Report on Analysis of Polynesian Plain Ware from the Ulu Tree Site, on the Island of Tutuila, American Samoa

Suzanne L. Eckert[1] and Frederic B. Pearl[1]
[1] Department of Anthropology, Texas A&M University
[2] Department of General Academics, Texas A&M Galveston

KEYWORDS: Polynesian Plain Ware, Tutuila, Samoa, Oceania, ceramic production.

Polynesian Plain Ware from the Ulu Tree Site (AS-31-127)

The Ulu Tree site is located on the island of Tutuila, American Samoa. It is situated on the Tafuna Plain, a broad flat plain of fresh basaltic tuffs and lavas on the southwest side of the island that are of Holocene age (Stearns 1944). The Ulu Tree site is among a growing number of pottery-bearing sites that have been salvaged due to ongoing construction activities by the American Samoa Power Authority (ASPA). Pottery-bearing sites are particularly significant in Samoa for three reasons: 1) The presence of pottery is considered a characteristic feature of "Ancestral Polynesian Society," the purported ancestors of eastern Polynesians; 2) There is heated controversy over whether ceramic production ceased ca. 1600 BP, or whether it continued into the later prehistoric period; and, 3) ceramics lend themselves to analyses that can answer key questions about prehistoric economies - something about which little is known in Samoa for the period of 3300 to 1600 BP. Items 1 and 2 above are particularly controversial, and continued investigation of well-stratified early Samoan sites is much needed. Because ceramics are central to these key issues in Samoan archaeological studies, it is imperative that every collection of ceramics be fully documented and reported, and thereby available for scholars, who might then approach a more comprehensive understanding of these vital issues. It is with this spirit in mind that we make this report of the Ulu Tree ceramics available.

Ceramic Analysis

A total of 259 ceramic sherds were examined from the Ulu Tree site with the hope of meeting two research goals. First, we wanted to characterize sherds in a way that would make this analysis comparable to published collections from other western Polynesian sites. Second, due to stratigraphic information available from the Ulu Tree Site, we had hoped that some ceramic attributes would vary over time so as to help in Samoan chronology building. However, due to small sample size, limited contextual information, and lack of chronological data, interpretations of this ceramic assemblage are necessarily limited in scope and are to be considered preliminary.

All 259 sherds from the Ulu Tree site are Polynesian Plain Ware. Provenance information is based upon notes written on artefact bags. Pottery was recovered from surface contexts (N = 47) and from excavated test pits (N = 212). Horizontal patterning in sherd distribution cannot be examined, as the spatial relationship between excavation units was not noted on artefact bags. No radiocarbon dates in association with pottery were reported, so no absolute dates can be assigned to the ceramic artefacts. However, the majority of sherds (N = 212) came from Test Pit 2 and stratigraphic depth was recorded on artefact bags from this unit, allowing for examination of sherds between strata and therefore possibly over time.

We recorded 19 attributes for each sherd. These attributes include sherd ID number, site, provenance, part, body thickness, sherd size, weight, temper, temper size, paste colour, firing core, rim thickness, rim orientation, rim profile, lip cross section, rim form, surface modification, location of surface modification, porosity, and any additional comments. Attributes are described more fully in; data for each sherd is provided in the Appendix. This section summarises the 19 attributes recorded for each sherd from the Ulu Tree site, before moving onto a more detailed discussion of data patterning in the next section.

Basic data were recorded for each sherd (see Table 1). The sherd identification number (as written on each sherd), site (Ulu Tree Site Faleniu Sewer M3 Line) and Provenance (as recorded on each artefact bag) were recorded for each sherd allowing us to relate each sherd back to its original excavation context. The size (measured in 2 sq cm increments) and weight (in grams) of each sherd was also measured. The modal size and average weight of sherds by provenance (Table 1) varies enough to warrant explanation. The modal size and average weight of sherds by unit may vary due to preservation differences between units (for example, sherds may be crushed more in some units due to depositional history); however, these attributes may vary due to sampling bias by archaeologists (for example, larger sherds are more likely to be picked up on the surface). The possibility of sample bias should be taken into account in any future quantitative analyses.

Table 1: Summary of basic data by provenance recorded for all ceramic sherds from the Ulu Tree site Faleniu sewer MC Line

Provenance	Total # Sherds (rims)	Modal Size	Average Weight
Bag 1 Surface Collection Around Ulu Tree	41 (8)	4 cm^2	12.48 gm
Bag 2 Test Pit 2 by Tree Trunk	6 (1)	2 cm^2	3.07 gm
Bag 5 Test Pit 2 Layer 1 0-14 cm	9 (3)	4 cm^2	10.75 gm
Bag 6 Test Pit 2 Layer I2 14-28 cm	102 (9)	2 cm^2	6.13 gm
Bag 7 Test Pit 2 Layer II2 28-34 cm	49 (2)	2 cm^2	4.55 gm
Bag 9 Test Pit 2 Layer II2 34-54 cm	6 (0)	2 cm^2	2.59 gm
Bag 12 Test Pit 2 Feature 1 26-44 cm	40 (5)	4 cm^2	6.16 gm
Bag 13 Surface Collection from visit with DA	2 (2)	4 cm^2	10.81 gm
Surface Collection Kokoland Sewer Back of House	4 (1)	4 cm^2	8.59 gm

Note: The number in parentheses in total # sherds is the number of this total which are rim sherds

Vessel part was recorded for each sherd as either a rim or body sherd. A total of 228 body sherds and 31 rim sherds were recorded. Of the 31 rim sherds, 2 refit (sherds #58 and #64 from Bag 6). This refit was considered one sherd in the following analyses. With the exception of this one refit, all rims sherds had different enough profiles (see discussion below) to suggest that each sherd was from a different vessel. As such, the minimum number of vessels represented by this ceramic assemblage is 30. Body thickness (measured in mm) was recorded (see Table 2).

Table 2: Average ceramic body and rim thickness for each provenance of the Ulu Tree site Faleniu sewer MC line

Provenance	**Average body thickness**	**Average rim thickness**
Bag 1 Surface Collection Around Ulu Tree	10.16 mm	12.5 mm
Bag 2 Test Pit 2 by Tree Trunk	7.81 mm	7.49 mm
Bag 5 Test Pit 2 Layer 1 0-14 cm	8.16 mm	10.11 mm
Bag 6 Test Pit 2 Layer 12 14-28 cm	9.01 mm	13.08 mm
Bag 7 Test Pit 2 Layer 112 28-34 cm	7.69 mm	no data
Bag 9 Test Pit 2 Layer 112 34-54 cm	6.77 mm	no rims
Bag 12 Test Pit 2 Feature 1 26-44 cm	8.54 mm	10.89 mm
Bag 13 Surface Collection from visit with DA	11.7 mm	no data
Surface Collection Kokoland Sewer Back of House	9.12 mm	10.32 mm

Only two sherds had any observed surface modification and, in both cases, this modification was the presence of striations probably due to the wiping of the surface before the vessel was fired. No intentional decoration was recorded on any sherd; as such, this entire assemblage is composed of Polynesian Plain Ware.

Temper, temper size, paste, and firing core were recorded for most sherds. These data provide information on production technology and technological style. Eight different temper types were identified (see Table 3) using a binocular microscope.

Table 3: Binocular temper types identified in sherds from the Ulu Tree site

Temper	% (#)	Description
0		6 (16) indeterminate (usually due to being a very small sherd)
1	27 (70)	most angular intermediate igneous rock of dark gray, dull
2	6 (16)	angular igneous rock of black-and-white, some sparkle
3	17 (44)	combination of gray vesicular igneous rock and bright white inclusions
4	<1 (2)	, subangular igneous rock with large black phenocrysts in gray matrix
5	<1 (2)	' abundant amount of fine grained, subrounded, bright white inclusions
6	39 (102)	mostly fine-grained, homogenous red, igneous rock, some vesicular
7	<1 (1)	diverse inclusions including black rock, white chalky material, buff inclusions
8	2 (5)	shell/coral, almost like small pieces of pinkish chert flakes

By far, the most common tempering material was some form of igneous rock. The two most common igneous rock tempers were a fine, grained homogenous rock with some vesicular pieces and a dark grey igneous rock. Petrographic analysis will aid in further identifying these temper types. Although the entire range of temper sizes was recorded, most (56 per cent) temper inclusions were either medium or course grained. The most common paste colour recorded (63 per cent) was brown to dark brown (Munsell Color Chart Hue 7.5YR Value 3-4 Chroma 2-4). Firing cores recorded were all for oxidized atmospheres; the brown colour of the paste also suggests that all pottery recovered from this

Figure 1: Rim forms recorded for the Ulu Tree site (assuming all vessels have a direct rim orientation)

site was fired in an oxidising atmosphere. Differences in temper and paste may indicate differences in household production practices within a village, changes in production practices over time, inter-village exchange, or inter-island exchange. Further data are needed to understand temper diversity, including better chronological control, a petrographic analysis of sherds, and geological sourcing of the observed tempering materials.

Five attributes were recorded for rim sherds only: rim orientation, rim profile, lip cross section, rim form, and apparent porosity. Rim orientation was measured relative to the central axis of the vessel; because all the rim sherds in this assemblage were small, and there is not a good typology for Samoan rim forms, all rims were assumed to be direct until further data can be collected. Rim profile refers to the degree of exterior or interior rim thickening relative to body thickness. Of the rim sherds that were large enough to record profile (N = 20), seven were thickened (both interior and exterior sides expand), seven were parallel (no thinning or thickening), five had a thickened interior, and one had a thickened exterior. By far, the most common lip cross section was square (N = 22). With the assumption of a direct rim orientation, 10 rim forms have tentatively been identified (see Figure 1). These rim forms may reflect vessel function, style over time and/or style across space. More data are needed to verify these forms as well as to interpret them.

Apparent porosity is an approximate measure of the amount of space in ceramic fabric occupied by pores (voids) (Rice 1987; Rye 1981). Porosity reflects production choices in terms of both clay and temper; higher porosity is desirable for cooking vessels and vessels used to store liquids, while lower porosity is ideal for storage of dry goods and serving vessels. Keeping small sample size in mind, the majority of rim sherds in this assemblage (N = 19) had a high porosity. However, a bimodal distribution is suggested (see Figure 2) possibly indicating at least two different vessel types for two differrent functions.

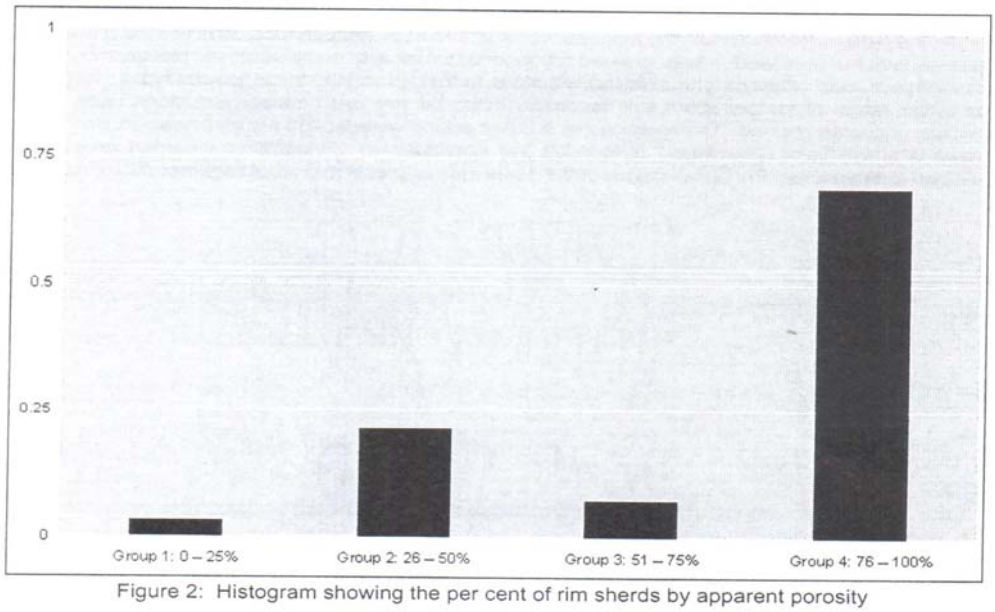

Figure 2: Histogram showing the per cent of rim sherds by apparent porosity

Discussion

This ceramic analysis was undertaken with the hope of characterising the ceramic assemblage of the Ulu Tree site in such a way as to make this analysis comparable to published collections from other western Polynesian sites. A brief discussion of some of this literature in light of the Ulu Tree assemblage will hopefully provide some insight into how the current report fits into the broader context of western Polynesian archaeology.

Discussion of the ceramic assemblages from four Samoan sites-Mulifanua, 'Aoa, To'aga, and Sasoa'a - are well published (Clark and Michlovic 1996; Green 1974; Green and Davidson 1974; Kirch and Hunt 1993; Kirch et al. 1990). The radiocarbon ages of the first three sites cluster at about 3000 BP, while Sasoa'a produced a radiocarbon date of 1840. With these dates, it would not be unreasonable to assume that the Mulifanua, 'Aoa and To'aga had similar ceramic assemblages, while Sasoa'a had a distinct ceramic assemblage. This is not the case: of these four sites, only Mulifanua has produced indisputable Lapita pottery. 'Aoa, To'aga, and Sasoa'a all have ceramics assemblages that are completely composed of Polynesian Plain Ware despite the 1,000 year time gap between Sasoa'a and the other two sites. Further, the dates for pottery from 'Aoa are both complex and controversial (Clark 1993; Clark and Michlovic 1996). Although the traditional view of Samoan pottery dates the cessation of production at about 1,700 years ago, pottery was reported at 'Aoa from strata radiocarbon dated to about 400 years ago. The pottery from the Ulu Tree site is similar to 'Aoa, as well as to Mulifanua and To'aga, in that it is composed entirely of Polynesian Plain Ware. Considering the current uncertainty on the date ranges for such an assemblage, caution needs to be used in assigning a date range to the Ulu Tree site based only on the presence of pottery.

One of the primary foci of published ceramic reports from Samoan sites is a discussion of temper. Although a petrographic analysis of temper has yet to be done on the Ulu Tree ceramic assemblage, no unusual patterns were found in the binocular analyses. The primary tempering material at Ulu Tree was a diverse suite of igneous rock; similarly, the primary temper at To'aga, (Dickenson 1993), 'Aoa (Clark and Michlovic 1996), Vailele (Dickenson 1969), Falefa (Dickenson 1969) and sherds from smaller surveys (Cochrane et al. 2004) was some type of igneous rock. What is notable is that, at least without further petrographic analysis, the diversity of identified temper types appears to be greater at the Ulu Tree site than reported for some other sites. For example, Dickenson (1969) reports only three distinct temper types for Vailele and Falefa, while we report seven distinct temper types for the Ulu Tree site (see Figure 3).

While there are apparent similarities between the 'Aoa (Clark and Michlovic 1996) ceramic assemblage and the one examined in this report, including paste colour, body thickness, and general temper selection, there is one significant difference. Clark and Michlovic (1996) report 31 rim sherds at 'Aoa, which is the same sample size that we report here for the Ulu Tree site. Although the sample size is small, Clark and Michlovic (1996: 161) report that 14 of their rims were "flat to somewhat rounded" and 17 of their sherds were bevelled. We recorded similar data for 28 rim sherds; 24 of our rims are flat to somewhat rounded (Figure 1: Rim Forms A, B, C, D, H, I) while only 4 could be considered bevelled (Rim Forms E, F, G, J). There is a significant difference in the distribution of rim forms at these two sites (chi = 10.55, df = 1, p = 0.0012). If this patterning holds to be true with a larger sample size, it may reflect temporal variation.

Finally, due to stratigraphic information available from the Ulu Tree site, we had hoped to find possible chronological trends in pottery that should be examined further with larger sample sizes and better chronological control. Unfortunately, no patterning was found in vessel thickness, rim form, temper type, or paste colour between the strata. This may be due to sample size, it may be due to the context the pottery was deposited in (secondary rather than primary), it may be because the occupation of the Ulu Tree site was relatively short, or it may be because ceramic production practices remained consistent over long periods of time in Samoa.

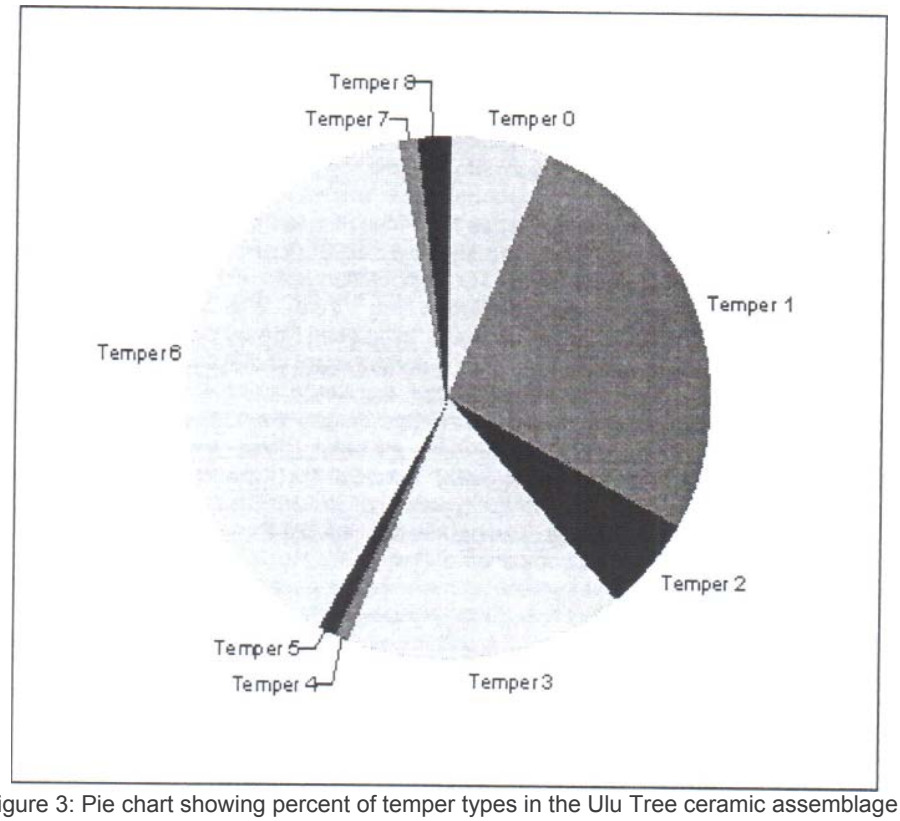

Figure 3: Pie chart showing percent of temper types in the Ulu Tree ceramic assemblage

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Appendix

ID	SITE	PROVENANCE	PART	BODYTHICK mm	SIZE	WEIGHT gms	TEMPER	TEMPERSIZE	PASTE	CORE	RIMTHICK mm	RIMORIENT	RIMPROF	LIPSECT	RIMFORM	SURFMOD	SURFLOC	POROSITY	COMMENTS
1	Ulu	1	1	15.82	6	36.21	1	4	5YR 6/8	1 or 2	15.82	2	3	3	D	1	n/a	42.09	
2	Ulu	1	1	9.2	4	16.86	2	4	7.5YR 7/8	1 or 2	15.93	2	1	3	C	1	n/a	38.73	thinning from rim, # gone
3	Ulu	1	1	15.33	4	18.76	3	4	7.5YR 7/6	1 or 2	n/a	0	0	3	B	1	n/a	49.69	exterior mostly gone
4	Ulu	1	1	16.57	4	7.1	2	2	5YR 5/8	4	16.57	0	0	3	F	1	n/a	98.04	small sherd
5	Ulu	1	1	10.86	4	16	1	3	5YR 6/8	1 or 2	12.31	2	1	3	A	1	n/a	26.02	
6	Ulu	1	1	n/a	4	5.6	4	4	5YR 6/8	1 or 2	n/a	0	0	3	A	1	n/a	29.41	exterior mostly gone
7	Ulu	1	1	n/a	2	3.47	3	2	5YR 4/6	4	14.37	0	0	3	B	1	n/a	64.44	tiny sherd, hard to see stuff
8	Ulu	1	1	n/a	2	2	0	0	0	0	n/a	0	0	0	J	1	n/a	28.23	tiny sherd, did not break
9	Ulu	1	2	16.66	4	27.53	1	4	5YR 6/8	4						1	n/a		
10	Ulu	1	2	13.24	6	34.81	3	4	5YR 6/8	3						1	n/a		
11	Ulu	1	2	8.36	6	20.83	5	5	7.5YR 4/4	1 or 2						1	n/a		very different temper and paste
12	Ulu	1	2	10.58	4	13.53	6	3	5YR 4/6	1 or 2						1	n/a		
13	Ulu	1	2	15.67	4	18.02	1	4	5YR 5/6	1 or 2						1	n/a		
14	Ulu	1	2	12.57	6	19.07	7	2	5YR 5/8	1 or 2						1	n/a		
15	Ulu	1	2	12.86	4	21.34	1	3	5YR 6/8	3						1	n/a		
16	Ulu	1	2	14.83	4	22.38	1	3	5YR 6/8	1 or 2						1	n/a		
17	Ulu	1	2	11.09	4	8.03	3	4	5YR 5/8	1 or 2						1	n/a		
18	Ulu	1	2	10.26	4	7.41	0	1	5YR 4/6	1 or 2						A2	2		striations not decoration, gritty
20	Ulu	1	2	10.9	4	15.53	1	3	5YR 4/6	1 or 2						1	n/a		
21	Ulu	1	2	10.36	4	9.53	3	2	10YR 4/2	1 or 2						1	n/a		
22	Ulu	1	2	7.37	4	7.13	6	3	5YR 4/6	3						1	n/a		firing core likely result of repeated firing
23	Ulu	1	2	10.53	6	15.21	1	4	7.5YR 5/4	1 or 2						1	n/a		
24	Ulu	1	2	9.02	4	5.54	6	3	7.5YR 4/4	1 or 2						1	n/a		
25	Ulu	1	2	8.09	4	5.36	6	3	5YR 3/4	1 or 2						1	n/a		
26	Ulu	1	2	9.9	4	6.64	6	3	5YR 3/1	1 or 2						1	n/a		
27	Ulu	1	2	7.09	4	8.3	1	4	7.5YR 5/6	1 or 2						1	n/a		
28	Ulu	1	2	9.69	4	7.05	6	2	2.5YR 3/4	1 or 2						1	n/a		
29	Ulu	1	2	10.33	4	3.57	6	2	5YR 3/3	1 or 2						1	n/a		
30	Ulu	1	2	10.9	4	7.81	6	2	5YR 3/4	1 or 2						1	n/a		
31	Ulu	1	2	8.03	4	4.7	3	3	5YR 6/4	4						1	n/a		
32	Ulu	1	2	8.46	4	9.21	5	4	5YR 2.5/2	1 or 2						1	n/a		
33	Ulu	1	2	7.19	2	2.7	3	2	7.5YR 5/4	1 or 2						1	n/a		
34	Ulu	1	2	9.7	2	4.56	1	4	5YR 6/8	1 or 2						1	n/a		
35	Ulu	1	2	8.74	4	7.39	6	2	7.5YR 4/4	1 or 2						1	n/a		
36	Ulu	1	2	6.18	4	4.19	1	4	7.5YR 6/6	1 or 2						1	n/a		
37	Ulu	1	2	10.83	2	5	2	4	7.5YR 5/6	1 or 2						1	n/a		
38	Ulu	1	2	7.37	2	2.72	6	2	5YR 4/4	1 or 2						1	n/a		
39	Ulu	1	2	9.01	4	4.51	6	2	5YR 4/4	1 or 2						1	n/a		
40	Ulu	1	2	8.53	2	4.77	1	2	5YR 5/8	1 or 2						1	n/a		
41	Ulu	1	2	5.83	2	0.96	0	0	0	0						1	n/a		tiny sherd, did not break
42	Ulu	2	1	7.17	2	1.75	1	5	5YR 6/8	1 or 2	7.49	2	3	3	B	1	n/a	55.56	
43	Ulu	2	2	11.3	4	9.4	1	5	5YR 4/6	1 or 2						1	n/a		
44	Ulu	2	2	6.05	4	2.52	6	2	5YR 3/4	1 or 2						1	n/a		
45	Ulu	2	2	5.91	2	1.17	1	4	5YR 6/8	1 or 2						1	n/a		tiny sherd, did not break
46	Ulu	2	2	6.51	2	1.07	1	4	5YR 5/6	1 or 2						1	n/a		tiny sherd, did not break
47	Ulu	2	2	9.89	2	2.51	2	3	5YR 5/8	1 or 2						1	n/a		tiny sherd, did not break
48	Ulu	5	1	7.33	4	3.78	1	5	5YR 5/8	1 or 2	6.29	2	3	3	D	1	n/a	88.89	
49	Ulu	5	1	8.88	4	10.01	1	4	7.5YR 5/6	1 or 2	9.33	2	3	3	B	1	n/a	92.31	
50	Ulu	5	1	12.08	6	47.81	1	4	7.5YR 6/6	1 or 2	14.71	2	1	3	A	1	n/a	96.68	
51	Ulu	5	2	7.99	4	6.72	6	2	5YR 4/6	1 or 2						1	n/a		
52	Ulu	5	2	8	4	6.35	6	2	5YR 3/1	1 or 2						1	n/a		
53	Ulu	5	2	8.23	4	14.91	1	4	5YR 6/8	1 or 2						1	n/a		
54	Ulu	5	2	6.05	2	2.49	3	1	5YR 4/2	1 or 2						1	n/a		
55	Ulu	5	2	7.85	2	2.76	1	3	5YR 5/8	1 or 2						1	n/a		
56	Ulu	5	2	7.04	2	1.96	1	4	5YR 6/8	1 or 2						1	n/a		tiny sherd, did not break
57	Ulu	6	1	11.42	4	11.35	6	2	5YR 4/6	1 or 2	13.87	2	4	3	A	1	n/a	21.74	
59	Ulu	6	1	8.65	4	5.4	6	2	5YR 4/6	1 or 2	13.9	2	1	3	C	1	n/a	97.59	
60	Ulu	6	1	12.35	4	6.76	1	5	5YR 6/6	1 or 2	12.6	2	5	3	I	1	n/a		

ID	SITE	PROVENANCE	PART	BODYTHICK mm	SIZE	WEIGHT gms	TEMPER	TEMPERSIZE	PASTE	CORE	RIMTHICK mm	RIMORIENT	RIMPROF	LIPSECT	RIMFORM	SURFMOD	SURFLOC	POROSITY	COMMENTS	
120	Ulu	6	2	7.28	2	1.27	0	0	0	0						1	n/a		tiny sherd, too small to break	
121	Ulu	6	2	6.64	2	1.59	6	3	2.5YR 3/6	1 or 2						1	n/a			
122	Ulu	6	2	7.74	2	1.72	1	4	7.5YR 6/8	1 or 2						1	n/a			
123	Ulu	6	2	6.84	2	1.15	6	3	7.5YR 5/8	1 or 2						1	n/a			
124	Ulu	6	2	7.03	4	4.16	3	4	7.5YR 4/6	1 or 2						1	n/a		residue?	
126	Ulu	6	2	13.14	4	8.29	1	5	7.5YR 6/8	1 or 2						1	n/a			
127	Ulu	6	2	10.08	2	5.32	1	5	7.5YR 5/8	1 or 2						1	n/a			
128	Ulu	6	2	11.71	4	6.26	1	5	7.5YR 6/6	1 or 2						1	n/a			
129	Ulu	6	2	6.59	2	1.74	6	3	5YR 4/6	1 or 2						1	n/a			
130	Ulu	6	2	6.99	2	1.7	6	3	5YR 4/6	1 or 2						1	n/a			
131	Ulu	6	2	7.61	2	1.51	1	4	0	1 or 2						1	n/a			
132	Ulu	6	2	10.41	2	2.2	1	5	7.5YR 6/6	1 or 2						1	n/a			
133	Ulu	6	2	7.41	2	1.22	6	3	5YR 4/6	1 or 2						1	n/a			
134	Ulu	6	2	6.49	2	1.5	6	2	5YR 5/8	1 or 2						1	n/a			
135	Ulu	6	2	12.01	2	3.94	6	4	7.5YR 5/8	1 or 2						1	n/a			
136	Ulu	6	2	7.83	2	1.41	6	3	7.5YR 5/8	1 or 2						1	n/a			
137	Ulu	6	2	9.14	2	1.78	6	3	7.5YR 5/6	1 or 2						1	n/a			
138	Ulu	6	2	4.09	2	0.42	0	0	0	0						1	n/a		tiny sherd, too small to break	
141	Ulu	7	1	7.78	2	2.69	3	2	5YR 2.5/1	1 or 2	0	0	0	0	0	1	n/a	97.47		
142	Ulu	7	1	6.39	2	1.43	3	2	5YR 2.5/2	1 or 2	0	0	0	0	0	1	n/a	90.48		
143	Ulu	7	2	11.22	6	48.15	3	3	7.5YR 3/4	1 or 2						1	n/a			
144	Ulu	7	2	8.24	6	16.45	6	2	5YR 3/3	1 or 2						1	n/a			
145	Ulu	7	2	7.85	4	9.35	1	4	10YR 6/4	1 or 2						1	n/a			
146	Ulu	7	2	14.3	4	11.14	2	4	5YR 5/8	1 or 2						1	n/a			
147	Ulu	7	2	12.5	4	10.6	6	3	5YR 3/3	1 or 2						1	n/a			
148	Ulu	7	2	13.66	4	7.02	6	2	5YR 5/8	1 or 2						1	n/a			
149	Ulu	7	2	4.67	4	5.71	3	3	5YR 3/2	1 or 2						1	n/a			
150	Ulu	7	2	8.32	4	7.84	1	3	7.5YR 6/6	1 or 2						1	n/a			
151	Ulu	7	2	11.32	4	5.29	3	2	5YR 4/6	1 or 2						1	n/a			
152	Ulu	7	2	6.23	4	4.49	6	3	5YR 3/3	1 or 2						1	n/a			
153	Ulu	7	2	6.54	4	5.45	1	4	5YR 3/3	1 or 2						1	n/a			
154	Ulu	7	2	8.4	4	6.96	3	3	5YR 3/4	1 or 2						1	n/a			
155	Ulu	7	2	9.65	4	4.85	6	2	2.5YR 4/6	1 or 2						1	n/a			
156	Ulu	7	2	7.25	4	3.67	6	2	5YR 4/6	1 or 2						1	n/a		residue?	
157	Ulu	7	2	5.94	4	3.18	1	4	7.5YR 5/2	1 or 2						1	n/a			
158	Ulu	7	2	7.46	4	2.57	3	3	2.5YR 3/6	1 or 2						1	n/a			
159	Ulu	7	2	9	4	5.67	2	4	7.5YR 5/6	1 or 2						1	n/a			
160	Ulu	7	2	12.01	2	3.32	6	2	5YR 4/4	1 or 2						1	n/a			
161	Ulu	7	2	6.94	4	2.57	6	2	5YR 4/4	1 or 2						1	n/a			
162	Ulu	7	2	7.4	4	4.8	3	4	7.5YR 4/4	1 or 2						1	n/a			
163	Ulu	7	2	5.75	4	3.07	6	3	7.5YR 4/4	1 or 2						1	n/a			
164	Ulu	7	2	6.13	2	3.14	1	4	2.5YR 5/6	1 or 2						1	n/a			
165	Ulu	7	2	8.04	2	2.69	2	3	7.5YR 6/6	1 or 2						1	n/a			
166	Ulu	7	2	7.07	4	3.2	6	2	7.5YR 5/8	1 or 2						1	n/a			
167	Ulu	7	2	6.04	4	3.64	2	4	5YR 6/8	1 or 2						1	n/a			
168	Ulu	7	2	6.49	2	1.62	6	3	5YR 3/4	1 or 2						1	n/a			
169	Ulu	7	2	9.33	2	1.98	6	3	5YR 4/6	1 or 2						1	n/a		residue?	
170	Ulu	7	2	9.53	2	3.01	3	2	5YR 3/4	1 or 2						1	n/a			
171	Ulu	7	2	6.61	2	1.2	6	3	5YR 3/4	1 or 2						1	n/a		exterior missing	
172	Ulu	7	2	6.41	4	3.17	3	3	5YR 4/6	1 or 2						1	n/a			
173	Ulu	7	2	5.23	2	1.17	6	2	5YR 4/6	1 or 2						1	n/a			
174	Ulu	7	2	8.86	2	1.39	3	2	5YR 5/8	1 or 2						1	n/a			
175	Ulu	7	2	8.74	2	3.61	1	4	7.5YR 5/4	1 or 2						1	n/a			
176	Ulu	7	2	6.4	2	1.38	3	3	5YR 4/4	1 or 2						1	n/a			
177	Ulu	7	2	6.79	2	1.83	0	0	0	1 or 2						1	n/a		tiny sherd, too small to break	
178	Ulu	7	2	8.54	2	2.15	1	4	5YR 6/8	1 or 2						1	n/a			
179	Ulu	7	2	5.25	2	0.84	3	2	5YR 4/2	1 or 2						1	n/a			
180	Ulu	7	2	9.08	2	1.7	3	2	5YR 4/4	1 or 2						1	n/a			

ID	SITE	PROVENANCE	PART	BODYTHICK mm	SIZE	WEIGHT gms	TEMPER	TEMPERSIZE	PASTE	CORE	RIMTHICK mm	RIMORIENT	RIMPROF	LIPSECT	RIMFORM	SURFMOD	SURRLOC	POROSITY	COMMENTS	
120	Ulu	6	2	7.28	2	1.27	0	0	0	0						1	n/a		tiny sherd, too small to break	
121	Ulu	6	2	6.64	2	1.59	6	3	2.5YR 3/6	1 or 2						1	n/a			
122	Ulu	6	2	7.74	2	1.72	1	4	7.5YR 6/8	1 or 2						1	n/a			
123	Ulu	6	2	6.84	2	1.15	6	3	7.5YR 5/8	1 or 2						1	n/a			
124	Ulu	6	2	7.03	4	4.16	3	4	7.5YR 4/6	1 or 2						1	n/a		residue?	
126	Ulu	6	2	13.14	4	8.29	1	5	7.5YR 6/8	1 or 2						1	n/a			
127	Ulu	6	2	10.08	2	5.32	1	5	7.5YR 5/8	1 or 2						1	n/a			
128	Ulu	6	2	11.71	4	6.26	1	5	7.5YR 6/6	1 or 2						1	n/a			
129	Ulu	6	2	6.59	2	1.74	6	3	5YR 4/6	1 or 2						1	n/a			
130	Ulu	6	2	6.99	2	1.7	6	3	5YR 4/6	1 or 2						1	n/a			
131	Ulu	6	2	7.61	2	1.51	1	4	0	1 or 2						1	n/a			
132	Ulu	6	2	10.41	2	2.2	1	5	7.5YR 6/6	1 or 2						1	n/a			
133	Ulu	6	2	7.41	2	1.22	6	3	5YR 4/6	1 or 2						1	n/a			
134	Ulu	6	2	6.49	2	1.5	6	2	5YR 5/8	1 or 2						1	n/a			
135	Ulu	6	2	12.01	2	3.94	6	4	7.5YR 5/8	1 or 2						1	n/a			
136	Ulu	6	2	7.83	2	1.41	6	3	7.5YR 5/8	1 or 2						1	n/a			
137	Ulu	6	2	9.14	2	1.78	6	3	7.5YR 5/6	1 or 2						1	n/a			
138	Ulu	6	2	4.09	2	0.42	0	0	0	0						1	n/a		tiny sherd, too small to break	
141	Ulu	7	1	7.78	2	2.69	3	2	5YR 2.5/1	1 or 2	0	0	0	0	0	1	n/a	97.47		
142	Ulu	7	1	6.39	2	1.43	3	2	5YR 2.5/2	1 or 2	0	0	0	0	0	1	n/a	90.48		
143	Ulu	7	2	11.22	6	48.15	3	3	7.5YR 3/4	1 or 2						1	n/a			
144	Ulu	7	2	8.24	6	16.45	6	2	5YR 3/3	1 or 2						1	n/a			
145	Ulu	7	2	7.85	4	9.35	1	4	10YR 6/4	1 or 2						1	n/a			
146	Ulu	7	2	14.3	4	11.14	2	4	5YR 5/8	1 or 2						1	n/a			
147	Ulu	7	2	12.5	4	10.6	8	3	5YR 3/3	1 or 2						1	n/a			
148	Ulu	7	2	13.66	4	7.02	6	2	5YR 5/8	1 or 2						1	n/a			
149	Ulu	7	2	4.67	4	5.71	3	3	5YR 3/2	1 or 2						1	n/a			
150	Ulu	7	2	8.32	4	7.84	1	3	7.5YR 6/6	1 or 2						1	n/a			
151	Ulu	7	2	11.32	4	5.29	3	2	5YR 4/6	1 or 2						1	n/a			
152	Ulu	7	2	6.23	4	4.49	6	3	5YR 3/3	1 or 2						1	n/a			
153	Ulu	7	2	6.54	4	5.45	1	4	5YR 3/3	1 or 2						1	n/a			
154	Ulu	7	2	8.4	4	6.96	3	3	5YR 3/4	1 or 2						1	n/a			
155	Ulu	7	2	9.65	4	4.85	6	2	2.5YR 4/6	1 or 2						1	n/a			
156	Ulu	7	2	7.25	4	3.67	6	2	5YR 4/6	1 or 2						1	n/a		residue?	
157	Ulu	7	2	5.94	4	3.18	1	4	7.5YR 5/2	1 or 2						1	n/a			
158	Ulu	7	2	7.46	4	2.57	3	3	2.5YR 3/6	1 or 2						1	n/a			
159	Ulu	7	2	9	4	5.67	2	4	7.5YR 5/6	1 or 2						1	n/a			
160	Ulu	7	2	12.01	2	3.32	6	2	5YR 4/4	1 or 2						1	n/a			
161	Ulu	7	2	6.94	4	2.57	6	2	5YR 4/4	1 or 2						1	n/a			
162	Ulu	7	2	7.4	4	4.8	3	4	7.5YR 4/4	1 or 2						1	n/a			
163	Ulu	7	2	5.75	4	3.07	6	3	7.5YR 4/4	1 or 2						1	n/a			
164	Ulu	7	2	6.13	2	3.14	1	4	2.5YR 5/6	1 or 2						1	n/a			
165	Ulu	7	2	8.04	2	2.69	2	3	7.5YR 6/6	1 or 2						1	n/a			
166	Ulu	7	2	7.07	4	3.2	6	2	7.5YR 5/8	1 or 2						1	n/a			
167	Ulu	7	2	6.04	4	3.64	2	4	5YR 6/8	1 or 2						1	n/a			
168	Ulu	7	2	6.49	2	1.62	6	3	5YR 3/4	1 or 2						1	n/a			
169	Ulu	7	2	9.33	2	1.98	6	3	5YR 4/6	1 or 2						1	n/a		residue?	
170	Ulu	7	2	9.53	2	3.01	3	2	5YR 3/4	1 or 2						1	n/a			
171	Ulu	7	2	6.61	2	1.2	6	3	5YR 3/4	1 or 2						1	n/a		exterior missing	
172	Ulu	7	2	6.41	4	3.17	3	3	5YR 4/6	1 or 2						1	n/a			
173	Ulu	7	2	5.23	2	1.17	6	2	5YR 4/6	1 or 2						1	n/a			
174	Ulu	7	2	8.86	2	1.39	3	2	5YR 5/8	1 or 2						1	n/a			
175	Ulu	7	2	8.74	2	3.61	1	4	7.5YR 5/4	1 or 2						1	n/a			
176	Ulu	7	2	6.4	2	1.38	3	3	5YR 4/4	1 or 2						1	n/a			
177	Ulu	7	2	6.79	2	1.83	0	0	0	1 or 2						1	n/a		tiny sherd, too small to break	
178	Ulu	7	2	8.54	2	2.15	1	4	5YR 6/8	1 or 2						1	n/a			
179	Ulu	7	2	5.25	2	0.84	3	2	5YR 4/2	1 or 2						1	n/a			
180	Ulu	7	2	9.08	2	1.7	3	2	5YR 4/4	1 or 2						1	n/a			

ID	SITE	PROVENANCE	PART	BODYTHICK mm	SIZE	WEIGHT gms	TEMPER	TEMPERSIZE	PASTE	CORE	RIMTHICK mm	RIMORIENT	RIMPROF	LIPSECT	RIMFORM	SURFMOD	SURFLOC	POROSITY	COMMENTS
181	Ulu	7	2	5.5	2	1.38	6	3	5YR 5/6	1 or 2						1	n/a		
182	Ulu	7	2	8.33	2	1.57	1	4	7.5YR 6/6	1 or 2						1	n/a		
183	Ulu	7	2	5.67	2	1.34	3	2	7.5YR 4/4	1 or 2						1	n/a		
184	Ulu	6	2	6.5	2	0.96	0	0	0	0						1	n/a		tiny sherd, too small to break
185	Ulu	7	2	6.54	2	0.09	0	0	0	0						1	n/a		tiny sherd, too small to break
186	Ulu	7	2	3.83	2	0.43	0	0	0	0						1	n/a		tiny sherd, too small to break
187	Ulu	7	2	7.43	2	0.73	0	0	0	0						1	n/a		tiny sherd, too small to break
188	Ulu	7	2	4.18	2	0.5	0	0	0	0						1	n/a		tiny sherd, too small to break
189	Ulu	7	2	6.72	2	0.84	0	0	0	0						1	n/a		tiny sherd, too small to break
192	Ulu	9	2	8.39	2	5	6	3	5YR 4/6	1 or 2						1	n/a		lots of tiny pieces
193	Ulu	9	2	6.34	2	3.01	6	2	5YR 4/6	1 or 2						1	n/a		
194	Ulu	9	2	5.44	2	3.39	1	4	7.5YR 6/8	3						1	n/a		
195	Ulu	9	2	7.04	2	2.42	3	2	7.5YR 3/2	1 or 2						1	n/a		bag reads "food residue" but do not see
196	Ulu	9	2	6.66	2	0.93	6	3	5YR 5/8	1 or 2						1	n/a		
197	Ulu	9	2	n/a	2	0.77	3	2	5YR 4/6	1 or 2						1	n/a		surfaces missing
198	Ulu	12	1	6.82	4	5.16	6	2	5YR 4/6	1 or 2	8.75	2	1	3	C	1	n/a	92.19	
199	Ulu	12	1	11.59	6	24.26	8	4	2.5YR 3/6	1 or 2	15.62	2	4	3	A	1	n/a	98.61	
200	Ulu	12	1	9.27	4	15.31	6	4	5YR 4/6	1 or 2	13.76	2	1	2	E	1	n/a	94.85	
201	Ulu	12	1	7.48	6	25.85	4	2	5YR 6/8	1 or 2	6.91	2	3	3	B	1	n/a	90.74	
202	Ulu	12	1	7.81	4	3.27	6	3	5YR 5/8	4	9.45	2	1	2	G	1	n/a	91.67	
203	Ulu	12	2	10.21	4	11.78	6	3	5YR 4/4	1 or 2						1	n/a		
204	Ulu	12	2	10.3	4	7.76	6	3	2.5YR 4/6	1 or 2						1	n/a		
205	Ulu	12	2	10.76	4	8.67	1	4	5YR 5/6	1 or 2						1	n/a		
206	Ulu	12	2	11.12	4	10.51	6	3	5YR 5/8	1 or 2						1	n/a		
207	Ulu	12	2	9.56	4	8.66	3	4	5YR 3/1	1 or 2						1	n/a		
208	Ulu	12	2	11	6	18.99	6	4	2.5YR 3/4	1 or 2						1	n/a		
209	Ulu	12	2	10.39	4	5.48	6	3	5YR 3/3	1 or 2						1	n/a		
210	Ulu	12	2	5.02	4	3.19	6	2	2.5YR 4/8	1 or 2						1	n/a		
211	Ulu	12	2	9.72	4	11.28	3	4	5YR 3/4	1 or 2						1	n/a		
212	Ulu	12	2	8.09	4	6.65	3	3	5YR 4/6	1 or 2						1	n/a		
213	Ulu	12	2	10.74	4	9.32	1	4	5YR 5/8	1 or 2						1	n/a		
214	Ulu	12	2	10.45	4	6.69	6	4	2.5YR 4/6	1 or 2						1	n/a		
215	Ulu	12	2	6.69	4	2.95	6	2	2.5YR 4/6	1 or 2						1	n/a		
216	Ulu	12	2	4.93	4	3.21	3	2	5YR 3/1	1 or 2						1	n/a		
217	Ulu	12	2	11.2	4	4.43	1	5	7.5YR 5/2	1 or 2						1	n/a		
218	Ulu	12	2	8.65	4	3.91	6	3	2.5YR 4/8	1 or 2						1	n/a		
219	Ulu	12	2	7.6	2	2.46	6	3	5YR 5/8	1 or 2						1	n/a		
220	Ulu	12	2	7.41	2	2.85	6	2	2.5YR 4/8	1 or 2						1	n/a		
221	Ulu	12	2	8.09	4	3.06	6	2	5YR 4/6	1 or 2						1	n/a		
222	Ulu	12	2	10.26	4	5.57	6	2	5YR 4/6	1 or 2						1	n/a		
223	Ulu	12	2	5.27	4	2.98	3	3	5YR 3/3	1 or 2						1	n/a		
224	Ulu	12	2	4.87	4	2.59	3	2	5YR 3/4	1 or 2						1	n/a		
225	Ulu	12	2	7.99	4	3.03	6	3	5YR 4/6	4						1	n/a		
226	Ulu	12	2	11.1	2	2.87	1	5	5YR 5/8	1 or 2						1	n/a		
227	Ulu	12	2	6.88	2	1.65	6	2	5YR 4/6	1 or 2						1	n/a		
228	Ulu	12	2	9.4	4	4.43	1	5	7.5YR 6/6	1 or 2						1	n/a		
229	Ulu	12	2	10.2	2	2.97	1	5	5YR 4/6	1 or 2						1	n/a		
230	Ulu	12	2	5.87	2	1.13	1	5	7.5YR 5/2	1 or 2						1	n/a		
231	Ulu	12	2	7.6	4	2.27	1	5	7.5YR 5/6	1 or 2						1	n/a		
232	Ulu	12	2	7.21	2	1.94	6	4	5YR 4/6	1 or 2						1	n/a		
238	Ulu	12	2	7.08	2	0.99	3	3	5YR 4/6	1 or 2						1	n/a		
239	Ulu	6	2	10.11	2	0.91	0	0	0	0						1	n/a		tiny sherd, too small to break
242	Ulu	6	2	n/a	2	0.38	0	0	0	0						1	n/a		tiny sherd, too small to break
243	Ulu	12	2	7.23	4	3.23	6	2	5YR 4/2	1 or 2						1	n/a		
245	Ulu	6	2	6.32	4	4.98	6	3	5YR 4/6	1 or 2						1	n/a		
245	Ulu	13	1	10.8	4	12.81	1	5	5YR 6/8	1 or 2	0	0	0	0	B	1	n/a	76.79	
246	Ulu	6	2	9.41	4	6.47	1	5	5YR 6/8	1 or 2						1	n/a		
246	Ulu	13	1	12.6	4	8.81	1	5	5YR 5/8	1 or 2	0	0	0	0	H	1	n/a	98	

ID	SITE	PROVENANCE	PART	BODYTHICK mm	SIZE	WEIGHT gms	TEMPER	TEMPERSIZE	PASTE	CORE	RIMTHICK mm	RIMORIENT	RIMPROF	LIPSECT	RIMFORM	SURFMOD	SURFLOC	POROSITY	COMMENTS	
247	Ulu	6	2	8	2	3.37	3	2	5YR 5/1	1 or 2						1	n/a			
248	Ulu	6	2	10.41	4	5.45	6	4	5YR 4/6	1 or 2						1	n/a			
249	Ulu	6	2	7.59	2	2.11	6	3	5YR 4/6	1 or 2						1	n/a			
250	Ulu	6	2	8.03	2	3.05	6	3	5YR 5/8	1 or 2						1	n/a			
251	Ulu	6	2	5.81	2	1.62	6	3	5YR 4/4	1 or 2						1	n/a			
252	Ulu	6	2	9.13	4	4.74	1	4	7.5YR 5/8	1 or 2						1	n/a			
253	Ulu	6	2	10.71	2	2.65	6	3	5YR 5/8	1 or 2						1	n/a			
254	Ulu	6	2	5.07	2	2.15	6	3	5YR 5/8	1 or 2						1	n/a			
255	Ulu	6	2	6.35	2	1.94	6	2	5YR 5/8	1 or 2						1	n/a			
256	Ulu	6	2	8.47	2	2.83	6	3	5YR 5/8	1 or 2						1	n/a			
257	Ulu	6	2	6.57	2	1.99	6	2	5YR 5/8	1 or 2						1	n/a			
258	Ulu	6	2	11.11	2	1.4	6	3	5YR 3/4	1 or 2						1	n/a			
259	Ulu	6	2	8.47	2	2.22	6	3	5YR 3/3	1 or 2						1	n/a			
260	Ulu	6	2	11.31	2	3.06	6	3	7.5YR 5/8	1 or 2						1	n/a			
264	Ulu	6	2	6.38	2	0.84	0	0	0	0						1	n/a		tiny sherd, too small to break	
280	Ulu	12	2	8.71	2	2.15	6	3	5YR 4/6	1 or 2						1	n/a			
419	Ulu	56	1	9.75	4	13.42	1	5	5YR 6/8	1 or 2	10.32	2	3	3	B	1	n/a	86		
420	Ulu	56	2	10.17	4	8.16	6	1	5YR 4/6	1 or 2						1	n/a			
421	Ulu	56	2	7.94	4	5.16	1	4	5YR 6/8	1 or 2						1	n/a			
422	Ulu	56	2	8.63	4	7.63	1	4	5YR 5/8	1 or 2						1	n/a			
142A	Ulu	7	2	5.39	2	1.75	6	2	5YR 4/4	1 or 2						1	n/a			
19?	Ulu	1	2	8.23	4	8.76	6	1	5YR 4/6	1 or 2						1	n/a		tiny sherd, did not break	
235A	Ulu	12	2	n/a	2	1.4	6	3	5YR 5/8	1 or 2						1	n/a			
235B	Ulu	12	2	8.34	2	1.54	3	3	5YR 3/3	3						1	n/a			
58/64	Ulu	6	1	9.34	4	6.17	6	2	5YR 3/4	3	12.85	2	4	3	A	1	n/a	97.89	58 and 64 refit	
64/58	Ulu	6	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	refit with 58, see 58 for data	
87A	Ulu	6	2	7.87	2	2.83	3	2	5YR 4/6	1 or 2						1	n/a			