Tewa Red and the Puebloan Diaspora: The Making of Ledbetter Red

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Abstract

In the 17th and early 18th centuries, Native American potters in the vicinity of the Scott County Pueblo (14SC1) in western Kansas produced a local copy of unpainted Tewa red ware known as Ledbetter Red. We examine the red-slipped unpainted ceramics from 14SC1 and two nearby sites, 14SC304, and 14SC409, using macroscopic data on slip and paste attributes, petrographic data on inclusions, and oxidation data on slip and paste colors to compare Ledbetter Red with Tewa Red and with the ancestral Apache ceramics native to the study area, and also to evaluate differences in Ledbetter Red between sites. Changes in the execution of Ledbetter Red between earlier (14SC1) and later (14SC304 and 14SC409) sites may represent the work of newly arrived Puebloan potters and then their descendants raised in ancestral Plains Apache territory. Although some Tewa Red traits were deemphasized or abandoned in Ledbetter Red over time, the red slip was maintained and actually improved in quality in later examples. The highly visible red color might have been symbolically the most important aspect of Ledbetter Red bowls, reflecting the ethnic and historical complexity of these protohistoric Plains communities.

Keywords

US Great Plains, US Southwest, Northern Rio Grande, Scott County Pueblo, Tewa Red,

Ledbetter Red, ceramics, petrographic analysis, compositional analysis, oxidation analysis

1. Introduction

Throughout the turbulent Spanish colonial period, native people in northern New Spain often left large settled communities as refugees, migrants, or captives (Brooks 2002; Dozier 1954; Ferguson and Preucel 2005; Forbes 1994; Preucel 2002; Spicer 1962). Some of those moving were Puebloan women who joined Plains Athabaskan groups and left an archaeological trace through the ceramic vessels they made in their new territories (Beck and Trabert 2014; Habicht-Mauche 1987, 2000, 2008). We have strong evidence of Puebloan potters at multiple sites in the vicinity of the Scott County Pueblo (14SC1) in western Kansas (Figure 1), where some of the 17th and early 18th century residents produced a local copy of unpainted red ware as made in Tewa-speaking Puebloan communities in New Mexico. James Gunnerson (1998, 2006) initially identified this local copy of Tewa Red during a 1965 field visit to the area, naming it “Ledbetter Red,” but he never published a description and the type was largely forgotten. This evidence for local manufacture of a Puebloan ceramic type by local residents—and the implications for population movement from the Rio Grande region—is an important counterpoint to other literature on Plains-Pueblo relationships, which often focuses on trade (e.g., Baugh and Nelson 1987; Spielmann 1983, 1991).

In this paper, we examine the red-slipped unpainted ceramics from 14SC1, 14SC304, and 14SC409, describing Ledbetter Red and placing it within spatial, temporal, and cultural context. We use macroscopic data on slip and paste attributes, petrographic data on mineralogy inclusions, and oxidation data on slip and paste colors to compare Ledbetter Red with Tewa Red and with the ancestral Apache ceramics native to the study area, and also to evaluate differences in Ledbetter Red between sites. We argue that changes in the execution of Ledbetter Red

between earlier (14SC1) and later (14SC304 and 14SC409) sites may represent the work of newly arrived Puebloan potters and then their descendants raised in ancestral Plains Apache territory. One or more generations later, it was the red interior slip on Ledbetter Red bowls that persisted most clearly and may have been a potent reminder of Puebloan heritage and identity.

Figure 1. Archaeological sites and modern raw material sample locations in the study area.

1.1 Archaeological sites in the study area: 14SC1, 14SC304, and 14SC409

Red ware was produced in this part of the eastern High Plains after interaction with, and probably some population movement from, Puebloan communities in the northern Rio Grande region of New Mexico. Marked evidence of interaction and migration appears at the Scott County Pueblo (14SC1), so named for the 7-room stone and adobe pueblo that is the northeasternmost pueblo in the United States. This is in spite of the distance between the Scott County Pueblo and Taos Pueblo, the closest pueblo in the northern Rio Grande region; one documented journey on horseback (that of Juan de Ulibarri) between the two areas covered over 400 km and took 23 days (Gunnerson 1992; Schroeder 1974). This was historically Plains Apache territory, and an ancestral Plains Apache (Dismal River aspect) occupation predated and may have continued alongside the pueblo at 14SC1. Women from one or more northern Rio Grande pueblos apparently moved to western Kansas, joining the existing Athabaskan-speaking residents and making pottery at the site using techniques from their natal communities (Beck and Trabert 2014).

Recent stratigraphic analysis of the AMS radiocarbon dates at 14SC1 (Hill et al. n.d.) suggest at least two occupation episodes, one including the pueblo and one including the intact pit features and associated artifacts below the pueblo. Possible date ranges of the earlier features, based on the calibrated dates, are AD 1463-1528 and AD 1552-1634. We argue for the AD 1552-1634 range, based on the recovery of a Robin's egg blue bead (Type IIa40) from excavations slightly south of the pueblo. It is difficult to date the construction of the pueblo, but dates from four borrow pits, probably used to quarry adobe for the construction of the pueblo, produced two possible intercepts: AD 1526-1556 and AD 1632-1651. The pueblo structure was later burned,

which charred a large quantity of corn on the floor of the pueblo and other floor artifacts and features. The three dates associated with burning the pueblo also provide at least two possible age ranges: AD 1652-1681 and AD 1739-1802. The AD 1652-1681 range appears most likely, given the absence of horse bones and artifacts clearly dating to the 18th century. The painted nonlocal ceramics from the site, including Tewa Polychrome (AD 1650-1750) and Rio Grande Glaze Ware (manufactured until approximately AD 1700) also support occupation in the second half of the 17th century (dates from Wilson 2010).

We compare the red-slipped unpainted ceramics from 14SC1 to those from two nearby sites, 14SC304 and 14SC409. 14SC304 is the site where James Gunnerson originally identified the ceramic type Ledbetter Red. He excavated here in 1965, recording it as 14SC111 and naming it the Ledbetter site. He never published the excavation methods or results, although he briefly mentions the site in print (Gunnerson 1968, 1998). In his field notes, he states that they excavated a ‘typical’ Dismal River structure, 3.6 m in diameter, with five posts surrounding a central hearth (Hoard 2009). The limited artifacts recovered include lithic debitage, stone scrapers, groundstone shaft abraders, and ceramics. Further investigation of this site by the Kansas Historical Society and the University of Iowa suggests that although some cultural materials remain, the site has been too significantly disturbed to warrant further excavation (Hoard 2009; Trabert and Hill n.d.). One AMS radiocarbon date at 14SC304 (Hill et al. n.d.) indicate occupation range between AD 1680-1730, suggesting that the occupation here either overlapped with the later occupation at 14SC1 or immediately followed it.

14SC409 is located several hundred meters south of 14SC1 and was originally recorded in 1976 as a 9,400 square meter scatter of pottery, lithic flakes, and bones. Limited excavations were conducted by the Kansas Historical Society in 2009 (Hoard 2009) and the University of

Iowa in 2013 and 2014 (Trabert 2015; Trabert and Hill n.d.). The recovered artifacts include ceramics, lithics, faunal remains, and *Olivella dama* shell beads. Two AMS radiocarbon dates indicate an occupation date range between AD 1680-1730 (Hill et al. n.d.). This date range is supported by the recovery of a French gunflint at the site in 2009 dating to AD 1675-1800 (Hoard 2009). 14SC409 was probably occupied at roughly the same time as 14SC304 and the end of the occupation at 14SC1.

1.2 Early description of Ledbetter Red

Recalling his 1965 field visit to the Scott County Pueblo area, Gunnerson (2006:625) writes, “One of the Dismal River house sites (14SC111 [now 14SC304]), brought to our attention by Bill Ledbetter, was especially interesting. From it we recovered locally made red-painted sherds, apparently in imitation of Tewa Pueblo red ware. This new type we named Ledbetter Red.” This is the most detailed discussion of Ledbetter Red to appear in Gunnerson’s published work, as he never mentions this type in his discussions of regional ceramics (Gunnerson 1968, 1987).

Among James Gunnerson’s documents curated at the Kansas Historical Society are some observations on Ledbetter Red, in the form of handwritten notes (dated February 6, 1971) and also three typed pages titled “Description of New Pottery Type” that summarize his notes.

Excerpts are provided below (with emphases added and typographical errors corrected):

Distribution: Known only from Ledbetter site [14SC304] (77 sherds out of 890 recovered at site)

Time period: 1675?-1725?. . .

Surface treatment: Smoothed and incompletely polished. Very thin red slip or wash applied before polishing and firing. . .

Temper: Moderate amounts of fine rounded sand. A few particles up to about 1 mm. in diameter

Color: Paste usually dark gray to black, sometimes light gray to buff. Slip is various shades of red from buff to orange to moderately bright red. . .

Vessel form: No restorable vessels found, but sherds suggest only bowls. . .

Comparisons: The *Ledbetter Red sherds appear to be identical in paste, tempering, and thickness to the more abundant (91%) gray utility ware at the site.* This is what Wedel [1959:441] calls Scott Plain. . . Ledbetter Red is much smoother and much more polished than is Scott Plain.

Ledbetter Red could be a local attempt to imitate Tewa red wares which do show up at other Plains Apache sites although no sherds were found at the Ledbetter site. Tewa Red wares, however, have a thicker slip, are much better polished and have a paste that is nothing like that of Ledbetter Red. The range of color (red) in the latter is apparently much greater than one finds on Tewa Red.

Geneseo Red Filmed (Wedel 1949:89) is apparently similar in paste, but differs in vessel form (small-mouthed, globular vessels), surface treatment (cord roughened and simple stamped as well as carefully smoothed), lip form (rarely flattened), and nature of pigment (often “fugitive”). It is possible, however, that the inspiration for the use of red pigment of Ledbetter Red did come from Geneseo Red Filmed.

Gunnerson’s observations have also been summarized by Hoard (2009:55-56). “Geneseo Red Filmed” as referred to by Gunnerson is a ceramic type defined for the contemporaneous Little River focus of the Great Bend aspect (ancestral Wichita) to the east in central Kansas (Blakeslee and Hawley 2006; Wedel 1959).

1.3 Tewa red-slipped unpainted ceramics and regional copies

The closest locales with significant red ware production were in the Tewa-speaking communities of the northern Rio Grande, where potters made unpainted red and black vessels by roughly AD 1600 (Schaafsma 2002; Warren 1977). Tewa Red ceramics have been reported from indigenous and vecino households in northern New Mexico into the mid-eighteenth century (Ferg 1984; Levine 2004; Warren 1976).

This red-slipped unpainted pottery has been previously termed Posuge Red (Mera 1939:12) and is technologically identical to the polished black ceramics with the exception of the

final smudging of the vessel surface (Harlow 1973). “Posuge Red (Tewa Red)” is the only red-slipped unpainted type defined for the Northern Rio Grande and Galisteo Basin in a recent guide to archaeological ceramic identification (Wilson 2010). Mera’s type name “Posuge Red” was initially defined for a specific vessel form (jars with flaring rims), however. Posuge Red, like many other post-contact Puebloan ceramic types (e.g., Batkin 1987; Frank and Harlow 1990; Harlow 1973), was created by examining whole vessels, complicating efforts to apply it to fragmented sherd collections (Wilson 2011:223). Schaafsma (2002) has therefore argued for using the term Tewa Red rather than Posuge Red in sherd analyses. For similar reasons, Ellis (1964) substituted the term San Juan Red for Posuge Red. We primarily use “Tewa Red” in this paper but use it interchangeably with “Posuge Red,” given that “Posuge Red” is still used in the ceramic type collections in the H. P. Mera Room (Laboratory of Anthropology, Museum of Indian Arts and Culture, Santa Fe, New Mexico) consulted for this project.

Tewa Red (Schaafsma 2002; Wilson 2010), also known as “Tewa Polished Red” (Wilson 2011), has “at least one surface that exhibited a red polished slip without evidence of other decoration,” a slip that is “bright red to maroon and. . . is usually well polished” and tempered with “fine tuff” (Wilson 2011:225). The “polishing with conspicuous stone strokes. . . [gave] Tewa pottery its characteristic appearance for hundreds of years” (Harlow 1973:39). Variations on Tewa Red include Tewa Buff-Tan (Schaafsma 2002:149), an unslipped variety, and Tewa Brown and Tewa Maroon, which are probably not separate types but reflect the presence of intentionally unslipped areas on vessels or changes in red slip color on Tewa Red due to firing conditions (Schaafsma 2002:149-150). Tewa Red sherds may be confused with unpainted red-slipped fragments of Tewa Polychrome (Schaafsma 2002).

Volcanic materials such as ash, tuff, and pumice distinguish the pastes of Tewa area ceramics. These materials come from the Tesuque formation, which outcrops discontinuously across the Española Basin and contains zones of fine white volcanic ash (Galusha and Blick 1971). The use of ash, tuff, and pumice as temper is documented ethnographically and archaeologically from the nearby Tewa-speaking and ancestral Tewa pueblo communities (Habicht-Mauche 1993; LeFree 1975; Wilson 2011). LeFree (1975:14) notes that the fine volcanic tuff used as temper by Santa Clara potters is “visible as white strata at the rims of most of the hills in the area,” which is a good description of Tesuque formation ash zones. A ceramic thin section made using clay and ash provided by a modern San Ildefonso potter strongly resembles the paste of thin sections of Abiquiu Black-on-white (AD 1375-1450) from fourteenth- and fifteenth-century Arroyo Hondo, located about five miles south of Santa Fe (Habicht-Mauche 1993:81; Vint 1999). In Schaafsma’s (2002:147, 152) sample of ceramics from the Abiquiu Reservoir area in the Chama Valley of New Mexico (roughly 100 km northwest of Santa Fe), 99 percent of the non-culinary Tewa ceramics (Tewa Red, Tewa Black, Tewa Gray, Tewa Black-on-white, and the polychrome types) have tuff temper.

Although Tewa Red originates in the Española Basin, it was copied elsewhere in the northern Southwest, notably at Picuris and Pecos Pueblos. It appeared at Picuris after AD 1600, both as vessels from the Tewa area and also as locally made copies (Warren 1976:B-43). The exchanged Tewa Red ceramics at Picuris “are tempered with large glassy spicules of tuff similar to that found in deposits on and near the Pajarito Plateau. This tuff temper is identical to the tempering material found in sherds of the same types collected by Herbert Dick at San Juan Pueblo” (Dick et al. 1999:90). In contrast, the “local variety is not as well polished, is softer, and has in the paste abundant mica inclusions, which are lacking in the true San Juan Red [Tewa

Red]” (Dick et al. 1999:90-91). Red-slipped unpainted vessels known as Plain Red appeared towards the end of occupation at Pecos Pueblo, “late in Glaze V” (Glaze E, AD 1515-1700; Wilson 2010:66) and “remained in fashion until the abandonment of the pueblo” (Kidder 1936:287). Plain Red vessels at Pecos are typically tempered with quartz-feldspar sand with mica flakes, and often have coarser grains of siltstone (up to 2-3 mm) as well (Shepard 1936:541). Vessels similar to Tewa Red were also made farther south, near Albuquerque (Wilson 2010:14) and in the Salinas Basin (Warren 1977:366).

2. Sample and methods

Our data on the 14SC1, 14SC304, and 14SC409 red-slipped unpainted ceramics were collected through macroscopic observations (slip color, paste color, surface treatment) and petrographic and oxidation analyses. We make comparisons with ceramics known to be locally produced (Dismal River Gray Ware) from 14SC1 and ceramics known to be manufactured in the Española Basin in the northern Rio Grande (Tewa Red and Tewa Polychrome) from the ceramic type collections of the H. P. Mera room, Museum of New Mexico.

The 14SC1 ceramics analyzed for this paper were recovered by the Kansas Historical Society (KSHS; see Beck and Trabert 2014). The KSHS collection includes 36 red-slipped unpainted sherds (6 rim, 30 body). These sherds make up the majority of the 51 “Puebloan slipped and/or painted sherds” (8 rim, 43 body) identified by Beck and Trabert (2014:Table 4), which are less than one percent of the ceramics recovered from 14SC1. Most of the remaining “Puebloan” sherds identified by Beck and Trabert (2014:Table 4; 11 body) exhibit black paint and appear to be ash/pumice/tuff-tempered fragments of Tewa Polychrome or a similar type (Wilson 2011). Two additional body sherds were initially identified as red-slipped unpainted

ceramics and counted as such in Beck and Trabert (2014:Table 4) , but later determined through the detailed analyses described below to be unslipped. The remaining two rim sherds recorded by Beck and Trabert (2014:Table 4) have black paint but no visible slip and cannot be assigned to a known type.

The 14SC304 and 14SC409 ceramic collections are also curated by the KSHS. The collection from 14SC304 includes 47 red-slipped unpainted sherds (4 rim, 43 body). This is 30 fewer sherds than observed by Gunnerson in his original type description for Ledbetter Red, and it is possible that not all of the sherds he collected are held by the KSHS. The collection from 14SC409 includes 65 red-slipped unpainted sherds (5 rim, 60 body).

Finally, we collected clay and sand samples from the area around 14SC1 for comparison in the macroscopic and petrographic analysis (Trabert 2015; Trabert et al. 2015). The clay samples were taken from a profile along Ladder Creek, approximately 4 km north of 14SC1, and the sand was collected from one of the surrounding quarries mining the Ogallala Formation sand and gravel (Figure 1).

2.1 Petrographic analysis and other microscopy

As part of her regional work with Dismal River ceramics, Trabert (2015; Trabert et al. 2015) submitted samples of Dismal River Gray Ware, micaceous ceramics, and red-slipped unpainted ceramics from 14SC1, 14SC304, and 14SC409 for petrographic analysis. David V. Hill collected the petrographic data used to define compositional groups, including mineral grain identification, grain shape and size, and percentage of inclusions, following Matthew et al. (1991) and Terry and Chilingar (1955; see Hill's report in Trabert 2015, Appendix B; Trabert et al. 2015). Beck examined the un-sectioned remnants of the petrographic sample, using a nonpolarizing binocular

microscope, identifying criteria to assign the remaining red-slipped sherds in this study to one of the defined groups.

Figure 2. Examples of compositional groups from 14SC1: (a) arkosic sand, coarse paste group (Dismal River Gray Ware, SC-5, no catalog number); b. arkosic sand, very fine paste group (indeterminate plain, SC-39, cat 553); (c) arkosic sand, coarse paste group (Ledbetter Red, SC-22, cat 24115); (d) arkosic sand, coarse paste group (Ledbetter Red, SC-51, cat 11273); (e) sand/sandstone group (indeterminate unpainted red-slipped, SC-41, cat 23196); (f) sand/sandstone group (Pecos Glaze or Plain Red, SC-15, cat 27523); (g) biotite granite group (SC-9, cat 9948); (h) ash/pumice/tuff group (Tewa Polychrome, SC-11, cat 1925).

The five compositional groups, based primarily on dominant mineralogy and inclusion size range, are: arkosic sand, coarse paste; arkosic sand, very fine paste; biotite granite; sandstone/sand; and ash/pumice/tuff (Figure 2). The “coarse paste” group (Figure 2a, c, d) has inclusions up to coarse or very coarse sand in size; the “very fine paste” group (Figure 2b) has inclusions up to fine sand in size. The “arkosic sand, coarse paste,” if not also the “arkosic sand, fine paste” group, represents use of local materials (Trabert 2015; Trabert et al. 2015) based on comparison with our sample of Ogallala Formation sands. Diffendahl (1984) describes sediment and sediment sources for the Ogallala Formation. The sand grains from the Ogallala, as observed in the quarry sample, ranged in size from very fine sand to gravel in size, with rounded to subrounded grains of arkosic (quartz and feldspar) composition. They also included trace amounts of welded tuff (ash and pumice), basalt, limestone, and caliche, all materials also found in small amounts in “arkosic sand, coarse paste” ceramics.

Attributes of the “arkosic sand, coarse paste” group are also consistent with petrographic observations of clay in the study area, particularly the appearance of reddish brown pizolites and caliche in the paste. Grain size ranged up to very fine sand in our modern clay samples. In addition to trace amounts of sub-angular to rounded quartz, samples also had alkali feldspar, biotite, reddish brown clay pizolites (fine to medium sand in size) and caliche (coarse sand in size). Snail shells were not observed in the petrographic analysis of Ladder Creek clays, probably because the clay was ground before it was made into test tiles to be fired and thin-sectioned. Small snail shells are visible macroscopically in unprocessed samples of the same Ladder Creek clays, however. They were also found in buried soils elsewhere along Ladder Creek, including at the nearby site 14SC112 to the south (Figure 1; Mandel 2007: Table 2).

Nonlocal materials are probably represented by the biotite granite, sandstone/sand, and ash/pumice/tuff groups. Sherds in the “biotite granite” group (Figure 2g) contained some biotite granite fragments with attached quartz and feldspar, and grains were angular rather than the rounded to subrounded grains seen in the “arkosic sand” groups. At least some of the biotite granite tempered ceramics may have been made on the High Plains, perhaps near the Front Range in Colorado or the Laramie Mountains in Wyoming (Trabert et al. 2015).

The sandstone/sand group (Figure 2e, f) may represent vessels manufactured in the vicinity of Pecos, as sandstone and siltstone outcrops around Pecos were used throughout the glaze ware sequence there (Shepard 1936:517). Sand and sandstone are present in over 90% of samples of Late Group Rio Grande Glaze Ware at Pecos and in roughly 10% of the samples from the Rio Arriba district around the modern Tewa pueblos as well (Shepard 1942).

Pastes in the “ash/pumice/tuff” group (Figure 2h) contain large quantities (around 50 percent of the matrix) of these inclusions and may also have up to three percent of quartz sand up to fine sand in size. These pastes are very fine in texture and contain much larger quantities of ash, pumice, or tuff than the occasional grains found in Ogallala formation sands. As noted earlier, they represent vessels manufactured in or around the Española Basin.

2.2 Slip and paste colors: oxidation analysis and other observations

The original slip and paste colors were recorded for all red-slipped sherds analyzed from 14SC1, 14SC304, and 14SC409. Beck conducted oxidation analysis on ten red-slipped body sherds (six “arkosic sand, coarse paste” sherds and four with sandstone/sand) from 14SC1, following previously described methods (Roper et al. 2010, Beck et al. 2012; see also Beck 2006). All original and oxidized colors are reported here in Munsell notations and color names from the

Year 2000 Revised Washable Edition of the Munsell Soil Color Charts. One additional term used here that is not used in the Munsell charts is “buff,” a label frequently applied by ceramic analysts to describe very light ceramic pastes and surfaces (Beck 2006; Beck et al. 2012). “Buff” colors, as defined in this study, had a Munsell value (lightness) of 7 or greater. This is a higher value than used in previous studies (Beck 2006; Beck et al. 2012), but better distinguishes unusually pale pastes from the bulk of Plains ceramic pastes, which frequently oxidize to colors with a value of 6 (Roper et al. 2010: Tables 4, 6).

2.3 Dismal River Gray Ware comparison

Local red-slipped ceramics might have similar pastes to other local ceramics, as originally suggested by Gunnerson in his unpublished notes on Ledbetter Red. We drew comparative data on paste color and mineral inclusions from a small sample of Dismal River Gray Ware (Baugh and Eddy 1987; Brunswig 1995), so named for its typical dark gray to brown color produced by firing in reduced conditions. Eight Dismal River Gray Ware body sherds were included in the broader petrographic and instrumental neutron activation analyses reported by Trabert (2015; Trabert et al. 2015) and analytically shown to be produced in our study area. Beck conducted oxidation analysis on all eight sherds, using the same methods as for the red-slipped unpainted sherds.

All eight of these sherds, as well as the other 12 Dismal River Gray Ware sherds analyzed only by petrography, fall into the “arkosic sand, coarse paste” group (see Hill’s report in Trabert 2015, Appendix B). Five of these sherds are grouped into Trabert’s (2015; Trabert et al. 2015) INAA Group 3, along with almost all of the analyzed Dismal River Gray Ware recovered from Kansas. Group 3 is assumed here to be local to the 14SC1 area, perhaps unlike

Group 2 (where Dismal River Gray Ware from Nebraska clusters) and Groups 1 and 5 (which contains micaceous ceramics from Dismal River sites in Kansas and Nebraska; Trabert 2015; Trabert et al. 2015).

2.4 Tewa red-slipped ceramics comparison

Beck visited the H. P. Mera room at the Museum of New Mexico to record slip color, paste color, and surface treatment on a sample of historical-period Tewa ceramics from the type collection. Although not all of these ceramics were recovered from Tewa communities, their presence in the type collection was taken as evidence that they were representative examples of Tewa ceramic types. The 24 sherds recorded in the type collection include Posuge Red [Tewa Red] and Tewa Polychrome from LA 38 (Cuyamungue) and Tewa Polychrome from LA 625 (Pecos Pueblo), LA 16, LA 34 (Cochiti Spring; Warren 1977), and LA 295 (Old Cochiti; Warren 1977). Some additional sherds of Tewa Polychrome were unlabeled. Two small vessels missing provenience information and labeled “Nambe Buff” (Tewa Buff; Wilson 2011) were also recorded.

Oxidation analysis was not possible with this comparative sample, so we have data only on the original slip and paste colors. In oxidation analysis of this sample and others, colors that were “buff” (with a value of 7 or greater) before oxidation analysis remained buff afterwards (see Beck 2006 for a discussion of color changes during oxidation analysis). We therefore assume that buff pastes observed on sherds in the H. P. Mera Collections would remain buff even after refiring.

3. Results and discussion

3.1 Tewa Red from the Tewa Basin: the H. P. Mera collections

As noted in previous type descriptions (e.g., Schaafsma 2002; Wilson 2010; Wilson 2011), Tewa potters emphasized bright red slips with high polish on Tewa Red vessels. Slips on Posuge Red [Tewa Red] vessel fragments in the H. P Mera collections appeared on both surfaces, only on the interior, or on the exterior with a smudged and polished interior. In all cases, the red slip on Tewa sherds had a polished, glossy appearance, with visible polishing striations.

As recorded by Beck for this sample, the original red slip color on Tewa Polychrome is usually red (10R 4/6, 10R 5/6), with a few cases of weak red (10R 5/4, 10R 4/4, 10R 4/3) and pale red (10R 6/4). In a few cases, slips vary from red to light brown (7.5YR 6/4) or light reddish brown (5YR 6/4) on the same sherd. Posuge Red [Tewa Red] slips are red (10R 5/6), weak red (10R 5/3, 10R 5/4), light red (10R 6/6) or reddish brown (5YR 4/3). The reddish brown color is unusual and associated with a smudged and polished vessel interior.

Tewa ceramic pastes are often “buff” in color, with Munsell values over 7. Original paste colors for Tewa Polychrome sherds in the H. P. Mera collections are mostly pink (5YR 7/4, 7.5YR 7/4) with some examples of reddish brown (5YR 5/4), light reddish brown (5YR 6/4), reddish yellow (5YR 6/6), and light brown (7.5YR 6/4) pastes. One sherd had a paste varying from pink to light reddish brown along with a carbon core. Almost all of the Tewa sherds analyzed had a carbon core, frequently a thick one. Posuge Red [Tewa Red] pastes were light reddish brown or pink, and the two Nambe Buff vessels had pink (7.5YR 7/4) pastes.

3.2 Paste composition and provenance at 14SC1, 14SC304, and 14SC409

Of the 148 red-slipped unpainted sherds from these three sites, only eight body sherds (all from 14SC1) might belong to vessels manufactured in the northern Rio Grande rather than the study area. Two body sherds of the eight contain ash/pumice/tuff temper. Both are extremely small, with missing interior surfaces and red-slipped exteriors.

Six body sherds—two of which were included in the petrographic analysis (samples SC-15 and SC-41; see Hill’s report in Trabert 2015, Appendix B)—have sandstone/sand temper. Four of the six have smudged and polished interiors with red-slipped exteriors, and two are slipped on both the interior and exterior. As noted earlier, at least some of these may originate in the Pecos area. One of the sherds slipped on both surfaces (SC-15; Figure 2f) had “Pecos Glaze” written on it in pencil, although no glaze paint or other decoration was visible on the surface. This sherd might have been assigned to the Pecos area by a previous analyst based on the sandstone inclusions. If this provenance is accurate, the sherd may represent a Plain Red (Shepard 1936:541-542) vessel rather than the Glaze E type Pecos Glaze Polychrome (AD 1515-1700; Wilson 2010:66). The average and maximum grain size observed in SC-15 compare well with grain size descriptions for both Pecos types (Shepard 1936:512, 541). The other sherd in this group to be analyzed petrographically (SC-41; Figure 2e) has markedly coarser paste containing poorly sorted sandstone, rather than the well sorted sandstone observed in SC-15, and may have a different provenance.

All of the remaining analyzed sherds (Tables 1-3)—five of which were included in the petrographic analysis—fall into the “arkosic sand, coarse paste” group, along with the locally produced Dismal River Gray Ware sherds. We consider these red-slipped, unpainted ceramics to

be local copies of Tewa Red as argued by Gunnerson, and refer to them throughout the rest of this paper as Ledbetter Red.

Arkosic sand is very widely available in the Plains, the northern Rio Grande region, and elsewhere, so arkosic sand alone is no guarantee of local production. Arkosic sand was used for temper in 80% of the Late Group of Rio Grande Glaze Ware samples at Picuris (Shepard 1942). Red-slipped ceramics similar to Tewa Red were also made near Albuquerque with sand temper (Wilson 2010:14), and Plain Red ceramics from Pecos may have only sand without siltstone inclusions (Shepard 1936). In Ledbetter Red ceramics, however, the arkosic sand is often accompanied by occasional particles of tuff and pumice, basalt, and caliche as observed in the Ogallala Formation sand samples. The size range of inclusions (up to coarse sand) is also consistent with the Dismal River Gray Ware sherds. Finally, the broken edges of five Ledbetter Red sherds from 14SC304 reveal snail shell similar to the snail shell observed in Ladder Creek clays. It is surprising that potters did not crush all of the snail shell when processing the clay, but its survival here provides a very good marker of local clay use.

3.3 Ledbetter Red slip color and surface treatment

Gunnerson's initial observations of Ledbetter Red from 14SC304 suggest that these locally made red-slipped ceramics should be much less well polished and have greater variation in slip color than Tewa Red from the H. P. Mera collections. This is true of many examples of Ledbetter Red (Figure 3), but Gunnerson's generalizations obscure important variation between sites.

Potters at the different sites had different levels of success in duplicating the red color of Tewa Red, with the closest and most consistent color match at 14SC409. The most common slip color at 14SC1 is reddish brown (Table 1). At 14SC304 the most common color is yellowish red,

but there are more cases of “red” slips than at 14SC1 (Table 2). Interior slips are usually red at 14SC409, with exterior slips tending toward browner and more variable colors (Table 3). Other variation between sites includes the presence of smudged and polished interiors only at 14SC1, and the use of a thin wash on vessel exteriors at 14SC304 and 14SC409 instead of a thicker slip (Table 4). Vessel surfaces are well polished at 14SC1. At 14SC304 and 14SC409, slips tend to be poorly polished to smoothed; even when the surface is glossy, there are often pronounced bumps beneath the polish.

Figure 3. Examples of Ledbetter Red sherds: (a) 14SC1 bowl interior (cat 8883); (b) 14SC1 bowl interior (cat 24297); (c) 14SC1 flat vessel base exterior (cat 12354); (d) 14SC304 bowl exterior (spec 315); (e) 14SC304 bowl interior (spec 316).

3.4 Oxidation analysis results: paste color, slip attributes, and firing conditions

The oxidation data are consistent with a local provenance for Ledbetter Red. The oxidized paste colors of the Ledbetter Red samples (Table 5) range from red to light red to “buff” colors, similar to the range observed in the oxidized Dismal River Gray Ware sample (Table 6): red, yellowish

red, and “buff” (reddish yellow, 7.5YR 7/6). In contrast, all of the samples with sandstone/sand inclusions had oxidized paste colors of red or light red. Although the pastes of Ledbetter Red and Dismal River Gray Ware ceramics oxidize to the same color range, there is a greater proportion of brown and black colors in Dismal River Gray Ware pastes prior to refiring. (Gray pastes are present on Ledbetter Red ceramics only alongside smudged and polished interiors.) This indicates that Ledbetter Red ceramics were fired in a more oxidizing atmosphere, which was important for developing the red color of the slip.

The buff paste colors, which are more common here than in an oxidized sample of Central Plains ceramics (Roper et al. 2010), overlap with the range of paste colors seen in Tewa ceramic pastes in the H. P. Mera Collection. Lest paste color be used as a marker for Tewa manufacture, it is important to recognize that buff paste colors are also possible with western Kansas clays fired in an oxidizing atmosphere. The only reliable guide to identifying ceramics from the Española Basin area is to identify the characteristic ash/pumice/tuff temper in the paste.

The oxidation analysis revealed that at 14SC1 the smudged interior surfaces had been slipped prior to smudging (e.g., cat 6742 in Tables 1, 5), as done for Tewa black polished types (Guthe 1925; Mera 1939). It also revealed that the differences in slip color between Ledbetter Red from 14SC1 and Tewa Red are due primarily to firing conditions rather than the qualities of the slip raw material. Refiring changes reddish brown and brown slips to red and weak red colors, which are much more consistent with the original (unrefired) colors of Tewa Red slips.

Twentieth-century Tewa potters ensured bright red slips during firing by keeping fuel away from vessels and removing vessels while hot; in contrast, black surfaces were produced by instead leaving the vessels in place and smothering the fire with manure (Guthe 1925; LeFree 1975). When firing red-slipped vessels, potters at Santa Clara in 1968 (LeFree 1975) used tin

cans, corrugated tin, and a metal grill to raise pots off the ground and to keep fuel from touching or falling on the pottery. This improvised kiln was then surrounded by bark slabs, either gathered cottonwood bark or obtained from a lumber mill. Once the fire died down, roughly 30 minutes after lighting it, potters removed hot vessels with a pole. Vessels went from brown to red as they cooled. The process was similar for polished black vessels at Santa Clara, except that cow dung was added as fuel to the bark and then the fire was smothered with fine manure once it reached maximum temperature. Vessels were then left in the kiln for another 30 minutes or longer.

Potters at San Ildefonso in 1921 apparently used dung for firing all types; they too removed red slipped and polychrome vessels while hot, but smothered the fire with manure for black polished vessels (Guthe 1925).

Dismal River potters probably used bison dung as fuel, which was plentiful where bison were hunted and may even have been traded by some Plains groups to Puebloan potters for vessel firing (Schroeder 1972; Snow 1982). Animal dung is also used widely for firing where domestic animals are present, including in the postcontact Pueblos after livestock was introduced (Shepard 1985). Dung is a good insulator of heat but burns quickly, more so than other fuels (Shepard 1985). Dismal River potters probably left vessels to cool where they were fired, rather than removing hot vessels, which would have oxidized carbon from the hot vessel surface in the open air.

In summary, different firing procedures must have been used to produce Ledbetter Red and Dismal River Gray Ware. Although potters at 14SC1 oxidized the surfaces of Ledbetter Red vessels, they did not successfully replicate bright red Tewa slips. This is due to incomplete oxidation of the slip, rather than the color of the slip material. Did these Ledbetter Red pots cool a little too much before being removed from the fire? If firing materials or conditions at the site

differed from those to which Puebloan potters were accustomed, they may have misjudged the rate of cooling and pulled vessels out too late. At any rate, these technical problems were solved at the later sites 14SC304 and 14SC409, where the red slips on Ledbetter Red ceramics are often more similar in color to those on Tewa Red ceramics.

3.5 Ledbetter Red vessel forms

The surface treatments on sherds with both surfaces visible indicate that all are bowls (see Table 4). Bowls are a common form for Tewa Red vessels, but rare in Dismal River sites outside the study area (Beck and Trabert 2014; Trabert 2015). Most of the 15 rim sherds in the sample are very small, providing little additional information on vessel form. Two rim sherds (Figure 4) and two base sherds (Figures 5-6) suggest that soup plates and direct rim bowls were present in the study area. Soup plates are a common form for red-slipped unpainted ceramics after Spanish colonization (Warren 1977).

Figure 4. Rim sherd profiles from (a) 14SC1 (SC-22, cat 24115; see also Figure 2c) and (b) 14SC409 (cat 46-3).

Very flat bases similar to the flat base at 14SC1 appear on “plain rimmed” Plain Red bowls from Pecos (Kidder 1936:Figure 247f, g). Heights of these examples are 88-98 percent of the vessel base diameter, and the orifice is 230 percent of the vessel base diameter in both cases. If the 14SC1 bowl (Figure 5), which had a 5 cm base diameter, had a similar direct rim vessel form, it might have been 4.4-4.9 cm tall with an orifice of 11.5 cm. Flat bases also appear on soup plates, such as this example from seventeenth-century contexts at the Palace of the Governors in Santa Fe (Figure 6; C. Dean Wilson, personal communication, 2015).

Figure 5. Vessel shape comparison between (a) and (a-b) Plain Red vessels from Pecos (redrawn from Kidder 1936:Figure 247f, g) and (c) base sherd from 14SC1 (cat 12354; see also Figure 3c).

Figure 6. Vessel shape comparison between (a) base sherd from 14SC409 (cat 90) and (b) soup plate from Palace of the Governors (C. Dean Wilson, personal communication, 2015).

4. Conclusion

The type Ledbetter Red represents red-slipped unpainted ceramics produced in western Kansas. Although these ceramics were made with locally available materials, including sand from the nearby Ogallala Formation, they differ technologically from local Dismal River Gray Ware, not only in the application of a red slip but also in the firing atmosphere and in the use of polishing and smudging. Ledbetter Red ceramics were well oxidized, unlike the reducing atmosphere used for firing Dismal River Gray Ware. Surfaces were polished with visible

polishing striations and bowl interiors were occasionally smudged, with surfaces slipped prior to smudging. These attributes are consistent with the type Tewa Red, produced by Tewa potters and imitators after A.D. 1600.

Potters in the Tewa Basin were better able to achieve a bright red slip than those in western Kansas, seemingly due to better control over firing conditions. Potters at the earliest site, 14SC1, had the most difficulty in replicating the bright red Tewa slip color. If these potters had recently moved here from the northern Rio Grande region, as argued by Beck and Trabert (2014), they may have been adjusting to local differences in firing materials or conditions. At the two later sites, 14SC304 and 14SC409, the Ledbetter Red slips are often a better match to Tewa Red slips. Other attributes also change through time, however; slips are thinner at the later two sites and the quality of polishing declines. In these respects, Ledbetter Red became less like Tewa Red over time.

We interpret the earliest site (14SC1) as the entry of Puebloan potters into our study area at least during the period AD 1650-1700 if not earlier. We can only identify them as coming from the northern Rio Grande area, as there are several possible communities of origin (Beck and Trabert 2014; Trabert 2015). The ceramics made by these potters after arriving in western Kansas include a local version of Tewa Red known as Ledbetter Red. Although they used local raw materials, they otherwise conformed to the conventions for Tewa Red, including slip thickness, polishing, and smudging. They clearly used a different vessel firing process than that used by local ancestral Apache potters, necessary for oxidizing the red slip. In this early period, however, the new arrivals still needed to learn the nuances of working with local fuel sources and firing conditions.

Ledbetter Red was made later at 14SC304 and 14SC409, possibly decades later by the descendants of the Puebloan women at 14SC1. These potters lived a primarily Athabaskan lifestyle, judging from the architecture and other material culture, and may represent the full integration of people of Puebloan origin into the local population. They successfully produced a bright red slip on Ledbetter Red, having apparently worked out any kinks in the firing process. Other “Puebloan” aspects of ceramic manufacture are deemphasized, however; interior smudging was abandoned, and polishing became more faint and careless. The potters who made Ledbetter Red at 14SC304 and 14SC409 were surrounded by potters working in a different ceramic tradition, and lacked the training or the inclination to maintain these earlier traits of Tewa Red. The highly visible red was still important, however, and may have been a significant marker of heritage and identity for those descended from the original Puebloan potters.

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Table 1. Ledbetter Red ceramics from 14SC1.

CAT NO	#	SIZE	Petro. sample no.	Exterior (original)	Exterior (original) color	Interior (original)	Interior (original) color	Surface
rim								
1130	1	1		10R 3/6	dark red	obscured by caliche	ND	slip int and ext
3518	1	1		5YR 5/4	reddish brown	5YR 4/6	yellowish red	slip int and ext
4607	1	1		10R 4/4	red	2.5YR 5/4	reddish brown	slip int and ext
7489	1	1		blackened with carbon	ND	7.5YR 4/4	brown	slip int only
24115	1	2	SC-22	ND	ND	ND	ND	slip int and ext
24769	1	1		5YR 4/4	reddish brown	7.5YR 4/3	brown	slip int and ext
body								
4597	1	1		slip 10R 4/4	weak red	slip 2.5YR 4/4	reddish brown	slip int and ext
4606	1	1		slip 10R 5/8 to 2.5YR 3/3	red	black polished	NA	int smudged and polished; slip ext
6742	1	1		slip 10R 5/4	weak red	dark brown polished	NA	int smudged and polished; slip ext
8883	1	2		unslipped	NA	slip 5YR 4/4	reddish brown	slip int only
9904	1	2		slip 5YR 5/6 to 10R 4/4	weak red	slip 5YR 5/3	reddish brown	slip int and ext
10182	2	1		slip 10YR 4/6	dark yellowish brown	not visible	ND	int not visible; slip ext
11273	1	1	SC-51	ND	ND	ND	ND	slip int and ext
12347	1	1		slip 2.5YR 4/4	reddish brown	slip 2.5YR 4/4	reddish brown	slip int and ext
12414	1	1		slip 2.5YR 4/6	red	slip 2.5YR 4/6	red	slip int and ext
12416	1	1		slip 2.5YR 5/4	reddish brown	slip 2.5YR 5/6	red	slip int and ext
13153	1	1		slip 2.5YR 4/4	reddish brown	slip 5YR 5/4	reddish brown	slip int and ext
13154	1	1		unslipped; simple stamped?	NA	slip 5YR 5/4	reddish brown	slip int only
21114	1	1		slip 10R 4/6	red	dark brown polished?	NA	int smudged and polished;

								slip ext
21259	1	2		unslipped	NA	slip 5YR 5/3	reddish brown	slip int only
23523	1	1		slip but too small	ND	not visible	ND	int absent; slip ext
24297	1	2		slip 7.5YR 5/2	brown	slip 5YR 5/4	reddish brown	slip int and ext
25399	1	1		slip 10R 4/4	weak red	slip 5YR 4/3	reddish brown	slip int and ext
25863	1	1		black polished	NA	slip 7.5YR 5/3	brown	slip int only
22773-4	1	1		slip 10R 5/4 to 2.5YR 4/4	weak red	brown to black polished	NA	int smudged and polished; slip ext
base								
12354	1	2		slip 2.5YR 4/3	reddish brown	slip 2.5YR 4/3	reddish brown	slip int and ext

Table 2. Ledbetter Red ceramics from 14SC304 (*snail shell fragment in paste).

CAT NO	#	SIZE	Petro. sample no.	Exterior (original)	Exterior (original) color	Interior (original)	Interior (original) color	
rim								slip int and ext
255	1	1		10R 4/6	red	10R 4/6	red	ND
266	1	1		too small		too small		slip int and ext
292*	1	1		5YR 4/3	reddish brown	5YR 5/6	yellowish red	slip int and ext
319	1	1		5YR 5/3	reddish brown	5YR 4/6	yellowish red	
body								int absent; ext slip
264	1	1		10R 4/6	red	surface gone		slip int and ext
264	2	1		10R 4/6	red	10R 4/6	red	slip int and ext
264	1	1		10R 5/4	weak red	10R 5/4	weak red	ND
264	3	1		too small		too small		slip int; thin wash ext
285*	2	1		7.5YR 6/4 to 2.5YR 4/6	light brown to red	5YR 5/6	yellowish red	ND
293	2	1		too small		too small		ND
293	2	1		too small		too small		slip int only
293	1	1		unslipped 7.5YR 5/3	brown	5YR 4/4	reddish brown	ND
294	1	1		damaged		damaged		int slip; ext absent
295	1	1		surface gone		10R 4/6	red	slip int; thin wash ext
299*	1	1		5YR 6/4	light reddish brown	10R 5/6	red	slip int only
299*	1	1		unslipped 7.5YR 6/4	light brown	10R 4/8	red	slip int only
300	3	1		unslipped 7.5YR 5/3	brown	2.5YR 4/4	reddish brown	slip int and ext
301	1	1		10R 4/6	red	10R 4/6	red	slip int; thin wash ext
314*	7	1		5YR 6/4	light reddish brown	5YR 5/6	yellowish red	slip int only
314	3	1		unslipped 7.5YR 6/4	light brown	5YR 5/6	yellowish red	slip int and ext
315	1	1		10R 4/4	weak red	5YR 5/8	yellowish red	slip int only
316	1	1		unslipped 7.5YR 6/4	light brown	10R 4/6	red	ND
331	1	1		unknown		unknown		slip int and ext

345	1	1		10R 4/6	red	2.5YR 5/6	red	slip int and ext
345	1	1		5YR 4/2	dark reddish gray	5YR 4/3	reddish brown	slip int only
345	1	1		unslipped 7.5YR 6/4	light brown	5YR 5/6	yellowish red	slip int only
345	1	1		unslipped fire cloud to 10YR 6/3	pale brown	2.5YR 5/6	red	slip int; thin wash ext
364	1	1		7.5YR 6/3 to 5YR 6/3		2.5YR 5/6	red	slip int only
364	1	1		unslipped 7.5YR 6/3	light brown	2.5YR 5/6	red	slip int; thin wash ext
367	1	1		10YR 6/2 to 10R 4/4	pale red to weak red	10R 4/6	red	ND
376	1	2	SC-27	ND		ND		

Table 3. Ledbetter Red ceramics from 14SC409.

CAT NO	#	SIZE	Petro. sample no.	Exterior (original)	Exterior (original) color	Interior (original)	Interior (original) color	Surface
rim								
409-6	1	1		10R 4/6	red	10R 4/6	red	slip int and ext
409-38-1	1	2		2.5YR 4/6	red	10R 4/8	red	slip int and ext
409-46-2	1	1		5YR 4/4	reddish brown	10R 4/8	red	slip int and ext
409-46-3	1	2		5YR 4/4	reddish brown	10R 4/8	red	slip int and ext
409-58	1	2		10R 4/8 to 5YR 5/6	red to yellowish red	10R 4/8	red	slip int and ext
body								
409-2	1	1		unslipped 7.5YR 6/3	light brown	10R 5/6	red	slip int only
409-4	1	1		5YR 6/4	light reddish brown	10R 4/6	red	slip int; thin wash ext
409-6	1	1		10R 4/4 to 2.5YR 5/4	weak red to reddish brown	10R 4/6	red	slip int and ext
409-6	1	1		10R 4/6	red	10R 4/6	red	slip int and ext
409-6	1	1		10R 4/6	red	10R 4/6	red	slip int and ext
409-6	1	2		10R 4/6 to 2.5YR 5/4	red to reddish brown	10R 4/4	weak red	slip int and ext
409-6	1	1		10R 4/8	red	10R 4/6	red	slip int and ext
409-10	1	1		? Not present		10R 4/6	red	slip int; ext absent
409-10	1	1		surface worn away; 7.5YR 6/4	light brown	10R 4/6	red	slip int; ext absent
409-18	2	1		10R 4/6	red	10R 4/6	red	slip int and ext
409-23	1	1		surface worn away; 5YR 6/6	reddish yellow	10R 4/6	red	slip int; ext absent
409-34	1	2		fire cloud to 2.5YR 5/6	fire cloud to red	10R 4/8	red	slip int and ext
409-37	1	1		5YR 5/6	yellowish red	10R 4/8	red	slip int and ext
409-39	1	1		2.5YR 4/6	red	10R 4/8	red	slip int and ext
409-40	1	1		5YR 5/6	yellowish red	10R 4/8	red	slip int and ext
409-41	1	1		10R 4/8	red	10R 4/8	red	slip int and ext
409-42	1	1		10R 4/8 to 10R 4/4	red to weak red	10R 4/8	red	slip int and ext
409-43	1	1		10R 5/6	red	10R 4/8	red	slip int

								and ext
409-44	1	1		10R 4/8 to 5YR 4/6	red to yellowish red	10R 4/8	red	slip int and ext
409-45	1	1		10R 5/4	weak red	10R 4/8	red	slip int and ext
409-45	1	1		5YR 4/4	reddish brown	10R 4/8	red	slip int and ext
409-46	10	1		10R 4/8 to 5YR 4/3	red to reddish brown	10R 4/8	red	slip int and ext
409-46	1	2		10R 4/8 to 5YR 5/6	red to yellowish red	10R 4/8	red	slip int and ext
409-46	1	1		5YR 4/3	reddish brown	10R 4/8 to 5YR 5/6	red to yellowish red	slip int and ext
409-46	1	2	SC-34	fire cloud	fire cloud	10R 4/8	red	slip int only
409-51	1	1		2.5YR 5/4	reddish brown	10R 5/6	red	slip int and ext
409-62	1	1		10R 4/6	red	10R 4/8	red	slip int; thin wash ext
409-62	1	1		10R 5/8	red	10R 4/8	red	slip int and ext
409-62	3	1		7.5YR 6/4 to 2.5YR 5/4	light brown to reddish brown	10R 4/6	red	slip int and ext
409-63	1	1		too small	too small	too small	too small	ND
409-65	1	1		7.5YR 6/4 to 10R 4/6	light brown to red	10R 4/6	red	slip int; thin wash ext
409-72	1	1		5YR 4/4	reddish brown	10R 4/8	red	slip int and ext
409-76	1	1		2.5YR 5/6	red	2.5YR 5/6	red	slip int and ext
409-78	2	1		10R 4/8	red	10R 4/8	red	slip int and ext
409-78	1	1		2.5YR 6/4	light reddish brown	10R 5/6	red	slip int and ext
409-84	2	1		10R 6/6	light red	10R 4/6	red	slip int and ext
409-90	1	1		10R 5/6	red	10R 4/6	red	slip int and ext
409-90	1	1		10R 5/6	red	10R 4/6	red	slip int and ext
409-94	1	1		5YR 6/4	light reddish brown	10R 4/6	red	slip int and ext
409-94	1	1		surface worn away; fire cloud to 7.5YR 6/4	fire cloud to light brown	10R 4/8	red	slip int; ext absent
409-98	3	1		surface worn away; fire cloud to 7.5YR 6/4	fire cloud to light brown	10R 4/6	red	slip int; ext absent
409-106	1	1		fire cloud	fire cloud	10R 4/6	red	slip int only
409-106	1	1		2.5YR 6/4	light reddish	10R 5/6	red	slip int

					brown			and ext
base								
409-90-1 to 6	1	3	SC-19 [90-5]	10R 5/6	red	10R 4/6	red	slip int and ext

Table 4. Slip placement and smudging on Ledbetter Red.

	14SC1	14SC304	14SC409
Slip int and ext	15 (63%)	10 (29%)	51 (89%)
Slip int and thin red wash ext	0	12 (35%)	3 (5%)
Slip int only (unslipped ext)	5 (21%)	12 (35%)	3 (5%)
Smudged and polished int and exterior slip	4 (17%)	0	0
Total sherds with both surfaces present and visible	24	34	57
Total Ledbetter Red sherds in collection	27	47	65

Table 5. Oxidation data for Ledbetter Red ceramics from 14SC1.

CAT NO	Exterior (oxidized)	Exterior (oxidized) color	Interior (oxidized)	Interior (oxidized) color	Paste (oxidized)	Paste (oxidized) color
6742	slip 10R 4/6	red	slip 2.5YR 5/6	red	2.5YR 6/8	light red
8883	unslipped 10R 5/6	red	10R 5/6	red	10R 5/8	red
9904	slip 10R 5/4	weak red	not visible on fragment	ND	10YR 7/4	very pale brown
13153	slip 10R 4/4	weak red	slip 10R 4/4	weak red	7.5YR 8/4	pink
21259	unslipped 2.5YR 4/6	red	slip 10R 4/6	red	10R 4/8	red
24297	slip 2.5YR 4/6	red	slip 2.5YR 4/6	red	2.5YR 4/8	red

Table 6. Oxidation data for Dismal River Gray Ware from 14SC1.

CAT NO	Petro. sample no.	INAA sample no.	INAA group	Paste (original)	Paste (original) color	Paste (oxidized)	Paste (oxidized) color
7621	SC-33	24	5	5YR 5/6	yellowish red	2.5YR 4/8	red
41965	SC-30	50	3	2.5Y 2.5/1	black	7.5YR 7/6	reddish yellow
43134	SC-13	52	2	7.5YR 3/1 to 7.5 6/6	very dark gray to reddish yellow	5YR 5/8	yellowish red
no cat #1	SC-5	7	1	7.5YR 4/4 to 7.5YR 2.5/1	brown to black	2.5YR 5/6	red
no cat #2	SC-6	8	3	5YR 6/6	reddish yellow	5YR 6/6	reddish yellow
no cat #3	SC-2	9	3	5YR 5/6 to GLE Y1 2.5/N	yellowish red to black	2.5YR 4/6	red
no cat #4	SC-3	10	3	7.5YR 6/4	light brown	5YR 6/6	yellowish red
no cat #6	SC-43	11	3	10YR 5/2 to 10YR 3/1	grayish brown to very dark gray	7.5YR 7/6	reddish yellow