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ARCHAEOMETRY LABORATORY

Archaeological Investigations at the Norse Farms Ø4 and Ø37, Narsaq Commune, Greenland

R.G. Commisso, 2003

INTERIM REPORT

ARCHAEOLOGICAL INVESTIGATION

at the Norse Farms

Ø4 and Ø37

Narsaq Commune, Greenland

Excavation Permit Number: NKA 51.20.03-05

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SUMMARY

This report details the archaeological fieldwork conducted at Ø4 (FM-nr 534) and Ø37 (FM-nr 531) under the Excavation Permit Number 51.20.03-05. The purpose of the fieldwork was the application and assessment of a new method of archaeological investigation that uses the nitrogen isotopic composition of plants currently growing on archaeological sites to identify past alterations to the environment. This study is part of a three-year doctoral research project that will be applying this method at a number of archaeological sites in Greenland.

The fieldwork consisted of the collection of the above ground portion of individual plants at selected locations within two Norse farms (Ø4 and Ø37) in the Qorlortup Itinnera region of the Eastern Settlement. For the majority of the samples, the soil below the plants was collected using a 25 mm core in order to correlate whether the plant samples were growing on natural or anthropogenic sediments,

The analysis of the plant and soil samples is currently being conducted. To date there are only a few isotopic measurements of the plant samples from Ø37 to report. While these initial results suggest that the possible fertilization of the infield is being reflected in the isotopic composition of the plants collected within this area, further analysis is required before this conclusion can be made. The final report will provide all of the results following the completion of the project.

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1.0 INTRODUCTION

This report details the archaeological fieldwork conducted between July 29 and August 5, 2003 at two Norse farms, Ø4 (FM-nr 534) and Ø37 (FM-nr 531), in Qorlortup Itinnera (Fig. 1). The purpose of the research was to apply and assess a new method of archaeological investigation that uses the isotopic composition of plants currently growing within a site to identify past human alterations to the environment.

The field work consisted of the collection of plant samples at chosen locations within the archaeological sites. The soils below the majority of the sample locations were also collected, using a 25 mm core, in order to determine whether the plants were growing on anthropogenic or naturally accumulated soils.

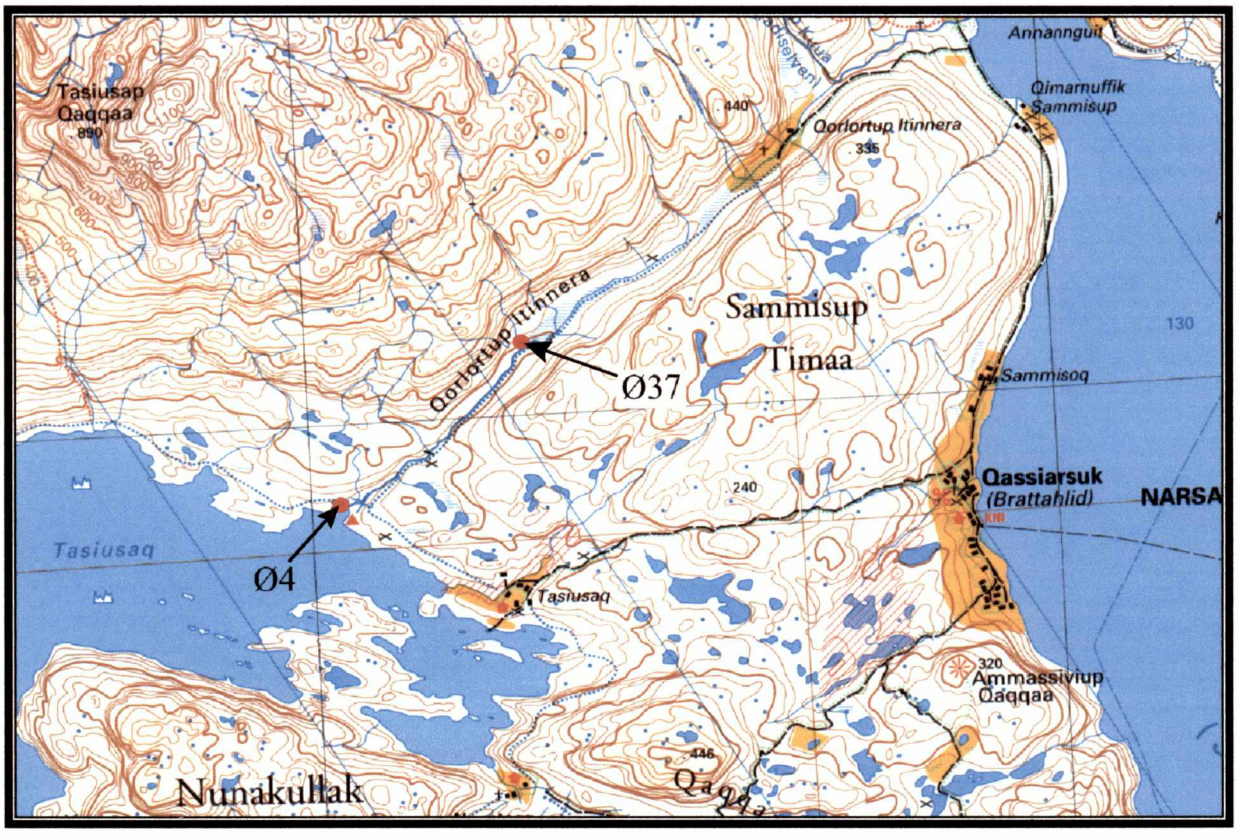

Figure 1. Map showing the locations of the Norse farms Ø4 (FM-nr 534) and Ø37 (FM-nr 531).

This report provides the relevant background information of the project and details the fieldwork at each site. The analysis of the plants and soils is currently being conducted. To date, we only have the results of the isotopic measurement for a limited number of plant samples from Ø37.

This study was conducted under the Excavation Permit Number 51.20.03-05 in accordance with the regulations of the Greenland National Museum and Archive. The study was directed solely at determining whether a relationship between $\delta^{15}N$ values of modern plants and anthropogenic sediments and as such, no effort was made to obtain additional information regarding these archaeological sites.

2.0 PROPOSED PROJECT

This section outlines the background to the research proposal and provides the location and description the archaeological sites investigated.

2.1 RESEARCH PROPOSAL

The research conducted at Ø4 (FM-nr 534) and Ø37 (FM-nr 531) was the first part of a proposed three-year research project in Greenland, which will apply and assess a new method of archaeological investigation at a number of archaeological sites.

From our previous work at archaeological sites on the Pacific Coast of British Columbia, Canada and at a Thule site on Cornwallis Island in the Canadian Arctic archipelago, we know that plants growing on midden deposits containing marine animal remains have a higher portion of ^{15}N isotopes (or higher $\delta^{15}N$ values) than the plants growing on natural soils in the same area (Commisso, 2002). These observed differences in plant $\delta^{15}N$ values directly reflect the higher portion of ^{15}N isotopes in the nitrogen derived from the decaying marine animals as compared to the nitrogen that is naturally accumulated in soils. While this is a simplification of a complex nitrogen cycle and the associated fractionation processes (see Hogberg 1997 and Handley and Scrimgeour 1997 for reviews), in theory and practice plant $\delta^{15}N$ values will reflect the isotopic composition of animal derived nitrogen in certain physical and climatic environments (cf., Ben-David, 1998; Ben-David, 1998A; Bilby, 1996; Cederholm, 1999; Erskine, 1998; Fisherwold, 1999; Hawke, 1999; Kline, 1990; Mizutani, 1991; Mizutani, 1991A).

In part, the project is assessing whether marine animals accumulated in Greenlandic archaeological sites will have the same affect on the $\delta^{15}N$ values of the plants growing on these deposits as we have found elsewhere. To test this, plants were collected from the midden deposits in the Norse sites since it has been established that these deposits consistently contain large numbers of seal remains.

An additional goal of the research is to determine whether other organic contributions to the soils, such as fertilizers (i.e. manure, seaweed, etc.), can also be identified through the $\delta^{15}N$ values of the modern vegetation. While there has been much speculation on possible fertilizer applications on Norse farms, there is very little quantitative evidence that fertilizing practices were routinely performed by these farmers (see McGovern *et al.* 1988 for discussion)

2.2 Ø4 (FM-nr 534)

The Norse farm Ø4 (FM-NR 534) is located on the northern shoreline of Tasiusaq at the western end of Qorlortup Itinnera at the mouth of the Qorlortup river (61 09 388 lat.N, 45 39 400 long.W (WGS 84)) (Figs. 1 and 2). This appears to have been a relatively large farm based on the number of ruins. Most of the ruins are situated along the present edge of the terrace. Four other ruins are located up slope. Approximately 650 m west-northwest of the farm there is a large stone enclosure that abuts a rock outcrop (Fig. 4).

Figure 2. Photo looking northwest across the mouth of the Qorlortup River towards Ø4 (FM-nr 534).

The natural exposures along the terrace edge, in front of what is believed to be the main dwelling (Fig. 4), revealed a thick humic layer with small numbers of bone dispersed throughout. This was interpreted to be midden deposits. Midden deposits were also suspected to be between the main dwelling and the barn/byre since the vegetation within this area was more dense and luxuriant than vegetation covering the rest of the site (Fig. 4). No infield could be clearly defined within the site although immediately west of the byre/barn there is a relatively small grassy area where there is a distinct absence of dwarf-shrubs. This grassy area may represent a portion of or the entire infield (Fig. 4).

2.3 Ø37 (FM-nr 531)

The Norse farm Ø37 (FM-nr 531) is located approximately 3.3 km northeast of Tasiusaq in the central portion of Qorlortop Itinerra (61 10 583 lat.N, 45 36 289 long.W (WGS 84)) (Fig 1).

Figure 3. Photo looking north towards Ø37 (FM-nr 531). Black lines identify some of the ruins and the green line shows the extent of what is interpreted to be the infield.

The farm is situated on the floor of the valley on the eastern half of a large alluvial fan. Based on the number of ruins it appears to have been a mid-sized farm, consisting of one dwelling, a barn/byre, two stone enclosed pen/folds, (Fig. 5) and several other small unidentified buildings or enclosures near the main buildings and along the bottom of the slope, north of the dwelling.

There were no visual indications of midden deposits within the site, although we assumed that they may be located around the dwelling. The infield appeared to be clearly demarcated. It is believed to extend northwest/southeast from the base of the slope to the Qorlortop River and southwest/northeast from a fluvial cut or ditch to the eastern edge of the alluvial fan (Figs. 3 and 5). In comparison to the surrounding area including the remaining portions of the alluvial fan, the area believed to have been the infield had noticeably fewer surface cobbles, a distinctive grass cover and an absence of dwarf-shrubs (Fig. 3). There are

also two linear stone formations, presumably dykes, located along the eastern portions of the field (Figs. 5 and 7).

3.0 METHODOLOGY

3.1 OBJECTIVES

The general objectives of the fieldwork were:

1) to collect plant samples from a variety of locations within the site including the midden deposits, within the structures, and from the infield;

2) to collect plant samples from the surrounding area were there was no direct evidence of human impact;

3) to extract the sediment below the sample locations using a 25 mm core ; and,

4) to record the location of the plant and core samples.

3.2 METHODOLOGY

3.2.1 Sampling at Ø4 (FM-nr 534)

Plants were collected from 111 sample locations at Ø4 (FM-nr 534) (Fig. 4). Within the general area of the building ruins, we randomly selected 35 sample locations which were on a variety of features such as the midden deposits between the barn/byre and dwelling, the suspected infield to the west of the barn/byre and some locations on the surrounding hillside (Fig. 4). This also includes 10 samples from within the buildings (six from the barn/byre, two from the dwelling, and one from each stone–built house). To prevent any impact to in-situ artifacts or features, no soils were collected within the buildings. Soils were collected at the remaining 25 sample locations within this area.

Within the large stone enclosure west of the main site, plants were collected at 69 sample locations which were placed at equal intervals along several east/west transects (Fig. 4). Seven additional samples locations were randomly placed outside of the enclosure.

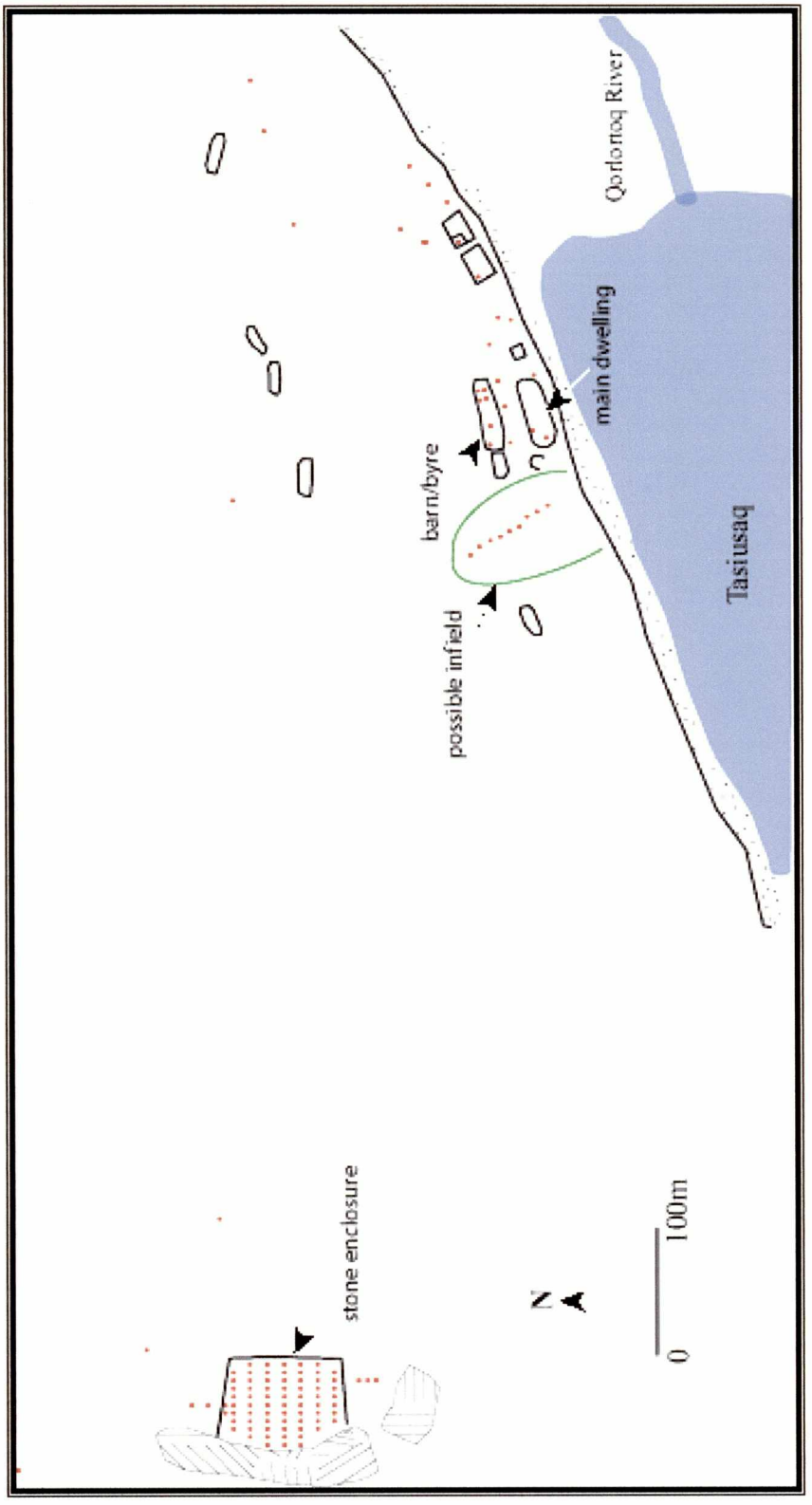

Figure 4. Schematic map of Ø4 (FM-NR 534) showing the location of the ruins and the sample locations (red circles).

Soils were collected at every second sample location on the each transect within the enclosure (total of 34 sediment cores). Soils were collected at each sample location outside of the enclosure.

3.2.2 Sampling at Ø37 (FM-nr 531)

Plants were collected from 111 sample locations at Ø37 (FM-nr 531). The majority of the sample locations were systematically placed at equal intervals along five transects which extended across the assumed infield (outlined in green on Figure 5) and an undisturbed area to the west and southwest of the infield.

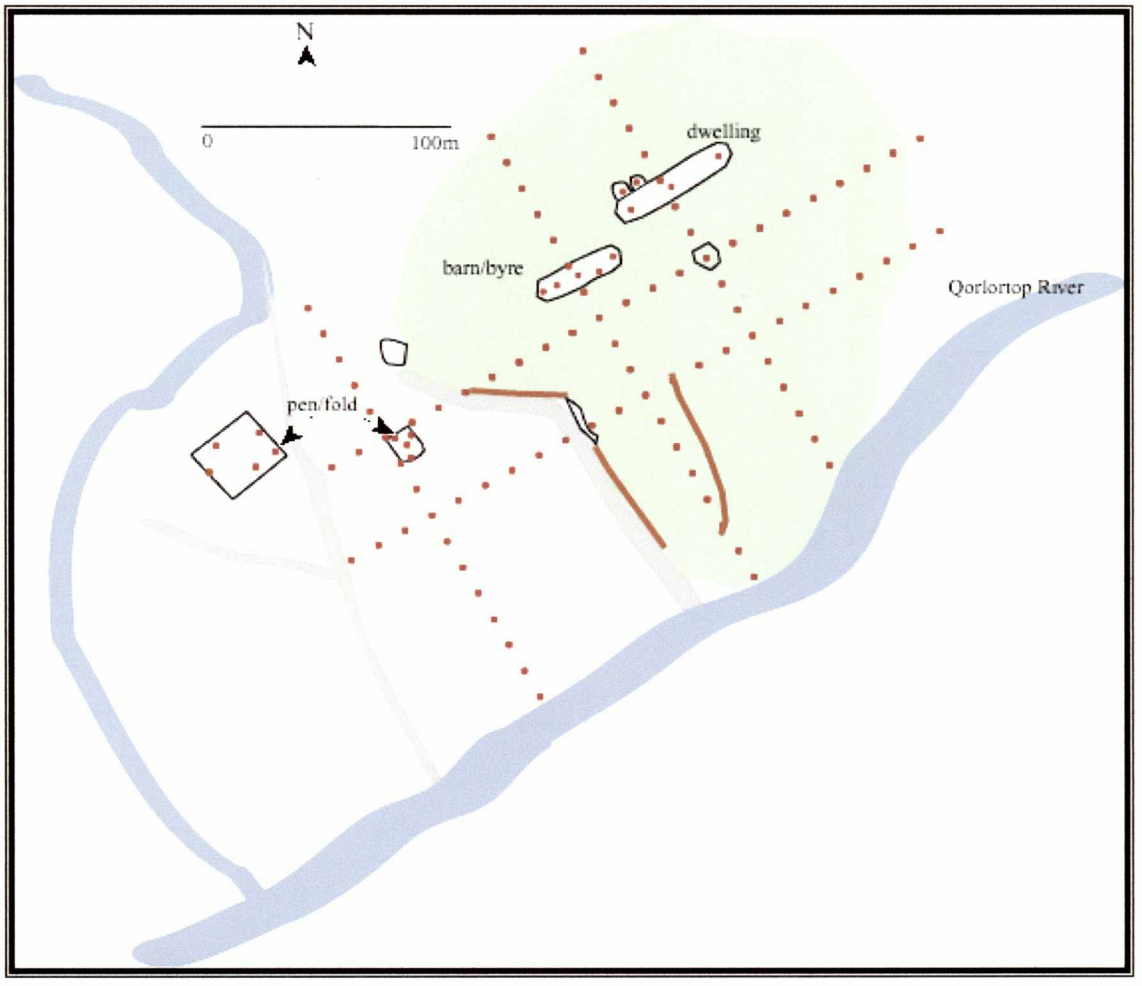

Figure 5. Schematic map of Ø37 (FM-nr 531) showing the location of the ruins and the sample locations (red circles).

Included within the 111 sample locations were a number of randomly placed samples within the buildings and pens/folds (five samples each from both the dwelling and the barn/byre, four from inside of a small central pen/fold, and five from a larger pen at the western extent of the farm) (Fig. 5). As was the case at Ø4 (FM-NR 534), no soils were collected within either the dwelling or barn/byre to prevent any impact to in-situ artifacts or features. Soils were collected at the remaining 101 sample locations including those within the pen/folds.

3.2.3 Sampling Procedure

The fieldwork was carried out between July 29 and August 5, 2003.

A theodolite was used to record the coordinates of each sample location. Plant sampling consisted of the collection of the above-ground portion of one or more plants at each location. For those sample locations where soils were collected, a 25 mm core was used to collect a single soil core at each sample location (Figure 6).

Figure 6. An example of a soil core collected from the infield at Ø37.

The depth of the soil cores ranged from 5 to 60 cm below the surface dependent upon on the permeability and depth of the soil. A photograph of each sediment core was taken and the sediments were collected and labeled by sample locality. The plant and soil samples were shipped to the Simon Fraser University Archaeometry Lab, Burnaby, British Columbia, Canada, dried under vacuum and are stored in the lab for analysis.

4.0 RESULTS

4.1 Results of the archaeological investigations at Ø4 and Ø37

4.1.1 Results from Ø4 (FM-NR 534)

Plants were collected from 111 sample locations at this site. Soil cores were collected at a selected number (59 soil cores) of these locations. A visual inspection of the cores was conducted in the field and no artifacts were discovered in any of the cores.

To date, there are no results to report for either the isotopic analysis of the plants or the chemical analysis of the soils for this site. The preparation and analysis is currently being conducted for these samples.

4.1.2 Results from Ø37 (FM-NR 531)

Plants were collected from 111 sample locations at this site. Soil cores were collected at all of the sample locations outside of the dwelling and barn/byre (101 soil cores). A visual inspection of the cores was conducted in the field and no artifacts were discovered in any of the cores.

To date, we have only obtained a few results for the isotopic analysis of the plants at this site (presented below in Figure 6). There are no results to report for the chemical analysis of the soils. The preparation and analysis of the soil samples and the remaining plant samples is currently being conducted.

As shown in Figure 6, the results of the nitrogen isotopic measurement for the plant samples collected along one of the transects at Ø37 (FM-nr 531) shows considerable variability in the plant $\delta^{15}N$ values for the respective sample locations. For those samples located on what is believed to have been the infield (light green area) the range in values is from -0.6 to 7.6 ‰. The two samples collected off the field have values of -0.7 and 1.6 ‰. A sample collected in a small annex of one of the pens has a $\delta^{15}N$ value of 4.1 ‰.

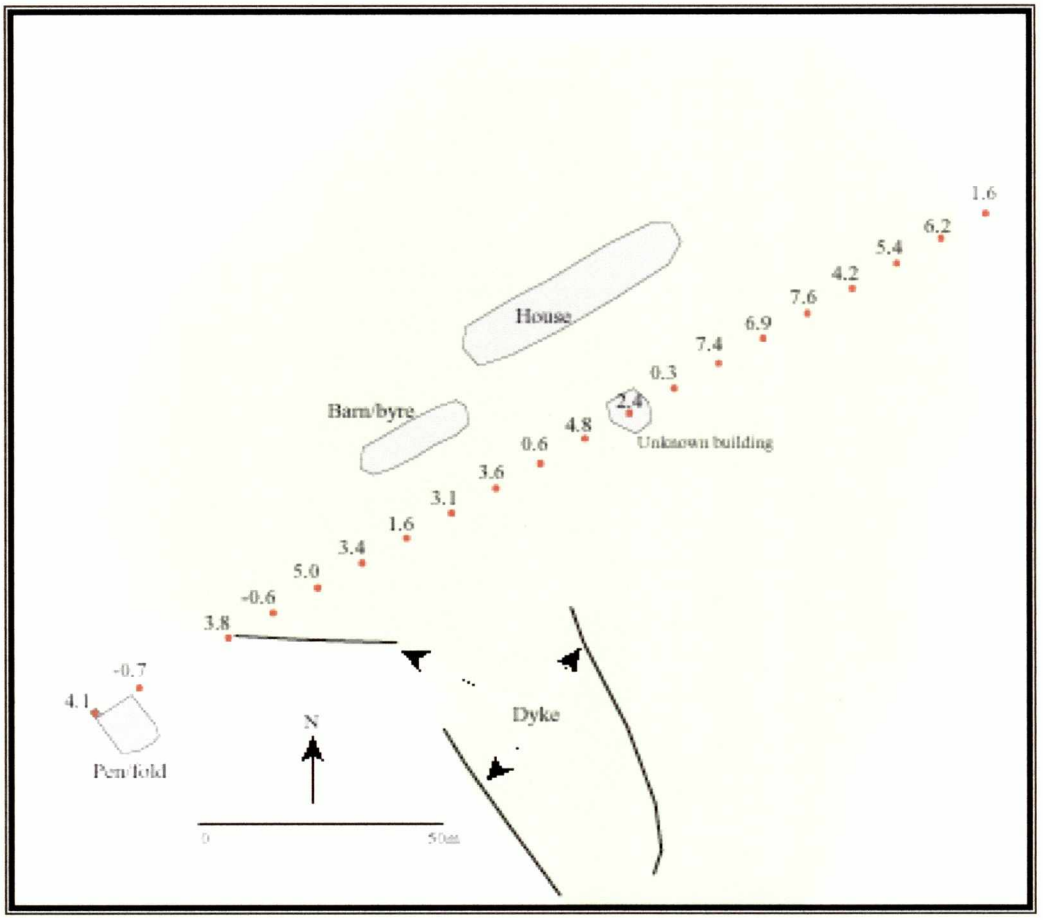

Figure 6. Results of the nitrogen isotopic measurement for a few plant samples from Ø37. The numbers represent the $\delta^{15}N$ values (‰) of the plants at these locations.

Considerably more results are needed to before any conclusions can be made, however these first results suggest that there may be some evidence of past fertilization of the infield. The range in $\delta^{15}N$ values for plants growing on natural soils is expected to be < 2.0 ‰. While further analysis will determine if this expectation is correct, the two values (-0.7 and 1.6 ‰) for the samples collected off of the field correspond with this range. In comparison, a large number of samples collected from what is believed to have been the infield have $\delta^{15}N$ values above 3.0 ‰. These values indicate that the nitrogen added to the soil in these areas is isotopically different than the naturally accumulated nitrogen and thus suggests that some type of fertilizer (i.e. manure or seaweed) was added in the past.

5.0 CONCLUSIONS

The fieldwork conducted at Ø4 (FM-nr 534) and Ø37 (FM-nr 531) was the first application in a three-year project which will be determining if the $\delta^{15}N$ values of plants currently growing on Greenlandic archaeological sites can be used to identify areas where organic material has been deposited in the past. Our application consisted of the collection of plants from selected locales (a total of 222 localities) within these sites such as midden deposits, infields and within some of the structures. Additional plant samples were collected from presumed natural areas for comparison. Soils below selected sample areas (160 soil cores) were collected using a 25 mm core. No artifacts were found in any of the cores. The soils will be chemically analyzed to determine if they are naturally or anthropogenically accumulated.

The soil analysis and the isotopic measurement of the plants are currently being conducted. The few results that we have obtained thus far from Ø37 (FM-nr 531), indicates that there is some isotopic effect within the infield which may be attributed to past fertilization, although more results are needed before this conclusion can be made. All of results of the study will be presented in a Final Report at the commencement of the project.

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