POTTERY SOUTHWEST

Volume 35, No. 1-2 JUNE 2019
SPRING-SUMMER 2019 ISSN 0738-8020

MISSION STATEMENT

Pottery Southwest, a scholarly journal devoted to the prehistoric and historic pottery of the Greater Southwest (*https://potterysouthwest.unm.edu*), provides a venue for student, professional, and avocational archaeologists in which to publish scholarly articles, as well as providing an opportunity to share questions and answers. Published by the Albuquerque Archaeological Society since 1974, *Pottery Southwest* is available free of charge on its website which is hosted by the Maxwell Museum of the University of New Mexico.

CONTENTS

Pottery Southwest is a non-profit journal of the Albuquerque Archaeological Society

Christine VanPool Steps Down from Pottery Southwest Editorial Board

Christine VanPool, one of the original Editorial Board members from the restart of Pottery Southwest in 2005, has stepped down from the Board due to increased committee responsibilities at the University of Missouri. While Chris was instrumental in many facets of the restart of PSW, her expertise in Casas Grandes regional ceramics has been especially valuable to its continuation. PSW thanks Christine for her years of service to ceramics on the Editorial Board and wishes her well in her new roles at Missouri.

Those of you with similar interest in regional pottery, please consider joining the Board; it's a wonderful way to contribute to the conversation on ceramics, to start a student's publication experience, and to invite other contributions that keep the breadth and variety alive and well at PSW.

AN UNUSUAL TABIRA POLYCHROME CANTEEN

Regge N. Wiseman, Emeritus and Research Associate, Office of Archaeological Studies,
Center for New Mexico Archaeology, Santa Fe

On a trip to Pueblo Blanco/Tabira Ruin (LA 51) in the Salinas District of central New Mexico (Figure 1) in the early 1990s, the writer had the occasion to examine, photograph, and record information about a remarkable Tabira Polychrome canteen (Figure 2). When I took the photograph and made the notes, this vessel was in the possession of the owner of a ranch through which one had to pass to gain access to Pueblo Blanco/Tabira Ruin. At that time, the rancher said that he had dug up the vessel when he was a kid back in the 1930s or 1940s. I assumed that he dug it out of LA 51, but he did not state this, nor did I ask him. He subsequently gave the vessel to his son. Sadly, a few years later I learned that the vessel had been sold to a collector.

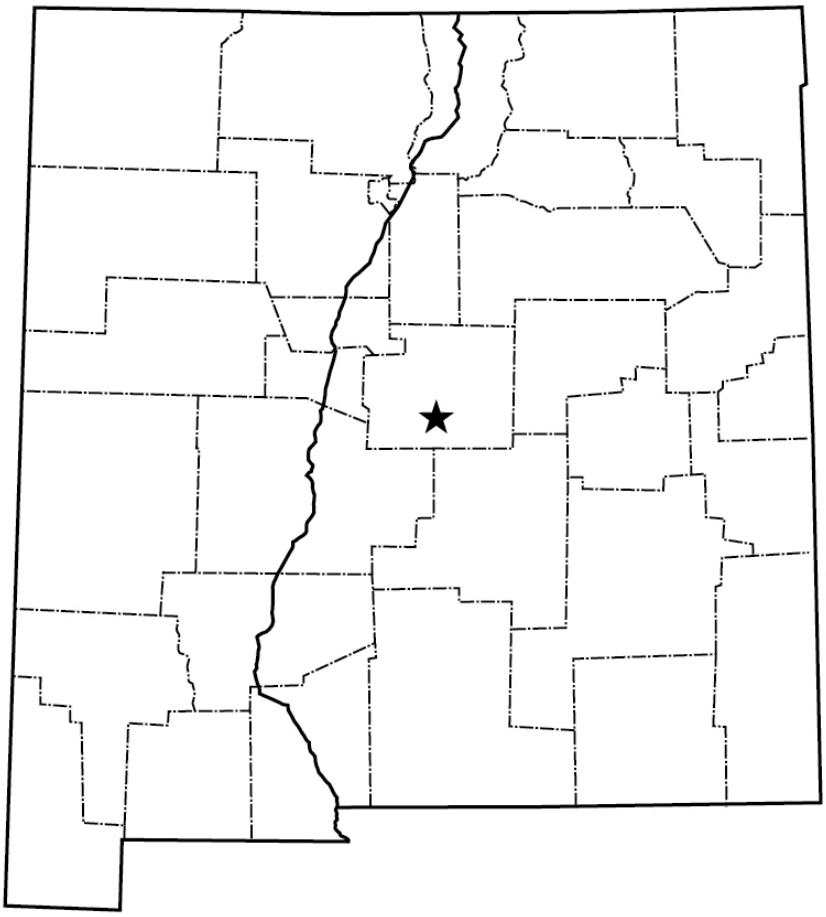


Figure 1. General location of Tabira Ruin in Torrance County, New Mexico.

Figure 2. Photograph of the Tabira Polychrome canteen (photograph by the author).

Although the polychrome variant of Tabira is uncommon, its closely allied variants Tabira Black-on-white and Tabira Plain were the primary service wares in the Jumano pueblos of central New Mexico from the mid-sixteenth century through to the abandonment of the area in the second half of the seventeenth century (Hayes, Young, and Warren 1981). Tabira Polychrome differs from the black-on-white pottery by the addition of yellow or red fugitive

paint as filler in the design. Hayes estimates the manufacture dates for the polychrome as A.D. 1650 to 1672 (Hayes, Young, and Warren 1981:75).

The form of this canteen is typical for the type. The front is strongly convex, the back is flat, the neck is short and narrow in diameter with a slightly everted lip, and rope-type handles are located on each side just above the widest point on the vessel. The body at its greatest diameter is 46 cm wide, its height (base to bottom of neck) is 41 cm, and its dimension from front to back is 28 cm. The neck is 5 cm high, and the diameter of the orifice is 10 cm.

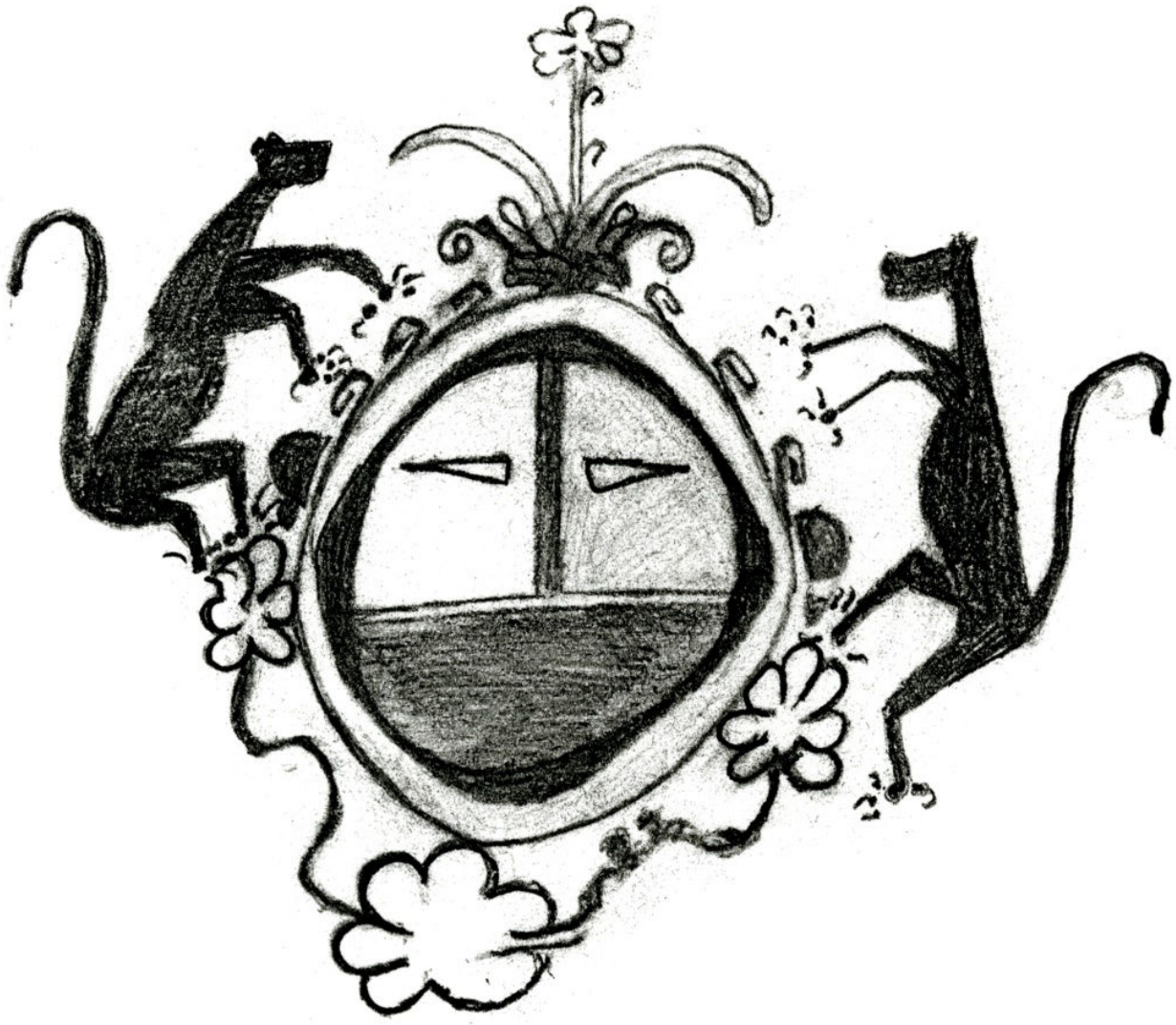


Figure 3. Drawing of the design on the canteen (illustration by Peter Bullock).

Even for a group of pottery variants that is known for unique and interesting designs, this vessel is a standout. The total effect is one of a European coat-of-arms with distinctly Native American motifs (Figure 3). Instead of a shield, the central figure is a katsina mask divided into three colored zones—a left eye zone in white, a right eye zone in red, and a lower zone in black. The face is surrounded by a thick black line of variable width, with bulges possibly representing the four cardinal directions. Surrounding that is a wide band of red with a final outline of black. A series of squared spirals is appended to the outer line between the bulbar ears and the crown. A stalked flower with large basal leaves crowns the mask. Three flowers on a vine frame the lower half of the mask.

Large animals in black are on either side of the mask. Both are more-or-less conventional mountain lion depictions with curved tails arched over their backs and comma-like claws on each foot. Although the two figures are not exact duplicates of one another in the treatment of the backs and the positions of the hind legs, the claws indicate that both depict mountain lions.

The neck of the canteen is painted black, perhaps with some small depictions of animals (?). Unfortunately, I was so enamored with the main design that I failed to get a more thorough description of this neck decoration! A wide black line extends down on both the shoulders from the base of the neck to the handles.

It is easy to conclude that the design on this canteen mimics a European coat-of-arms. Likewise, it is easy to suggest that it was made for and used by Native Americans, for it is impossible to imagine any Spaniard of the time being willing to display it in any context involving other Spaniards. Instead, I view this vessel as native attempt to legitimize a native institution, such as a hunting society, in a newly learned European method of imaging.

Acknowledgements. I would like to thank Peter Y. Bullock, formerly of the Office of Archaeological Studies staff, for drawing Figure 3. And, of course, the rancher who allowed me to examine and photograph this remarkable canteen.

Reference Cited

Hayes, Alden C., Jon Nathan Young, and A.H. Warren
1981 *Excavation of Mound 7, Gran Quivira National Monument, New Mexico*. National Park Service Publications in Archeology 17, Washington, D.C.

CERAMIC ANALYSIS AT KUAUA (LA 187): 2017 SITE TESTING AND CHRONOLOGY

Hayward H. Franklin
Research Associate, Maxwell Museum, University of New Mexico

Introduction to the Project

In the spring of 2017 a new study of prehistoric Pueblo ceramics was initiated from the major site of Kuaua ("Evergreen"), LA 187, located on the Rio Grande within Coronado State Historic Site near Bernalillo, New Mexico. Although some previous pottery analyses had been conducted in the past, they tended to be very old, or in more recent times, somewhat limited in scope by the demands of specific salvage or testing operations (Akins and Hannaford 2005; Vierra 1987). No attempt had been made to launch into the large collections from the site held in New Mexico museums, originally obtained during the extensive excavations of the 1930s. Indeed, their analysis was impossible without the cleaning, storing, cataloging, and accessioning of such collections that has formed a major effort in museum agendas in recent years. Therefore, with a view towards understanding some of these major pottery assemblages collected long ago, and to extend our knowledge of comparative collections from other Classic period sites in the Middle Rio Grande Valley, I volunteered to begin a pottery analysis project.

Fortunately, this undertaking has been assisted greatly by the help and encouragement of the staff at the Coronado Historic Site, including Matt Barbour and Ethan Ortega, Annie Campagna, and Janet Peterman (see Ortega and Barbour 2017). Moreover, the active Friends of Coronado Historic Site were willing to assist me in the analysis process. These interested and knowledgeable volunteers have been well trained in the identification of prehistoric pottery of the area, and have served as essential crew members and personal friends. With materials on loan from the Museum of Indian Arts & Culture collections in Santa Fe, the crew began with analysis of ceramics from the 1938 collection by Dorothy Luhrs, then a graduate student at the University of New Mexico. Directing WPA labor during the Depression Era, Luhrs completed the excavation of a stratigraphic trench along the inside plaza wall of the North Plaza roomblock, and also excavated several of the rooms adjacent to that plaza (Luhrs 1938). The analysis of the Luhrs collections continues, having generated data on some 3,000 to 4,000 potsherds. Technical analysis of pastes and tempers is ongoing. Petrographic thin section identification of tempers is anticipated.

However, during our work with the Luhrs collection, a new excavation project was undertaken in the summer of 2017 by Coronado State Historic Site staff, with the volunteer assistance of the Friends of Coronado Historic Site. According to the new project design, a limited collection of materials was to be obtained with modern methods, from excavated meter squares and a series of auger tests around the perimeter of the site, but not within any rooms. The purpose was to determine the extent of artifact distributions around the pueblo boundary, and assist in the interpretation of the adjacent plazas and roomblocks. This paper details the results of our initial analysis of the ceramics from these test excavations.

Historical Background

Discovery of Developmental period (A.D. 600-1200) and Coalition period (A.D. 1200-1325) pithouses at Coronado Historic Site and at nearby localities along the Rio Grande demonstrates the long Pueblo occupation of the area in the centuries preceding the rise of multi-room communal pueblos of the Classic period.

The large pueblo we know as Kuaua (Figure 1) was one of several very large communities thriving in the Middle Rio Grande between Bernalillo on the north and Isleta Pueblo on the south. The Spanish knew this area as the Tiguex Province, and it is known today as the Southern Tiwa culture area. During the Classic period (Pueblo IV), lasting from about A.D. 1300 to the Pueblo Revolt of 1680, many large settlements similar to Kuaua were inhabited by a large population of Tiwa-speaking peoples. Kuauans may have spoken Tiwa or Keres or both. As many as 16 to 18 large towns were thriving at the time of the Spanish exploratory expeditions (Entradas) of 1540-1598. Spanish accounts record at least 16 large pueblos, and others may have been missed in the tallies (Barrett 2002:64). If each of these held 1,000 inhabitants, an estimate of 16 or 18 thousand people in the culture area might not be unreasonable.

Figure 1. Kuaua in the early 1940s, after excavation with walls emphasized by reconstruction (www.nmhistoricsites.org).

Beginning in 1540, the relatively stable agricultural culture of the Middle Rio Grande became heavily impacted by the arrival of the Spanish Entradas from colonized Mexico to the south (Hammond and Rey 1966). The intermittent but intrusive and militaristic European exploration parties began to exert a profound and lasting influence on native Pueblo culture (Mathers 2013; Schmader 2016). The disruption, dislocation, disease, and intermittent hostilities during the Entradas came to crisis conditions with permanent Spanish colonization.

Although Kuaua was evidently spared the worst of European depredations during the Entrada period, it, too, was heavily affected, along with neighboring Pueblos, by Spanish occupation during the Early Colonial period (1598-1680). Numerous Spanish land grants were established in the Rio Grande Valley, and estancias were now owned by Spanish families. With permanent colonial occupation at large ranches owned by prominent Spanish families, the nearby Pueblo inhabitants were everywhere impacted in many ways after about 1600. In fact, one of these was established near Kuaua Pueblo, only about a half mile to the south. Now destroyed by a campground and trailer park, the ruins of Casa Quemada were investigated by a team of archaeologists in the 1970s. Excavation notes and analysis records from several researchers have now been compiled into a single report by Regge Wiseman (2017), forming an important part of the Kuaua archaeological and historical record.

Despite the perseverance of the Pueblo population through the period of the Spanish Entradas, establishment of European farms and ranches in close proximity to many of the large Pueblo settlements after 1600 began to have a severe impact. The estimated 16 to 18 large pueblos dwindled to four or five by the time of the Pueblo Revolt of 1680. European diseases, forced relocations of remaining populations by the policy of "*reducción*," forced religious conversion, and general intense acculturation resulted in a Pueblo population drastically reduced in size and territory. Kuaua appears to be one of the few remaining towns to be inhabited to some degree until the Pueblo Revolt of 1680 caused the complete Spanish withdrawal from the New Mexico colony. Kuaua was never repopulated after the reconquest of New Mexico in 1692, although there are hints of sporadic use of the site area. The resettlement in the 1700s of the Tiwa pueblos of Isleta to the south and Sandia on the north, along with the Keres pueblos of Zia and Old Santa Ana to the west of Kuaua restored part of the local population. But this represented only a small remnant of the extensive and flourishing Puebloan population that had resided in the Middle Rio Grande before the Spanish incursion.

The Archaeology of Kuaua

The crumbling adobe walls of Kuaua today give only a slight impression of the massive structure that existed in the Classic period (Figure 1). Visitors see replica walls of adobe bricks placed on top of the original puddled adobe wall stubs. Major construction episodes formed three large roomblocks of contiguous rooms surrounding three large plazas (Figure 2). Plaza areas were multi-purpose community spaces, and typically contained one or more kivas. These major roomblock-plaza units were evidently constructed at different times during the 350 years of the Classic period, with the South plaza group first. Thereafter the North plaza compound was built, followed by the East plaza compound. The latter appears to be incomplete, and may have not

been finished by its Pueblo builders. As a whole, Kuaua has 935 ground floor rooms (Akins and Hannaford 2005:3). The number of second and third story rooms is problematic, but estimates of a total of 1,000-1,200 total rooms are not unrealistic (for example, Vierra 1987:2). Six kivas have been identified, not all in use concurrently. As such, Kuaua was undoubtedly one of the largest of the Pueblo towns of the Classic period, and it remains as the best preserved today. Aside from portions of historic Isleta, and Piedras Marcadas Pueblo (LA 290) on Albuquerque's west side near the Montaño Bridge, Kuaua remains as one of the few places that preserve the intact architecture of a Classic adobe pueblo settlement. The metropolitan expansion of Albuquerque has largely obliterated the evidence of the other Classic period pueblos.

Due perhaps to its better condition and better preservation, the ruins of Kuaua have attracted the attention of historians and archaeologists from the early twentieth century until today. The work at the site is briefly summarized here. For a more complete history, see Vierra (1987) and Akins and Hannaford (2005).

Work at Kuaua proceeded episodically during the first half of the twentieth century. In the early 1900s, excavation was undertaken by Charles Lummis of the Southwest Museum. His excavation encompassed several parts of the southernmost roomblock, still referred to as the "Lummis Section." Unfortunately, his excavation records have been lost, although a second study of this roomblock was completed by Charles Kelley (Kelley 1936). The site attracted interest because of its location at or near the location of Coronado's winter encampments of 1540 and 1541. A locality for at least one of Coronado's encampments was recorded and partially excavated somewhat south of Kuaua, nearer to Santiago Pueblo/Bandelier's Puaray (Vierra 1989). Pursuit of the Coronado question in the early 1930s saw Kuaua come under the attentions of Edgar Lee Hewett who headed major excavations in 1934-1938 with a team from the School of American Research and the University of New Mexico. The staff included future contributors to the archaeology of Kuaua including Reginald Fisher, Gordon Vivian, and Marjory (Lambert) Tichy (Vierra 1987:2). Gordon Vivian's thesis (1932), and his short articles on Bandelier's Puaray (Santiago Pueblo, Vivian 1934) and the kiva murals of Kuaua (Vivian 1935) stand out as informative works. The kivas and murals were also described by Tichy (1938).

No direct evidence of visitation by the Spanish was recovered by these excavations, although many rooms were excavated with the help of Works Progress Administration (WPA) laborers in the 1930s. It was revealed that the site was extensive, with an estimated 1,000 to 1,200 rooms built of puddled adobe arranged around three large plazas. One crew was directed by UNM graduate student Dorothy Luhrs; a collection of pottery and limited notes remain today. Pottery was mainly Rio Grande Glazeware, first codified by Kidder and Shepard (1936), and then by Mera (1933). However, despite the recovery of thousands of ceramic artifacts, no concerted analysis project was undertaken to study them, although some of Hewett's students made a start. Additionally, Anna Shepard (1942) examined a small sample petrographically as part of her region-wide initial study of glazeware manufacture. The 1938 collection and notes by Dorothy Luhrs from the North Plaza are currently being studied by our volunteer crew. In sum, despite the extensive excavation of the majority of the rooms, the opening of several kivas, and recovery of the kiva murals, no comprehensive report of the 1930s archaeological work was ever published. Bertha Dutton's book, *Sun Father's Way* (1963), explains the kiva mural art and symbolism at Kuaua.

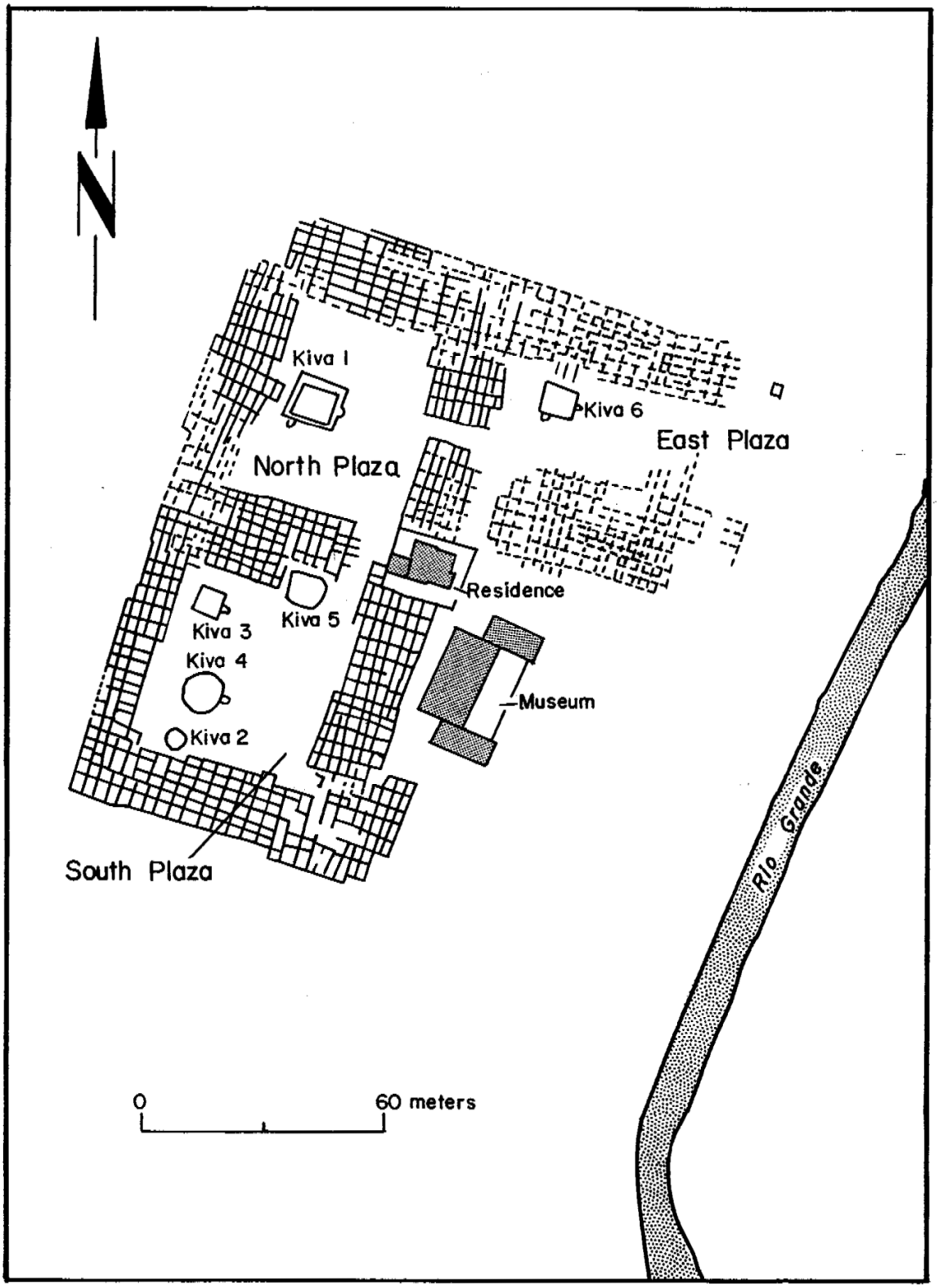


Figure 2. Kuaua (LA 187) plan view (adapted from Vierra 1987).

Excavations of various kivas (Tichy 1938, summarized in Vierra 1987:2-8) provide a general temporal profile for the various plazas at Kuaua. The oldest kivas are in the South Plaza and produced Glazes A and B with some C, indicating fourteenth and early fifteenth century occupation. The few available dendrodates from the South Plaza area support this time frame (Vierra 1987). Associated with this portion of the site, a recently obtained radiocarbon date from TU #3 on this project yielded a calibrated date of 1380-1430 (37.6% confidence interval), (International Chemical Analysis 2018). Despite its known earlier construction, parts of the South Plaza may have been reoccupied in early Colonial times (Vierra 1982). On the other hand, in the later North Plaza, Kiva 1 produced smaller amounts of Glaze A-C (only 15%), while later types dominated—Glaze D (28%), Glaze E (36%), and Glaze F (21%) (Vierra 1987:7).

Construction of a new restroom facility at the southeast corner of the ruins in 1986 resulted in the excavation of two long trenches that contained abundant artifacts, presumably related to the South Plaza roomblock and the Lummis section (Vierra 1987). Ceramics were analyzed by Charles Carrillo (1987), who examined 3,928 sherds. Included were 173 glazeware bowl rims (Carrillo 1987:19). Only the glazeware rims and non-local sherds were examined in detail. Examination of the glazeware rims had the following results (Carrillo 1987):

> "The Rio Grande glaze ware recovered in these test excavations showed a sequence from A to F, verifying the previous work. Of the 173 glaze ware rims, large and consistent numbers of each glaze ware period were represented. Glazes A-E all yielded more than 20 each; the greatest number was Glaze D (46) and E (34). Glaze F, however, was only represented by 6 sherds."

Carrillo (1987:20) also noted trace amounts of nonlocal Pueblo IV bichromes such as Chupadero B/w, Galisteo B/w, and Biscuitware. Grayware utility sherds and glazeware sherds were present in about the same amounts. Both nonlocal and local Historic pottery was present in small quantities and included three Mexican majolica sherds. Historic Puebloan matte wares identified were Hopi, Tewa area Powhoge Polychrome, and Puname Polychrome from Zia Pueblo. Red slipped bowls of Salinas Red from the southeast and Casitas Red-on-brown from the north, and a clay pipe rounded out the historic wares. These materials may relate to the 1600s Spanish hacienda just south of Kuaua (Wiseman 2017) or may represent a reoccupation of the southern roomblock (Lummis Section) as suggested by Vierra (1987:47).

Based on a site assessment (Elliot 1993), minor excavations were conducted in 1994 (Akins and Hannaford 2005) to determine methods and materials used in construction fabric; these wall clearing tests resulted in recovery of some ceramics. Stratigraphy in the East Plaza indicated that the rooms were relatively late, with walls superimposed over earlier Middle Classic period trash marked by late fifteenth century types (Espinoso G/p and San Lazaro G/p) (Akins and Hannaford 2005:13), implying that at least a portion of the East Plaza was built relatively late, perhaps around A.D. 1500. Ceramic analysis by Dean Wilson (2005:23-27) included a typological analysis and paste examination of 613 sherds. Wilson's (2005:23) careful typological analysis followed type definitions of earlier studies in the vicinity: Kidder and Shepard (1936), Mera (1933, 1935), and Franklin (1997). The majority of the painted wares are typical of the local glazeware series, with the most numerous being Agua Fria G/r, Largo G/y, Espinoso G/p, San Lazaro G/p, and Puaray G/p (Wilson 2005: Table 9). He, too, observed that these types span the Early to Late Classic

periods (Wilson 2005:25) but the absence of Glaze F in the assemblage reinforces the impression that post-1600 glazeware was a minor component of the Kuaua assemblage.

As post-script to this review of prior work, very recent field research at Kuaua pertains to Spanish contact with the town. After this paper was largely completed, an interesting new find at Kuaua corroborates our conclusions about the dating of the North Plaza roomblock. As already interpreted, the pottery frequencies (below) from the test units near the North Plaza suggest that its period of major occupation was later than the South Plaza. Specifically, the higher frequencies of Glazes D and E (with some earlier glazes persisting) point to use from approximately A.D. 1525-1575. Recently, a metal detection survey and historical research by Clay Mathers has revealed that the Coronado expedition did, in fact, reach Kuaua and interact with its population (personal communication 4/10/19; Hayden 2018). This was expectable from known historical records of the expedition, as well as archaeological evidence from Santiago Pueblo and a probable campsite of a portion of the expedition, all within about three miles of Kuaua (see Vierra 1989). Mathers' field survey has now revealed the presence of Spanish metal artifacts, including copper crossbow dart points, lead musket balls, and chain mail armor fragments. Mathers interprets these as evidence of a direct conflict between Kuaua residents and Coronado's forces. More will be known later, but the fixed historical date of 1540-1541 coincides nicely with the occupation of the North Plaza as estimated from ceramics alone.

The 2017 Testing Project

The 2017 work took place around the perimeter of the roomblock walls so as to capture a ceramic representation of the exteriors of the roomblock-plaza groups. Figure 3 shows the locations of the Test Units (TUs) and Auger Units (AUs) investigated on an aerial view of the site. TUs are in blue, AUs are in yellow.

TUs were 1 x 1 meter squares located immediately outside the exterior walls of the roomblocks belonging to the South, North, and East plazas. Only the east end of the East Plaza was not represented. Field methods involved single TUs grouped into larger excavation units. The TUs were excavated by trowel and screened with ⅛-inch mesh until sterile soil was reached. Although the spatial extent of the testing was limited, sampling by the series of TUs extended around the almost the entire perimeter of the site, and collections within the squares amounted to 100 percent recovery.

Collections from the AUs were very limited. The resultant sample of potsherds from AUs was therefore small, but the auger tests determined the outward limits of artifact middens and scatters around the outside of the main site walls. AUs were arranged in a perpendicular manner going away from the exterior roomblock walls in order to determine the lateral and vertical extent of the material culture deposits.

The use of fine screens assured the recovery of large percentages of the artifacts present, as well as natural environmental samples. All retrieved materials were cataloged as they came out of the field, and were appropriately bagged and labeled. Ceramics were washed lightly with water, dried, bagged and labeled. Analysis in the lab recorded provenience, and counts by pottery ware, type, and vessel form.

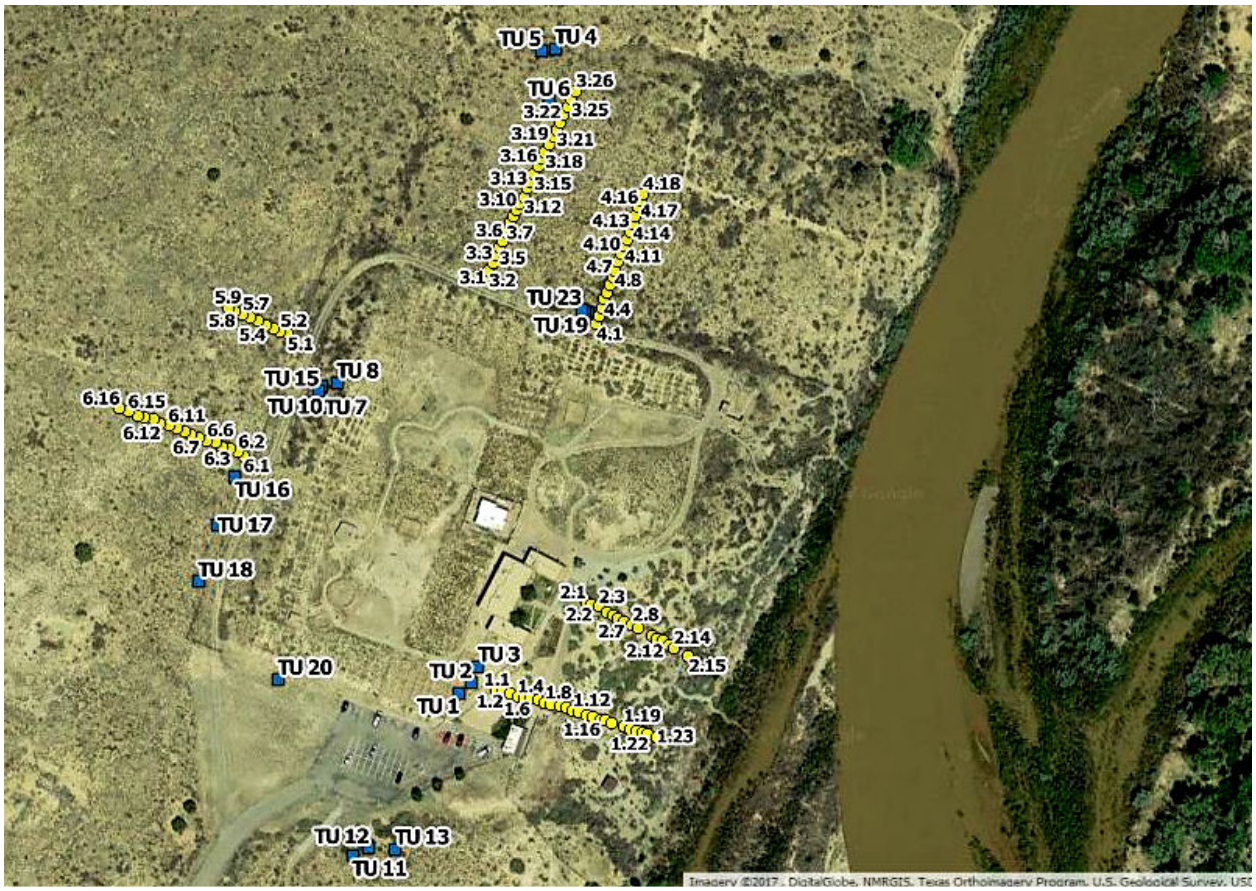


Figure 3. Location of Test Units (TU) and Auger Units (AU) around perimeter of site (illustration by Ethan Ortega).

Analysis Results: The 2017 Collection as a Whole

The Sample

The collection from the project amounts to over 5,000 sherds, of which 2,206 were large enough to analyze, 2,145 from the TUs and 61 from the AUs (Figure 4). This forms a modest but adequate sample. All of the sherds recovered have now been cleaned and where possible identified to pottery type by the volunteer crew. This paper describes the typological results thus far; additional studies of ceramic pastes and tempers are anticipated.

Pottery Types

Type identifications were made according to standard pottery type definitions; for the Rio Grande Glazewares, these include Mera (1933, 1935), and the Eighth Southwest Ceramic Seminar (Honea 1966). Summary definitions and dates for the pottery types have been compiled by Oppelt (2007) and online by Dean Wilson (2008-2017).

Figure 4. Typical pottery from a TU bag from the 2017 testing program at Kuaua.

Table 1 shows the identified types and their date ranges. As a reminder, pottery "types" are simply nodes along a continuum of creative production across centuries. In most cases, pottery in given traditions forms an unbroken time series. Analytically, of course, we break this continuum into discrete slices based on attribute changes that indicate patterns of ceramic manufacture and use across space and time. The dominant ware, Rio Grande Glazeware, is represented by all the major time units (Glazes A thru F), and within these, all the major named pottery types are also represented. Noteworthy in this new sample is that there is really no break in the glazeware series; all major types are present over nearly 400 years. Rio Grande Glazeware and its types were originally defined by Kidder and Shepard (1936) and refined by Mera (1933, 1935). Shepard (1942) studied the pastes and tempers, including some from Kuaua. The date ranges are estimates based on investigations across many sites in the region. At different site locations, pottery has been dated by seriation of surface collections, partly by stratigraphic profiles, and in recent years by the addition of association with absolute (chronometric) dates via dendrochronolgy or radiocarbon methods. For example, recent work at LA 290 (Piedras Marcadas Pueblo) with vertical testing showing stratigraphic changes in styles, together with verification by AMS radiocarbon dates, allowed more accurate determination of pottery changes through time (Franklin 2017).

Table 1. Identified Pottery Types and Date Ranges.

Ware	Pottery Type	Est. Dates
Glazeware Bowl Rims	Unknown	1315-1700
	Rio Grande glazeware unknown type	1315-1450+
Glaze A	Agua Fria Glaze/red	1325-1425
	San Clemente Glaze/polychrome	1325-1425
	Cieneguilla Glaze/yellow	1325-1425
Glaze B	Largo Glaze/yellow	1425-1450
	Largo Glaze/red	1425-1450
	Largo Glaze/polychrome	1425-1450
Glaze C	Espinoso Glaze/polychrome	1450-1500+
	Kuaua Glaze/polychrome	1450-1500+
Glaze D	San Lazaro Glaze/polychrome	1490-1525+
Glaze E	Puaray Glaze/polychrome	1525-1575+
	Puaray Glaze E-F hybrid polychrome	1575-1650
Glaze F	Kotyiti Glaze/red	1600-1700
	Kotyiti Glaze/yellow	1600-1700
	Kotyiti Glaze/polychrome	1600-1700
Glazeware Bowl Body and Jar	Rio Grande Glaze Early – red slip	1315-1450
	Rio Grande Glaze Early – yellow slip	1315-1450
	Rio Grande Glaze Early – polychrome	1315-1450
	Rio Grande Glaze Intermediate – red slip	1450-1150
	Rio Grande Glaze Intermediate – yellow slip	1450-1550
	Rio Grande Glaze Intermediate – polychrome	1450-1550
	Rio Grande Glaze Late – red slip	1550-1700
	Rio Grande Glaze Late – yellow slip	1550-1700
	Rio Grande Glaze Late – polychrome	1550-1700
	Rio Grande Glaze unidentified to type	1315-1700
Non-Glazeware Decorated	Historic Matte Paint unknown type	1700-1900
	Hopi area yellow ware	1350-1600
	Black/white mineral painted unknown type	pre-1300
	Biscuit A (Abiquiu B/w)	1375-1450
	Biscuit B (Bandelier B/w)	1425-1550
Utility Ware	Rio Grande Utility grayware generic	1100-1700
	Rio Grande Utility clapboard corrugated	1100-1325+
	Rio Grande Utility indented corrugated	1100-1325+
	Rio Grande Utility plain surfaced utility	1325-1700
	Corona corrugated	1100-1300
	Middle Rio Grande Micaceous utility	1325-1700
	Northern Rio Grande utility	1100-1300+

The glazeware types at Kuaua span the entire series from Glaze A to F, or approximately A.D. 1300 to 1700, although local production of glazeware probably did not become well established until 1315 to 1325. The effective endpoint was the Pueblo Revolt of 1680, when essentially all the populace was absent from the Middle Rio Grande Valley. While there are hints of minor persistence of glazeware in the Santa Fe area, essentially all pottery produced subsequently was matte-paint pigments rather than glaze in composition.

Glazeware types are delineated primarily on chronological changes in bowl rim forms. During this analysis, therefore, only bowl rims were identified to specific types. Other sherds were classed into Early, Intermediate, and Late glazeware categories when possible. Our process was to assign bowl body sherds and the less-diagnostic painted jar sherds to these three broad categories based on decoration style and general paint characteristics (paint color, slip tones, runniness, and so forth). This resulted in a larger sample of glazeware that could be assigned to broad time periods (see Tables 2 and 3, center).

Occasional pieces appeared that are not in the glazeware series, but overall they are rare (Table 2). These include a few sherds of black-on-white types made in the vicinity during the preceding Coalition phase, in the 1100s and 1200s. These are typically found sporadically in the Classic period sites, and may reflect the early construction phase of the large pueblos by populations already resident in the Middle Rio Grande basin. Other sherds mark imports from distant regions, as ceramic trade and exchange was a prominent aspect of Pueblo regional contact at the time. Thus, it is not surprising to identify a few pieces from the Hopi mesas (Jeddito Black-on-yellow or Sikyatki Polychrome). Also, contact with the large settlements to the north on the Pajarito Plateau, including the Bandelier Park District, is marked by consistent imports of the Biscuitware series (Abiquiu Black-on-gray and Bandelier Black-on-gray). Both Hopi and Biscuitware pottery commonly appear in Classic period glazeware assemblages in the Middle Rio Grande area. Within the production sphere of the local glazeware, trade and exchange of glazeware vessels between contemporaneous large pueblos was commonplace (see Shepard 1942), but at present monitoring the direction and amount of intra-pueblo glazeware exchange is difficult due to the great uniformity of decoration styles across these Middle Rio Grande towns. Measuring such local village-level interaction will require detailed assessment of paste clays, lithic tempers, and possibly minute design preferences. Additional study of these aspects is anticipated.

Utility pottery is of the typical kind seen at Classic period sites (Tables 1 and 2), almost all of it plain-surfaced jars typically employed for cooking and storage. A few corrugated (clapboard or indented) pieces are typically included, as is the case here. Texturing of utility pottery by manipulation of exposed coils was disappearing during this period, and evidence of coils was increasingly obliterated by wiping. By about 1350 most utility pottery no longer exhibited coils on the exterior surfaces. Also increasing with time was smudging and polishing of interior surfaces of utility jars. This would have reduced permeability of liquids stored in them, and possibly strengthened the vessel walls. Concurrently, there seems to be a widening of the jar orifice through time in the Classic period. This would allow the application of smudging and polishing to the interior surface. Small numbers of smudged-interior utility bowls also appear. These utility ware trends are impressionistic at present, and have not been studied in detail.

Table 2. Kuaua 2017 Testing Project Ceramic Analysis Ceramic Type Counts.

Ware	Pottery Type	Code	Count	% Group	% Total
Glazeware		99			
Bowl Rims	Unknown	100	13	11.6	0.6
	Agua Fria G/r	103	14	12.5	0.6
Glaze A	San Clemente G/p	104	7	6.3	0.3
	Cieneguilla G/y	105	7	6.3	0.3
	Largo G/y	201	9	8.0	0.4
Glaze B	Largo G/r	202	4	3.6	0.2
	Largo G/p	203	2	1.8	0.1
	Glaze C generic	300	4	3.6	0.2
Glaze C	Espinoso G/p	301	6	5.4	0.3
	Kuaua G/p	302	3	2.7	0.1
Glaze D	Glaze D generic	400	5	4.5	0.2
	San Lazaro G/p	401	15	13.4	0.7
	Glaze E generic	500	6	5.4	0.3
Glaze E	Puaray G/p	501	10	8.9	0.5
	Puaray Glaze E-F hybrid	502	4	3.6	0.2
	Kotyiti G/r	601	1	0.9	t
Glaze F	Kotyiti G/y	602	1	0.9	t
	Koyiti G/p	603	1	0.9	t
	Subtotal Glazeware bowl rims		112	100.0%	5.1%
Glazeware	Rio Grande Glaze Early – red slip	700	36	3.9	1.6
Body Sherds	Rio Grande Glaze Early – yellow slip	701	29	3.1	1.3
	Rio Grande Glaze Early – polychrome	702	13	1.4	0.6
	Rio Grande Glaze Intermediate – red slip	703	85	9.1	3.9
	Rio Grande Glaze Intermediate – yellow slip	704	53	5.7	2.4
	Rio Grande Glaze Intermediate – polychrome	705	86	9.2	3.9
	Rio Grande Glaze Late – red slip	706	53	5.7	2.4
	Rio Grande Glaze Late – yellow slip	707	61	6.6	2.8
	Rio Grande Glaze Late – polychrome	708	16	1.7	0.7
	Rio Grande Glaze unidentified to type	709	498	53.5	22.6
	Subtotal Glazeware body sherds		930	100.0%	42.2%
Non-Glazeware	Historic Matte Paint unknown types	750	1	11.1	t
Decorated	Hopi area yellow ware	780	1	11.1	t
	Black/white mineral painted unknown type	805	2	22.2	0.1
	Biscuit A (Abiquiu B/w)	851	2	22.2	0.1
	Biscuit B (Bandelier B/w)	852	3	33.3	0.1
	Subtotal Non-Glazeware		9	100.0%	0.4%
Utility Ware	Rio Grande Utility ware generic	900	338	29.3	15.3
	Rio Grande Utility clapboard corrugated	901	6	0.5	0.3
	Rio Grande Utility indented corrugated	902	5	0.4	0.2
	Rio Grande Utility plain surfaced	903	796	68.9	36.1
	Corona Corrugated	904	2	0.2	0.1
	Middle Rio Grande Micaceous utility	907	7	0.6	0.3
	Northern Rio Grande utility	908	1	0.1	t
	Subtotal Utility ware		1,155	100.0%	52.4%
		Total	**2,206**		**100.0%**

Table 3. Pottery Type by Vessel Form.

Ware	Pottery Type	Code	Jar	Bowl	Other	Unknown	Total
Glazeware Bowl Rims	Unknown	99-100	1	10	1[a]	1	13
Glaze A	Agua Fria G/r	103		14			14
	San Clemente G/p	104		7			7
	Cieneguilla G/y	105		7			7
Glaze B	Largo G/y	201		9			9
	Largo G/r	202		4			4
	Largo G/p	203		2			2
Glaze C	Glaze C Generic	300	3	1			4
	Espinoso G/p	301		6			6
	Kuaua G/p	302		3			3
Glaze D	Glaze D Generic	400		5			5
	San Lazaro G/p	401		15			15
Glaze E	Glaze E Generic	500	1	5			6
	Puaray G/p	501	1	9			10
	Puaray Glaze E-F Hybrid	502		4			4
Glaze F	Kotyiti G/r	601		1			1
	Kotyiti G/y	602		1			1
	Koyiti G/p	603		1			1
Glazeware Body Sherds	Rio Grande Glaze Early – red slip	700	9	27			36
	Rio Grande Glaze Early – yellow slip	701	15	14			29
	Rio Grande Glaze Early – polychrome	702	4	9			13
	Rio Grande Glaze Intermediate – red slip	703	30	55			85
	Rio Grande Glaze Intermediate – yellow slip	704	17	35	1[b]		53
	Rio Grande Glaze Intermediate – polychrome	705	24	62			86
	Rio Grande Glaze Late – red slip	706	4	47	1[c]	1	53
	Rio Grande Glaze Late – yellow slip	707	14	47			61
	Rio Grande Glaze Late – polychrome	708	2	14			16
	Rio Grande Glaze unidentified to type	709	403	94		1	498
Non-Glazeware Decorated	Historic Matte Paint unknown types	750		1			1
	Hopi area yellow ware	780		1			1
	Black/white mineral painted unknown type	805	2				2
	Biscuit A (Abiquiu B/w)	851		2			2
	Biscuit B (Bandelier B/w)	852	2	1			3
Utility Ware	Rio Grande Utility - Generic	900	335	3			338
	Rio Grande Utility - Clapboard Corrugated	901	6				6
	Rio Grande Utility - Indented Corrugated	902	5				5
	Rio Grande Utility - Plain Surfaced	903	795	1			796
	Corona Corrugated	904	2				2
	Middle Rio Grande Micaceous Utility	907	7				7
	Northern Rio Grande Utility	908	1				1
		Total	**1,683**	**517**	**3**	**3**	**2,206**

[a] mug/pitcher; [b] worked sherd; [c] soup plate

One historic Pueblo sherd (unidentified, but probably Zia or Santa Ana) was found in TU2, Group I (South Plaza). Also, one historic form, a portion of a "soup plate" with flared rim typed as Kotyiti G/r, was found in TU 13, on the south side of the South Plaza, next to the parking lot. Although this area was rumored to have been reoccupied following the reconquest, there is little evidence, other than the two sherds, in this testing sample. Small amounts of Mexican and Spanish Colonial period ceramics, including majolica, were recorded by Carrillo's analysis of ceramics (1987) from Vierra's 1987 excavations at the southeast corner of the pueblo, near the restrooms. (The restrooms are the rectangular building with the white roof at the northeast corner of the parking lot; see Figure 3). It is also possible that these seventeenth century ceramics are associated with Casa Quemada (LA 4955) located a short distance to the south (Wiseman 2017), as Spanish settlements relied heavily on pottery from nearby pueblos.

Frequency in the Sample

The percentages of the various wares and types can give an idea of the relative popularity and extent of production of ceramics at any given period of time. Table 1 gives current estimates of dates for the pottery types found in 2017; Table 2 gives the frequencies and percentages for the types from the 2017 sample. The overall counts clearly show the dominance of the glazeware numerically. As a whole, glazeware amounts to 47.2 percent of the entire count of 2,206 sherds that were large enough for analysis. Non-local, non-glaze painted sherds comprise only 0.4 percent, while utility ware occupies the remaining 52.4 percent.

Within the glazeware bowl rim category, the counts are not large, amounting to about five percent of the total. However, they are an analytically "tight" and highly diagnostic group. Data in Table 2 show that Glaze A types represent 25.1 percent of all glazed rims. The dominance of Glaze A numerically is expectable, since Glaze A has the longest production span, and there were more types, varieties and amounts of glazed pottery produced in the Glaze A rim style than in any succeeding rim-style period. Later rim styles are represented as follows: Glaze B (13.4%), Glaze C (11.6%), Glaze D (17.9%), Glaze E (17.9%) and Glaze F (2.7%) (Table 2). Again, all the phases of Rio Grande glazeware are represented, although not equally in quantity. Glaze A dominates the assemblage. Another peak in frequency appears in Glaze D and E; together, Glazes D and E comprise 35.7 percent of all glazeware rims. Glaze F drops drastically, with only 2.7 percent of the bowl rims. This supports the results of earlier excavations—Glaze F is much less frequent than any other glaze. This may, of course, signal a decline in production and possibly a decline in population during this stressful era after 1600.

The glazeware periods, as defined, are of differing lengths of time; thus numbers per period are not necessarily equivalent "units per year." Normalizing the counts per length of time in each period might yield a fairer comparison. In any case, given the data in Table 2, it is apparent that peaks of glazeware occurred in Glaze A, and again in Glazes D and E. Although the data imply a continuous glazeware sequence for almost 400 years, the times of 1300 to 1425 and 1500 to 1600 were the peaks of glazeware quantities at Kuaua.

Similar trends can be seen in the larger group of glazeware bowl body and jar sherds, which are not specifically diagnostic (Table 2, middle). In this more general analysis, sherds were grouped into Early, Middle, and Late general categories according to design style and glaze paint quality. The Early group is equivalent to Glazes A and B, Intermediate is Glazes C and D, while Late consists of Glazes E and F. Despite the limitations of these general categories, the same quantitative trends are evident. The highest counts (and also percentages) are in the Early and Intermediate groups with Intermediate sherds as a whole amounting to a high percentage of the total bowl body and jar sherds identified. Both the diagnostic bowl rims and the more generally identifiable non-bowl rim sherds signify the same trends. Most clearly, it shows that glazeware utilization was continuous throughout the Classic period. The peaks in Glaze A and Glazes D-E documented by the glazeware bowl rim sherds may imply an increased population at those times, but further research is needed to support this proposition.

As mentioned above, the imported painted ware comes from the Hopi mesas, and from the Tewa district of the Pajarito plateau north of Santa Fe. Numerically, the imports are quite small: 7 sherds in a sample of 2,206. Although trade pottery from distant sources outside the Middle Rio Grande is present, it is not abundant at Kuaua.

It is common for about half of Classic period assemblages to be utility ware. Before the Classic, much higher percentages of site collections were utility pottery. In Table 2, the counts for Rio Grande utility ware (generic), and Rio Grande plain surfaced utility can be considered as a group; if so, 98.2 percent of all utility is the plain surfaced utility that dominates local Classic period assemblages. Minor quantities of clapboard and indented corrugated mark a holdover from practices in the Coalition period. Small amounts of Corona Corrugated and micaceous utility jars indicate that some utility ware, like the small amounts of decorated pottery, arrived by trade from other centers in the region. The phenomenon of imports in the utility ware category is not unusual, but it cannot be discerned without close analysis. At Pottery Mound (LA 416), significant amounts of utility ware arrived from the Acoma, Zuni, and Hopi production centers, along with the more obvious imports of painted pottery from those same districts (Franklin 2014).

Vessel Forms

Analysis also included recording the basic vessel form of all 2,206 fragments (Table 3). During this period of time, variability in vessel form was rather low; open-mouth glazeware bowls and ollas with low necks were almost the only shapes present. Although previous eras of ceramics had seen a much greater expression in vessel forms (canteens, duck pots, ladles, mugs, pitchers, effigies, etc.), this diversity of forms was lost during the Classic period. Despite some variability in bowl rim size, basic bowl shapes remained quite static throughout the Classic period. Impressionistically, glazeware bowl diameters at Kuaua varied, but not markedly by chronological period. Hemispherical in shape, their main variability lay in the distinctive rim forms that demark their chronological position to archaeologists.

One distinctive variant during Glaze C was the "Kuaua" rim form, recognized as Kuaua Glaze Polychrome by Mera (1933). In contrast to the other rim variants in Glaze C (typically classified as Espinoso G/p), the Kuaua G/p variety displays an incurving rim, sometimes markedly so. The lip is then sharply beveled (angled), more so than the other S-shaped rim variants within Glaze C (Figure 5). As a consequence of the inward curvature, in many examples the painted decoration was confined to the exterior of the enclosed bowl. In other specimens there is decoration on both surfaces. It is a well-named type, as this beveled-rim Kuaua variant is quite common at Kuaua, occurring alongside the S-shaped Espinoso G/p rims in Glaze C assemblages.

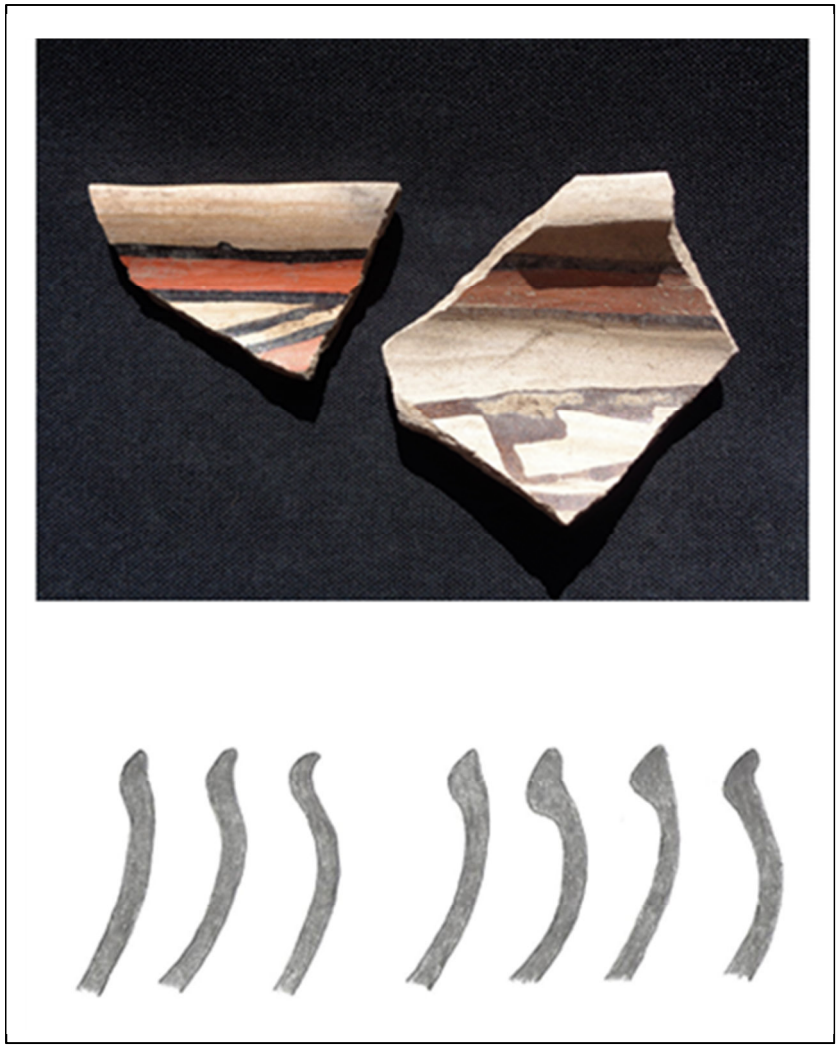


Figure 5. Glaze C Varieties and Comparative Rim Profiles.
Left three are Espinoso G/p, right four are Kuaua G/p.

The overall tally of bowl versus jar sherds is shown in Table 3. Again, the named glazeware types are confined to bowl rims in this analysis, although the table does list six apparent jar rims that were given type names. Following that in Table 3, the glazeware bowl body and painted jar residual group does show large numbers of both bowl and jar fragments. As expected, a tally of all glazeware jar and bowl sherds shows that almost equal numbers of jar (528) and bowl (507) fragments are in the collection. This ratio is beginning to appear fairly consistently in glazeware counts from contemporaneous sites in the area, including Piedras Marcadas Pueblo (Franklin 2017). The ratio of complete original vessels would be different, of course, since large painted ollas break into many more pieces than bowls. Given an open form (bowl) and a closed form (jar) of equal diameters, the jar might break into about twice as many pieces as a bowl, all other factors being equal. Therefore, despite the equality of vessel forms in the sherd count, more bowls than jars would be anticipated as whole vessels.

Utility pottery is, of course, almost entirely in the form of restricted orifice jars, although these appear to vary considerably in orifice diameter. Used for cooking, storage, and transport, these multi-purpose vessels were also of varying size, although variability within Classic utility ware requires more study. Again, formal variability is limited mainly to jars during this period, although asymmetrical plainware "duck" or "shoe" pots have also been found. Plain gray utility bowls are almost nonexistent, as painted bowls served the bowl function almost universally. Nevertheless, a few plain gray utility ware bowl rims are usually recorded, only five in this collection.

Distribution and Variation Across the Site

Location of Tests

The 23 TU locations are shown on Figure 3. As mentioned above, they were arranged specifically to test the nature of debris immediately outside but related to the roomblocks of the three major plazas (South, North, and East). Auger tests were arranged linearly running at right angles to the roomblocks and the TUs (Figure 3). As it turned out, the auger holes, designed to test the depth of cultural deposits, contained so few ceramics that these were not included in the distributional analysis. Initial assessment of ceramic distributions involved tabulating sherd counts by TU; all except TU 20 contained pottery. Sherd counts per TU varied widely, and sample sizes are not the same despite the fairly even distribution of TU locations around the site edges. Nevertheless, all 22 with ceramics yielded diagnostic rims.

Distribution of Ceramics by Grouped Test Units

The TU ceramic counts were grouped into five summary totals, based on the proximity of each TU to the major roomblocks of the site (South Plaza, North Plaza, and East Plaza). Data from the TUs adjacent to these major roomblocks are assumed to relate directly to these construction-habitation architectural units. These groups thus should reflect deposition from the adjacent plaza and the specific side of the roomblock of that plaza; for example, "North Plaza, west side" is Group III. The key to Table 4 lists the groups and the TUs assigned to them according to the individual plaza and the side of its roomblock.

Table 4. Ceramic Counts by Grouped Test Units (diagnostic bowl rims and body sherds).

Ceramic Time Period	Group I	Group II	Group III	Group IV	Group V
Early A,B	76	34	3	5	2
%	36.0%	42.0%	1.8%	31.3%	4.5%
Intermediate C,D	95	34	78	6	33
%	45.0%	42.0%	47.3%	37.5%	75.0%
Late E, F	40	13	84	5	9
%	19.0%	16.0%	50.9%	31.3%	20.5%
Total	211	81	165	16	44

Key to Groups:
I. South Plaza, south side, next to parking lot, including tests south of the parking lot; TU#: 1, 2, 3, 11, 12, 13, 20 (20 had no pottery)
II. South Plaza, west side; TU#: 16, 17, 18
III. North Plaza, west side; TU#: 7, 8, 9, 10, 14, 15
IV. North Plaza, north side; TU#: 4, 5, 6
V: North Plaza, northeast side (bordering on East Plaza); TU#: 19, 21, 22, 23

The five groups of TUs yielded a total of 2,145 sherds in all. Group I (South Plaza, south side) has the largest sherd total (790). Group II (South Plaza, west side) also had a large total (394). Group III (North Plaza, west side) also produced a large sample (741). Group IV, North Plaza, north side (55), and Group V, the North Plaza, northeast side (165), had much smaller ceramic totals. Quantitatively, the South Plaza yielded the majority of the pottery, while the North Plaza was second. The north end of the North Plaza and the northeast tests (Groups IV and V) produced less pottery.

The diagnostic Rio Grande Glazewares across the five groups of TUs produced the combined data in Table 4. Considering the glazeware diagnostic bowl rims and body sherds, grouped into the three major time brackets of Early (A and B), Intermediate (C and D), and Late (E and F), the amounts and percentages change dramatically across and around the site perimeter. Group I (South Plaza, south side) is dominated by early and intermediate glazes (81%). Group II, on the west side of the South Plaza, contains similar early and intermediate amounts, with only 16 percent late glazes. By contrast, Group III, from the North Plaza, west side, increases the Late amount to 50.9 percent. Group IV (North Plaza, north side), and Group V (North plaza northeast side) are similarly dominated by Intermediate and Late glazes. Indeed, in Group V, the Early glazes decline to 4.5 percent. Along the north side of the pueblo, the total counts are lower than elsewhere, for unknown reasons; perhaps a smaller village population left smaller samples retrievable archaeologically.

As interpreted, the percentages reveal major differences in the ages of the glazeware pottery across the three roomblock-plaza units. The overall trend is a definite change in the Glaze A to F bowl rim frequencies across the site. Although confirmation via a set of new chronometric dates would obviously be desirable, those available from the South Plaza, together with the ceramic

frequency trends shown on Table 4, suggest a growth and occupational pattern starting with the South Plaza (Glazes A to C), then the North Plaza (Glazes D to F). This trend would also include, presumably, the Northeast roomblock. Inadequate archaeological investigation of the northeast and eastern portions of the site, as well as disturbance by modern house and museum construction have resulted in uncertain data from this part of Kuaua.

Recent research by Clay Mathers, mentioned above, also accords well with the ceramic interpretation that the North Plaza was later than the South Plaza. Clear evidence of the arrival of Coronado's forces in 1540 at the northwest corner of the site is consistent with the ceramic evidence of Glaze D and E pottery in that same locality.

Summary

Based on this ceramic analysis, Kuaua was occupied throughout the entire Classic Pueblo/Pueblo IV period, from about A.D. 1300 to the Pueblo Revolt of 1680. All the pottery derives from the prehistoric and early historic Puebloan ceramic tradition. Deposition was continuous for the entire period, implying that there was a resident population during that entire time. There is no evidence in our sample of reoccupation of the pueblo after the Pueblo Revolt, nor are there any pieces of majolica, olive jars, etc. that might relate to the Spanish occupation, even though a seventeenth century Spanish colonial hacienda was constructed a short distance away to the south (Wiseman 2017).

From the evidence at Kuaua, supported by evidence from nearby contemporaneous Classic period pueblos (Piedras Marcadas, Chamisal, Isleta, Montaño Bridge, Santiago), the Rio Grande Glazeware series of pottery types dominated the assemblages for almost 400 years. Most of these Classic period sites, including Kuaua, display a continuous series of types and varieties that that have been codified (and to some extent absolute dated) in the Middle Rio Grande Valley. From the evidence at Kuaua and similar large communities in the area, we can say that the ceramic sequence of types confirms occupation and continuous pottery production over the entire span of the Classic period. At the same time, trade connections with other contemporaneous Pueblo centers is evidenced by imports from the Hopi mesas and the Bandelier Park District and Pajarito Plateau.

The second finding of the analysis was that the roomblocks surrounding the South, North, and East plazas were probably built and occupied in that order. Despite the general lack of chronometric dates at Kuaua, previous studies of depositional evidence and sequence of kiva construction have suggested this order of construction (Akins and Hannaford 2005; Vierra 1987). The 2017 testing was critical in uniformly sampling all around the site perimeter. Despite limited sample sizes, trends in time are clearly visible. The continuous series of glazeware is not uniformly distributed, but instead reveals temporal trends across the site. These trends show up both in the diagnostic glazeware bowl rims and in the temporally generalized groupings of glazeware bowl body and jar sherds.

The Rio Grande glazeware samples from the 2017 testing program all point to the same conclusion as the previous studies: Construction and occupation started with the South Plaza rooms and continued to the North and East plazas. Not only were the rooms to the north and east more recent, the ceramic samples in the northeast area are much smaller (per test unit), implying less intensive occupation of those sections of Kuaua. In this sample, suggestions of a late reoccupation (or utilization by the colonial period household on adjoining property) in the South Plaza area consist of a Glaze F soup plate rim and an historic matte-painted Pueblo sherd. However, TU assemblages dominated by Glaze A generally indicate that this section of the pueblo was the area of initial Puebloan construction.

In sum, this testing and analysis project has succeeded in sampling and analyzing ceramic materials from the exterior of the extensive ruins area of Kuaua Pueblo. The analysis suggests a construction and use sequence of roomblock-plaza units independent of the yet unstudied collections excavated from rooms long ago. Future analyses will fill in more of our knowledge gaps as we proceed to examine collections of pottery from the early excavations. In addition to ceramics, other scholarly studies are now in progress with a view towards a more complete understanding of the lives of the ancient Kuauans.

Acknowledgements: Thanks to the Friends of Coronado Historic Site for the curation and analysis work on the 2017 test collections. Our trained analysis crew accomplished the ceramic identifications with speed and expertise. Matt Barbour and Ethan Ortega supported the data retrieval and this analysis project and formed a liaison with the Coronado State Historic Site. A special tip of the hat goes to Holly Franklin for her patience and independent checking of the Excel databases.

References Cited

Akins, Nancy J. and Charles A. Hannaford
2005 *Archaeological Testing at Kuaua Pueblo, Coronado State Monument, New Mexico*. Office of Archaeological Studies, Museum of New Mexico. Archaeology Notes No. 310, Santa Fe.

Barrett, Elinore M.
2002 *Conquest and Catastrophe: Changing Rio Grande Pueblo Settlement Patterns in the Sixteenth and Seventeenth Centuries*. University of New Mexico Press, Albuquerque.

Carrillo, Charles M.
1987 Ceramic Assemblage. In *Test Excavations at Kuaua Pueblo (LA 187), edited* by Bradley J. Vierra, pp. 19-21. Laboratory of Anthropology Notes No. 396, Santa Fe.

Dutton, Bertha P.
1963 *Sun Father's Way: The Kiva Murals of Kuaua*. University of New Mexico Press, Albuquerque.

Elliot, Michael L.
1993 *Kuaua, the Evergreen Pueblo.* Report prepared for the Museum of New Mexico State Monuments, Santa Fe.

Franklin, Hayward H.
1997 Valencia Pueblo Ceramics. In *Excavations at Valencia Pueblo (LA 953) and a Nearby Hispanic Settlement (LA 67321), Valencia County, New Mexico*, edited by K.L. Brown and B.J. Vierra, pp. 125-257. Office of Contract Archaeology Report No. 185-400F, Albuquerque.

2014 *The Pottery of Pottery Mound: Ceramic Surface Sampling, External Trade, and Internal Diversity*. Maxwell Museum Technical Series No. 22. University of New Mexico, Albuquerque.

2017 *Piedras Marcadas (LA 270) Ceramics: The Pottery of a Classic Period Rio Grande Pueblo*. Maxwell Museum Technical Series No. 30. University of New Mexico, Albuquerque.

Hammond, George P., and Agapito Rey
1966 *The Rediscovery of New Mexico, 1580-1594*. University of New Mexico Press, Albuquerque.

Hayden, Maddy
2018 Site yields evidence of Coronado's expedition. *Albuquerque Journal* 3 December: A1, A4. Albuquerque.

Honea, Kenneth, compiler
1966 *Eighth Southwestern Ceramic Seminar: Rio Grande Glazes*. Museum of New Mexico, September 23-24, 1966, Santa Fe.

International Chemical Analysis Co., letter of August 20, 2018 to Barbara Harris, Friends of Coronado Historic Site, on file at Coronado Historic Site, Bernalillo, NM.

Kelley, J. Charles
1936 *An Excavation Study of the Lummis Section, Kuaua*. Ms. on file, LA 187, Archeological Site Records, Laboratory of Anthropology, Santa Fe.

Kidder, Alfred V., and Anna O. Shepard
1936 *The Pottery of Pecos*. Vol. 2*, Glaze Paint, Culinary, and Other Wares*. Papers of the Phillips Academy No. 7, New Haven.

Luhrs, Dorothy
1938 *Stratigraphy Tests in the North Plaza at Kuaua (LA 187). Ms. on file,* Coronado State Historic Site, Bernalillo, NM.

Mathers, Clay
2013 Contest and Violence on the Northern Borderlands Frontier: Patterns of Native-European Conflict in the Sixteenth-Century Southwest. In *Native and Spanish New Worlds: Sixteenth-Century Entradas in the American Southwest and Southeast*, edited by Clay Mathers, Jeffrey M. Mitchem, and Charles M. Haecker, pp. 205-230. University of Arizona Press, Tucson.

Mera, H. P.
1933 *A Proposed Revision of the Rio Grande Paint Sequence*. Laboratory of Anthropology, Technical Series Bulletin No. 5, Santa Fe.

1935 Ceramic Clues to the Prehistory of North Central New Mexico. *Technical Series*, Bulletin No. 8. Laboratory of Anthropology, Santa Fe.

Oppelt, Norman T.
2007 *Prehistoric Southwest Pottery Types and Wares.* Greeley, Colorado.

Schmader, Matthew F.
2016 Coronado in the Tiguex Province, 1540-1542. In *History and Archaeology: Connecting the Dots, Papers in Honor of David H. Snow*, edited by Emily J. Brown, Carol J. Condie, and Helen K. Crotty, pp. 199-215. Papers of the Archaeological Society of New Mexico 42, Albuquerque.

Shepard, Anna O.
1942 Rio Grande Glaze-Paint Ware: A Study Illustrating the Place of Ceramic Technological Analysis in Archaeological Research, pp. 129-262. *Contributions to American Anthropology and History* No. 39, Publication 528 of the Carnegie Institution, Washington, D.C.

Tichy, Marjorie F.
1937 The Kivas of Paako and Kuaua. *New Mexico Anthropologist* 2(4-5):71-80.

Vierra, Bradley J.
1987 *Test Excavations at Kuaua Pueblo (LA 187)*. Laboratory of Anthropology Notes No. 396. Museum of New Mexico, Santa Fe.

1989 A Sixteenth-Century Spanish Campsite in the Tiguex Province, with contributions by Martha R. Binford, Karen H. Clary, Stanley M. Hordes, Michael P. Marshall, Mollie S. Toll, and Cheryl Wase. *Laboratory of Anthropology Notes* No. 475, Santa Fe.

Vivian, Gordon R.
1932 A Re-study of the Province of Tiguex. M.A. thesis, University of New Mexico, Albuquerque.

1934 The Excavation of Bandelier's Puaray. *El Palacio* 37(19-20):153-161.

1935 The Murals of Kuaua. *El Palacio* 37(19-20):153-161.

Wilson, C. Dean
2005 Ceramic Analysis. In *Archaeological Testing at Kuaua Pueblo, Coronado State Monument, New Mexico*, edited by Nancy J. Akins and Charles A. Hannaford, pp. 23-26. Archaeology Notes No. 310, Office of Archaeological Studies, Museum of New Mexico, Santa Fe.

2008-2017 *Pottery Typology Project*. Office of Archaeological Studies, New Mexico Department of Cultural Affairs. Electronic Document, http://ceramics.nmarchaeology.org/index.

Wiseman, Regge N.
2017 *LA 4955, a Descriptive Report of the 1970 Excavations next to the Coronado Historic Site, Bernalillo County, New Mexico, with Pottery and Artifact Identifications by David H. Snow and David W. Kayser, Historic Native Pottery Tempering Materials by A.H. Warren, Faunal Identifications by Arthur H. Harris, Botanical Identifications by Richard I. Ford.* Manuscript on file at Coronado Historic Site and Laboratory of Anthropology, Museum of Indian Arts and Culture, Santa Fe.

IDENTIFICATION OF BLUE PIGMENT ON FOUR SHERDS FROM LA 6387 IN THE UPPER SAN JOSÉ VALLEY, MCKINLEY COUNTY, NEW MEXICO

C. L. Kieffer,
Wheelwright Museum, University of New Mexico, and Santa Fe Community College
and
Emma Britton, Independent Scholar

Abstract

The widespread use, exchange, and significance of blue and blue-green stones throughout Mesoamerica and the American Southwest have been well documented. However, documentation of blue pigment manufacture and its application to artifacts is relatively scarce by comparison. This paper documents analysis of four sherds caked with blue pigment from the Museum of Indian Arts & Culture's Archaeological Research Collection. These sherds, recovered from LA 6387 in the Upper San José Valley, McKinley County, New Mexico, were submitted for non-destructive XRF analysis to determine geochemical composition. Preliminary results indicate the pigment is likely ground azurite, a blue-colored copper mineral endemic to the American Southwest.

Introduction

The presence of blue pigment in the American Southwest, prior to Spanish Contact, is not common. Despite its general absence in the archaeological record, blue-green colors are imbued with profound cultural significance throughout the Americas, including the American Southwest, as well as Mesoamerica (Ortiz 1969; DeBoer 2005). Archaeologically, this cultural significance, is most commonly emphasized by the attention to blue and blue-green stones among many indigenous peoples in the Americas (Sahagún 1956; Weigand 1982; Weigand and Harbottle 1993).

This research focuses on mineralogical identification of blue pigment recently re-discovered within the Museum of Indian Arts & Culture's Archaeological Research Collections during an update to the database catalog record following rehousing of the material. Though rare, blue pigments do occur naturally. Therefore, narrowing down the pigment's identity and possible geographic sources can be useful in conversations regarding procurement patterns, linking a seemingly unique set of sherds to greater discussions of human behavior. The blue pigment on these sherds, specifically, is unlikely to be a deliberate attempt at decoration, but rather unintentional smearing of the pigment related to the decoration of something else. It is possible, however, given the location of the pigment smears on the interior of the corrugated sherds, that these sherds may have been part of a vessel intended for the transportation or application of the blue pigment. Ultimately, the significance of this paper is to document a case of blue-smeared artifacts in hopes of aiding future researchers in investigating and discussing larger anthropological questions in the Southwest.

Background

Although blue pigments are relatively uncommon, there are several significant artifacts in the American Southwest that are elaborated upon through the use of blue-green pigments. For example, blue pigments have been noted in the form of fugitive paint on Mimbres Classic Black-on-white vessels (Moulard 1984: xxi). Additionally, blue and blue-green pigments have been identified on wooden objects at Chaco Canyon (Vivian 1978; see Plog 2003 for an overview), and similarly painted wooden objects have been recovered at Aztec West Ruin, New Mexico (Webster 2011). X-ray florescence analysis of blue painted wooden artifacts from Pueblo Bonito and the Aztec West Ruin has concluded that these blue pigments are high in copper elemental composition and likely derived from rocks such as azurite and malachite (Mahar 2009; Webster 2011:158). Outside of New Mexico, few blue decorated artifacts have been discovered, with the most noteworthy exception being two painted staffs from the Magician's Burial near Flagstaff, Arizona (McGregor 1943:287).

Site Background

The indented corrugated ceramics with bright blue pigment adhered to the interior surface examined in this study probably date to the Pueblo II period (A.D. 900-1100). The sherds were originally recovered from LA 6387, Feature 17, in which the sherds were intentionally placed. LA 6387 is located in the Upper San José Valley on the east side of the Zuni Mountains, immediately east of the Continental Divide near Interstate 40 in McKinley County. LA 6387 is located within the traditional historic Zuni land use area. The site did not receive intensive archaeological investigation due to its excavation being conducted as part of a highway salvage project (De Cicco 1964). The most thorough documentation of the site can be found in Jack Smith's doctoral dissertation (1965).

The site consists of two structures, a small pit house, two kivas, a plaza, and a trash midden (Figure 1) (De Cicco 1964:224, 231). It appears to have been only briefly occupied and lacked clear stratigraphy or any dating via dendrochronology (Smith 1965:193). Smith (1965:181-183) argued that this site and other sites in this area were tied to Chaco via trade routes. Support for this argument included similarities between the decorated and utility ceramics of the Upper San José Valley to the early deposits of Pueblo Bonito and a small structure at the southern side of Chaco Canyon (Smith 1965:186).

Methods

XRF

Four sherds, Field Specimen numbers 17-9-1, 17-9-2, 17-9-3, and 17-3 (Figures 2 and 3) with blue pigment caked on their interior surfaces were submitted to Steven Shackley for non-destructive analysis. Sherd 17-3 was analyzed twice, once over the interior blue tinted pigment surface as well as over the non-pigment-tinted exterior surface. This was done in order to verify that past readings were not dramatically skewing the geochemical data obtained from the blue pigment.

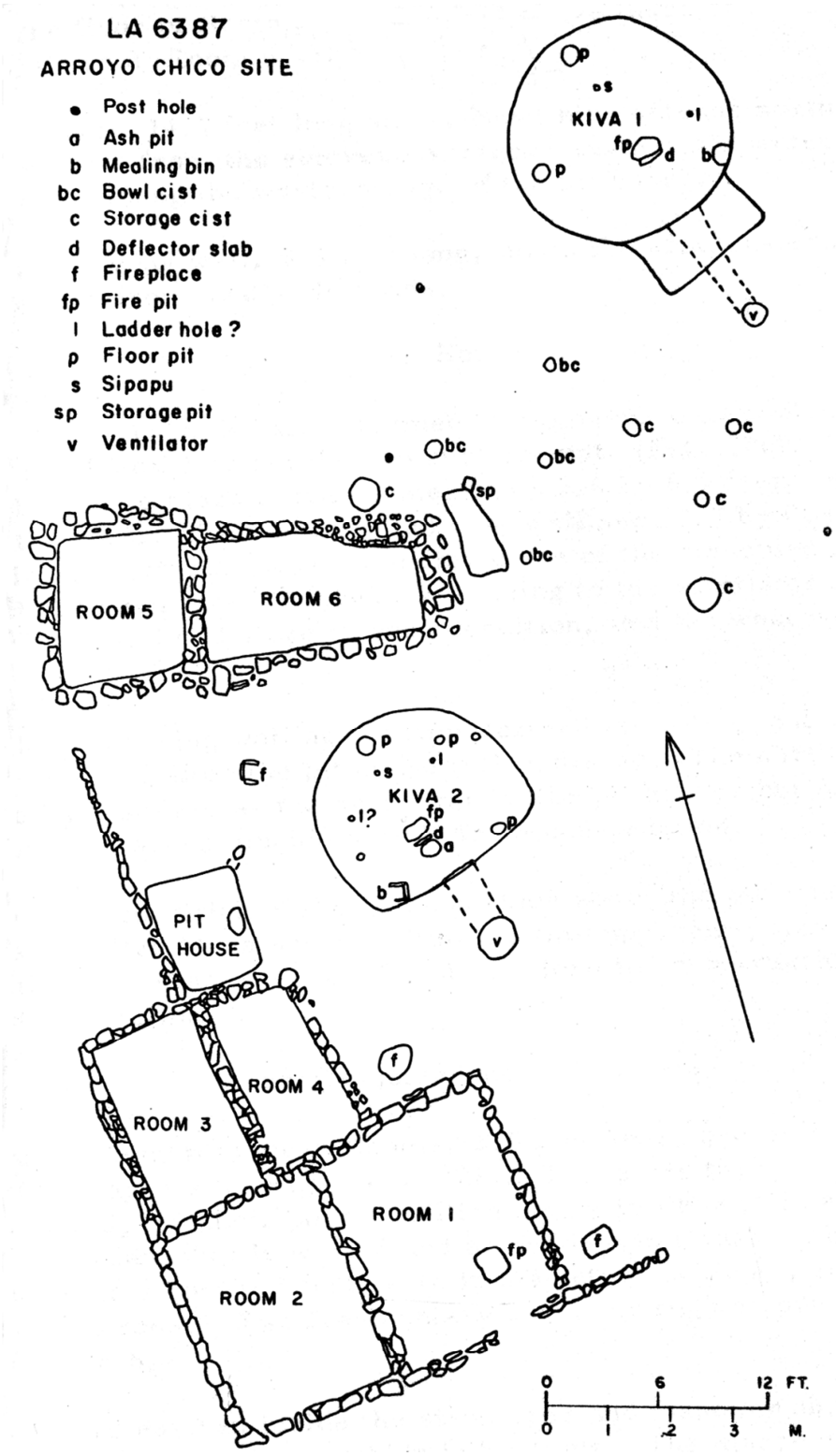


Figure 1. LA 6387 Site Map (adapted from De Cicco 1964:225)

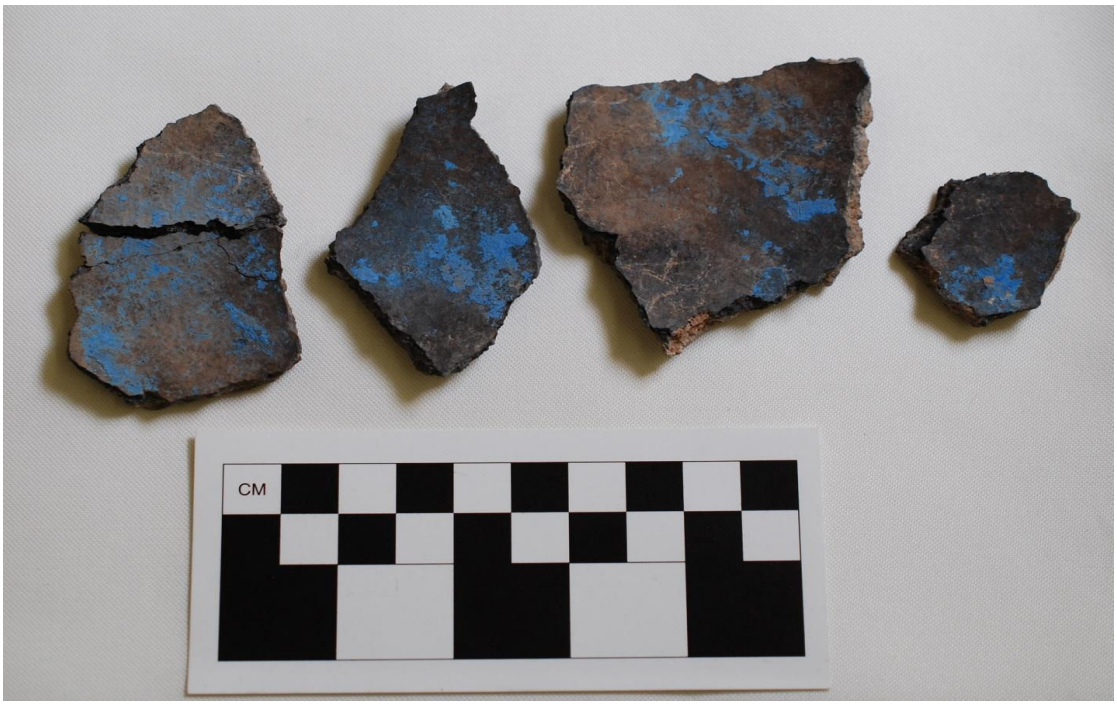


Figure 2. Interiors of the corrugated sherds from LA 6387 with blue pigment analyzed in this research. MIAC Catalog #60084. Collections of the Museum of Indian Arts & Culture/Laboratory of Anthropology, Museum of New Mexico, Santa Fe, NM.

Figure 3. Exteriors of the corrugated sherds from LA 6387 with blue pigment analyzed in this research. MIAC Catalog #60084. Collections of the Museum of Indian Arts & Culture/Laboratory of Anthropology, Museum of New Mexico, Santa Fe, NM.

Analyses were conducted on a ThermoScientific *Quant'X* EDXRF spectrometer, located in the Geoarchaeological XRF Laboratory, Albuquerque, New Mexico, equipped with a thermoelectrically Peltier cooled solid-state Si(Li) X-ray detector, with a 50 kV, 50 W, ultra-high-flux end window bremsstrahlung, Rh target X-ray tube and a 76 μm (3 mil) beryllium (Be) window (air cooled), that runs on a power supply operating 4-50 kV/0.02-1.0 mA at 0.02 increments. The spectrometer is equipped with a 200 l min^{-1} Edwards vacuum pump, allowing for the analysis of lower-atomic-weight elements between sodium (Na) and titanium (Ti). Data acquisition is accomplished with a pulse processor and an analogue-to-digital converter. Elemental composition is identified with digital filter background removal, least squares empirical peak deconvolution, gross peak intensities, and net peak intensities above background.

For the analysis of mid-Z condition elements Ti-Nb (Kα lines), Pb, Th (Lα lines), the x-ray tube is operated at 32 kV, using a 0.05 mm (medium) Pd primary beam filter in an air path at 100 seconds livetime to generate x-ray intensity Kα-line data for elements titanium (Ti), manganese (Mn), iron (as $Fe_2O_3^T$), cobalt (Co), nickel (Ni), copper, (Cu), zinc, (Zn), gallium (Ga), rubidium (Rb), strontium (Sr), yttrium (Y), zirconium (Zr), niobium (Nb), and Lα-line data for lead (Pb), and thorium (Th). Trace element intensities were converted to concentration estimates by employing a linear or quadratic calibration line ratioed to the Compton scatter established for each element from the analysis of international rock standards certified by the National Institute of Standards and Technology (NIST), the US. Geological Survey (USGS), the Canadian Centre for Mineral and Energy Technology, and the Centre de Recherches Pétrographiques et Géochimiques in France (Govindaraju 1994). Line fitting is linear (XML) for all elements. When barium (Ba) is analyzed in the High Zb condition, the Rh tube is operated at 50 kV and up to 1.0 mA, ratioed to the bremsstrahlung region (see Davis et al. 2011; Shackley 2011).

Further details concerning the petrological choice of these elements in Southwest obsidian and other volcanic rocks is available in Shackley (1988, 1995, 2005, 2011; also Mahood and Stimac 1991; and Hughes and Smith 1993). Nineteen specific pressed powder standards are used for the best fit regression calibration for elements Ti-Nb, Pb, Th, and Ba, include G-2 (basalt), AGV-2 (andesite), GSP-2 (granodiorite), SY-2 (syenite), BHVO-2 (hawaiite), STM-1 (syenite), QLO-1 (quartz latite), RGM-1 (obsidian), W-2 (diabase), BIR-1 (basalt), SDC-1 (mica schist), TLM-1 (tonalite), SCO-1 (shale), NOD-A-1 and NOD-P-1 (oceanic manganese) all US Geological Survey standards, NIST-278 (obsidian), U.S. National Institute of Standards and Technology, BE-N (basalt) from the Centre de Recherches Pétrographiques et Géochimiques in France, and JR-1 and JR-2 (obsidian) from the Geological Survey of Japan (Govindaraju 1994).

Analysis of the major oxides of Na, Mg, Al, Si, P, Cl (as ppm), K, Ca, Ti, V, Cr, Mn, Fe, As, Cd, Sn, Sb, and Bi is performed under the multiple conditions elucidated below (not all are reported here) (Figure 4 and Table 1). The fundamental parameter analysis (theoretical with standards), while not as accurate as destructive analyses (pressed powder and fusion disks) is usually within a few percent of actual, based on the analysis of the SARM-69 ceramic standard (see also Shackley 2011). The fundamental parameters (theoretical) method is run under conditions commensurate with the elements of interest and calibrated with ten USGS standards (RGM-1, rhyolite; AGV-2, andesite; BHVO-1, hawaiite; BIR-1, basalt; G-2, granite; GSP-2, granodiorite; BCR-2, basalt; W-2, diabase; QLO-1, quartz latite; STM-1, syenite), and one Japanese Geological Survey rhyolite standard (JR-1).

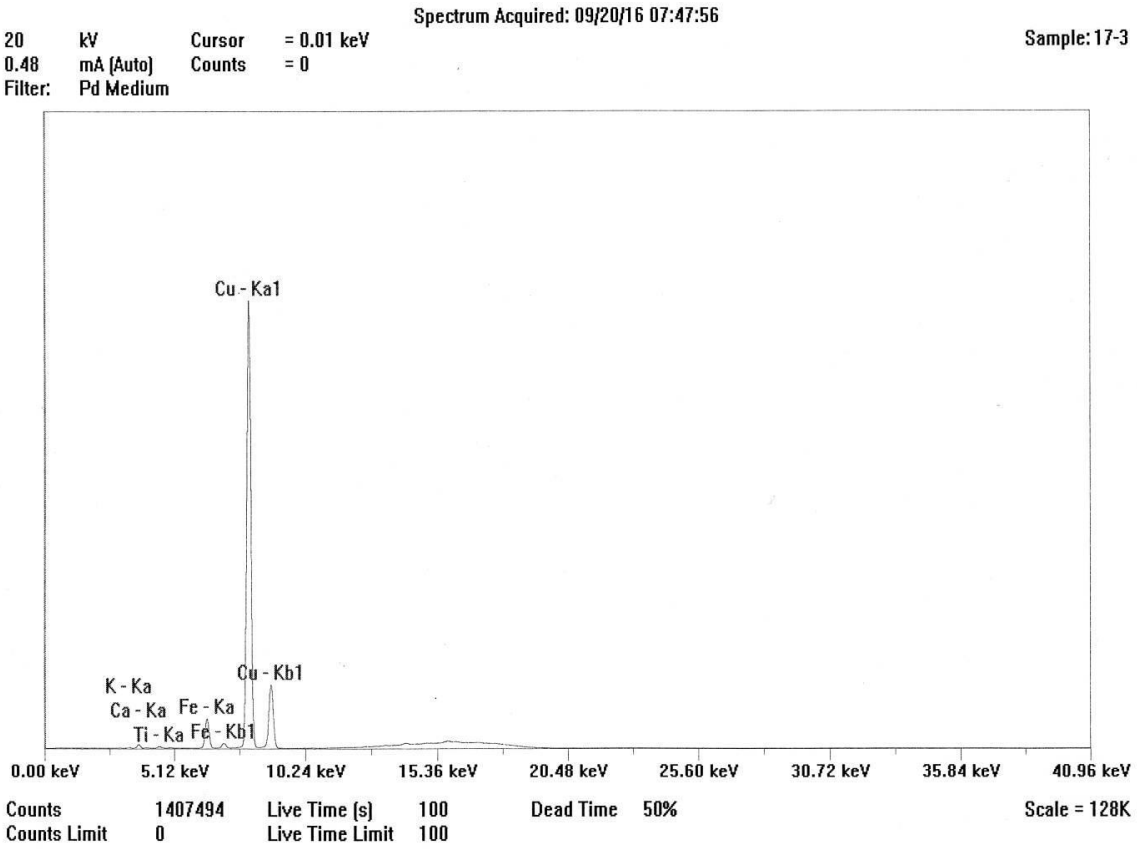


Figure 4. XRF quantitative elemental composition for tinted side of ceramic sample 17-3.

Table 1. Oxide and trace element concentrations for the four sherd samples and SARM-69 and RGM-1 ceramic and rhyolite standards.

Sample	Na2O %	MgO %	Al2O3 %	SiO2 %	P2O5 %	Cl ppm	K2O %	CaO %	TiO2 %	V2O5 %	Cr2O3 %	MnO %
17-9-1	0.753	3.491	26.05	57.172	0	1476.02	1.971	3.545	1.523	0.07	0	0.014
17-9-2	0.405	2.788	25.683	53.3	0	1524.83	1.748	3.869	1.241	0.061	0.001	0.012
17-9-3	0.894	3.048	27.442	56.277	0.106	1921.42	1.707	3.942	1.506	0.051	0	0.011
17-3 (tinted)	0.278	3.611	18.498	45.637	0.127	1260.52	1.741	6.375	0.9	0.076	0.004	0.016
17-3 (non-tinted)	1.239	2.419	27.919	55.767	0	3333.63	2.034	4.956	1.541	0.059	0.001	0.041
SARM-69	1.262	2.192	16.923	65.91	0	0	2.262	2.56	0.788	0.048	0.046	0.133
Sample	Fe2O3 %	CuO %	Ni ppm	Cu ppm	Zn ppm	Ga ppm	Rb ppm	Sr ppm	Y ppm	Zr ppm	Nb ppm	Ba ppm
17-9-1	3.345	1.732	21	10710	68	28	45	133	39	307	41	90
17-9-2	2.777	7.717	26	39988	78	19	36	127	42	314	37	183
17-9-3	3.055	1.57	17	7944	63	24	37	131	36	311	32	277
17-3 (tinted)	2.686	19.5	26	82318	78	13	34	126	45	290	28	261
17-3 (non-tinted)	3.406	0.087	19	400	63	28	40	129	46	327	31	257
SARM-69	7.736	0.006	16	14	37	16	145	108	29	218	9	838

Results

Ultimately, data indicate that the blue pigment on the corrugated sherds demonstrate high amounts of copper (Table 1). The variation demonstrated by the XRF elemental composition of the pigment on the four sherds also suggests the possibility of different sources, or even a mixing of sources. The initial report provided to the authors by Dr. Shackley suggested that the pigment on the sherds was possibly ground turquoise ($CuAl_6$ $(PO_4)_4$ $(OH)_8$ $5H_2O$).

However, photographs included in this article led reviewers to suggest that the smudges are azurite or malachite. As one reviewer noted, the elemental composition of turquoise seemingly overlaps with other minerals such as azurite, chrysocolla, and malachite to name a few (Kim et al. 2003). Azurite would also fit the chemical profile of the XRF results, given that azurite is a copper carbonate hydroxide (Northrup 1995:52). Additional consultation about the XRF results with Dr. David Killick of the University of Arizona indicates that the distinct lack of phosphorus implies that the mineral is probably azurite, not turquoise as suggested in the initial report.

What humans perceive as mineral color is consistently misleading and typically considered non-diagnostic in mineral identification, which means that quantitative analyses must follow qualitative observations. The photographs provided in this article, coupled with the practical experiences of reviewers, however, led the authors to revisit the data and revise their conclusions. And while azurite is more likely the mineral identification based on the data provided in this article, Dr. Killick also advises that X-Ray Diffraction (XRD) or Raman spectroscopy would be necessary to make this identification definitive.

Discussion

The nearest turquoise source to LA 6387 is located in the Cerrillos Hills Mining District, over 200 km away, south of Santa Fe, New Mexico (Mathien 1999) (Figure 5). Historic mining of azurite by Zuni has been recorded in the Upper San José Valley, east of the Zuni Mountains, in the vicinity of LA 6387 (Ferguson et al. 1985). According to Ferguson and colleagues (1985:49), the only other traditional Zuni mineral collection areas, other than the Cerrillos Hills Mining District where turquoise was acquired, were just north of the White Mountains of Arizona and further south of there in an area east of the Gila Mountains. With the qualitative analysis indicating the blue pigment is probably not turquoise, additional quantitative analyses are necessary to further associate these pigment smudges to known sources.

If this pigment is turquoise, such possible long distances within the American Southwest suggest that multiple sites may have been involved with the acquisition, exchange, and processing of raw turquoise. This idea is supported by the isotopic analysis of turquoise samples from Chaco Canyon that indicates their trade networks allowed them to procure turquoise from as far away as Arizona and Nevada (Hull and Fayek 2012:36). The same study also indicates that Chacoan outliers such as the Guadalupe Community, which has been debated as a turquoise preparer for Chaco (Judge 1989; Durand and Durand 2000), also acquired turquoise from multiple sources. These studies focus heavily on Chaco Canyon and significant Chacoan outliers; our data indicate that less well-recognized sites such as LA 6387 may have also been active participants in complex trade relationships in the region.

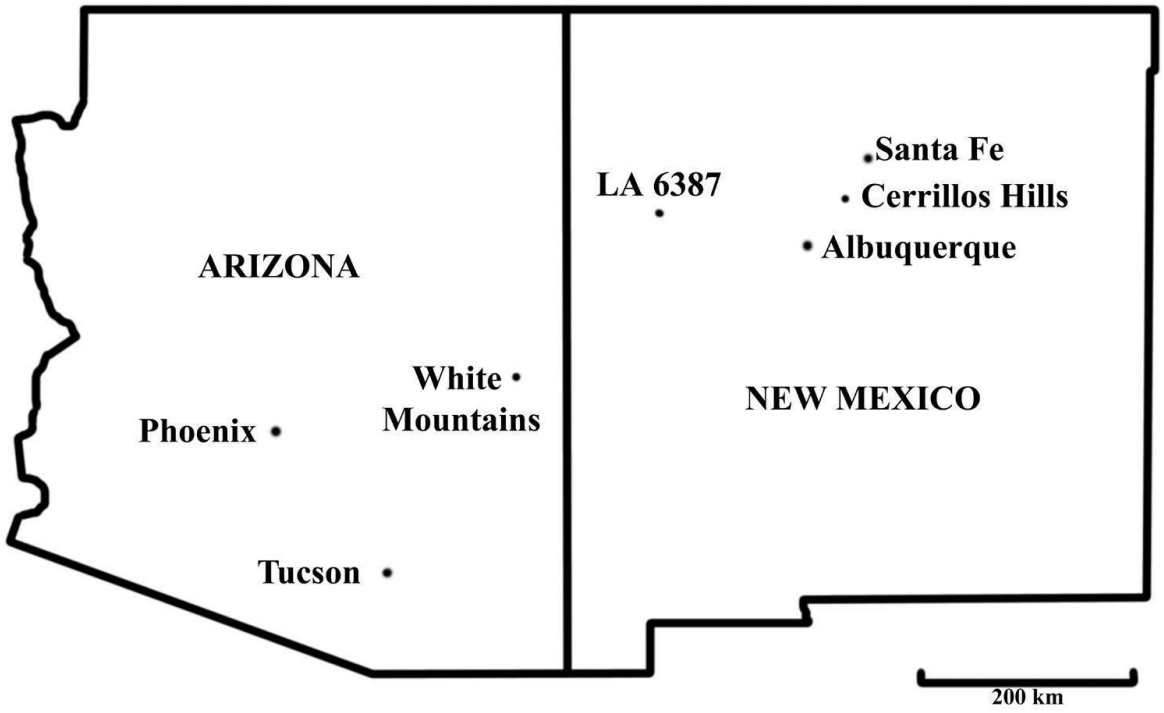


Figure 5. Map with location of LA 6387 in relation to the two closest turquoise sources and modern cities for reference.

Whereas turquoise is commonly part of archaeological discussions, the prehistoric use of azurite in the Southwest has also been well documented. Azurite, along with malachite and turquoise, was noted from many Basketmaker II to early Pueblo III sites excavated as part of the National Park Service Chaco Project (Mathien 1997). These blue-green minerals were often collected by the general population to be used by ceremonial leaders in rituals (Lewis 2002). Ultimately, it would make more sense for individuals mining this blue mineral pigment to take advantage of abundant local resources if the goal were simply to create a blue pigment. Azurite can be found in 21 counties in New Mexico, including Cibola County (Northrup 1996:52). As noted above, mining of azurite by Zuni has been recorded in the Upper San José Valley in the vicinity of LA 6387 (Ferguson et al. 1985).

Conclusions

While the intended purpose for these specific samples of pulverized blue pigment is, and will remain, unknown for now, the fact that these blue pigment-smudged sherds were intentionally placed in Feature 17 reinforces the symbolic and aesthetic value of the color blue in the region and may suggest that even the byproduct of blue pigment object manufacturing was still imbued with these qualities. It is our hope that our publication of this example of blue pigment on these sherds will facilitate the research agendas of others more highly focused on this topic.

Acknowledgments. The authors would like to thank Dr. M. Steven Shackley at Geoarchaeological XRF Laboratory for promptly running our samples and supplying us with a report of the results. The authors would also like to express their gratitude to Drs. Joan Mathien and David Killick for their interpretations of the qualitative and quantitative data. We would also like to express our gratitude to Dr. Maxine McBrinn and Dr. Judith A. Habicht Mauche for their advice.

References Cited

Davis, M. Kathleen, Thomas L. Jackson, M.Steven Shackley, Timothy Teague, and Joachim H. Hampel
2011 Factors Affecting the Energy-Dispersive X-Ray Fluorescence (EDXRF) Analysis of Archaeological Obsidian. In *X-Ray Fluorescence Spectrometry (XRF) in Geoarchaeology*, edited by M.S. Shackley, pp. 45-64. Springer, New York.

DeBoer, Warren R.
2005 Colors for a North American Past. *World Archaeology* 37(1): 66-91.

De Cicco, G.
1964 Arroyo Chico Site (LA 6387). In *Highway Salvage Archaeology Vol. 5: Salvage Archaeology in the Prewitt District*, edited by Jack E. Smith, pp.223-237. New Mexico State Highway Department and Museum of New Mexico, Santa Fe.

Durand, Stephen R., and Kathy Roler Durand
2000 Notes from the Edge: Settlement Pattern Changes at the Guadalupe Community. In *Great House Communities across the Chacoan Landscape*, edited by J. Kantner and N.M. Mahone, pp. 101-109. University of Arizona Press, Tucson.

Ferguson, T. J., E. Richard Hart, Ronald Stauber, and Troy Lucio
1985 *A Zuni Atlas*. University of Oklahoma Press.

Govindaraju, K.
1994 Compilation of Working Values and Sample Description for 383 Geostandards. *Geostandards Newsletter* 18 (special issue).

Hull, Sharon K., and Mostafa Fayek
2012 Cracking the Code of Pre-Columbian Turquoise Trade and Procurement Strategies. In *Turquoise in Mexico and North America: Science, Conservation, Culture and Collections*, edited by J.C.H. King, Max Carocci, Caroline Cartwright, Colin McEwan, Rebecca Stacey, pp. 29-40. Archetype Publications, London.

Judge, W. James
1989 Chaco Canyon-San Juan Basin. In *Dynamics of Southwest Prehistory*, edited by L. S. Cordell and G. J. Gumerman, pp. 209–261. Smithsonian Institution Press, Washington, D.C.

Kim, J., A.W. Simon, V. Repoche, J. W. Mayer, and B. Wilkins
2003 Proton-induced X-ray emission analysis of turquoise artefacts from Salado Platform Mound sites in the Tonto Basin of Central Arizona. *Measurement Science & Technology* 14:1579-1589.

Lewis, Candace K.
2002 *Knowledge is Power: Pigments, Painted Artifacts, and Chacoan Ritual Leaders*. M.A. thesis, Department of Anthropology, Northern Arizona University, Flagstaff.

Mahood, Gail A., and James A. Stimac
1990 Trace-Element Partitioning in Pantellerites and Trachytes. In *Geochemica et Cosmochimica Acta* 54: 2257- 2276.

Mahar, G.
2009 *Report to Accompany the XRF Analysis of Aztec and Chaco Painted Wood Samples from the AMNH Collection*. Ms. on file, North American Archaeology Lab, American Museum of Natural History, New York.

Mathien, Frances Joan
1997 Ornaments of the Chaco Anasazi. In *Ceramics, Lithics, and Ornaments of Chaco Canyon: Analyses of Artifacts from the Chaco Project, 1971-1978. Volume III. Lithics and Ornaments*, edited by F. J. Mathien, pp. 1119-1219. Publications in Archeology 18G, Chaco Canyon Studies. National Park Service, Santa Fe.

1999 Identifying Sources of Prehistoric Turquoise in North America: Problems and Implications for Interpreting Social Organization. *Journal of the Society of Bead Researchers* 12-13: 17-37.

McGregor, John C.
1943 Burial of an Early American Magician. *Proceedings of the American Philosophical Society*. The American Philosophical Society, Philadelphia.

Moulard, Barbara L.
1984 *Within the Underworld Sky: Mimbres Ceramic Art in Context*. Twelve Trees Press, Pasadena, CA.

Northrup, Stuart A.
1995 *Minerals of New Mexico*. Third Edition, revised by Florence A. LaBruzza. University of New Mexico Press, Albuquerque.

Ortiz, Alfonso
1969 *The Tewa World: Space, Time, Being, and Becoming in a Pueblo Society*. The University of Chicago Press, Chicago.

Plog, Stephen
2003 Exploring the Ubiquitous through the Unusual: Color Symbolism in Pueblo Black-on-white Pottery. *American Antiquity* 68(4):665-695.

Sahagún, Bernardino de
1956 *Historia General de las Cosas de Nueva España*. Editorial Porrua, Mexico.

Shackley, M. Steven
1988 Sources of Archaeological Obsidian in the Southwest: An Archaeological, Petrological, and Geochemical Study. *American Antiquity* 53(4):752-772.

1995 Sources of Archaeological Obsidian in the Greater American Southwest: An Update and Quantitative Analysis. *American Antiquity* 60(3):531-551.

2005 *Obsidian: Geology and Archaeology in the North American Southwest*. University of Arizona Press, Tucson.

2011 An Introduction to X-Ray Fluorescence (XRF) Analysis in Archaeology. In *X-Ray Fluorescence Spectrometry (XRF) in Geoarchaeology*, edited by M.S. Shackley, pp. 7-44. Springer, New York.

Smith, Jack E.
1965 The Archaeology of the Upper San José Valley, Northwest New Mexico and Its Relation to the Developmental Stage of the Chaco Branch of the Anasazi Tradition. Ph.D. dissertation, University of California, Los Angeles.

Vivian, R. Gwinn
1978 Wooden Ritual Artifacts from Chaco Canyon, New Mexico: The Chetro Ketl Collection. *Anthropological Papers of the University of Arizona* 32.

Webster, Laurie D.
2011 Perishable Ritual Artifacts at the West Ruin of Aztec, New Mexico: Evidence for a Chacoan Migration. *Kiva* 77(2):139-171.

Weigand, Phil C.
1982 Mining and Mineral Trade in Prehispanic Zacatecas. *Anthropology* 6(1-2):87-134.

Weigand, Phil C., and Garman Harbottle
1993 The Role of Turquoises in the Ancient Mesoamerican Trade Structure. In *The American Southwest and Mesoamerica: Systems of Prehistoric Exchange*, edited by J. E. Ericson and T. G. Baugh, pp. 159-178. Plenum Press, New York.

Exhibits and Events

The El Paso Museum of Archaeology presents **An Ageless Craft: Historic and Modern Pueblo Pottery**. The exhibit features over 200 objects representing the Rio Grande and Western pueblos from the collections of Albert Alvidrez, the El Paso Archaeological Society, as well as the Museum's permanent collection. Through January 11, 2020. Information at: http://archaeology.elpasotexas.gov.

Patricia L. Crown will present a free lecture on **Chocolate in Chaco and Beyond** on September 27, 2019 in the Anthropology lecture hall (Anth. 163) on the University of New Mexico campus. While the lecture is free and open to all, the wine and chocolate reception to follow the lecture is a fundraiser for the Maxwell Museum of Anthropology. Details are online at http://maxwellmuseum.unm.edu.

The **Southwest Kiln Conference** will be held this year in Globe, Arizona at Gila Pueblo, Besh-Ba-Gowah, and the Timber Camp Recreation Area of the Tonto National Forest from October 4th to October 6th, 2019. The conference brings together ceramic artists, replicators, and archaeologists in a lively context of discussion and ceramic creativity. Further details may be found in the short article about the conference that follows this list. See also the Kiln Conference website www.swkiln.com.

The **21st Biennial Jornada Mogollon Conference** will take place on October 11th and 12th, 2019 at the El Paso Museum of Archaeology in El Paso. Details at https://archaeology.elpasotexas.gov/events/2019/10/12/copy-of-21st-biennial-jornada-mogollon-archaeology-conference.

The **Arizona Archaeological Society Annual Meeting** will be held in Sedona, AZ from Friday to Sunday October 25-27, 2019, hosted by the Verde Valley Chapter. Details at https://www.azarchsoc.org/page-1862680.

The **New Mexico Archaeology Fair** will take place at Blackwater Draw near Portales on Saturday October 26, 2019. This year marks the 90th anniversary of the Blackwater Draw Paleoindian site's discovery, the 50th anniversary of the Anthropology & Applied Archaeology Department at Eastern New Mexico University, and the 20th anniversary of the annual atlatl competition held at Blackwater Draw. More information at https://ne-np.facebook.com/nmhistoricpreservation/posts/1894741053961777.

A **Micaceous Pottery Making Class** is tentatively scheduled for November 2-3, 2019 at the USFS Tijeras Ranger Station near Albuquerque. Participants in the class taught by Steven Rospopo will make their own ceramics from raw clay through firing. Contact Steve at sdrospopo@msn.com.

New Mexico Archeological Council Fall Conference "Collaborative Archaeology, Indigenous Archaeology, and Tribal Historic Preservation in the Southwestern United States" will take place

November 9, 2019 at the Hibben Center on the UNM campus. The keynote speaker event will be Friday, November 8, at 7:30, also at the Hibben Center. Octavius Seowtewa, Leader of the Pueblo of Zuni Cultural Resources Advisory Team, will speak on Zuni's Connection to the Grand Canyon and Beyond. Information at www.nmarchcouncil.org.

The **Society for American Archaeology** 85th Annual Meeting will be held in Austin from April 22nd to April 26th, 2020. Details at https://www.saa.org/annual-meeting.

The **Archaeological Society of New Mexico** Annual Meeting will be held at the Sagebrush Inn and Conference Center in Taos from May 8th to May 10th, 2020. The theme of the conference is "Taos at the Crossroads of Trade." Further information can be found at www.taosarch.org.

The 2019 Southwest Kiln Conference

Steven D. Rospopo, University of New Mexico and
San Juan College Totah Archaeological Project

The Southwest Kiln Conference (SWKC) is an annual event focused on the art, science, and technology of recreating the prehistoric pottery of the American Southwest. Founded in 2003 as the "Leupp Kiln Conference," it is held in different locations around the Southwest every year. The SWKC provides opportunities for people with a range of interests and skill levels, from presentations on archaeological subjects; to demonstrations of prehistoric whiteware, redware, yellowware, smudged wares, micaceous wares, corrugated grayware, and lead glazeware pottery technology (see Figure 1); surface and outdoor kiln pottery firings; and field trips to obtain regional clays capable of being used for pottery manufacturing.

Figure 1. Corrugated pottery demonstration (Courtesy SWKC 2018).

The 2019 Southwest Kiln Conference will be held on October 4–6, 2019 in Globe, Arizona at Gila Pueblo, the Besh-Ba-Gowah Site, and the Timber Camp Recreation Area of the Tonto National Forest. In the tradition of past SWKC events, potters and kiln masters meet to learn more about regional pottery traditions and practices. In the fourteenth century, the Globe area was a core area for the "Salado Phenomenon" where a mixing of Puebloan, Mogollon, and Hohokam traditions took place. In the 1920s when Southwest archaeology was still in its infancy, Harold Gladwin founded Gila Pueblo Foundation (GPF) here, built on the ruins of Gila Pueblo. GPF was instrumental in early archaeological research on Hohokam and Salado pottery. Attendance is free and open to the public, although there is a charge for the campground, for the dinner, and for t-shirts. Registration is now open; conference information is available at https://www.swkiln.com.

An exciting conference is planned for this year. The SWKC master potters and kiln experts invite those interested in prehistoric pottery technology to attend and learn about the exciting things being done in the fields of prehistoric pottery replication and experimental archaeology. The schedule for this year's events is as follows:

October 3:
12:00 - 3:00 Firewood Collection at Timber Camp Campground

October 4:
8:00 – 10:00 Registration, Gila Pueblo Room 522
8:30 – 12:00 Presentations, Gila Pueblo Room 522
1:00 – 4:00 Pottery Demonstrations, Besh-Ba-Gowah Central Plaza.
6:00 Reception and Introductions

October 5:
8:00 – 10:00 Registration, Timber Camp Campground
8:00 – 5:00 Trade table, Timber Camp Campground
8:00 – 12:00 Surface oxidation pottery firings, Timber Camp Campground (see Figure 2)
1:00 – 4:00 Trench, reduction (limited oxidation) pottery firings, Timber Camp Campground
7:00 – 8:00 Evaluations and Discussion, Session I of Pottery Firings

Figure 2. Surface oxidation firing (Courtesy SWKC 2018).

October 6:
8:00 – 10:00 Open trench kilns, Timber Camp Campground (see Figure 3)
10:00-11:30 Evaluations and Discussions, Session II of Pottery Firings
12:00 Field trip: Tour of Kinishba Ruins (White River, Arizona)

Figure 3. Black-on-white Pottery Reduction Kiln (Courtesy SWKC 2018)

CONTENTS

Bice, Richard A., and William L. Sundt
1968 *An Early Basketmaker Campsite: Report on AS-1, a Field Project of the Albuquerque Archaeological Society*. Albuquerque Archaeological Society, Albuquerque.

Bice, Richard A.
1968 *Tonque Pueblo, Docent Handbook*, for Exhibition Prepared by the Albuquerque Archaeological Society for the Museum of Albuquerque, September 7, 1968.

Barnett, Franklin
1969 *Tonque Pueblo: A Report of Partial Excavation of an Ancient Pueblo Indian Ruin in New Mexico.* Albuquerque Archaeological Society, Albuquerque.

Bice, Richard A.
1970 *Basketmaker III-Pueblo I Manifestations on the Rio Puerco of the East.* Technical Note No. 1, Albuquerque Archaeological Society, Albuquerque.

Bice, Richard A., and William M. Sundt
1972 *Prieta Vista: A Small Pueblo III Ruin in North-Central New Mexico.* Report of the Excavation of the AS-3 Site by the Albuquerque Archaeological Society in Cooperation with Eastern New Mexico University. Albuquerque Archaeological Society, Albuquerque.

Barnett, Franklin, and William M. Sundt
1973 *San Ysidro Pueblos: Two Prehistoric Pueblo IV Ruins in New Mexico*. Albuquerque Archaeological Society, Albuquerque.

Barnett, Franklin
1974 *Sandstone Hill Pueblo Ruin, Cibola Culture in Catron County, New Mexico.* Albuquerque Archaeological Society, Albuquerque.

Wiseman, Regge N.
1986 *An Initial Study of the Origins of Chupadero Black-on-white.* Technical Note No. 2, Albuquerque Archaeological Society, Albuquerque.

Schroeder, A. H.
1987 *Vidal Great Kiva Site, LA 16254, Progress Report for 1986*. Albuquerque Archaeological Society, Albuquerque.

Sundt, William M., and Richard A. Bice
1989 *Tijeras Canyon Site AS-10: Preliminary Report.* Albuquerque Archaeological Society, Albuquerque.

Bice, Richard A., Sheila Brewer, Bettie Terry, Phyllis Davis, Gordon Page, Elizabeth Kelley, William Sundt, and Joan Wilkes
1990 *The Vidal Great Kiva Near Gallup, New Mexico*, Summary Status Report. Albuquerque Archaeological Society, Albuquerque.

King, Dudley W., and Richard A. Bice
1992 *Subfloor Channels in Prehistoric Ruins: Anasazi Region of the Southwest*. Albuquerque Archaeological Society, Albuquerque.

Olson, Nancy H., and Richard A. Bice, edited by Alan M. Shalette
1995 *The Albuquerque Archaeological Society: The First Twenty-Five Years, 1966-1991.* Albuquerque Archaeological Society, Albuquerque.

Bice, Richard A.
1997 *Field Guide to Mid-Rio Grande Pottery.* Technical Note No. 4. Albuquerque Archaeological Society, Albuquerque.

Bice, Richard A.
1998 *Prehispanic Pueblo Pottery,* second edition, Albuquerque Archaeological Society, Albuquerque.

Bice, Richard A., Phyllis S. Davis, and William M. Sundt
1998 *The AS-8 Pueblo and the Cañada de las Milpas, a Pueblo III Complex in North-Central New Mexico*. Albuquerque Archaeological Society, Albuquerque.

Bice, Richard A., Phyllis S. Davis, and William M. Sundt
2003 *AS-5, Indian Mining of Lead for Use in Rio Grande Glaze Paint*, Report of the AS-5 Bethsheba Project Near Cerillos, New Mexico. Albuquerque Archaeological Society, Albuquerque.

SUBMISSIONS TO *POTTERY SOUTHWEST*

The availability of Pottery Southwest in electronic format creates opportunities for communicating with a wide audience in a sophisticated manner. It is currently published twice a year on a flexible schedule. Included are sections for Major Papers, Comments & Responses, Book Reviews, and Current Exhibits & Events. Following is a brief list of guidelines to follow in preparing submissions:

Style: Please refer to the *Chicago Manual of Style* for any questions regarding punctuation, i.e., single versus double quotation marks. Please adhere to the Society for American Archaeology's *American Antiquity* Style Guide for submissions.

Author Information: Major papers should be approximately 10-15 pages including bibliographies and endnotes. Comments & Responses, Book Reviews, and Current Exhibits & Events should be short, in the 500- to 1,500-word range. Authors are responsible for the accuracy of their work.

Page Set-up: All submissions must be in Microsoft Word format. Top, bottom, left and right margins must be 1 inch. Do not use any headers and footers in your submission. Text font should be Times New Roman, 12 point. Figure labels should be Times New Roman, 10 point. Paragraphs should be single spaced. Do not use the tab key, enter key, or the space bar to line up text. Bibliographies must follow the *American Antiquity* style guide.

Spelling, Grammar, and Punctuation: Please spell check and grammar check your work before submission.

Images: Images must be in .jpg format. Images should be submitted as a separate file as well as inserted into the document.

Inserts: Please do not import spreadsheets, pie charts, etc. from Excel into the Word document. They must be converted to Word format for submission, or converted to .jpg format. Do not use text boxes.

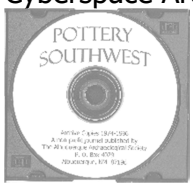
Deadlines: The deadlines for the 2020 issues are November 15, 2019 and May 15, 2020. Papers submitted after these dates will be considered for the following issue.

Returns or Rejections: *Pottery Southwest* reserves the right to reject or return for revision, any material submitted on the grounds of inappropriate subject matter or material of poor quality or of excessive length, or if the material contains defamatory or illegal references. Manuscripts may also be returned for reformatting when they do not comply with the style provisions. Papers under consideration for publication elsewhere will not be accepted.

Questions, comments or inquiries should be sent to the editors at *psw@unm.edu*.

***Pottery Southwest* Copyright:** The Albuquerque Archaeological Society has held the copyright for *Pottery Southwest* since 1974. Standard copyright procedures apply; i.e., an author who contributes a paper to *Pottery Southwest* may distribute the paper in its entirety as long as they reference *Pottery Southwest* as the source, i.e., *https://potterywouthwest.unm.edu* and the volume reference. The same hold true for citations in bibliographies. The author may not offer the same article in its entirety to any other publication. Downloads of *Pottery Southwest* are offered free of charge. Thus, it is unrealistic for an author to assume to hold an individual copyright on a specific paper. Copyrights for individual photographs that are used to illustrate a point in the text and referenced therein as "figures," are part of the submission and are treated as such. Authors are responsible for ensuring that material presented for publication does not infringe upon any copyright held by a third party.

ORDER FORM
for POTTERY SOUTHWEST Vols. 1-23, 1974-1996 Archive CD
and/or Five Years in Cyberspace Archive CD Vols. 24-28



TO: Albuquerque Archaeological Society
P. O. Box 4029
Albuquerque, NM 87196

Number & Choice	**POTTERY SOUTHWEST CDs PLEASE PRINT CLEARLY**	**Price per CD**	**Total**
[____] Vol. 1-23 [____] Vol. 24-28	Name: _____ Address: _____ City: _____ State: _____ Zip Code: _____ E-Mail (optional): _____	$5.00 for AAS members and students $7.50 for non-members	
No. of Oppelt CDs	**PREHISTORIC SOUTHWESTERN POTTERY TYPES AND WARES by Norman Oppelt PLEASE PRINT CLEARLY**	**Price per CD**	
[____]	Name: _____ Address: _____ City: _____ State: _____ Zip Code: _____ E-Mail (optional): _____	$6.00 for AAS members & students, $7.50 for non-members plus $3.00 shipping & handling	
Number of AAS CD Sets	**Albuquerque Archaeological Society CDs Sets PLEASE PRINT CLEARLY**	**Price per CD Set of 2**	
[____]	Name: _____ Address: _____ City: _____ State: _____ Zip Code: _____ E-Mail (optional): _____	$15.00 shipping & handling included	
	AMOUNT ENCLOSED:		$_____