CERAMIC ANALYSIS AT *WIKALOKAL*, SAN DIEGO COUNTY (CA-SDI-4787)

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Recent research in sourcing San Diego-region ceramics has identified two distinct wares: Tizon Brown Ware from the coastal foothills and mountains, and Salton Brown Ware from the eastern mountain slopes and desert. This study examines the geographic origins of these wares from Wikalokal, *a late prehistoric site in the Laguna Mountain region. Ceramics are studied from a stone structure dating to the historic period. Methods used in the determination of clay origins include hand-specimen examination and thin-section analysis.*

Recently, new methods in ceramic analysis have allowed researchers to discern the geographic origin of pottery found in the Peninsular Range of southern California (Hildebrand *et al.* in press). Traditionally, pottery found at sites in San Diego County has been assigned to the category Tizon Brown Ware, which is manufactured throughout southern California. In addition to Tizon, wares from the Salton Trough area, such as Lower Colorado Buff Ware, are also found in the county. Another important ware from the Salton Trough region is Salton Brown Ware, which is being detected for the first time in the mountains of San Diego County.

The focus of this research is to test a new method of hand-specimen analysis to be used in the study of brown wares in the county. Such a methodology is important because the two brown wares in question, Tizon and Salton, come from different geographic regions, the desert and the mountains. Being able to discern the geographic origin of pottery may be of assistance in addressing questions of vessel use and residential mobility.

The basis of the following methodology comes from the work of Hildebrand *et al.* (in press). In their attempt to characterize the chemical and mineral differences between the clays of southern California, the authors make use of two types of study, Neutron Activation Analysis (NAA) and petrographic thin sectioning. In the authors' study, a collection was made of ceramic samples from archaeological sites and raw clay samples from three geographic locations: The Peninsular Range, coastal sites, and the Salton Trough. These samples were tested according to the two methods of analysis mentioned above. The results delineated three different wares, Tizon Brown Ware from the mountains, and Salton Brown Ware and Lower Colorado Buff Ware from the desert. In general, desert sites contained Salton Brown Ware and Lower Colorado Buff Ware, while mountain sites generally contained Tizon Brown Ware. One site was unique in that it contained all three ceramic wares. The site is called *Wikalokal* and was also used in the current study.

THE SITE

Wikalokal, also known as Buckman Springs, is located in the Laguna Mountain region of the Peninsular Range. The site is ideally situated in the mountains, with easy access to the desert to the east and the coast to the west. The pottery at Wikalokal is presumed to be associated with Patayan II and Patayan III time periods (Waters 1982), which cover roughly A.D. 1000-1890. This time frame is consistent with the proposed dates for the advent of pottery in San Diego County as discussed by Laylander (1992).

Pottery at Wikalokal has not been dated directly to determine its age at the site. However, the nearby site of Cottonwood Creek has produced a radiocarbon date of 960±80 years (May 1976). This date was obtained from a charcoal lens overlying a human burial and is considered by May to represent the Aearliest ceramic bearing strata (May 1976:4)

CERAMIC WARES IN SOUTHERN CALIFORNIA

The definition of wares in San Diego County and all of southern California has not been without problems. Before describing the wares used in this study, a few definitions are important for clarification. First, "ware" is a broad category used to group together pottery on the basis of similar mineral or chemical composition, or a similar method of manufacture. Wares do not carry any cultural affinities,

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Proceedings of the Society for California Archaeology, Volume 14, 2004. pp 119-123

which is often cause for confusion as the terms "ware" and "type" are often used interchangeably. The term "type" is reserved for pottery that carries similar cultural affinities, such as the selection of a particular design motif. An example of a type would be Boulder Gray, which is a type of Moapa Gray Ware as defined by Margaret Lyneis (Lyneis 1992:30).

Tizon Brown Ware

The term "Tizon" was originally used by Harold Colton to designate wares in the western Arizona area. The term was later extended to describe the pottery of the southern California area. Colton's description of Tizon included quartz, feldspar, and occassional mica (Colton 1939). The utility of the terminology has been debated (see Lyneis 1988; Van Camp 1979), but it is still used. Tizon Brown Ware is the most commonly occurring ware in San Diego County. The maunfacturing technique used for Tizon Brown Ware is called paddle-and-anvil construction. The clay is residual, formed by the erosion of the parent rock of the Peninsular Range. Tizon clays are created by the erosion of plagioclase feldspar. The mineral components of Tizon Brown Ware include quartz, plagioclase, and biotite mica. The most distinguishing characteristic for Tizon versus Salton is the appearance of amphibole, a black mineral that is also referred to as hornblende. This mineral is not found in Salton Brown Ware clays. At Wikalokal, 99 percent of the sherds in the collection were originally identified as Tizon, with the other 1 percent identified as Lower Colorado Buff Ware.

Salton Brown Ware

Malcolm Rogers described this as a desert ware that is reddish-brown firing. Salton Brown Ware has its origins in eastern slopes of the Peninsular Range. This sedimentary clay is the result of the erosion of clay producing biotite mica from the mountain slopes. These clays also have much higher concentrations of both quartz and mica than Tizon Brown Ware (Table 1). Salton Brown Ware also contains orthoclase feldspar, a mineral that can be viewed in thin section, which is notably absent from Tizon Brown Ware. Salton Brown Ware is best identified on the basis of high concentrations of quartz and mica and a lack of amphibole.

Lower Colorado Buff Ware

Lower Colorado Buff Ware originates from deposits in ancient Lake Cahuilla. These clay deposits are lacustrine in nature, having formed during the different stands of the ancient lake. This ware is readily distinguishable from the two brown wares mentioned above. In thin section, clay particles and crushed sherds can be seen. These inclusions act to temper the clay for easier manipulation.

METHODS AND RESULTS

As stated at the beginning, the purpose of this research was to test a new method of differentiation between Tizon Brown and Salton Brown wares. This research marked the first application of the results of Hildebrand *et al.* for use in a research setting. The goal was to create a method of hand-specimen analysis that could be used in a lab situation. This preliminary sample confirmed that wares could be identified according to the parameters set in the Hildebrand *et al.* study. The sample also provided verification that there was a significant component of Salton Brown Ware at Wikalokal as Hildebrand *et al.* indicated. The ability to discern between Tizon Brown Ware and Salton Brown Ware depends upon the ability to determine the presence or absence of certain minerals and inclusions in the sherds, as described in the definitions of the wares.

Testing was conducting using two samples from Wikalokal. Both came from Structure 1, located in the group of stone structures at the site (Figure 1). The first sample was non-random and consisted of all the rim sherds from the structure. This was approximately 116 sherds, or about 5 percent of the total for Structure 1. This sample was designed to be a blind test conducted by three participants, who were to examine a fresh edge on each sherd and determine if it was Tizon, Salton, Buff, or other. The objective of this test was to check the consistency of the hand-specimen identification method. The goal was to achieve approximately the same ratios of Tizon to Salton with each participant.

The three participants examined the rim sherds, and the results were mixed but instructive. For the first sample, two participants examined the sherds under a binocular microscope, while the third used a hand lens. Initial agreement was only 36 percent among participants because of the variance caused by the hand lens (Table 2). Apparently, the use of a hand lens does not allow enough magnification and light to detect some of the defining minerals involved. For instance, the amphiboles that are commonly found in Tizon are sometimes small and hard to detect using a microscope. Amphiboles may sometimes be mistaken for biotite mica, which is another dark mineral, although the mica has a flatter, more planar look. Under a hand lens, these minerals are practically

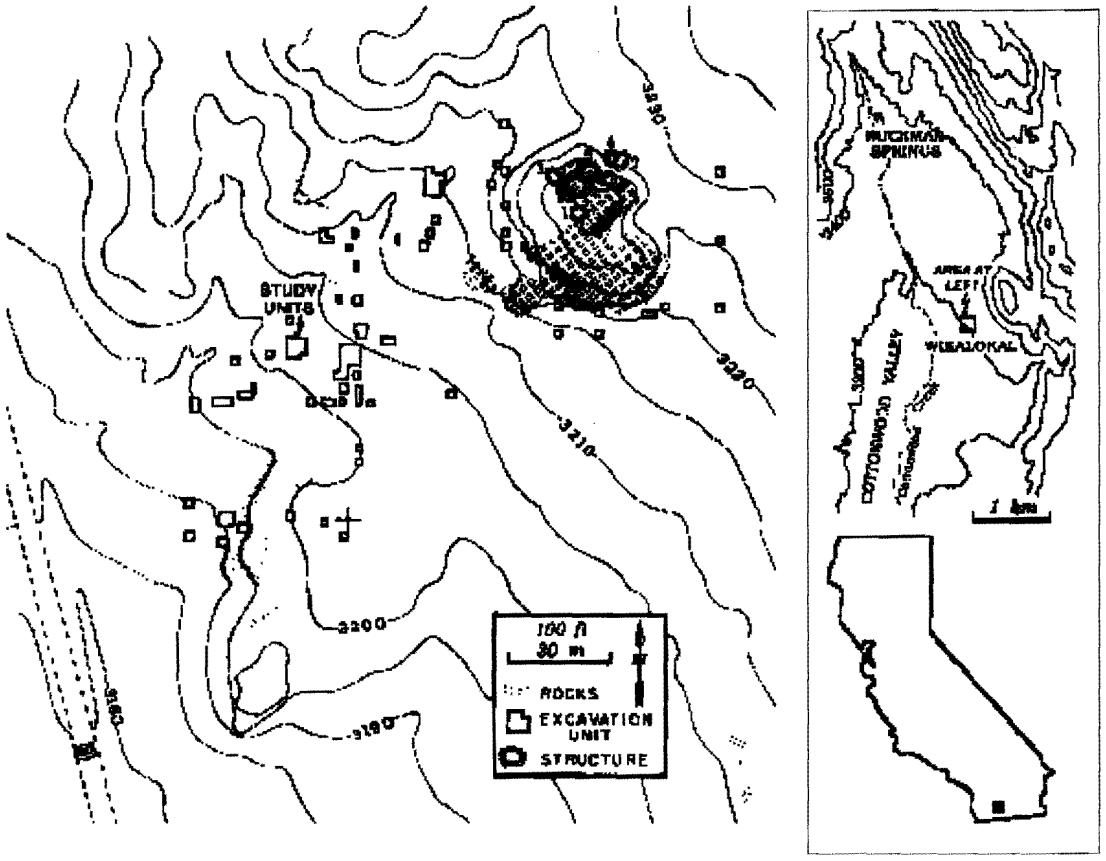

Figure 1: Wikalokal Site Map with Regional Context (reprinted with permission from J. Hildebrand).

impossible to detect, especially if the clay fabric is dark. For this reason, the participants decided that all sherd examination should use a microscope.

The results of the participants using the microscope were more encouraging. After adjustment, the overall patterning indicated a mix of 67 percent Tizon, 29 percent Salton, and 4 percent Buff. It was discovered that the two participants using the microscope had a high rate of agreement for Tizon and Salton, 90 percent and 85 percent respectively, with overall agreement at about 82 percent.

After the first sample, 27 rim sherds were selected for thin-section analysis. Sherds included Tizon, Salton, Buff, and a number of undetermined sherds – those were not agreed upon after reexamination by the participants. Thin-section analysis was conducted to test the accuracy of the method of hand-specimen analysis. There are several steps involved to create a thin section from a ceramic sherd. The method used here follows from Hildebrand *et al.* and includes three steps. First, the sherd is encased in an epoxy resin. Then the sherd is attached to a glass slide and ground to a thickness of 30 microns. Finally, the sherd is examined under plane-polar and cross-polar light using a slide microscope.

Table 2 lists both the original ware determinations from the selected samples and the determinations after thin-section analysis. As the table illustrates, the results of hand-specimen identification were very close to those from the thin sections. Of the eight "Salton" sherds selected, two were revealed to be Tizon. Of the 20 sherds that were identifiable, this indicates an error rate of 10 percent. Of the sherds that were initially undetermined after hand-specimen analysis, five were Tizon and two were Salton. The rate of indetermination was seven out of 116 sherds, or 6 percent. These two numbers indicate an overall accuracy rate of 84 percent for the hand-specimen analysis.

Once the results were discussed between the three participants, a second sample was constructed. It was random and consisted of approximately 232 body sherds, or approximately 10 percent of the Structure 1 sample. These sherds were selected from only those sherds listed as Brown Ware in the catalog. This second sample was run by one individual. The goal

Ceramic Type	Sorting	Total Inclusions	Qtza%	Pl%	Bt%	Ms%	Am%	Rock%
Salton	Poor	65	62	12	9	6	5	5
Salton	Mod.-Well	73	60	10	20	5	2	2
Tizon	Mod.	67	48	17	3	1	27	1
Tizon	Poor-Mod.	61	54	23	5	1	13	1

Table 1: Minerals present in Salton Brown Ware and Tizon Brown Ware
[a]Mineral Abbreviations: Qtz = Quartz, Pl = Plagioclase, Bt = Biotite, Ms = Muscovite, Am = Amphibole.
(Reproduced with permission from J. Hildebrand & J. Schaefer).

Table 2: Cross comparison of sherds with hand-specimen and thin-section analysis.

	Thin-Section Results		
	Tizon	Salton	Buff
Tizon = 10	10	0	0
Salton = 8	2	6	0
Undeter. = 7	5	2	0
Buff = 2	0	0	2

was to test whether the same ratio of Tizon to Salton could be found in this second sample. The final pattern for this sample indicated 68 percent Tizon and 32 percent Salton, very close to the results of the first sample. The results were taken as an indication that the method of hand-specimen analysis was valid.

DISCUSSION

The results of these analyses are important for a few reasons. First, they showed that the component of Salton Brown Ware in the area under study was approximately 30 percent. This indicates that Salton Brown Ware is apparent in significant numbers at Wikalokal. Second, it shows that the study could be replicated successfully. Replication was considered successful because the larger body sample resulted in approximately the same ratio as the rim sample. Since the samples were both pulled from the same structure, a similar ratio was the expected result.

The most important aspect of this study, aside from testing the new methodology, is that it has now been established that pottery made in the desert has been transported to the mountains in significant numbers. A brief examination of the "gray literature" indicates that, for the most part, brown wares in a mountain context have been categorized as Tizon Brown Ware, as was the case for Wikalokal (e.g., Carrico 1978, 1982; Fulmer 1979; Gallegos 1986). These authors have not been singled out on purpose; any random search of the literature on file at the South Coastal Information Center would likely produce similar results. New research should be aimed at reexamining older sites in the mountains to determine if there is a similar occurrence of Salton Brown Ware. Additionally it may be instructive to determine how far west Salton Brown Ware may be found.

I feel that the proposed questions are important not only for ceramic studies, but for San Diego archaeology in general. Researchers will be provided with a new technique that affords concrete ways to differentiate between two common brown wares in the county, something that has been lacking in the past. It also opens up an entire realm of research questions, if desert wares are found to consistently occur in other

sites in San Diego County. This is where it has implications for regional archaeology. The proposed research provides a good starting point for discussions regarding trade and mobility, through a medium that has not been traditionally used in southern California B ceramic analysis. It is this author's hope that the research will generate a new way of looking at sites containing ceramics: how clay pots were procured, manufactured, and used prehistorically in San Diego County.

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