Prehistoric and Historic Brown Ware Pottery from the Pala Road Bridge Site

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Abstract

CA-RIV-4707/H, the Pala Road Bridge site, produced abundant brown ware pottery. Ceramic evidence from the site indicates continuity in production and use from the Late Prehistoric period into the historic period. The stratigraphic and artifact associations of the site's ceramics are evaluated, and the prehistoric pottery is compared with the historic ceramics. The Pala Road Bridge site pottery provides important evidence for the interpretation of brown ware pottery from other locations in southern California. This essay stands as caution against the too rapid assumption that pottery of similar appearance must be either prehistoric or historic, when it could be both.

Introduction

CA-RIV-4707/H, the Pala Road Bridge site, is a multi-component site situated near Temecula Creek, just north of the Pechanga Indian Reservation in Riverside County (Figure 1). The uppermost prehistoric component (0–50 cm) consists of both San Luis Rey I (without pottery) and San Luis Rey II deposits (with pottery). The San Luis Rey II deposits appear to be concentrated in the upper 30–40 cm. Based on the presence of Cottonwood projectile points, a mortar rim fragment, and a radiocarbon date of 790 ± 90 BP obtained from hearth charcoal, this component was occupied as early as AD 1100 but was abandoned prior to European contact. It may represent a field camp and/or a single family residential base. A probable occupational hiatus may be represented by the 50–70 cm levels. This is stratigraphically preceded by a very low density deposit of debitage, bone, manos, a metate, hammerstones, and fire-altered rock all between 70 and 100+ cm. No diagnostic chronological indicators were found, but this component probably dates to the Late Milling Stone or Intermediate period. At this earliest time of occupation, the site was probably a field camp or food procurement and processing location.

The historic deposit is localized (perhaps 10–12 m in diameter). It contains abundant butchered domestic faunal remains (mostly cattle) with some wild species (rabbit, some specimens with butchering marks). Tizon Brown Ware sherds are common, and at least one Colorado Buff Ware vessel is present. Other remains include historic white ware ceramics, glass bottle fragments, and metal artifacts, including a crude coffee can; there are bits of cloth, charred plant remains (corn and wild species, including riparian plants), and a bit of burnt daub. The ground stone tools and lithic debitage recovered from the historic deposits are doubtless prehistoric carry-overs. While the historic trash deposit could not be associated with specific individuals, the combination of a cleaver or a large blade tool, butchered domestic animal bone, Tizon Brown Ware (mostly cooking and/or storage vessels), and the presence of charred riparian bone, suggests the possibility of an aculturated family of mixed Native American and Hispanic ancestry. Diagnostic ceramic white wares and glass bottles date the assemblage to ca. 1860–1890.

Prehistoric Tizon Brown Ware at CA-RIV-4707/H

The taxon, Tizon Brown Ware, was first applied by Colton and Hargrave (1937) to sherds found in northwestern Arizona and later described in detail by Dobyns and Euler (1958). May (1978) attempted to delineate a number of types of Tizon Brown Ware. More recent studies of historic period brown wares have been conducted by Griset (1990) and Schaefer (1994). Both Tizon Brown Ware and Lower Colorado Buff Ware sherds were found at CA-RIV-364, a post-Mission period Indian village situated 4.8 km east of Temecula (Drover et al. 1989:72; Drover et al. 1998). These wares were also recovered from the Apis Adobe in Old Temecula, which dates from ca. 1845–1875 (Drover et al. 1989:70–73), and at the Luiseño village of Temeku which dates primarily to the Late Prehistoric period and early historic period (McCown 1955:40–55).

Drover described the Tizon Brown Ware from the Apis Adobe (CA-RIV-1520):

> In general it is a pottery ware that exhibits a wide range of colors from terra-cotta red to a very dark gray black depending on mineral inclusions and firing conditions. The surfaces are usually smoothed and unpolished. It is made from residual granitic clays found along streambeds located in the coastal

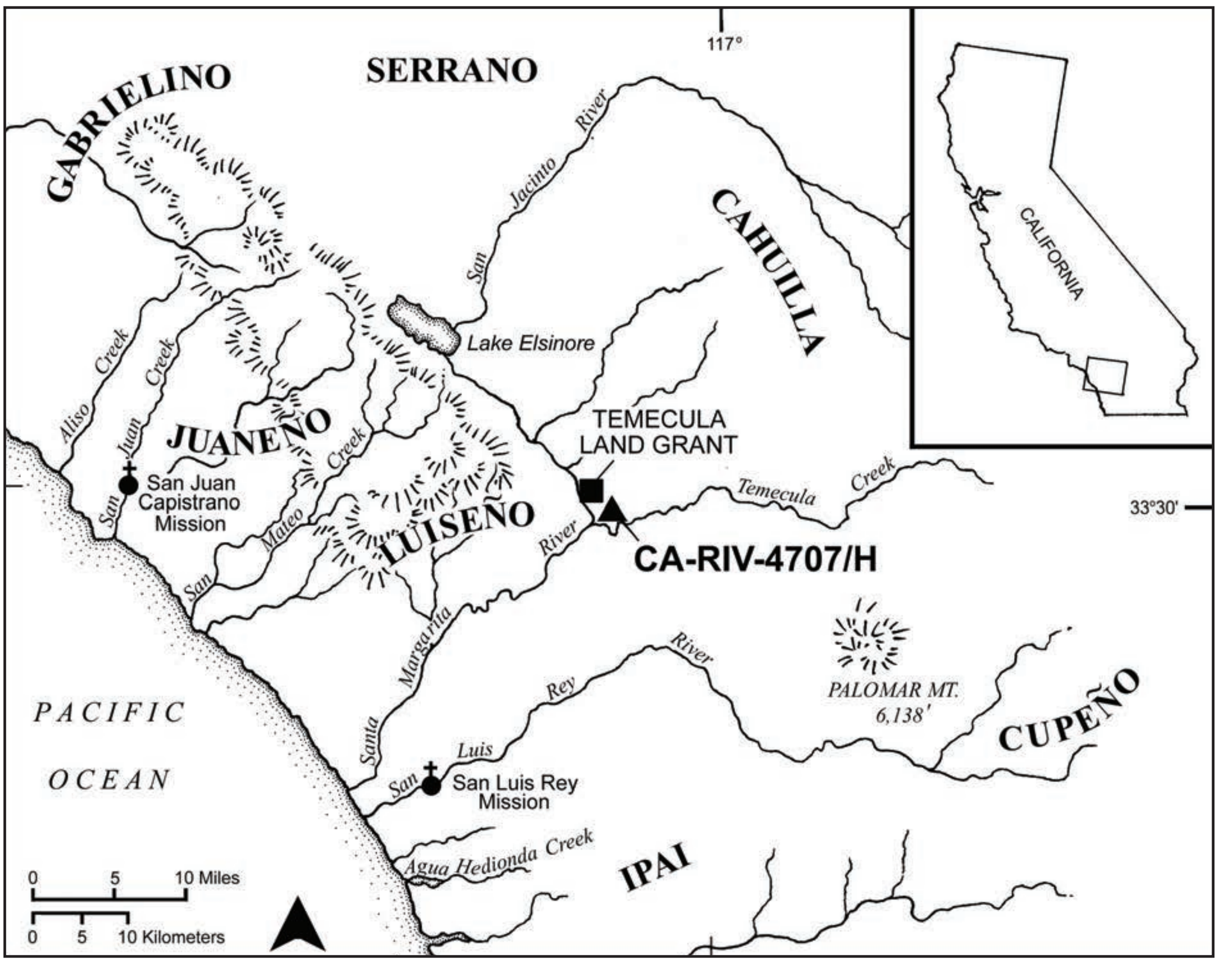

Figure 1. Location of the Pala Road Bridge site, CA-RIV-4707/H (triangle) and its relation to ethnographic groups and natural and historic features. Map by Rusty Van Rossmann and Philip de Barros (after Kroeber 1925).

> and mountain areas … Within these clays a number of natural inclusions are present. They consist of quartz, feldspars, mica, etc., and as such, Tizon Brown Ware pottery is often self-tempering and needs no additional temper to provide strength during firing or cooking. Construction techniques and vessel types for the region have been described by Malcolm Rogers (1936) and others. For various reasons … the classification of plain wares into "types" should be achieved with the utmost conservatism as warned by Euler (1959:41). Geographical differences in local clays, temper, firing techniques, and potters render taxonomy beyond the level of wares and inferences based thereon most difficult [Drover et al. 1989:73].

The prehistoric ceramic collection from RIV-4707/H consists of 106 Tizon Brown Ware sherds recovered from trenches (16), the site surface (11), and Test Units 1 and 2 (79) during the Extended Phase I investigations by Ogden Environmental and Energy Services, San Diego (Clevenger 1997:Table 11); an additional 45 sherds were recovered from test excavations conducted by Professional Archaeological Services (PAS), San Diego (de Barros 1997). These sherds were recovered from Test Units 5, 7–10, 12, and 13. Although a few prehistoric sherds were probably present in adjacent Test Units 4 and 6, they are impossible to distinguish from the hundreds of historic period brown ware sherds associated with the middle-to-late nineteenth century trash dump at this location. Any prehistoric sherds that may have been present in those units were excluded from the following analysis.

Study of the prehistoric ceramic collection was done in two parts. The first part consisted of a general inspection of the ceramics excavated by Clevenger (1997). This excavation produced the Ogden Extended Phase I subsurface collection. The second part focused on a sherd analysis of the formal PAS test excavation collection. It should be emphasized that the prehistoric sherds are very small; the 79 sherds recovered from Test Units 1 and 2 weighed 94.6 g with a mean of 1.2 g per sherd (Clevenger 1997:Appendix B). The 45 prehistoric sherds from the PAS formal test excavations weighed 67.8 g with a mean of 1.5 g per sherd. This is in contrast to the 752 sherds from Test Units 4 and 6, almost entirely historic, whose total weight was 7,684 g, giving a mean weight of 10.2 g per sherd. The larger historic sherds, including several partially reconstructible vessels, provided information about vessel form, and techniques of manufacture (coiling, paddle-and-anvil), vessel use (soot, fire blackening), firing techniques (fire clouds, smudging, reducing versus oxidizing atmosphere), and variations in surface finish, surface color, and paste color. Such information was much more difficult to assess from the small prehistoric sherds. Seventy-nine sherds weighing a total of 94.6 g were recovered from the Ogden Extended Phase I investigations. Forty-five sherds weighing 67.8 g were recovered from the PAS test excavations. This gives a combined weight of 162.4 g for 124 sherds and an average weight of 1.3 g per sherd.

Vertical and Horizontal Distribution

Table 1 shows the horizontal and vertical distribution of prehistoric Tizon Brown Ware in Test Units 1–2, 5, and 7–13. Clevenger's Test Unit 3 was off site and is not shown. Test Units 4 and 6 consisted almost entirely of a historic period deposit, and the few prehistoric sherds that might be present could not be distinguished from the historic period Tizon Brown Ware. Units 1 and 2 belong to the Ogden Extended Phase I program. Units 5 and 7–13 belong to the Formal Test Excavation Program carried out by PAS.

Table 1. Vertical and Horizontal Distribution of Prehistoric Tizon Brown Ware at CA-RIV-4707/H.

	Test Units*										
Depth (cm)	**1**	**2**	**5**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**Total**
0-10	10	11	0	0	0	2	0	0	0	1	**24**
10-20	15	23	1	1	2	2	2	0	9	0	**55**
20-30	10	5	1	0	3	2	4	0	1	1	**27**
30-40	2	2	0	1	1	4	3	0	1	0	**14**
40-50	0	0	0	0	0	0	0	0	0	0	**0**
50-60	0	1	0	0	0	1	2	0	0	0	**4**
Total	**37**	**42**	**2**	**2**	**6**	**11**	**11**	**0**	**11**	**2**	**124**

* This table combines data from the Ogden Extended Phase I work (Clevenger 1997) and units from the formal test excavations carried out by Professional Archaeological Services (de Barros 1997).

Vertical Distribution

Except for four sherds from the 50–60 cm level, 97 percent of the 124 Tizon Brown Ware sherds from Test Units 1–2, 5, and 7–13 were recovered from the 0–40 cm levels. The distribution by sherd count peaks at the 10–20 cm level. A similar peak occurs for sherd distribution by weight (de Barros 1997:Figure 5–10). Tizon Brown Ware is clearly associated with the upper cultural component (0–50 cm). Surprisingly, no pottery was recovered from the 40–50 cm level. Perhaps those few sherds at the 50–60 cm level were the result of rodent activity.

Horizontal Distribution

The distribution of surface and subsurface prehistoric Tizon pottery strongly suggests the heart of the prehistoric component was situated where Test Units 1 and 2 were placed. Evidence from Test Units 9, 10, and 12 (and perhaps 8) suggests that these units were also located within or near the main concentration of prehistoric material. The small amount of pottery in Test Units 5, 7, 11, and 13 suggests these units were marginal areas of site occupation, except for Test Unit 7 where flintknapping occurred.

Prehistoric Tizon Brown Ware

Ogden's Extended Phase I Subsurface Collection

A brief study of the 79 subsurface sherds recovered from Test Units 1 and 2 indicates the following:

- If one uses the criteria that sherds with relatively unsmoothed interiors are most often jars and that those with smoothed interiors are most often bowls, then both bowls and jars appear to be present. No rim sherds were recovered in this collection. A few sherds show possible evidence for undulating interior surfaces typical of the paddle-and-anvil technique.

- Blackened surfaces are present on some sherds. Some appear to be fire blackened (with and without soot residues) as a result of cooking activities. Other black surfaces may be the result of firing an entire vessel or the inside of a vessel in a reducing atmosphere, leading to occasional smudged surfaces.

- The pottery was generally low-temperature fired as evidenced by the presence of carbon cores in numerous sherds.

- Vessel wall thickness was measured on 64 sherds (the remaining 15 sherds were fragments without two surfaces) using a transparent millimeter rule and rounding off to the nearest millimeter. Thickness ranges from 3 to 9 mm with most sherds falling in the 5 mm (18 sherds) to 6 mm range (24 sherds). Thicknesses of 4 mm (10 sherds) and 7 mm (7 sherds) are also common. Only four sherds (6 percent) surpass 7 mm; three are 8 mm thick, and one is 9 mm thick. A single sherd is only 3 mm thick. These data have been incorporated into Figure 2.

- Paste color ranges from various shades of brown to orange tan and gray to black (for cores).

- None of the prehistoric sherds show signs of decoration, painted or otherwise. Decoration of Luiseño pottery is not common, though McCown (1955:39) noted a "very small" percentage of sherds (out of over 20,000) "with incised cross-hatching and wavy lines on the shoulder and fingernail impressions on the rim," recovered from the ethnographic village of Temeku. This site was occupied during both prehistoric and historic

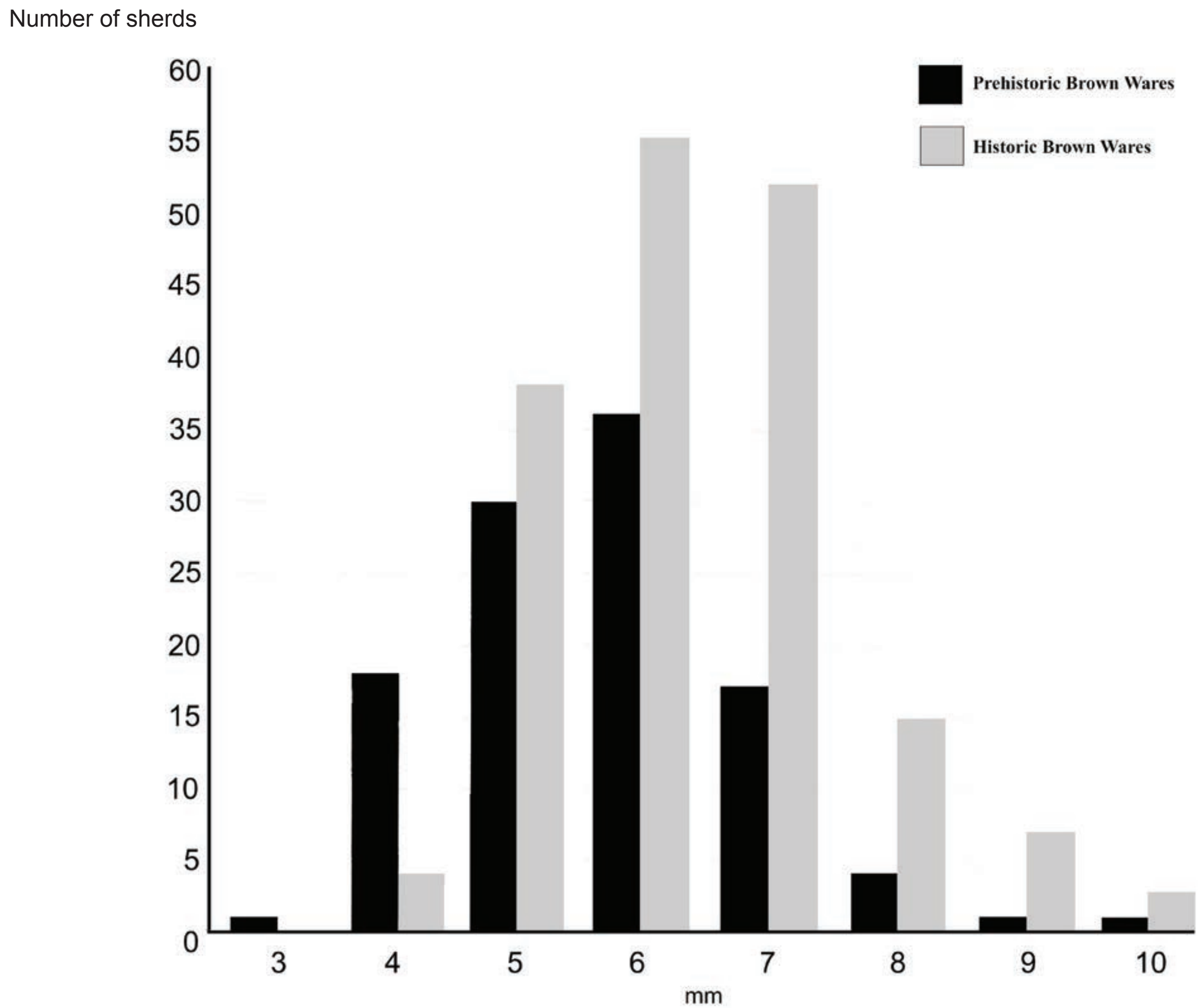

Figure 2. Comparison of vessel wall thickness between the CA-RIV-4707/H site's prehistoric (dark bars) and historic (light bars) components, rounded to nearest millimeter. By Philip de Barros and Rusty Van Rossmann.

periods, but McCown does not indicate the probable time period of the decorated sherds.

An in-depth analysis of the sherds recovered from the test excavations revealed similar trends.

Formal PAS Test Excavation Collection

The following data are based on a careful examination of 44 sherds (see de Barros 1997). One sherd consisted of an interior fragment without original interior or exterior surfaces. It was not analyzed.

Vessel Forms

Only a single prehistoric period rim is present in this collection (Figure 3a). It appears to be from a jar. Again, if relatively unsmoothed (undulating) interiors are primarily indicative of jars and smoothed interiors primarily indicative of bowls, then both forms are clearly present (see Figure 4); however, it is very difficult to assess individual sherds because of their size. Data from the later historic period brown wares suggest that some bowls had undulating, relatively unsmoothed interiors. If this was the case for the prehistoric material, then it clearly makes it difficult to assess with certainty whether a given sherd is from a jar or a bowl. A few sherds show possible evidence of fire blackening (2) or soot (1) which suggests a vessel was used in cooking.

Vessel Wall Thickness

The range in vessel wall thickness for 44 sherds is similar to that in Test Units 1 and 2, i.e., 4–10 mm.

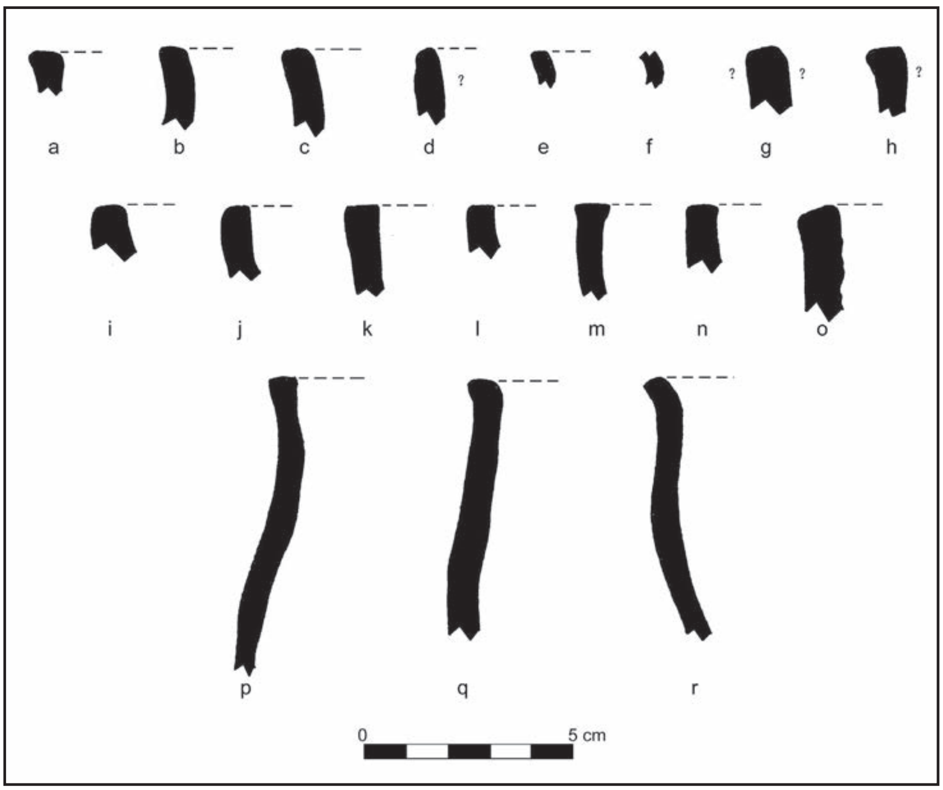

Figure 3. Prehistoric and historic Tizon Brown Ware rim and body sherds from the Pala Road Bridge site, CA-RIV-4707/H. (a) prehistoric jar; (b–h, p, q) probable historic jars; (i–o, r) probable historic bowls. By Philip de Barros and Rusty Van Rossmann.

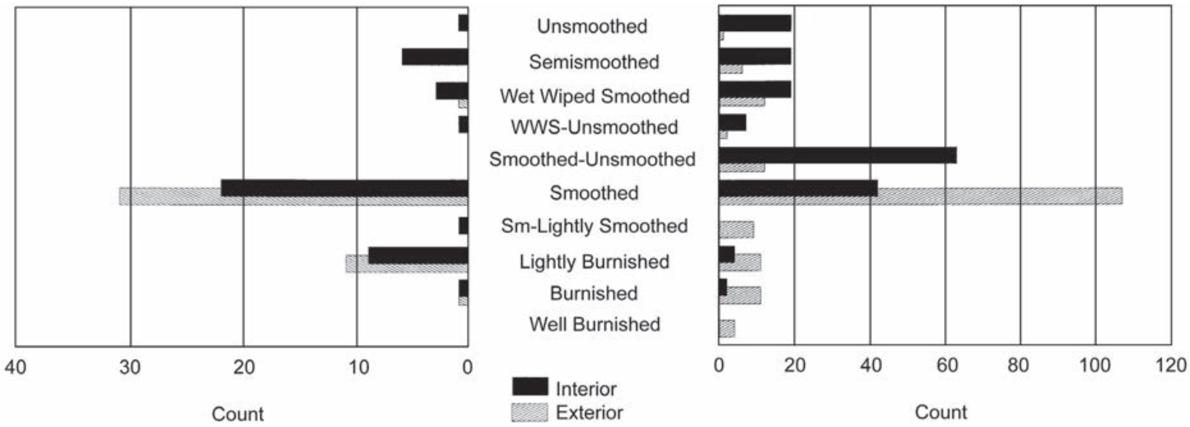

Figure 4. Comparison of vessel surface finish attributes of prehistoric (left) and historic (right) Tizon Brown Ware samples from the Pala Road Bridge site, CA-RIV-4707/H. By Philip de Barros and Rusty Van Rossmann.

Most sherds (95 percent) measure between 4 and 7 mm with thicknesses of 5 and 6 mm being the most common (12 each). Ten sherds are 4 mm thick, and seven are 7 mm thick. Only 2 sherds (<5 percent) surpass 7 mm in thickness, one at 8 mm and one at 10 mm. The combined totals from Test Units 1 and 2 and Units 5 and 7–13 are presented in Figure 2 (n = 108). The trends observed in each collection are again apparent in the combined totals. The thickness distribution is relatively symmetrical with a peak in the 5–6 mm range and significant quantities at both 4 and 7 mm. Sherds <4 mm or >8 mm are rare. At Temeku, McCown (1955:39) found that brown ware pottery measured from 3–12 mm in thickness, with the majority 4 to 7 mm; however, he did not distinguish between prehistoric and historic period sherds, and his Table 6 unfortunately presents data contradicting this conclusion.

Presence and Type of Carbon Cores

The prehistoric sherds indicate firing at relatively low temperatures, probably in an open firing setting. Two lines of evidence suggest this: (1) the high frequency (61 percent) of incompletely oxidized organic material within the paste of the sherds; (2) the relative ease with which a small fragment could be broken off each sherd using a pair of pliers. About 23 percent of the sherds contain the classic "carbon core," a gray to black layer of unburned organics sandwiched between areas devoid of organics. Another 30 percent possess an asymmetrical, or one-sided, core, i.e., the layer of unburned organics is on one side of the paste or sherd instead of being sandwiched in the middle. This suggests that an oxidizing atmosphere was present on one vessel surface, whereas a reducing atmosphere was dominant on the other surface. Often this resulted in a blackened, smudged-like interior or exterior surface. This probably reflects the position of the pots relative to the structure of the open firing. Finally, 9 percent of the sherds contain unburned organics throughout the paste. In three cases this appears to be due to low firing temperatures and/or the lack of a good oxidizing atmosphere as surface colors are primarily shades of brown. In a fourth case it appears that a reducing atmosphere dominated, and both paste and surface colors are gray black to black.

The constant reuse of pots for cooking, as well as the refiring of old pots to oxidize them again, makes interpretations relating carbon cores to original firing conditions very difficult to determine (Suzanne Griset and Georgie Waugh, personal communications 1996).

Moreover, a single vessel can show great variety in the location and extent of its carbon core if measured at various points (Suzanne Griset, personal communication 1996). This was clearly evident for many of the partially reconstructible historic pots.

Vessel Surface and Paste Colors

The predominant colors of both vessel surfaces and interior paste consist of three shades; they are listed in order of frequency: tan brown, light brown, and brown. For vessel surfaces, gray brown was also frequent but relatively less common for vessel paste. The range of vessel paste colors is greater than that of vessel surfaces, which is often the case. Vessel surfaces tend to be dulled by use, the action of subsurface groundwater, and other forms of weathering.

Paste color was determined after breaking off a small chip with a pair of pliers. Paste colors were observed where color was not obscured by a carbon core. If gray to black unburned organics encompassed the entire cross-section of the sherd (a full paste core), the paste color was designated by the color of the core. Paste core colors range from various shades of brown to gray and black. A few are orange-tan or orange. It is important to note that vessel surface and paste colors can vary extensively within a single pot as was evident for the partially reconstructible historic vessels described later.

Vessel Surface Finish

A comparison of the surface finish of vessel interiors and exteriors revealed that unsmoothed, semismoothed, and wet wipe smoothed (with a wet vegetal material or cloth) surfaces are almost exclusively found on vessel interiors (Figure 4). Smoothed surfaces are common on both vessel interiors and exteriors, but they are definitely more common on the latter. Lightly burnished surfaces are found more or less equally on both vessel interiors and exteriors. Burnished and well burnished sherds are rare. No sherds were recorded with a combination of both smoothed and unsmoothed surfaces. This type of surface treatment combination is associated with undulating, paddle-and-anvil surfaces in the historic period brown wares. A few sherds have somewhat undulating surfaces, but they do not show a combination of surface treatments. The small sherd size of this collection makes a study of this attribute very difficult.

Paste Inclusions

A macroscopic examination of the paste of the prehistoric sherds recovered from the test excavations suggest that quartz and feldspar are the most common paste constituents. There is some evidence for muscovite mica. Three prehistoric sherds were sectioned to check for types and sizes of mineral inclusions. Most sherds were too small for effective thin sectioning, which greatly limited the choice. Those that were selected were chosen based on probable variations in paste inclusions; they were analyzed by Frank Tepley (Tepley 1997) of the UCLA Geology Department.

Catalog No. 602

The provenience of specimen 602 is the 10–20 cm level of Unit 12; this specimen is likely a prehistoric Tizon Brown Ware bowl fragment. Its various attributes include fire-cloud on exterior producing one-sided core, tan surface color, tan brown to orange tan paste color, smoothed interior and exterior, and a vessel wall thickness of 7 mm. Its exterior has a greasy shine. Macroscopic examination suggests there are small quartz grain inclusions in the paste. A thin section reveals that the sherd is about 60 percent clay, 35 percent mineral grains, and 5 percent pore space. Mineral grains include potassium feldspar (18 percent), quartz (12 percent), plagioclase feldspar (4 percent), and trace amounts (1 percent) of amphibole, pyroxene, and iron oxide; grain size ranges from .1 to .5 mm for plagioclase feldspar, .1 to 1.0 mm for quartz, and .1 to

2.0 mm for potassium feldspar. Grains are blocky to angular in shape.

Catalog No. 603

Provenience of specimen 603 is the 10–20 cm level of Unit 12; this specimen is a prehistoric Tizon Brown Ware probable jar sherd. It is characterized by a one-sided core, brown surface, and a brown paste. It has a lightly burnished exterior and smoothed interior; the vessel wall is 7 mm thick. To the naked eye it appears to have quartz and white and light orange inclusions; it is typical of many sherds except perhaps for its thickness. This sample is about 60 percent clay, 35 percent mineral grains, and 5 percent pore space. The abundance of mineral grains is equally divided between quartz (14 percent) and potassium feldspar (14 percent), with lesser amounts of plagioclase feldspar (6 percent) and trace amounts (about 1 percent) of both amphibole and pyroxene. Grain sizes range from .5 to .75 mm for quartz and plagioclase feldspar, averaging about .3 mm for potassium feldspar (but a few are as large as 1.5 mm) and averaging about .5 mm for amphibole. Some of the plagioclase feldspar grains are altered, probably due to weathering.

Catalog No. 604

The provenience of specimen 604 is the 20–30 cm level of Unit 8. It is a prehistoric Tizon Brown Ware bowl sherd. It has a full paste core; soot is present on the black vessel exterior. It has a black exterior and a tan brown interior surface. Paste color is black. It has a smoothed exterior and a somewhat smoothed, undulating interior. Vessel wall thickness varies from 4 to 6 mm, and it appears to have large quartz and white inclusions. This sample is about 65 percent clay, 30 percent mineral grains, and 5 percent pore space. There are approximately equal proportions of quartz (12 percent) and potassium feldspar (12 percent) with lesser amounts of plagioclase feldspar (4 percent) and amphibole (2 percent). Quartz crystals range from .1 to 1.0 mm in size. There are a few large (2–3 mm) grains of potassium feldspar, but most range between .5 to 1.0 mm. Plagioclase feldspar grains range between .5 and .75 mm. The mineral grains are angular in shape.

Discussion

Mineral inclusions within the three prehistoric sherds are quite similar, dominated by quartz and potassium feldspar, followed by plagioclase feldspar and trace amounts of amphibole and pyroxene (2 of 3 sherds). Mineral grains range between .1 mm and 1.0 mm for quartz and plagioclase feldspar (with most of the latter between .5 and .75 mm). Potassium feldspar grains are generally larger, with some specimens in the 1.5–3 mm range. Mineral grains are blocky to angular. Some plagioclase feldspar grains in specimen 603 are altered, perhaps due to weathering. While crushed rock temper could have been added to the clay, the relatively small sizes of the grains (most less than 1.0 mm) suggest natural, nonplastic inclusions. It is not known to what extent dry clays were sieved to eliminate larger mineral particles.

While it is assumed that the vessels were made from locally available clays, the mineral grains in the three sherds analyzed are not distinctive. All of them could have come from almost any geological formation in the area. Rock types common in the area include granites, gabbros, and granodiorites which can provide quartz, feldspar, and pyroxene. The area is also rich in Pleistocene volcanic tuffs, agglomerates, dikes, and flows which contribute potassium feldspar (Tepley 1997). While it is likely that the prehistoric vessels were made within the immediate region, the actual clay source(s) cannot be specified without a comparative analysis of potential and ethnographically known sources. Such studies would incorporate both petrographic and chemical analyses, including X-ray fluorescence (XRF), instrumental neutron activation analysis (INAA), and scanning electron microscopy (SEM) before distinctive fingerprints can be identified.

Historic Tizon Brown Ware at CA-RIV-4707H

All surface and subsurface sherds from the Extended Phase I investigations were identified as prehistoric Tizon Brown Ware (Clevenger 1997). A brief examination of these sherds by the author did not clearly suggest that any of them came from the partially reconstructible historic vessels recovered in Test Units 4 and 6. Significantly, the historic brown wares from Test Units 4 and 6 strongly resemble the prehistoric Tizon Brown Ware sherds. Consequently, distinguishing the prehistoric sherds which may be present from the historic examples is difficult. However, given the relative paucity of prehistoric brown ware sherds recovered from the test excavation units, it is unlikely that Test Units 4 and 6 contained more than a dozen prehistoric sherds combined. For example, Test Unit 13 situated about 18 m to the south of Test Units 4 and 6 contained only two prehistoric Tizon Brown Ware sherds. Test Unit 8 located about 28 m to the north contained only 6 sherds. Test Unit 12 contained 11 sherds, but it is located toward the center of the prehistoric deposit, not on the site periphery as are Test Units 4, 6, 8 and 13. It was decided that the brown ware ceramics from Test Units 4 and 6 could be evaluated as historic period ceramics. Moreover, when a sample of sherds was analyzed from Test Unit 4, only sherds that were greater than thumbnail size (ca. 2 cm) were examined. Since 90 percent of the Tizon Brown Ware sherds recovered outside the historic trash feature (Units 1–2, 5, and 7–13) were smaller than 2 cm, this selection procedure further reduced the chance that the historic period Tizon Brown Ware analysis would be significantly affected by the presence of intrusive prehistoric sherds.

A sample of 175 brown ware sherds from Test Unit 4 were examined to derive information on vessel form and techniques of manufacture (coiling, paddle-and-anvil), vessel use (soot, fire blackening), firing techniques (fire clouds, smudging, reducing vs. oxidizing atmosphere), and variations in surface finish, surface, color and paste color. This 51 percent sample (175/343) included all sherds greater than thumbnail size. This sample was selected primarily to facilitate analysis of the series of attributes selected, a difficult task with very small sherds. Sherds which clearly belonged to the same vessel were treated as a single unit to avoid skewing the data.

Counts and Weights

Excavations produced 343 low-fired brown ware sherds weighing 3,872 g from Test Unit 4, while 371 low-fired brown ware sherds weighing 3,664 g were recovered from Test Unit 6, giving a combined total of 714 sherds weighing 7,536 g. Additionally, 38 sherds (19 each in Test Units 4 and 6) of Colorado Buff Ware, weighing a total of 148 g, were also recovered. Excluding imported white wares (European ceramics), the total number of sherds of all types for both units is 752, weighing a total of 7,684 g. In short, the historic period brown wares outnumber the ceramic white wares 752:41, or 18.3:1. This is much higher than the 1.6:1 ratio of brown wares to white wares found at the Apis Adobe site occupied between 1845 and 1875 (CA-RIV-1520) in Old Temecula (Drover et al. 1989:70).

Horizontal and Vertical Distribution

Little can be said of the horizontal distribution of the historic period brown wares and the more highly fired Colorado Buff Ware ceramics, as they were recovered in relatively equal amounts in the adjacent Test Units 4 and 6 and were not recovered elsewhere. The distribution patterns in the two units a exhibit a bimodal distribution with a small peak at 30–40 cm and a much higher peak at the 50–60 cm level in Test Unit 4 and the 60–70 cm level of Test Unit 6. In general, the bulk of the pottery by weight was recovered between the 50–80 cm levels, 86 percent for Test Unit 4 and 84 percent for Test Unit 6. These levels are characterized by the presence of large sherds belonging to only a dozen or so vessels. Distributional data from partially reconstructible historic period brown ware vessels and from 38 sherds of imported Colorado Buff Ware suggests that the earthenwares present in Test Units 4 and 6 were deposited in a single episode (de Barros 1997).

Vessel Form and Function

Jars or Pots versus Bowls

Distinguishing jars from bowls on the basis of sherds is challenging (Figures 3, 5, 6). The data suggest that a number of jars and pots had very broad openings like bowls, making it hard to distinguish bowls from a broad-mouthed pot or basin. Moreover, some broad-mouthed vessels are bowls with undulating interiors; assuming that sherds with undulating interiors are from jars or pots and that sherds with smoothed interiors are from bowls is problematic. Finally, some of these broad-mouthed vessels were used as cooking pots so that fire-blackening and soot are not always good indicators of vessel shape or type.

An examination of rim and neck sherds that appear to come from the same vessel from Test Units 4 and 6 suggests there are six definite bowl rims (including two with slightly incurved rims), eight probable bowl rims, 12 definite jar rims, and nine probable jar rims, giving a total of 14 bowls as opposed to 21 jars. If only the definite categories are used, bowls make up 6 of 18, or 33 percent. If the total assemblage of definite and probable categories are used, bowls represent 14 of 35, or 40 percent. In either case, jars are clearly the dominant vessel form. Evidence from partially reconstructed vessels and large rims sherds provides information on vessel orifice diameter and occasionally vessel height. This information, along with associated attributes of paste, color, and vessel surface treatment, is summarized for each vessel in Table 2.

Evidence of Cooking

Forty-seven sherds have clear evidence of fire-blackening on their exteriors, and another 28 may be fire-blackened. Fifteen sherds exhibit evidence of soot on their exteriors, and another nine may have soot. Thus, up to 75 sherds (43 percent) show evidence of fire-blackening, and up to 24 sherds (14 percent) appear to have soot, indicating use as cooking vessels.

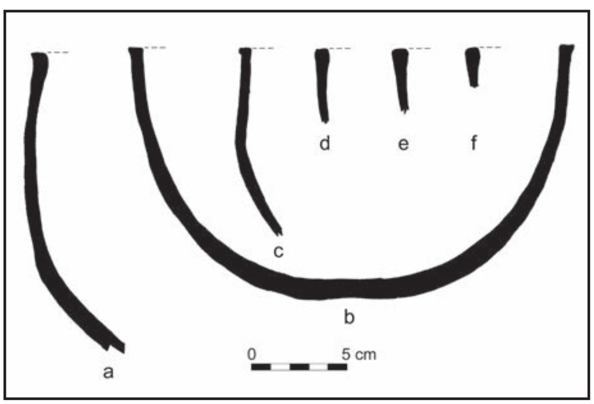

Figure 5. Historic Tizon Brown Ware bowl fragments (a, b, f) and rim sherds (c–e) from the Pala Road Bridge site, CA-RIV-4707/H. By Philip de Barros and Rusty Van Rossmann.

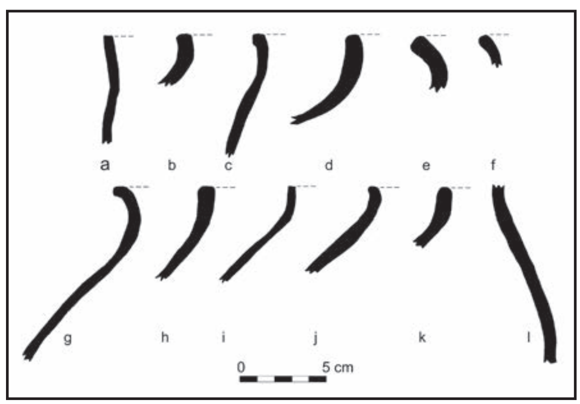

Figure 6. Historic Tizon Brown Ware body and rim sherds from the Pala Road Bridge site, CA-RIV-4707/H. By Philip de Barros and Rusty Van Rossmann.

Table 2. Attributes Associated with Historic Tizon Brown Ware Rims from Test Units 4 and 6.

Cat. No., Figure[a] (no. sherds)	Unit, Level (cm)	Jar/ Bowl	Orifice Diameter (cm)[b]	Wall Thickness (mm)[c]	Surface Color and other Attributes[d]	Surface Treatment[e]	Paste Color and Core Color[f] (if present)
605, Figure 6h (1)	U4, 40–50	J	–	6–7, rim 11	tan brown	undulated; WWS to US	light to tan brown with light gray core
607, Figure 6d (4)	U4, 50–60 60–70	J	18	5, rim 10	dark gray with light to tan brown spots, FC (I); FB? (E)	WWS	dark gray
608, Figure 5c (6)	U4, 50–60	B	26+	5–6, rim 7	light to tan brown; FB, S, lower part (E); greasy stain, lower part (I)	highly undulated interior; I:WWS-US E:S-US	tan brown with gray core; thin pink layer near core
609, Figure 5a (9)	U4, 50–60	B	>25	6 UB 8 LB 8 rim	gray-brown to gray with brownish-black stains/deposits at bottom (I); black with soot or residue below rim, soot on lower body (E)	I:S-US E:S-LB?	I–E layers: 1: pinkish, 2: core, 3: brown to black; core varies in thickness
6010, Figure 4r (2)	U6, 60–70	B?	18	5–7	orange-tan (I); gray black (E); FB (E)	undulated exterior; I:S; E:US	I–E layers: 1: orange-tan, 2: gray core
6012, Figure 6k (1)	U6, 60–70	J	21	6, 8 rim	tan brown; fire cloud	I:S-US; E:S-LB	orange-tan; light gray core
6013, Figure 6g (1)	U4, 60–70	J	12	4–6	light brown (I); brown (E); FB and S? (E); FC (I); greasy residue? on exterior	undulated interior; I:S-US; E:S	I–E layers: 1: tan brown, 2: gray black core, 3: gray, 4: brown
6014, Figure 6c (1)	U4, 60–70	J	–	4–6	tan brown; FB (lower E); FC (I)	undulated interior; I:S-US, E:S	tan brown with gray core
6015, Figure 5a (17)	U6, 70–80	B	23 13 cm high	5–6 UB 6–9 LB	Light tan brown-gray brown (E); gray black to dark black (I); multiple FC (E);	slightly undulated in areas; I:S(-US); E:S	gray black with thin tan brown layer adjacent to E
616, Figure 4a (3)	U4, 30–40	J?	–	5–7	tan brown (I); blackish brown (E); FB (E)	undulated interior; I:S-US, E:S-LB	tan brown with core
617, Figure 6j (1)	U4, 50–60	J	11	6–8, rim 6	orange tan (I); tan brown (E); FC (or FB?) (E)	I:US; :SS	I–E layers: 1: orange tan, 2: gray black core, 3: tan brown
618, Figure 6b (2)	U4, 50–60 U6, 30–40	J	–	8, rim 9	light. brown (I); brown-black (E); FB (E)	I:SS; E:WWS	light brown; thin gray core
619, Figure 5c (1)	U4, 50–60	B	–	4, rim 8	gray black (I); black (E); soot (E) below rim	I:WS; E:S	black throughout
620, Figure 6a (1)	U4, 50–60	J	–	5	tan brown; FC (I)	I:S; E:S	tan brown; gray brown core
621, Figure 4m (3)	U4, 60–70	B?	–	6, rim 8	light brown	I:SS; E:SS	I–E layers: 1: light brown, 2: gray black core, 3: tan brown

Table 2. Continued.

Cat. No., Figure[a] (no. sherds)	Unit, Level (cm)	Jar/ Bowl	Orifice Diameter (cm)[b]	Wall thickness (mm)[c]	Surface Color and other Attributes[d]	Surface Treatment[e]	Paste Color and Core Color[f] (if present)
622, Figure 6e (1)	U4, 60–70	J	–	9	light brown (I); gray black (E); FB (E)	I:S E:S	light brown with gray black core
623, Figure 6i (1)	U6, 40–50	J	–	6.5	orange tan (I); brown (E);	slightly undulated interior; I:S; E:WB	I–E layers: 1: orange-tan, 2: gray
624, Figure 5d (2)	U6, 60–70	B	–	4–8, rim 8	Black	I:SS E:SS	black throughout
625, Figure 4p (1)	U6, 70–80	J?	25+	5–7	tan brown (I); light brown (E); FB (E)	slightly undulated interior; I:S-US; E:S	I–E layers: 1: tan brown, 2: gray black core, 3: light brown
626, Figure 5e (1)	U6, 70–80	B	–	4–7, rim 7	light to tan brown	I:WWS E:WWS	light to tan brown
627, Figure 6l (neck) up to 26 sherds (everted rim?)	Units 4 and 6	J	–	4–8	gray-brown to gray black (I); orange to tan brown to gray brown, even pinkish (E); FC and FB (E)	highly undulated interior with yucca (?) brush marks; I:-US; E:S	variable I–E layers: 1: gray black core, 2: tan brown; also 1: gray or light brown, 2: gray black core, 3: pinkish-tan brown to brown

a. Vessel figure reference, if applicable.
b. Estimate of vessel interior orifice diameter.
c. Vessel wall thickness; maximum rim thickness given. LB = lower body; UB = upper body.
d. Refers to both interior and exterior surfaces unless otherwise specified. FC = fire cloud(s); FB = fire blackening; S = soot.
e. Refers to both interior and exterior surfaces unless otherwise specified. Undulated = undulating surface due to use of paddle-and-anvil technique; E = vessel exterior; I = vessel interior; WWS = wet wipe smoothed; US = unsmoothed; SS = somewhat smoothed; S = smoothed; S-US or WWS-US = combination of smoothed and unsmoothed areas often associated with undulating surface; WS = well smoothed; S-LB = smoothed to lightly burnished; LB = lightly burnished; WB = well burnished.
f. Table 3 lists paste inclusions as revealed by thin sections. I–E layers = layers of paste from the interior towards the exterior surface of the sherd.

A few vessels appear to have residues in their interiors, which have not been identified. One sherd appears to have an asphaltum-like material on its exterior surface, but it was not used to seal a crack in the vessel wall. There is no clear evidence of salt residues in vessel bottoms, which would indicate use as water storage vessels.

Comparison with Historic White Wares

While the historic period Tizon Brown Ware assemblage consists of jars, pots, and bowls, the imported white wares appear to have been used as plates and platters. At least one ironstone pitcher and one bowl spoon are also present (Tepner 1997).

Vessel Construction Techniques

Vessel Construction

The historic period brown wares show evidence of individual coils molded together by the paddle-and-anvil technique. Three sherds show clear evidence of separation along overlapping coil lines. Seventy-one sherds (41 percent) exhibit undulating interior surfaces indicative of the use of the paddle-and-anvil technique.

Vessel Wall Thickness

Vessel wall thickness ranges from about 4 to 10 mm (Figure 2). About 61 percent (107) of the sherds range between about 6 to 7 mm in thickness, and 83 percent range between about 5 to 7 mm. A significant number (14 percent) have thicknesses ranging from roughly 8 to 10 mm and probably represent lower body sherds from jars, pots, or bowls. A very small number (3 percent) are only about 4 mm thick and may be from the upper portion of bowls. Evidence from cross-fitted sherds that form partially reconstructed vessels indicates that wall thickness varies within a single vessel. For example, a partially reconstructed hemispherical bowl, with an orifice diameter of about 23 cm and a height of 13 cm, has an upper body that is generally 5–6 cm in diameter, whereas portions of the lower body reach 8–9 cm in thickness (Catalog No. 6015 in Table 2). Moreover, vessel thickness may vary several millimeters at the same latitude of the vessel. This suggests that these vessels were made relatively quickly and variation in vessel wall thickness was not of great concern to the potters. This variation may also be partly a by-product of the paddle-and-anvil technique. Already mentioned is the fact that McCown (1955:39) at Temeku does not differentiate between prehistoric and historic brown ware pottery; in combination they measure 3–12 mm in thickness, with the majority ranging from 4 to 7 mm.

Vessel Firing Techniques

Several lines of evidence suggest that RIV-4707/H pottery was produced in low-temperature, open air fires, exposing pottery to a highly variable firing atmosphere (Rye 1981:96–98). This firing method results in a variety of brown surface and paste colors, fire clouds, carbon cores, relatively soft paste, variations in vessel surface color on a single surface, and differences in interior versus exterior surface colors. The presence of blackened jar and possibly bowl interiors suggests some vessel interiors were fired in a primarily reducing atmosphere, though this may or may not have been intentional.

Paste Hardness or Fracture

Paste hardness was not measured in a quantifiable manner. It was estimated subjectively by the degree of pressure it took to remove a small chip of pottery from each sherd using a pair of pliers. In general, the paste ranged from quite soft to relatively soft. Only a few sherds offered considerable resistance to the pliers. According to Rye (1981:121), if a sherd “breaks easily with a friable edge, it was probably fired below about 750° C.” The vast majority of the sherds analyzed broke in this fashion.

Vessel Surface Color, Fire Clouding, Paste Color, and Carbon Cores

Variations in vessel surface color and fire clouding, i.e., the formation of black areas on a vessel surface, are caused by differential access to air (oxygen) during firing and cooling (Rye 1981:120). This is typical of open air firing. The partially reconstructed vessels from the RIV-4707/H collection show considerable variations in surface color and the evidence of fire clouding. This was particularly obvious on the large hemispherical bowl (Cat. No. 6015). About 17 percent of the sherds from the 175 sherd sample showed definite or possible evidence of fire clouding.

Vessel Surface Color

Vessel surface color varies extensively. Both sides of 175 sherds were examined for color. The dominant surface colors were relatively dark shades: tan brown (19.8 percent), gray brown (15.3 percent), black (15.3 percent), light brown (14.7 percent), brown (13.5 percent), and gray black (9.3 percent). Dark brown (3.9 percent) and gray sherds (3.0 percent) were also present. Only 5.1 percent were a lighter orange tan color. Some pinkish shades were noted on a few sherds from Test Unit 6 but not analyzed in detail. Color variations may be due to the repeated use of the same vessel for cooking and to post-depositional effects associated with weathering and ground water.

Vessel Paste Color

Vessel paste color is variable. Excluding the gray-to-black color of the carbon cores often noted in the paste, vessel paste color is somewhat lighter than vessel surface color, but the darker shades are still the most common. Just over two-thirds (69.6 percent) of the sherds have the following three paste colors: tan brown (26.6 percent), light brown (23.1 percent), and brown (19.9 percent). Whereas gray brown, gray, gray black and black colors represent 42.9 percent of the vessel surface colors, only 13.5 percent of the sherds have such paste colors. Whereas only 5.1 percent of the surface colors are an orange tan color, 14.7 percent of the paste colors are either orange tan (9.8 percent) or pinkish (4.9 percent). The differences between surface and interior paste colors reflect the dulling effects of vessel use, weathering (including groundwater), and superficial reduction of the surface due to fire clouding. Vessel surface and paste colors can vary extensively within a single pot as is evident for some of the partially reconstructible historic vessels described in Table 2.

Carbon Cores

Almost two-thirds (65.7 percent) of the sherds analyzed from Test Unit 4 exhibit some kind of carbon core within the paste. Of these, 43.4 percent contain a sandwich core, i.e., an interior band of gray to black sandwiched between two lighter layers of paste. This kind of carbon core was the result of incompletely oxidized organics found within the original clay used to make the pot, typical of earthenware pottery fired at relatively low temperatures (Rye 1981:Figure 104; Rice 1987:334). The thickness of the core is highly variable, resulting from the varied temperatures in open air firing.

Another 17.1 percent of the sherds exhibit an asymmetrical carbon core where the paste consists of two bands, one gray to black and the other relatively light. Often the vessel surface adjacent to the carbon core is also gray to black. Evidence from the partially reconstructed vessels indicates that a number of vessel interiors (jars, pots, and perhaps bowls) are gray black to black. The asymmetrical cores and blackened vessel interiors probably resulted from a reducing atmosphere. This can be caused by the vessel being placed upside down, thereby limiting the amount of oxygen that could get inside the vessel or by fuel “smothering” the vessels. The result is that some pots became smudged, i.e., they had entirely blackened interiors or partially or fully blackened exteriors (Rye 1981:116; Rice 1987:334). Suzanne Griset (personal communication 1996), after examining whole pots in museum collections, believed that such blackening was unintentional. Finally, 5.1 percent of the sherds have a full paste carbon core, indicating that they were probably part of vessels fired in a reducing atmosphere, with or without the presence of organics in the paste (Rye 1981:Figure 104).

Discussion

According to Rice (1987:Table 11.3), brown and gray surface colors in the presence of carbon cores generally indicate various degrees of incomplete oxidation, and dark gray and black surface colors indicate a reducing atmosphere or smudging. Rye (1981:117) also noted that gray black to black surfaces may also indicate that vessels were left in the open firing setting while they cooled. Rye noted:

> In this situation, the outer surfaces and possibly also the inner surfaces will almost certainly be covered with ash, unburned charcoal, and unburned fuel. The atmosphere will therefore be nonoxidizing. Provided this atmosphere is maintained until the

> temperature drops to about 350° C, the surfaces will be blackened by deposition of carbon [Rye 1981:117].

On the other hand, a number of sandwich carbon cores from RIV-4707/H are relatively thick with only a thin layer of "natural" clay color present adjacent to the surface of the sherd. Rye (1981:117) indicated that this results from removal of a vessel from the open firing setting and allowing it to cool in the air.

> In this case, the surface will be oxidized during cooling … If it was originally reduced and blackened by carbon deposition, a thin layer of "natural" clay color will form adjacent to the surface … This layer will have a very sharp interior margin … The presence of this sharply defined oxidized zone adjacent to the surface is diagnostic of open firing followed by very rapid cooling in air [Rye 1981:117–118].

The constant reuse of pots for cooking, as well as the refiring of old pots to oxidize them again, makes interpretations that relate carbon cores to original firing conditions difficult to determine (Suzanne Griset and Georgie Waugh, personal communications 1996). Moreover, a single pot can show great variety in the placement and extent of the carbon core if it is measured at various points over the pot (Suzanne Griset, personal communication 1996). This is clearly evident for many of the partially reconstructible historic pots described in Table 2.

Vessel Surface Treatment

None of the historic period brown wares show any evidence of decoration or the application of a clay wash or slip. Surface treatment consisted of various degrees of smoothing or burnishing. The distribution of surface treatment types on vessel interiors and exteriors is shown in Figure 4.

Vessel Interiors

Vessel interiors were generally left unsmoothed or partially smoothed. Forty-five sherds (26 percent) are noted as either unsmoothed, semismoothed, or showing a combination of wet wipe smoothing using some kind of wet cloth or vegetable matter. Another 36 percent show a mixture of smoothed and unsmoothed areas on an undulating surface resulting from the use of a paddle and an anvil; eleven percent show evidence of wet wipe smoothing which produces a textured but relatively smooth surface. In short, 73 percent of the sherds do not exhibit fully smoothed surfaces. Only 24 percent of the sherd interiors exhibit a completely smoothed surface, and a very small number have lightly burnished (2 percent) or burnished surfaces (1 percent). If jars or pots generally have relatively unsmoothed interiors, then this suggests that most of the sherds at RIV-4707/H are from jars or pots and not bowls.

Vessel Exteriors

Vessel exterior treatment is in sharp contrast to their interior treatment. Only 19 percent of sherd exteriors are not completely smoothed as opposed to 73 percent of sherd interiors. Fully smoothed surfaces are present on 61 percent of the sample, and 20 percent show various degrees of burnishing. In fact, 9 percent have burnished or well burnished surfaces. This would again suggest that a majority of the vessels were jars or pots, not bowls.

Vessel Paste Inclusions

A macroscopic examination of the paste of the historic period brown ware sherds suggest that quartz, feldspar, and muscovite are the most common materials present. At least two vessels appear to have dark black inclusions (olivine?) in addition to quartz and muscovite. There appears to be a good deal of variation in the size of paste inclusions. Some sherds appear to have very large quartz and/or feldspar inclusions, and some smoothed vessels show evidence of relatively large flakes of muscovite mica. Other sherds exhibit relatively fine quartz inclusions with little evidence of feldspar or mica.

Eleven sherds of historic period Tizon Brown Ware were selected for sectioning and petrographic analysis by Frank Tepley of UCLA. They were selected on the basis of variations in vessel form (jar versus bowl), paste inclusions, and vessel surface treatment.

Table 3 summarizes data on provenience, vessel type, pore space, mineral grain frequency, ware type, size, and shape for 11 sherds. These data indicate that pore space ranges between 2 and 20 percent of the paste with a mean of 9.8 percent. Mineral grains occupy between 35 and 52 percent of the paste with a mean of 40.6 percent. The most common minerals noted in these sherds are potassium feldspar followed by quartz and then by plagioclase feldspar. In a few cases quartz or plagioclase feldspar are as common as potassium feldspar. In one case (Cat. No. 6011) plagioclase feldspar is the most common mineral. Small to trace amounts of amphibole are found in most sherds. Trace amounts of pyroxene, biotite, and muscovite are also occasionally encountered. Curiously, muscovite was observed macroscopically in three specimens (Cat. Nos. 6010, 6012, and 6013) but was only detected petrographically in the Cat. No. 6010 specimen, which may be a sampling error. Alkalic pyroxene was observed in one sherd (Cat. No. 6010).

Potassium feldspar grains are often less than 1.0–1.5 mm, but a few larger grains are up to 2.5 mm. Quartz grains are generally smaller than 1.0 mm, but a few between 1.0 and 1.5 mm were noted in some sherds. Plagioclase feldspar grains are generally less than .5 mm, but some are .75 to 1.0 mm in size. Amphibole and pyroxene grains are relatively small, generally less than .5 to .75 mm. In most sherds, mineral grains are angular to subangular or blocky in shape, suggesting a derivation from primary clays produced from decaying bedrock or secondary clays composed of material that was not transported by water for long distances. While crushed rock temper could have been added to the clay, the relatively small sizes of the grains (most less than 1.0–1.5 mm) suggests that we are dealing with natural, nonplastic inclusions. It is not known to what extent dry clays were sieved to eliminate larger mineral particles. In two examples (Cat. Nos. 6014 and 6015) some grains are angular to subangular, and some are subangular to subrounded suggesting a mixture of primary and secondary clays and/or the effects of weathering. Sherd 6010 contains a high proportion of weathered mineral grains.

In general, the petrographic data are not very distinctive. Potassium and plagioclase feldspar and quartz, as well as amphibole, pyroxene, biotite, and muscovite, are all products of the weathering of various types of granitic rocks which are common to the geology of the project region (Tepley 1997:Appendix I:9). The only clear anomaly is the presence of alkalic pyroxene. No alkalic intrusive rock suites are common to this area of southern California. This mineral is present only in a probable bowl rim sherd; this artifact may have been manufactured outside the region. Cat. No. 6010 is the only sherd with extensive weathering of mineral grains and the only sherd where muscovite was detected petrographically.

Prehistoric/Historic Tizon Brown Ware Continuity

Is the historic period brown pottery ware substantially different from the Late Prehistoric period Tizon Brown Ware pottery? Based on the ceramic evidence analyzed, the answer would be no, yet some differences do exist.

Vessel Form and Function

Prehistoric sherds appear to represent jars and bowls used for cooking. Soot was clearly detectable on

Table 3. Results of Petrographic Analysis of Historic Period Tizon Brown Ware.

Catalog No.	Provenience	Vessel Type (Figure)	Pore Space[a]	Mineral Grains[a]	Mineral Types and Percentages	Mineral Size (mm)[b]	Mineral Shape
605	Unit 4, 40–50 cm	jar rim (6h)	15%	35%	quartz (15%)	.5–.75; a few 1.0–1.5	angular to subangular
					pot feld (15%)	.5–1.5	
					pla feld (4%)	mean .5	
					amphibole (1%)		
606	Unit 4, 40–50 cm	jar body	5%	35%	pot feld (20%)	.1–1.0; a few 1.5–1.8	angular to subangular
					quartz (10%)	.1–1.0	
					pla feld (5%)	.25–.5	
607	Unit 4, 50–60 cm	jar rim (6d)	20%	35%	pot feld (25%)	.35–.75; a few 1.0	angular to subangular
					quartz (7%)	.25–.75; a few 1.0	
					pla feld (3%)	mean .35	
					amphibole (1%)		
608	Unit 4, 50–60 cm	bowl rim (5c)	8%	42%	pot feld (31%)	.25–.30; a few 2.0	angular
					quartz (8%)	.25–.30; a few 2.0	
					pla feld (3%)		
					amphibole (..)		
609	Unit 4, 50–60 cm	bowl rim (5a)	5%	45%	pot feld (30%)	.5–.75; a few 1.0-1.3	angular to subangular
					pla feld (9%)	.3–.5; a few to .75	
					quartz (5%)		
					amphibole (..)		
					biotite (..)		
6010	Unit 6, 60–70 cm	bowl (?) rim (4r)	3%	52%	pot feld (37%)	mean .5; a few 2.0–2.5	many blocky
					pla feld (8%)	mean .3	many highly weathered
					quartz (3%)	mean .3	
					amphibole (2%)	.25–.75	
					alkali		
					pyroxene (2%)	.25–.75	
					biotite (..)		
					muscovite (..)		
6011	Unit 6, 60–70 cm	jar (?) rim	2%	43%	pla feld (25%)	.1–.75; most .3	blocky
					pot feld (10%)	mean .6; a few 2.0	
					quartz (6%)	mean .5; a few 1.25	
					biotite (2%)		biotite and amphibole highly weathered
					amphibole (2%)		
6012	Unit 6, 60–70 cm	jar rim (6k)	20%	40%	quartz (13%)	Two size ranges for all 3: most .1–.25, some 1.0	angular to subangular
					pot feld (13%)		
					pla feld (13%)		
					biotite (..)	1 @ 2.0	biotite highly weathered
6013	Unit 4, 60–70 cm (balk)	jar rim (6g)	5%	45%	pot feld (25%)	.1–.5; a few 1.5–1.8	mostly blocky
					pla feld (10%)	.1–1.0	
					quartz (5%)	.1–.3; a few 1.0–1.5	
					amphibole (5%)		amphibole highly weathered
					pyroxene (..)		
					Fe oxide (..)		

Table 3. Continued.

Catalog No.	Provenience	Vessel Type (Figure)	Pore Space[a]	Mineral Grains[a]	Mineral Types and Percentages	Mineral Size (mm)[b]	Mineral Shape
6014	Unit 4, 60–70 cm (balk)	jar rim (6c)	10%	45%	pot feld (30%)	<1.0; 1 @ 2.5	larger grains subangular to sub-rounded; smaller grains angular to subangular
					quartz (10%)	.1–1.5; mean .75	
					pla feld (5%)	.3–.5	
					amphibole or pyroxene (..)		
6015	Unit 6, 70–80 cm	bowl rim (5a)	15%	30%	pot feld (28%)	.1–.75; a few 1.5	larger grains subangular to sub-rounded; smaller grains angular to subangular
					quartz (8%)	mean .75	
					pla feld (2%)	.1–.5; a few 1.0	
					amphibole or pyroxene (..)	.1–.2	

a. The percentage represents the proportion of the paste occupied by pores or by observable mineral grains. Pot feld = potassium or alkali feldspar; pla feld = plagioclase feldspar; Fe oxide = iron oxide. (..) = trace amounts under 1%.
b. Mineral grain size range data are based on Tepley (1997). A range of values is sometimes presented with a mean value; large grains are noted.

one sherd, but a number were affected by either fire blackening or fire clouding; in view of the small size of the sherds, it is sometimes difficult to distinguish between the two. Smudging or firing in a reduced atmosphere also occurred. Fire blackened surfaces and soot appear relatively common in the historic period brown ware sample suggesting that many vessels were used for cooking.

Vessel Wall Thickness

Vessel wall thickness of the prehistoric sherds ranges between 3 and 10 mm, with most sherds at 4–7 mm; 5–6 mm is the most common thickness (Figure 2). The mean thickness is 5.7 mm. The historic period brown wares are generally somewhat thicker. Thicknesses range between 4 and 10 mm, but most sherds are between 5 and 7 mm. The mean thickness is 6.4 mm, or .7 mm thicker than the prehistoric sherds. Sherds only 4 mm thick are relatively rare among the historic period brown wares (3 percent), whereas they represent 17 percent of the prehistoric sherds recovered. It is not known whether this difference in mean thickness is due to higher frequencies of larger vessels, higher frequencies of jars or pots, or differences in manufacturing techniques. Drover et al. (1989:70) also observed that the historic period Tizon Brown Ware ceramics at the Apis Adobe were thicker than their prehistoric counterparts, but no statistical study was done.

Vessel Surface and Paste Colors

The range of colors for the prehistoric and historic Tizon Brown Ware vessels and sherds is basically similar. However, tan brown surfaces are considerably more common among the prehistoric specimens (31.8 percent versus 19.8 percent), whereas black surfaces are less common among the prehistoric sherds (6.8 percent versus 15.3 percent). This suggests a higher proportion of the historic vessels were used for cooking, at least at RIV-4707/H. The three dominant paste colors among both the prehistoric and historic vessels are basically the same and in roughly the same proportions: tan brown, light brown, and brown. Orange tan paste appears to be more common among the historic period vessels, and gray is more common among the prehistoric vessels. Pinkish shades occur only among the historic period wares. The other color types do not differ significantly.

Carbon Cores

A comparison of carbon core data reveals that both prehistoric and historic period wares have relatively similar frequencies of sherds without carbon cores, 38.6 percent for the prehistoric vessels and 34.3 percent for the historic period wares. The vessel and paste color data, along with this carbon core data, suggest that both prehistoric and historic wares were open fired at relatively low temperatures, resulting in insufficient oxidation of organic materials residing in the clays. There are significant differences in the frequencies of sandwich, one-sided, and full paste carbon cores. Sandwich cores are significantly more common (43.4 percent) in the historic period vessels than they are for the prehistoric wares (22.7 percent). Conversely, one-sided cores are more common (29.5 percent) in prehistoric sherds than they are in the historic sherds (17.1 percent). Finally, full paste carbon cores represent 9.1 percent of the prehistoric sherds but only 5.1 percent of the historic sherds. These differences may reflect some differences in the setting of the open firing, i.e., the arrangement and position of the pots, the placement and type of fuel, and/or whether vessels were cooled within the open firing setting or pulled out for cooling in air. It may also reflect differences in vessel use (extent of cooking) or differences in the frequency of refiring after use.

Vessel Interiors

Thirty-seven percent of the historic period interior surfaces are unsmoothed, semismoothed, wet wipe smoothed, or some combination of these, whereas for the the prehistoric sherds only 25 percent fit these categories (Figure 4). A combination of smoothed and unsmoothed finishes on the same sherd occurrs in 36 percent of the historic period sample, whereas none is recorded for the prehistoric sample. This is probably because the very small size of the prehistoric sherds makes it difficult to see variation in surface treatment. By comparison, 50 percent of the prehistoric sherds have fully smoothed interiors, whereas only 25 percent of the historic sherds are fully smoothed. Likewise, 25 percent of the prehistoric sherds show some evidence of burnishing, whereas only 3 percent of the historic sherds do. This suggests that the interiors of the prehistoric vessels were generally given a better finish than was the case for the historic period vessels. A higher frequency of vessel interiors were either fully smoothed and/or burnished to some degree.

Vessel Exteriors

Most of the prehistoric vessel exteriors were smoothed (70 percent) or lightly burnished (25 percent). The figures are somewhat lower for historic period vessels, smoothed (61 percent) and smoothed to lightly burnished and lightly burnished (11 percent). However, a higher number of the historic sherds were burnished (6 percent) or well burnished (2 percent), compared to only 2 percent and 0 percent, respectively, for the prehistoric sherds. The number of potsherds that are smoothed or burnished in the prehistoric assemblage is 97 percent, while it is only 80 percent for the historic wares (Figure 4). These data suggest that somewhat less labor was spent on the surface treatment of vessel exteriors of historic period wares; however, some historic vessels received considerably more attention, thus accounting for the higher frequency of burnished surfaces among the historic wares.

Paste Inclusions

A macroscopic examination of the paste of the prehistoric sherds suggested that feldspars and quartz were the dominant minerals. Petrographic analysis of three sherds confirmed the presence of potassium and plagioclase feldspar and quartz in all three, amphibole in two, and pyroxene in one. The types and general frequencies of these mineral constituents are very similar to those found in most of the historic Tizon Brown

Ware sherds (Table 2). Some light-colored mica was observed macroscopically; no muscovite was found petrographically in the prehistoric sherds, whereas muscovite is present in several historic period sherds. However, this could be due to sampling error. While it is possible that crushed rock temper was added to the prehistoric and historic clays, the evidence more strongly supports the use of primary and secondary clays with natural, nonplastic inclusions.

Conclusions

The prehistoric and historic brown ware ceramics from the Pala Road Bridge site show considerable continuity in vessel and surface paste colors, paste constituents, and firing techniques. Muscovite may be more common in the historic vessels, but this could be a sampling error. Alkalic pyroxene was found in one historic period sherd but in none of the prehistoric potsherds. Its presence suggests the possible importation of the vessel from outside the region. As for construction, it is presumed that coiling and paddle-and-anvil techniques were used on the prehistoric material, but this cannot be verified with certainty given the very small size of the prehistoric sherds. It was clearly the technology used for the historic Tizon Brown Ware pottery. The range in vessel wall thickness is similar for both prehistoric and historic wares, but historic period wares on average are about .7 mm thicker. Vessel surface treatment was generally less labor-intensive for the historic period wares, especially for vessel interiors. However, vessel exteriors are more frequently burnished or more highly burnished on historic period vessels. All things considered, it is reasonable to use the term Tizon Brown Ware for both the prehistoric and historic period brown wares at RIV-4707/H because they appear to be of the same ceramic tradition (Griset 1990).

Several authorities (Kroeber and Harner 1955; Griset 1990; Schaefer 1994) discussed transformations in the Native American pottery industry as it adapted to a cash economy during the late nineteenth and early twentieth centuries. It may also be significant that nineteenth century Anglo-Americans and Latinos regularly purchased earthenware vessels from California Indians, including the Luiseño. These were purchased not as curiosities but were acquired for utilitarian purposes (mainly for water storage and cooking) (Griset 1990; Schaefer 1994).

So why did prehistoric Tizon Brown Ware pottery continue on, and strongly, into the historic period at the Pala Road Bridge site? Southern California Latinos then, as now, believed that earthenware pots were the best for cooking beans and that porous, clay water pots were good for keeping water cool through evaporation (Jerry Schaefer, personal communication 1996). Not peculiar to southern California, this utilitarian ceramic tradition has remained a bicultural characteristic throughout Mexico and Central America since the sixteenth century. Long after the introduction of cheap glass, metal, and most recently, plastic containers, many people still prefer to keep their daily drinking water in an old-fashioned ceramic *tinaja* (Brian D. Dillon, personal communication 2012). At least in some cases, making the transcultural ceramic continuity perhaps inevitable was the practice of Anglo-American and Latino households employing Luiseño women as domestic help. Tizon Brown Ware pottery, little changed from prehistoric times, could easily have made its way into historic domestic settings through such daily interaction. Alternatively, mixed marriage households (Anglo or Hispanic with California Indian) may have produced a similar result. Wade (1997:5) noted that a late nineteenth century store owner, Louis Wolf, had a mulatto/Indian wife. Although these conclusions are preliminary, they imply that further studies of Tizon Brown Ware ceramics from multi-component sites or from mixed marriage or aculturated households may provide a fruitful way to investigate issues of acculturation and ethnicity in southern California's archaeological record.

References Cited

Clevenger, Joyce
1997 *Extended Phase I Survey of CA-RIV-4707/H for the Temecula Creek (Pala Road) Bridge, City of Temecula, Riverside County, California.* Report prepared by Ogden Environmental and Energy Services Co., Inc., San Diego. Report submitted to the Riverside County Transportation Department. On file, Eastern Information Center, University of California, Riverside.

Colton, Harold Sellers, and Lyndon Lane Hargrave
1937 *Handbook of Northern Arizona Pottery Wares*. Museum of Northern Arizona Bulletin No. 11. Flagstaff.

de Barros, Philip
1997 *Phase II Evaluation of Archaeological Site CA-RIV-4707/H for Determination of Eligibility, Temecula Creek (Pala Road) Bridge Project, City of Temecula, Riverside County, California, 08-Riv-CR-Pala Road*. Report prepared by Professional Archaeological Services, San Diego, California. Report submitted to the Transportation Department, County of Riverside. Report RI-03440. On file, Eastern Information Center, University of California, Riverside.

Dobyns, Henry F., and Robert C. Euler
1958 Tizon Brown Ware: A Descriptive Revision. In *Pottery Types of the Southwest: Wares 14, 15, 16, 17 and 18: Revised Descriptions, Alameda Brown Ware, Tizon Brown Ware, Lower Colorado Buff Ware, Prescott Gray Ware, San Francisco Mountain Gray Ware*, edited by Harold S. Colton. Museum of Northern Arizona Ceramic Series No. 3D. Flagstaff.

Drover, Christopher E., Richard E. Cerreto, and Stephen O'Neil
1998 *Archaeological Excavations of Old Temecula Village, Riv-3: A Post Contact Luiseño Village*. Report prepared for the Deputy Road Director, Riverside County, California. Report RI-0547 1085700. On file, Eastern Information Center, University of California, Riverside.

Drover, Christopher E., Karen Swope, and Leland Bibb
1989 *Archaeological Data Collection at Apis Adobe ca. 1845–1875, Riv-1520, Old Temecula, California*. Report RI-2420 1084170. On file, Eastern Information Center, System, University of California, Riverside.

Euler, Robert C.
1959 Comparative Comments on California Pottery. In, Archaeological Resources of Borrego State Park. *Archaeological Survey Annual Report, 1958–1959* 1:41–42. Department of Anthropology and Sociology, University of California, Los Angeles.

Griset, Susan
1990 Historic Transformations of Tizon Brown Ware in Southern California. In *Hunter-Gatherer Pottery From the Far West*, edited by Joanne Mack, pp. 179–200. Nevada State Museum Anthropological Papers No. 23. Carson City.

Kroeber, Alfred L.
1925 *Handbook of the Indians of California*. Bureau of American Ethnology Bulletin 78. Smithsonian Institution, Washington, D.C.

Kroeber, Alfred L., and Michael J. Harner
1955 *Mohave Pottery*. Anthropological Records Vol. 16, No. 1. University of California Press, Berkeley.

McCown, Benjamin E.
1955 *Temeku: A Page from the History of the Luiseño Indians.* Papers of the Archaeological Survey Association of Southern California 3. San Bernardino, California.

May, Ronald V.
1978 A Southern California Indigenous Ceramic Typology: A Contribution to Malcolm J. Rogers' Research. *ASA Journal* 2(2).

Rice, Prudence M.
1987 *Pottery Analysis: A Sourcebook*. University of Chicago Press, Chicago.

Rogers, Malcolm
1936 Yuman Pottery Making. *San Diego Museum Papers* 2. San Diego Museum of Man, San Diego.

Rye, Owen S.
1981 *Pottery Technology: Principles and Reconstruction.* Manuals on Archaeology 4. Taraxacum, Washington.

Schaefer, Jerry
1994 The Stuff of Creation: Recent Approaches to Ceramic Analysis in the Colorado Desert. In *Recent Research Along the Lower Colorado River,* edited by Joseph A. Ezzo and Jeffrey H. Altschul, pp. 81–100. Statistical Research Technical Series 51. Tucson, Arizona.

Tepley, Frank
1997 Appendix I: Ceramic Thin Sections. In *Phase II Evaluation of Archaeological Site CA-RIV-4707/H for Determination of Eligibility, Temecula Creek (Pala Road) Bridge Project, City of Temecula, Riverside County, California, 08-Riv-CR-Pala Road,* by Philip de Barros. Report prepared by Professional Archaeological Services, San Diego, California. Report submitted to the Transportation Department, County of Riverside. Report RI-03440. On file, Eastern Information Center, University of California, Riverside.

Tepner, Marcia
1997 Appendix H: Analysis of Historic Ceramic Whitewares, Bottles, and Metal Artifacts. In *Phase II Evaluation of Archaeological Site CA-RIV-4707/H for Determination of Eligibility, Temecula Creek (Pala Road) Bridge Project, City of Temecula, Riverside County, California, 08-Riv-CR-Pala Road,* by Philip de Barros. Report prepared by Professional Archaeological Services, San Diego, California. Report submitted to the Transportation Department, County of Riverside. Report RI-03440. On file, Eastern Information Center, University of California, Riverside.

Wade, Sue Anne
1997 Appendix C: Historic Archival Research. In *Phase II Evaluation of Archaeological Site CA-RIV-4707/H for Determination of Eligibility, Temecula Creek (Pala Road) Bridge Project, City of Temecula, Riverside County, California, 08-Riv-CR-Pala Road,* by Philip de Barros. Report prepared by Professional Archaeological Services, San Diego, California. Report submitted to the Transportation Department, County of Riverside. Report RI-03440. On file, Eastern Information Center, University of California, Riverside.