-4 mm, dark brown to redish dark brown sandy silt loam, unsorted, upper boundary diffuse to clear irregular anthropic, total void space 10-20%, moderate organic staining, large lenses and pockets of brownish white to gray peat ash (see description 38.9) 2-5%, larger sandgrains partially to wholly bright orange in OIL 2-5%,. | Sandy soil mixed with peat ash, bioturbated. |
| 38.6 | [2736] | Thickness 5-6 mm, redish brown silt loam to brown sandy silt loam, poorly to unsorted, upper boundary diffuse to clear irregular anthropic, total void space 10-20%, weak organic staining, about 30% of layer is undisturbed soil similar to 38.19, charred peat flakes 5-10%, peat ash pockets <2% (materail similar to 38.9 and 38.5.1). | Loamy to sandy soil, heavily iron stained, rough mixture of natural massive to strongly bioturbated soil mixed with peat ash and organics. Possible turf collapse/leveling layer. Possible abandonment phase. |
| 38.7 | [2714] | Thickness 10-14 mm, redish dark brown to very dark brown sandy silt loam, unsorted, upper boundary diffuse to clear irregular anthropic, total void space in groundmass 10-20%, moderate to strong organic staining, one large lense or inclusion of charred peat/plant tissue 30-40%, charred and spongy decomposing plant tissue with <2% sand grains embedded in the tissue, were peat inclusions is situated there is a 8-10 mm thick void/space where peat has most likely shrunk considerably when dried, one large ped and a few much smaller similar to 38.19 embedded/mixed in groundmass, about 2-5%, <2% of larger sandgrains partially or wholly bright orange in OIL, fuel ash slag vesicular transluscent gray globules <1 mm in size. | Occupation deposti, upper boundary fairly clear, might be compaction due to trampling, material is partially blackened and charred and no substancial root action observed, bioturbated, peat flake possibly a fragment of unused fuel. |
| 38.8 | [2711] | Thickness 2-5 mm, redish brown to redish dark brown silt loam to sandy silt loam, unsorted, upper boundary diffuse to clear irregular anthropic, total void space about 10-20%, one large peat ash pocket/fragment (see decription 38.9) or 2-5% of whole layer, very few sand grains show bright orange to pinkish red color in OIL or <2%, weak to moderate organic staining. | Sandy silt loam well mixed with traces of peat ash and fuel ash slag, almost no clear pockets of peat ash except the single large one, clear biological disturbance, worm channels, spongy voids and chambers 5-10% of total void space. |
| 38.9 | [2711] | Thickness 0,5-2 mm, gray and dark gray to brownish gray lens of peat ash, unsorted, upper boundary diffuse to clear irregular anthropic, total void space 2-5%, a few iron nodules in matrix and very weak iron staining, organic staining weak to strong especially close to decomposing and/or charred plant tissue, phytoliths and diatom sceletons mostly intact/unmelted. | Pure peat ash, one dumping event from hearth, thins out and has been mixed with layer 38.10 towards the left in thin section, bioturbated. |
| 38.10 | [2711] | Thickness 3-5 mm, redish brown to dark brown sandy silt loam, unsorted, upper boundary clear smooth to irregular anthropic, total void space about 10-20%, soil peds similar to matrix 38.19, subangular to subrounded peds made up of smaller rounder peds (digested?), a few sandgrains partially to wholly bright pinkish red in OIL <2%, weak to moderate organic staining, peds mildly stained with iron/iron nodules. | Mixture of natural soil peds (similar to matrix 38.19), peat ash, fuel ash slag and plant tissue, mostly small and decomposing charred peat fragments, two or three clear unburned plant tissue fragments, pockets of peat ash mostly concentrated close to the lower boundary near peat ash lens 38.9, bioturbated. |

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| **38.11** | **[2691]** | Thickness 2-5 mm, brownish gray to very dark brown silt loam, unsorted, upper boundary diffuse to clear irregular to weakly smooth anthropic, silvery gray to bright orange dotted with black in OIL, total void space about 5-10%, worm channels and chambers <0,5 mm in diameter and 2-5% of total void space, one or two larger stone fragments partially bright red to pink in OIL, matrix mostly undiagnostic silica fragments and fuel ash slag, moderate organic staining, matrix mixed with peds similar to matrix 38.19 but less sandy, largest ped oblong, subrounded and about 2 mm long, 0,6 mm thick, 2-5% of total groundmass. | Mixture of peat ash at different burning stages containing differing amounts of soil/silt loam, small charred peat flakes and plant tissue, bioturbated. |
| **38.12** | **[2691]** | Thickness 3-5 mm, dark brown to very dark brown sandy silt loam, unsorted, upper boundary diffuse irregular anthropic, total void space about 10-20%, charcoal fragments very small and undiagnostic: most likely charred plant tissue, a few of the larger stone fragments are partially to wholly bright orange to pinkish red in OIL, longer plant tissue fragments are moderately to strongly aligned horizontally, silica sceletons of phytolits and diatoms mostly intact (unmelted) within peat ash pockets and lenses, small peat fragments (see peat description in 38.13) <2% of whole layer, organic staining mild to moderate, small iron stained peds in matrix similar to 38.19 <2%, a few sandgrains partially bright red to orange in OIL on the surface, traces of phlobaphene containing tissues (bark). | Very similar to 38.13 except matrix less orange in OIL, sandy silt loam very rich in peat ash, fuel ash slag, organic matter and charcoal, bioturbated. |
| **38.13** | **[2691]** | Thickness 2-4 mm, very dark brown sandy silt loam, unsorted, upper boundary diffuse to clear irregular anthropic, total void space about 10-20%, longer plant fragments moderately to strongly aligned horizontally, heavy organic staining, about 2% of the layer is elongated pockets of pure peat ash (see description 38.9), only one or two larger sand grains bright orange in OIL but fine matrix rich in bright orange fragments, one possible wood charcoal fragment in layer <0,5 mm, too small for species identification; large peat flake about 10-20% of the layer: about 8 mm long, 1-1,5 mm thick, light to very dark brown, mildly charred, 90% decomposing plant tissue, <2% soil, 5-10% elongated voids; 38.13b peat ash, weak organic staining, similar to 38.9 but much less compacted, longer diatoms and plant tissue moderately aligned horizontally, diatoms and phytoliths mostly intact, a few transluscent gray globules of fuel ash slag, few tiny charcoal fragments. | Mixture of sandy silt loam and peat ash, plant tissue, fuel ash slag and charcoal, most likely remnants from the hearth, worm channels and chambers <0,5 mm in diameter indicating bioturbation, no strong signs of trampling. |
| **38.14** | **[2691]** | Thickness 1-2 mm, very dark brown mixture of silt loam and peat ash, upper boundary diffuse irregular anthropic, total void space about 10-20%, matrix clearly bright orange in OIL and some of the larger sand grains are partially or wholly bright orange to dark red in OIL, heavy organic staining of matrix, unburned plant tissue structure fairly intact (rare), charred plant tissue dark brown to black and structure decomposing, longer and larger plant fragments strongly horizontally aligned, charcoal fragments tiny without distinguishing markers, two or three tiny pockets of pure peat ash/phytoliths and diatoms (see 38.9), fuel ash slag mostly distributed throughout the groundmass and mostly <0,5 mm in size. | Soil rich peat ash also containing fragments of charred peat/plant tissue, charcoal, fuel ash slag. Most likely one dumping event of fuel ash and remnants from the hearth, no strong signs of trampling, bioturbated. |
| **38.15** | **[2664]** | Thickness 6-9 mm, redish to dark brown silt loam and sandy silt loam, poorly to unsorted, upper boundary sharp and fairly smooth anthropic, total void space 5-10%, coarse/fine ratio (50 µm) ranges from 2/98 to 30/70, sand grains mostly smaller than 1 mm, a few of the larger sand grains are partially to wholly bright pinkish dark red to bright orange in OIL, organic staining is very weak to moderate, very little identifiable plant material, fuel ash slag and charcoal are well distributed throughout the matrix apart from one or two small pockets, fuel ash slag <0,5 mm transluscent gray to black rounded vesicular globules, charcoal fragments mostly <0,5 mm in size and seem to be burned plant material, burned bone fragments tiny and unclassifiable, bone only charred not calcined, 2-5% iron staining and iron nodules within matrix. 38.15b are 1 large lens and 2-3 smaller pockets of unsorted soil rich peat ash within 38.15a, about 5-10% of layer 38.15, large lens strongly aligned horizontally. | A heterogenous mixture of loamy (similar to 38.19) and sandy soil, mixed with fuel ash slag and small charcoal framgents (15.1). In the pure peat ash pockets and lenses (15.2) the peat burned seems to have contained consideral amounts of soil. Most of the silica sceletons are intact. Fuel ash and charcoal mixed with soil. Iron staining of groundmass could suggest wet or waterlogged conditions. A few small chambers and channels along with small round peds would suggest mild biological reworking of material, upper boundary farily smooth, total void space fairly little, could suggest some trampling. |
| **38.16** | **[2643]** | Thickness about 2 mm, very dark brown sandy silt loam, upper boundary diffuse to clear irregular to wavy antrhopic, total void space 10-20%, very weak or no compaction, a few smaller sand grains and flecks bright orange in OIL, mild iron staining, fuel ash slag round, transluscent gray vesicular globules of melted silica, <1 mm in size, plant material mildly to strongly decomposed, organic staining moderate to strong, burned bone fragments tiny and unclassifiable. | Aeolian anthropogenic rich sediment, very few clear diatoms and phytoliths. |
| **38.17** | **[2643]** | Thickness 1-2 mm, dark brown sandy silt loam, upper boundary diffuse to clear irregular anthropic, total void space 5-10%. | A very thin discontinous lens of sandy soil very similar to 38.19 deposited before layer 38.18 formed above and mixed with it, aeolian sediment. |
| **38.18** | **[2643]** | Thickness 3-8 mm, dark brown sandy silt loam, unsorted very porous/loose groundmass, upper boundary clear irregular anthropic, total void space about 20-30%, 2-3 sandgrains bright orange in OIL, a few plant tissue fragments, possibly peat, unburned to mildly charred and/or decomposing plant tissue, weak to moderate organic staining, fuel ash slag partially to wholly melted transluscent gray silica. | Turf collapse. Accumulation after abandonment. |
| **38.19** | **[2643]** | Thickness +9 mm, redish brown to dark redish brown silt loam, poorly sorted, upper boundary unknown, total void space about 2-5% in matrix, 2-5% dark redish and orange brown iron nodule formations, iron staining of matrix weak to moderate, layer is largely fragmented up, planes 20-30% with moderately to unaccomodated sides, planes are large and moderately to strongly aligned horizontally, layer possibly fragmented up when it was taken or dried, might partially also be due to biological activiy, 38.19.1 is a large pocket of bioturbated soil and peat ash rich in phytoliths and fuel ash slag/melted silica. | Loamy soil or turf partially mixed with pockets of fuel ash, possibly wall collapse. Accumulation after abandonment. |

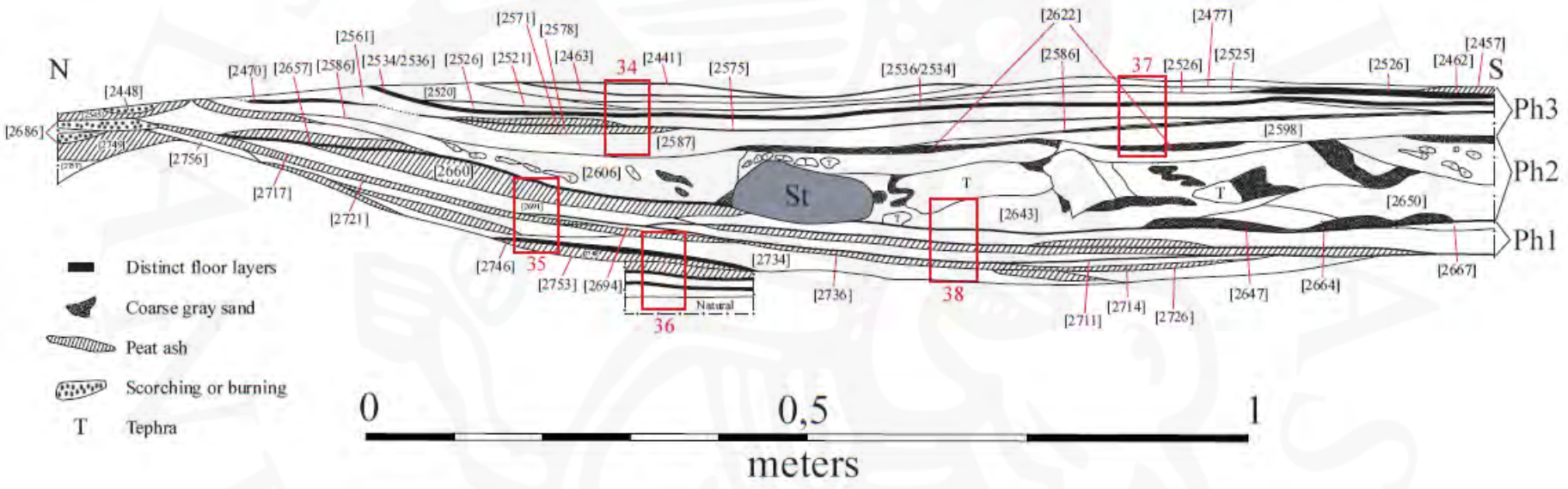


*Figure 9 - Section drawing of occupation deposits in booth [2397]*

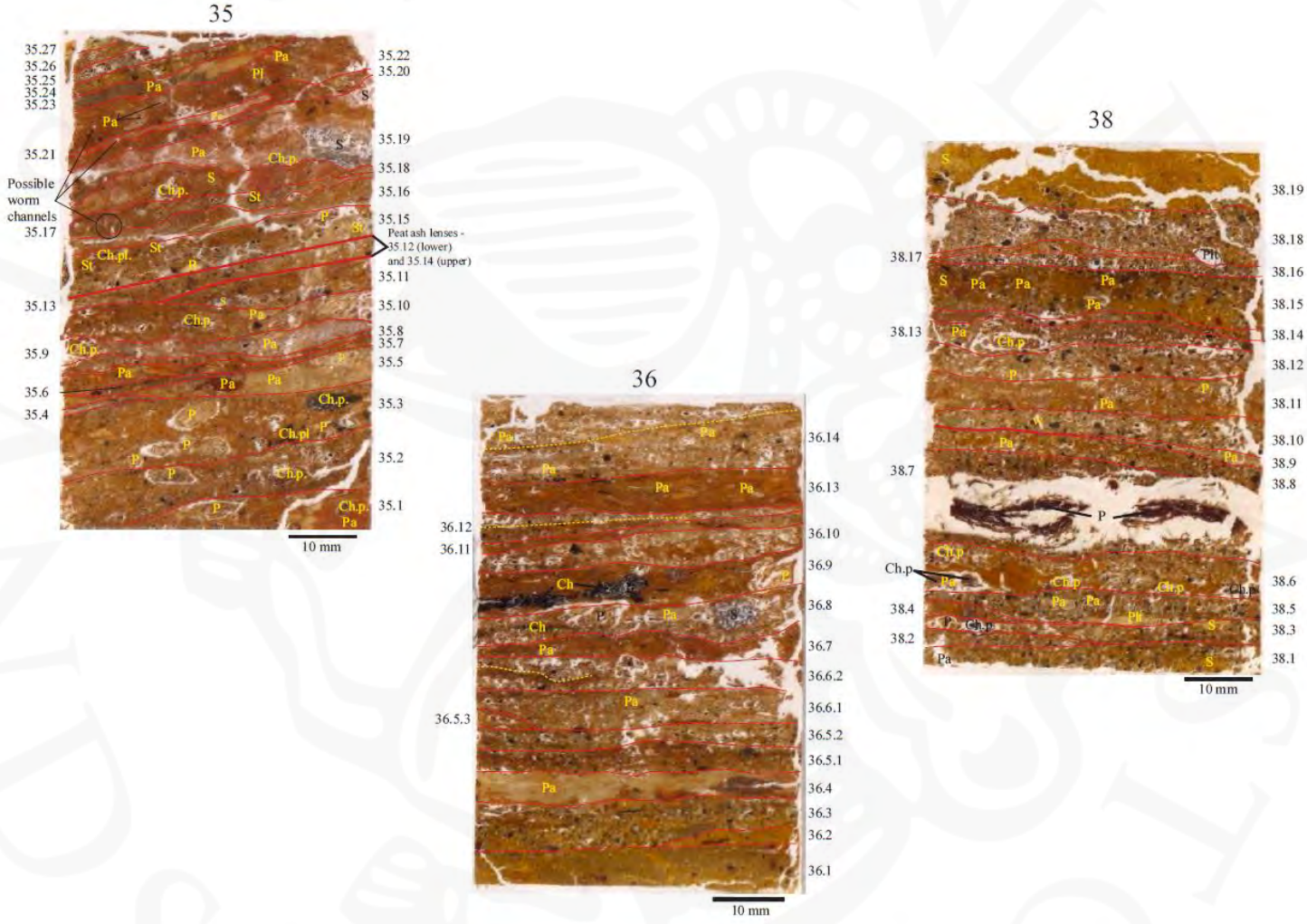


*Figure 10 - Thin sections 06-35, 06-36 and 06-38 taken from occupation phase 1 in booth [2397]*
*B=bone, Ch=charcoal, Ch.p=charred peat, S=fuel ash slag, P=peat, Pa=peat ash, Plt=Plant tissue, St=stone*

***Phase 3 - Thin sections 06-34 and 06-37***

✓ *Thin section 34 - About 1,2 m north of the entrance into booth [2397]*

At least 24 layers of gray, brown and redish brown to dark and very dark brown silt loams, sandy silt loams and sand were identified which measured from 0,5 mm up to at least 9 mm thick (see figure 10). The sediements are comprised of a few very thin peat ash lenses and multiple layers of unsorted soil containing pockets and inclusions of anthropogenic debris e.g. peat ash, decomposing and carbonized plant tissues and peat flakes. A summary of important features and interpretations can be seen in table 7. A detailed description of each microstratigraphic unit can be found in table A5 in the appendix.

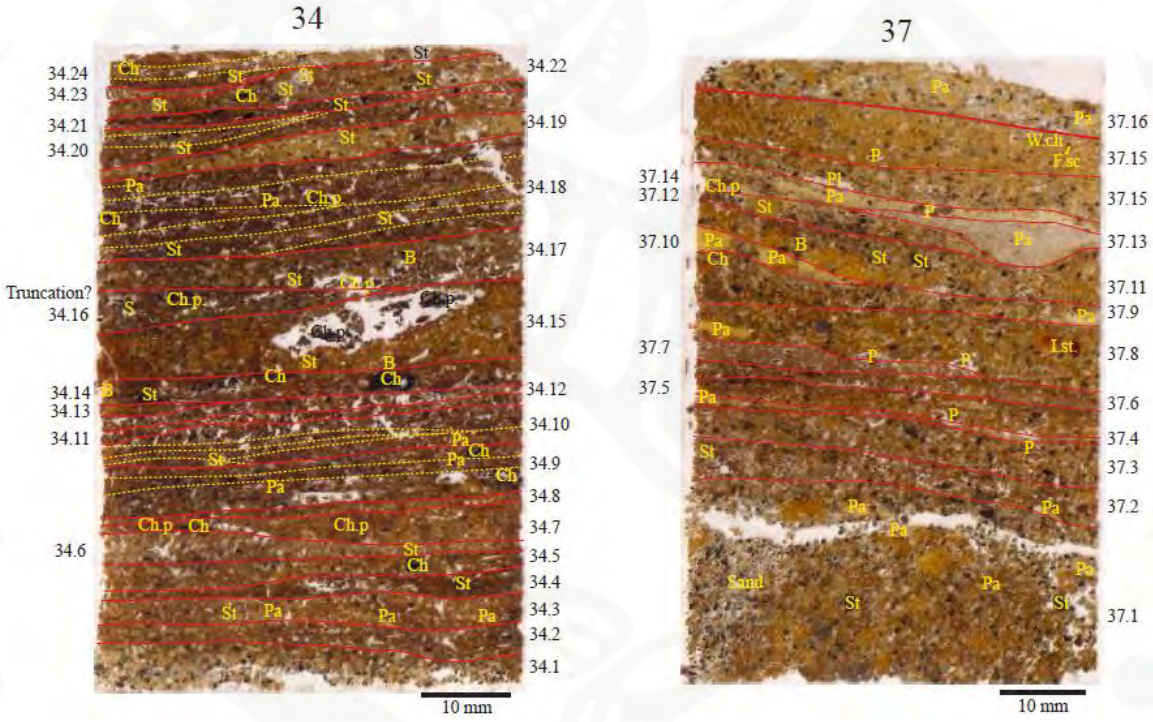


*Figure 11 - Thin sections 06-34 and 06-37 taken from occupation phase 3 in booth [2397]*
*B=bone, Ch=charcoal, Ch.p.=charred peat, I.st.=iron staining, Pa=peat ash, St=stone*

*Table 7 – Descriptions and interpretations of layers in thin section 06-34 from phase 3.*

| Unit | Context | Important Features | Interpretation |
|---|---|---|---|
| 34.1 | [2606] | Thickness + 6 mm, grayish brown loamy sand, unsorted, total void space 5-10%, upper boundary clear irregular anthropic, lower boundary unknown, very weak organic staining, 5-10% of sand grains partially to wholly bright orange in OIL, sandgrains mostly angular to subangular, common that only outer edge is orange, fuel ash slag brownish transluscent gray and composed of partially to wholly melted phytoliths and diatoms. Vesicular slag globules. | Loamy sand mixed with fuel ash slag. Aeolian sand deposit or leveling layer, bioturbated. |
| 34.2 | [2587] | Thickness 2-3 mm, dark brown silt loam, upper boundary fairly clear and smooth anthropic, lower part mildly mixed with the loamy sand in 34.1, total void space 20-25%. Channels and chambers mostly worm disturbance, decomposing plant tissue mostly redish brown, structure still partially clear, organic staining moderate to strong, matrix dotted with bright orange fragments from <2% up to 5%, very little identifiable charred material, most likely plant charcoal with possibly one or two wood charcoal fragments mixed in. | Two very similar thin lenses, a very thin dark line that suggests possible trampling between them, ~1-2 mm in thickness and slightly different color of brown and orange brown macroscopically in OIL, all lenses have fairly clear and smooth anthropic boundaries in OIL, floor lenses/layers, bioturbated. |
| 34.3 | [ 2587] | Thickness 3-4 mm, dark brown silt loam, upper boundary fairly clear and smooth anthropic, material very similar to layer 34.2. Inclusions of poorly sorted peat ash described at x100 (see descriptions 34.3.1 and 34.3.2 ). Lenses strongly parallel to boundary, about 30% of whole layer, diatoms and phytoliths mostly intact in peat ash type 34.3.1 but all melted into fuel ash slag in type 34.3.2. Organic material in peat ash very decomposed and/or charred, no clear tissue structure. Pockets of peat ash lenses mixed with matrix material 34.3 here and there due to worm disturbance | Two or three similar very thin lenses, ~1-2 mm in thickness, slightly different colors of brown and orange brown in OIL, all lenses have fairly clear and smooth anthropic boundaries in OIL, floor lenses/layers, partially disturbed by worm action. |
| 34.4 | [2587] | Thickness 0,5-3 mm, dark to very dark brown silt loam, poorly sorted, groundmass masked by moderate to heavy organic staining, upper boundary diffuse to clear irregular anthropic, total void space 10-15%, small pockets of peat ash similar to 34.3.1 about 2-5%, heavy iron staining 5-10%, plant tissue orange red, tissue structure unclear, charcoal mostly burned plant tissue. Layer thins down towards the left in section down to 0,5 mm in thickness, void space there 30-80%, mostly spongy voids and chambers. | Layer a mixture of soil, peat ash and charred plant materials, possibly more than one dumping event of mixed fuel ash debris from the hearth, layer heavily disturbed due to worm action towards the left, iron staining both of matrix and partially filling voids, could indicate a period of wetting or waterlogging. |
| 34.5 | [2587] | Thickness 2-3 mm, redish brown to very dark brown sandy silt loam, unsorted, mild organic staining, upper boundary clear and fairly smooth anthropic, total void space 10-20%, upper boundary is a <0,2 mm thick lens of very dark gray to blackish brown compacted material, slag transluscent to yellowy gray and vesicular, <2% sandgrains bright orange in OIL, iron staining in matrix <2%, plant material redish brown to very dark brown, structure unclear to faint, one or two tiny fragments of calcite, 2-3 small identifiable wood charcoal fragments, most likely birch or willow, other charcoal unidentifiable. | Dark lens at upper boundary suggests mild trampling, sandy silt loam mixed with fuel ash slag and charcoal, layer thins out mildly towards the right, bioturbated. |
| 34.6 | [2587] | Thickness 1-3 mm, brown to very dark brown silt loam, poorly sorted, total void space 20-30%, upper boundary clear irregular to wavy anthropic or sedimentary, small charred peat flakes 2-5%, plant material light to dark redish brown, tissue structure faint to clear, a few pockets of grayish brown peat ash, mild iron staining of matrix <2%, no identifiable charcoal fragments. | Loamy soil, possibly aeolian deposit or leveling layer, little influx of anthropogenic inclusions, layer heavily disturbed by bioturbation, no clear trampling. Possible abandonment phase. |
| 34.7 | [2578] | Thickness 1-5 mm, mottled gray through dark brown to very dark brown and black mixture of silt, charred peat and peat ash, unsorted, upper boundary diffuse to clear irregular to mildly wavy anthropic, total void space 10-15%, mild iron staining of matrix 2-5% mostly within peat fragments, subangular to subrounded and elongated peds all <2 mm, most <1 mm. Plant tissue light redish to redish brown and dark to very dark brown, structure faint to clear. Charred and unburned peat flakes about 10-20% of whole layer (see descriptions 34.7.1 and 34.7.2 respectively), diatoms and phytoliths, where visible, seem mostly intact, highly masked by charred organics and organic staining, charcoal seems mostly charred plant material, no identifiable wood charcoal, plant material in unburned peat flakes heavily decomposed, no clear tissue structure, peat fairly rich in silt. | Coarse mixture of soil, peat ash pockets, charred and/or decomposing peat flakes and charcoal, floor lens, mildly compacted, possibly more than one dumping event, bioturbated. |
| 34.8 | [2578] | Thickness 1-2 mm, brown to dark brown silt, matrix very similar to 34.2, total void space 2-5%, upper boundary clear irregular to fairly smooth anthropic, mild organic staining, no indentifiable charcoal fragments, mild iron staining of matrix, plant remains mostly weakly to moderately decomposed, mostly small flakes of bark. | Aeolian silt, heavily disturbed by bilogical action, no clear trampling, abandonment phase. |
| 34.9 | [2575] | Thickness 4-8 mm, dark to very dark brown silt loam, unsorted, upper boundary diffuse to clear irregular to smooth anthropic, moderate to heavy organic staining of matrix, total void space 20-30%, largely worm channels and chambers, channels strongly vertical and horizontal to boundary, at least one vertical worm channel cuts layer 34.8 below, one vertical worm channel stops dead at upper boundary, largest voids contain remnants of decomposing peat flakes and excrement, indentifiable charred organics elongated charred peat fragments, charcoal mostly unidentifiable, most likely charred plant material, most plant tissue moderately to strongly decomposed, peat ash lenses/pockets 2-5%, <2% diatoms in matrix, structure of diatoms and phytoliths mostly intact, heavy biological disturbance, mostly by worm action. | Mixture of silt loam and peat ash with a few peat ash pockets and lenses and elongated flakes of weakly to strongly charred peat, more than one dumping event, at least three similar 1-3 mm thick floor deposits which can only be positively distinguished by color in OIL, occupation phase. |
| 34.10 | [2571] | Thickness 3-5 mm, upper boundary diffuse irregular anthropic, moderate to heavy organic staining, total void space 20-30%, pockets and lenses of fairly pure peat ash and peat ash slag similar to 34.13 and 34.3.1 about 2-5% of whole, one possible wood charcoal, otherwise mostly burned peat and plant tissue, heavily disturbed by biological disturbance however layering still clear, phytoliths and diatoms both melted and intact, plant material moderately to strongly decomposed, traces of decomposing phlobaphene tissues/bark in groundmass. | Mixture of silt loam, peat ash, fuel ash slag, charred peat fragments and charcoal, at least four or five similar 0,5-2 mm thick floor deposits which can be distinguished apart by color in OIL, two lenses more bright orange in color, one lens above upper boundary of 34.9 and one small lens towards the left of section in the middle of layer, very similar in color in PPL, possibly each a singular dumping event, lenses described all together, clear boundary between 34.9 and 34.10 without any clear abandonment deposits between them, possibly same occupation phase. |

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| **34.11** | **[2571]** | Thickness 1-2 mm, dark redish brown silt loam, upper boundary fairly clear especially in OIL but very irregular anthropic, total void space 20-30%, groundmass heavily masked by organic and iron staining, dark to bright orange in OIL, 1-2 larger sand grains also bright orange in OIL. | Singular dumping event of peat ash with traces of burned soil, bioturbated. |
| **34.12** | **[2571]** | Thickness 1-3 mm, grayish to very dark brown silt loam, upper boundary diffuse to clear irregular anthropic, very similar to 34.10. | Mixture of silt loam, peat ash, fuel ash slag, charred peat fragments and charcoal, floor layer, heavily bioturbated. |
| **34.13** | **[2571]** | Described at x100 due to thinness of lens, thickness 1-2 mm, small lens only about 1 cm long, dies out towards the right of thin section, massive, total void space <2%, brownish gray silt, moderately sorted, upper boundary clear irregular anthropic, weak organic staining of groundmass. | Lens of fuel ash slag, one dumping event, weakly bioturbated. |
| **34.14** | **[2561]** | Thickness 2-3 mm, dark grayish and redish brown to blackish brown silt loam, upper boundary clear fairly smooth anthropic, heavy organic staining, total void space 10-20%, mostly in lower part of layer, upper part a massive <0,5 mm thick lens of peat ash, diatoms mostly intact, identifiable charred material charred peat flakes, plant material moderately to strongly decomposed, planar voids between peds strongly parallel and perpendicular to boundary. | Lens of fuel ash and mixture of fuel ash slag, soil and charred peat flakes, a few dumping events, upper surface possibly trampled, similar to 34.13 except diatom structure is intact similar to 34.3.1, peds either spongy towards the bottom of lens or laminated/elongated towards the surface, occupation deposits, layer partially bioturbated. |
| **34.15** | **[2534]/ [2536]** | Thickness 6-9 mm, redish brown to redish dark brown sandy silt loam, very weak, if any, organic staining, upper boundary clear irregular to weakly wavy anthropic, a 2,4 cm long and 2-5 mm wide cigarshaped void about 20-30% of layer, total void space 30-40%, a few (<2%) smaller sand grains partially to wholly bright orange to red in OIL, fuel ash slag mostly transluscent gray and amorphous to vesicular but 2-3 fragments can be found that are black and vesicular, fuel ash slag mostly in small pockets of peat ash, sandgrains mostly angular to subangular, one small very rounded sandgrain. | Mixture of sandy silt loam and peat ash, within the large void there are remnants of charred peat/plant tissue, void was possibly all peat fragment but now only 20-30% of tissue left, bioturbated, possibly two layers of sandy silt loam, one light yellowy brown to brown to the right in section, one darker redish brown towards the middle and left, but material is very similar sandy silt loam with differing amounts of iron staining in matrix. Possible turf collapse or leveling layer from/after phase of abandonment. |
| **34.16** | **[2534]/ [2536]** | Thickness 1-4 mm, yellowy and grayish red brown to dark brown silt loam, upper boundary diffuse irregular anthropic, total void space about 10-20%, layer thins out towards the right of thin section and disappears in the middle which might suggest truncation, upper part of layer rich in charred peat flakes and plant tissues, one 2,5 mm long and 1 mm thick charred subangular peat fragment at surface of layer aligned parallel to boundary, diatoms in peat matrix clear and intact, 5-6 larger sand fragments bright orange in OIL, plant tissue moderately to highly decomposed, one large black and vesicular fuel ash slag fragment, others translucent gray. | Possible truncated occupation surface or floor, bioturbated. |
| **34.17** | **[2526]** | Thickness 3-5 mm, upper boundary diffuse to clear irregular anthropic, very similar to 34.15 except a bit darker in color and slightly finer grain size, total void space 5-10%, less disturbed by biological action, very few larger sandgrains bright orange in OIL. | Mixture of sandy silt loam and peat ash, possible leveling layer or floor, bioturbated. |
| **34.18** | **[2521]** | Thickness 9-11 mm, main groundmass grayish brown to very dark brown silt loam, upper boundaries clear irregular to fairly smooth anthropic, total void space 10-20%, moderate to heavy organic staining, weak patchy iron staining, at least three 0,2-1 mm thick and 5-20 mm long lenses of peat ash strongly parallel to boundary similar to 34.3.2, 34.13 and 34.23, lenses rather unclear in PPL but very clear in OIL in colors of yellowygray, orange red and pale redish and yellowy brown, also 1 or 2 lenses similar to matrix 34.11, the thin lenses are in between 1-3 mm thick layers of soil mixed with peat ash and charred plant materials, lenses 10-20% of whole layer, the three thicker layers can be destinguished by ligher and darker brown colors in PPL, a few (<2%) larger sandgrains bright orange in OIL, plant tissue moderately to very strongly decomposed and/or charred, slag translucent gray to yellowy gray vesicular globules. | Occupation deposits, many small single dumping events. Most plant tissue, charcoal and slag fragments <1 mm in size, no identifiable charcoal material, bioturbated, last layer at upper boundary seems least disturbed by worm action possibly due to compaction/trampling. |
| **34.19** | | Thickness 1-3 mm, yellowy grayish brown to redish dark brown sandy silt loam, unsorted, upper boundary clear irregular to mildly wavy anthropic, total void space 10-20%, very weak organic staining, small groundmass area strongly stained with iron, very similar to 34.1 but less sandy, only 2-3 sandgrains bright orange in OIL. | Sandy soil mixed very poor in anthropogenic inclusions, bioturbated. Possible turf collapse, period of abandonment. |
| **34.20** | | Thickness 2-4 mm, three thin layers (1-2 mm thick) of similar brown and dark brown silt loam and one <0,5 mm thick lens of fuel ash similar to 34.23, moderate to heavy organic staining, faint patchy iron staining, upper boundaries clear and fairly smooth to irregular anthropic, total void space 5-10%, plant tissue moderately to strongly decomposed, trace amounts of charred and calcined bone, one or two possible wood charcoal fragments. | Occupation layers or floors, at least one or two single dumping events of fuel ash, smooth upper boundaries and massive microstructure suggest at least moderate trampling, bioturbated. |
| **34.21** | **[2463]** | Thickness 1-2 mm, dark to very dark brown silt loam, unsorted, upper boundary diffuse irregular anthropic, total void space about 2-5%, one or two possible small wood charcoal fragments, groundmass heavily masked by organic staining, very similar to 34.4. | Compacted occupation layer/floor, weakly bioturbated. |
| **34.22** | | Thickness 2-4 mm, brown to redish brown to dark brown silt loam to sandy silt loam, upper boundary diffuse to clear irregular to smooth anthropic, unsorted, moderate to heavy dark brown to black organic staining, total void space 10-15%, plant material moderately to strongly decomposed, a few larger sand grains partially to wholly bright orange in OIL, charcoal seems mostly charred plant material, at least one <0,5 mm thick lens of fuel ash slag without clear diatoms or phytolits similar to layer 23, dark red to dark orange iron staining and nodules in matrix <2%, at least one very small calcined bone fragment in groundmass. | At least one or two dumping events, occupation surface/floor, bioturbated. |
| **34.23** | **[2441]** | Thickness 0,5-1 mm, described at x100 magnification, gray unsorted silt dotted with black and brown, upper boundary clear irregular anthropic, total void space 2-5%, a small lens only about 1,2 cm long, dies out towards the right, soil portion mostly mossgreen, gray and brown volcanic glass, all plant material highly decomposed and/or charred, organic staining mostly very weak but very heavy in a few much smaller patches around decomposing plant materials. | Fuel ash and silica slag, difficult to say what is melted silica and what is unmelted phytoliths, very few clear diatoms present, weakly dotted with bright orange in OIL, occupation deposit, possibly a singular dumping event or deposition of hearth materials. |

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| **34.24** | **[2441]** | Thickness 2-4 mm, brown to very dark brown silt to silt loam, boundaries of lenses diffuse to clear irregular to smooth anthropic, total void space 10-15%, lenses thin out towards the right of thin section, upper boundary of the top lens unknown, upper and lower lenses are darker and more massive than the middle lens, groundmass of the middle lens only <2% bright orange in OIL while matrices of the darker lenses upper and lower are 5-10% bright orange in OIL, in the groundmass diatoms are mostly in trace amounts except for one thin cigarshaped lens of peat ash in middle layer largely composed of diatoms and dark brown to black decomposing and charred plant materials, charred plant materials bright orange to black in OIL, plant materials moderately to strongly decomposed, fuel ash slag translucent gray to grayish brown and vesicular, organic staining heavy in upper and lower lenses but moderate in middle lens. | At least three clear layers or depositional events of a mixture of soil, charred and/or decomposing plant materials and peat ash, middle lens brown to dark brown, lower and upper very dark brown and massive, very similar contents, occupation deposits. |

✓ *Thin section 37 – About 60 cm north of the entrance to booth [2397]*

Thin section 37 was not described in detail except for a few observances of its general content as the sediments are fairly similar to the ones in section 34. About 16 layers were identified in the section. The layers are mostly gray and grayish brown to redish and dark brown silt loams, sandy silts and coarse loamy sands, along with a few lenses of pure peat ash (see figure 11). All the layers are mostly grayish brown to caramel brown in OIL but at least <2-5% of the larger sandgrains in every layer are partially bright orange to bright pinkish red in OIL. The deposits are fairly undisturbed with clear boundaries but weakly to strongly spongy structure and clear fairly small worm channels and chambers in many layers suggest at least some biological disturbance througout the sequence. Slightly darker and fairly smooth upper boundaries were observed in occupation depostis 37.2, 37.3, 37.5, 37.6 and 37.15.

Layer 37.1 is most likely remnants of turf collapse and a possible levelling layer. All the other layers are likely occupational deposits, or floors, all the way up to layer 37.16. Thickness of occupation layers ranges from 0,5 mm to 0,6 cm while layer 1 is about 2-2,3 cm thick. At least four or five clear single dumping events of pure peat ash can be seen in layers 37.4, 37.8, 37.10, 37.13 and 37.14. All other layers contain only pockets of peat ash here and there. The peat ash lenses are largely composed of fuel ash slag or melted silica. The fuel ash slag is angular to globular and vesicular, transluscent gray and white to brownish and yellowy gray.

Only one or two very small possible wood charcoal fragments were found in layers 37.9 and 37.15. Otherwise the carbonized organic component seems mostly made up of charred plant tissue and peat. A few small decomposing unburned flakes of peat were also observed here and there. All plant tissues and peat fragments are redish brown to dark brown in PPL, fairly small and moderately to strongly decomposed. One or two slithers of phlobaphene tissue, or bark, were also found in the section. Calcined and charred bone is only present in trace amounts. One clear bone fragment was found in layer 11.

## Discussion

### *The occupation deposits*

All the occupation deposits analysed in the thin section samples taken from Gásir are fairly clear and relatively undisturbed by post-depositional processes. Boundaries are easily observed, if not by eye or in plain polarized light then with oblique incident light. The layers can be grouped roughly into three catergories; floor deposits (pale gray in description tables), temporary hearth deposits (pale red in description tables) and possible abandonment deposits (turf collapse, aeolian sediments, leveling layers). The layers range in thickness from less than a millimeter (floors/aeolian sediment) up to more than 2 cm (turf collapse).

Heavily trampled, or beaten, floors or occupational surfaces within permanent dwellings have been observed to have densely packed microaggregate matrix with well developed platy structures. They often contain highly fragmented anthropogenic debris, heavy organic staining of groundmass and horizontal bedding of elongated inclusions (Nielsen, 1991; Simpson et al, 1999; Milek, 2006; Macphail and Goldberg, 2010). Most of the floor deposits (occupational surfaces) within sections 05-7, 05-8, 06-34, 06-37 and 06-38 from booths [1765] and [2397] are only moderately compact silt loams and sandy silt loams, relatively poor in anthropogenic inclusions with weak to moderate and heavy (rare) organic staining of matrix.

Between the loamy floors at irregular intervals a few thin homogenous peat ash lenses were observed (see e.g. units 7.1.2, 37,4, 37,10, 37.13, 37.14 and 38.9). While these lenses are fairly compact they have not been broken up or trampled into the layers below by any significant degree. These lenses clearly represent single dumping (e.g. during a hearth cleaning) and/or depositional episodes of fuel ash possibly in order to diminish dampness and smell in wet conditions (Milek, 2006).

Occupational deposits, or floors, in thin sections 05-39, 06-35 and 06-36 (all units in sections 35 and 36 and units 39.2, 39.3, 39.5, 39.6 and 39.9) seem to have the same basic component of silt loams and sandy loams as mentioned above but the majority (excepting 39.11 and 39.13) of them is very rich in peat ash remains due to their close proximity with temporary hearths. The pure peat ash lenses are also thicker (see e.g. 35.5, 35.19, 35.21, 35.23, 36.4, 36.13) and more frequent alongside frequent unburned peat fragments.

The only other occupation surface layers that do not look similar are units 40.1 and 40.4 from area [2409]. The soil component is mostly the same but they are the only layers which have unusual amounts of large wood charcoal fragments and wood ash. This gives

them a much darker blackish color due to moderate to heavy organic staining of groundmass from the charcoal.

Elongated components (e.g. plant tissue, stones, peat flakes, bone) in almost all the floor layers are moderately to strongly aligned horizontally. The upper boundaries of all the floor layers have mostly been described as diffuse to clear, irregular to smooth anthropic. While a few boundaries are fairly clear and smooth there are little signs of any heavy or long term trampling as is often observed in permanent dwellings, except maybe in layers 38.15 and 39.16 where the groundmass closer to the upper boundary is slightly darker, more fine grained and compact than their lower parts.

These loamy and sandy loam deposits have most likely partially been deliberately deposited/spread onto the floors of the booths during occupation along with fuel ash debris to battle wetness and smell. After deposition the deposits were likely mixed with debris spilled, e.g. during hearth cleaning, and/or inadvertantly carried into the booths by people or deposited as aeolian dust (Courty et al., 1994; Milek, 2006; Machphail and Goldberg, 2010). If the model of occupation surfaces set forth by Gé et al. (1993) is considered these deposits could be classified as multiple *polyphased occupation surfaces*; more than one phase of surfaces with clear changes in anthropic sediment fabrics in the *active zone* without interruption caused by natural deposition or construction collapse, but with minimal trampling in the *active zone*.

According to Milek (2006) floor maintenance in year-around turf houses in the 19th and early 20th century often included putting down fresh turves in pantries and heavy traffic areas to keep them clean and maintain a fairly smooth walking surface. This resulted in alternating layers of fairly clean turf and compacted dark floor surfaces. When floors got too thick they were shovelled out. No clear indications of such floor maintance was found within the Gásir booth sections. The floor material is only weakly to moderately trampled and was seemingly allowed to accumulate fairly freely.

The *polyphased occupation surfaces* are interrupted in a few places in the Gásir samples by possible thin fine grained aeolian deposits (e.g. units 38.16, 38.17, 39.10, 39.12, 34.19), and thicker rough mixtures of silt loams, loamy sands and/or sands in structural collapse and leveling layers (e.g. 7.2, 8.1, 8.13, 34.1, 36.3, 37.1, 37.16, 38.6, 38.18 and 38.19), most likely deposited during abandonment and/or just before occupation was resumed (leveling layers). The thin aeolian deposits suggest temporary mobilization of fine materials from eroded or unvegetated surfaces in the vicinity, prior to further anthropogenic deposition (Simpson and Barrett, 1996). It is very likely that turf collapse and sagging turf walls were

sometimes used as leveling materials prior to fresh occupation deposits although it is impossible to tell how long a time would have passed between phases. Traces of anthropogenic debris could be found in almost all the abandonment deposits. Only layers 36.1 and 36.2 were identified as fairly undisturbed in situ natural soil (Andosol B-horizon) at the bottom of booth [2397].

Three sections from booth [1765] (section 05-8) and area [2409] (sections 05-39 and 05-40) east of booth [2396] contained evidence of in situ temporary hearth deposits and associated peat ash dumps. In booth [1765] the dark colored peat ash and charcoal rich hearth deposits (units 8.4 to 8.10) are lying in a shallow bowl or depression that was at least 2 cm deep at its southern edge. Fuel ash filling 8.10 has quite possibly been partially cleaned out from above before layer 8.11 was deposited on top, possibly as a floor surface after the hearth was abandoned. Later, peat ash lenses 8.5-8.8 and soil deposit 8.11 have been cut or truncated (peat ash lenses only truncated to the left), possibly during a cleaning episode before layer 8.12 was deposited. The peat ash lenses are 1-4 mm thick while the last burning episode, or hearth filling, was at least 0,1-1 cm thick.

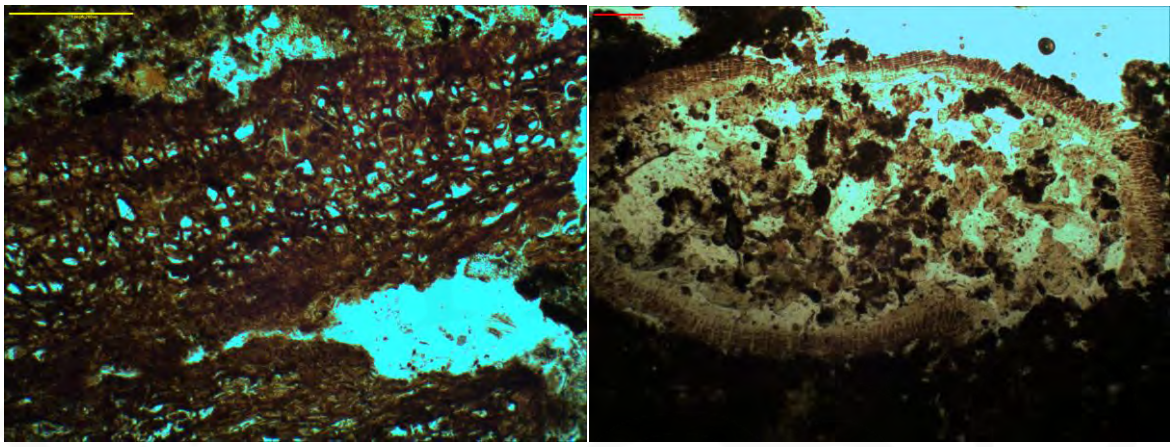
The upper half of section 40 was not described in any detail but unit 40.6 is comprised of a few strange 2-3,5 cm thick peat ash rich hearth deposits, in a clear cut into unit 40.5 (see figure 6). The deposits within 40.6 are horizontal and have a strongly horizontal fabric but a clear radiating discoloration (pale yellowy gray to black color) through the lower layers possibly due to temperature differentiation within the hearth materials during burning (Canti and Linford, 2000; Simpson, et al., 2003). This hearth filling has then been capped by more peat ash and fuel ash slag lenses which in turn, along with unit 40.5, have again been truncated by unit 40.7. Unit 40.7 is another filling in a +2,5 cm deep cut or depression of a temporary hearth, again filled with thick lenses and pockets of fairly well burned dark red and pale yellowy gray peat ash. In the field these deposits were thought to be connected to deposits 39.7 to 39.9 of section 05-39 but they could not be connected in thin section with any confidence.

In thin section 05-39 the layers below 39.10 (39.2-39.9), along with layer 39.14, are extremely rich in peat ash and charred peat and moderately to strongly rubified in oblique incident light (see figure 6). Layers 39.2, 39.3, 39.5 and 39.6 are most likely layers of mixed peat ash, peat charcoal and soil deposited on the margins of a temporary hearth. Within the layers there are subtle hints both in color changes and groundmass fabric that the layers are made up of more than one depositional event. These lenses have clearly been cut at boundaries 39.2/39.3 and 39.5/39.6 where some of them end abruptly, possibly due to a

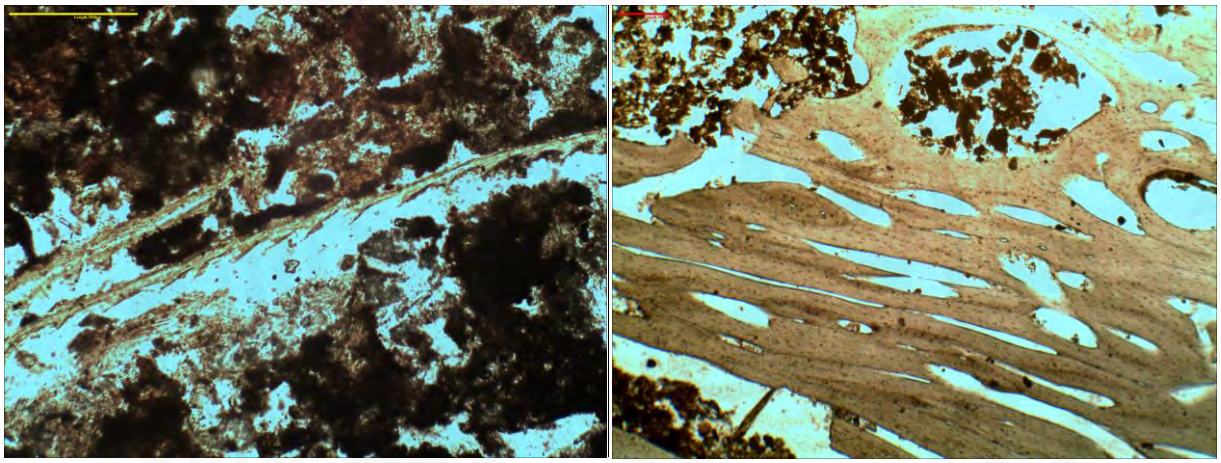
cleaning event. After deposition layers 39.2 and 39.3 were cut at the same time towards the left in the section and layer 39.4 formed. Layer 39.4 is most likely the southern margin of a poorly burned 1,5 cm thick peat filling of a temporary hearth. On the margin of the cut small peat flakes are clearly lining the sides of the hearth pit as their internal fabric and long axis is tilted 50-90° down to the right while the rest of the filling is mixed and horizontal. The poorly burned filling is then topped by thin horizontal lenses and pockets of peat ash and charred peat. Layer 39.4 is covered by layer 39.5 but towards the right of the section layer 39.5 is very thin due to a shallow (0,2-1 cm deep) bowl/depression, or cut made to accomodate peat ash layers or marginal hearth fillings 39.7 and later 39.8. Layers 39.7 and 39.8 are a rough mixture of peat ash and charcoal. A knife sharp cut that tilts about 50° down towards the right seperates these two layers. Layers 39.6-39.8 are finally covered by possible floor layer or occupation surface 39.9. This layer, along with layers 39.14 and 39.15, is very rich in charred hearth materials and they might also very well have formed in the vicinity of later temporary hearths.

Together these deposits suggest rapid accumulation of fuel ash materials close to temporary hearth margins similar to the layers in sections 06-35 and 06-36 from booth [2397], and multiple cleaning out and reuse of each hearth.

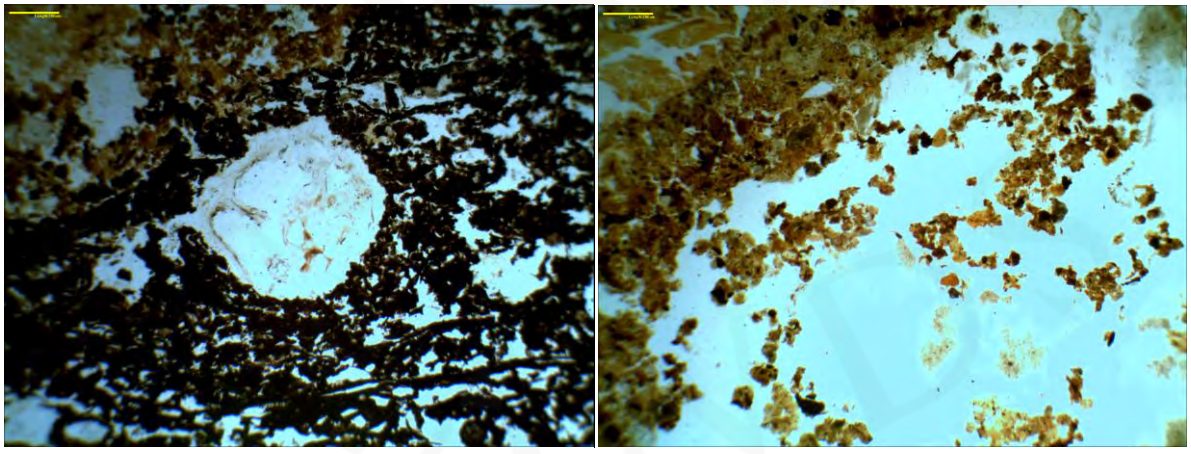
Anthropogenic inclusions within the occupation and abandonment deposits, other than fuel materials, are scarce. A large part of all unburned plant tissues and bark are fragmented and moderately (see figures 12 and 13) to very strongly decomposed (FitzPatrick, 1993). The biological and chemical alterations of these organic materials could have occurred long prior to deposition and most likely continued afterwards. Inclusions indicative of food resources are also rare and fragmented. Fish bone (unburned) was only positively identified in layer 39.15 (see figure 14). Animal bone, partly charred but mostly calcined (see figure 15), was found in trace amounts here and there (e.g. in units 34.14, 34.17, 35.15, 37.11, 39.1, 39.15 and 40.5). Cooking does usually not burn bone and bone only calcifies to gray and white colors at temperatures above 525°C. The weak presence of calcined bone most likely indicates that food refuse was occationally thrown into the hearth, possibly even as supplementary fuel, and later strewn around the site along with the fuel ash (Simpson et al., 1999; Milek, 2006). No clear idea of food resources on site can be deduced from these samples but the concentrated anthropogenic inclusions (fish bone, animal bone, seaweed and other plant tissue) in units 39.14 and 39.15 (context [2125]) could possibly indicate that food processing and/or possibly eating took place at some point in area [2409] east of booth [2396]. For a detailed faunal analysis see Harrison (2007).



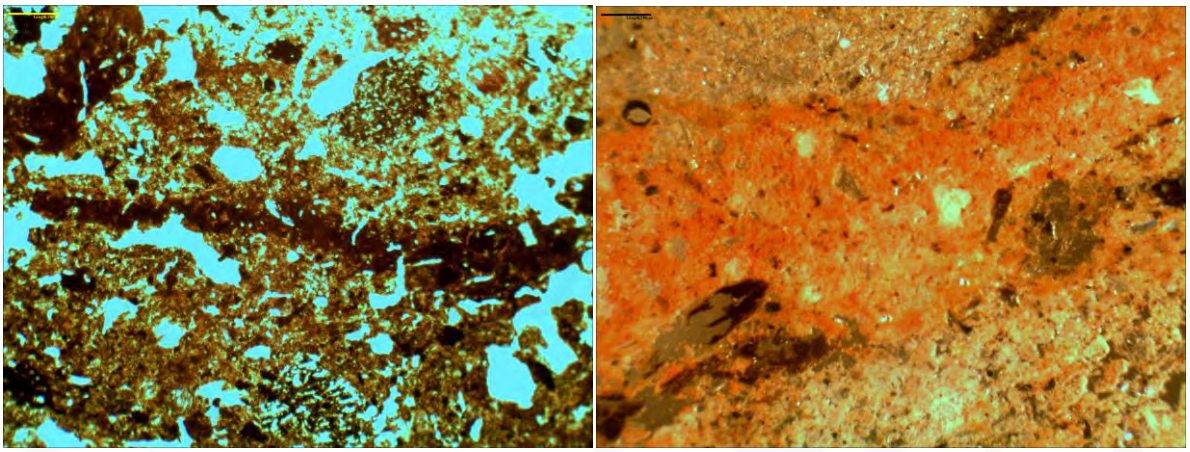
*Figures 12 and 13 – Plant tissue (left) from layer 39.14, bark (right) from layer 39.7, scale bars about 200 µm*



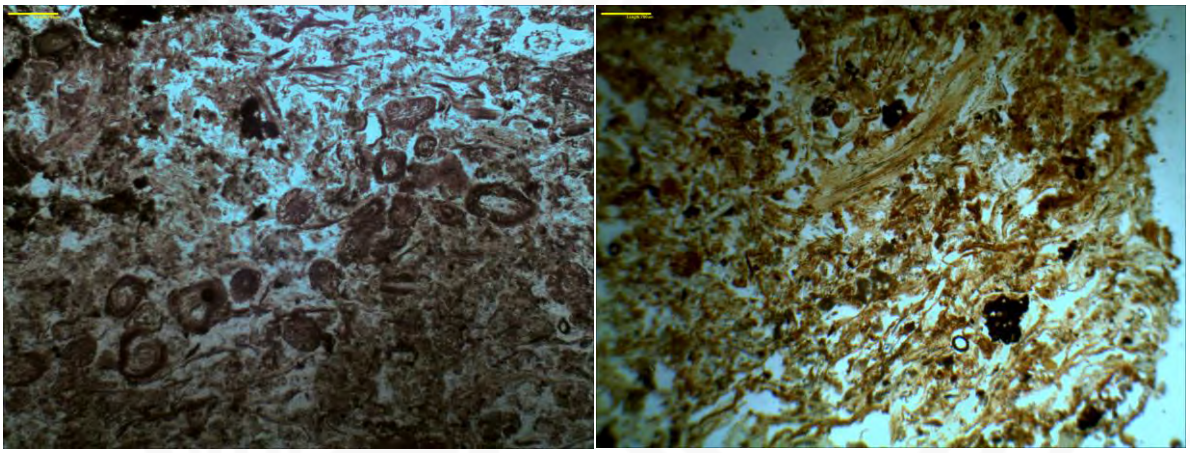
*Figures 14 and 15 – Fish bone (left) from layer 39.15, calcined bone (right) from layer 40.5, scale bars about 200 µm.*



*Figures 16 and 17 – Root nodule embedded in charred peat (left) from layer 40.5, excrement in a worm channel (right) from layer 8.14, scale bars about 200 µm.*

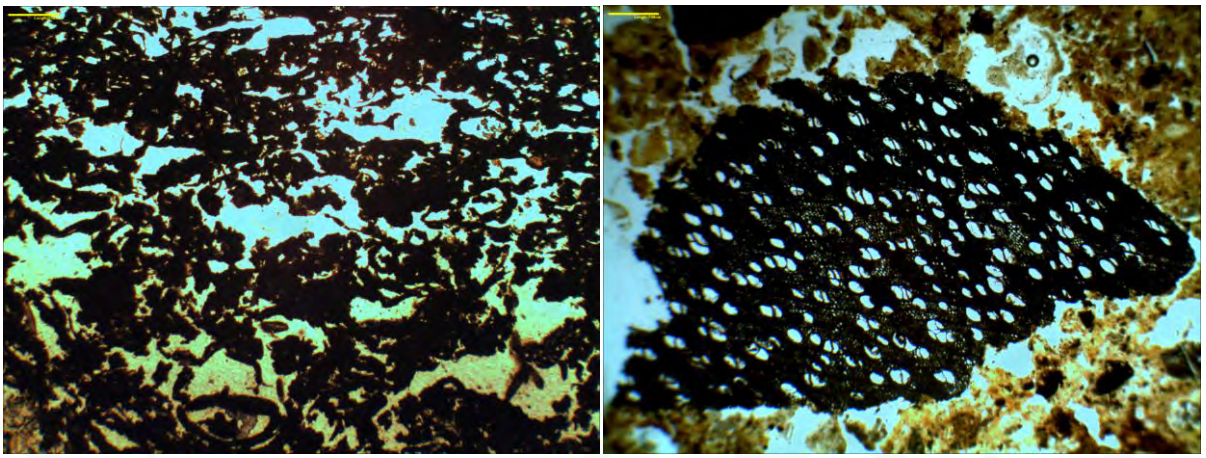


*Figures 18 and 19 – Iron pan (left) in layer 8.14 and a lens of rubified earth in OIL (right) in layer 35.20, scale bars about 200 µm.*

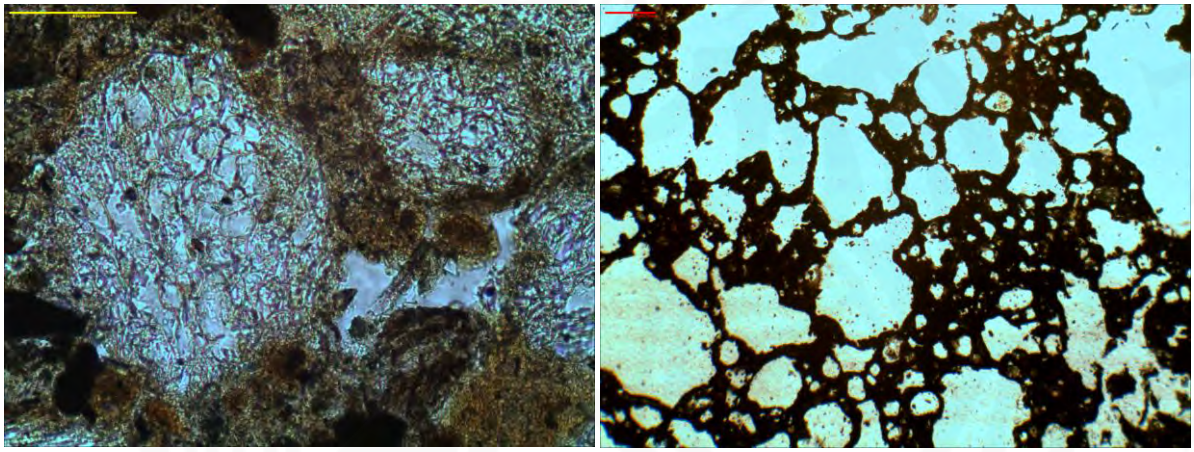


*Figures 20 and 21 - Peat from layers 40.5 (left) and 35.3 (right), scale bars about 200 µm.*

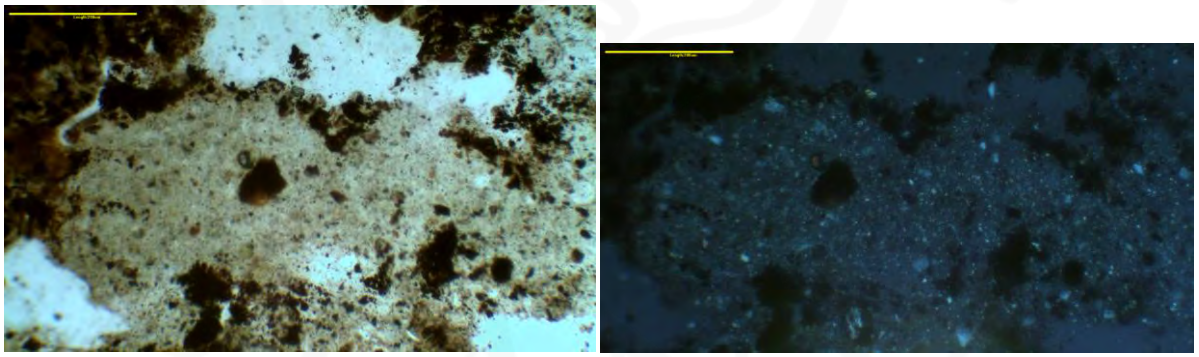
*Figures 22, 23 and 24 – Peat ash rich in diatoms (left) in layer 36.4, peat ash very rich in phytoliths (middle) from layer 40.7, peat ash where all diatoms and phytoliths have melted (right) from layer 37.13, scale bar on the left about 200 µm, scale bars in the middle and to the right about 100 µm.*



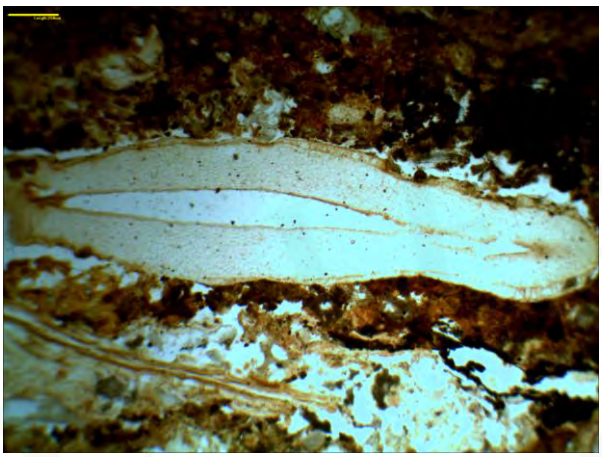
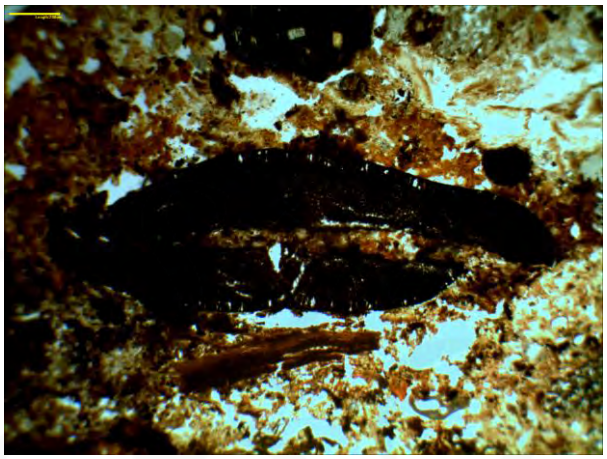
*Figures 25 and 26 – Charred peat (left) from layer 40.5 and birch charcoal (right) from layer 8.14, scale bars about 200 µm*



*Figures 27 and 28 – Light fuel ash slag (left) from layer 39.13 and dark fuel ash slag (right) from layer 36.8, yellow scale bar about 100 µm, red scale bar about 200 µm.*



*Figures 29 and 30 – Calcareous ash in layer 40.4, PPL (left), XPL (right), scale bars 200 µm*

*Figures 31 and 32 – Seaweed bulbs from layer 39.15, unburned (left), charred (right), scale bars 200 µm.*

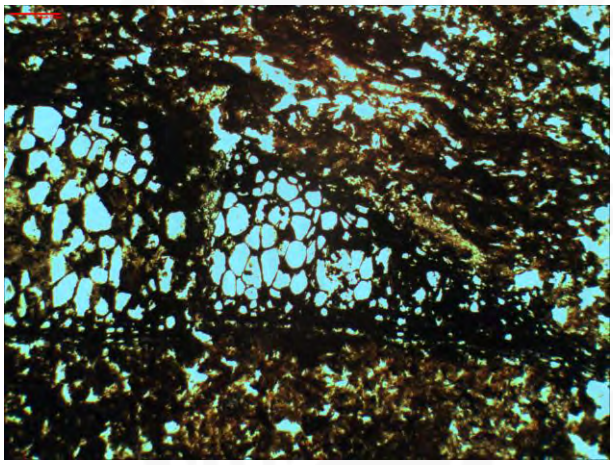


*Figure 33 – Charred plant parenchyma from layer 40.5, scale bar about 200 µm.*

***Post-depositional processes***

As was mentioned above the deposits and their boundaries in the section samples from Gásir are fairly clear and mostly relatively undisturbed by post-depositional processes. The microstructure of the occupation sediements discussed above is often a rather complex mixture of massive, angular and subangular blocky and spongy, to rare platy, channel and chamber structures. These complex structures are mostly made up of weakly to moderately developed fine (2-10 mm) to ultrafine (<1mm) soil peds (Bullock, et al., 1985). While most of the layers exhibit little homogenization of groundmass or hazing of layering and boundaries, clear signs of bioturbation and basic reworking of sediments can still be seen in every section (e.g. layers 36.5, 36.6, 38.6, 39.12 and 40.5). The common spongy (and/or vughy) and rare channel microstructures are indicative of bioturbation by soil macro- and mesoorganisms

(Kooistra and Pulleman, 2010) and clear worm channels and chambers can be seen e.g. on the boundary of layers 8.13 and 8.14, in layer 39.9 and 39.11, through layer 39.10 as well as in layers 34.7, 34.15, 36.6.2 and 38.5, although clear excremental pedofeatures (see figure 17) such as loose infillings of voids are rare (Bullock, et al., 1985; FitzPatrick, 1993). No clear signs of root action or decomposing root tissue was identified except in layer 40.5 in section 05-40. Layer 40.5 has a strongly developed spongy structure and is comprised of at least three occupation deposits which seem to have gradually almost faded into one due to bioturbation during a hiatus in deposition. Remnants of root tissues are distributed throughout the layer (see figures 6 and 16).

Another possible indicator of a pause in deposition and succeeding exposure of sediments to the elements is clearly seen, e.g. at boundary 34.12/34.13-34.14 in thin section 34 (see figure 11). In this area of the section, layers 34.10 to 34.12 exhibit clear moderately developed subangular blocky to spongy (or vughy) microstructure which seems to end fairly abruptly at this boundary where it changes in layers 34.13 and 34.14 into mostly massive to very weakly developed subangular blocky microstructure. Such abrupt changes in microstructure can also be seen in section 36 e.g. in layers 36.9 to 36.13 (see figure 10).

Layers that are not heavily bioturbated exhibit massive, weakly to strongly developed angular to subangular and platy (rare) structures. The angular and subangular blocky structures suggest that the sediments have been exposed to cycles of wetting and drying and possibly freezing and thawing (FitzPatrick, 1993; Van Vliet-Lanoë, 2010). The platy structures could possibly suggest exposure to freezing and thawing as well, which could certainly be expected in open-air structures during the winter. They could however also have formed due to compaction or trampling. No clear clayey or silty cappings formed through repetitive freeze-thaw cycles were observed on soil peds, but as they certainly seem scarce some might have been overlooked (FitzPatrick, 1993; Simpson and Barrett, 1996; Van Vliet-Lanoë, 2010).

These limited and sometimes discontinuous occurrences of pedofeatures in such organic rich sediments, alongside very thin abandonment deposits (e.g. 8.15, 38.16-38.17, 39.10 and 39.12, see above), suggest pauses in anthropogenic deposition/occupation, even if natural deposition and chemical and mechanical breakdown were only active over short periods at a time (Simpson and Barrett, 1996). The exact length of these periods is uncertain but in light of the evidence it is not unreasonable to suggest that in most cases exposure could not have lasted more than one or two winters, excepting the deposits in unit 40.5 which were probably exposed somewhat longer than that.

Only two places in the sections exhibit clear, strong iron staining of groundmass (units 40.2 and 40.3) due to inhibited water drainage, and iron panning at boundaries (units 8.14 and 8.16) due to impervious surfaces possibly formed through trampling (see figure 18). At what stage after deposition the iron translocation took place is unclear (Simpson, et al., 1999). This certain lack of strongly developed iron staining and panning denotes fairly uninhibited water drainage through the sediments during wet/dry cycles and fairly rare longstanding water saturation (several days at most) in the booths, possibly due to meticulous floor maintenance of the inhabitants and limited trampling of the sediments (Lindbo et al., 2010).

***Fuel utilization and evidence of burning***

As discussed above clear layers indicative of in-situ burning of fuel in temporary hearths were found in sections 05-8, 05-39 and 05-40. In all the sections peat (FitzPatrick, 1993; Carter, 1998; Guttmann, et al., 2003) seems to have been the most prominent fuel source and exploitation seems to be fairly consistent throughout. Floor layers in thin sections 06-35 and 06-36 are especially influenced by the presence of hearth [2844] and contain many small but clear flakes of unburned peaty turves (see figures 6, 10, 20 and 21). However, the largest flakes (some charred but mostly unburned) were found in a large void in layer 7 in section 06-38, at the base of unit 5 in section 05-40, in layer 9 in section 36 and in layers 1 and 9 in section 39. General flake size ranges from 1-25 mm in length and 0,5-10 mm in width. Most of the larger peat flakes have clear void spaces following their outer contours suggesting that they have dried out considerably after deposition (Milek, personal communication). The peaty turves are amorphous to fibrous and spongy organic rich flakes with very strong internal horizontal alignment of plant tissue. Their mineral content seems fairly fine grained (silts and fine silt loams) and mostly <20%. Diatom frustules (silica sceletons of algae; Round, et al., 1990) are found in small amounts within most of the flakes. Their structure and composition suggests that their source was most likely poorly drained organic rich peat deposits (FitzPatrick, 1993).

Another indicator of peat being the main fuel are extensive lenses and pockets of peat ash throughout most of the sections (see figures 22-24). The peat ash has a range of very dark grayish brown and black colors to very clear pinkish reds, redish grays, grays and yellowy whites depending on the stage of burning and temperatures involved. The darker colored layers are mostly very rich in carbonized organic materials (charcoal, see figure 25) due to incomplete combustion at fairly low temperatures and possibly short lived exposure to fire

(Simpson et al, 2003). However, when peat is exposed to temperatures above 550°C the organic component is completely combusted (Canti and Linford, 2000; Simpson, et al., 2003). What is left after burning at higher temperatures are often pale colored lenses rich in phytoliths (siliceous plant remains; Piperno, 2006) and diatom frustules (Simpson et al., 2003). In the pale colored deposits from Gásir (see e.g. units 35.5, 35.23, 36.4, 37.13 and 37.14, 38.9 and 40.7) the silica diatom frustules and phytoliths are mostly intact (unmelted, see figures 22 and 23). Due to compaction and small size it is difficult to discern what kinds of phytoliths might be present in these layers but the ash seems to be fairly poor in phytoliths compared to diatoms and elongated (e.g. grassy) phytoliths seem mostly rare or not present (see figure 22). This might possibly be due to the plants forming the peat source largely not being phytolith producers (e.g. mosses and sedges; Piperno, 2006). Only one clear pocket of very phytolith rich peat ash was found in layer 40.7 (see figure 23). At first glance at the diatoms, pennate frustules seem more abundant in the deposits than the centric ones. Pennate frustules are extremely abundant e.g. in sediments of lakes, salt marshes and sandy beaches (Round, et al., 1990).

Although the diatom frustules and phytolits are mostly intact in the Gásir peat ash a few lenses are comprised partially to wholly of amorphous (see figure 25) silica, and very often vesicular, transluscent gray and black fuel ash slag globules (see e.g. units 7.1.2, 35.19, 39.7, 39.13 and one upper lens of 40.6). Traces of these slag globules (see figures 27 and 28) are also often found in the matrix of the occupational deposits on site. Melting temperature of silica is very high or 1713°C (Canti, 2003) which is much to high for a cooking fire or a temporary hearth. However, when silica comes in contact with basic salts (potassium, magnesium, calcium, sodium) which, along with silica, are abundant in Icelandic Andosols (Arnalds, et al., 1995; Arnalds and Kimble, 2001), the high melting temperature lowers considerably and the silica vitrifies to form glassy vesicular slag but usually only on a fairly small scale both in size and quantity. It might therefore be speculated that the fuel ash slag in the Gásir deposits could be mostly a mixture of melted phytoliths, diatoms and/or siliceous soils and sands formed within the range of a cooking fire/temporary hearth (Canti, 2003; Milek, 2005).

When we look at the sediments from Gásir under oblique incident light (OIL) some of them appear strongly bright orange and red (see figure 19), especially in sections 06-35 and 06-36 close to hearth [2844]. In fact most of the sediments have at least traces of loamy silts and sand sized grains within their groundmass that shine partially to wholly bright orange and pinkish red in oblique incident light. This indicates that soil has been subjected to fairly low

temperature burning. At temperatures around and over 400°C iron rich compounds in the soils are disrupted and iron forms iron oxides, (maghaematite in reducing conditions and to haematite in oxidising conditions) and the iron oxides turn the soil this bright orange and red color (Courty, et al., 1989; Canti and Linford, 2000; Simpson, et.al., 2003). Large amounts of this burned soil most likely originate in the peaty turves used for fuel or from sediments within the temporary hearths constructed on site.

During the analysis traces of wood charcoal and seaweed were also found. Very few of the wood charcoal fragments could be identified to species but two or three very small charcoal fragments were identified in context [1851] (e.g. unit 8.14) in sections 05-7 and 05-8 (see figure 26). Only unit 40.4 produced clear remnants of wood charcoal and one small pocket of gray, strongly crystallitic (XPL) wood ash (see figures 29 and 30). The wood ash is mostly comprised of micritic calcium carbonate crystals and formed during low temperature burning (FitzPatrick, 1993; Canti, 2003; Simpson, et al., 2003; Milek, 2006). All identifiable wood charcoal was classified as birch (Mooney, personal communication). Very little evidence of calcareous wood ash was found in the Gásir sections but this might be more due to poor preservation (rapid distintergration of calcite crystals) in Icelands acidic soils (Arnalds, 2003) and the sites often open aired conditions rather than complete absence of this material (Canti, 2003; Simpson, et al., 2003).

Two bulbs of seaweed (see figures 31 and 32) were found in unit 39.15, one charred and one fairly fresh and unburned (Mooney, personal communication). These fragments are most likely bladders of rockweed (*Ascophyllum nodosum)* or bladder wrack *(Fucus vesiculosus)*. Seaweed is considered a less efficient fuel source than wood due to high mineral content (rich in sodium, potassium, calcium and magnesium). This could suggest that if seaweed was sometimes used alongside peat as fuel, formation of fuel ash slag might have been more common. Seaweed has been used not only as fuel but also in metalworking, in dyeing wool and for medicinal purposes (Kristjánsson, 1980; Mooney, 2009). Seaweed was also fed to livestock as a food supplement and during hard times people even ate it, but just as seaweed is a poor fuel source it also has poor nutritional qualities and therefore could not be used on its own as a food source without serious consequences (Kristjánsson, 1980). Finally, one fairly large fragment of charred plant parenchyma (Mooney, personal communication), possibly some kind of a leaf fragment, was also found in unit 40.5 but where it originated from is as yet unknown (see figure 33). It seems that in this area of Gásir at least, wood and seaweed were indeed burned on site but most likely only as supplementary fuel. No clear evidence was found of dung in these sections, neither burned or unburned.

## Conclusions and further analysis

All the occupation deposits analysed in the samples taken from Gásir are fairly clear, with easily identifiable boundaries and relatively undisturbed by post-depositional processes. The layers were grouped roughly into three catergories; floor deposits, temporary hearth deposits and possible abandonment deposits. The layers ranged in thickness from less than a millimeter (floors/aeolian sediment) up to more than 2 cm (turf collapse and hearth fillings). Most of the occupational deposits were weakly to moderately compacted silt loams and sandy silt loams which were relatively poor in anthropogenic inclusions and organic staining. In between these layers occational clear lenses of peat ash were observed. These deposits were most likely deliberately spread onto the floors of the booths just prior to and during occupation to battle dampness and smell, and possibly as leveling layers. After deposition the floors were likely mixed with debris spilled e.g. during hearth cleaning, and/or inadvertantly carried into the house by people, wind and water.

The sediments present clear indications of bioturbation and exposure to the elements during short gaps in occupational deposition e.g. through subangular to spongy (vughy) microstructures, thin natural deposits and turf collapse. The layers were rich in fuel and fuel ash remnants (traces were even found within turf collapse and aeolian deposits) while inclusions such as burned bone and other anthropogenic debris was rare. The temporary hearth deposits suggested rapid accumulation of fuel ash materials and multiple cleaning out and reuse of each hearth. Organic rich boggy peat appears to have been the main fuel on site along with wood and seaweed as supplementary fuel. Fuel ash suggests burning at low up to fairly high temperatures, most likely within the range of a cooking fire or temporary hearth.

No significant changes or differences in use of space or floor maintenance practices within or between the booths was found in the thin sections. The sediments analysed do not contain clear evidence of any other human activity other than general occupation (e.g. sleeping, fuel burning/cooking, feeding). All the evidence collected supports the image of Gásir as a place of temporary and/or seasonal occupation.

Further analysis of the thin sections could include taking a closer look at the peat remains to ascertain in more detail the types of plant materials they are made up of, as well as looking at diatom species and phytoliths present in the peat ash, to locate possible peat sources with more accuracy. Other burned and unburned plant remains, e.g. in deposits 39.15 and 40.5, could also give beneficial information through further scrutiny by a seasoned archaeobotanist.

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# Appendix

*Table A1 – Descriptions of microstratigraphic units in thin sections 39 and 40 from occupation layers [2409]*

| | Structure | | Groundmass | | | | | | Porosity | | | | | | | Biomin. | | Organic Matter | | | | | | Inclusions | | | | | | Pedofeat. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Microstratigraphic Unit | Microstructure | Dominant Orientation/Distribution of Basic Components | Texture Classification | Coarse/Fine Ratio (50 µm) | Coarse/Fine Related Distribution | Nature of Fine Mineral Material (PPL) | Nature of Fine Mineral Material (OIL) | Birefringence Fabric (XPL) | Simple Packing Voids | Compound Packing Voids | Complex Packing Voids | Chambers | Channels | Planar Voids | Spongy and Vughy Voids | Phytoliths | Diatoms | Amorphous (dark brown to black) | Amorphous (light brown to light reddish brown) | Plant remains (<1 mm) | Plant remains (1-10 mm) | Fungal Sclerotia | Fungal Spores | Charcoal (< 1 mm) | Charcoal (1-10 mm) | Burnt Bone (<1 mm) | Burnt Bone (1-10 mm) | Calcareous ash | Fuel ash slag | Amorphous and Cryptocrystalline (iron staining, iron pans and nodules) | Excremental |
| **40.1** | Massive to subangular blocky, peds slightly elongated | Unoriented, random, elongated components moderately parallel to boundary | Silt loam | 15/85 | Close porphyric | Dark brown, redish very dark brown, blackish brown, black, dotted | Brown to very dark brown and redish dark brown, dotted | Undifferentiated and weakly crystallitic | | | + | ▪ | ▪ | ▪▪ | ▪ | + | ▪ | ▪▪▪▪ | | ▪ | + | | + | ▪▪▪ | ▪▪ | ▪ | | | ▪▪ | + | + |
| **40.2** | Massive to subangular blocky | Unoriented, random, elongated components weakly to moderately parallel to boundary | Silt loam | 5/95 | Close porphyric | Redish graybrown to dark redish graybrown, dotted | Redish gray brown to grayish brown and brown, dotted with dark orange and black | Undifferentiated to weakly crystallitic | | ▪ | + | ▪ | ▪▪▪ | + | ▪▪▪ | ▪▪ | + | ▪▪ | ▪ | ▪▪▪ | ▪▪ | | + | ▪ | | ▪ | | | ▪ | ▪▪▪ | ▪▪ |
| **40.3** | Weak subangular blocky | Unoriented, random | Fine silt loam | 5/95 | Loose porphyric | Redish gray-brown | Bright gray to redish gray, dotted with dark orange and black | Undifferentiated to weakly stipple speckled and crystallitic | | ▪ | + | ▪ | ▪▪ | ▪ | ▪▪ | ▪▪▪ | ▪ | + | ▪▪ | ▪▪ | ▪▪ | ▪▪ | + | ▪ | ▪ | | | | | ▪ | ▪▪ | ▪▪ |
| **40.4** | Weak subangular blocky to spongy | Unoriented, random, elongated components weakly to strongly parallel to boundary | Silt loam | 10/90 | Close porphyric | Grayish and redish brown to grayish and redish dark brown to very dark brown and black, dotted | Light gray to gray, brownish gray to grayish brown, grayish caramel brown and dark brown, dark orange, dotted and mottled with black, gray and dark to bright orange | Undifferentiated, weakly stipple speckled and crystallitic | | + | ▪ | ▪▪ | ▪▪ | + | ▪▪ | ▪▪ | ▪ | ▪▪ | ▪ | ▪▪ | ▪▪▪ | | + | ▪▪▪ | ▪▪▪ | + | | ▪* | ▪ | ▪ | ▪ |

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| **40.4.1*** | Chamber structure | Unoriented, random | Fine silt loam | 2/99 | Loose porphyric | Light to dark gray, grayish dark brown, dotted | Dull silver to dark gray and brownish dark gray, dotted with black and white | Undifferentiated to strongly crystallitic | | | ▪ | ▪▪▪▪ | | | ▪▪ | + | | ▪▪ | | | | | ▪▪▪▪▪ | | | | ▪▪▪▪▪ | | | |
| **39.1** | Massive and compact grain structure to very weak subangular blocky | Unoriented, random | Very fine sandy silt loam | 25/75 | Close porphyric | Grayish brown to grayish dark brown, dotted with black | Silvery gray dotted with dark gray and black | Undifferentiated and stipple speckled, weakly crystallitic | + | | ▪ | | | | ▪ | ▪ | + | + | + | ▪ | ▪ | | | ▪ | | | | | | + | |
| **39.1.1** | Weakly to moderately spongy | Unoriented, random, longer plant tissue moderately to strongly parallel to each other and the outer edges of aggreagates | Silt | 1/99 | Loose porphyric | Organic; Grayish brown to redish dark brown, dotted with black | Organic; Grayish to caramel brown, dotted with black and mottled with orange | Undifferentiated and stipple speckled, very weakly crystallitic | | | | | | | ▪▪▪ | + | ▪ | ▪▪▪ | ▪▪▪▪ | ▪▪ | ▪ | | | | | | | | ▪▪ | |
| **39.2** | Spongy to compact grain structure | Unoriented, random, longer plant tissues strongly parallel to each other within peds and parallel to boundaries | fine silt loam | 2/98 | Close porphyric | Mottled, redish and grayish dark brown, gray, dark brown to very dark brown and redishblack brown, dotted with black | Mottled, gray to dark gray, brownish gray and caramel to dark brown and bright orange, dotted with black and orange | Undifferentiated and stipple speckled, weakly crystallitic | ▪ | + | ▪ | + | ▪ | ▪ | ▪▪ | + | ▪ | ▪▪▪ | ▪▪ | ▪▪ | | | | ▪ | | | ▪▪▪ | | + | | ▪ |
| **39.3** | Massive to spongy to compacted grain structure | Unoriented, random, longer organic fragments strongly parallel within peds and lenses, & parallel to boundaries, peds weakly to strongly parallel to boundary | Fine silt loam | 2/98 | Loose to close porphyric | Mottled to laminar, gray, brownish gray, redish and orange browns to very dark brown and redish very dark brown to black, dotted with black | Mottled to laminar, whitish gray to gray and dark gray, caramel brown to dark brown to bright orange, dotted with black, white and orange | Undifferentiated and stipple speckled, very weakly crystallitic | + | + | ▪ | + | ▪ | + | ▪ | ▪ | ▪ | ▪▪▪▪ | ▪▪ | ▪ | ▪ | | | ▪ | ▪▪ | ▪ | | | + | | ▪ |

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| **39.4** | Spongy to fibrous | Unoriented, random, longer organic material and peds mostly moderately to very strongly perpendicular to upper boundary except in top 2 mm of filling where parallel | Fine silt loam | 2/98 | Loose porphyric | Mottled, grayish and redish dark brown to very dark brown with a redish haze, dotted with black | Mottled, gray and orange gray to caramel and dark brown to bright orange, dotted with black | Undifferentiated and stipple speckled, weakly crystallitic | + | ▪ | ▪ | | + | | ▪▪ | + | ▪ | ▪▪▪ | ▪▪ | ▪▪▪▪ | | | | ▪ | ▪ | + | | | + | | ▪ |
| **39.5** | Massive to spongy to compacted grain structure | Unoriented, random, longer organic fragments strongly parallel within peds and lenses, and parallel to boundaries, peds weakly to strongly parallel to boundary | Fine silt loam | 2/98 | Loose to close porphyric | Mottled to laminar, gray, brownish gray, redish and orange browns to very dark brown and redish very dark brown to black, dotted with black | Mottled to laminar, whitish gray to gray and dark gray, caramel brown to dark brown to bright orange, dotted with black, white and orange | Undifferentiated and stipple speckled, very weakly crystallitic | + | + | ▪ | + | ▪ | + | ▪ | ▪ | ▪ | ▪▪▪▪ | ▪▪ | ▪ | ▪ | | | ▪ | ▪▪ | ▪ | | | + | | ▪ |
| **39.6** | Weakly spongy to very compact grain structure | Unoriented, random, longer components strongly parallel to boundaries | Fine silt loam | 2/98 | Close porphyric | Mottled, redish and grayish dark brown, gray, dark brown to very dark brown and redishblack brown, dotted with black | Mottled, gray to dark gray, brownish gray and caramel to dark brown and bright orange, dotted with black and orange | Undifferentiated and stipple speckled, weakly crystallitic | ▪ | + | ▪ | + | ▪ | ▪ | ▪▪ | + | ▪ | ▪▪▪ | ▪ | ▪▪ | | | | ▪ | | | | | + | | ▪ |
| **39.7.1** | Massive | Unoriented, random | Fine silt loam | 1/99 | Loose porphyric | Light to dark gray, dotted | Dark gray, dotted with orange and black | Stipple speckled and weakly crystallitic | | | ▪ | | | | | ▪▪▪▪▪▪▪ | ▪ | ▪ | | | | | | | + | | | | ▪▪▪ | + | + |
| **39.7.2** | Massive to spongy | Unoriented, random | Fine silt loam | 2/98 | Loose porphyric | Brownish light gray, dotted | Silvery gray to dark and brownish gray, weakly dotted with black and orange | Stipple speckled and weakly crystallitic | | | + | | | | ▪▪ | ▪▪ | ▪▪▪▪▪▪▪ | ▪▪ | | | | | | | + | | | | ▪ | + | + |
| **39.7.3** | Massive | Unoriented, random | Fine silt loam | 1/99 | Loose porphyric | Gray to dark and brownish gray, dotted | Silvery to caramel gray, dotted with orange and black | Stipple speckled and weakly crystallitic | | | ▪ | | | | | | | ▪ | | | | | | | ▪ | | | | ▪▪▪▪▪▪▪▪ | + | |

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| **39.8** | Finely spongy | Unoriented, random, at upper boundary peds are moderately aligned parallel to same boundary | Fine silt loam | 1/99 | Close porphyric | Dark gray, grayish dark brown, to very dark brown and black | Mottled, gray, caramel brown, dark brown to bright orange and pinkish brown | Undifferentiated and stipple speckled, weakly crystallitic | ▪▪ | + | ▪ | | | ▪ | ▪▪▪▪ | ▪ | ▪▪ | ▪▪▪▪▪▪ | + | ▪ | ▪▪▪ | | | + | | | | | ▪ | | | |
| **39.9** | Massive to weakly spongy and angular blocky | Unoriented, random, longer peds and plant tissues strongly parallel to each other and boundaries | Fine silt loam | 1/99 | Loose porphyric | Mottled, gray, grayish brown to grayish dark brown to redish dark and blackish brown | Mottled, silvery gray, gray, caramle brown and dark brownish gray to bright orange, dotted with black and orange | Undifferentiated and stipple speckled, weakly crystallitic | | | + | | ▪ | + | ▪ | ▪ | ▪▪ | ▪▪▪▪▪ | ▪▪ | ▪▪ | | | | ▪▪ | ▪▪ | | | | ▪ | | + |
| **39.9.1** | Weakly spongy | Unoriented, random | Fine silt loam | 1/99 | Loose porphyric | Organic; Light to redish brown, dotted | Organic; Brownish gray to grayish brown | Undifferentiated and stipple speckled, weakly crystallitic | | | ▪ | | ▪ | | ▪ | ▪▪ | + | ▪ | ▪▪▪▪▪▪▪▪ | ▪▪ | | | | + | | | | | | | |
| **39.10** | Massive to spongy | Unoriented random, elongated components weakly to moderately parallel to boundary | Fine silt loam | 15/85 | Loose porphyric | Grayish to dark and redish brown, dotted | Gray, grayish caramel brown and caramel brown to dark brown, dotted with black, gray and orange | Undifferentiated to crystallitic and weakly stipple speckled | | | ▪ | + | ▪▪ | | ▪▪ | ▪▪ | ▪ | ▪ | ▪▪ | ▪ | | ▪ | + | ▪ | | + | | | ▪▪ | ▪ | ▪ |
| **39.11** | Massive to weak sponge and channel structure | Unoriented, random, elongated components moderately to strongly parallel to boundary | Sandy silt loam | 25/75 | Loose to close porphyric | Grayish to grayish and redish brown to grayish dark brown, dotted | Faint greenish gray to grayish caramel brown and caramel brown, dotted | Undifferentiated to crystallitic, very weakly stipple speckled | | | + | ▪ | ▪▪ | | ▪ | ▪▪ | + | ▪ | + | ▪ | | | | ▪ | ▪ | + | | | ▪ | ▪ | + |
| **39.12** | Weakly subangular blocky to compacted granular and crumb structures | Unoriented, random | Fine silt loam | 5/95 | Loose porphyric | Orange brown, dotted with black and dark red | Caramel brown to dark caramel brown, dotted with black and dark orange | Undifferentiated to weakly crystallitic | | ▪ | ▪ | | + | | ▪▪ | ▪▪ | + | + | ▪ | ▪▪ | | | | + | | | | | | ▪▪ | ▪▪ |
| **39.13** | Weak sponge to channel structure | Unoriented, random, longer components weakly to moderately parallel to boundary | Silt loam to sandy silt loam | 5/95-30/70 | Loose to close porphyric | Redish and orange brown, light grayish brown to grayish brown and grayish dark brown, mottled and dotted | Gray to dark caramel brown, dotted | Undifferentiated to weakly crystallitic and stipple speckled (rare) | + | + | ▪ | ▪ | ▪▪ | | ▪▪ | ▪▪ | + | ▪ | ▪ | ▪ | ▪ | + | | ▪▪ | | + | + | | ▪ | ▪▪ | ▪ |

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| **39.13.2** | Spongy | Unoriented, random | Sandy silt loam | 40/60 | Close porphyric | Brownish very light gray, dotted | Brownish to redish bright light gray, dotted | Stipple speckled and weakly crystallitic | | | + | | ▪▪ | | ▪▪ | ▪▪ | | ▪▪ | | | | | | + | | | | | ▪▪▪▪▪▪▪▪▪ | ▪ | |
| **39.14** | Massive to very weak sponge and channel structure | Unoriented, random, elongated components moderately to strongly parallel to boundary | Fine silt loam | 1/99 | Loose to close porphyric | Mottled and lensed, brownish gray to dark brownish gray, dark brown to redish dark brown, very dark brown and black, dotted | Whitish gray to bright translucent gray and bluish dark gray, bright orange, grayish dark brown, caramel brown and very dark brown, dotted with bright orange, black and gray | Undifferentiated to faintly stipple speckled, very weakly crystallitic | | | + | + | ▪▪ | | ▪ | ▪▪ | ▪▪▪ | ▪▪▪▪ | | + | ▪▪ | | | ▪▪▪ | ▪▪ | | | ▪ | | + |
| **39.15** | Weakly spongy | Unoriented, random, elongated components moderately to strongly parallel to boundary | Silt loam | 5/95 | Close porphyric to enaulic (rare) | Mottled and lensed, brownish gray to brown, very redish dark brown, grayish dark brown to very dark brown and black, dotted | Whitish gray, gray, brownish gray, grayish brown, grayish caramel brown to dark brown, bright pinkish orange, dotted with black, gray and bright orange | Undifferentiated to stipple speckled, weakly crystallitic | + | + | ▪ | ▪ | ▪▪ | ▪▪ | ▪▪▪ | ▪ | ▪ | ▪▪▪ | ▪▪ | ▪▪▪▪ | ▪▪▪ | | | ▪▪ | ▪▪ | ▪ | ▪▪▪ | | ▪ | | ▪ |
| **39.16** | Massive to weakly laminar | Unoriented, random, elongated components strongly to very strongly aligned parallel to boundary | Silt loam | 5/95 | Close porphyric | Mottled and lensed, dark gray, redish and grayish dark brown, very dark brown to blackish brown and black | Gray, brownish gray and grayish brown, dark red and orange brown, strongly dotted, lensed and mottled with black, bright orange, whitish orange and gray | Undifferentiated, faintly stipple speckled and crystallitic | | | + | ▪ | + | ▪▪ | | ▪ | ▪▪ | ▪▪▪▪ | ▪▪ | ▪▪▪ | ▪▪▪ | | + | ▪▪ | ▪ | + | + | | ▪ | + | + |
| **39.17** | Weakly spongy | Unoriented, random, elongated components moderately to very strongly aligned vertically | Silt loam | 10/90 | Close porphyric | Light brown to grayish dark brown, dotted | Gray to brownish dark gray, very weakly dotted with black, gray and orange | Stipple speckled and undifferentiated, weakly crystallitic | | | + | | | ▪ | ▪ | ▪▪ | ▪ | ▪ | ▪▪▪▪ | ▪▪ | ▪▪▪▪ | | + | + | | | | | + | | |

\+ present in trace amounts, ▪ < 2% ▪▪ 2-5%, ▪▪▪ 5-10%, ▪▪▪▪ 10-20%, ▪▪▪▪▪ 20-30%, ▪▪▪▪▪▪ 30-40%, ▪▪▪▪▪▪▪ 40-50%, ▪▪▪▪▪▪▪▪ 50-60%, ▪▪▪▪▪▪▪▪▪ 60-70%

*Table A2 – Descriptions of microstratigraphic units in thin sections 7 and 8 from booth [1765]*

| | Structure | | Groundmass | | | | | | Porosity | | | | | | | Biomin. | | Organic Matter | | | | | Inclusions | | | | | | Pedofeat. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Microstratigraphic Unit | Microstructure | Dominant Orientation/Distribution of Basic Components | Texture Classification | Coarse/Fine Ratio (50 µm) | Coarse/Fine Related Distribution | Nature of Fine Mineral Material (PPL) | Nature of Fine Mineral Material (OIL) | Birefringence Fabric (XPL) | Simple Packing Voids | Compound Packing Voids | Complex Packing Voids | Chambers | Channels | Planar Voids | Spongy and vughy | Phytoliths | Diatoms | Amorphous (dark brown to black) | Amorphous (light brown to light reddish brown) | Plant remains (<1 mm) | Plant remains (1-10 mm) | Fungal Sclerotia | Charcoal (< 1 mm) | Charcoal (1-10 mm) | Burnt Bone (<1 mm) | Burnt Bone (1-10 mm) | Fuel ash slag | Aggregates/Lenses of Tephra | Amorphous and Cryptocrystalline (iron pans, iron staining and nodules) | Excremental |
| **8.1** | Spongy to very finely granular | Unoriented, random | Silt loam | 10/90 | Loose porphyric to enaulic | Redish brown and brown to dark brown and grayish dark brown, dotted | Grayish to caramel brown dotted with black and dull orange to dark orange | Undifferentiated to weakly crystallitic and stipple speckled | | ▪ | ▪ | ▪ | ▪▪ | | ▪▪▪ | + | ▪ | + | ▪ | ▪ | | | ▪ | | + | | ▪▪ | | ▪▪ | ▪▪ |
| **8.2** | Weak subangular blocky to sponge and chamber structure | Unoriented, random | Silt loam | 5/95 | Loose porphyric | Mottled, gray to very dark brown | Mottled, gray, dark gray, caramel brown and brown, dotted with black and dull orange | Undifferentiated to weakly crystallitic and stipple speckled | | ▪ | ▪ | ▪▪▪ | ▪▪ | | ▪▪ | + | ▪ | ▪ | | ▪ | | | ▪▪ | ▪▪▪ | | | ▪▪ | | ▪ | ▪▪ |
| **8.3** | Spongy | Unoriented, random | Silt loam | 5/95 | Loose porphyric | Redish brown to dark and grayish dark brown, dotted | Gray to caramel brown dotted with dull orange to dark orange and black | Undifferentiated to weakly crystallitic and stipple speckled | | ▪ | ▪ | ▪ | ▪▪ | | ▪▪▪ | + | ▪ | ▪ | + | ▪ | | | ▪▪ | | ▪ | | ▪▪ | | ▪ | ▪ |
| **8.4** | Massive to spongy | Unoriented, random, longer plant and charcoal materials aligned moderately to strongly parallel to boundaries | Silt | 1/99 | Loose porphyric | Mottled and lensed, gray and grayish brown to brown and very dark brown, dotted with black | Mottled and lensed, silvery and light gray to brownish and bluish gray and orange light gray, dotted with black | Undifferentiated and stipple speckled to very weakly crystallitic | | | ▪ | ▪ | ▪▪ | ▪ | ▪▪ | ▪ | ▪▪ | ▪▪▪ | | ▪▪ | | | ▪▪ | | + | | + | | | ▪▪ |
| **8.5** | Fairly massive to sponge or chamber structure | Unoriented, random, longer components and lenses moderately to strongly aligned parallel to boundaries | Silt | 1/99 | Loose porphyric | Brownish dark gray to dark grayish brown and black | Gray and bluish gray to brownish gray and very dark brown dotted with orange and black | Undifferentiated and stipple speckled to weakly crystallitic | | | ▪ | ▪ | ▪ | | ▪ | ▪ | ▪▪ | ▪▪▪ | | ▪▪ | | | ▪▪ | | + | | ▪ | | ▪ | + |

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| **8.6** | Massive to weakly spongy | Unoriented, random, longer components and lenses moderately to strongly aligned parallel to boundaries | Silt | 0/100 | Loose porphyric | Dark brown to redish very dark brown to black | Light to dark gray to brownish very dark gray to black weakly dotted with bright orange | Undifferentiated and very weakly crystallitic | | | ▪ | + | + | | ▪▪ | ▪ | ▪▪ | ▪▪▪ | | | | | ▪▪▪▪ | ▪▪▪ | + | | | | + | ▪ |
| **8.7** | Fairly massive | Unoriented, random, longer components and lenses moderately to strongly aligned parallel to boundaries | Silt | 0/100 | Loose porphyric | Brownish dark gray to dark grayish brown and black | Gray and bluish gray to brownish gray and very dark brown dotted with orange and black | Undifferentiated and stipple speckled to weakly crystallitic | | | ▪ | ▪ | ▪▪ | | + | ▪ | ▪▪▪ | ▪ | | | | | ▪▪ | | | | ▪ | | + | ▪ |
| **8.8** | Massive to sponge, channel and weakly granular structures | Unoriented, random, longer plant and charcoal materials aligned moderately to strongly parallel to boundaries | Silt | 1/99 | Loose porphyric to weakly enaulic | Mottled and lensed, gray to redish gray and grayish brown to brown and very dark brown, dotted with black | Mottled and lensed, silvery to orange, bluish and dark gray and grayish brown to very dark brown, dotted with black | Undifferentiated and stipple speckled to very weakly crystallitic | + | | ▪ | ▪ | ▪▪ | ▪ | ▪▪ | ▪ | ▪▪ | ▪▪▪ | | ▪▪ | | + | ▪▪ | ▪▪▪ | + | | + | | + | ▪ |
| **8.9** | Complex, fairly strongly compact grain structure | Unoriented, random | Fine silt loam | 10/90 | Weakly enaulic to close porphyric | Greenish gray to brown | Translucent gray and light gray to dark gray and brownish dark gray | Undifferentiated and stipple speckled to weakly crystallitic | + | ▪ | ▪ | | | + | + | + | ▪ | + | | | | | ▪ | | | | | | | |
| **8.10** | Complex weakly to strongly compact grain structure | Unoriented, random, longer charcoal fragments moderately to strongly aligned parallel to boundaries | Very fine silt loam | 5/95 | Enaulic to close porphyric | Greenish gray to brown and dark brown, dotted with black | Translucent gray and light gray to dark gray and brownish dark gray dotted with black | Undifferentiated and stipple speckled to weakly crystallitic | ▪ | ▪ | ▪▪ | + | ▪▪ | ▪▪▪ | ▪ | + | ▪ | + | | | | | ▪▪▪▪ | ▪▪▪ | | | | | | ▪ |
| **8.11** | Spongy | Unoriented, random, longer components weakly to strongly aligned parallel to boundary | Silt loam | 5/95-10/90 | Loose porphyric | Gray to grayish brown and brown to redish and dark brown to very dark brown, dotted with black | Grayish to caramel brown dotted with black and orange | Undifferentiated to weakly crystallitic and stipple speckled | | | ▪ | ▪ | ▪▪ | | ▪▪▪ | ▪ | ▪ | ▪ | | + | | ▪ | ▪ | ▪ | + | | ▪▪ | | ▪ | ▪ |
| **8.12** | Sponge to channel | Unoriented, random | Silt loam | 10/90 | Loose porphyric | Brown and faint redish brown to dark brown, dotted with black | Light grayish brown to redish caramel brown, dotted with black and orange (rare) | Undifferentiated to weakly crystallitic | | | ▪ | ▪ | ▪▪ | + | ▪▪▪ | + | ▪ | + | | + | ▪ | | ▪ | | ▪ | | ▪ | | | |

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| **8.13** | Intergrain subangular blocky to sponge and/or chamber structures | Unoriented, random | Loamy sand | 50/50 | Close porphyric to enaulic | Brown to dark brown, dotted with black | Light caramel to grayish caramel brown dotted with black and dark orange | Undifferentiated to weakly crystallitic | ▪▪ | ▪▪ | ▪ | | + | | ▪▪▪ | + | + | + | + | + | | | ▪ | | | | + | | ▪ | ▪▪▪ |
| **8.14** | Mostly spongy and partially subangular blocky, platy and massive | Unoriented, random, longer components moderately to strongly aligned parallel to boundaries | Silt loam | 15/85 | Loose to close porphyric | Redish brown to brown and very dark brown, dotted with black | Greenish gray to caramel brown, dotted with black and weakly orange | Undifferentiated to weakly crystallitic and stipple speckled | | ▪ | ▪ | ▪ | ▪▪ | ▪ | ▪▪▪ | ▪▪ | ▪ | ▪ | + | ▪ | | + | ▪ | ▪ | + | ▪ | ▪ | | ▪▪ | ▪▪ |
| **8.15** | Very loose sponge to crumb structure | Unoriented, random, longer plant material moderately to strongly aligned parallel to boundaries | Silt loam | 10/90 | Enaulic to loose porphyric | Redish dark brown to very dark brown, dotted with black | Caramel brown to dark brown, dotted with black | Undifferentiated to weakly crystallitic | + | ▪▪ | ▪ | ▪ | ▪▪ | | ▪▪▪▪▪ | + | + | ▪▪ | | ▪▪ | | | + | | + | | + | | ▪ | ▪▪▪ |
| **8.16** | Mostly spongy, partially subangular blocky, platy and massive | Unoriented, random, longer components moderately to strongly aligned parallel to boundaries | Silt loam | 15/85 | Loose to close porphyric | Redish brown to brown and very dark brown, dotted with black | Greenish gray to caramel brown, dotted with black and weakly orange | Undifferentiated to weakly crystallitic and stipple speckled | | ▪ | ▪ | ▪ | ▪▪ | ▪ | ▪▪▪ | ▪▪ | ▪ | ▪ | + | ▪ | | + | ▪ | ▪ | + | ▪ | ▪ | | ▪▪ | ▪▪ |
| **8.17** | Massive to chamber structure | Unoriented, random, longer diatoms moderately aligned parallel to boundary | Silt | 2/98 | Close porphyric to enaulic | Gray to yellowy brown to very dark brown | Silvery to brownish translucent gray dotted with black and faint orange | Stipple speckled | | | + | ▪ | | | + | + | ▪▪▪▪▪▪▪▪▪ | ▪ | | | | | ▪ | | | | + | | ▪ | |
| **7.1** | massive, weak to moderately subangular blocky to platy and spongy | Unoriented, random, elongated plant tissues, peds etc., moderately to strongly parallel to boundaries | silt loam to sandy silt loam (rare) | 15/85 | Loose to close porphyric | Lenses gray, grayish brown, redish brown, brown, dark brown and very to blackish dark brown, dotted with black | gray, grayish caramel brown, caramel brown to orange brown, dotted with black and orange | undifferentiated and stipple speckled to weakly crystalitic | | ▪ | ▪ | ▪ | ▪▪ | ▪▪ | ▪▪▪ | ▪ | ▪▪ | ▪ | + | ▪ | ▪▪ | + | ▪▪ | ▪ | + | ▪▪ | ▪▪ | ▪ | ▪▪ | ▪▪ |
| **7.1.1** | Strongly developed subangular blocky to sponge, crumb and fibrous structures | Unoriented, random, elongated peds and plant material strongly aligned parallel to boundary | Fine silt loam to fine loamy sand | 2/98-70/30 | Loose to close porphyric to enaulic | Organo-mineral; Mottled greenish gray, black and brown, to redish and dark brown dotted with black and greenish gray | Mottled grayish caramel brown, translucent and whitish gray, to light caramel brown, red and dark brown | Undifferentiated and stipple speckled to weakly crystalitic | ▪ | ▪ | ▪ | | ▪▪▪ | ▪▪ | ▪▪▪ | ▪ | ▪▪ | ▪ | ▪▪▪ | ▪▪▪ | | | + | | | | + | | ▪▪ | ▪▪? |

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| **7.1.2** | Weakly developed spongy | Unoriented, random | Silt | 2/98 | Loose porphyric | Translucent gray dotted with brown and black | Silvery to brownish gray very weakly dotted with black and orange | Stipple speckled to weakly crystallitic | + | | ▪ | ▪▪ | ▪ | | ▪▪▪ | ▪▪ | ▪ | + | | | | | ▪ | | | | ▪▪▪▪▪▪▪▪▪ | | + | |
| **7.2** | Weakly developed subangular blocky to spongy and granular | Unoriented, random | Silt loam to very fine sandy loam | 10/90 | Loose to close porphyric to enaulic | Grayish to dark brown, redish dark brown and very dark brown, dotted | Brownish gray to caramel brown, dotted with black and orange | Undiffer-entiated to weakly crystalitic and stipple speckled | | + | ▪ | ▪ | ▪▪▪ | | ▪▪ | ▪ | ▪ | ▪ | + | ▪ | | | ▪ | ▪▪ | + | ▪▪ | ▪▪▪ | ▪ | ▪▪ | ▪▪ |

+ precent in trace amounts, ▪ < 2% ▪▪ 2-5%, ▪▪▪ 5-10%, ▪▪▪▪ 10-20%, ▪▪▪▪▪ 20-30%, ▪▪▪▪▪▪ 30-40%, ▪▪▪▪▪▪▪ 40-50%, ▪▪▪▪▪▪▪▪ 50-60%, ▪▪▪▪▪▪▪▪▪ 60-70%

*Table A3 – Descriptions of microstratigraphic units in thin section 36 from booth [2397], phase 1*

| Context and Microstratigraphic Unit | Structure | | Groundmass | | | | | Porosity | | | | | Biomin. | | Organic Matter | | | | | | | Inclusions | | | | | Pedofeat. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Microstructure | Dominant Orientation/Distribution of Basic Components | Texture Classification | Coarse/Fine Ratio (50 µ) | Coarse/Fine Related Distribution | Nature of Fine Mineral Material (PPL&OIL) | Birefringence Fabric (XPL) | Complex Packing Voids | Chambers | Channels | Spongy and Vughy Voids | Planar Voids | Phytoliths | Diatoms | Amorphous (dark brown to black) | Amorphous (light brown to light reddish brown) | Plant remains (<1mm) | Plant remains (1-10 mm) | Wood (<1mm) | Fungal Sclerotia | Fungal Spores | Charcoal (< 1 mm) | Charcoal (1-10 mm) | Burned bone (<1 mm) | Fuel ash slag | Aggregates | Amorphous and Cryptocrystalline (iron pans, nodules and staining) | Excremental |
| **36.1** | Massive to weakly platy structure | Unoriented, random | Silt loam | 10:90 | Porphyric | Brown, dotted | Undiff. to weakly crystallitic | ▪ | | + | | ▪▪ | + | | ▪ | ▪ | | | | | | | | | | | | + |
| **36.2** | Compacted crumb structure | Unoriented, random | Silty clay loam | 5:95 | Porphyric | Redish brown, dotted | Undiff. | ▪▪ | | | | ▪ | ▪ | + | + | + | | | | | | | | | | | ▪▪ | |
| **36.3** | Poorly developed subangular blocky with patches of crumb sturcture | Unoriented, random | Sandy silt loam | 25:75 | Porphyric | Brown, redish brown, dotted | Undiff. to weakly crystallitic | ▪▪ | | ▪▪ | | ▪▪ | + | + | ▪ | + | | | | | | | + | | + | ▪ | | ▪▪▪ | |
| **36.4** | Massive with a few planar voids | Unoriented, random, elongated phytoliths/diatoms moderately horizontal | Silt | 0:100 | Porphyric | Pinkish gray (PPL), silver gray to gray (OIL) | Undiff-erentiated to weakly stipple speckled | | | + | | ▪▪ | ▪▪▪▪▪▪▪ | ▪▪▪▪▪ | ▪ | | | | | | | | ▪▪ | ▪▪ | | | | | |
| **36.4.1** | Weakly developed subangular blocky, peds very to ultra fine | Unoriented, random | Silt loam | 20/80 | Porphyric | Dark brown (PPL), dotted, bright orange (OIL) | Undiff. | ▪▪▪ | | | | ▪▪▪▪ | + | + | ▪▪▪ | | | | | | | | ▪▪▪▪ | | | | | | |
| **36.4.2** | Massive with a few compound packing voids | Unoriented, random | Silt loam | 5/95 | Porphyric | Pinkish dark brown (PPL), dotted, orange light brown (OIL) | Undiff. | ▪▪ | | | | | ▪ | + | ▪ | | | | | | | | ▪ | | | ▪▪▪▪▪▪ | | | |
| **36.5.1** | Very weakly to moderately developed subangular blocky to very fine granular | Mostly unoriented, random, elongated particles horizontal | Silt loam | 10/90 | Porphyric | Dark brown (PPL), dotted, matrix orange brown/rubified (OIL) | Undiff. to weakly crystallitic | ▪▪ | ▪▪ | | + | ▪▪ | ▪▪▪ | ▪▪ | ▪ | | ▪ | | | | | | ▪▪ | | | ▪ | | | |

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| **36.5.2** | Weakly to moderately developed subangular blocky to spongy (rare), peds very to ultra fine | Mostly unoriented, random, elongated particles horizontal | Silt loam to sandy silt | 15/85 | Porphyric | Gray to brown, dotted (PPL), gray to grayish brown dotted with bright orange silt and sand grains/ burned soil (OIL) | Undiff. to weakly crystallitic | ▪ | ▪▪ | + | ▪▪ | ▪▪ | ▪▪▪ | ▪▪ | + | + | ▪ | | ▪ | | + | ▪ | | | ▪▪ | ▪▪ | | + |
| **36.5.3** | Weakly to moderately developed subangular blocky to spongy (rare), peds very to ultra fine | Mostly unoriented, random, elongated particles horizontal | Silt loam to sandy silt | 15/86 | Porphyric | Gray to brown, dotted (PPL), gray to grayish brown dotted with bright orange silt and sand grains/ burned soil (OIL) | Undiff. to weakly crystallitic | ▪ | ▪▪ | + | ▪▪ | | ▪▪▪ | ▪▪ | + | + | ▪ | | | | | ▪ | | | ▪▪ | | | |
| **36.6.1** | Weakly to moderately developed subangular blocky to spongy (rare), peds very to ultra fine | Mostly unoriented, random, elongated particles moderately to strongly horizontal | Silt loam | 2/98 | Porphyric | Gray to brown/redish brown, dotted (PPL), silvergray, yellowish brown/brown, dotted w.bright orange silt + sand (OIL) | Undiff. to weakly crystallitic and stipple speckled | ▪ | ▪ | + | ▪▪ | ▪▪ | ▪▪▪▪▪ | ▪▪▪ | + | + | ▪ | | + | + | + | ▪ | | | ▪ | ▪▪ | | + |
| **36.6.2** | Spongy structure, peds irregular, very to ultra fine | Mostly unoriented, random, elongated particles strongly horizontal | Silt loam | 2/98 | Porphyric to mildly enaulic | Grayish brown, brown (PPL), silvery gray, yellowy brown to dark brown, speckled w.bright orange flecks (OIL) | Undiff. to weakly crystallitic | ▪ | ▪▪ | | ▪▪▪ | ▪▪ | ▪▪ | ▪ | ▪ | + | ▪▪ | | ▪▪ | | | ▪ | ▪ | | ▪ | ▪▪ | | ▪ |
| **36.7** | Massive, lensed | Unoriented, random, elongated particles moderately to strongly horizontal | Silt loam | 2/98 | Porphyric | Redish brown, redish dark brown (PPL), silvery gray, yellowish brown, bright orange (OIL) | Undiff. to weakly crystallitic | ▪ | ▪ | + | | + | ▪▪▪▪ | ▪▪ | ▪ | + | + | | | | | ▪ | | | ▪ | | | |
| **36.8** | Moderately to well developed subangular blocky to granular, very to ultra fine | Unoriented, random, elongated particles moderately to strongly horizontal | Silt loam | 5/95 | Porphyric to enaulic | Gray, brown, redish brown | Undiff. to weakly crystallitic | ▪▪ | ▪ | | ▪▪▪ | ▪▪▪ | ▪▪▪ | ▪ | ▪ | ▪ | ▪▪ | ▪▪ | ▪ | | | ▪ | | | ▪ | | | + |
| **36.9** | Massive, lensed | Unoriented, random, elongated particles moderately to strongly horizontal | Silt loam | 2/98 | Porphyric | Redish brown, redish dark brown (PPL), silvery gray, yellowish brown, bright orange (OIL) | Undiff. to weakly crystallitic | + | ▪ | ▪ | | + | ▪▪▪ | ▪▪ | ▪ | + | + | | | | | ▪ | ▪ | + | ▪ | | | + |

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| **36.9.1** | Spongy, very fine to ultra fine slightly elongated peds horizontal | Unoriented, random, elongated particles moderately to strongly horizontal | n/a | n/a | Enaulic | Black (PPL), black with a glittery aspect, no rubification (OIL) | Undiff. | ▪▪▪ | ▪ | | ▪▪▪▪ | ▪▪ | + | + | | | | | | | | | ▪▪▪▪▪▪▪ | ▪▪▪ | | + | | | |
| **36.10** | Poorly developed subangular blocky to crumb, very to ultra fine | Unoriented, random, elongated particles horizontal | Silt | 2/98 | Monic to porphyric | Grayish brown, redish brown, dark brown | Undiff. | ▪▪ | ▪▪▪ | | ▪▪ | ▪▪▪ | ▪▪▪ | ▪▪ | ▪ | + | ▪ | | ▪ | | | ▪ | ▪ | | ▪ | | | ▪ |
| **36.11** | Massive | Unoriented, random | Silt | 2/98 | Porphyric | Pinkish gray, dotted (PPL), silvergray to gray, bright orange patches (OIL) | Undiff-erentiated to weakly stipple speckled | | | | | | ▪▪▪▪▪▪ | ▪▪▪▪ | ▪ | | | | | | | ▪ | | | + | | | |
| **36.11.1** | Massive | Unoriented, random | Silt | 0/100 | Porphyric | Redish dark brown (PPL), silver gray, bright orange (OIL) | Undiff. | | | | | | ▪▪▪▪ | ▪▪ | + | + | | | | | | ▪ | | | + | | | |
| **36.12** | Moderately to well developed subangular blocky to granular, very to ultra fine | Unoriented, random, elongated particles moderately to strongly horizontal | Silt loam | 10/90 | Porphyric | Dark brown (PPL), silver gray, light brown, bright orange (OIL) | Undiff. to weakly crystallitic | ▪▪▪ | ▪▪ | | ▪ | ▪▪ | ▪▪▪▪ | ▪▪ | ▪ | + | ▪ | | + | ▪ | | | | ▪ | ▪ | | | |
| **36.13** | Massive, lensed | Unoriented, random, elongated particles moderately horizontal | Silt | 2/98 | Porphyric | Dark brown, dark redish brown, yellowish orange brown, grayish brown, dotted (PPL), yellowish brown, silver gray, bright orange (OIL) | Undiff. to weakly crystallitic and stipple speckled | ▪ | + | | | | ▪▪▪▪ | ▪▪▪ | + | + | | | + | | | ▪ | ▪ | | + | | | |
| **36.14** | Moderately developed subangular blocky to granular, peds very to ultra fine | Unoriented, random, elongated particles mildly to strongly horizontal | Silt loam | 2/98 | Porphyric | Gray and grayish brown, dark brown, dotted (PPL), gray, silver gray w.mild yellowish brown + bright orange flecks (OIL) | Undiff. to weakly crystallitic and stipple speckled | ▪▪ | ▪▪ | | ▪▪ | ▪▪ | ▪▪▪▪ | ▪▪▪ | ▪ | + | + | + | + | | | ▪ | | + | ▪ | | | + |

+ precent in trace amounts, ▪ < 2% ▪▪ 2-5%, ▪▪▪ 5-10%, ▪▪▪▪ 10-20%, ▪▪▪▪▪ 20-30%, ▪▪▪▪▪▪ 30-40%, ▪▪▪▪▪▪▪ 40-50%, ▪▪▪▪▪▪▪▪ 50-60%, ▪▪▪▪▪▪▪▪▪ 60-70%

*Table A4 – Descriptions of microstratigraphic units in thin section 38 from booth [2397], phase 1*

| Microstratigraphic Unit | Structure | | Groundmass | | | | | | Porosity | | | | | | Biomin. | | Organic Matter | | | | | Inclusions | | | | Pedofeat. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Microstructure | Dominant Orientation/Distribution of Basic Components | Texture Classification | Coarse/Fine Ratio (50 µm) | Coarse/Fine Related Distribution | Nature of Fine Mineral Material (PPL) | Nature of Fine Mineral Material (OIL) | Birefringence Fabric (XPL) | Compound Packing Voids | Complex Packing Voids | Chambers | Channels | Spongy and Vughy Voids | Planar Voids | Phytoliths | Diatoms | Amorphous (dark brown to black) | Amorphous (light brown to light reddish brown) | Plant remains (<1mm) | Plant remains (1-10 mm) | Fungal Spores | Charcoal (< 1 mm) | Charcoal (1-10 mm) | Burnt Bone (<1 mm) | Fuel Ash Slag | Amorphous and Cryptocrystalline (iron pans, nodules and staining) | Excremental |
| **38.1** | Massive to weakly developed subangular blocky | Unoriented, random distribution | Sandy silt loam | 35/65 | Close porphyric | Redish to dark brown | Redish brown weakly dotted with black and orange | Undifferentiated to weakly crystallitic | | ▪ | + | ▪ | ▪ | ▪ | ▪ | + | + | | | | | + | | | ▪▪▪ | ▪ | + |
| **38.1.1** | Massive | Unoriented, random distribution | Silt loam | 0/100 | Close porphyric | Brownish gray | Yellowy silver gray weakly dotted with black and orange | Undifferentiated | | + | | | | | ▪ | ▪ | + | | | | | | | + | ▪▪▪▪▪▪▪▪ | ▪▪ | |
| **38.2** | Weakly to strongly developed subangular blocky | Unoriented, random distribution | Silt loam | 5/95 | Close porphyric | Dark brown, dotted | Light brown to gray, faintly orange | Undifferentiated to weakly crystallitic | | | + | ▪ | ▪▪ | ▪ | + | ▪ | ▪ | + | ▪ | | | ▪ | | + | ▪ | ▪▪ | + |
| **38.3** | Weak to moderately developed subangular blocky to spongy | Unoriented, random distribution | Sandy silt loam | 15/85 | Close porphyric | Redish dark brown to very dark brown, dotted | Caramel brown dotted with dark red, black and weakly bright orange (rare) | Undifferentiated to weakly crystallitic | | ▪▪ | ▪ | ▪▪ | ▪▪ | | + | ▪ | ▪ | + | ▪ | | | + | ▪ | + | ▪ | ▪ | ▪▪ |
| **38.3.1** | Massive | Unoriented, random distribution | Silt loam | 0/100 | Close porphyric | Gray | Silvery gray dotted with red | Undifferentiated | | + | | | | | ▪ | ▪ | + | + | | | | + | | | ▪▪▪▪▪▪▪▪▪▪ | ▪ | |
| **38.4** | Weakly to strongly developed subangular blocky | Mostly unoriented, random distribution | Silt loam | 5/95 | Porphyric to enaulic | Very dark brown, dotted | Weakly light brown to strongly bright orange and gray | Undifferentiated to weakly crystallitic | | ▪▪ | ▪ | ▪▪ | ▪▪ | ▪▪ | ▪ | ▪▪ | ▪ | | ▪▪ | | | ▪ | | + | ▪ | + | + |
| **38.5** | Weakly to strongly developed subangular blocky to spongy | Unoriented, random distribution | Sandy silt loam | 30/70 | Close porphyric | Dark brown to redish dark brown, dotted | Light brown to silver gray and partially mildly to bright orange, dotted with black and orange | Undifferentiated to weakly crystallitic | | ▪▪ | ▪▪ | ▪▪ | ▪▪ | | + | ▪▪ | ▪▪ | + | ▪▪ | ▪ | | + | | ▪ | ▪ | ▪ | ▪▪ |
| **38.6** | Subangular blocky to granular to crumb | Unoriented, random distribution | Sandy silt loam | 15/85 | Close porphyric to enaulic | Redish brown to brown, dotted | Redish light caramel brown to gray, dotted with black and orange red | Undifferentiated to weakly crystallitic | ▪ | ▪▪ | ▪ | ▪▪ | ▪▪ | | + | ▪ | ▪ | + | ▪▪ | ▪ | | ▪ | | | ▪ | ▪ | ▪▪▪ |

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| **38.7** | Massive to subangular blocky to spongy | Unoriented, random distribution | Sandy silt loam | 20/80 | Close porphyric | Redish dark brown to very dark brown, dotted | Grayish to caramel brown to mildly orange, dotted with black and bright orange (rare) | Undifferentiated to weakly crystallitic | | ▪▪ | ▪▪ | ▪▪ | ▪ | | + | ▪ | ▪ | + | ▪ | ▪ | | ▪ | | | ▪ | ▪ | ▪ |
| **38.8** | Weakly to strongly developed subangular blocky to spongy | Unoriented, random distribution | Silt loam to sandy silt loam | 10/90 | Close porphyric to enaulic | Redish brown to dark redish brown, dotted | Caramel brown to redish brown dotted with black, silver gray and dark and bright (rare) orange | Undifferentiated to weakly crystallitic | | ▪▪ | ▪▪ | ▪ | ▪▪ | | + | ▪ | ▪▪ | + | ▪ | | | + | | + | ▪▪ | ▪ | ▪ |
| **38.9** | Massive to grain | Longer diatoms and phytoliths weakly to moderatly horizontal, random distribution | Silt loam | 0/100 | Close porphyric | Gray and dark gray to grayish brown, dotted | Silver gray to bright orange | Undifferentiated to weakly crystallitic | | ▪ | + | | | ▪ | ▪▪▪▪▪ | ▪▪▪▪▪▪▪ | ▪ | | | | | ▪ | | + | + | | |
| **38.10** | Moderately to well developed subangular blocky to spongy | Unoriented, random distribution | Sandy silt loam | 10/90 | Close porphyric to enaulic | Redish brown to dark brown, dotted | Caramel to redish brown to silvergray, dotted with black adn orange | Undifferentiated to weakly crystallitic | | | | | | | + | ▪▪ | ▪▪ | + | ▪▪ | ▪ | | ▪ | | + | ▪▪ | ▪ | ▪▪ |
| **38.11** | Massive to mildly spongy or chamber structure | Unoriented, random distribution | Silt loam | 2/98 | Porphyric | Brownish gray to very dark brown, dotted | Silvery gray to bright orange, dotted with black | Undifferentiated to very weakly crystallitic | | ▪ | ▪ | ▪ | ▪▪ | ▪ | ▪▪ | ▪▪▪▪ | ▪▪ | | ▪▪ | ▪▪ | | ▪ | | | ▪ | + | + |
| **38.12** | Moderately subangular blocky to spongy | Mostly unoriented, random distribution | Silt loam to sandy silt loam | 10/90 | Porphyric to enaulic | Dark brown to very dark brown, dotted | Caramel brown to gray, mildly dotted with black and orange | Undifferentiated to weakly crystallitic | | ▪▪ | ▪ | ▪ | ▪▪ | ▪▪ | ▪ | ▪▪ | ▪▪ | | ▪ | ▪ | | ▪ | | + | ▪ | + | + |
| **38.13** | Weakly to strongly developed subangular blocky | Mostly unoriented, random distribution | Sandy silt loam | 5/95 | Porphyric to enaulic | Very dark brown, dotted | Light brown to gray, dotted with black and orange | Undifferentiated to weakly crystallitic | | ▪▪ | ▪▪ | ▪▪ | ▪ | ▪ | ▪ | ▪▪ | ▪▪ | | ▪▪ | | | ▪ | | | ▪▪ | + | + |
| **38.13.1** | Massive to grain | Mostly unoriented, random distribution | Silt loam | 0/100 | Porphyric to enaulic | Whitish gray to brown | Silvery gray to dark brown | Undifferentiated to weakly crystallitic | | ▪▪ | ▪▪ | | | | ▪▪▪▪ | ▪▪▪ | ▪▪ | | ▪▪ | | | ▪ | | | ▪▪ | + | |
| **38.14** | Weakly to strongly developed subangular blocky | Mostly unoriented, random distribution | Silt loam | 5/95 | Porphyric to enaulic | Very dark brown, dotted | Weakly light brown to strongly bright orange and gray | Undifferentiated to weakly crystallitic | | ▪▪ | ▪ | ▪▪ | ▪▪ | ▪▪ | ▪ | ▪▪ | ▪ | | ▪▪ | | | ▪ | | + | ▪ | + | + |
| **38.15** | Massive to weakly to moderately developed subangular blocky | Unoriented, random distribution | Silt loam to sandy silt loam | 10/90 | Open to close porphyric to enaulic (rare) | Redish dark brown, dotted | Caramel brown dotted with black, silvery gray, bright orange and dark red | Undifferentiated to weakly crystallitic | | ▪▪ | ▪ | + | + | ▪ | ▪ | ▪ | + | | | | | ▪ | | + | ▪▪ | ▪▪ | + |
| **38.15.1** | Massive to grain | Unoriented, random distribution | Silt loam | 0/100 | Close porphyric | Very dark brown to black and tranluscent gray | Bright orange to deep red and silvery gray dotted with black | Undifferentiated to weakly stipple speckled | | + | | | | | ▪ | ▪▪▪▪▪▪ | + | | | | | ▪ | | + | ▪ | + | |

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| **38.16** | Moderately to strongly developed subangular blocky | Unoriented, random distribution | Sandy silt loam | 5/95 | Porphyric to enaulic | Very dark brown, dotted | Brown dotted with black and bright orange flecks | Undifferentiated to weakly crystallitic | + | ▪▪ | ▪ | + | ▪▪▪ | ▪ | + | + | ▪▪ | | ▪ | + | + | ▪▪ | | + | ▪▪ | ▪ | |
| **38.17** | Massive to weakly to strongly developed subangular blocky to crumb | Unoriented, random distribution | Silt loam | 2/98 | Porphyric to enaulic | Redish to dark redish brown, dotted | Silver gray to light caramel brown dotted with black and bright orange | Undifferentiated to weakly crystallitic | ▪▪ | ▪ | | | | ▪ | ▪▪ | + | + | + | | | | | ▪ | | | ▪▪ | ▪▪▪▪▪▪ |
| **38.18** | Moderately to strongly developed subangular blocky to crumb | Unoriented, random distribution | Sandy silt loam | 10/90 | Porphyric to enaulic | Dark brown, dotted | Light redish brown to brown dotted with black and bright orange | Undifferentiated to weakly crystallitic | ▪▪▪▪ | ▪▪▪ | + | | ▪▪▪ | + | ▪ | + | ▪ | + | ▪▪ | | | | ▪ | | + | ▪▪ | ▪ | |
| **38.19** | Massive to weakly to strongly developed subangular blocky to crumb | Unoriented, random distribution | Silt loam | 2/98 | Porphyric to enaulic | Redish to dark redish brown, dotted | Silver gray to light caramel brown dotted with black and bright orange | Undifferentiated to weakly crystallitic | ▪▪ | ▪ | | | | ▪ | ▪▪ | + | + | + | | | | | ▪ | | | ▪▪ | ▪▪▪▪▪▪ |
| **38.19.1** | Massive to weakly to strongly developed subangular blocky to crumb | Unoriented, random distribution | Silt loam | 2/98 | Porphyric to enaulic | Gray to caramel brown, dotted | Silver gray to caramel brown dotted with black and bright orange | Undifferentiated to weakly crystallitic | ▪▪ | ▪ | | | | | ▪▪▪▪▪ | | + | + | | | | | ▪ | | | ▪▪▪ | ▪▪ | ▪▪▪▪▪▪ |

+ precent in trace amounts, ▪ < 2% ▪▪ 2-5%, ▪▪▪ 5-10%, ▪▪▪▪ 10-20%, ▪▪▪▪▪ 20-30%, ▪▪▪▪▪▪ 30-40%, ▪▪▪▪▪▪▪ 40-50%, ▪▪▪▪▪▪▪▪ 50-60%, ▪▪▪▪▪▪▪▪▪ 60-70%

*Table A5 – Descriptions of microstratigraphic units in thin section 34 from booth [2397], phase 3*

| | Structure | | Groundmass | | | | | | Porosity | | | | | | | Biomin. | | Organic Matter | | | | | Inclusions | | | | | | Pedofeat. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Microstratigraphic Unit | Microstructure | Dominant Orientation/Distribution of Basic Components | Texture Classification | Coarse/Fine Ratio (50 µm) | Coarse/Fine Related Distribution | Nature of Fine Mineral Material (PPL) | Nature of Fine Mineral Material (OIL) | Birefringence Fabric (XPL) | Simple Packing Voids | Compund Packing Voids | Complex Packing Voids | Chambers | Channels and Vughs | Spongy | Planar Voids | Phytoliths | Diatoms | Amorphous (dark brown to black) | Amorphous (light brown to light reddish brown) | Plant remains (<1mm) | Plant remains (1-10 mm) | Wood (<1mm) | Charcoal (< 1 mm) | Charcoal (1-10 mm) | Bone (<1 mm) | Burnt Bone (<1 mm) | Burnt Bone (1-10 mm) | Fuel ash slag | Amorphous and Cryptocrystalline (iron pans, nodules and staining) | Excremental |
| **34.1** | Weakly to moderately developed subangular blocky to grain | Unoriented, random | Loamy sand | 45/55 | Close porphyric to enaulic | Dark brown to redish dark brown, dotted | Light caramel brown weakly dotted with black and orange | Undifferentiated to weakly stipple-speckled | ▪ | ▪ | ▪ | ▪ | ▪ | | | + | + | + | | | | | + | | | | | ▪▪ | + | ▪ |
| **34.2** | Massive to weakly subangular blocky and spongy | Mostly unoriented and random, larger elongated materials and voids moderately to strongly parallel to boundaries | Silt loam | 10/90 | Loose porphyric | Dark brown, dotted | Grayish and yellowy brown to brown, dotted with bright orange and black | Undifferentiated to weakly stipple-speckled | | | ▪ | ▪▪ | ▪▪▪ | ▪▪ | ▪ | + | + | ▪ | | ▪▪ | | + | ▪▪ | ▪ | | + | | ▪ | | ▪ |
| **34.3** | See layer 34.2 | | | 5/95 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **34.3.1** | Very fine weakly developed subangular blocky to spongy | Unoriented, random, longer organic material moderately to strongly parallel to boundary | Silt | 2/98 | Loose porphyric | Gray to mildly redish dark brown | Mostly silvery gray to yellowy brown with slithers of yellowy red to dark brown | Undifferentiated to weakly stipple-speckled | | | ▪ | ▪▪ | ▪▪▪ | ▪▪▪▪ | | ▪▪▪ | ▪▪ | ▪▪▪ | | | | | ▪ | | + | | | ▪▪▪ | + | ▪ |
| **34.3.2** | Massive | Unoriented, random | Silt | 1/99 | Loose porphyric | Yellowy transluscent gray | Gray | Weakly stipple speckled | | | | | | | | | | + | + | | | | + | | | | | ▪▪▪▪▪▪▪▪▪▪ | + | |

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| **34.4** | Massive to strongly spongy | Unoriented, random, elongated components moderately to strongly parallel to boundary | Silt loam | 5/95 | Loose porphyric | Dark to very dark brown, dotted | Yellowy to dark gray and orange to dark orange brown, mottled | Undifferentiated to weakly stipple speckled | | | + | ▪▪▪ | ▪ | ▪ | | + | + | ▪ | | ▪ | | | ▪▪ | | | + | | + | | |
| **34.5** | Massive to weakly developed subangular blocky to spongy | Unoriented, random, elongated plant material strongly oriented parallel to boundary | Sandy silt loam | 20/80 | Close porphyric | Redish to very dark brown, dotted | Orange and yellowy brown to brown, dotted with black, bright orange and silvery gray | Undifferentiated to stipple speckled | | | ▪ | ▪▪ | ▪▪ | ▪▪▪ | | + | + | ▪ | | ▪▪ | | + | ▪ | | | + | | ▪▪ | ▪ | ▪ |
| **34.6** | Weakly subangular blocky to very spongy | Unoriented, random, elongated plant material strongly parallel to boundary | Silt loam | 10/90 | Loose porphyric | Brown to very dark brown, dotted | Yellowy and grayish brown to dark brown, dotted with black and dark and bright orange | Undifferentiated to stipple speckled | | | ▪ | ▪ | ▪▪ | ▪▪▪▪ | | + | + | ▪ | ▪ | ▪▪ | ▪ | + | ▪▪ | | | | | ▪ | ▪ | ▪▪ |
| **34.7** | Massive to spongy, voids small meso- and microvoids | Unoriented, random, elongated components moderately to strongly parallel to boundary | Silt | 2/98 | Loose porphyric | Mottled, gray through dark brown to very dark brown and black, dotted | Mottled yellowy brown to dark and bright orange and silvery gray, dotted with black | Undifferentiated to weakly stipple speckled | | | ▪▪ | ▪ | ▪ | ▪▪ | | ▪▪ | ▪ | ▪▪▪▪ | ▪ | ▪▪ | | | ▪▪ | | | | | ▪▪ | ▪▪ | ▪ |
| **34.7.1** | Spongy to platy | Unoriented, random, plant materials strongly parallel to each other and the boundary | Silt | 2/98 | Loose porphyric | Redish dark brown to black | Yellowy brown to orange and bright orange, dotted with black | Undifferentiated to very weakly stipple speckled | | | | ▪ | | ▪▪▪ | ▪▪ | + | + | ▪▪▪▪▪▪ | ▪▪ | | | | ▪ | | | | | | ▪▪▪▪ | |
| **34.7.2** | Massive | Unoriented, random, plant materials strongly parallel to each other and the boundary | Silt | 1/99 | Loose porphyric | Dark to very dark brown | Gray to orange and dark orange brown | Undifferentiated to very weakly stipple speckled | | | + | | | + | | + | ▪ | ▪▪▪▪▪▪▪ | ▪ | | | | | | | | | ▪▪▪▪ | |
| **34.8** | Subangular blocky to spongy | Unoriented, random | Silt | 2/98 | Loose porphyric | Brown to dark brown, dotted | Yellowy brown to brown, dotted with black and silvery gray | Undifferentiated to stipple speckled | | | ▪ | ▪ | ▪ | ▪▪ | | + | + | ▪ | + | ▪ | | ▪ | ▪ | | | | | ▪ | ▪ | ▪ |
| **34.9** | Weakly subangular blocky to strongly spongy | Unoriented, random, elongated plant material and peat flakes moderately to strongly parallel to boundary | Silt loam | 5/95 | Loose porphyric | Grayish brown to brown to very dark brown, dotted | Grayish, yellowy and greenish brown to brown, dotted with black and dark to very bright orange | Undifferentiated to weakly stipple speckled | | | ▪▪ | ▪▪ | ▪▪▪ | ▪▪▪ | | + | ▪▪ | ▪▪ | ▪ | ▪▪ | | | ▪ | ▪▪ | | | | + | ▪ | ▪▪ |

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| **34.10** | Weakly subangular blocky to spongy | Unoriented, random, elongated components moderately to strongly parallel (planar voids and channels also perpendicular) to boundary | Silt loam | 15/85 | Porphyric | Mottled, gray through dark brown to very dark brown, dotted | Mottled, gray, whitish gray, yellowy to redish brown to dark brown, dotted with black and dark to very bright orange | Undifferentiated to stipple speckled | | | ▪▪ | ▪ | ▪▪▪ | ▪▪▪ | + | ▪ | ▪ | ▪▪ | + | ▪▪ | ▪ | + | ▪ | ▪ | + | + | | ▪ | ▪ | ▪▪ |
| **34.11** | Spongy | Unoriented, random, elongated components strongly parallel to boundary | Silt loam | 15/85 | Porphyric | Dark redish brown | Brown and dark to very bright orange, faintly dotted with black | Undifferentiated to weakly stipple speckled | | | ▪ | ▪ | ▪ | ▪▪▪▪ | | + | + | ▪ | + | + | ▪▪ | | + | | | | | | ▪▪▪▪ | |
| **34.12** | Subangular blocky to spongy | Unoriented, random, elongated components moderately to strongly parallel to boundary | Silt loam | 15/85 | Porphyric | Mottled, grayish brown through dark brown to very dark brown, dotted | Mottled, gray, whitish gray, yellowy to redish brown to dark brown, dotted with black | Undifferentiated to stipple speckled | | | ▪▪ | ▪ | ▪▪▪ | ▪▪▪ | + | ▪ | ▪ | ▪▪ | + | ▪▪ | ▪ | + | ▪ | ▪ | + | + | | ▪ | ▪ | ▪▪ |
| **34.13** | Massive | Unoriented, random | Silt | 1/99 | Loose porphyric | Brownish gray, dotted | Gray to light yellowy brown dotted with redish brown | Stipple speckled | | | + | + | | | | + | + | ▪▪ | | | | | + | | | | | ▪▪▪▪▪▪▪▪▪▪ | + | |
| **34.14** | Massive to subangular blocky to spongy, peds elongated and strongly oriented parallel to boundary | Unoriented, random, elongated comoponents strongly parallel to boundary | Silt loam | 10/90 | Porphyric | Grayish and dark redish brown to blackish brown | Mottled, gray, brown and black dotted with black and orange | undifferentiated to weakly stipple speckled | | | ▪ | ▪ | ▪ | ▪▪ | ▪▪ | + | ▪▪ | ▪▪ | + | ▪▪ | | | ▪ | ▪▪▪ | | + | ▪ | ▪▪ | ▪ | ▪ |
| **34.15** | Massive to weakly developed fine subangular blocky | Unoriented, random | Sandy silt loam | 25/75 | Close porphyric | Brown and redish brown to dark brown, dotted | Transluscent gray to yellowy and redish brown, dotted red and black | Undifferentiated to weakly stipple speckled | | | ▪ | ▪ | ▪▪ | + | + | + | + | ▪ | | + | | | ▪ | | | ▪ | | ▪▪▪ | ▪▪ | + |
| **34.16** | Massive to weakly developed subangular blocky to spongy | Unoriented, random, longer organic material moderately to strongly parallel to boundary | Silt loam | 10/90 | Loose porphyric | Yellowy to grayish red brown to dark brown, dotted | Greenish yellowy brown to brown dotted with black | Undifferentiated to weakly stipple speckled | | | ▪ | ▪ | ▪▪▪ | ▪▪ | | + | + | ▪▪ | + | ▪ | | | ▪ | ▪▪▪▪ | | | | ▪▪▪ | ▪ | ▪ |
| **34.17** | Massive to weakly developed fine subangular blocky | Unoriented, random | Sandy silt loam | 20/80 | Close porphyric | Brown and redish brown to dark brown, dotted | Transluscent gray to yellowy and redish brown, dotted red and black | Undifferentiated to weakly stipple speckled | | | ▪ | ▪ | ▪▪ | + | + | + | + | ▪ | | + | | | ▪ | | | ▪ | | ▪▪▪ | ▪▪ | + |

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| **34.18** | Weakly subangular blocky to spongy | Unoriented, random, elongated components moderately to strongly parallel (and voids also perpendicular) to boundary | Silt loam | 10/90 | Loose to close porphyric | Grayish brown to brown to very dark brown, dotted | Mottled, yellowy and grayish brown to dark brown, dotted with black and a touch of orange | Undifferentiated to weakly stipple speckled | | | ▪ | ▪▪ | ▪▪ | ▪ | ▪ | + | + | ▪ | + | ▪▪ | ▪ | | ▪ | | | + | | ▪▪ | ▪ | ▪ |
| **34.19** | Massive to subangular blocky, fine grained | Unoriented, random, very few elongated fragments moderately parallel to boundary | Sandy silt loam | 20/80 | Close porphyric | Light yellowy grayish brown to redish dark brown, dotted with black | Transluscent gray to yellowy gray brown dotted with orange and black | Undifferentiated to weakly stipple speckled | | | ▪▪ | ▪ | ▪▪ | ▪▪ | ▪ | + | + | ▪ | + | + | | | ▪ | | | | | ▪▪▪▪ | ▪ | + |
| **34.20** | Massive to weakly spongy | Unoriented, random, longer plant material moderately aligned parallel to boundary | Silt loam | 5/95-10/90 | Loose porphyric | Grayish brown to dark brown, dotted | Yellowy and grayish light brown to brown, dotted with black and dark to bright orange | Undifferentiated to weakly stipple speckled | | | ▪ | ▪ | ▪ | ▪▪ | | + | + | ▪ | + | ▪ | | | ▪▪ | | | + | | ▪▪ | ▪ | + |
| **34.21** | Massive to spongy | Unoriented, random, elongated components moderately to strongly parallel to boundary | Silt loam | 2/98 | Loose porphyric | Dark to very dark brown, dotted | Yellowy to dark gray and orange to dark orange brown, mottled | Undifferentiated to weakly stipple speckled | | | + | ▪ | ▪ | ▪ | | + | + | ▪ | + | ▪ | | | ▪▪▪ | | | + | | + | ▪ | |
| **34.22** | Weakly subangular blocky to a weak spongy and channel structures | Unoriented, random, elongated components strongly parallel to boundary | Silt loam to sandy silt loam | 15/85 | Close porphyric | Brown to redish brown to dark brown, dotted with black and light redish orange | Grayish caramel brown to brown, dotted with black, orange and silvery gray | Undifferentiated to weakly stipple speckled | | | ▪ | ▪ | ▪▪ | ▪▪ | | + | ▪ | ▪ | + | ▪ | ▪ | | ▪▪ | | | + | | ▪▪ | ▪ | ▪ |
| **34.23** | Massive to very weak sponge and channel structure | Unoriented, random, elongated components moderately to strongly parallel to boundary | Silt | 2/98 | Loose porphyric | Gray dotted with black and brown | Silvery to greenish gray and brown dotted with bright orange and black | Undifferentiated to very weakly stipple speckled | | | + | + | ▪ | ▪ | | ▪▪ | ▪ | ▪ | | ▪ | | | ▪ | | | | | ▪▪▪▪▪▪▪ | ▪ | |
| **34.24** | Massive to weakly subangular blocky to spongy | Unoriented, random, elongated components moderately to strongly parallel to boundary | Silt to silt loam | 2/98-15/85 | Loose porphyric | Brown to very dark brown, dotted | Light brown to grayish brown dotted with dark to bright orange and black | Undifferentiated to weakly stipple speckled | | | ▪ | ▪ | ▪ | ▪▪ | ▪ | + | ▪▪ | ▪▪ | + | ▪▪ | ▪ | | ▪ | ▪ | | + | | ▪▪ | ▪ | ▪ |

+ precent in trace amounts, ▪ < 2% ▪▪ 2-5%, ▪▪▪ 5-10%, ▪▪▪▪ 10-20%, ▪▪▪▪▪ 20-30%, ▪▪▪▪▪▪ 30-40%, ▪▪▪▪▪▪▪ 40-50%, ▪▪▪▪▪▪▪▪ 50-60%, ▪▪▪▪▪▪▪▪▪ 60-70%

## Part Two

# Rocks and minerals from the Gásir trading post in Eyjafjörður, North Iceland

Sólveig Guðmundsdóttir Beck

# Rocks and minerals from the Gásir trading post in Eyjafjörður, North Iceland

## Methods

The artifacts and manuports were analyzed with the help of standard reference books (Pellant, 1992; Kristján Sæmundsson and Einar Gunnlaugsson, 2002), a hand lens (x10) and a Leica MZ6 stereomicroscope. Additional assistance on identification was sought from Kristján Jónasson, geologist at The Icelandic Institute of Natural History.

## Icelandic stones and minerals

### Basalt

The trading post at Gásir is situated on Upper-Miocene (8,5-10 m.y.) mafic and intermediate, extrusive bedrock (Haukur Jóhannesson and Kristján Sæmundsson, 2009a and 2009b). Basalt is a fine grained, dark gray to black, extrusive mafic rock. It is silica deficient and composed largely of ferromagnesian minerals and plagioclase, often with large phenocrysts. Phenocrysts are relatively large and usually conspicuous crystals distinctly larger than the grains of the rock groundmass. The most frequent phenocrysts in Iceland are feldspar, pyroxene and olivine. Volcanic scoria, or slag (gjall), is highly vesicular glassy basalt often with more void space than rock. Black scoria is formed from spatters and sprays of lava that have fallen to the ground around the spewing craters and solidified fairly fast (Kristján Sæmundsson and Einar Gunnlaugsson, 2002).

Most of the basalt finds (8 pieces) from Gásir (see table 4 in appendix 2) are manuports (02-148, 03-116, 05-065 and 06-180). Find 02-133 is a possible quernstone rim fragment, find 03-096 is classified as a weight and find 05-059 is a broken hammer. Their total volume was roughly estimated to be about 1300 $cm^3$ and together they weighed about 1,7 kg.

Together the manuports (5 pieces) weigh about 0,5 kg and their volume is roughly estimated to be about 440 $cm^3$. Find 03-116 is a subrounded firecracked rock with sulfur residue that weighs about 480 gr. Find 06-180 is a fragment of basalt scoria misidentified as slag. Other finds are natural manuports. The size range is between 2-10 cm in length, 1,8-7,8 cm in width and 1-4,6 cm in thickness.

Find 02-133 is a quernstone rim fragment of gray vesicular basalt with feldspar phenocrysts. The phenocrysts are transluscent, <1 mm in length and give the rock a glittery aspect. The vesicles are fairly small (<0,5 cm) but abundant. Vesicular basalt is formed when

lava solidifies while gas is bubbling through it and the holes get trapped in the rock (Pellant, 1992). No eye is apparent in the rock fragment but it seems to be a smooth and curved rim that could possibly have been worked. The fragment is about 202 gr in weight, about 8,9 cm in length, 4,7 cm in width and 4,2 cm in thickness. The fragment is roughly estimated to be about 176 $cm^3$ in volume. If the fragment is from a quernstone the original stone was estimated to be between 40-50 cm in diameter and was at least 4,7 cm thick when it fell into disuse. This diameter fits nicely into the diameter range of Scandinavian quernstones which is 35-60 cm. A thickness of 4,7 cm would suggest that the stone has lost at least 10 cm in thickness since it was first made. The flat bottom and mildly convex top could suggest that this is the upper halve of a mill. The fact that the fragment is vesicular also suggests quernstone as vesicular basalt is thought to make better and longer lasting quernstones (Elín Bjarnadóttir, 2007).

Find 03-096 is a possible weight. The rock has a brownish gray weathering coat which makes identification hard but it is most likely basalt. The rock has a circular hole about 2-5 mm in diameter roughly through the center. The hole is probably a partial natural vesicle. The rock is fine grained and vesicular with vesicles <5 mm in diamter. The find is about 5 gr in weight, 2,6 cm in length, 2,3 cm in width and 0,9 cm thick. Volume was roughly estimated to be about 5 $cm^3$.

Find 05-059 is a broken sledge hammer. The hammer is made of dark gray basalt with small feldspar phenocrysts. Tiny vesicles are rare in a fine grained groundmass. Through the stone there is a natural hole which is 3-3,5 cm in diameter. The outer surface of the rock is subrounded most likely due to water erosion and/or wear. The hammer fragment weighs about 0,9 kg, is about 13,5 cm long, 7,8 cm wide and 6,5 cm thick. Its volume was roughly estimated to be about 680 $cm^3$. The diameter of the hammer was estimated to be around 14 cm in diameter before it broke.

Basalt is very common in Iceland and hard to source without a very detailed analysis of the groundmass in thin section and/or with chemical analysis so their source could be from almost anywhere in Iceland. Vesicles can usually not be used solely to find a material source. Sources of quernstone mines are rare in Iceland but mines are known at Geitland and in Hallmundarhraun in Borgarfjörður (Elín Bjarnadóttir, 2007). Many craftsmen traveled around their district and built quernstones and put up mills for farms (Elín Bjarnadóttir, 2007) and it would seem more practical to find local material to build from, rather than heft around large blocks of material from elsewhere except where it was absolutely nescessary. This could also apply to the sledge hammer. According to Kristján Mímisson (pers.comm., 2011) sledge

hammers have been around since Landnám but become particularly common in the 16th and 17th centuries. Possible sources of large subrounded manuports could be Hörgá river or the seashore of Eyjafjörður if the rock used for the hammer was subrounded to begin with. Otherwise any rock from the viscinity with a large enough perforation would probably do.

**Gabbro**

A small weight (02-127) made from grayish white to very dark gray medium grained gabbro was found at Gásir in the year 2002 (see table 8 in appendix 2). The gabbro is subrounded most likely due to water erosion, fairly flat and elongated. Two holes have been bored through the rock, at either end, one is larger and further from the tip of the rock (1,6 cm) than the other (1 cm). The larger hole is 1,3 cm in diameter while the smaller one is 0,9 cm in diameter. Clear striations can be seen inside them. The end with the smaller hole is fractured on one side although the hole is still intact. The weight weighs about 45 gr, is about 7,5 cm in length, 1,8-3,4 cm in width and 1,1-1,2 cm in thickness. Its volume was roughly estimated to be about 23 $cm^3$.

Gabbro can mostly be found in Southeast-Iceland in Eystra- and Vestrahorn and in Þorgeirsfellshyrnu og Kolgrafamúla in Snæfellsnes, West-Iceland (Kristján Sæmundsson and Einar Gunnlaugsson, 2002). Mafic and intermediate intrusions of gabbro, dolerite and/or diorite can, however, also be found in Fagranesfjall and Kirkjufjall mountains above the farm Engimýri in Öxnadalur about 30 km SSW of Gásir. As well as in the southern slopes of Sandárhnjúkur and Flöguselshnúkur mountains above Hörgá river about 45 km southwest of Gásir which could mean the manuport has been transported to the coast of Eyjafjörður with the Öxnadalsá, Þverá and/or Hörgá rivers (Haukur Jóhannesson and Kristján Sæmundsson, 2009a). The stone might also have been brought in from the outside by humans as ballast or deposited on the Icelandic seashore from sea ice.

**Quartz minerals**

Quartz minerals are among the most common minerals found in Iceland, in fact the most common minerals in the world, next to feldspar. As amygdales they form at temperatures from 20-150°C in the rock strata or in dykes close to high temperature geothermal areas. They can also form at the periphery of plutonic rock intrusions. Fine grained quartz, chalcedony, onyx and agate are common amygdales in tholeiite basalts and very often form in some combination together in the same cavity. Chalcedony is also found in rhyolite. Jasper however is a bit different. Jasper forms the largest amygdales in Iceland and jasper amygdales and

dyke fillings in basalts and rhyolites are very common. It is also found in large deposits, or layers, and blocks of it can weigh up to 50-100 kg (Kristján Sæmundsson and Einar Gunnlaugsson, 2002).

In Gásir about 63 quartz mineral finds were collected (see table 5 in appendix 2). The collection weighed about 350 gr and its volume was roughly estimated to be 280 $cm^3$. The collection is comprized of agate (2), chalcedony (1), jasper (3), onyx (18), opal (3), smoky quartz (4) and undiagnostic quartz (32) with a size range between 0,6-5,2 cm in length, 0,5-4,5 cm in width and 0,4-2,7 cm in thickness.

*Chalcedony*

Chalcedony is a very fine grained variety of quartz that often shows a mammillary habit. Chalcedony is most often white or gray but is also known in green, pale blue and black (Kristján Sæmundsson and Einar Gunnlaugsson, 2002). Fragment 02-144 is a bottle green to black, weakly transluscent fragment that clearly formed gradually in a void (amygdale). It has a smooth to mildly knotty outer surface and something that could possibly be the mammillary habit of chalcedony in the center. The fragment is about 7 gr in weight, 2,5 cm in length, 1,7 cm in width and 1 cm in thickness. Its volume was roughly estimated to be about 4 $cm^3$.

*Agate*

Agate is a specific variety of chalcedony that shows concentric banding in different colors in section (Kristján Sæmundsson and Einar Gunnlaugsson, 2002). Two agates (03-077 and 05-065) were found in Gásir. Find 03-077 is a brownish gray pebble rounded due to water erosion. The pebble is transluscent and clear parallel but wavy banding is visible. The pebble is about 1 gr in weight, 1,4 cm in length, 1,1 cm in width and 0,6 cm in thickness. Find 05-065 is also transluscent with faint dark and light banding around a center of tiny quartz rock crystals. The find is partially subangular most likely due to water erosion and weighs about 9 gr, is about 2,5 cm in length, 2 cm in width and 1,6 cm in thickness. Their total volume is roughly estimated to be about 9 $cm^3$.

*Jasper*

Jasper is also a form of chalcedony. Jasper is most commonly red but it can also be green, yellow and/or brown (Kristján Sæmundsson and Einar Gunnlaugsson, 2002). Find 03-084 is a red angular jasper with gray quartz bands. The fragment is possibly water worn as it has no sharp edges. It is about 4 gr, 2,1 cm in length, 1,8 cm in width and 1,1 cm in thickness.

Fragment 05-062 is a opaque green jasper, mottled with faint dark flecks. The fragment is subangular with a weak greasy lustre, weighs about 1 gr, is 1,4 cm in length, 0,8 cm in width and 0,5 cm in thickness. And finally fragment 06-123 is most likely a caramel brown jasper flake. The fragment has sharp edges and a greasy to a very faint glassy lustre. It is about 1 gr in weight, 1,1 cm in length, 0,8 cm in width and 0,8 cm in thickness. The total volume of the jasper flakes is roughly estimated to be about 6 $cm^3$.

*Onyx*

The most common type of quartz mineral found in Gásir was onyx as 18 pieces were collected. Onyx is also a form of chalcedony which has parallel dark and light banding (Pellant, 1992). The fragments were angular to very rounded and about 7-8 manuports are possibly waterworn. The parallel banding in all the fragments is translucent gray to white. The size range of the finds is 1-5,2 cm in length, 0,9-4,4 cm in width and 0,4-2,7 cm in thickness. The collection weighs about 240 gr and is roughly estimated to be about 190 $cm^3$ in volume.

*Opal*

Opal is an almost amorphous variation of quartz that contains about 3-13% of water. It is usually very light colored to milky white and can be opaque to translucent. Sometimes it can also be grey, brown, green, red or even blue. Opal is softer and has more lustre than jasper. Seven possible opal fragments were found in Gásir. Find 04-218 is a green opal with very faint dark and light banding. The fragment is subangular possibly due to water erosion with irregular fracture and a dull glassy lustre. It is about 1,9 gr in weight, 1,9 cm in length, 1,6 in width and 0,8 in thickness. Find 04-223 is a white to pale green opal and the fragment is subrounded to subangular most likely due to water erosion. It has a faint glassy lustre and clear dark and light irregular banding. The opal is about 6,4 gr, 2,4 cm in length, 2,1 cm in width, 1,3 cm in thickness. Find 06-5118 is a bluish dark green flake with sharp edges, concoidal fracture and a weak glassy lustre. The flake is angular to subangular, about 8 gr in weight, 2,3 cm in length, 2,1 cm in width and 1,7 cm in thickness. The collection is roughly estimated to be about 17 $cm^3$ in volume. Four manuports (03-055, 05-026, 05-072, 06-130) were also found in Gásir which are all quite similar that could possibly be opal but it is not impossible that the fragments could also be glass. The fragments are all transluscent smokey gray to dark gray with very worn chipped edges and very matted surfaces although a very faint glassy lustre was observed in some of the fresher fractures. The fragments are subangular to subrounded and possibly waterworn. Together they are about 2,9 gr in weight

and have a size range from 1-1,5 cm in length, 0,7-1,2 cm in width and 0,5-0,6 cm in thickness. Their volume was estimated to be about 3 $cm^3$.

*Quartz*

The largest portion of the quartz mineral collection was a group of 31 quartz pebbles, or manuports, without any distinguishing features. The collection weighs about 60 gr and is roughly estimated to be about 45 $cm^3$ in volume. The manuports are transluscent grayish white to opaque white with dull to glassy lustre. Most have either a subrounded waterworn surface or a pitted rough surface of an amygdale but no other clear distinguishing features. Their size ranges from 0,6-2,7 cm in length, 0,5-1,8 cm in width and 0,4-1,4 cm in thickness. Within the group there is one possible bead (05-201). The pebble is whitish gray to white in color, about 3 gr in weight and 1,1-1,3 cm in diameter. It has a glassy lustre and is most likely subrounded due to water erosion. On its surface there are three small holes that are <2 mm in diameter and depth. Two of the holes are almost directly against each other on each end. One more hole is also on the third side almost directly in between the other two. Within the pebble there is a very faint possible inner fracture, possibly due to boring. The holes could be an attempt at making a bead (Elín Hreiðarsdóttir, pers.comm, 2011).

An exact source is very hard, if not impossible, to find for most of the quartz minerals as they are very common amygdales in igneous rocks in Iceland (Kristján Sæmundsson and Einar Gunnlaugsson, 2002) but it is likely that they came from the mountains west and southwest of Gásir, from the Hörgá river or the shores of Eyjafjörður. Large jasper deposits are e.g. known in Hestfjall in Borgarfjörður about 220 kilometers southwest of Gásir (Kristján Sæmundsson and Einar Gunnlaugsson, 2002) and jasper is a very common find around the extinct central volcanos in East Iceland (Helgi Hallgrímsson, 2009) but it is not unlikely however that the small jasper pebbles from Gásir could also have come from the area around Gásir as there are remnants of an extinc caldera in the mountains between the mountain Kerling and Öxnadalur valley about 25 km SSW of Gásir (Haukur Jóhannesson and Kristján Sæmundsson, 2009b).

**Obsidian and Pitchstone**

Only one flake (04-217) of glassy black obsidian was found in Gásir. The flake is very small and does not seem to be worn from use as its edges are very sharp. Three fragments (03-054, 03-068 and 03-091), possibly of less shiny black pitchstone with a silvery gray perlite coat,

were also found (see table 8 in appendix 2). One of the fragments (03-068) is long and thin with a sharp irregular tip. It slightly resembles a roughly made stylus but weather it was used as one is unlikely. The fargment seems unworked, 6,6 cm long, 0,9 cm wide and 0,6-0,8 cm wide. The size range of the other fragments is 1,1-2 cm in length, 0,9-1,4 cm in width and 0,3-0,9 cm in thickness. The collection weighed about 8,3 gr in total and was about 7,6 $cm^3$ in volume.

Obsidian is formed when rhyolitic lava is subjected to extremely rapid to instantaneous cooling so that atoms freeze in place without crystals forming (Kristján Sæmundsson and Einar Gunnlaugsson, 2002). The closest known source of obsidian is found in Hrafntinnuhryggur south of Krafla (Hughes and Lucas, 2009) about 65 km east of Gásir and about 15 km northeast of Mývatn.

Pitchstone is very similar to obsidian but coarser and has a resinous lustre because it has cooled slower than obsidian. It can also form when obsidian is weathered as it takes on water and looses its lustre. Pitchstone is a common formation with rhyolite (Kristján Sæmundsson and Einar Gunnlaugsson, 2002; Pellant, 1992). Possible sources are the same as with the obsidian as well as the rhyolite formations found in and around the extinct caldera in the mountains between the mountain Kerling and Öxnadalur valley about 25 km SSW of Gásir.

**Sulfur**

Sulfur is found in nature as a pure element and as sulfide and sulfate minerals. Sulfur has been very sought after through the centuries for use in gunpowder (Sigfús H. Andrésson, 1988). In Gásir about 90 fragments of sulfur were collected (see table 6 in appendix 2) that together weighed about 0,33 kg. The volume of the collection was roughly estimated to be just over 300 $cm^3$ with a size range between 0,5-5,2 cm in length, 0,3-4,5 cm in width and 0,2-2,2 cm thickness (fragment 02-137 might be larger). Finds 02-134 and 02-137 aer not included in volume.

In Iceland sulfur is mostly formed near hot springs in active geothermal areas (Kristján Sæmundsson and Einar Gunnlaugsson, 2002). Sulfur mines in Iceland are considerable and sulfur was first mined and exported in the late 13th century. Export and mining largely continued until the late 16th century but was mostly ceased presumably after prices dropped considerably. In the early 18th century mining and export expanded again on and off but by World War II it had ceased completely most likely largely due to progress in weapon design and manufacture.

Known sulfur mines closest to Gásir are in Mývatnssveit and they are Reykjahlíðarnámur

east of, and on the easters slopes of Námafjall, Kröflunámur in Leirhnúkur, Fremri námur east of and in the crater Ketill on the outskirts of Ódáðahraun and Þeistareykjanámur at Þeistareykir (Jón E. Vestdal, 1943). Námafjall is about 65 km ESE of Gásir and about 5 km northeast of Mývatn. Krafla is about 65 km east of Gásir and 8 km north of Námafjall. Ketill is about 85 km southeast of Gásir and about 25 km SSE of Námafjall. Þeistareykir are about 60 km ENE of Gásir and about 30 km NNW of Námafjall.

**Tertiary Red Interbasalt Sediment (Rauðaberg)**

The red sediments, or rauðaberg, are mixtures of weathered tephra and saprolitic soils interbedded with tuff and hyoloclastites sandwiched between tertiary plateau basalts in West, Northwest (Roaldset, 1983) and East Iceland (Leó Kristjánsson, 1973). The most famous example of use of rauðaberg sediments in Iceland is Hóladómkirkja in Hjaltadalur, North Iceland. The cathedral is largely built of ashlar stones of red interbasalt sandstone and basalt. The cathedral was built in 1757-1763 under the supervision of bricklayers Sabinsky (1757-1760) and Schätzer (1760-1763). The material was taken from an outcrop in Hólabyrða (Kirkjukort, 2010) which is a mountain less than a kilometer east of Hólar.

Two fragments of rauðaberg were found in Gásir (see table 8 in appendix 2). Find 02-148 is a bright red to brown, angular stone flake with a rough surface. Within the sediment there seem to be a few small white inclusions which could possibly amygdales. The fragment is about 11 gr in weight, 3,9 cm in length, 2,8 cm in width and 1 cm in thickness. It does not seem to have been worked and its volume was roughly estimated to be about 11 $cm^3$. Find 03-097 was a red, angular rock with white inclusions which could also possibly be amygdales that were <5 mm in length. The texture of the groundmass is fine grained and massive as no clear vesicles are visible. The rock seems to have been worked and possibly polished as it has fairly flat regular sides and smooth blunt edges. It is about 91 gr in weight, 4,6-4,8 cm in length, 3,1-4,1 cm in width and 1,4-2,5 cm in thickness. Its volume was roughly estimated to be around 40 $cm^3$.

The closest known formations are in Hólabyrða about 40 km ENE of Gásir as meantioned above but it is not unlikely other deposits of rauðaberg can be found closer to the site.

**Zeolites**

Zeolites are very common in Iceland and occur mainly as secondary minerals, or amygdales, in basalt. Zeolites are white or transluscent natrium, kalium and/or calcium alumino silicates with poorly bound crystal water (Kristján Sæmundsson and Einar Gunnlaugsson, 2002).

Almost all the zeolites (5 psc.) from Gásir (01-002, 02-160, 02-176, 06-138 and 06-5157) were white, radiating fibrous masses most likely of scolecite or mesolite, which are very common in Tertiary olivine basalts (see table 7 in appendix 2). The size range of the fragments was 2,9-7,9 cm in length, 1,9-5 cm in width and 1,4-2,4 cm in thickness. Other zeolites (02-169 and 02-172, 3 psc.) were very rounded due to water erosion and therefore did not show clear crystal structure so they could not be classified confidently in more detail. Their size ranged from 1,5-2,1 cm in length, 0,9-1,6 cm in width and 1-1,7 cm in thickness.

About 50% of all Icelandic lava formations are tholeiite and 30% are olivine tholeiite (Sveinn Jakobsson, 1984) which makes it hard to pinpoint a specific source, but according to Sveinn Jakobsson (1977) zeolites are commonly found in the vicinity of extinct volcanic systems where temperature metamorphism and amygdale formations are very common. In Gásir the closest extinct volcanic system is in the mountains between Kerling mountain and Öxnadalur valley about 25 km SSW of Gásir (Haukur Jóhannesson and Kristján Sæmundsson, 2009b) which means the zeolites were possibly transported to the coast of Eyjafjörður with the Hörgá river and its many tributaries.

## Foreign stones and minerals

### Flint

Flint and chert are composed of cryptocrystsalline masses of connected quartz crystals and fibres with water-filled micropores between them. Flint can also contain amorphous silica called opal and microfossils. It is thought to have been formed as part of some kind of post-depositional process in carbonate sediments (chalk) where silica was redistributed (Henderson, 2000). Flint has been used for the manufacture of flint tools since the Stone Age. It has also been used with iron pyrite to make sparks but since the Iron age it has been used with steel (fire striker or fire steel) for the same effect (Rapp, 2009; Wikipaedia, 2011).

One beautiful flint nodule (06-137) and 13 flint flakes (see table 9 in appendix 3) where found in Gásir. All of them are white to grayish black and brownish dark gray, mottled and/or dotted. The flint nodule is fairly large, about 0,6 kg, 12 cm long, 9,5 cm wide and 4,8 cm thick. It is subrounded and almost intact except for one end where flint seems to have been chipped off. Its volume was roughly estimated to be about 500-550 $cm^3$. The flint flakes mostly have sharp edges and no clear indication of wear except possibly on flakes 03-071 and 04-214 where edges are faintly blunt. Flake 06-135 seems to have been burned. The size range of the flakes was about 1,8-4,8 cm in length, 0,6-4,4 cm in width and 0,5-2,5 cm in thickness. Together the flakes weighed about a 100 gr and their volume was roughly

estimated to be about 140 $cm^3$.

The carbonate sediments in Europe, that are now for example the White Cliffs of Dover and the coastal cliffs of Denmark and France, were formed throughout almost all of Late Creataceous time, when high sea levels led to extensive flooding of western Europe. The chalk covered most of the east coast of England, the coast of Europe from northern France, over Holland, Belgium and parts of Germany all the way up to the Baltic Sea, the whole of Denmark and the southern tip of Sweden. Shallow water facies also covered large inland regions of France, Germany and Poland (Stanley, 1999).

As Cretaceous rocks only occur on shore in Norway on the islands Andøya and Svalbard in the far north and on the southernmost tip of Sweden (Ramberg et al. (eds.), 2008) the two most likely sources of the flint finds would be England or Denmark although it is not impossible it could have come from mainland Europe. In England flint can be found in the Dover chalk deposits in thick horizontal layers at depths between about 1-10 m below the surface. Best known sources of gray to blackish flint (gray opaque with inclusions, black translucent and fine grained) are in southern England e.g. from Brandon in Suffolk county (Kenmotsu, 1990). Gray to black flint however can also be found in Denmark on the southeast coast of Zealand, in Langeland and on the Island of Møn (Becker, 1959; White, 1975). According to Durst (2009) it is possible to distinguish between English and Danish flints with a fair degree of accuracy with chemical analysis.

**Metamorphic rocks**

Metamorphic rocks form at great depths at high pressures and temperatures from pre-existing rocks and sediments formed on the surface of the earth. As the temperature and pressure conditions change the old minerals become unstable and new ones are formed that are at equilibrium with their new environment. The textures of metamorphic rocks are either foliated (e.g. slate and schist) or nonfoliated (e.g. quartzite and marble) (Stanley, 1999).

At Gásir just over 50 fragments of metamorphic rocks were collected that could not be classified as whetstones or whetstone material, steatite objects or bakeplates. The collection weighs about 5,5 kg and its volume was roughly estimated to be just under 4000 $cm^3$ in volume (see table 10 in appendix 3). The size of the fragments ranged from 0,8-26 cm in length, 0,7-15 cm in width and 0,2-7 cm in thickness. Within the collection there are e.g. fragments of metasandstones, biotite and muscovite mica schists, and schistose gneiss.

***Metasandstones***

Find 02-132 is a very dark gray, massive flagstone fragment. The rock is about 9,1 cm in length, 7 cm in width and 2,6 cm in thickness and weighs about 300 gr. Its volume was roughly estimated to be about 166 $cm^3$. At the edges (cross section) there are faint signs of possible relict bedding structures or foliation and clear criss-cross striations on the flat, polished, surfaces. No vesicles or phenocrysts are present in the rock but under the microscope there are clear circular inclusions which Kristján Jónasson suggested might possibly be graphite. Kristján also suggested the find might be some kind of metasandstone which is not found in Iceland. Whether the rock had any particular function is uncertain but it could possibly have been used for polishing and/or grinding.

Find 02-164 is broken in two but the fragments clearly fit together. Together the fragments weigh about 354 gr and their combined volume was roughly estimated to be about 125 $cm^3$. The rock is comprised of two distinct layers with continuous banding of dark colored glassy biotite mica schist and light colored granular metasandstone, possibly quartzite. The metasandstone layer is thicker than the mica schist. The crumbly texture of the metasandstone resembles more a regular badly fused sandstone but the strongly foliated mica schist clearly shows that the rock has undergone considerable metamorphism. A few, much thinner and more compact discontinuous bands of light colored granular quartz and feldspar are also observed within the thin lenses of the schist. The fragments do not seem to be worked

Finds 05-068 and 05-071 are comprised of four thin flakes of gray laminated metasandstone, possibly quartzite. Their size ranges from 5,7-7,1 cm in length, 3,1-6,6 cm in width and 0,2-0,6 cm in thickness. Their volume was roughly estimated to be about 60 $cm^3$ and together they weigh about 67 gr. The massive fabric is fairly fine grained but comprised of equant mineral grains of quartz and/or feldspar. Microscopically thin folia of mica sheets are clear on the flat surfaces giving the stones a faint glassy apperance and suggest relict bedding structures. The fragments do not seem to be worked.

***Phyllite***

Phyllites are metamorphic rocks transitional between slates and schists. They are fine grained, have a characteristic sheen and wavy foliation. Often small-scale folding can be seen. One fragment (02-153) of possible phyllite was found at Gásir. The fragment exhibits wavy foliation and has a very weak glittery aspect, possibly from mica. The surface of the find is brownish grey and highly weathered and worn which makes further material identification difficult. The fragments is roughly shaped like a coin, with rounded outer edges but one edge

chipped or broken. Dark and light banding is clear on the wavy surfaces. The flake weighs about 5 gr, is about 2,6-2,8 cm in diameter and 0,5 cm thick. It is not unlikely that this rock fragment has been worked into the shape of a coin but to what purpose is unclear.

***Schists and gneiss***

Schists are medium to coarse grained metamorphic rocks formed at moderate pressures and temperatures, that show schistose foliation and are mostly composed of clearly visible platy or elongated minerals (e.g. mica and amphibole) that show planar alignment. Gneiss is a medium to coarse grained metamorphic rock that is formed at high pressures and temperatures and is characterized by discontinous dark (foliated) and light (granular) banding of e.g. dark and light mica, white and pink feldspars and gray quartz among other minerals (Pellant, 1992; Stanley, 1999).

*Mica schists*

The largest part of the metamorphic rock collection at Gásir was mica schists (see table 11 in appendix 3). About 34 fragments were recorded which together weighed just under 2 kg. Their volume was roughly estimated to be about 1600 $cm^3$. Find 03-085 is a thin flake of coarse grained strongly foliated bright silvery gray muscovite mica schist. Find 03-292 is a small thin flake of gray biotite mica (registered as a bakestone fragment) and find 06-126 is a white to greenish light gray muscovite-quartz schist. Most of the other finds are strongly foliated silvery gray to black medium grained fragments of flakey biotite rich mica schists, some with very thin granular bands of quartz and feldspars. All of the fragments are unworked.

*Schistose gneiss (?)*

Eight subangular to angular fragments from Gásir (02-159, 02-160, 02-174, 03-210 and 06-161) seem to be in a metamorphic state somewhere between schist and gneiss. The fragments are foliated and made up of fairly thick, mostly discontinuous granular bands of grayish white quartz and white to pinkish white feldspar between flaky, glassy black bands of dark biotite rich mica. The dark bands are rather crumbly while the granular bands are massive and often thicker. Together the fragments weigh about 2,55 kg and their volume was roughly estimated to be about 1900 $cm^3$. No signs of human working were observed.

Most of the rock fragments don´t seem to be very useful for any type of building or shaping as they are crumbly, strongly foliated and very heterogenous. It is therefore most

likely they are waste products from whetstone and/or bakestone ores or simply useless remnants of ballast. Most of the biotite rich mica schists and schistose gneiss` seem fairly similar in the hand specimens which could suggest a similar source but without further petrographic analysis it is uncertain.

As Iceland is a very young volcanic island on a divergent tectonic plate boundary metamorphic rock is not a natural occurrence. Boulders and stones of metamorphic rocks are however fairly common on our shores that have come to the island with icebergs or as ballast (Þorleifur Einarsson, 1991). Unfortunately rocks like phyllite, mica schist and gneiss are among the most common rock types in Norway with gneiss being the most common of them all (Ramberg et al. (eds.), 2008). From the coastal areas between Stavanger and Bergen up towards the NNW to its northernmost tips, Norway is riddled with metamorphic rock formations formed during the Caledonide orogeny more than 400 Ma ago. Large parts of central and northern Scotland, the Hebrides, Orkneys and Shetland, even parts of Ireland and Greenland, are also made up of metamorphic rocks formed in the Caledonian orogeny (Toghill, 2004). This makes sourcing unworked metamorphic rocks extremely difficult if not impossible. However, according to Hansen (2010) a very large part of the whetstone materials found at Gásir were either of the Eidsborg type from Telemark or of unknown origin and most of the bakestones seem to be from the Hardanger area (see below). This makes Norway a very likely source but Solli and Nordgulen´s (2008) bedrock map of Norway shows that there are not very many sources of mica schists or other metamorphic rocks such as phyllites or gneiss around Eidsborg. Northwest and southeast of Hardangerfjorden in Norway however, large expances of areas are comprised of mica schists, phyllites, sandstones and quartzites along with the bakestone talc schists (Solli and Nordgulen 2006) which would make the coastal areas around Hardangerfjorden a more feasible source.

**Steatite (soapstone)**

Steatite, or soapstone, is a general term for soft metamorphic rocks composed mostly of talc with varying amounts of chlorite and amphiboles that are easily worked (Forster and Bond, 2004; Henderson, 2000; Crawford and Smith, 1999). Steatite can be either massive or of the foliated schistose variety (Forster, 2004; Crawford and Smith, 1999). Steatite has been used in Scandinavia and Shetland since the Neolithic as a pottery temper as well as for tools and moulds. It was not until the Bronze Age that vessels and pots appeared. In Norway the industry reached it´s peak in the Viking period and the Middle Ages (Forster and Bond 2004; Ramberg et al. (eds.), 2008).

In Iceland soap stone objects such as cooking pots, oil lamps, gaming pieces and spindle whorls have mostly been found and dated back as far as the Viking Age (Kristján Eldjárn, 1949). At Gásir four fragments of steatite were recovered (see table 11 in appendix 3). Two are possible vessel fragments (01-011 and 03-067), one is a broken net sinker (04-005) and one (03-207) does not seem to be worked except for one circular perforation.

Fragment 01-011 is about 3,5 cm in length, 2,6 cm in width and 1,2 cm in thickness. The fragment is polished smooth on one side, slightly curved and weighs about 12 gr. Clear parallel banding can be seen on the smooth, slightly curved outer edge. The vessel has most likely been round and was estimated to have been at least 11 cm in diameter. Fragment 03-067 is a cooking pot fragment (grýta) that most likely had a flat bottom. The fragment is curved and has a blackened outer convex side. Clear scuff marks, shallow striations and short thin deep grooves are on the inside, or concave side, of the vessel fragment. The diameter has been estimated to have been about 20 cm judging from the outer rim. The fragment varies in thickness from 0,7-1 cm which is thought to be fairly thin (Kristján Eldjárn, 1949). The thicker side was assumed to be near the bottom of the vessel. The fragment weighs about 18 gr, is 4,4 cm in length, 3,8 cm in width. Thinner flat bottomed cooking pots are thought more likely to be from the Middle Ages (Kristján Eldjárn, 1949).

Find 04-005 is a net sinker broken in half. The fragment is about about 8,6 cm in length, 3,2 cm in width and 2,3 cm in thickness. It is though most likely that before the sinker broke it would have been about 6-6,5 cm in width. The sinker is subrounded possibly due to polishing. At the narrow end of the sinker, about 1 cm from the tip in the middle of the rock, there is a clear perforation that, judging by the striations inside, was bored through the rock. The perforation is about 1,1 cm in diameter but half of it is now missing. The sinker weighs 88 gr and its volume was roughly estimated to be about 63 $cm^3$. Very few sinkers or weights made of steatite have been found in Iceland (Kristján Eldjárn, 1949).

Fragment 03-207 is a whitish gray to very dark gray, weakly foliated steatite flake with a greasy surface. The flake weighs 19 gr, is about 4,5 cm in length, 3,9 cm in width and 1 cm in thickness. Its volume was roughly estimated to be about 18 $cm^3$. One possible black porphyroblast is visible on the surface. A circular perforation has been drilled through the fragment at one end but no other signs of working are visible. The perforation is about 1 cm in diameter. The pupose of the perforation is unclear but it could possibly be an attempt at repairs, a broken weight or remnants of an attachement for handles (Crawford and Smith, 1999).

According to Forster and Bond (2004) chemical provenancing of steatite artefacts has

proved difficult due to high heterogeneity within single quarries. Although to date a few attempts have been promising it is thought that, where possible, using morphological characteristics to connect finds to different areas is just as helpful, if not better than chemical analysis (Forster and Bond, 2004). Several hundred soapstone quarries are scattered throughout Norway (Ramberg et al. (eds.), 2008) and at least 77 outcrops and 17 quarries of steatite are known to be connected to archaeological production in Norway and Sweden (Forster and Bond, 2004). Today the best known steatite quarries in Norway are at Otta in south-central Norway, at Sparbu, Steinkjer in central Norway and at Grunnes, Målselv in northern Norway. At least one quarry is also at Handöl, Åre in Sweden (Selonen and Suominen, 2003). Quarries are also known in Shetland, mostly on Unst (Catpund and Clibberswick), Fetlar and Mainland, and on the west coast of Greenland (Forster and Bond, 2004; Crawford and Smith, 1999). As most of the bakestones seem to come from the Hardanger district (see below) it is not unlikely the steatite finds originated from that area as well.

***Schistose steatite and bakestones***

Bakestones are flat steatite flagstones around 30-60 cm in diameter, varying in thickness between 5-25 mm, with characteristic tool marks (striations) on both sides. In Shetland bakestones were made from homogenous heavy steatite rock, similar material used in making cooking pots both in Shetland and Norway. The stones were up to 25 mm in thickness and rectangular to subrectangular in shape. Norwegian bakestones, however, were made of schistose steatite that exhibited foliated fractures. The Norwegian stones were trimmed thinner than the Shetland stones to 7-10 mm in thickness and were usually circular or semi-ciruclar. The Norwegian schistose steatite however was not suitable for use in making vessels. The similar thermal expansion characteristics of the talc, chlorite and amphibole minerals in the steatite made them ideal to endure alternating heating and cooling (Crawford and Smith, 1999; Forster, 2004).

According to Ramberg et al. (eds., 2008) the soft chlorite-talc schist (schistose steatite/greenstone) was worked on the west coast of Norway in 26 (29 according to Crawford and Smith 1999, p.136) quarries in a small area at Ølve in Hardanger, Hordaland on the southwest coast of Norway to obtain griddles for baking. The bakestones from Norway can be distinguished from Shetland bakestones by the texture of the rock, superior craftsmansship and their circular shape. Norwegian schistose bakestones are dated as far back as the 11th century, while the roughly manufactured rectangular to sub-rectangular bakestones from

Shetland are dated as early as the Viking Age (Forster, 2004; Crawford and Smith, 1999). Shetland bakestones were manufactured e.g. at Cunningsburgh quarry.

*Schistose steatite (?)*

Four fragments were found in Gásir that slightly resemble schistose steatite bakestone materials (see table 12 in appendix 3) but show no clear signs of human working. Fragments 02-152 (2 psc.) and 02-165 (1 psc.) are very similar. Together the three fragments weigh about 0,5 kg and their size range is between 4,4-14 cm in length, 1,5-11 cm in width and 0,6-2,8 cm in thickness. Their volume was roughly estimated to be about 250 $cm^3$. The fragments are gray to black and even faintly green under lamplight with a mild greasy feal to the surface. The fragments exhibit weak wavy foliation with very faint light gray banding in between folds. On one of the flat surfaces of each stone flake there are large glassy black crystal sheets (most likely biotite) <0,5 cm in length which give the stone a glittery aspect. The matrix is fine to coarse grained and fairly soft and the materials type is most likely schistose steatite but no clear signs of human working were observed.

The material is slightly reminiscent of bakestones although not as clearly foliated or as flat. Fragment 02-156 is most likely a pinkish gray, subangular steatite flake with weakly foliated texture. No clear signs of working can be seen on the fragment but the material slightly resembles the bakestone materials also found at Gásir although the color is very different and the foliation weaker. The fragment weighs 14,5 gr, is about 3,5 cm in length, 3 cm in width and 1,4 cm thick.

*Bakeplates*

The total bakeplate collection found at Gásir weighs about 2 kg and includes over 80 bakeplate fragments (see table 12 in appendix 3). However only 60 fragments were included in this report as about 20 fragments were not accessible during the analysis. Estimated volume of fragments analysed was roughly estimated to be around 1500 $cm^3$. Only weight, number and volume of bakeplate fragments analysed so far can be seen in table 1 and chart 1. Fragment size ranged from 1,2 cm up to 17 cm in length, 0,7 to 14 cm in width and from 0,2-2,8 cm in thickness. Average thickness seems to have been roughly about 6-8 mm. Most of the Gásir bakestone fragments had clear criss-cross striations on one or both sides. One fragment (03-292) had a clear borehole through it (6 mm in diameter), possibly connected to attempts to vire or tie a broken plate together.

All the larger rimfragments are most likely of the Hardanger type. Only 11 curved

rimfragments could be used to estimate possible diameter which seemed to range from at least 25 cm up to 60 cm. Three fragments could possibly be from square bake plates (03-060, 06-053, 06-164) so it is not impossible that some of the fragments could be from Shetland. However, no clear corner piece was found in the analysed collection, and average fragment thickness and clear foliation of almost all of the fragments point more to a Norwegian source.

**Unknown**

One mineral fragment could not be indentified (02-146). The fragment is grayish green and subangular without very clear crystal structure. It seems to be porous with very small and irregular pores. The fragment is about 2 cm in length, 1,8 cm in width and 1,6 cm in thickness. Type of mineral and possible source unknown (see table 8 appendix 2).

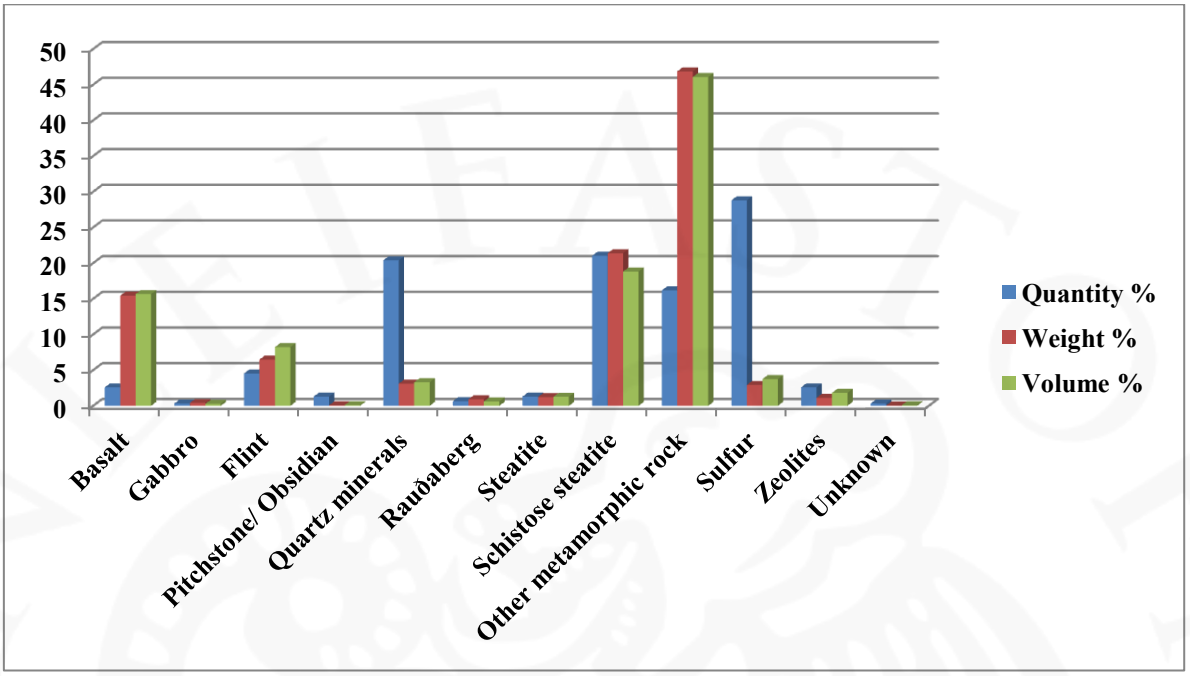
## Conclusions

About 310 stone finds and fragments (excluding whetstones) were analysed from the Gásir stone collection which together weighed about 11,2 kg. Roughly estimated volume was about 8400 $cm^3$. When we look to quantity the most common stone types were, sulfur, quartz minerals, schistose steatite, mica schists and flint but if we look at weight and volume the basalt finds and the metamorphic rocks dominate in the collection. Graphic representation of the comparisons between quantity %, weight % and volume % can be seen in chart 1. The most common material/object types were bakestones, manuports (foreign and domestic), sulfur ore and flint flakes.

*Table 1 – Material types found at Gásir and their quantity, weight and volume*

| | Quantity (psc) | % | Weight (gr) | % | Volume (cm3) | % |
|---|---|---|---|---|---|---|
| **Basalt** | 8 | 2,6 | 1723 | 15,4 | 1306 | 15,7 |
| **Gabbro** | 1 | 0,3 | 45 | 0,4 | 23 | 0,3 |
| **Flint** | 14 | 4,5 | 723,7 | 6,5 | 686 | 8,2 |
| **Pitchstone/Obsidian** | 4 | 1,3 | 8,34 | 0,1 | 8 | 0,1 |
| **Quartz minerals** | 63 | 20,4 | 346,32 | 3,1 | 276 | 3,3 |
| **Rauðaberg** | 2 | 0,6 | 102 | 0,9 | 51 | 0,6 |
| **Steatite** | 4 | 1,3 | 137 | 1,2 | 106 | 1,3 |
| **Schistose steatite** | 65 | 21,0 | 2387 | 21,4 | 1569 | 18,8 |
| **Other metamorphic rock** | 50 | 16,2 | 5231 | 46,9 | 3841 | 46,1 |
| **Sulfur** | 89 | 28,8 | 327,2 | 2,9 | 312 | 3,7 |
| **Zeolites** | 8 | 2,6 | 126 | 1,1 | 152 | 1,8 |
| **Unknown** | 1 | 0,3 | 4,5 | 0,04 | 6 | 0,1 |
| **Total:** | **309** | **100** | **11161** | **100** | **8336** | **100** |

*Chart 1 – Comparison of quantity, weight and volume % between rock types*




Distribution of find types and their total weight within contexts can be seen in table 3. They are spread out in about 160 contexts mostly with only one or two material types within each context. Very little of the material can give us dating evidence except the Hardanger bakestones which give us a time frame from the 11th-15th century and the sulfur which could possibly give us a period from the 13th to 16th century. Over 50% of the materials were domestic and just under 50% foreign materials most likely all from central and/or western Norway (metamorphic rock) and Denmark or England (flint). The Icelandic rocks were all most likely found in close proximity to Gásir or within Northern Iceland (see table 2) although a source further afield can not be completely ruled out. For a more detailed petrographic analysis of the materials destructive methods are required.

*Table 2 – Division of materials compared to the distance from their source*

| | Distance from source (km) | Material types | Quantity (%) |
|---|---|---|---|
| **Zone 1** | <30* | Close vicinity to Gásir: Quartz minerals, zeolites, basalt, gabbro | 26 |
| **Zone 2** | 30-180 | Areas within N-Iceland: Sulfur, rauðaberg, obsidian | 31 |
| **Zone 3** | 180-300 | Areas outside N-Iceland: None | 0 |
| **Zone 4** | >300 | Foreign materials: Mica schist, schistose gneiss, bakestones, steatite, flint | 43 |

* The minimal distance a horse can travel in one day (Jónas Kristjánsson, 2010)

When the domestic material collection from Gásir is compared to other sites like e.g. the farm sites of Hrísheimar and Sveigakot (Hansen, 2009; Hauptfleisch, 2009a & 2009b) and the Hofstaðir site (Lucas (ed), 2009) in the north of Iceland there is very little difference in material types. Quartz minerals and basalts were the most common materials and very few materials could not potentially be found within zones 1 and/or 2. One exception to this was sulfur. It is interesting to note that while only 1 fragment of sulfur seems to have been found in the Hofstaðir, Hrísheimar and Sveigakot sites combined about 90 fragments were found in Gásir.

If we look at the percentage of domestic material compared to foreign material, it is clear that domestic material seems to be more common (~70% on average) at Hofstaðir, Sveigakot and Hrísheimar while at Gásir it was just under 50% (whetstones included, see Hansen, 2010). The most common foreign materials found at Hrísheimar, Sveigakot and Hofstaðir were flint fragments, whetstones and steatite. The collection at Gásir seems to be fairly similar in that respect with the exception that it also contains one large flint nodule which has only been partially broken into smaller pieces along with large amounts of bakestone fragments and unworked metamorphic rocks which could possibly have been used as ballast.

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# *Appendices*

## *Appendix 1*

*Table 3 – Context numbers and find types*

| Context | Finds numbers | Baking plates (gr) | Icelandic manuports (gr) | Flint (gr) | Sulfur (gr) | Schist/ Gneiss (gr) | Vessels (gr) | Hammer (gr) | Quern (gr) | Weights (gr) | Other (gr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **N/A** | 03-069, 06-018 | x | | 4 | | | | | | | |
| **C3** | 03-292 | 28,5 | | | | 0,5 | | | | | |
| **4E** | 01-011 | | | | | | 12 | | | | |
| **SF2** | 02-127 | | | | | | | | | | 45 |
| **001** | 02-113, 02-114, 02-133, 02-134, 02-145, 02-146, 02-147, 02-148, 02-149, 06-114, 06-162 | 178,7 | 71,5 | 0,5 | 19 | 814 | | | 202 | | 11 |
| **100** | 01-002 | | 13 | | | | | | | | |
| **101** | 03-057, 03-058, 03-059, 03-060, 03-073, 03-098 | x+263 | | | 26 | 334 | | | | | |
| **223** | 02-128, 02-135, 02-150 | | 22 | | 3,5 | 235 | | | | | |
| **229** | 02-152 | | | | | 28 | | | | | |
| **235** | 02-115 | 33 | | | | | | | | | |
| **236** | 02-153 | | | | | 5 | | | | | |
| **238** | 02-154 | | 2 | | | | | | | | |
| **243** | 02-116 | 29 | | | | | | | | | |
| **256** | 02-129, 02-136 | | 19 | | 10 | | | | | | |
| **260** | 02-156 | 14,5 | | | | | | | | | |
| **266** | 02-117 | 35,5 | | | | | | | | | |
| **268** | 02-157 | | 2 | | | | | | | | |
| **270** | 02-159 | | | | | 22 | | | | | |
| **271** | 02-137 | | | | 129 | | | | | | |
| **278** | 02-130 | | 13 | | | | | | | | |
| **282** | 02-160 | | 20 | | | | | | | | |
| **283** | 02-131, 02-138 | | 3 | | 15 | | | | | | |
| **312** | 02-132 | | | | | | | | | | 303 |
| **317** | 02-118 | 0,5 | | | | | | | | | |
| **350** | 02-139, 02-162 | | | | 2,5 | 44 | | | | | |
| **353** | 02-140 | | | | 12 | | | | | | |
| **356** | 02-163, 02-164, 02-165 | | | | | 947 | | | | | |
| **357** | 02-119, 02-144, 02-166 | 14,5 | 8 | | | | | | | | |
| **359** | 02-167 | | | 4,5 | | | | | | | |
| **366** | 02-168 | | | | | 702 | | | | | |
| **372** | 02-169 | | 2 | | | | | | | | |
| **374** | 02-120, 02-141 | 14,5 | | | 9,5 | | | | | | |
| **377** | 02-170 | | | | | 3 | | | | | |
| **394** | 02-142 | | | | 0,5 | | | | | | |
| **399** | 02-121 | 6 | | | | | | | | | |
| **407** | 02-171 | | 2 | | | | | | | | |
| **410** | 02-172 | | 8 | | | | | | | | |
| **452** | 02-173 | | 12 | | | | | | | | |
| **486** | 02-174 | | | | | 1437 | | | | | |
| **497** | 02-176 | | 8 | | | | | | | | |
| **525** | 03-099 | | | | 3 | | | | | | |
| **529** | 03-116 | | 477 | | | | | | | | |
| **531** | 03-210 | | | | | 3 | | | | | |
| **533** | 03-061 | 15 | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **556** | 03-100 | | | | 0,5 | | | | | | |
| **559** | 03-062 | x | | | | | | | | | |
| **568** | 03-101 | | | | 3 | | | | | | |
| **585** | 03-102 | | | | 0,5 | | | | | | |
| **586** | 03-103 | | | | 0,5 | | | | | | |
| **625** | 03-104, 03-105 | | | | 6 | | | | | | |
| **634** | 03-055, 03-070 | | 0,5 | 3 | | | | | | | |
| **639** | 03-075 | | 37 | | | | | | | | |
| **642** | 03-068 | | 7 | | | | | | | | |
| **652** | 03-076 | | 4 | | | | | | | | |
| **655** | 03-106 | | | | 1 | | | | | | |
| **660** | 03-078 | | 1 | | | | | | | | |
| **669** | 03-079 | | | | | 15 | | | | | |
| **671** | 03-107 | | | | 3 | | | | | | |
| **674** | 03-077 | | 8 | | | | | | | | |
| **683** | 03-108 | | | | 0,5 | | | | | | |
| **684** | 03-109 | | | | 0,5 | | | | | | |
| **686** | 03-071 | | | 9 | | | | | | | |
| **688** | 03-110 | | | | 0,2 | | | | | | |
| **697** | 03-081 | | | | | 7 | | | | | |
| **698** | 03-111 | | | | 0,5 | | | | | | |
| **701** | 03-082 | | | | | 72 | | | | | |
| **706** | 03-112 | | | | 5 | | | | | | |
| **727** | 03-207 | 19 | | | | | | | | | |
| **733** | 03-084 | | 4 | | | | | | | | |
| **746** | 03-085, 03-086 | | 1 | | | 31 | | | | | |
| **756** | 03-063 | 45 | | | | | | | | | |
| **757** | 03-087, 03-113 | | 1 | | 0,5 | | | | | | |
| **765** | 03-088 | | 1 | | | | | | | | |
| **768** | 03-089 | | 7 | | | | | | | | |
| **779** | 03-090, 03-091, 03-114 | | 1,5 | | 4 | | | | | | |
| **792** | 03-067 | | | | | | 18 | | | | |
| **794** | 03-054 | | 0,5 | | | | | | | | |
| **838** | 03-064 | 4 | | | | | | | | | |
| **845** | 03-093 | | | | | 12 | | | | | |
| **846** | 03-065 | 21 | | | | | | | | | |
| **915** | 03-066 | x | | | | | | | | | |
| **953** | 03-096 | | | | | | | | | 5 | |
| **963** | 03-097, 03-115 | | | | 0,2 | | | | | | 91 |
| **1159** | 04-221 | | 3 | | | | | | | | |
| **1175** | 04-005 | | | | | | | | | 88 | |
| **1275** | 04-214 | | | 5,26 | | | | | | | |
| **1376** | 04-225 | | | | 0,97 | | | | | | |
| **1396** | 04-220 | | 56 | | | | | | | | |
| **1453** | 04-211 | | | 25,48 | | | | | | | |
| **1465** | 04-222 | | 9 | | | | | | | | |
| **1498** | 04-226 | | | | 0,42 | | | | | | |
| **1501** | 04-224 | | 2 | | | | | | | | |
| **1542** | 04-203 | 36,1 | | | | | | | | | |
| **1551** | 04-213 | | | 3,06 | | | | | | | |
| **1563** | 04-204 | 32,9 | | | | | | | | | |
| **1591** | 04-217 | | 0,34 | | | | | | | | |
| **1622** | 04-212 | | | 29,63 | | | | | | | |
| **1671** | 04-215 | | | 6,49 | | | | | | | |
| **1676** | 04-218 | | 1,91 | | | | | | | | |
| **1678** | 04-210 | 1,9 | | | | | | | | | |
| **1693** | 04-227 | | | | 0,87 | | | | | | |
| **1696** | 04-216 | 2,6 | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1727** | 04-223 | | 6,4 | | | | | | | | |
| **1795** | 05-198 | | | | 1 | | | | | | |
| **1817** | 05-078 | | | | 1,8 | | | | | | |
| **1829** | 05-003 | 110,5 | | | | | | | | | |
| **1876** | 05-067 | | | | | 1 | | | | | |
| **1878** | 05-005 | 65,7 | | | | | | | | | |
| **1886** | 05-073 | | | | 2,4 | | | | | | |
| **1911** | 05-201 | | 3 | | | | | | | | |
| **1948** | 05-011, 05-061 | 118,7 | | | | | | | | | |
| **1978** | 05-012, 05-049 | 299,4 | | | | | | | | | |
| **1989** | 05-074 | | | | 33 | | | | | | |
| **2008** | 05-019 | | 1 | | | | | | | | |
| **2050** | 05-071 | | | | | 25,2 | | | | | |
| **2059** | 05-202 | | 5 | | | | | | | | |
| **2076** | 05-068 | | | | | 49,7 | | | | | |
| **2147** | 05-026 | | 0,5 | | | | | | | | |
| **2151** | 05-075 | | | | 1,2 | | | | | | |
| **2177** | 05-027 | 4,4 | | | | | | | | | |
| **2183** | 05-028 | 26,5 | | | | | | | | | |
| **2187** | 05-033 | x | | | | | | | | | |
| **2220** | 05-076 | | | | 0,7 | | | | | | |
| **2237** | 05-203, 05-077 | | 11 | | 4,5 | | | | | | |
| **2256** | 05-072 | | 0,7 | | | | | | | | |
| **2347** | 05-062 | | 1 | | | | | | | | |
| **2354** | 05-059 | | | | | | | 960 | | | |
| **2363** | 05-066 | | 37 | | | | | | | | |
| **2373** | 05-065 | | 31 | | | | | | | | |
| **2374** | 05-063 | | | 7,9 | | | | | | | |
| **2443** | 06-128 | | 2 | | | | | | | | |
| **2453** | 06-126, 06-132 | | 4 | | | 12,5 | | | | | |
| **2456** | 06-006 | | | | | 1,8 | | | | | |
| **2467** | 06-120 | | 1 | | | | | | | | |
| **2471** | 06-127 | | 4 | | | | | | | | |
| **2477** | 06-130 | | 1,2 | | | | | | | | |
| **2485** | 06-161 | | | | | 382,4 | | | | | |
| **2517** | 06-138 | | 70,1 | | | | | | | | |
| **2564** | 06-020 | 1,3 | | | | | | | | | |
| **2593** | 06-025 | | 6 | | | | | | | | |
| **2595** | 06-129 | | 1 | | | | | | | | |
| **2606** | 06-027 | 129,7 | | | | | | | | | |
| **2626** | 06-029 | 9,9 | | | | | | | | | |
| **2634** | 06-180, 06-181 | | 11 | | | | | | | | |
| **2638** | 06-131 | | | | | 6,8 | | | | | |
| **2645** | 06-123 | | 1 | | | | | | | | |
| **2649** | 06-037 | 11,6 | | | | | | | | | |
| **2664** | 06-040 | 2,7 | | | | | | | | | |
| **2714** | 06-050 | 78 | | | | | | | | | |
| **2724** | 06-053, 06-134, 06-137, 06-142 | 70,8 | | 622,3 | | | | | | | |
| **2751** | 06-125 | | | | 2,1 | | | | | | |
| **2774** | 06-122 | | 1 | | | | | | | | |
| **2783** | 06-135 | | | 2,1 | | | | | | | |
| **2813** | 06-076 | 40,8 | | | | | | | | | |
| **2816** | 06-077 | | | | 25,3 | | | | | | |
| **2856** | 06-093 | | 0,2 | | | | | | | | |
| **2862** | 06-097 | | 2 | | | | | | | | |
| **2946** | 06-112 | 9,1 | | | | | | | | | |
| **5135** | 06-5110 | | | | | 311,7 | | | | | |
| **5149** | 06-5118 | | 13 | | | | | | | | |
| **5206** | 06-5142 | 129,5 | | | | | | | | | |
| **5227** | 06-5156, 06-5157 | 19,3 | 5 | | | | | | | | |
| | **Total:** | **1660,1** | **1047,4** | **723,2** | **330,2** | **5502,6** | **30,0** | **960,0** | **202,0** | **93,0** | **450,0** |

## *Appendix 2 – Icelandic rock types*

*Table 4 - Basalt*

| Finds No | Context | Site no. | Object Type | Material | Stone Type | Descriptions | Qnt | Weight (gr) | Volume (cm3) |
|---|---|---|---|---|---|---|---|---|---|
| **02-133** | 001 | GAS02 | Quernstone rim fragment | Igneous Rock | Basalt, vesicular, feldspar | Gray, vesicular, transluscent tiny feldspar phenocrysts (<1mm) give the rock a glittery aspect, vesicles fairly small (<0,5 cm) but abundant, quern was at least 4,7 cm thick, only rim, smooth and curved, possibly worked, if the fragment is from a quern the original stone was most likely between 40 and 50 cm in diameter | 1 | 202,0 | 175,7 |
| **02-148** | 001 | GAS02 | Manuport | Igneous Rock | Basalt | Igneous rock - Very dark gray, fine grained matrix, partial redish brown weathering coat, one or two large possible olivine phenocrysts, subangular, basalt hugsanlega úr móbergskarga (Kristján) | 1 | 34,0 | 32,7 |
| **02-148** | 001 | GAS02 | Manuport | Igneous Rock | Basalt, feldspar | Igneous rock - Very dark gray thin flake, fine grained matrix, one or two small transluscent phenocrysts, most likely feldspar, one side smooth possibly due to water erosion, faint redish haze on smooth side, fire cracked? | 1 | 27,0 | 24,3 |
| **03-096** | 953 | GAS03 | Weight? | Igneous Rock | Basalt? | Brownish gray in color, weathering coat, circular hole about 2-5 mm in diameter through roughly the center of the stone, most likely a partial natural vesicle, stone is fine grained, vesicular, vesicles moderate, <5 mm in diameter, most likely basalt but hard to tell without damaging the object | 1 | 5,0 | 5,4 |
| **03-116** | 529 | GAS03 | Manuport | Igneous Rock | Basalt | Dark gray, massive, no clear phenocrysts or vesicles, broken in half, partially subrounded most likely due to water erosion, yellowy brown residue on the outside of stone, possibly sulfur, faint soot on outside could indicate fire cracking | 1 | 477,0 | 349,6 |
| **05-059** | 2354 | GAS05 | Hammer | Igneous Rock | Basalt, phenocrysts | Dark gray, tiny feldspar phenocrysts, tiny vesicles rare, natural hole through stone, 3-3,5 cm in diameter, subrounded, most likely due to water erosion (or wear?), diameter of hammer ~14 cm | 1 | 960,0 | 684,5 |
| **05-065** | 2373 | GAS05 | Manuport | Igneous Rock | Basalt | Dark gray, subrounded to rounded due to water erosion, three or four small vesicles <3 mm in diameter, otherwise massive and fine grained | 1 | 8,0 | 6,1 |
| **06-180** | 2634 | GAS06_ Kirkja | Manuport | Igneous Rock | Basalt scoria | Igneous rock - Dark gray to redish gray, frothy, highly vesicular, vesicles fairly small, low density, does not fracture easily, most likely basalt scoria, previously identified as slag | 1 | 10,0 | 27,9 |
| | | | | | | | 8 | 1723 | 1306 |

*Table 5 – Quartz minerals*

| Finds No | Con-text | Site no. | Object Type | Material | Stone Type | Descriptions | Qnt. | Weight (gr) | Volume (cm3) |
|---|---|---|---|---|---|---|---|---|---|
| **02-128** | 223 | GAS02 | Manuport | Mineral | Onyx | Mineral - brownish gray, weakly transluscent, clear dark and light horizontal banding, does not yield to knife, amygdale, outer surface irregular, pitted and subangular, one side however very flat where the stone has fragmented between bands | 1 | 22 | 21 |
| **02-129** | 256 | GAS02 | Manuport | Mineral | Onyx | Mineral - Clear horizontal gray and white banding, transluscent, does not yield to knife, amygdale, subangular | 1 | 19 | 15 |
| **02-130** | 278 | GAS02 | Manuport | Mineral | Onyx | Mineral - Clear horizontal gray and white banding, does not yield to knife, amygdale, subangular, one edge subrounded most likely due to water erosion | 1 | 13 | 12 |
| **02-131** | 283 | GAS02 | Manuport | Mineral | Onyx | Mineral - Clear horizontal gray and white banding, does not yield to knife, angular, flat stone | 1 | 3 | 1 |
| **02-144** | 357 | GAS02 | Manuport | Mineral | Chalcedony | Mineral - Bottle green to black, does not yield to knife, weakly transluscent, clearly formed gradually in void, smooth to mildly knotty outer surface, quartz mineral, possible mammillary habit of chalcedony in center, amygdale | 1 | 7 | 4 |
| **02-147** | 001 | GAS02 | Manuport | Mineral | Quartz | Mineral - Light yellowy brown, very weakly transluscent to opaque, rounded most likely due to water erosion, does not yield to knife, no distinguishing features | 1 | 6 | 3 |
| **02-154** | 238 | GAS02 | Manuport | Mineral | Quartz | Mineral - Brownish yellow with tiny redish yellow clusters of circles on surface, rounded due to water erosion, weakly transluscent, does not yield to knife, circles possibly remains of mammilary habit of chalcedony | 1 | 2 | 1 |
| **02-157** | 268 | GAS02 | Manuport | Mineral | Quartz, onyx? | Mineral - Rounded most likely due to water erosion, white to whitish gray, possibly very faint dark and light parallel layers of onyx visible inside pebble, does not yield to knife, no sharp edges to scratch glass | 1 | 2 | 1 |
| **02-166** | 357 | GAS02 | Manuport | Mineral | Quartz | Mineral - Transluscent, yellowy light gray, rounded most likely due to water erosion, glassy lustre, does not yield to knife, no edges to scratch glass, quartz mineral, no diagnostic features | 1 | 1 | 0,4 |
| **02-171** | 407 | GAS02 | Manuport | Mineral | Quartz | Mineral - Yellowy light gray, glassy lustre, transluscent, rounded due to water erosion, does not yield to knife, no diagnostic features | 1 | 2 | 1 |
| **02-173** | 452 | GAS02 | Manuport | Mineral | Onyx | Mineral - Light gray to white, clear horizontal layering on smaller fragment, faint layering on larger one, do not yield to knife, subangular | 2 | 10 | 3 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **02-173** | 452 | GAS02 | Manuport | Mineral | Quartz, rounded | Mineral - Brownish gray to yellowy white, rounded due to water erosion, no distinguishing features, do not yield to knife, opaque to weakly tranluscent | 2 | 1 | 1 |
| **02-173** | 452 | GAS02 | Manuport | Mineral | Quartz, subangular | Mineral - White, subangular, amygdale, no distinguishing features, does not yield to knife, weakly transluscent | 1 | 1 | 1 |
| **03-055** | 634 | GÁS03 | Manuport | Mineral | Opal? | Mineral - Gray, transluscent, subangular, possibly waterworn, does not yield to knife, chipped, | 1 | 0,5 | 0,5 |
| **03-075** | 639 | GAS03 | Manuport | Mineral | Onyx | Mineral - White to transluscent gray, clear parallel horizontal banding, dark and light bands, one side fairly flat where onyx has fractured, other side rough irregular side of amygdale, white banding opal? does not yield to knife, scratches glass, could be mildly water worn | 1 | 37 | 30 |
| **03-076** | 652 | GAS03 | Manuport | Mineral | Onyx | Mineral - White to transluscent gray, clear parallel horizontal banding, dark and light bands, angular, edges blunt, rough outer surface of amygdale, does not yield to knife, scratches glass | 1 | 4 | 3 |
| **03-077** | 674 | GAS03 | Manuport | Mineral | Agate | Mineral - Brownish gray, rounded due to water erosion, clear parallel but wavy banding, transluscent, does not yield to knife | 1 | 1 | 1 |
| **03-077** | 674 | GAS03 | Manuport | Mineral | Onyx | Mineral - White and gray, clear horizontal banding, does not yield to knife, angular | 1 | 5 | 5 |
| **03-077** | 674 | GAS03 | Manuport | Mineral | Quartz | Mineral - Brownish gray, transluscent, rounded due to water erosion, do not yield to knife | 2 | 2 | 1 |
| **03-078** | 660 | GAS03 | Manuport | Mineral | Onyx | Mineral - Grayish white, faint horizontal parallel banding, rounded due to water erosion, does not yield to knife | 1 | 1 | 1 |
| **03-084** | 733 | GAS03 | Manuport | Mineral | Jasper, red | Mineral - red, angular, gray quartz bands, possibly water worn, no sharp edges, does not yield to knife | 1 | 4 | 4 |
| **03-086** | 746 | GAS03 | Manuport | Mineral | Quartz | Mineral - Transluscent whitish to brownish gray, subrounded to rounded, glassy lustre, no other clear diagnostic features, do not yield to knife, drop like | 2 | 1 | 1 |
| **03-087** | 757 | GAS03 | Manuport | Mineral | Quartz | Mineral - Grayish white, rounded due to water erosion, does not yield to knife, no distinct features, partially transluscent | 1 | 1 | 1 |
| **03-088** | 765 | GAS03 | Manuport | Mineral | Quartz | Mineral - white to gray, transluscent, rounded due to water erosion, does not yield to knife, no other distinctive features | 1 | 1 | 2 |
| **03-089** | 768 | GAS03 | Manuport | Mineral | Onyx | Mineral - white, residue of green mineral on one flat side, clear gray and white horizontal banding, green mineral yields to knife but not fingernail, possibly remains of parent rock? Claystone? | 1 | 7 | 5 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **03-090** | 779 | GAS03 | Manuport | Mineral | Quartz | Mineral - Transluscent brownish gray, waterworn, subrounded, pitted surface, glassy lustre, does not yield to knife, no signs of grooves or holes | 1 | 1 | 1 |
| **04-218** | 1676 | GAS04 | Manuport | Mineral | Opal, green | Mineral - Green, very faint dark and light banding, yields to knife, not to fingernail, subangular due to water erosion, irregular fracture, dull glassy lustre, most likely green opal | 1 | 1,91 | 2 |
| **04-220** | 1396 | GAS04 | Manuport | Mineral | Onyx | Mineral - transluscent, grayish white, does not yield to knife, glassy lustre, upper and lower surface very flat, suggests onyx, edges are rough and pitted and subangular to subrounded most likely due to water erosion, amygdale | 1 | 56 | 39 |
| **04-221** | 1159 | GAS04 | Manuport | Mineral | Onyx | Mineral - White to gray, transluscent, clear parallel banding, white and gray, flat upper and lower surface, does not yield to knife | 1 | 3 | 5 |
| **04-222** | 1465 | GAS04 | Manuport | Mineral | Onyx | Mineral - Transluscent, brownish gray, flat top and bottom, faint banding visible in light, does not yield to knife, subrounded most likely due to water erosion, | 1 | 9 | 6 |
| **04-223** | 1727 | GAS04 | Manuport | Mineral | Opal, white and light green | Mineral - White to pale green, subrounded to subangular most likely due to water erosion, yields weakly to knife, faint glassy lustre, banding, clear color distinction in banding, most likely opal | 1 | 6,4 | 7 |
| **04-224** | 1501 | GAS04 | Manuport | Mineral | Quartz, milky | Mineral - transluscent, grayish white, round, does not yield to knife, weak glassy lustre | 1 | 2 | 1 |
| **05-019** | 2008 | GAS05 | Manuport | Mineral | Quartz | Mineral - Gray, transluscent, does not yield to knife, rounded most likely due to water erosion, no other distinguishing features, most likely quartz | 1 | 1 | 0,4 |
| **05-026** | 2147 | GAS05 | Manuport | Mineral | Opal? | Mineral - Dark brownish gray, transluscent, subrounded most likely due to water erosion, does not yield to knife, kristalfletir?, faint glassy lustre, edges too rounded to scratch glass | 1 | 0,5 | 0,4 |
| **05-062** | 2347 | GAS05 | Manuport | Mineral | Jasper, green | Mineral - Green, mottled with faint dark flecks, subangular, does not yield to knife, scratches glass faintly, weak greasy lustre, opaque, most likely jasper | 1 | 1 | 1 |
| **05-065** | 2373 | GAS05 | Manuport | Mineral | Agate | Faint dark and light banding around a center of quartz crystals, glassy lustre, subangular most likely due to water erosion, transluscent, quartz, most likely agate | 1 | 9 | 8 |
| **05-065** | 2373 | GAS05 | Manuport | Mineral | Quartz, milky | Mineral - Brownish white, subangular to subrounded most likely due to water erosion, no lustre, do not yield to knife, to rounded to scratch glass, no other distinguishing features | 2 | 14 | 9 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **05-066** | 2363 | GAS05 | Manuport | Mineral | Onyx | Mineral - Broken in flakes, very rounded, clear dark and light horizontal banding, fractures into flat flakes, transluscent, gray to white | 1 | 37 | 30 |
| **05-072** | 2256 | GAS05 | Manuport | Mineral | Opal? | Transluscent, gray to dark gray, subangular, worn chipped edges and sides, faint glassy lustre, does not yield to knife, scratches glass faintly, | 1 | 0,7 | 0,7 |
| **05-201** | 1911 | GAS05 | Bead? | Mineral | Quartz | Mineral - Whitish gray to white, subrounded due to water erosion, very faint possible dark and light banding, not horizontal, possibly around a center? Or maybe inner fracture? Glassy lustre, three small holes in surface, two almost directly against each other on each end, one more hole on third side almost directly in between the other two, could be possible attemt at making a bead? < 2mm in diameter and depth, does not yield to knife | 1 | 3 | 2 |
| **05-202** | 2059 | GAS05 | Manuport | Mineral | Onyx | Mineral - Grayish and yellowy white light and dark banding, horizonal and parallel, does not yield to knife, subrounded most likely due to water erosion, one side flat | 1 | 5 | 3 |
| **05-203** | 2237 | GAS05 | Manuport | Mineral | Onyx | Mineral - Grayish to milky white, transluscent, clear dark and light parallel banding, horizontal, subangular most likely due to water erosion | 2 | 11 | 10 |
| **06-025** | 2593 | GAS06 | Manuport | Mineral | Quartz | Mineral - Gray to white and transluscent, subangular, does not yield to knife, could possibly be chalcedony but no unambiguous features | 1 | 6 | 4 |
| **06-093** | 2856 | GAS06 | Manuport | Mineral | Quartz | Tiny round pebble, waterworn, yellowy white to orange red, circular patterns, glassy lustre, no clear boring or holes, most likely quartz | 1 | 0,20 | 0,2 |
| **06-097** | 2862 | GAS06 | Manuport | Mineral | Quartz | Mineral - Yellowy gray and grayish white, mottled, glassy lustre, subrounded, waterworn, does not yield to knife, no other clear diagnostic features | 1 | 2 | 1 |
| **06-120** | 2467 | GAS06 | Manuport | Mineral | Quartz | Mineral - Grayish white, transluscent, subrounded, glassy lustre, waterworn, does not yield to knife | 1 | 1 | 1 |
| **06-122** | 2774 | GAS06 | Manuport | Mineral | Quartz | Mineral - Whitish gray to white, subrounded due to water erosion, very faint possible dark and light banding, not horizontal, glassy lustre, transluscent, does not yield to knife, agate? Onyx? | 1 | 1 | 0,4 |
| **06-123** | 2645 | GAS06 | Flake | Mineral | Jasper, caramel | Mineral? - Caramel brown, sharp edges, concoidal fracture, does not yield to knife, greasy to faint glassy lustre, scratches glass, most likely jasper, but could also be flint | 1 | 1 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **06-127** | 2471 | GAS06 | Manuport | Mineral | Quartz | Mineral - Gray, transluscent, do not yield to knife, one fragment has pitted surface of amygdale, possibly water worn, subangular to angular | 2 | 4 | 3 |
| **06-128** | 2443 | GAS06 | Manuport | Mineral | Quartz | Mineral - Yellowy white, subangular, waterworn, pitted surface of amygdale, weakly transluscent, does not yield to knife | 1 | 2 | 2 |
| **06-129** | 2595 | GAS06 | Manuport | Mineral | Quartz | Mineral - transluscent gray to white, partially smooth outer surface, broken, does not yield to knife, faint glassy lustre, scratches glass, looks like a broken blade, thin towards the sides thick towards the middle, broken at the ends | 1 | 1 | 1 |
| **06-130** | 2477 | GAS06 | Manuport | Mineral | Opal? | Mineral - Dark gray, transluscent, subangular, does not yield to knife, chipped, waterworn, weak glassy lustre | 1 | 1,2 | 1 |
| **06-132** | 2453 | GAS06 | Manuport | Mineral | Quartz | Mineral - Whitish gray, transluscent, pitted rough surface of amygdale, does not yield to knife, glassy lustre, subangular, possibly waterworn, small quartz crystals in cavity along with possible smoky quartz | 1 | 4 | 4 |
| **06-181** | 2634 | GAS06_ Kirkja | Manuport | Mineral | Quartz | Mineral - Whitish gray, subrounded most likely due to water erosion, weakly transluscent, does not yield to knife, no other diagnostic features | 1 | 1 | 1 |
| **06-5118** | 5149 | GAS06 | Manuport | Mineral | Quartz | Mineral - Gray, transluscent, does not yield to knife, subrounded, no other distinguishing features, most likely quartz amygdale | 1 | 5 | 4 |
| **06-5118** | 5149 | GAS06 | Manuport | Mineral | Opal, green | Mineral - Bluish dark green, sharp edges, yields to knife, weak glassy lustre, concoidal fractures, angular to subangular | 1 | 8 | 8 |
| | | | | | | | 63 | 347 | 275 |

*Table 6 – Sulfur*

| Finds No | Context | Site no. | Object Type | Material | Stone Type | Descriptions | Qua. | Weight (gr) | Volume (cm3) |
|---|---|---|---|---|---|---|---|---|---|
| **02-134** | 001 | GAS02 | Ore, mineral | Mineral | Sulfur | Not analysed by SGB | 7 | 19,0 | |
| **02-135** | 223 | GAS02 | Ore, mineral | Mineral | Sulfur | Mineral - bright yellow, coarse grained, crumbly, distinct smell | 1 | 3,5 | 3 |
| **02-136** | 256 | GAS02 | Ore, mineral | Mineral | Sulfur | Mineral - bright yellow, coarse grained, crumbly, distinct smell | 2 | 10,0 | 7 |
| **02-137** | 271 | GAS02 | Ore, mineral | Mineral | Sulfur | Not analysed by SGB | 1 | 129,0 | |
| **02-138** | 283 | GAS02 | Ore, mineral | Mineral | Sulfur | Mineral - bright yellow, coarse grained, crumbly, distinct smell | 5 | 15,0 | 33 |
| **02-139** | 350 | GAS02 | Ore, mineral | Mineral | Sulfur | Mineral - bright yellow, coarse grained, crumbly, distinct smell | 1 | 2,5 | 2 |
| **02-140** | 353 | GAS02 | Ore, mineral | Mineral | Sulfur | Mineral - 16 fragments+small grains, bright yellow, coarse grained, crumbly, distinct smell | 16 | 12,0 | 29 |
| **02-141** | 374 | GAS02 | Ore, mineral | Mineral | Sulfur | Mineral - bright yellow, coarse grained, crumbly, distinct smell | 2 | 6,5 | 7 |
| **02-142** | 394 | GAS02 | Ore, mineral | Mineral | Sulfur | Mineral - bright yellow, coarse grained, crumbly, distinct smell | 2 | 0,5 | 1 |
| **03-098** | 101 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 3 | 26,0 | 47 |
| **03-099** | 525 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 1 | 3,0 | 5 |
| **03-100** | 556 | GAS03 | Ore, mineral | Mineral | Sulfur | Gray to very pale yellow, faint distinct smell, glassy lustre, coarse grained | 1 | 0,5 | 1 |
| **03-101** | 568 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 3 | 3,0 | 4 |
| **03-102** | 585 | GAS03 | Ore, mineral | Mineral | Sulfur | Pale yellow, coarse grained, crumbly, distinct smell, glassy lustre | 1 | 0,5 | 1 |
| **03-103** | 586 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 4 | 0,5 | 0,4 |
| **03-104** | 625 | GAS03 | Ore, mineral | Mineral | Sulfur | Brownish yellow, coarse grained, crumbly, distinct smell | 1 | 5,0 | 7 |
| **03-105** | 625 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 2 | 1,0 | 3 |
| **03-106** | 655 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 1 | 1,0 | 4 |
| **03-107** | 671 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 2 | 3,0 | 5 |
| **03-108** | 683 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 1 | 0,5 | 1 |
| **03-109** | 684 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 1 | 0,5 | 1 |
| **03-110** | 688 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 1 | 0,2 | 0,4 |
| **03-111** | 698 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 1 | 0,5 | 2 |
| **03-112** | 706 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 1 | 5,0 | 11 |
| **03-113** | 757 | GAS03 | Ore, mineral | Mineral | Sulfur | Yellow, very dirty, coarse grained, crumbly, distinct smell | 2 | 0,5 | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **03-114** | 779 | GAS03 | Ore, mineral | Mineral | Sulfur | Gray to bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 5 | 4,0 | 9 |
| **03-115** | 963 | GAS03 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, crumbly, distinct smell, glassy lustre | 1 | 0,2 | 0,5 |
| **04-225** | 1376 | GAS04 | Ore, mineral | Mineral | Sulfur | Bright yellow to brown, coarse grained, very faint smell, crumbly | 1 | 1,0 | 2 |
| **04-226** | 1498 | GAS04 | Ore, mineral | Mineral | Sulfur | Pale yellowy white, coarse grained, faint distinctive smell | 1 | 0,4 | 1 |
| **04-227** | 1693 | GAS04 | Ore, mineral | Mineral | Sulfur | Bright yellow, coarse grained, very faint smell, crumbly | 1 | 0,9 | 2 |
| **05-073** | 1886 | GAS05 | Ore, mineral | Mineral | Sulfur | Mineral - bright yellow, coarse grained, crumbly, distinct smell | 1 | 2,4 | 4 |
| **05-074** | 1989 | GAS05 | Ore, mineral | Mineral | Sulfur | Mineral - White to bright yellow, glassy lustre, coarse grained, crumbly, faint distinct smell | 2 | 33,0 | 62 |
| **05-075** | 2151 | GAS05 | Ore, mineral | Mineral | Sulfur | Mineral - Transluscent to bright yellow, coarse grained, crumbly, distinct smell | 2 | 1,2 | 2 |
| **05-076** | 2220 | GAS05 | Ore, mineral | Mineral | Sulfur | Mineral - bright yellow, coarse grained, crumbly, distinct smell | 1 | 0,7 | 1 |
| **05-077** | 2237 | GAS05 | Ore, mineral | Mineral | Sulfur | Mineral - Yellow, coarse grained, dirty, faint glassy lustre, distinct smell, now 6 fragments and many smaller fragments | 6 | 4,5 | 5 |
| **05-078** | 1817 | GAS05 | Ore, mineral | Mineral | Sulfur | Mineral - Yellow, coarse grained, faint glassy lustre, distinct smell | 1 | 1,8 | 3 |
| **05-198** | 1795 | GAS05 | Ore, mineral | Mineral | Sulfur | Mineral - Bright yellow, glassy lustre, crumbly, coarse grained, distinct smell | 1 | 1,0 | 1 |
| **06-077** | 2816 | GAS06 | Ore, mineral | Mineral | Sulfur | Lump of grayish soil laced with yellow sulfur, massive, crumbly | 1 | 25,3 | 42 |
| **06-125** | 2751 | GAS06 | Sulphur | Mineral | Sulfur | Two larger lumps and small fragments of yellow sulfur | 2 | 2,1 | 1 |
| | | | | | | | 89 | 327 | 312 |

*Table 7 - Zeolites*

| Finds No | Contex | Site no. | Object Type | Material | Stone Type | Descriptions | Qnt. | Weight (gr) | Volume ($cm^3$) |
|---|---|---|---|---|---|---|---|---|---|
| **01-002** | 100 | GAS01 | Manuport | Mineral | Zeolite | Mineral - White, opaque, yields to knife, clear crystal structure, at least five clusters, each a mass of parallel thin needles radiating from one common source, clusters growing against and into one another, most likely scolecite or mesolite | 1 | 13 | 16 |
| **02-160** | 282 | GAS02 | Manuport | Mineral | Zeolite | Mineral - White, opaque, yields to knife, clear crystal structure, at least seven or eight clusters, each a mass of parallel thin needles radiating from one common source, clusters growing against and into one another, most likely scolecite or mesolite, rough outer surface of amygdale, subangular | 1 | 20,0 | 37 |
| **02-169** | 372 | GAS02 | Manuport | Mineral | Zeolite | Mineral - Yellow, surface yields weakly to knife, rounded due to water erosion, no diagnostic features, most likely zeolite | 1 | 2,0 | 1 |
| **02-172** | 410 | GAS02 | Manuport | Mineral | Zeolite | Mineral - Yellowy white, subrounded most likely due to water erosion, no clear crystal structure, no lustre, yield to knife, not fingernail, very weakly to steel coin, most likely zeolites | 2 | 8,0 | 3 |
| **02-176** | 497 | GAS02 | Manuport | Mineral | Zeolite | Mineral - White, no lustre, clear crystal structure, yields to knife, banded, white and whitish gray banding in radiating crystal clusters, clusters growing against and into one another, crystals in clusters radiating from one source, zeolite, most likely scolecite or mesolite | 1 | 8,0 | 13 |
| **06-138** | 2517 | GAS06_ Kirkja | Manuport | Mineral | Zeolite | Mineral - White to yellowy white, a sandwich of zeolite clusters, thin prismatic crystals growing out/radiating from one shared center, many clusters growing together and side by side, two rows growing against each other making a sandwich with a void between, most likely formed in a crack/dike, yields to knife, most likely scolecite or mesolite, basalt inclusions, amygdale | 1 | 70,1 | 75 |
| **06-5157** | 5227 | GAS06 | Manuport | Mineral | Zeolite | Mineral - White, yields very easily to knife and to fingernail, thin prismatic crystals radiating from one common sources, at least three clusters growing together and up against each other, very weak glassy lustre, otherwise matt, most likely scolecite or mesolite | 1 | 5 | 8 |
| | | | | | | | 8 | 126 | 152 |

*Table 8 – Other Icelandic stone types*

| Finds No | Cont. | Site no. | Object Type | Material | Stone Type | Descriptions | Qnt | Weight (gr) | Volume (cm3) |
|---|---|---|---|---|---|---|---|---|---|
| **02-127** | SF2 | GAS02 | Weight | Igneous Rock | Gabbro | Igneous rock - Grayish white to very dark gray, coarse grained, subrounded possibly due to water erosion, flat and elongated, two holes have possibly been bored through stone, at either end, one is larger and further from the end (1,6 cm) than the other (1 cm), larger hole is 1,3 cm in diameter while the smaller one is 0,9 cm in diameter, fairly round, possible striations inside them, end with smaller hole fractured on one side although the hole is still intact, use unclear | 1 | 45,0 | 23 |
| **02-146** | 001 | GAS02 | Manuport | Mineral | Unknown | Grayish green, porous, pores very small and irregular in shape, yields to knife, not fingernail, chlorite or epidote rich amygdale? No clear crystal structure (Kristján) | 1 | 4,5 | 6 |
| **02-148** | 001 | GAS02 | Manuport | Sedimentary Rock | Red interbasalt sediment | Sedimentary rock - Bright red to brown, rough surface, small white dots moderate, possibly amygdales? Most likely red interbasalt sediment (rauðaberg) | 1 | 11,0 | 11 |
| **03-054** | 794 | GÁS03 | Manuport | Igneous Rock | Pitch stone, weathered | Igneous rock - Black glassy pitch stone (could also be obsidian) with silvery gray perlite coating, mildly waterworn?, subangular | 1 | 0,5 | 0,5 |
| **03-068** | 642 | GAS03 | Object? | Igneous Rock | Pitch stone + pearlite | Igneous rock - Black with a silvery gray coat, edges worn, greasy lustre, most likely pitch stone with pearlite coating, does not yield to fingernail, long and thin fragment, one end a sharp irregularly shaped tip, reminiscent of a stylus, unclear weather object is worked or not | 1 | 7,0 | 4 |
| **03-091** | 779 | GAS03 | Manuport | Igneous Rock | Pitch stone | Black, weak glassy lustre, blunt angular edges, irregular fracture, slightly hydrated obsidian? Flakes easily, resembles stone coal | 1 | 0,5 | 3 |
| **03-097** | 963 | GAS03 | Manuport | Igneous Rock | Red interbasalt sediment | Sedimentary rock - Red with white and black crystals/flecks <5 mm in length, angular, blunt edges, medium grained, no clear vesicles, fairly massive, mjög líklega hogginn til, worked, flat sides, | 1 | 91 | 40 |
| **04-217** | 1591 | GAS04 | Flake | Igneous Rock | Obsidian | Igneous rock - Black, opaque, sharp edges, concoidal fracture, glassy lustre | 1 | 0,3 | 0,5 |
| | | | | | | | 8 | 160 | 87 |

## *Appendix 3 - Foreign materials*

*Table 9 - Flint*

| Finds No | Contex | Site no. | Object Type | Material | Stone Type | Descriptions | Qnt. | Weight (gr) | Volume (cm3) |
|---|---|---|---|---|---|---|---|---|---|
| **02-145** | 001 | GAS02 | Flake | Sedimentary Rock | Flint | Sedimentary Rock - sharp edges, concoidal fracture, dotted, white dots and bands in brownish gray flint, does not seem to be worn | 1 | 0,5 | 2 |
| **02-167** | 359 | GAS02 | Flake | Sedimentary Rock | Flint | Sedimentary rock - Dark gray to black, mottled, clear concoidal fractures, sharp transluscent edges, one end pointy, mildly resembles an arrow head, one edge has clear yellowy white outer edge of nodule | 1 | 4,5 | 3 |
| **03-069** | U/S | GAS03 | Flake | Sedimentary rock | Flint | Sedimentary rock - gray, mottled, sharp edges, smooth fracture, no lustre, no clear wear patterns | 1 | 4,0 | 6 |
| **03-070** | 634 | GAS03 | Flake | Sedimentary rock | Flint | Sedimentary rock - Very dark gray, sharp edges, concoidal fracture, partial light gray tip, mottled, no clear wear | 1 | 3,0 | 4 |
| **03-071** | 686 | GAS03 | Flake | Sedimentary Rock | Flint | Sedimentary rock - White to very dark gray, partial thin cherty coating, angular, but edges blunt, wear? Mottled, concoidal fracture, weak glassy lustre | 1 | 9,0 | 10 |
| **04-211** | 1453 | GAS04 | Flake | Sedimentary Rock | Flint | Sedimentary Rock - Gray, faint dark banding, partial thick cherty coat, angular, but edges dull to mildly sharp, concoidal fracture, no clear wear patterns, no lustre | 1 | 25,5 | 28 |
| **04-212** | 1622 | GAS04 | Flake | Sedimentary Rock | Flint | Sedimentary rock - light to very dark gray, mottled, sharp edges, concoidal fracture, no lustre, partial white, cherty outer coat, no clear wear patterns | 1 | 29,6 | 53 |
| **04-213** | 1551 | GAS04 | Flake | Sedimentary Rock | Flint | Sedimentary rock - light to very dark brownish gray, mottled, sharp edges, partially tranluscent, concoidal fracture, partial very thin brownish cherty outer coat on one side, no lustre | 1 | 3,1 | 4 |
| **04-214** | 1275 | GAS04 | Flake | Sedimentary Rock | Flint | Sedimentary rock - very dark gray, sharp edges, concoidal fracture, partial white cherty outer coat at one end, possibly faint wear patterns | 1 | 5,3 | 7 |
| **04-215** | 1671 | GAS04 | Flake | Sedimentary Rock | Flint | Sedimentary Rock - Dark gray, light colored mottling, sharp edges, concoidal fracture, brownish white cherty coating/outer surface of flint, no clear signs of wear, no lustre | 1 | 6,5 | 8 |
| **05-063** | 2374 | GAS05 | Flake | Sedimentary Rock | Flint | Sedimentary Rock - Dark gray with partial white cherty coating, concoidal fracture, sharp edges, no apparent wear, opaque | 1 | 7,9 | 10 |
| **06-134** | 2724 | GAS06 | Flake | Sedimentary Rock | Flint | Sedimentary rock - White to gray with small black flecks, smooth to irregular fractures, sharp edges, small flake, burned? | 1 | 1,3 | 2 |
| **06-135** | 2783 | GAS06_Kirkja | Flake | Sedimentary Rock | Flint | Sedimentary rock - Light to dark gray, partial white cherty outer coat and subrounded surface of nodule, sharp edges, concoidal fracture, very faint greasy lustre, mottled | 1 | 2,1 | 3 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **06-137** | 2724 | GAS06_Kirkja | Ore, stone | Sedimentary Rock | Flint | Sedimentary rock - Large flint nodule, partially fragmented at one end but largely subangular and intact, partial brownish white thin cherty coat, light to brownish dark gray, mottled, gray mottles in dark gray matrix, clear long and thin prehistoric organisms petrified in the flint, weak greasy lustre | 1 | 621,0 | 547 |
| | | | | | | | 14 | 723 | 686 |

*Table 10 – Metamorphic rock (excluding whetstone and baking plate materials)*

| Finds No | Context | Site no. | Object Type | Material | Stone Type | Descriptions | Qnt | Weight (gr) | Volume (cm3) |
|---|---|---|---|---|---|---|---|---|---|
| **02-132** | 312 | GAS02 | Polishing rock? Grinding slab? | Metam. rock | Metasand-stone | Very dark gray, massive, no phenocrysts or vesicles, flagstone fragment, polished on both large flat sides, clear criss cross striations, possibly metasandstone with small circular inclusions, possibly graphite (Kristján, NÍ) | 1 | 303,0 | 166 |
| **02-149** | 001 | GAS02 | Ore, stone | Metam. rock | Schist | Metamorphic rock - Dark gray with a glittery aspect, surface yields to fingernail, foliated structure, fragments into flakes, one sharp end/edge, one or two possible small round porphyorblasts on one side. Similar to 03-093 etc. | 1 | 814 | 421 |
| **02-150** | 223 | GAS02 | Ore, stone | Metam. rock | Schist | Metamorphic rock - Light gray with a glittery aspect (light mica?) and tiny black specks (dark mica?), foliated, fine grained, flat, fairly thin stone, subangular, similar texture to 03-093 but lighter color | 1 | 235 | 115 |
| **02-153** | 236 | GAS02 | Ore, stone | Metam. rock | Phyllite? | Metamorphic rock - Clear lamination, foliated, does not yield to fingernail, weakly to knife, very weak glittery aspect, possibly from mica, outer edges seem rounded, foliation wavy, one end broken, looks a bit like a coin, dark and light banding clear on the flat surfaces, worn | 1 | 5 | 4 |
| **02-159** | 270 | GAS02 | Ore, stone | Metam. rock | Schistose gneiss | Metamorphic rock, black glittery biotite mica in discontinuous banding, white to whitish pink (pink feldspar) more firm feldspar/quartz light colored mica in discontinuous banding in between the black banding, crumbly, fragments angular, foliated, similar to 03-210 | 4 | 22 | 25 |
| **02-162** | 350 | GAS02 | Ore, stone | Metam. rock | Schist | Metamorphic rock - crumbly, flakes easily, does not yield to fingernail, silvery to golden in color, foliated, glittery aspect from mica, fine to moderately fine grained, small black biotite mica crystals in a finer silvery gray matrix, subangular | 2 | 44 | 21 |
| **02-163** | 356 | GAS02 | Ore, stone | Metam. rock | Schist | Metamorphic rock - crumbly, white to black, dark and light banding, thin white band (4 mm), thicker black (5 mm), smaller fragments mostly dark banding, most likely fragments from the larger pieces, foliated, glittery aspect from black and light mica, fine to moderately fine grained, subangular, could be same as 164 | 10 | 49 | 153 |
| **02-164** | 356 | GAS02 | Ore, stone | Metam. rock | Schistose sandstone | Metamorphic rock - Clear continuous banding, some thinner bands discontinuous, crumbly/soft, crumbles and flakes, not good whetstone material, fragments weakly foliated, glittery aspect (dark and white mica), a few coarse grained bands within the fine grained bands, darker bands thinner, fragments fit together, weakly morphed sandstone | 2 | 354 | 124 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **02-168** | 366 | GAS02 | Ore, stone | Metam. rock | Schistose gneiss | Metamorphic rock - Discontinuous dark and light banding, coarse and moderately fine grained, light colored bands coarse, dark colored banding finer grained, rock subangular, glittery aspect given by dark and light mica, pinkish haze on massive lighter bands (quartz, feldspar, light mica) possibly pink feldspar, dark lenses (biotite mica) fairly flaky and loose while light lenses are firm and granular, darker bands much thinner (<0,5 cm) than lighter ones (0,5-2,5 cm thick) | 1 | 702 | 895 |
| **02-174** | 486 | GAS02 | Ore, stone | Metam. rock | Schistose gneiss | Metamorphic rock - Foliated, clear dark and light discontinuous banding in section (muscovite/bitotite mica + quartz feldspar), possible flattened mineral grains visible in planar view, flakes, light to very dark gray, large flat stone/flagstone, banding fairly straight, similar to 06-161, stone from floor | 1 | 1437 | 795 |
| **03-073** | 101 | GAS03 | Ore, stone | Metam. rock | Schist | Metamorphic rock - Silvery dark gray, glassy lustre from mica, foliated, fine grained, clear lamination but mostly all dark banding, one or two discontinous light bands of quartz and feldspar <3 mm thick, massive and fairly fine grained except for the light banding which is coarse grained, (half way between schist and gneiss?), similar to 03-082 | 1 | 334 | 308 |
| **03-079** | 669 | GAS03 | Object? | Metam. rock | Schist | Metamorphic rock - Dark gray, glassy lustre (mica), foliated, thin flake, might be polished on flat sides, fine grained, does not yield to fingernail, does not flake easily, similar to 03-093, 03-081 and 03-082 | 1 | 15 | 8 |
| **03-081** | 697 | GAS03 | Ore, stone | Metam. rock | Schist | Metamorphic rock - Dark gray, glassy lustre (mica), foliated, thin flakes, no signs of working, fine grained, does not yield to fingernail, does not flake easily, similar to 03-093 | 3 | 7 | 5 |
| **03-082** | 701 | GAS03 | Ore, stone | Metam. rock | Schist | Metamorphic rock - Silvery gray, glassy lustre from mica, foliated, fine grained, no clear lamination, similar to 03-093 and 03-081 | 1 | 72 | 74 |
| **03-085** | 746 | GAS03 | Ore, stone | Metam. rock | Schist, muscovite mica | Metamorphic rock - Bright silvery gray, strongly foliated, flakes easily, light colored mica, not worked, thin small to large plates, no clear porphyroblasts | 3 | 31 | 44 |
| **03-093** | 845 | GAS03 | Ore, stone | Metam. rock | Schist | White to silvery gray, glassy lustre, ligher and darker bands, darker band crumbly, foliated, lighter bands coarse crystals of quartz/feldspar? Clear foliation, mica crystals abundant, no clear signs of working, similar to 03-081 | 1 | 12 | 10 |
| **03-210** | 531 | GAS03 | Ore, stone | Metam. rock | Schistose gneiss | Metamorphic rock - Whitish pink banding with small pink flecks and glassy dark gray banding, granular, crumbly, no clear form, edges subangular, found with slag | 1 | 3 | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **03-292** | C3 | GAS03 | Flake | Metam. rock | Mica, biotite | Metamorphic rock - Thin flake, gray, foliated, no wawy fracture planes, shiny oily lustre, does not yield to fingernail, most likely biotite mica (Kristján) | 1 | 0,5 | 0,5 |
| **05-067** | 1876 | GAS05 | Ore, stone | Metam. rock | Schist, mica | Metamorphic rock - Thin flat flake, shiny gray, glassy lustre, dark and light mica, foliated, fairly coarse grained | 1 | 1 | 1 |
| **05-068** | 2076 | GAS05 | Ore, stone | Metam. rock | Laminated meta-sandstone | Metamorphic rock - Thin flat flakes, dark gray, glassy lustre of very thin dark and light mica on flat surfaces, fine grained, one flake has clear grayish white thin band, same as 071, clear quartz/feldspar grains in section | 3 | 50 | 41 |
| **05-071** | 2050 | GAS05 | Ore, stone | Metam. rock | Laminated meta-sandstone | Metamorphic rock - Thin flat flake, very dark gray, fairly fine grained, glassy lustre of very thin dark and possibly light mica on the flat surfaces, same as 068, clear quartz/feldspar grains in section | 1 | 25 | 17 |
| **06-5110** | 5135 | GAS06 | Ore, stone | Metam. rock | Schist, biotite mica | Metamorphic rock - Dark gray to black, glassy lustre, weakly foliated? One large block, three smaller fragments off block, a few brownish red (some circular) flecks possibly degraded garnet?, medium grained matrix comprised of crystals of quartz, feldspar and glassy black mica (rich), no clear banding | 4 | 312 | 410 |
| **06-006** | 2456 | GAS06 | Ore, stone | Metam. rock | Schist | Metamorphic rock - black to white, foliated, fragile, discontinuous white banding in black matrix, glassy lustre from mica, platy crystals, very fine grained, little lustre from light banding | 2 | 2 | 2 |
| **06-126** | 2453 | GAS06 | Ore, stone | Metam. rock | Schist, muscovite-quartz | Metamorphic rock - White to greenish gray, glassy lustre from light colored mica, foliated, few clear lenses/bands, rich in quartz, muscovite and possibly feldspar | 1 | 13 | 10 |
| **06-131** | 2638 | GAS06 | Ore, stone? | Metam. rock | Schist, mica | Metamorphic rock - Dark gray flake, foliated, crumbles easily into flakes, fine grained, yields to fingernail, one quartz porphyroblast, greasy surface, glassy lustre from dark and possibly light mica, | 1 | 7 | 6 |
| **06-161** | 2485 | GAS06_Kirkja | Ore, stone? | Metam. rock | Schistose gneiss? | Metamorphic rock - Faint discontinuous white and light gray to dark gray banding, foliated, glassy lustre of dark and light mica in very thin medium grained discontinuous lenses of flaky crystals in between coarse grained white and pinkish white feldspar and quartz crystals, massive, banding fairly straight, similar to 02-174 but thicker | 1 | 382 | 186 |
| | | | | | | | 50 | 5231 | 3841 |

*Table 11 – Metamorphic rocks – steatite, or soapstone*

| Finds No | Context | Site no. | Object Type | Material | Stone Type | Descriptions | Qnt. | Weight (gr) | Volume (cm3) |
|---|---|---|---|---|---|---|---|---|---|
| **01-011** | LF/4E | GAS01 | Object, vessel | Metamorphic rock | Steatite | Metamorphic rock - Dark gray, yields to fingernail, fragment polished on one side, clear parallel banding on a smooth slightly curved outer edge, rough irregular fracture, possible diameter of object 11 cm judging by the outer curve | 1 | 12 | 11 |
| **03-067** | 792 | GAS03 | Vessel, pot fragment | Metamorphic rock | Steatite | Metamorphic rock - Gray, curved fragments, yields to fingernail, greasy to the touch, blackened on the outer convex side, scuff marks, shallow striations and short thin deep grooves on the inside or concave side, glittery aspect in fracture possibly from dark mica, possible diameter of vessel about 20 cm judged from the outer rim, thickness varies, thicker side assumed to be near the bottom of vessel | 1 | 18 | 14 |
| **03-207** | 727 | GAS03 | Worked Stone | Metamorphic rock | Steatite | Whitish gray to very dark gray, yields easily to fingernail, weakly foliated, mild glassy lustre, one possible porphyroblast, black, clear hole has been drilled through fragment, about 1 cm in diameter, weak greasy feel | 1 | 19,0 | 18 |
| **04-005** | 1175 | GAS04 | Net Sinker, half | Metamorphic rock | Steatite | Gray, weakly foliated, clear striations inside man made hole, hole about 1,1 cm in diameter, stone broken in half, subrounded possibly due to polishing, yields to fingernail, greasy feel, hole bored at one end about a cm from the edge in the middle of the rock, half of hole missing | 1 | 88 | 63 |
| | | | | | | | 4 | 137 | 106 |

*Table 12 – Metamorphic rocks, baking plate materials*

| Finds No | Con-tex | Site no. | Object Type | Material | Stone Type | Descriptions | Qnt. | Weight (gr) | Volume (cm3) |
|---|---|---|---|---|---|---|---|---|---|
| **02-113** | 001 | GAS02 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray, foliated, faint to clear striations on both sides, 1-3 mm in width, <0,5 mm in depth, one smooth outer edge, seems slightly curved, possibly a circular bakeplate 30-32 cm in diameter. | 1 | 33,9 | 27 |
| **02-114** | 001 | GAS02 | Baking plate | Metamorphic rock | Schistose steatite? | Not analysed by SGB. | 1 | 19,0 | |
| **02-115** | 235 | GAS02 | Baking plate | Metamorphic rock | Schistose steatite? | Not analysed by SGB. | 1 | 33,0 | |
| **02-116** | 243 | GAS02 | Baking plate | Metamorphic rock | Schistose steatite? | Not analysed by SGB. | 1 | 29,0 | |
| **02-117** | 266 | GAS02 | Baking plate | Metamorphic rock | Schistose steatite? | Not analysed by SGB. | 1 | 35,5 | |
| **02-118** | 317 | GAS02 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Flake, dark gray, foliated, does not yield to fingernail, three clear parallel striations on one side, greasy lustre, not smooth. | 1 | 0,5 | 2 |
| **02-119** | 357 | GAS02 | Baking plate | Metamorphic rock | Schistose steatite? | Not analysed by SGB. | 1 | 14,5 | |
| **02-120** | 374 | GAS02 | Baking plate | Metamorphic rock | Schistose steatite? | Not analysed by SGB. | 1 | 14,5 | |
| **02-121** | 399 | GAS02 | Baking plate | Metamorphic rock | Schistose steatite? | Not analysed by SGB. | 1 | 6,0 | |
| **02-152** | 229 | GAS02 | Ore, stone | Metamorphic rock | Schist? Schistose steatite? | Metamorphic rock - gray to black, faintly green under lamp, weakly glittery (dark mica), possibly weakly wavy foliation, very faint light gray banding in between, does not yield to fingernail, mildly greasy feel, large glassy black crystals (porphyroblasts?) clear on one flat surface of each stone, <4 mm in length, fine to coarse grained rock, same as 02-165. | 2 | 28,0 | 9 |
| **02-156** | 260 | GAS02 | Baking plate? | Metamorphic rock | Schistose Steatite? | Metamorphic rock - yields to fingernail, pinkish gray, fairly massive, mildly soapy to the touch, faint foliation/laminar, coarse grained, subangular, does not seem to be worked. | 1 | 14,5 | 15 |
| **02-165** | 356 | GAS02 | Ore, stone | Metamorphic rock | Schist? Schistose steatite? | Metamorphic rock - gray to black, glittery (dark mica), possibly wavy foliation, very faint light gray banding in between, does not yield to fingernail, mildly greasy feel, large glassy black crystals clear on the flat surfaces (porphyroblasts?), <5 mm in length, thin, medium to coarse grained rock, a few coarse inclusions of light colored granular quartz or feldspar, one or two possible porphyroblasts on "lower" surface, similar to 152. | 2 | 540,0 | 244 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **03-057** | 101 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - greenish dark gray, fine grained, clear striations on one side, parallel/side by side, 1-2 mm in width, <1 mm in depth, one smooth outer edge, possibly curved, possibly 40 cm in diameter, yields weakly to fingernail. | 1 | 26,8 | 16 |
| **03-058** | 101 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Thicker fragment has striations on both sides, foliated, very dark gray, striations <2 mm in width and <1 mm in depth, parallel and criss-cross, short and long, weakly greasy surface, does not yield to fingernail, thinner fragment is greenish dark gray in color, foliated, yields to fingernail, smooth to weakly wavy fracture planes, no striations, foliation bands very thin. | 2 | 38,0 | 30 |
| **03-059** | 101 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Silvery to bluish dark gray, weakly greasy surface, foliated, partially yields to fingernail, very fine grained, striations on both sides of fragment, <2 mm in width and <0,5 mm in depth, striations only parallel on one side and criss-cross on the other (about 90° angle), foliated, layeres very thin. | 1 | 27,0 | 16 |
| **03-060** | 101 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Large fragment, Very dark gray, weak greasy lustre, striations on both sides, <3 mm in width, <1,5 mm in depth, only parallel on one side, perpendicular/criss-cross on the other, one edge seems intact and is straight which could suggest a square plate (?), foliated, fine grained, foliations/bands very thin, yields to fingernail. | 1 | 198 | 164 |
| **03-061** | 533 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray, fine grained, does not yield to fingernail, weak greasy lustre, foliated, clear striations on one side of smaller fragment, both sides on the larger one, <1,5 mm in width, <1 mm in depth, banding very thin. | 2 | 15 | 11 |
| **03-062** | 559 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Dark gray, fine grained, foliated, does not yield to fingernail, clear striations both parallel and criss-cross on both sides, 1-3 mm in width, <1 mm in depth, foliation very thin, no clear smooth outer edge. | 1 | 111,3 | 86 |
| **03-063** | 756 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray, fine grained, does not yield to fingernail, weak greasy lustre, foliated, not greasy to the touch, clear striations on both sides on the larger fragment, none on the smaller one, banding very thin, striations <2 mm in width and <1 mm in depth, parallel and criss-cross on one side, just parallel on the other. | 2 | 45 | 30 |

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| **03-064** | 838 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Small flake, no striations, Very dark gray, yields weakly to fingernail, foliated, thin layers/foliation, fine grained. | 1 | 4 | 2 |
| **03-065** | 846 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Small flakes, two flakes have striations on one side, one has none, very dark gray to very dark bluish gray, foliated, thin layers, yields to fingernail, striations <2 mm in width, <1 mm in depth, parallel. | 3 | 21 | 18 |
| **03-066** | 915 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock, very dark gray on striated side, pinkish dark gray on "smooth" side, one large flake, very clear striations on one side, only a small surface on other side striated, striations both parallel and criss-cross, 1-2 mm in width, <1,5 mm in depth, foliated, one fairly smooth outer edge, curved, possibly 32 cm in diameter, striations moderately parallel to outer edge. | 1 | 172,8 | 83 |
| **No finds no.** | 919 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray to almost black, greasy feel, foliated, yields to fingernail, shiny lustre, striated on both sides, striations parallel, moderately parallel to outer edge, striations 1-2 mm in width, <1 mm in depth, one possibly smooth curved outer edge, diameter possibly 32 cm, fragment triangular in shape. | 1 | 31,19 | 17 |
| **03-292** | C3 | GAS03 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Dark gray, foliated, clear striations both parallel and criss-cross on four of the larger fragments, only one has striations on both sides, striations <2 mm in width and <1 mm in depth, wavy fracture planes, fine grained, weak lustre, largest fragment has a clear hole bored through it, about 6 mm in diameter, does not yield to fingernail. | 6 | 28 | 48 |
| | | | Flake | Metamorphic rock | Mica sheet? | Metamorphic rock - Thin flake, gray, foliated, no wavy fracture planes, shiny oily lustre, does not yield to fingernail. | 1 | 0,5 | 1 |
| **04-203** | 1542 | GAS04 | Baking Plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark greenish gray to black, fine grained, yields to fingernail, greasy to shiny lustre, foliated, greasy feel, no clear outer edge, one side fully striated, striations parallel to diagonal, 1-3 mm in width, <1,5 mm in depth, faint striations on other side. | 1 | 36,0 | 16 |
| **04-204** | 1563 | GAS04 | Baking Plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray to almost black, greasy feel, foliated, yields to fingernail, shiny lustre, fully striated on one side, only partially on other, striations parallel, moderately parallel to outer edge, one smooth curved outer edge, diameter possibly 27-28 cm, striations 1-3 mm in width, <1 mm in depth. | 1 | 32,8 | 29 |

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| **04-210** | 1678 | GAS04 | Baking Plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very small slightly worn fragment of baking plate, very dark gray, foliated, subangular, yields weakly to fingernail. | 1 | 1,9 | 1 |
| **216** | 1696 | GAS04 | Baking Plate | Metamorphic rock | Schistose steatite | Dark gray, faint greasy feel, yields to fingernail, foliated, one or two possible porphyroblasts, three clear parallel striations on one side. | 1 | 2,6 | 2 |
| **05-003** | 1829 | GAS05 | Baking Plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray, foliated, yields weakly to fingernail, straitions on both sides, striations parallel, 1-4 mm wide, <1,5 mm in depth, fragment is subangular and has four roughly straight sides, no corner a clear outer corner, one corner is fairly subangular (90°) and so bakeplate might possibly have been square but not certain. | 1 | 110,5 | 72 |
| **05-005** | 1878 | GAS05 | Baking Plate | Metamorphic rock | Schistose steatite | Metamorphic rock - rim fragment, striations on both sides, whitish to very dark gray, striations parallel to diagonal, 1-3 mm in width, <2 mm deep, fine grained excepting one or two large porphyroblasts visible, angular, redish dark brown, decomposing, circular bake plate, the rounder edge of fragment indicates diameter at ca.38-40 cm, (but could be up to 60 cm in diameter), fragment fairly small, diameter could be bigger, yields to fingernail. | 1 | 65,16 | 35 |
| **05-011** | 1948 | GAS05 | Baking Plate | Metamorphic rock | Schistose steatite | Two baking plate fragments, fragments do not fit together, foliated, yield to fingernail, striations on both sides, fragments dark to very dark gray on one side, this side heavily striated, other side brownish gray, striations fewer, striations parallel, one fragment has possible partial smooth outer edge, curved, possibly more than 24 cm in diameter, striations <1,5 mm in depth, 1-3 mm in width. | 2 | 99,2 | 72 |
| **05-012** | 1978 | GAS05 | Baking Plate | Metamorphic rock | Schistose steatite | Metahorphic rock - Very dark gray, large rim fragment, fairly smooth curved edge, parallel and criss-cross striations on both sides, foliated, yields weakly to fingernail, striations 1-3 mm in width, <1,5 mm in depth, striations moderately parallel to outer rim, one corner black possibly blackened by charcoal dust, "solid" fragment. | 1 | 278,45 | 190 |
| **05-020** | 1978 | GAS05 | Baking Plate | Stone | | baking plate - Not found 7.3.2005 when finds were packed. | 1 | 0 | |
| **05-027** | 2177 | GAS05 | Baking Plate | Metamorphic rock | Schistose steatite | Metamorphic rock - very dark gray flake, striations on one side, parallel but faint, <1,5 mm in width, <0,5 mm in depth, angular, foliated, yields to fingernail, no clear outer edge. | 1 | 4,38 | 4 |

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| **05-028** | 2183 | GAS05 | Baking Plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Dark gray rim fragment, foliated, yields weakly to fingernail, striations on one side, striations parallel, <2 mm in width, <1mm in depth, one curved and fairly smooth outer edge, circular plate, round edge indicates diameter at ca. 28-30 cm, small fragment, diameter uncertain. | 1 | 25,49 | 19 |
| **05-033** | 2187 | GAS05 | Baking Plate | Metamorphic rock | Schistose steatite | Metamorphic rock - very dark gray rim fragment, could be straight, could be weakly curved, fairly smooth outer edge, foliated, yields weakly to fingernail, one side wholly striated, other only partially due to fragmentation, striations parallel and criss-cross, 1-3 mm in width, <1,5 mm in depth, if circular diameter was larger than 58 cm. | 1 | 160,74 | 102 |
| **05-049** | 1978 | GAS05 | Baking Plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Striations cover whole top side, one striation on other, brownish gray to very dark gray, foliated, striations parallel, 1-2 mm in width, <1 mm in depth, no clear outer edge, yields to fingernail. | 1 | 17,69 | 13 |
| **05-061** | 1948 | GAS05 | Baking Plate | Metamorphic rock | Schistose steatite | Metamorphic rock - very dark gray rim fragment, foliated, partially striated on one side, yields to fingernail, small flake broken off, diameter can be at least from 20-32 cm, could even be as large as 60 cm in diameter when compared to 05-12, fragment too small to say for sure, striations 1-2 mm in width, <1 mm in depth, parallel. | 2 | 17,45 | 14 |
| **5142** | 5206 | GAS06 | Baking plate | Stone | | Not analysed by SGB. | | 129,5 | |
| **5156** | 5227 | GAS06 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Silvery dark gray, greasy surface, foliated, partially yields to fingernail, 3 large flakes, 10 smaller ones, very fine grained, no striations but similar material as baking plates. | 13 | 19,3 | 44 |
| **06-018** | | GAS06 | Baking plate | Stone | | Not analysed by SGB. | 1 | x | |
| **06-020** | 2564 | GAS06 | Baking plate | Stone | | Not analysed by SGB. | 1 | 1,3 | |
| **06-027** | 2606 | GAS06 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - very dark gray rim fragment, very dusty, foliated, striations on both sides, striations parallel and criss-cross, 1-2 mm wide, <2 mm deep, rim cuved, round bakeplate, rim smooth, striations mostly parallel to outer edge, yields weakly to fingernail, diameter about 32-34 cm in diameter. | 1 | 126,47 | 106 |
| **06-029** | 2626 | GAS06 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock, very dark gray to brownish gray, one striated side, possible rim fragment, slightly curved and fairly smooth, striations parallel, diagonal to rim, <1 mm wide, <0,5 mm deep, foliated, could have been about 40 cm in diameter, but fragment small so not certain. | 1 | 11,49 | 9 |

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| **06-037** | 2649 | GAS06 | Baking plate | Stone | | Not analysed by SGB. | 1 | 11,6 | |
| **06-040** | 2664 | GAS06 | Baking plate | Stone | | Not analysed by SGB. | 1 | 2,7 | |
| **06-050** | 2714 | GAS06 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray, blackened by charcoal dust, striations on one side, dusty, striations faint, parallel and criss-cross, 1-2 mm in width, <0,5 mm in depth, foliated, yields to fingernail, no clear outer edge, (one small natural basalt pebble in bag). | 1 | 69,46 | 79 |
| **06-053** | 2724 | GAS06 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray, foliated, does not yield to fingernail, parallel striations on both sides, edge angular, tapered? (looks like the base of a pyramid without a top) Seems fairly straigt, angular plate? Striations parallel (one side) and strongly perpendicular (other side) to edge, 1-2 mm wide, <1 mm deep. | 1 | 68,59 | 52 |
| **06-076** | 2813 | GAS06 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray, striations on both sides, foliated, faintly glassy lustre, surface fairly smooth, fine grained, no clear outer edge, striation parallel and diagonal, fragmented, possibly not original striations or bottom of original striations, surface has been flaked off?, striations <1 mm in width, <0,3 mm in depth. | 1 | 40,67 | 26 |
| **06-112** | 2946 | GAS06 | Baking plate | Stone | | Not analysed by SGB. | 1 | 9,1 | |
| **06-114** | 1 | GAS06 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray, fine grained, foliated, rim fragment, striations on both sides, parallel only on one side, more faint, parallel and criss cross on the other, more clear, yields very weakly to fingernail, striations 1-2 mm in width, <1 mm in depth, diameter 50-60 cm. | 1 | 119,46 | 70 |
| **06-142** | 2724 | GAS06_Kirkja | Baking plate | Stone | | Not analysed by SGB. | 1 | 1,3 | |
| **06-162** | 1 | GAS06_Kirkja | Baking plate | Stone | | Not analysed by SGB. | 7 | 2,6 | |
| **06-164** | No context number | GAS06 | Baking plate | Metamorphic rock | Schistose steatite | Metamorphic rock - Very dark gray, dirty, foliated, one possible straight outer edge, faint parallel striations on one side, 1-2 mm wide, <0,5 mm in depth, yields to fingernail. | 1 | 27,24 | 20 |
| | | | | | | | 86 | 2697 | 1569 |

## Part Three

# Vitrified materials and slags from Gásir in North Iceland

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**January 11th, 2011**

# Vitrified materials and slags from Gásir in North Iceland.

**Sólveig Guðmundsdóttir Beck**

## Vitrified material

When materials that contain silicates (e.g. soil, stones, ceramics) are heated to adequately high temperatures they melt and become glassy, or vitrified. Vitrified materials are often mistaken for metallurgical waste but can be distuinguished apart by their fairly light weight (Jones (ed.) 2001).

From the archaeological site in Gásir about 1300 fragments of vitrified materials were collected (see table 7). The collection weighs about 9,7 kg in total with a size range between 0,5-10 cm in thickness, 0,5-12,5 cm in width and 0,5-16 cm in length. Volume was roughly estimated to be about 74.800 $cm^3$, or about 97% of the total material volume.

The fragments are gray and redish dark gray to black in color and have knotty and highly vesicular to coarse and frothy surfaces and textures. Vesicles are tiny to very large. The fragments are flat to very irregular in shape. Coarser surfaces are often bright red and black with possible plant remains, ash, soil and/or sand fused to the surface. Most of the fragments have few, if any, diagnostic features, are low in density and non-magnetic. A few fragments also have calcined bone and charcoal fused to/within them and some have possible fuel and/or rock impressions.

## Fuel ash slag

Fuel ash slag forms when ash from fuel (wood, plants) reacts with silicates in clay or stone to produce glassy light gray, highly vesicular and fragile materials (Jones (ed.) 2001).

In the analysis about 13 fragments of fuel ash slag (02-206, 04-290, 04,305, 04-315, 04-320, 05-183 and 05-184) were pulled apart from the other vitrified materials due to their very different appearance (table 5). All the fragments are very light gray to dark gray and black (rare) in color and very light weight. The collection weighs about 75 gr in total and has a size range between 0,4-3 cm in thickness, 0,6-6,4 cm in width and 1-9,5 cm in length. The fragments are highly vesicular but the vesicles are very small. Volume was roughly estimated to be about 310 $cm^3$, or about 0,4% of the total material volume. The fragments are not magnetic and mostly undiagnostic in morphology. A few fragments also have calcined white bone fragments fused to and within them.

**Undiagnostic slag**

Slag is a liquid mixture of ash, flux, and/or other impurities produced during smelting and smithing of metals which, when solidified, is very durable. Undiagnostic slags are fragments that have the dark color and weight of slags without any diagnostic surface morphology (Jones (ed.) 2001).

About 64 fragments of slag were uncovered in Gásir which together weigh about 0,8 kg (for contexts and numbers see tables 2 and 6). The fragments have a fairly small size range between 0,5-6,7 cm in length, 0,5-6 cm in width and 0,4-4 cm in thickness. Their volume was roughly estimated to be about 1420 $cm^3$, or just under 2% of the total material volume. The slag is dark gray to black and glassy, massive to mildly vesicular with fairly small to tiny vesicles. The slag surfaces are smooth to mildly knotty and/or gritty and some fragments have calcined bone inclusions and/or charcoal impressions with charcoal still lodged in them. In some of the fragments green, purple or red colors, or banding, is clearly visible within the slag and cavities often contain blue green inclusions, or amygdales, that could possibly be copper oxides. Sand, and even in one case small stones, are fused to the bottom of a few fragments.

**Hammerscale**

Hammerscale can both be spheroidal globules and flakes and they are formed in both primary and secondary smithing. The flakes form when a hot iron object is struck and its oxidized surface fragments, or flakes, from the blow. The spheroids also form during hammering as slag is driven from the metal and slag droplets cool in the air as globules (Jones (ed.), 2001).

Only six weakly magnetic possible hammerscale spheres (03-265, one spheroid with a long tail) were found in the Gásir collection. Their size is around 0,5 cm in diameter and together they weigh about 6 gr which is 0,002% of the total material volume.

**Bone and charcoal**

Only four small fragments of calcined bone (03-257, 03-270, 04-302 and 06-176) were found on their own within the Gásir collection (table 8). The fragments are around 1,5 cm in length, about 1,4 cm in width and 0,9 cm in thickness. Together they weigh about 3 gr. More bone was however found fused within vitrified materials and slag. This amount of burned bone most likely does not represent a large protion of the total amount of burned bone found on site. One charcoal fragment (03-235) was identified with the debris (table 8). The fragment is about 1,5 cm long, 1,2 cm wide and 1 cm thick and weighs about 0,5 gr. This amount of charcoal most likely represent only a tiny portion of the total amount of charcoal found on site.

## Discussion

A total of just under 1500 fragments were collected in Gásir which together weigh about 11,2 kg and were roughly estimated to be about 77.600 $cm^3$ in volume or a little under 0,1 $m^3$. Size of individual fragments ranges from <0,5-16 cm in length, <0,5-12,5 cm in width and <0,4-10 cm in thickness. Measured quantity, weight and volume of material groups can be seen in table 1.

| | Count (psc) | Weight (gr) | Volume ($cm^3$) |
|---|---|---|---|
| **Undiagnostic slag** | 64 | 770 | 1420 |
| **Vitrified material** | 1304 | 9711 | 74882 |
| **Fuel ash slag** | 14 | 75 | 311 |
| **Hammerscale** | 1 | 6 | 1,2 |
| **Iron objects*** | 19 | 140 | 140 |
| **Stone*** | 96 | 518 | 970 |
| **Total:** | **1498** | **11220** | **77664** |

*Originally identified as slag

*Table 1 – Quantity, weight and volume of materials from Gásir*

About 19 pieces of possible iron objects were misidentified as slag and the very few identifiable objects were mostly nails. This group weighed just over 140 gr in total. About 96 fragments of stones, mostly basalt, were also misidentified as slag. The stone group weighed about 0,5 kg in total. Percentages of quantity, weight and volume within each individual group of slag and vitrified materials are compared in bar chart 1 and it is very clear that undiagnostic vitrified materials are by far the largest part of the Gásir collection with undiagnostic slag a far second.

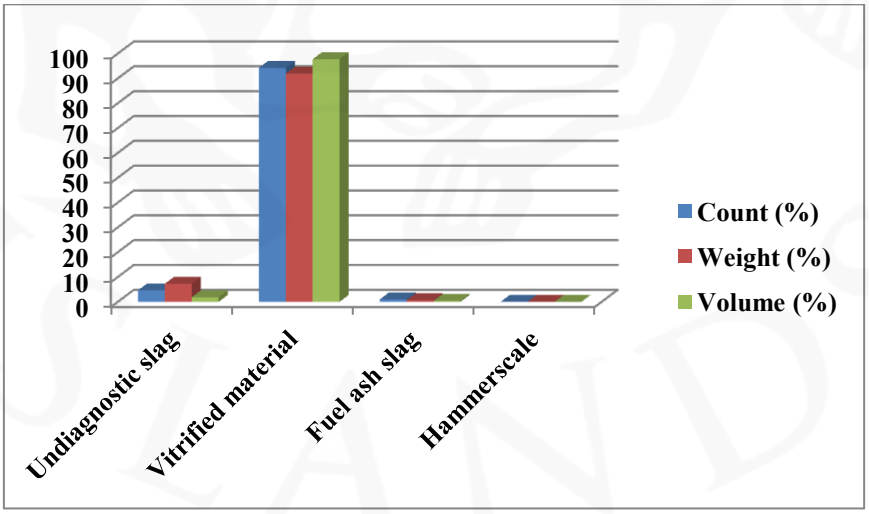


*Chart 1 - Comparison of quantity, weight and volume (%) of materials from the Gásir collection*

*Vitrified materials*

The light gray and frothy fragments of fuel ash slag found in Gásir are in all probability mostly vitrified fuel ash. The larger dark and redish gray to black fragments are however more likely to be a mixure of fuel ash slag, melted soils and sand.

Vitrified materials (including fuel ash slag) can form in any high temperature fire where alkalis (e.g. soda, potash), from e.g. plants, wood or bone, and silicates come together and are therefore, on their own, not indicative of metallurgical processes (Jones (ed.), 2001). Most of the vitrified material was collected in small fragments (<90 gr) all over the Gásir site in about 140 contexts of mixed soils, turf collapse, fillings and fuel ash dumps inside and outside the booths, in various pits and on the trackway. About 30 contexts contained over a 100 gr (101 gr - 660 gr) in vitrified materials each but they still held about 75% of the whole collection, or approximately 7,2 kg (see tables 2 and 3).

Only about 12,4% (1,2 kg) of the whole vitrified material collection was found within contexts also containing undiagnostic slag (see table 2) and even though those 12% could be connected to slag fragments it is unclear whether these materials formed together in situ or not. In table 2 it is clear that 18 out of 29 contexts which contained slag did not contain vitrified materials along with it so the two materials do not seem to be mutually inclusive. Only about 10% of the vitrified material (~1 kg) could be connected to traces of sulfur (~35 gr) and none of that material was found together in situ, so the formation of the vitrified materials does not seem to be strongly connected to sulfur processing either. It is interesting to note that at least 60% (~6 kg) of the vitrified material was found in deposits described as being rich in peat ash (e.g. dumps, hearths, turf mixtures) and about 25% (2,4 kg) was collected in situ in 11 peat ash rich deposits from makeshift hearths (see table 3). However, these deposits are still only a tiny fraction of all the contexts and hearths excavated that also contained peat ash without vitrified material.

So why did it form? At Gásir, peat seems to have been the most common fuel along with birch wood and possibly seaweed in smaller amounts (see Beck, this volume). Peat is usually fairly rich in phytoliths and/or diatom frustules (silica bodies of plant and algae), often along with silicate rich soils and even sand (Carter, 1998; see Beck, this volume; Braadbaart et al., forthcoming;). Melting temperature of silica on its own is very high or 1713°C (Canti, 2003). However, vitrification of silicate rich soils and sands and biogenic silica bodies normally only requires temperatures close to 1000°C as fluxing agents involved (basic salts such as potassium, magnesium, calcium and sodium) can lower melting temperatures down to at least 800°C depending on the length of heat exposure (Sharples (ed), 2005) and the silica

vitrifies to form glassy vesicular slag, although usually only on a fairly small scale both in size and quantity (Canti, 2003). Such salts are abundant in Icelandic Andosols (Arnalds, et al., 1995; Arnalds and Kimble, 2001; Milek, 2006). According to (Braadbaart et al., forthcoming; Canti and Linford, 2000; McDonnell, 2001 and Sharples (ed), 2005) heat in makeshift and domestic hearths is usually in the range of 300-500°C but temperatures up to 800-1000°C are well achievable, especially in the center of a hearth. Canti and Linford (2000) also suggest that surface fires and makeshift hearths do not seem to have any significant effect on the soils and sediments below them other than reddening, due to moisture, the buffering capability of organic matter and the insulation ash layers provide after they start to accumulate on the surface. Therefore surface soils and sediements most likely do not contribute any significant amount of material in the formation of vitrified slag.

Since a significant part of the vitrified material at Gásir was found in situ in makeshift hearths it is not unlikely that the rest of the material found strewn in peat ash dumps and other contexts on site have a similar source, but judging from the large amounts of peat ash deposits without vitrified materials, this by no means happened every time a peat fire was lit. A study done recently by Braadbaart et al. (forthcoming) shows that vitrified materials are not usually formed in a hearth fire at temperatures below 800°C but they did conclude that peat was the most efficient fuel source to maintain a steady source of heat over longer periods of time. It can be extrapolated that the most important parts in the formation of vitrified materials is high heat and possibly length of heat exposure. In a study done by Bafentse (2001) on vitrified dung deposits in Botswana, thickness of the fuel deposits can also be a factor. He observed that in burning abandoned dung middens the high heat needed (~1000°C) to vitrify the dung could not be achieved unless the deposits were very dry and fairly thick otherwise only ash and dung char was formed.

From all this information it can be concluded that the large fragments of vitrified material found at Gásir could have formed in a situation where fairly high lasting temperatures, fuel deposits rich in silicous compounds (possibly fairly thick) and time came together in the right proportions. What those proportions are exactly and to what purpose is anyones quess but most likely the vitrified materials formed through more than one specific human activity whether it be domestic or industrial, although the largest fragments are more likely to have formed in connection to some form of industry. More concrete information could be gathered by experimenting with fuels (wood, peat, dung) and hearth types (e.g. pits, surface hearths, stone hearths) as well as through chemical analysis of the vitrified material.

*Undiagnostic slag*

A few undiagnostic slag fragments along with weakly magnetic hammerscale suggests possible iron smithing in the area but without more diagnostic material the real scope of the iron working in Gásir is unknown. A large part of the slag collection are very dark gray, black and red colored slag pieces with smooth surfaces and massive internal structure which slightly resemble tap slags formed through iron smelting (Jones (ed.), 2001) but as no other substantial smelting debris has been found on site so far such an interpretation is unlikely. The dark colors, glassy and smooth surfaces and massive structures could also suggest either copper or lead smelting slag (Dungworth et al., 2009; Jones (ed.), 2001) although no very clear rivulets or flow structures were observed. The redish haze on some of the surfaces along with the greenish blue, red, purple and green stripes and patches within the slag further support that theory. Fragment 03-208 has a copper pin fused to its surface and many of the fragments have partial blueish green coatings, or amygdales, that could possibly be copper oxides. These anomalies suggest that most of the slag remains found at Gásir are more likely to come from copper smelting rather than lead or iron smelting/smithing, although chemical analysis would have to be done to make sure.

*Bone*

Calcined bone fragments were found within fragments of slag and vitrified materials as well as individually. Bone becomes completely calcined and white or pale yellow in color at temperatures between 525°C and 645°C (Mays, 1998). The individual bone fragments as well as the fragments within the vitrified materials are only evidence of burning episodes, most likely within the range of a cooking fire (Jones (ed.), 2001). The bone fragments within the slag could merely be remnants of fuel used in the metal working processes or it could possibly have been added as a flux (a chemical cleaning agent that facilitates in smithing by removing oxidation from metals to be joined) (Jones (ed.), 2001).

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## Appendices

*Table 2 – Contexts at Gásir that contain undiagnostic slag, iron objects and/or hammerscale*

| Context | Finds no. | Undiagnostic slag (gr) | Vitrified material (gr) | Fuel ash slag (gr) | Iron objects (gr) | Hammer-scale (gr) | Total |
|---|---|---|---|---|---|---|---|
| **1** | 02-185, 02-188, 02-215, 02-117, 04-262, 05-197, 06-157 | 75 | 123 | | 4 | | **202** |
| **101** | 03-208 | 56 | 395 | | | | **451** |
| **221** | 02-198 | 31 | | | | | **31** |
| **259** | 02-214 | 18 | | | | | **18** |
| **288** | 02-193 | 44 | | | | | **44** |
| **368** | 02-203, 02-206 | 3 | 37 | 3 | | | **43** |
| **480** | 02-226 | | | | 2 | | **2** |
| **530** | 03-209 | 6 | 4 | | | | **10** |
| **540** | 03-215 | 39 | | | | | **39** |
| **559** | 03-216 | 33 | 22 | | | | **55** |
| **569** | 03-218 | | 21 | | 4 | | **25** |
| **633** | 03-223 | 29 | 6 | | 26 | | **61** |
| **663** | 03-229 | 4 | | | | | **4** |
| **674** | 03-232, 03-233 | 13 | 18 | | 8 | | **39** |
| **697** | 03-239 | 4 | | | | | **4** |
| **796** | 03-255 | 72 | | | | | **72** |
| **823** | 03-261, 03-262 | 4 | 86 | | | | **90** |
| **832** | 03-264 | 5 | | | | | **5** |
| **835** | 03-265 | | 14 | | | 1 | **15** |
| **1159** | 04-267 | 16 | | | | | **16** |
| **1206** | 04-272 | | | | 6 | | **6** |
| **1213** | 04-273 | 26 | | | | | **26** |
| **1245** | 04-277 | 20 | 169 | | | | **189** |
| **1392** | 04-283 | | | | 14 | | **14** |
| **1548** | 04-299 | 26 | 0,5 | | | | **26,5** |
| **1550** | 04-300 | 17 | | | | | **17** |
| **1632** | 04-312 | | | | 1,3 | | **1,3** |
| **1682** | 04-322 | 8 | | | | | **8** |
| **1702** | 04-336 | 53 | | | | | **53** |
| **1713** | 04-351 | | | | 6 | | **6** |
| **2066** | 05-187 | 43 | | | | | **43** |
| **2128** | 05-195 | 5 | | | | | **5** |
| **2435** | 06-169 | 31 | | | | | **31** |
| **2456** | 06-151 | | | | 4,4 | | **4,4** |
| **2467** | 06-152 | | | | 8,7 | | **8,7** |
| **2535** | 06-150 | | | | 9,2 | | **9,2** |
| **2621** | 06-155 | | | | 21 | | **21** |
| **2738** | 06-160 | 38 | | | | | **38** |
| **2789** | 06-154 | | | | 6 | | **6** |
| **2907** | 05-118 | | | | 5,6 | | **5,6** |
| **2948** | 06-156 | | | | 9 | | **9** |
| **5001** | 04-5005 B, 04-5009, 06-5108 | 3 | 333 | | | | **336** |
| **5019** | 06-5150 B | 48 | | | | | **48** |
| **5194** | 06-5138 B | | 50 | | 5 | | **55** |
| | **Total:** | **770** | **1278,50** | **3** | **140,2** | **1** | **2193** |

*Table 3 – Contexts containing large amounts of vitrified material and deposit types*

| Context | Finds no. | Vitrified material (gr) | Type of deposit |
|---|---|---|---|
| **226** | 02-192 | 156 | Mottled peat ash dump |
| **284** | 02-218 | 215 | Fill of SFB |
| **307** | 02-190 | 340 | Hearth fill rich in peat ash, 25-45 cm thick, pit [460] |
| **311** | 02-220 | 172 | Hearth fill rich in fragments of wood charcoal and possible animal dung, up to 40 cm thick, pit [460] |
| **377** | 02-211 | 101 | Mixed turf layer |
| **381** | 02-189 | 140 | Mixed peat ash + charcoal fill in pit [436], associated with finds of sulfur 02-142 and slag from 02-206 |
| **394** | 02-213 | 170 | Charcoal rich fill in pit [436], associated with finds of sulfur 02-142 and slag from 02-206 |
| **429** | 02-194, 02-195, 02-201, 02-212 | 439 | Peat ash deposit in cut [440],possible base of hearth, group [462], about 25 cm deep |
| **439** | 02-210 | 510 | Mixed peat ash and turf, group [524] |
| **450** | 02-202 | 161 | Peat ash fill in hearth, in cut [457], group [458] |
| **535** | 03-214 | 150 | Backfill of SF [492], see also [618] |
| **568** | 03-217 | 266 | Root laden sandy silt, context also contained sulfur 03-101, connected to [677] |
| **586** | 03-220 | 91 | Sandy silt, context also contained sulfur 03-103 |
| **618** | 03-222 | 19 | Fill of hearth/furnace [630] in SF [492], see also [535] |
| **677** | 03-235 | 590 | Pink peat ash dump, connected with [568] |
| **688** | 03-237 | 148 | Mixed turf layer, [1076], associated with sulfur find 03-110 |
| **843** | 03-266 | 120 | Peat ash dump, fill, group [998], see also [963] |
| **878** | 03-270 | 108 | Sandy silt, external dump, group [1005] |
| **920** | 03-275 | 495 | Peat ash dump in SFB [1079] |
| **963** | 03-278 | 167 | Peat ash dump, context also contained sulfur find 03-115, fill, group [998], see also 843 |
| **1102** | 04-263 | 97 | Peat ash dump, group [1139] |
| **1676** | 04-320 | 163 | Mixed turf deposit, above [1681] |
| **1681** | 04-321 | 125 | Mixed deposit and charcoal, below [1676] |
| **1783** | 05-173 | 173 | Mixed sandy silt, group [1880] |
| **2007** | 05-182 | 660 | Filling of hearth [2140], 5-15 cm thick |
| **2023** | 05-183 | 295 | Peat ash filling of hearth [2140], 5-10 cm thick |
| **2269** | 05-190 | 117 | Peat ash deposit, group [2192] |
| **2432** | 06-165 | 24 | Fill of hearth, 1-5 cm thick, [group 3031] |
| **2452** | 06-176 | 230 | Fill of hearth, thickness unknown |
| **2476** | 06-168, 06-170 | 73 | Peat ash, burnt earth and turf, mixed |
| **2517** | 06-175 | 19 | Fill of hearth, 20-30 cm thick |
| **2547** | 06-167 | 80 | Peat ash deposit |
| **2638** | 06-166 | 133 | Mixed turf debris |
| **2757** | 06-087 | 28,8 | Backfill of hearth [2844] in booth [2397] |
| | **Total:** | **6776** | |

*Table 4 – Contexts rich in vitrified materials, bone and charcoal but lacking in slag*

| Context | Finds no. | Vitrified material (gr) | Fuel ash slag (gr) | Bone (gr) | Charcoal (gr) | Total (gr) |
|---|---|---|---|---|---|---|
| **224** | 02-225 | 3 | | | | **3** |
| **226** | 02-192 | 156 | | | | **156** |
| **231** | 02-197 | 8 | | | | **8** |
| **238** | 02-209 | 5,5 | | | | **5,5** |
| **243** | 02-207 | 14 | | | | **14** |
| **284** | 02-218 | 215 | | | | **215** |
| **297** | 02-224 | 39 | | | | **39** |
| **307** | 02-190 | 340 | | | | **340** |
| **311** | 02-220 | 172 | | | | **172** |
| **317** | 02-222, 02-223 | 48,5 | | | | **48,5** |
| **355** | 02-221 | 16 | | | | **16** |
| **357** | 02-216 | 13 | | | | **13** |
| **365** | 02-205 | 5 | | | | **5** |
| **370** | 02-196, 02-204 | 35 | | | | **35** |
| **377** | 02-211 | 101 | | | | **101** |
| **381** | 02-189 | 140 | | | | **140** |
| **390** | 02-199 | 14 | | | | **14** |
| **394** | 02-213 | 170 | | | | **170** |
| **400** | 02-187 | 7,5 | | | | **7,5** |
| **429** | 02-194, 02-195, 02-201, 02-212 | 439 | | | | **439** |
| **431** | 02-200 | 3 | | | | **3** |
| **439** | 02-210 | 510 | | | | **510** |
| **443** | 02-191, 02-219 | 52 | | | | **52** |
| **450** | 02-202 | 161 | | | | **161** |
| **531** | 03-210 | 32 | | | | **32** |
| **532** | 03-211 | 3 | | | | **3** |
| **533** | 03-212 | 10 | | | | **10** |
| **534** | 03-213 | 15 | | | | **15** |
| **535** | 03-214 | 150 | | | | **150** |
| **568** | 03-217 | 266 | | | | **266** |
| **585** | 03-219 | 14 | | | | **14** |
| **586** | 03-220 | 91 | | | | **91** |
| **617** | 03-221 | 22 | | | | **22** |
| **618** | 03-222 | 19 | | | | **19** |
| **634** | 03-224 | 39 | | | | **39** |
| **639** | 03-225 | 30 | | | | **30** |
| **651** | 03-226 | 39 | | | | **39** |
| **655** | 03-227 | 4 | | | | **4** |
| **660** | 03-228 | 28 | | | | **28** |
| **666** | 03-230 | 4 | | | | **4** |
| **672** | 03-231 | 15 | | | | **15** |
| **677** | 03-235 | 590 | | | 0,5 | **590,5** |
| **688** | 03-237 | 148 | | | | **148** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **689** | 03-238 | 15 | | | | **15** |
| **700** | 03-240 | 37 | | | | **37** |
| **701** | 03-241 | 8 | | | | **8** |
| **727** | 03-242 | 24 | | | | **24** |
| **728** | 03-243 | 3 | | | | **3** |
| **735** | 03-244 | 7 | | | | **7** |
| **738** | 03-245 | 31 | | | | **31** |
| **745** | 02-246 | 5 | | | | **5** |
| **756** | 03-248 | 9 | | | | **9** |
| **757** | 03-249 | 7 | | | | **7** |
| **773** | 03-251 | 33 | | | | **33** |
| **779** | 03-252 | 21 | | | | **21** |
| **782** | 03-253 | 3 | | | | **3** |
| **785** | 03-254 | 9 | | | | **9** |
| **808** | 03-256 | 16 | | | | **16** |
| **812** | 03-257 | | | 0,5 | | **0,5** |
| **815** | 03-258 | 2 | | | | **2** |
| **816** | 03-259 | 14 | | | | **14** |
| **817** | 03-260 | 0,5 | | | | **0,5** |
| **831** | 03-263 | 22 | | | | **22** |
| **843** | 03-266 | 120 | | | | **120** |
| **875** | 03-268 | 6 | | | | **6** |
| **876** | 03-269 | 4 | | | | **4** |
| **878** | 03-270 | 108 | | 1 | | **109** |
| **881** | 03-271 | 34 | | | | **34** |
| **883** | 03-272 | 6 | | | | **6** |
| **893** | 03-273 | 6 | | | | **6** |
| **894** | 03-095 | | 0,5 | | | **0,5** |
| **915** | 03-274 | 51 | | | | **51** |
| **920** | 03-275 | 495 | | | | **495** |
| **942** | 03-276 | 0,5 | | | | **0,5** |
| **957** | 03-277 | 0,5 | | | | **0,5** |
| **963** | 03-278 | 167 | | | | **167** |
| **966** | 03-279 | 0,5 | | | | **0,5** |
| **970** | 03-280 | 6 | | | | **6** |
| **1102** | 04-263 | 97 | | | | **97** |
| **1104** | 04-264 | 5 | | | | **5** |
| **1143** | 04-265 | 1 | | | | **1** |
| **1155** | 04-266 | 10 | | | | **10** |
| **1172** | 04-268 | 1 | | | | **1** |
| **1175** | 04-269 | 9 | | | | **9** |
| **1194** | 04-270 | 3 | | | | **3** |
| **1196** | 04-271 | 3 | | | | **3** |
| **1224** | 04-275 | 4 | | | | **4** |
| **1230** | 04-276 | 1 | | | | **1** |
| **1321** | 04-279 | 8 | | | | **8** |
| **1343** | 04-280 | 11 | | | | **11** |
| **1376** | 04-282 | 17 | | | | **17** |
| **1419** | 04-284 | 50 | | | | **50** |
| **1461** | 04-285 | 7 | | | | **7** |
| **1486** | 04-286 | 16 | | | | **16** |
| **1497** | 04-287 | 24 | | | | **24** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **1498** | 04-288 | 9 | | | | **9** |
| **1501** | 04-290 | | 0,5 | | | **0,5** |
| **1516** | 04-291 | 8 | | | | **8** |
| **1519** | 04-292 | 28 | | | | **28** |
| **1525** | 04-293 | 2 | | | | **2** |
| **1530** | 04-294 | 1 | | | | **1** |
| **1532** | 04-295 | 1 | | | | **1** |
| **1538** | 04-296 | 4 | | | | **4** |
| **1543** | 04-297 | 6 | | | | **6** |
| **1547** | 04-298 | 8 | | | | **8** |
| **1555** | 04-301 | 5 | | | | **5** |
| **1557** | 04-302 | 12 | | 0,5 | | **12,5** |
| **1610** | 04-304 | 0,9 | | | | **0,9** |
| **1619** | 04-305 | 1 | 1 | | | **2** |
| **1621** | 04-307 | 3 | | | | **3** |
| **1622** | 04-308 | 11 | | | | **11** |
| **1623** | 04-309 | 1 | | | | **1** |
| **1631** | 04-311 | 15 | | | | **15** |
| **1641** | 04-313 | 5 | | | | **5** |
| **1647** | 04-315 | | 3 | | | **3** |
| **1663** | 04-317 | 4,7 | | | | **4,7** |
| **1670** | 04-318 | 5,5 | | | | **5,5** |
| **1671** | 04-319 | 4 | | | | **4** |
| **1676** | 04-320 | 163 | 1 | | | **164** |
| **1681** | 04-321 | 125 | | | | **125** |
| **1685** | 04-334 | 5 | | | | **5** |
| **1691** | 04-335 | 5 | | | | **5** |
| **1708** | 04-337 | 13 | | | | **13** |
| **1722** | 04-338 | 4 | | | | **4** |
| **1776** | 05-172 | 5 | | | | **5** |
| **1783** | 05-173 | 173 | | | | **173** |
| **1794** | 05-174 | 32 | | | | **32** |
| **1795** | 05-175 | 5 | | | | **5** |
| **1851** | 05-176 | 35 | | | | **35** |
| **1873** | 05-177 | 4 | | | | **4** |
| **1893** | 05-178 | 10 | | | | **10** |
| **1916** | 05-179 | 10 | | | | **10** |
| **1937** | 05-180 | 4 | | | | **4** |
| **2002** | 05-181 | 61 | | | | **61** |
| **2007** | 05-182 | 660 | | | | **660** |
| **2023** | 05-183 | 295 | 1 | | | **296** |
| **2045** | 05-184 | | 65 | | | **65** |
| **2058** | 05-185 | 10 | | | | **10** |
| **2060** | 05-186 | 10 | | | | **10** |
| **2076** | 05-188 | 55 | | | | **55** |
| **2123** | 05-189 | 17 | | | | **17** |
| **2269** | 05-190 | 117 | | | | **117** |
| **2284** | 05-191 | 4 | | | | **4** |
| **2414** | 06-174 | 12 | | | | **12** |
| **2427** | 06-173 | 11,4 | | | | **11,4** |
| **2432** | 06-165 | 24 | | | | **24** |
| **2440** | 06-172 | 30 | | | | **30** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **2452** | 06-176 | 230 | | 1 | | **231** |
| **2476** | 06-168, 06-170 | 73 | | | | **73** |
| **2517** | 06-175 | 19 | | | | **19** |
| **2547** | 06-167 | 80 | | | | **80** |
| **2626** | 06-119 | 0,5 | | | | **0,5** |
| **2638** | 06-166 | 133 | | | | **133** |
| **2645** | 06-171 | 10 | | | | **10** |
| **2669** | 06-182 | 12 | | | | **12** |
| **2702** | 06-159 | 33,8 | | | | **33,8** |
| **2757** | 06-087 | 28,8 | | | | **28,8** |
| **5003** | 04-5018 | 11 | | | | **11** |
| **5066** | 04-5039 | 20 | | | | **20** |
| **5078** | 04-5027 | 5 | | | | **5** |
| **5096** | 04-5034 | 3 | | | | **3** |
| **5142** | 06-5112 | 14 | | | | **14** |
| | **Total:** | **8432,10** | **72** | **3** | **0,5** | **8507,6** |

*Table 5 – Fuel ash slag*

| No. | Site code | Context | MAX Dimensions (cm) | | | MIN Dimensions (cm) | | | Estimated volume (cm3) | Count | Weight (gr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length | Width | Depth | Length | Width | Depth | | | |
| **02-206** | GAS02 | 368 | 3,3 | 3 | 0,9 | | | | 9 | 1 | 3 |
| **03-095** | GAS03 | 894 | 1,7 | 1,3 | 1 | | | | 2 | 1 | 0,5 |
| **04-290** | GAS04 | 1501 | 1,8 | 1,4 | 1,1 | | | | 3 | 1 | 0,5 |
| **04-305** | GAS04 | 1619 | 2 | 1,7 | 1,2 | | | | 4 | 1 | 1 |
| **04-315** | GAS04 | 1647 | 2,8 | 2,3 | 1,6 | | | | 10 | 1 | 3 |
| **04-320** | GAS04 | 1676 | 3,5 | 2,1 | 1,2 | 2,6 | 1,6 | 1 | 13 | 2 | 1 |
| **05-183** | GAS05 | 2023 | 3,2 | 3 | 1,7 | 1 | 0,6 | 0,4 | 41 | 5 | 1 |
| **05-184** | GAS05 | 2045 | 9,5 | 6,4 | 3 | 5,3 | 3,5 | 2,5 | 229 | 2 | 65 |
| | | | | | | | | **Total:** | 311 | 14 | 75 |

*Table 6 – Undiagnostic slag*

| No. | Site code | Context | MAX Dimensions (cm) | | | MIN Dimensions (cm) | | | Estimated volume (cm3) | Count | Weight (gr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length | Width | Depth | Length | Width | Depth | | | |
| **02-185** | GAS02 | 001 | 5,4 | 3,7 | 3,2 | | | | 64 | 1 | 47 |
| **02-193** | GAS02 | 288 | 6 | 6 | 4 | | | | 144 | 1 | 44 |
| **02-198** | GAS02 | 221 | 3,6 | 3,4 | 1,6 | 3,5 | 3,5 | 1,5 | 38 | 2 | 31 |
| **02-203** | GAS02 | 368 | 3,2 | 1,7 | 0,7 | | | | 4 | 1 | 3 |
| **02-214** | GAS02 | 259 | 5 | 3,7 | 2 | | | | 37 | 1 | 18 |
| **02-215** | GAS02 | 001 | 3,3 | 2,5 | 1,5 | | | | 12 | 1 | 10 |
| **03-208** | GAS03 | 101 | 5 | 3,6 | 3,4 | 5,6 | 3,3 | 1,7 | 93 | 2 | 56 |
| **03-209** | GAS03 | 530 | 2 | 1,3 | 0,9 | 1,5 | 1,2 | 0,9 | 8 | 4 | 6 |
| **03-215** | GAS03 | 540 | 6,6 | 5,1 | 3 | | | | 101 | 1 | 39 |
| **03-216** | GAS03 | 559 | 4,2 | 3,6 | 3,4 | | | | 51 | 1 | 33 |
| **03-223** | GAS03 | 633 | 2,9 | 1,9 | 1,2 | 0,5 | 0,5 | 0,5 | 37 | 11 | 29 |
| **03-229** | GAS03 | 663 | 2,7 | 1,2 | 1,1 | | | | 4 | 1 | 4 |
| **03-233** | GAS03 | 674 | 4,3 | 2,9 | 1,5 | | | | 19 | 1 | 13 |
| **03-239** | GAS03 | 697 | 2 | 1,8 | 1,1 | | | | 4 | 1 | 4 |
| **03-255** | GAS03 | 796 | 6,7 | 5,3 | 3,5 | | | | 124 | 1 | 72 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **03-262** | GAS03 | 823 | 1,3 | 1 | 0,9 | 0,9 | 0,7 | 0,7 | 2 | 2 | 4 |
| **03-264** | GAS03 | 832 | 2,8 | 2,2 | 1,2 | | | | 7 | 1 | 5 |
| **04-267** | GAS04 | 1159 | 4,2 | 2,2 | 1,7 | | | | 16 | 1 | 16 |
| **04-273** | GAS04 | 1213 | 5 | 3,5 | 2 | | | | 35 | 1 | 26 |
| **04-277** | GAS04 | 1245 | 5 | 3,3 | 2 | | | | 33 | 1 | 20 |
| **04-299** | GAS04 | 1548 | 4,8 | 4 | 2,8 | | | | 54 | 1 | 26 |
| **04-300** | GAS04 | 1550 | 3,5 | 2,8 | 1,8 | | | | 18 | 1 | 17 |
| **04-322** | GAS04 | 1682 | 4,1 | 2,7 | 2,2 | | | | 24 | 1 | 8 |
| **04-336** | GAS04 | 1702 | 5,6 | 3,8 | 1,7 | 0,6 | 0,5 | 0,4 | 181 | 10 | 53 |
| **04-5005** | GAS04 | 5001 B | 2,4 | 1,1 | 0,9 | | | | 2 | 1 | 3 |
| **05-187** | GAS05 | 2066 | 5,5 | 4 | 2 | 2,1 | 1,9 | 1,7 | 51 | 2 | 43 |
| **05-195** | GAS05 | 2128 | 2,5 | 2,4 | 1,5 | | | | 9 | 1 | 5 |
| **06-157** | GAS06 | 1 | 3,9 | 3,3 | 2,5 | | | | 32 | 1 | 18 |
| **06-160** | GAS06 | 2738 | 5,8 | 3,4 | 3 | | | | 59 | 1 | 38 |
| **06-169** | GAS06 | 2435 | 4,7 | 4,1 | 3,3 | | | | 64 | 1 | 31 |
| **06-5150** | GAS06 | 5019 B | 5 | 2,4 | 2 | 0,8 | 0,7 | 0,5 | 97 | 8 | 48 |
| | | | | | | | | **Total:** | 1424 | 64 | 770,0 |

*Table 7 – Vitrified materials*

| No. | Site code | Context | MAX Dimensions (cm) | | | MIN Dimensions (cm) | | | Estimated volume (cm3) | Count | Weight (gr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length | Width | Depth | Length | Width | Depth | | | |
| **02-187** | GAS02 | 400 | 3,5 | 2,5 | 1,6 | 2,4 | 2,4 | 0,9 | 29 | 3 | 8 |
| **02-188** | GAS02 | 001 | 8 | 6,2 | 5,5 | 1 | 0,7 | 0,5 | 956 | 7 | 58 |
| **02-189** | GAS02 | 381 | 8,5 | 6,2 | 3,5 | 2,2 | 1,7 | 0,9 | 2066 | 22 | 140 |
| **02-190** | GAS02 | 307 | 5 | 5 | 5 | 1,5 | 1 | 0,5 | 2767 | 44 | 340 |
| **02-191** | GAS02 | 443 | 3,3 | 2,7 | 1,9 | | | | 17 | 1 | 7 |
| **02-192** | GAS02 | 226 | 9,5 | 8 | 4,5 | 7 | 5,5 | 4 | 744 | 3 | 156 |
| **02-194** | GAS02 | 429 | 6,6 | 5,7 | 2,7 | 1,6 | 1,3 | 0,9 | 362 | 7 | 48 |
| **02-195** | GAS02 | 429 | 2,8 | 2,5 | 2 | 2,4 | 1,8 | 1,2 | 19 | 2 | 6 |
| **02-196** | GAS02 | 370 | 2,7 | 2,4 | 1,7 | | | | 11 | 1 | 6 |
| **02-197** | GAS02 | 231 | 2,9 | 2,7 | 1,6 | 2,8 | 2,4 | 1,6 | 23 | 2 | 8 |
| **02-199** | GAS02 | 390 | 4,2 | 3 | 2,2 | 2,5 | 1,5 | 0,7 | 76 | 5 | 14 |
| **02-200** | GAS02 | 431 | 2,3 | 1,7 | 1,2 | | | | 5 | 1 | 3 |
| **02-201** | GAS02 | 429 | 10 | 6 | 5,5 | 5,2 | 4,5 | 1,5 | 1095 | 6 | 190 |
| **02-202** | GAS02 | 450 | 10 | 7,5 | 4 | 4 | 3,5 | 1,2 | 1109 | 7 | 161 |
| **02-203** | GAS02 | 368 | 6,3 | 4,6 | 2,2 | 1,4 | 1,2 | 0,9 | 228 | 7 | 37 |
| **02-204** | GAS02 | 370 | 4,6 | 4 | 2,8 | 2,6 | 2 | 0,9 | 141 | 5 | 29 |
| **02-205** | GAS02 | 365 | 3,6 | 1,6 | 1,2 | 2,1 | 1,8 | 1,2 | 11 | 2 | 5 |
| **02-207** | GAS02 | 243 | 4,4 | 3,3 | 1,4 | 3 | 2,1 | 1,2 | 28 | 2 | 14 |
| **02-209** | GAS02 | 238 | 2,8 | 2,4 | 1,9 | | | | 13 | 1 | 6 |
| **02-210** | GAS02 | 439 | 16 | 11 | 10 | 3,8 | 2,5 | 1,7 | 3552 | 4 | 510 |
| **02-211** | GAS02 | 377 | 9,5 | 9 | 5 | 2,8 | 2 | 1,6 | 655 | 3 | 101 |
| **02-212** | GAS02 | 429 | 7 | 4,5 | 3,5 | 1 | 1 | 0,6 | 998 | 18 | 195 |
| **02-213** | GAS02 | 394 | 11,5 | 6 | 4 | 1,7 | 1,5 | 0,8 | 2780 | 20 | 170 |
| **02-216** | GAS02 | 357 | 4,7 | 2,7 | 2 | 1,9 | 1,3 | 1 | 97 | 7 | 13 |
| **02-217** | GAS02 | 001 | 5,1 | 3,7 | 2,2 | 2,2 | 1,6 | 1 | 158 | 7 | 27 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **02-218** | GAS02 | 284 | 5,5 | 4 | 2,6 | 1,2 | 0,8 | 0,8 | 2348 | 81 | 215 |
| **02-219** | GAS02 | 443 | 5 | 4 | 2,9 | 2,2 | 1,3 | 1,1 | 245 | 8 | 45 |
| **02-220** | GAS02 | 311 | 12 | 8,5 | 4,2 | 3,4 | 1,8 | 0,8 | 1733 | 8 | 172 |
| **02-221** | GAS02 | 355 | 5,6 | 4,8 | 3 | | | | 81 | 1 | 16 |
| **02-222** | GAS02 | 317 | 4 | 2,7 | 2 | 2,3 | 1,3 | 0,8 | 60 | 5 | 16 |
| **02-223** | GAS02 | 317 | 6,5 | 4,9 | 1,7 | 3,8 | 2,3 | 1,6 | 102 | 3 | 33 |
| **02-224** | GAS02 | 297 | 5,2 | 4,2 | 3,3 | 2,2 | 1,1 | 0,7 | 406 | 11 | 39 |
| **02-225** | GAS02 | 224 | 1,6 | 1,3 | 1,1 | | | | 2 | 1 | 3 |
| **03-208** | GAS03 | 101 | 11,5 | 9 | 5 | 1,7 | 1,1 | 0,8 | 11158 | 43 | 395 |
| **03-209** | GAS03 | 530 | 4 | 2,8 | 1,7 | | | | 19 | 1 | 4 |
| **03-210** | GAS03 | 531 | 5,2 | 3,5 | 1,5 | 1,7 | 1,4 | 0,8 | 102 | 7 | 32 |
| **03-211** | GAS03 | 532 | 1,7 | 1,2 | 1,1 | | | | 2 | 1 | 3 |
| **03-212** | GAS03 | 533 | 3,8 | 2,5 | 1,7 | | | | 16 | 1 | 10 |
| **03-213** | GAS03 | 534 | 4,2 | 2,8 | 2,8 | 2,2 | 1,9 | 1,1 | 56 | 3 | 15 |
| **03-214** | GAS03 | 535 | 6,7 | 6,7 | 4 | 1,5 | 1,2 | 0,9 | 3714 | 41 | 150 |
| **03-216** | GAS03 | 559 | 5,8 | 4 | 2,1 | 1,4 | 1,1 | 0,7 | 174 | 7 | 22 |
| **03-217** | GAS03 | 568 | 5,8 | 5,5 | 4,5 | 1 | 1 | 0,7 | 3390 | 47 | 266 |
| **03-218** | GAS03 | 569 | 7,1 | 5 | 2,2 | 2,1 | 1,8 | 1,1 | 82 | 2 | 21 |
| **03-219** | GAS03 | 585 | 3,5 | 2,5 | 2 | 1,7 | 1,2 | 0,6 | 66 | 7 | 14 |
| **03-220** | GAS03 | 586 | 7 | 5,5 | 5 | 2 | 1,8 | 1,2 | 295 | 3 | 91 |
| **03-221** | GAS03 | 617 | 5,2 | 4,5 | 2,2 | 2 | 1,6 | 1,2 | 55 | 2 | 22 |
| **03-222** | GAS03 | 618 | 5,1 | 4,3 | 2 | 1,7 | 1,3 | 0,6 | 226 | 10 | 19 |
| **03-223** | GAS03 | 633 | 4,1 | 2,5 | 1,8 | | | | 18 | 1 | 6 |
| **03-224** | GAS03 | 634 | 9 | 5,5 | 2,7 | 2,7 | 2,2 | 1,6 | 143 | 2 | 39 |
| **03-225** | GAS03 | 639 | 3,6 | 3,4 | 2,5 | 1,5 | 1,3 | 0,7 | 144 | 9 | 30 |
| **03-226** | GAS03 | 651 | 6,7 | 5,4 | 3 | 1,2 | 0,8 | 0,7 | 218 | 4 | 39 |
| **03-227** | GAS03 | 655 | 2,8 | 2,7 | 1,8 | | | | 14 | 1 | 4 |
| **03-228** | GAS03 | 660 | 3,9 | 3,6 | 2 | 3,9 | 2,6 | 1,8 | 69 | 3 | 28 |
| **03-230** | GAS03 | 666 | 2,2 | 1,4 | 1,3 | 1,6 | 1,5 | 1,3 | 11 | 3 | 4 |
| **03-231** | GAS03 | 672 | 3,8 | 4,2 | 1,8 | | | | 29 | 1 | 15 |
| **03-232** | GAS03 | 674 | 4,5 | 3,8 | 2,8 | 1,6 | 1 | 0,6 | 244 | 10 | 18 |
| **03-235** | GAS03 | 677 | 9,5 | 8,5 | 7,5 | 0,5 | 0,5 | 0,5 | 606 | 53 | 590 |
| **03-237** | GAS03 | 688 | 10 | 5,8 | 5 | 3,2 | 1,6 | 1 | 885 | 6 | 148 |
| **03-238** | GAS03 | 689 | 6,1 | 3,7 | 1,9 | | | | 43 | 1 | 15 |
| **03-240** | GAS03 | 700 | 7 | 5 | 3,2 | | | | 112 | 1 | 37 |
| **03-241** | GAS03 | 701 | 4,2 | 2,9 | 2 | | | | 24 | 1 | 8 |
| **03-242** | GAS03 | 727 | 5,2 | 3,5 | 3 | | | | 55 | 1 | 24 |
| **03-243** | GAS03 | 728 | 2,1 | 1,5 | 1,2 | 2,1 | 1,5 | 1 | 7 | 2 | 3 |
| **03-244** | GAS03 | 735 | 2,1 | 1,5 | 1 | 1,8 | 1,6 | 0,9 | 9 | 3 | 7 |
| **03-245** | GAS03 | 738 | 4,3 | 5 | 3,5 | 1,7 | 1,1 | 1 | 193 | 5 | 31 |
| **03-246** | GAS03 | 745 | 4,1 | 3,2 | 2,1 | | | | 28 | 1 | 5 |
| **03-248** | GAS03 | 756 | 3,4 | 3 | 2 | 1,5 | 1,1 | 0,7 | 32 | 3 | 9 |
| **03-249** | GAS03 | 757 | 3,4 | 2,8 | 1,8 | | | | 17 | 1 | 7 |
| **03-251** | GAS03 | 773 | 4,2 | 2,6 | 2,5 | 2,3 | 1,5 | 1,5 | 81 | 5 | 33 |
| **03-252** | GAS03 | 779 | 3,2 | 2,8 | 2 | 1,5 | 1,2 | 1 | 79 | 8 | 21 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **03-253** | GAS03 | 782 | 3 | 2,9 | 1,5 | | | | 13 | 1 | 3 |
| **03-254** | GAS03 | 785 | 4,3 | 2,5 | 2,1 | | | | 23 | 1 | 9 |
| **03-256** | GAS03 | 808 | 4,7 | 3,5 | 2,8 | | | | 46 | 1 | 16 |
| **03-258** | GAS03 | 815 | 2,6 | 2,3 | 1,3 | | | | 8 | 1 | 2 |
| **03-259** | GAS03 | 816 | 4,1 | 3,1 | 2,5 | 3,4 | 3,1 | 2,6 | 59 | 2 | 14 |
| **03-260** | GAS03 | 817 | 2,3 | 1,5 | 0,9 | | | | 3 | 1 | 0,5 |
| **03-261** | GAS03 | 823 | 10 | 6,5 | 3,5 | 1 | 0,8 | 0,5 | 1709 | 15 | 86 |
| **03-263** | GAS03 | 831 | 5 | 3,5 | 1,8 | 2,5 | 1,1 | 1,1 | 86 | 5 | 22 |
| **03-265** | GAS03 | 835 | 3,4 | 3,3 | 1,4 | 2 | 1,9 | 1 | 88 | 9 | 14 |
| **03-266** | GAS03 | 843 | 6,5 | 5 | 3 | 1 | 0,8 | 0,6 | 1323 | 27 | 120 |
| **03-268** | GAS03 | 875 | 3,5 | 2,2 | 1,3 | 2,3 | 1,6 | 0,8 | 19 | 3 | 6 |
| **03-269** | GAS03 | 876 | 3,8 | 2 | 1,5 | 1,8 | 1 | 0,6 | 25 | 4 | 4 |
| **03-270** | GAS03 | 878 | 5,1 | 3,5 | 2,2 | 1,1 | 1 | 1 | 727 | 36 | 108 |
| **03-271** | GAS03 | 881 | 8 | 5 | 4 | 2,1 | 1,8 | 1,2 | 494 | 6 | 34 |
| **03-272** | GAS03 | 883 | 4,5 | 2 | 2 | | | | 18 | 1 | 6 |
| **03-273** | GAS03 | 893 | 2,9 | 2,8 | 2 | | | | 16 | 1 | 6 |
| **03-274** | GAS03 | 915 | 10 | 5 | 3 | 2,4 | 2 | 1 | 387 | 5 | 51 |
| **03-275** | GAS03 | 920 | 14,5 | 12,5 | 5 | 2,7 | 1,2 | 0,6 | 5903 | 13 | 495 |
| **03-276** | GAS03 | 942 | 2,5 | 2,4 | 2 | | | | 12 | 1 | 0,5 |
| **03-277** | GAS03 | 957 | 1,9 | 1,1 | 0,9 | | | | 2 | 1 | 0,5 |
| **03-278** | GAS03 | 963 | 11,5 | 7 | 4 | 1,4 | 1,1 | 0,6 | 2583 | 16 | 167 |
| **03-279** | GAS03 | 966 | 1,6 | 1,6 | 1,1 | | | | 3 | 1 | 0,5 |
| **03-280** | GAS03 | 970 | 2,8 | 2,7 | 1,5 | | | | 11 | 1 | 6 |
| **04-262** | GAS04 | 1 | 4,7 | 4,2 | 3 | 3 | 3 | 1,7 | 112 | 3 | 21 |
| **04-263** | GAS04 | 1102 | 8 | 6,5 | 2,5 | 1,1 | 0,6 | 0,5 | 2085 | 32 | 97 |
| **04-264** | GAS04 | 1104 | 3,1 | 2,5 | 1,7 | 1,8 | 1,5 | 1,3 | 17 | 2 | 5 |
| **04-265** | GAS04 | 1143 | 2,3 | 2,3 | 1,5 | | | | 8 | 1 | 1 |
| **04-266** | GAS04 | 1155 | 4 | 3 | 1,6 | | | | 19 | 1 | 10 |
| **04-268** | GAS04 | 1172 | 2,6 | 2 | 1,5 | | | | 8 | 1 | 1 |
| **04-269** | GAS04 | 1175 | 6,4 | 3,2 | 2,5 | | | | 51 | 1 | 9 |
| **04-270** | GAS04 | 1194 | 2,2 | 2 | 1,5 | 0,6 | 0,4 | 0,4 | 20 | 6 | 3 |
| **04-271** | GAS04 | 1196 | 3 | 1,8 | 1,7 | | | | 9 | 1 | 3 |
| **04-275** | GAS04 | 1224 | 3 | 2,6 | 2 | | | | 16 | 1 | 4 |
| **04-276** | GAS04 | 1230 | 1,8 | 1,5 | 1,4 | | | | 4 | 1 | 1 |
| **04-277** | GAS04 | 1245 | 12 | 7 | 5 | 1,5 | 0,9 | 0,8 | 1895 | 9 | 169 |
| **04-279** | GAS04 | 1321 | 4 | 3,5 | 1,8 | | | | 25 | 1 | 8 |
| **04-280** | GAS04 | 1343 | 4 | 3,4 | 2,7 | 1,6 | 1,2 | 0,9 | 58 | 3 | 11 |
| **04-282** | GAS04 | 1376 | 3,4 | 2,2 | 2,2 | 1,7 | 1,2 | 0,9 | 37 | 4 | 17 |
| **04-284** | GAS04 | 1419 | 8,5 | 5 | 4,5 | 3,2 | 2,4 | 1,5 | 304 | 3 | 50 |
| **04-285** | GAS04 | 1461 | 2,8 | 2,4 | 2 | 4 | 2,1 | 1,4 | 25 | 2 | 7 |
| **04-286** | GAS04 | 1486 | 8,3 | 6,5 | 2,5 | | | | 135 | 1 | 16 |
| **04-287** | GAS04 | 1497 | 4,3 | 4,2 | 3 | | | | 54 | 1 | 24 |
| **04-288** | GAS04 | 1498 | 2,5 | 2,4 | 2 | 2 | 1,6 | 1,4 | 25 | 3 | 9 |
| **04-291** | GAS04 | 1516 | 3,1 | 2 | 2 | 1,6 | 1,4 | 0,6 | 41 | 6 | 8 |
| **04-292** | GAS04 | 1519 | 5 | 4,4 | 2,5 | 1,8 | 1,3 | 1 | 229 | 8 | 28 |
| **04-293** | GAS04 | 1525 | 3,5 | 2,1 | 1,2 | | | | 9 | 1 | 2 |
| **04-294** | GAS04 | 1530 | 1,7 | 1,4 | 1,2 | | | | 3 | 1 | 1 |
| **04-295** | GAS04 | 1532 | 2,8 | 2 | 0,6 | | | | 3 | 1 | 1 |
| **04-296** | GAS04 | 1538 | 2,8 | 2,3 | 1,5 | 2,2 | 1,2 | 0,9 | 6 | 1 | 4 |
| **04-297** | GAS04 | 1543 | 4,3 | 3,2 | 1,2 | 1 | 0,6 | 0,5 | 25 | 3 | 6 |
| **04-298** | GAS04 | 1547 | 5,1 | 2,5 | 1,8 | | | | 23 | 1 | 8 |
| **04-299** | GAS04 | 1548 | 2,4 | 1 | 1 | | | | 2 | 1 | 0,5 |
| **04-301** | GAS04 | 1555 | 3,2 | 3,2 | 1,2 | | | | 12 | 1 | 5 |
| **04-302** | GAS04 | 1557 | 3,5 | 3,4 | 2,2 | 1,4 | 0,9 | 0,7 | 68 | 5 | 12 |
| **04-304** | GAS04 | 1610 | 1,8 | 1,7 | 0,9 | | | | 3 | 1 | 0,9 |
| **04-305** | GAS04 | 1619 | 2,8 | 2,2 | 1,2 | | | | 7 | 1 | 1 |
| **04-307** | GAS04 | 1621 | 2,7 | 2,4 | 1,2 | 1,5 | 1,2 | 1,1 | 15 | 3 | 3 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **04-308** | GAS04 | 1622 | 4,3 | 2,7 | 1,5 | | | | 17 | 1 | 11 |
| **04-309** | GAS04 | 1623 | 2,6 | 2,5 | 1,5 | | | | 10 | 1 | 1 |
| **04-311** | GAS04 | 1631 | 4,8 | 3 | 2,5 | 3 | 2,5 | 1,5 | 95 | 4 | 15 |
| **04-313** | GAS04 | 1641 | 3,6 | 2,5 | 1,2 | 1,9 | 1,7 | 0,9 | 14 | 2 | 5 |
| **04-317** | GAS04 | 1663 | 2,8 | 2,3 | 1,4 | 1,4 | 0,9 | 0,6 | 15 | 3 | 4,7 |
| **04-318** | GAS04 | 1670 | 3,3 | 3,1 | 2,4 | | | | 25 | 1 | 5,5 |
| **04-319** | GAS04 | 1671 | 2,4 | 2,1 | 1,9 | | | | 10 | 1 | 4 |
| **04-320** | GAS04 | 1676 | 6 | 5,3 | 2,5 | 1,2 | 0,7 | 0,7 | 601 | 15 | 163 |
| **04-321** | GAS04 | 1681 | 8 | 7 | 3,5 | 1 | 0,8 | 0,6 | 1277 | 13 | 125 |
| **04-334** | GAS04 | 1685 | 3,1 | 2,3 | 1,6 | | | | 11 | 1 | 5 |
| **04-335** | GAS04 | 1691 | 2,6 | 2,3 | 2 | | | | 12 | 1 | 5 |
| **04-337** | GAS04 | 1708 | 5,5 | 4,7 | 2,7 | | | | 70 | 1 | 13 |
| **04-338** | GAS04 | 1722 | 3 | 2,5 | 1,2 | 2,9 | 1,4 | 1 | 13 | 2 | 4 |
| **04-5009** | GAS04 | 5001 B | 7,5 | 4,8 | 2,8 | 1,6 | 1,1 | 1 | 615 | 12 | 129 |
| **04-5018** | GAS04 | 5003 B | 3,2 | 2,2 | 2 | 2 | 1,4 | 1,2 | 52 | 6 | 11 |
| **04-5027** | GAS04 | 5078 B | 3,7 | 2,7 | 1,7 | | | | 17 | 1 | 5 |
| **04-5034** | GAS04 | 5096 B | 3,1 | 2,2 | 1,2 | | | | 8 | 1 | 3 |
| **04-5039** | GAS04 | 5066 B | 3,5 | 3 | 1,5 | 0,5 | 0,5 | 0,5 | 16 | 25 | 20 |
| **05-172** | GAS05 | 1776 | 3,7 | 2,2 | 1,3 | | | | 11 | 1 | 5 |
| **05-173** | GAS05 | 1783 | 14,5 | 4,9 | 3,6 | | | | 256 | 1 | 173 |
| **05-174** | GAS05 | 1794 | 7 | 6,5 | 4,7 | 5,5 | 3,3 | 2,8 | 265 | 2 | 32 |
| **05-175** | GAS05 | 1795 | 4,4 | 3,2 | 2,8 | | | | 39 | 1 | 5 |
| **05-176** | GAS05 | 1851 | 6 | 4,2 | 3 | 2,1 | 1,6 | 0,9 | 118 | 3 | 35 |
| **05-177** | GAS05 | 1873 | 3,7 | 2,6 | 2,5 | 1,8 | 1,7 | 1,2 | 28 | 2 | 4 |
| **05-178** | GAS05 | 1893 | 4,3 | 3 | 1,6 | 2,4 | 2,2 | 1,3 | 41 | 3 | 10 |
| **05-179** | GAS05 | 1916 | 5,8 | 3,3 | 2,1 | | | | 40 | 1 | 10 |
| **05-180** | GAS05 | 1937 | 3,5 | 2,2 | 1,7 | | | | 13 | 1 | 4 |
| **05-181** | GAS05 | 2002 | 9 | 6 | 3 | 3 | 2,6 | 1,5 | 87 | 1 | 61 |
| **05-182** | GAS05 | 2007 | 12,5 | 8,5 | 4,5 | 0,5 | 0,5 | 0,5 | 478 | 144 | 660 |
| **05-183** | GAS05 | 2023 | 11 | 7,5 | 5 | 0,5 | 0,5 | 0,5 | 413 | 36 | 295 |
| **05-185** | GAS05 | 2058 | 4,3 | 3,1 | 2,4 | | | | 32 | 1 | 10 |
| **05-186** | GAS05 | 2060 | 4,6 | 3 | 1,4 | 3,9 | 1,7 | 1 | 39 | 3 | 10 |
| **05-188** | GAS05 | 2076 | 9,4 | 5,6 | 2,5 | | | | 132 | 1 | 55 |
| **05-189** | GAS05 | 2123 | 5,3 | 3,6 | 2,7 | 5,1 | 2,8 | 1,1 | 34 | 1 | 17 |
| **05-190** | GAS05 | 2269 | 10 | 6,5 | 3,5 | 4,2 | 3,6 | 2 | 387 | 3 | 117 |
| **05-191** | GAS05 | 2284 | 2,5 | 2 | 1,5 | | | | 8 | 1 | 4 |
| **05-197** | GAS05 | 1 | 3,6 | 3,3 | 2,2 | 1,8 | 1,2 | 0,9 | 14 | 1 | 10 |
| **06-087** | GAS06 | 2757 | 6,2 | 5,6 | 4,2 | | | | 146 | 1 | 28,8 |
| **06-119** | GAS06 | 2626 | 1,3 | 1,3 | 0,8 | | | | 1 | 1 | 0,5 |
| **06-157** | GAS06 | 1 | 5 | 3,5 | 2,5 | | | | 44 | 1 | 7 |
| **06-159** | GAS06 | 2702 | 4,3 | 3,3 | 3,3 | 4 | 3,3 | 2,5 | 80 | 2 | 33,8 |
| **06-165** | GAS06 | 2432 | 6,3 | 4,5 | 2,5 | 3,2 | 2,2 | 1,5 | 122 | 3 | 24 |
| **06-166** | GAS06 | 2638 | 10,5 | 9 | 7 | | | | 662 | 1 | 133 |
| **06-167** | GAS06 | 2547 | 7,5 | 6,5 | 3,3 | 3,5 | 2,6 | 1,2 | 429 | 5 | 80 |
| **06-168** | GAS06 | 2476 | 10,5 | 7,5 | 4 | | | | 315 | 1 | 62,3 |
| **06-170** | GAS06 | 2476 | 7,2 | 3,5 | 2 | | | | 50 | 1 | 10,7 |
| **06-171** | GAS06 | 2645 | 3,7 | 2,2 | 1,5 | 2,8 | 2,1 | 1 | 18 | 2 | 10 |
| **06-172** | GAS06 | 2440 | 5 | 3,9 | 1,7 | 3,5 | 2,6 | 1,3 | 90 | 4 | 30 |
| **06-173** | GAS06 | 2427 | 4,4 | 3,2 | 2 | 2,6 | 2,5 | 1,6 | 39 | 2 | 11,4 |
| **06-174** | GAS06 | 2414 | 4,3 | 3,4 | 2,3 | | | | 34 | 1 | 12 |
| **06-175** | GAS06 | 2517 | 5 | 4 | 2,4 | 2,4 | 2,3 | 1,2 | 137 | 5 | 19 |
| **06-176** | GAS06 | 2452 | 5 | 5 | 5 | 1,5 | 1 | 0,5 | 1069 | 17 | 230 |
| **06-182** | GAS06 | 2669 | 6 | 4,1 | 1,8 | | | | 44 | 1 | 12 |
| **06-5108** | GAS06 | 5001 B | 5,3 | 3,4 | 2,5 | 1,3 | 1,1 | 0,6 | 1561 | 68 | 204 |
| **06-5112** | GAS06 | 5142 B | 4,8 | 4 | 2,2 | 3,5 | 2,5 | 2 | 60 | 2 | 14 |
| **06-5138** | GAS06 | 5194 B | 5,1 | 3 | 2,4 | 0,5 | 0,5 | 0,5 | 368 | 20 | 50 |
| | | | | | | | | **Total:** | **74822** | **1304** | **9710,6** |

*Table 8 – Bone and charcoal*

| No. | Site code | Context | MAX Dimensions (cm) | | | MIN Dimensions (cm) | | | Count | Weight (g) | Id. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length | Width | Depth | Length | Width | Depth | | | |
| **03-235** | GAS03 | 677 | 1,5 | 1,2 | 1 | | | | 1 | 0,5 | Charcoal |
| **03-257** | GAS03 | 812 | 1,6 | 1,3 | 0,7 | | | | 1 | 0,5 | Bone |
| **03-270** | GAS03 | 878 | 1,4 | 1,1 | 1,1 | | | | 1 | 1 | Bone |
| **04-302** | GAS04 | 1557 | 1,7 | 1,6 | 0,8 | | | | 1 | 0,5 | Bone |
| **06-176** | GAS06 | 2452 | | | | | | | 1 | 1 | Bone |
| | | | | | | | | | 5 | 3,5 | |

## Part Four

# Preliminary Textile Report Gásir, Iceland 2011

Michéle Hayeur Smith

# Preliminary Textile Report

## GÁSIR, ICELAND 2011

Michèle Hayeur Smith

*Research Reports of the Circumpolar Lab 2*

**HAFFENREFFER MUSEUM OF ANTHROPOLOGY**

**BROWN UNIVERSITY**

This preliminary report is part of an NSF-funded project at the Haffenreffer Museum of Anthropology, Brown University (Rags to Riches An Archaeological Study of Textiles and Gender in Iceland, AD 874 -1800 (Award no:1023167 )), examining gender and textile production and research carried out by Fornleifastofnun Íslands (FSÍ, the Archaeological Institute of Iceland) at the site of Gásir, in Eyjafjörður, northern Iceland. *Rags to Riches* aspires to bring women's lives and women's roles in the Icelandic economy, in household and regional politics, and in Icelandic culture and projections of identity into the forefront of contemporary archaeological research in the North Atlantic. The Gásir project is examining the role of this site, the largest of Iceland's preserved medieval harbour sites, in the regional and international context of Iceland's economy.

This report is a preliminary analysis of the textile material excavated from Gásir between 2001-2006. The analysis of these textiles was carried out in May 2011 at the collections centre of the National Museum of Iceland (Þjóðminjasafn Íslands), where they are curated. Each piece was analysed for fibre identification, object dimensions, thread count, warp and weft yarn dimensions, spin tension (when possible), construction details, colour (evidence for dyeing will be performed in subsequent months), weave pattern, evidence for incorporation within larger garments or objects, adhering or incorporated non-textile materials, and unique features. All objects were photographed using a digital DinoScope™ microscope and a Nikon digital camera. Incorporated into the report are images from the DinoScope™ at magnifications ranging from 70X-200X. Samples have been taken from select pieces of cloth and await further analysis for dye identification and, in some cases, entomological analysis. These will be carried out at the University of Rhode Island at the Department of Textile Conservation.

When these analyses were carried out, if envelopes contained multiple fragments of cloth listed under the same number and that it was clear that these were fragments from the same piece of cloth, the largest was recorded, measured and analysed. All of the pieces were, in these cases, described as one piece of cloth. If the package contained more than one type of cloth, each different type was assigned a suffix (e.g a, b, c…z) after the National Museum's catalogue number to indicate a different fabric type. This having been said in the numbers listed below reflect each fragment to give an idea of the total number of fragments of cloth.

The annotations z2S, s2Z, etc. refer to plied yarns: z2S means the yarn is plied with an S-spin/twist (counter clockwise spin) using two z-spun/twist (clockwise-spin) single yarns. Sites from this period do not display a large variety of cloth types. The most common types are 2/2 twills or *vaðmál*, which come in a range of qualities or threads counts, as is apparent at Gásir. Cloth was used as currency and was legally regulated in Iceland between the 11$^{th}$ and 17$^{th}$ centuries. Cloth money was usually a 2/2 twill and, once acquired, was often re-used and transformed into clothing or household items. This is generally apparent in archaeological specimens by the amount of napping on the surface of the cloth, through the presence of seams or

other indications of secondary use or manufacturing activities, and sometimes through the presence of adhering materials, such as animal hair or surface treatments. Tabbies (*einskefta*) were also commonly produced. Although never used as currency, tabbies were used to make garments, wall hangings, etc (Hoffman, 1974). Patterned twills and 2/1 twills are extremely rare for this period but were produced during the Viking Age in Scandinavia and are sometimes recorded in Iceland. Knits do not appear in the archaeological record before 1500 AD. Roving, which is abundant at Gásir, is raw wool used for spinning and is represented in this collection by long twists of combed raw wool. The presence of roving as an export product is undocumented, thus far, in Iceland and indicates that not only was cloth exported from Iceland but also raw wool.

Textile fragments were recovered during excavation from a small church built for use at the harbour during the medieval period and from excavated, turf-walled, semi-permanent structures (búðir, booths) used for temporary, seasonal habitation at the harbour, for sheltering and protecting goods being traded or prepared for trans-shipment, and for craftwork.

The material recovered from the site can be divided into the following categories:

| | |
|---|---|
| WOVEN CLOTH | **54*** |
| FELT | 0 |
| ROVING | 21 |
| LOOSE FIBERS/ YARN | 3 |
| OTHER | 1 |
| TOTALS | 79 |

*these numbers include every fragment of cloth including those that belong to one larger piece of cloth

**Material divided according to location**

| | **Church** | **Booths** |
|---|---|---|
| Vaðmál (2/2 twill) | 48 | 5 |
| 2/1 Twill | 0 | 0 |
| Tabby weave | 0 | 1 |
| Roving | 0 | 21 |
| Complete garments | 2[1] | 0 |
| Loose fibres/yarn | 1 | 2 |

[1] Not analysed, on display in Akureyri and not include in total numbers of woven cloth listed above.

| | | |
|---|---|---|
| Felt | 0 | 0 |
| Uncertain weave type or material | 0 | 1 |

## Textiles from Gásir–Finds from the Church area.

### **GAS 2004-188-5033**: 2 fragments

| | |
|---|---|
| Dimensions | 42 cm x 30cm; 19cm x 5 cm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | z/s |
| Twist on warp | 43.9° |
| Twist on weft | NA |
| Thread count | 5/NA/cm |
| Colour | Dark brown |

Comments: Both of these fragments are from the same piece of cloth. The fabric is heavily felted and shredded making the weft threads difficult to see and assess. Portions of the fabric are shaped in semi-circular form. These are all significantly large pieces.

### **GAS 2004-188-5032:** 1 fragment

| | |
|---|---|
| Dimensions | 50.5 cm x 19cm x 10 cm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | Z/S |
| Twist on warp | 37.4° |

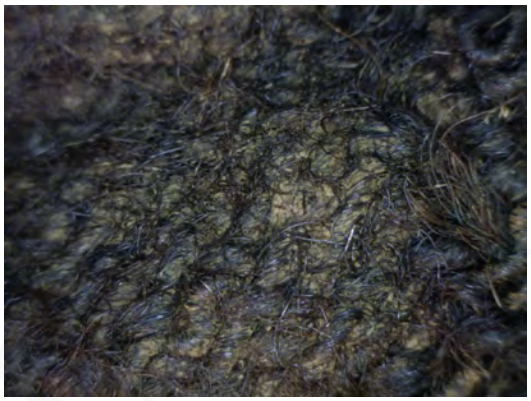
| | |
|---|---|
| Twist on weft | 26°? |
| Thread count | 9-10/4/cm |
| Colour | Brown |

Comments: 2/2 twill, heavily felted- the presence of additional coarse white hairs on the surface and stuck into the weave of the fabric might reveal its use. These hairs were selected for analysis and identification-possibly horse(?), which may suggest that these large pieces were part of saddles or horse gear.

**GAS 2004-188-5023:** 25 fragments

| | |
|---|---|
| Dimensions | 30 cm x 21.5 cm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | Z/S |
| Twist on warp | 41.3° |
| Twist on weft | 30.9° |
| Thread count | 10/6/cm |
| Colour | Dark brown |

Comments: relatively fine weave broken into many small pieces. Measurements were taken on the largest piece. Textile is very worn, with some degree of felting, making fabric structure difficult to see.



**GAS 2004-188-5038**: 3 fragments

| | |
|---|---|
| Dimension | 56.29 mm x 58.55 mm; 36.90 mm x 25.3mm, 52.09 mm x 33.35 mm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | Z/S |
| Twist on warp | 44.7° |
| Twist on weft | 21.2° |
| Thread count | 10/4 |
| Colour | Dark brown |

Comment: This textile was not well cleaned, with vegetal substances on surface, probably roots. All three fragments are from the same piece of fabric.

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**GAS 2004-188-5031** 1 fragment

| | |
|---|---|
| Dimensions | 101.06 mm x 85.1 mm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | Z/S |
| Twist on warp | 32.3° |
| Twist on weft | 34.3° |
| Thread count | 4/3/cm |
| Colour | brown |

Comments: loose weave, poor quality and low thread count. Fabric not well cleaned.

**GAS 2004-188-5021** 1 fragment

| | |
|---|---|
| Dimensions | 153.87 mm x 126.87 mm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | Z/S |
| Twist on warp | 43.3° |
| Twist on weft | 32.1° |
| Thread count | 9/5/cm |
| Colour | Dark brown |

Comments: 2/2 twill, average quality weave. Textile not well cleaned.

**GAS 2006-5105:** 15 fragments

| | |
|---|---|
| Dimensions | 26 cm x 11cm (taken on largest piece) |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | Z/S |
| Twist on warp | 40° |
| Twist on weft | 30° |
| Thread count | 9/4/cm |
| Colour | Dark brown |

Comment: 15 fragments, all part of one piece of cloth - measurements were taken on the largest piece. Textile is very dirty, still caked in mud and roots - difficult to see fabric structure.

## GAS 2004-188-5036

| | |
|---|---|
| Dimensions | 60.38 mm |
| Weave | NA |
| Fibre | Wool |
| Spin | z/s |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Tan |

Comments: a fragment of plied yarn spun z/s, although the fibres are so heavily napped that the spin direction is barely visible except at extremities. Overall, final plied twist not visible.

## Textile Finds from the Booths

### GAS 2003- (756)- 200 1 fragment

| | |
|---|---|
| Dimensions | 95.01 mm x 35.0mm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | z/s |
| Twist on warp | 49.7° |
| Twist on weft | 33.9° |
| Thread count | 10/6 |
| Colour | Light brown |

Comments: 2/2 twill small piece, well woven. An additional fragment, un-cleaned, in a sample bag from the field was attached to this one. The underside of this piece is very felted so the piece was used or worn.

**GAS 2002-085** 1 fragment

| | |
|---|---|
| Dimensions | 119.3mm x 75.46 mm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | Z/S |
| Twist on warp | 40°? |
| Twist on weft | 30° |
| Thread count | 10-12/8/cm |
| Colour | Brown |

Comments: weft faced 2/2 twill; the weft threads are thick and also hide the warp threads that are tightly spun. Several threads of yarn are coming apart from the main body of the fabric.


Top surface


Underside of same textile.

**GAS 2006-078** 1 fragment

| | |
|---|---|
| Dimensions | 97.45 mm x 20.43 mm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | Z/S |
| Twist on warp | 42.5° |
| Twist on weft | 30° |

| | |
|---|---|
| Thread count | 7/5/cm |
| Colour | Light brown |

Comments: Very regular 2/2 twill.

**GAS 2005-014** 1 fragment

| | |
|---|---|
| Dimension | 92.15 mm x 63.04 mm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | Z/S |
| Twist warp | 42.7° |
| Twist on weft | 30° |
| Thread count | 8/6/cm |
| Colour | Black |

Comments: fine weave.

## GAS 2005-085

| | |
|---|---|
| Dimensions | 28.13 mm x 22.90 mm |
| Weave | NA |
| Fibre | Vegetal fibre |
| Spin | NA |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Tan |

Comments: not a woven textile, clump of vegetal fibres. Straw? Flax?

## GAS 2006-034 1 fragment

| | |
|---|---|
| Dimension | 67.21 mm x 18.56 mm |
| Weave | Uncertain tabby? |
| Fibre | Wool |
| Spin | Z/S |
| Twist warp | NA |
| Twist on weft | NA |
| Thread count | 4?/3?/cm |
| Colour | brown |

Comment: Warp threads are almost impossible to see, as the textile surface is very napped due to coarse weft threads, weave type is difficult to identify. Possibly a weft-faced tabby weave?

**GAS 2004-1376** 1 fragment

| | |
|---|---|
| Dimensions | 87.70 mm x 21.50 mm |
| Weave | 2/2 twill |
| Fibre | Wool |
| Spin | Z/S |
| Twist on warp | 43° |
| Twist on weft | 38.2° |
| Thread count | 10-12/6/cm |
| Colour | Reddish brown |

Comments: 2/2 twill that is very napped that the textile is almost a felt. Underside is even more felted. Weave is apparent on the end section where loose yarn is visible.

## GAS 2003-201

| | |
|---|---|
| Dimensions | 55.88 mm x 0.23 mm |
| Weave | NA plied yarn |
| Fibre | Wool |
| Spin | Z2S |
| Twist on warp | 32.1° |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Tan |

Comment: single strands of yarn are spun z and are plied S.

## GAS 2002-086: 4 strands of roving

| | |
|---|---|
| Dimension | 200 mm x 22.76 mm; 190 mm x 19.23 mm; 185 mm x 10.58 mm; 39.24 mm x 14.04 mm |
| Weave | Roving |
| Fibre | Wool |
| Spin | NA |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Dark brown |

Comments: four strands of roving. A roving is a long and narrow bundle of fibre used to spin woollen yarn. Roving can be created by carding the fibre and then

drawing it into long strips. Because it is carded, the fibres are not all parallel, though drawing it into strips may align the fibres somewhat.

**Photo ref.**

**GAS 2005-088:** 2 strands of roving

| | |
|---|---|
| Dimensions | 205 mm x 17.33 mm/ 220 mm x 15.85 mm |
| Weave | NA roving |
| Fibre | Wool |
| Spin | NA |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Dark brown |

Comments: 2 strands of roving. These are very loosely twisted which comes from when the roving is prepared for sale. Today roving is often purchased in loosely twisted strands that come apart easily. Close examination indicates that many of the

fibres are parallel and that they consist of both finer hairs and coarse ones with a predominance of finer fibres, from dual-coated sheep.

**GAS 2002 -087:** 3 strands of roving

| | |
|---|---|
| Dimensions | 121.35 mm x19.96 mm; 33.03 mm x 17.82 mm; 68.27 mm x 11.40 mm |
| Weave | NA |
| Fibre | Wool |
| Spin | NA |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Dark brown |

Comment: three strands, although one appears to be a broken piece from the second strand. Wool is mostly finer fibres.

**GAS 2003-197:** 5 strands of roving

| | |
|---|---|
| Dimension | 355 mm x 12.48 mm; 250 mm x 15.10 mm; 174 mm x 17.69 mm; 103 mm x 16.62 mm; 42.44 mm x 16.28 mm |

| | |
|---|---|
| Weave | NA |
| Fibre | Wool |
| Spin | NA |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Dark brown |

Comment: similar to other strands.

**GAS 2006- 100:** 1 strand

| | |
|---|---|
| Dimension | 220 mm x 23.13 mm |
| Weave | NA |
| Fibre | Wool |
| Spin | NA |
| Twist warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Dark Brown |

Comment: Fibres have been combed; much of the wool is *þel,* the finer wool from the inner coat of the sheep.


**GAS 2003-312:** 1 strand of roving

| | |
|---|---|
| Dimension | 120.51 mm x 39.43 mm |
| Weave | NA |
| Fibre | Wool |
| Spin | NA |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Reddish brown |

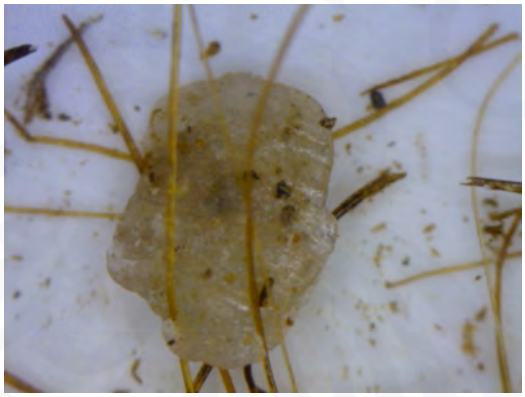
Comment: Loosely twisted piece of roving. Reddish hue on surface of the wool.


**GAS 2003-199:** I strand of roving

| | |
|---|---|
| Dimension | 68.92 mm x 27.31 mm |
| Weave | NA |
| Fibre | Wool |
| Spin | NA |
| Twist warp | NA |
| Twist on weft | NA |

| | |
|---|---|
| Thread count | NA |
| Colour | Dark brown |

Comment: Roving loosely twisted covered with white specks that look like clusters of flea eggs? Removal of one of the white flecks and examination under a microscope indicate that this could be the exoskeleton of a flea? Samples were taken for analysis by an entomologist.



**GAS 2003-202:** 2 strands of roving

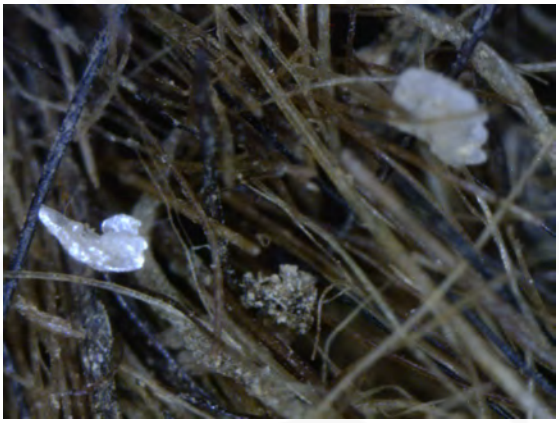
| | |
|---|---|
| Dimensions | 109.79 mm x 30.44 mm; 79.15 mm x 10.93 mm |
| Weave | NA |
| Fibre | Wool |
| Spin | NA |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Dark Brown |

Comment: the two fragments belong to one piece, once again loosely twisted. Roving has more white flecks. Wool may have been discarded because of a flea infestation?


**GAS 2003-198:** 1 strand of roving

| | |
|---|---|
| Dimensions | 82.47 mm x 22.05 mm |
| Weave | NA |
| Fibre | Wool |
| Spin | NA |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Dark Brown |

Comment: Roving, with evidence of parasites?

**GAS 2006-73:** Roving with small loop(?) at one extremity

| | |
|---|---|
| Dimensions | 85.82 mm x 15.54 mm |
| Weave | NA |
| Fibre | Wool |
| Spin | NA |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Brown |

Comment: small tie or loop at one end.

**GAS 2002-088:** Loose hair and mud

| | |
|---|---|
| Dimensions | 131.68 mm x 62.06 mm (largest piece; smaller ones have broken off) |
| Weave | NA |
| Fibre | Wool |
| Spin | NA |
| Twist on warp | NA |
| Twist on weft | NA |
| Thread count | NA |
| Colour | Dark Brown |

Comment: Clump of mud with hair/ fibres. Given the quantity of mud it is not possible to determine if there is a textile (either woven or felted) inside. Very fragile.