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Author(s): Samuel V. Connell

Source: *Latin American Antiquity*, Vol. 13, No. 4 (Dec., 2002), pp. 401-417

Published by: [Society for American Archaeology](#)

Stable URL: <http://www.jstor.org/stable/972223>

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GETTING CLOSER TO THE SOURCE: USING ETHNOARCHAEOLOGY TO FIND ANCIENT POTTERY MAKING IN THE NACO VALLEY, HONDURAS

Samuel V. Connell

The problem of finding the locations of ceramic production has limited interpretations of prehispanic Mesoamerican economies. A new method for locating pottery-making is offered that emphasizes ties between the process of clay extraction and the manufacture of ceramic goods at the same clay source. Observations at modern brick and roof tile-making factories (tejas) in the Naco Valley, Honduras, show that an effective arrangement for intensive production of ceramic goods is to create the finished product at the clay source. The major topographic transformations caused by clay extraction at tejas, such as borrow pits and escarpments, are also signatures of prehistoric clay removal and, in many cases, can contribute to the identification of ancient pottery-making locations. A potential production locus was identified at the previously unremarkable and peripheral Site 108, where excavations successfully uncovered a prehistoric pottery workshop. By expanding the scope of our research methodologies, in this case actually implementing ethnoarchaeological understandings to the archaeological record, and by gathering more evidence for ancient pottery production, in this case at clay sources in rural areas, we are better positioned to understand the complexities of Mesoamerican economies.

Un modelo ampliamente reconocido plantea dos niveles distintos de las economías alfareras de Mesoamérica: la fabricación y distribución de artículos de lujo patrocinada por las élites y la producción doméstica e intercambio de vasijas de uso común. La dificultad de ubicar los sitios de producción ha restringido las posibilidades de someter este modelo a prueba. En reacción a ello ofrecemos un nuevo procedimiento para identificar la producción de cerámica, haciendo hincapie en el vínculo entre la extracción intensiva de arcilla aluvial y la fabricación de artículos cerámicos en el lugar mismo del yacimiento. El descubrimiento de un número mayor de sitios de producción en los confines de los grandes centros de población nos permitirá ampliar los modelos de economías alfareras. Observaciones en las actuales fábricas de ladrillos y tejas en el Valle de Naco en Honduras señalan la elaboración del producto acabado en el yacimiento de arcilla como un arreglo eficaz para la producción intensiva de artículos cerámicos. Las importantes alteraciones que la extracción de la arcilla ocasiona en la topografía de estos lugares sugiere un procedimiento idóneo para la identificación de antiguos sitios de producción. Algunos elementos del paisaje visibles en un recorrido de superficie, tales como fosos y escarpas de contornos irregulares, son huellas reveladoras de la extracción prehistórica de arcilla y, en muchos casos, pueden ser indicios de la antigua producción de cerámica. Con base en estas suposiciones, decidimos efectuar sondeos en un posible lugar de producción, identificado en un reconocimiento previo de las fuentes de arcilla de todo el valle. Excavaciones en el periférico sitio 108, previamente considerado insignificante, en un área del Valle de Naco conocido como el Rancho Manacal, revelaron un área de taller cerámico, ubicado encima de un montículo de barro de origen natural, con huellas de su extracción en tiempos prehistóricos. El artículo describe una serie de descubrimientos hechos en el sitio 108, entre otros las estructuras de un taller, un elemento para la cocción de la cerámica, abundantes tiestos, varios tipos de artefactos de litica pulida usados para tratar el barro, el desgrasante y los pigmentos, así como los frecuentes hallazgos de concreciones de los pigmentos. Ampliando la envergadura de nuestros procedimientos de investigación y arrojando más datos sobre la antigua producción de cerámica, en este caso en las fuentes de arcilla en áreas rurales, estamos en mejores condiciones de apreciar las complejidades de economías antiguas. El saber que la producción de cerámica se lleva a cabo en la fuente de la arcilla ofrece un 'contexto ideal' para comprender la antigua economía alfarera.

Awidely accepted two-tier model for Mesoamerican ceramic economies contrasts elite sponsored manufacturing and distribution of prestige goods (“palace schools”) with household-level production and exchange of utili-

tarian pottery (“village traditions”) (see Ball 1993:258). This model arose as explanations for the evolution of sociopolitical complexity came to incorporate ideas of political economy (Brumfiel and Earle 1987; Friedman and Rowlands 1978) and, as

Samuel V. Connell ■ Department of Anthropology, University of California, Los Angeles and Cotsen Institute of Archaeology at UCLA, CA 90095; currently at U.S. Army Central Identification Laboratory, Hawaii 96853

Latin American Antiquity, 13(4), 2002, pp. 401–417
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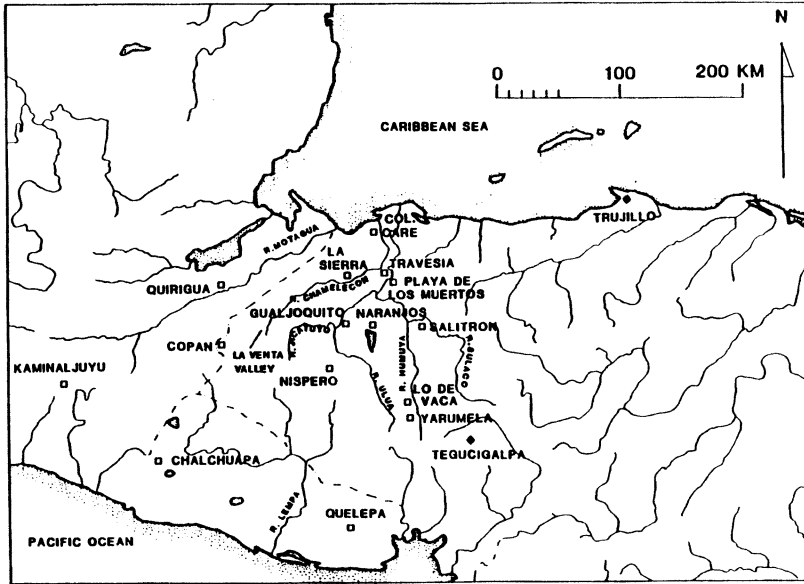


Figure 1. Southeastern Maya Periphery (Schortman and Urban 1994:8).

a result, craft specialization (Clark and Parry 1990; Costin 1991; Rice 1987:183–191; 1996; van der Leeuw 1977). In terms of the archaeological record, the two-tier model is based on rare discoveries of specialist production attached to major centers and a complete lack of evidence for intensive production found anywhere in their peripheries. Detailed ethnographies show that no residue of ceramic production activities at the household level would be found in the archaeological record (Arnold 1985; Deal 1998; Reina and Hill 1978; Thompson 1958). We should recognize, first and foremost, that an unsatisfactorily small database is being used to model and explain one of the most prevalent manufacturing activities in prehistory. All this negative evidence could be viewed another way. Perhaps archaeologists have not been looking in the right places. Our attention should move closer to the source.

I hope that by offering a new archaeological approach for finding ceramic production with more regularity, we can build better understandings of ancient Mesoamerican economies. As part of the Naco Valley Archaeological Project in northwestern Honduras, directed by Edward Schortman and Patricia Urban, I combined ethnoarchaeology and excavation to uncover evidence suggesting that ceramic production may have commonly taken place at or near clay sources.

Observations at modern ceramic brick and roof

tile-making factories (*tejas*) in the Naco Valley show that an effective arrangement for intensive production of ceramic goods is to create the finished product at the clay source. The major topographic transformations caused by clay extraction at these modern production sites present a useful marker for identifying ancient production locales. Certain features on the survey landscape, such as borrow pits and irregular escarpments, are key signatures of clay extraction in prehistory and, in many cases, may also be signatures of ancient pottery making. Assuming these features to be indicators of production, I tested a potential production locus identified during a valley-wide clay source survey. Excavations at the previously unremarkable peripheral Site 108, in an area of the Naco Valley known as Manacal Ranch, uncovered a prehistoric pottery workshop area. I conclude with a discussion of this research that explores the implications for discovery of ceramic production at hinterland sites on or near clay sources, especially with regard to a refined appreciation for the complexities of ancient economies.

Naco Valley Research Area

Archaeological research during the past two decades has brought attention to the Southeastern Maya Periphery (Figure 1) (Ashmore et al. 1987; Fash 1991; Fash and Sharer 1991; Henderson 1984; Hirth et al. 1989; Joyce 1991; Schortman et al. 1986, 2001;

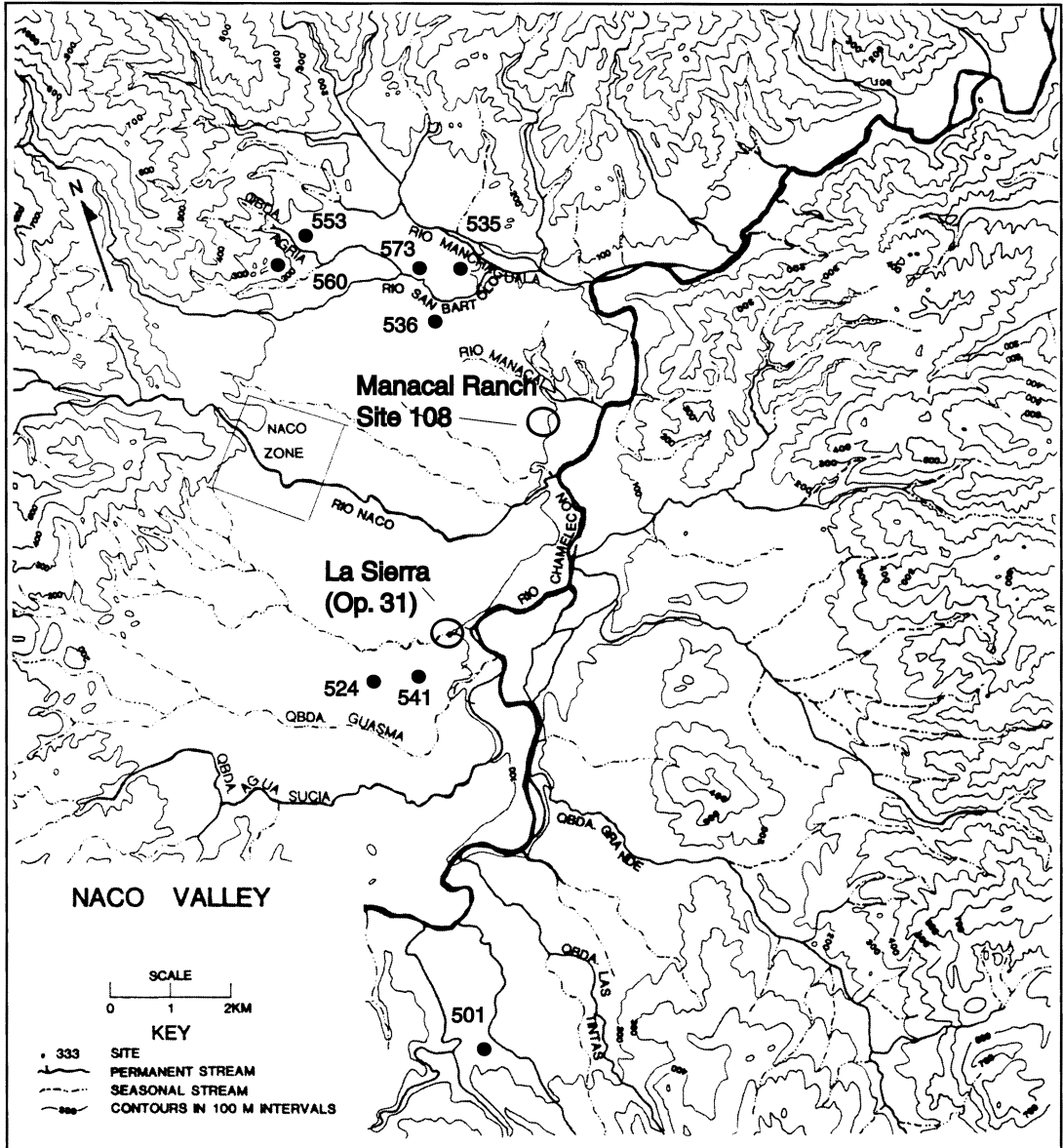


Figure 2. The Naco Valley with *tejas* and prehistoric sites labeled (La Sierra and Site 108 highlighted), as well as raw material sources mentioned in the text. Map adapted from Schortman and Urban et al. 1991b:22.

Schortman and Nakamura 1991; Schortman and Urban 1986, 1991a, 1991b, 1994; Sheets 1992). During the Late Classic period (A.D. 600–900) the Southeastern Maya Periphery is interpreted as an area of cultural transition between the Maya lowlands and upper Central America containing “basically Maya communities with strong ties to non-Maya Central America” (Henderson et al. 1979).

The Naco Valley in northwestern Honduras is a relatively small (96 km²) southwest-northeast trend-

ing valley in the heart of the Southeast Maya Periphery (Figure 2). Pine forests cover mountains rising 1,800 m above the valley floor. The Chamelecon River passes below the central site of La Sierra as it winds along the eastern edge of the valley flowing toward the Sula Plain and, eventually, the Caribbean. Although Strong, Kidder, and Paul performed a preliminary valley reconnaissance in 1936, no organized archaeological research had taken place in the Naco Valley until 1975, when John Henderson ini-

tiated the Naco Valley Archaeological Project (NVAP) (Henderson et al. 1979). Patricia Urban and Edward Schortman have been adding to this database since 1979. The work presented here benefits greatly from their complete survey of the valley floor, the clearing of almost 13,000 m² from a wide range of site types (Table 1), a fine-grained pottery typology, and a detailed geomorphological report (Anderson 1994; Schortman and Urban 1991a, 1991b, 1994; Urban 1986). Schortman and Urban (1994) use a “total polity analysis” to model the ancient Naco Valley political economy, focusing on the Late Classic primary center of La Sierra and its periphery. La Sierra has over 468 visible surface structures—ten times more than any other valley site (Schortman and Urban 1991b:2). La Sierra and its “near periphery” (an area within one km of the center) contain 36.9 percent of all recorded Late Classic Naco Valley structures.

Ceramic Production at La Sierra

On the northern margins of the city, roughly 100 m from the site core, Late Classic kiln remains were uncovered (Figure 3) (Schortman and Urban 1991b). Very high sherd densities (see Table 1—the Site or Group number is used as the excavation Operation number; Group 31 at La Sierra is also Operation 31 in the sequence of Naco Valley excavations) and *bajareque* (wattle and daub) fragments were recovered. The 6-m-diameter kiln contained two ventilation shafts and one large stoking hole. The curvature of the *bajareque* fragments suggests a domed superstructure supported by the circular cobble foundation. Schortman and Urban (1991a) also uncovered three other specialized firing locations in excavations near the kiln. Moreover, relatively recent work in the southern part of La Sierra has uncovered more evidence for ceramic production that was likely kiln-based (Operation 43) (Urban et al. 1997; Wells 1998). In conjunction, these excavations on the outskirts of La Sierra suggest various degrees of specialized ceramic production taking place synchronically (Carter 2000). Further excavations unearthed more craft production areas throughout La Sierra, ranging from obsidian blade and chert tool manufacture to marine shell ornaments and figurines. All these data support a proposed model of La Sierra’s sociopolitical and economic centralization (Schortman and Urban 1991b). In this sense, hinterland people are viewed primarily as consumers of goods and services

Table 1. Naco Valley Excavations.

Operation/ Site/Group	Location	M ² Cleared ^a	No. Sherds	Sherds/ M ²
11	La Sierra	225	26,405	117.36
12	La Sierra	224	16,580	74.02
13	La Sierra	35	7,942	226.91
14	La Sierra	55	2,063	37.51
15	La Sierra	38	6,000	157.89
17	La Sierra	25	1,808	72.32
19	La Sierra	270	24,689	91.44
26	La Sierra	44	747	16.98
27	La Sierra	34	1,151	33.85
31	La Sierra	500	46,438	92.88
32	La Sierra	85	8,031	94.48
33	La Sierra	212	8,214	38.75
36	La Sierra	150	8,951	59.67
37	La Sierra	97	1,415	14.59
38	La Sierra	194	6,395	32.96
39	La Sierra	150	6,253	41.69
79	near periphery	320	6,672	20.85
81	near periphery	255	8,321	32.63
84	periphery	150	6,594	43.96
92	periphery	200	7,810	39.05
96	periphery	180	8,180	45.44
101	periphery	310	7,983	25.75
106	periphery	34	1,214	35.71
108	periphery	52	7,604	146.23
112	periphery	12	1,398	116.50
120	periphery	150	6,436	42.91
168	periphery	60	3,725	62.08
183	periphery	77	2,123	27.57
261	periphery	43	1,369	31.84
262	periphery	212	5,593	26.38
306	periphery	400	13,355	33.39
335	periphery	115	3,414	29.69
337	periphery	120	1,946	16.22
386, Grp 3	periphery	67	269	4.01
386, Grp. 1	periphery	116	1,856	16.00
386, Grp. 2	periphery	122	1,861	15.25
386, Grp. 4	periphery	215	9,598	44.64
391, Grp. 2	periphery	120	1,775	14.79
391, Grp. 3	periphery	130	1,595	12.27
418	periphery	71	1,959	27.59
423, Centl. Grp.	periphery	240	9,539	39.75
423, NE Grp.	periphery	34	217	6.38
423, SW Grp.	periphery	250	22,851	91.40
426	periphery	300	15,250	50.83
428	periphery	65	4,275	65.77
	Averages	150.18	7,508	49.70

^am² calculations were not available for some 1979 excavations.

Note: All sites with less than 25m² of excavation were ignored (except for Site 112).

produced by the “capital.”

The major impetus to the research detailed herein was not only the discovery of the kiln, but also the complete lack of evidence for ceramic production in

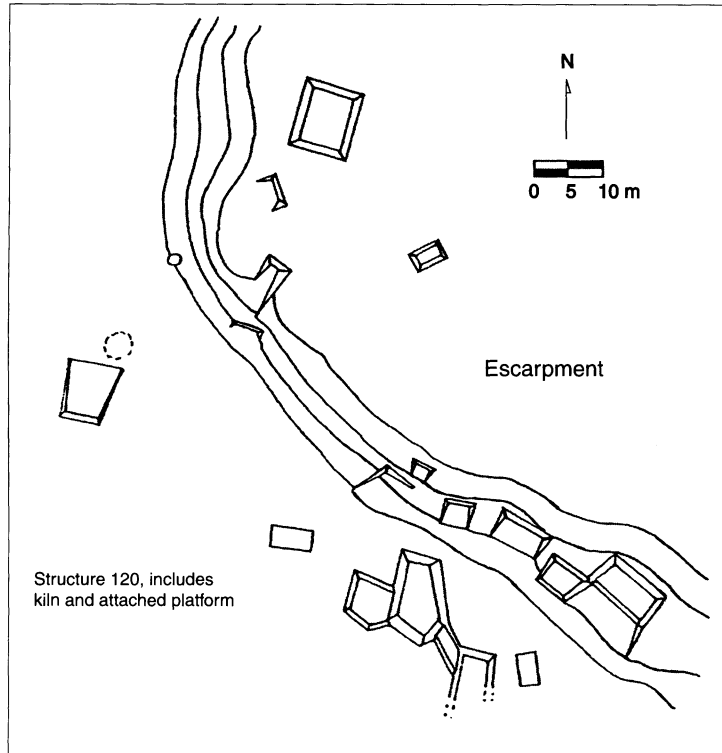


Figure 3. Survey map of La Sierra North Cluster prior to excavations.

the rest of the valley. Although the NVAP found some signs of other types of household production, no hinterland ceramic production evidence was recorded. Once again the two-tier model for organization of ceramic production appeared to be indirectly supported by a lack of evidence. However, as part of a continuing effort to better understand the ceramic economy and expand the research scope, I was enlisted by Edward Schortman and Patricia Urban to undertake a clay source survey of the Naco Valley. Samples were to be collected for comparative chemical analysis in order to trace the extent of the La Sierra-centered production and distribution network. The idea was that when clay sources were identified, we could determine which pottery types and what percentages of them were produced at La Sierra, and also begin to identify other possible sources.

Clay Sources and Tejeras

The clay source survey was designed to systematically sample the valley using both local informants and a detailed understanding of valley geomorphology. Our survey identified and collected samples

from 56 clay deposits throughout the 96 km² valley. The survey crew initially used local informants (traditional potters) to locate clay sources, but expanded coverage to areas beyond known resources to locate previously unreported clay sites.

Both residual and alluvial clays are quite common in the Naco Valley. Residual clays are found eroding out of deposits in the foothills on either side of the valley. The morphology of the valley floor is dominated by fluvial fans whose deposits interfinger laterally with alluvial deposits from major perennial and seasonal tributaries (Anderson 1994). Alluvial clays are laid down in strata of fine-grained brownish-gray montmorillonitic deposits. Often, as is the case with the clay sources here, fine-grained alluvial clays form in stranded oxbow lakes that deposit sediments slowly over time (see Figure 4).

Many of the sources most highly regarded by local informants are alluvial clays currently being extracted at *tejeras*, which are modern ceramic brick and tile making facilities. *Tejeras* are found everywhere in Latin America. Fired clay bricks and ceramic roof tiles are prominent construction items in many cities and towns throughout the region. In



Figure 4. Northeast corner of the Naco Valley showing Manacal Ranch Site 108 along the edge of an old oxbow of the Chamelecon River. Aerial photo acquired from Kirk Anderson in 1994.

the Naco Valley, six *tejeras* were documented (#524, 535, 536, 541, 553, 573). Each *tejera* was given a number in the NVAP site/operation sequence and then located on a 1:50,000 scale topographic map (Figure 2). Two of them were still functioning (#524 [Figure 5], #541) while the remaining four were in various stages of abandonment.

The prominent features at *tejeras* are kilns, work areas, wood piles, and the homes of the workers and their families (Figure 5). *Tejeras* are also dominated by large subtractive features that are created by extracting clay from alluvial strata. As clay is removed extensive borrow pits and escarpments slowly expand to the limits of available space. These

large, moonscape-looking features would be the most visible trace of prehistoric production activity when it took place at the clay source (Figure 6).

The owners and foreman of the functioning and recently closed *tejeras* were polled about business practices, output, number of employees, seasonality of production, buyers, history of operations, quality of clay, and the latter's relationship to manufacturing requirements. All the *tejeras* were located at the clay source except one (#536), which went out of business because of the high transportation costs of trucking clay 40 km from a source outside the valley. Informants also claim that the other three abandoned *tejeras* shut down because of poor clay quality

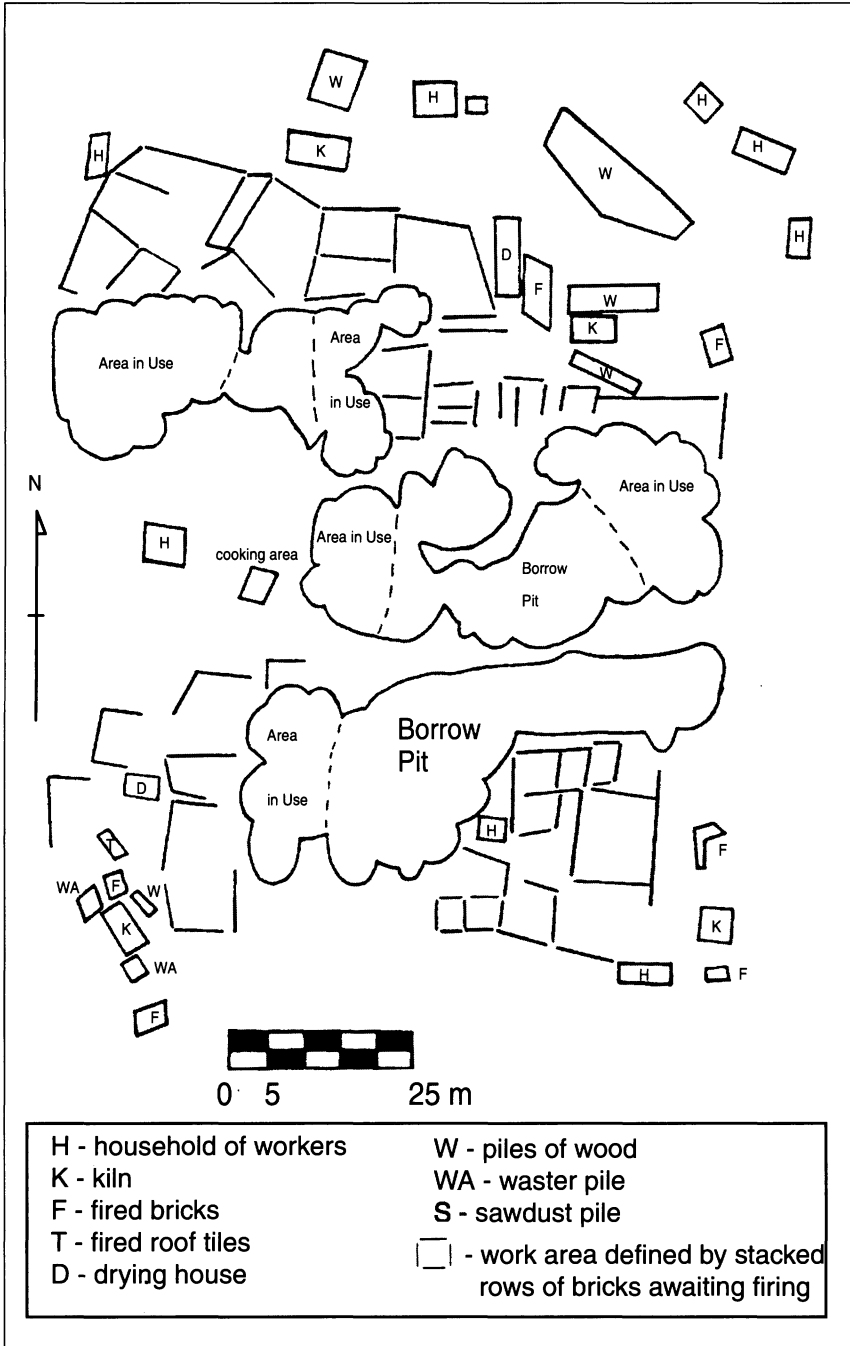


Figure 5. *Tejera* #524.

and depleted levels of clay (#535, 534, 553). The survival of *tejeras* #524 and #541 attests to the integral relationship between ceramic production and the high quantity and quality of clays. *Tejera* #541 began 25 years ago, and the larger *tejera* #524 started five years ago. The owner of *tejera* #524 estimates that

350,000 ceramic blocks can be produced during peak years. The blocks measure .27 m x .14 m x .05 m; approximately 661.5 m³ of clay is mined annually. For the aforementioned *tejera* #524, this translates to, at the minimum, approximately a 15-x-20-m area excavated per annum. At *tejera* #524, although the



Figure 6. *Tejera* #524 with borrow pit in foreground, and kiln with workspace and drying blocks in background.

excavation of clay is beginning to encroach on the kilns and workers' homes (Figure 5), the amount of alluvial clay available will sustain production for many years to come.

Middle-range Theory: A Particularistic Identification from Tejeras

As the keystone of middle-range theory, ethnoarchaeology has been used to interpret ancient behavioral dynamics by linking the "static" worlds of ethnographic and prehistoric material remains (Binford 1967; Hill 1968). Yet problems have arisen, primarily because direct historical ties are often needed to make convincing interpretations (Raab and Goodyear 1984). Nevertheless, with ceramic ethnoarchaeology the need exists to move beyond cautionary tales (D. Arnold 1991). More practical, and less theoretically charged, "particularistic identifications" can be made about behaviors associated directly with material objects (Thompson 1991) or site-formation processes (Kent 1984:42; Raab and Goodyear 1984). Specifically, I am interested in "ethnospatial" identifications that dependably link ethnographic realities to the spatial patterning of material remains (Kent 1984, 1987; Santley and Kneebone 1993)

Although examples of modern-day intensive ceramic manufacturing exist on a larger and more

complex scale than that pursued by traditional potters, *tejera* manufacturing sites are important links to the past because they provide examples of the spatial organization of extraction and production activities taking place at clay sources. Near the end of his book, Philip Arnold wonders about ethnoarchaeological studies of brick-making factories or *tejeras*. He writes:

I once mentioned to a colleague my desire to contrast the domestic pottery-making data . . . with a larger-scale, more standardized example of production. Brick manufacture is also conducted in the Tuxtlas, and I felt (and continue to believe) that such an industry would supply an excellent organizational counterpoint to the part-time potters. My colleague's response, however, was on the order of "Why are you interested in brick-making? The prehistoric potters in the Tuxtlas weren't making bricks, were they?" This statement implies that contemporary brick makers do not provide a relevant analog to ceramic producers in the past [P. Arnold 1991:157].

Although one might question the relevance of Arnold's statement and therefore the usefulness of this type of analogy (as his colleague does), my assumption is that because technological and labor requirements for clay extraction would be unchanged by time, the tie observed between clay resources and borrow pits found at *tejeras* should prove to be the

same signature pattern for ancient pottery production at clay sources.

Prehistoric Clay Extraction

Armed with the particularistic identification of clay extraction at production sites, I returned to La Sierra to test whether a known case of intensive prehistoric production would leave similar marks on the landscape. First, I reexamined the layout of La Sierra with regard to possible clay resources in the area and found the North Cluster kiln to be located on an alluvial clay stratum (Figure 3). A soil profile of the nearby escarpment face exposed a 2-m-thick stratum of greasy, very fine-grained, gray-brown, alluvial montmorillonite clay. Next, large shallow subsurface depressions were identified to the west and southwest of the kiln location. These appeared to be borrow pits slowly filled in over time. Once we knew what to look for, it became apparent that the previously identified production area along the south edge of La Sierra (Operation 43) was also in the midst of three borrow pits. In addition, the escarpment located alongside the La Sierra kiln at Structure 120 appears to have been shaved back in antiquity, creating irregularities in its form (Figure 3). Schortman and Urban's (1991a) excavations identified cobble steps built into the escarpment that would have made it easier to go up and down an otherwise dangerous and slippery clay slope. At modern *tejeras* a ladder is often used to climb in and out of borrow pits (see Figure 6 on the far right).

Besides being located at the clay source and exhibiting evidence for clay extraction, the spatial arrangement of features at the La Sierra kiln site correlates with those seen at modern *tejeras*. Schortman and Urban's (1991a) excavations uncovered evidence for staging areas and storage facilities similar to *tejera* #524 (Figure 5). At Structure 120 the long bodega-like structure attached to the kiln was probably used for the storing and drying of wood and products that awaited firing (Schortman and Urban 1991a). One of the kiln's two proposed air channels probably ventilated the drying/storage facility. In addition, there are a series of low mounds located alongside and below the escarpment that, based on comparisons to *tejeras*, may have served as ancillary workshops for pottery manufacture (Figure 3).

In sum, the pattern of carved alluvial clay strata resulting in irregular escarpments at the edge of river terraces, and excavated borrow pits on top of terraces,

is readily apparent on the survey landscape and is directly associated with intensive production at La Sierra. Not unexpectedly, this same pattern was also identified at old *tejeras* in various stages of abandonment. The ties between the archaeological record and modern *tejeras* suggest a signature pattern linking the extraction of clays and the close proximity of ceramic production activity areas.

Although I had tied ceramic production to the clay source in both a prehistoric and modern example, there remained one more critical step—the implementation of our ethnoarchaeological understandings to the archaeological record in a situation where we had not already identified ceramic production. I wanted to know whether this signature pattern could be used as a predictive method for discovering pottery-making in otherwise unremarkable places. The next step was to isolate other potential production sites on the basis of topographic features related to extraction and test for prehistoric ceramic production. If successful, this would verify a new and useful method for identifying potential prehistoric production not only in the Naco Valley, but also in Mesoamerica and worldwide.

Testing the Method: Investigations at Manacal Ranch Site 108

Prudence Rice (1987:180) wrote that “the ideal situation in investigating the structure of ancient pottery production is, of course, to know the source of the clay used as well as the location (by workshop materials, wasters, and/or kilns) of the pottery making.” Taken one step further, the especially “ideal situation” for understanding ancient pottery production as a whole, including the potentially substantial contributions of locations peripheral to centers and most households, is to know that pottery-making is likely taking place at the source of clay.

Manacal Ranch Site 108 lies in the northern part of the Naco Valley on the west side of the Chamelecon River (Figures 2 and 4). Originally surveyed by Strong, Kidder, and Paul in 1936, the site has since been largely destroyed by agribusiness and ranching. Perched just above the Chamelecon's second terrace, which was the Classic period floodplain (Anderson 1994:102–3), Site 108 sits in a rather unimposing pasture in the southeast corner of Manacal Ranch. Site 108 contains two 1-m-high mounds on the edge of the terrace and an earthen hummock 100 m to the east of the mounds (Figure 7). The

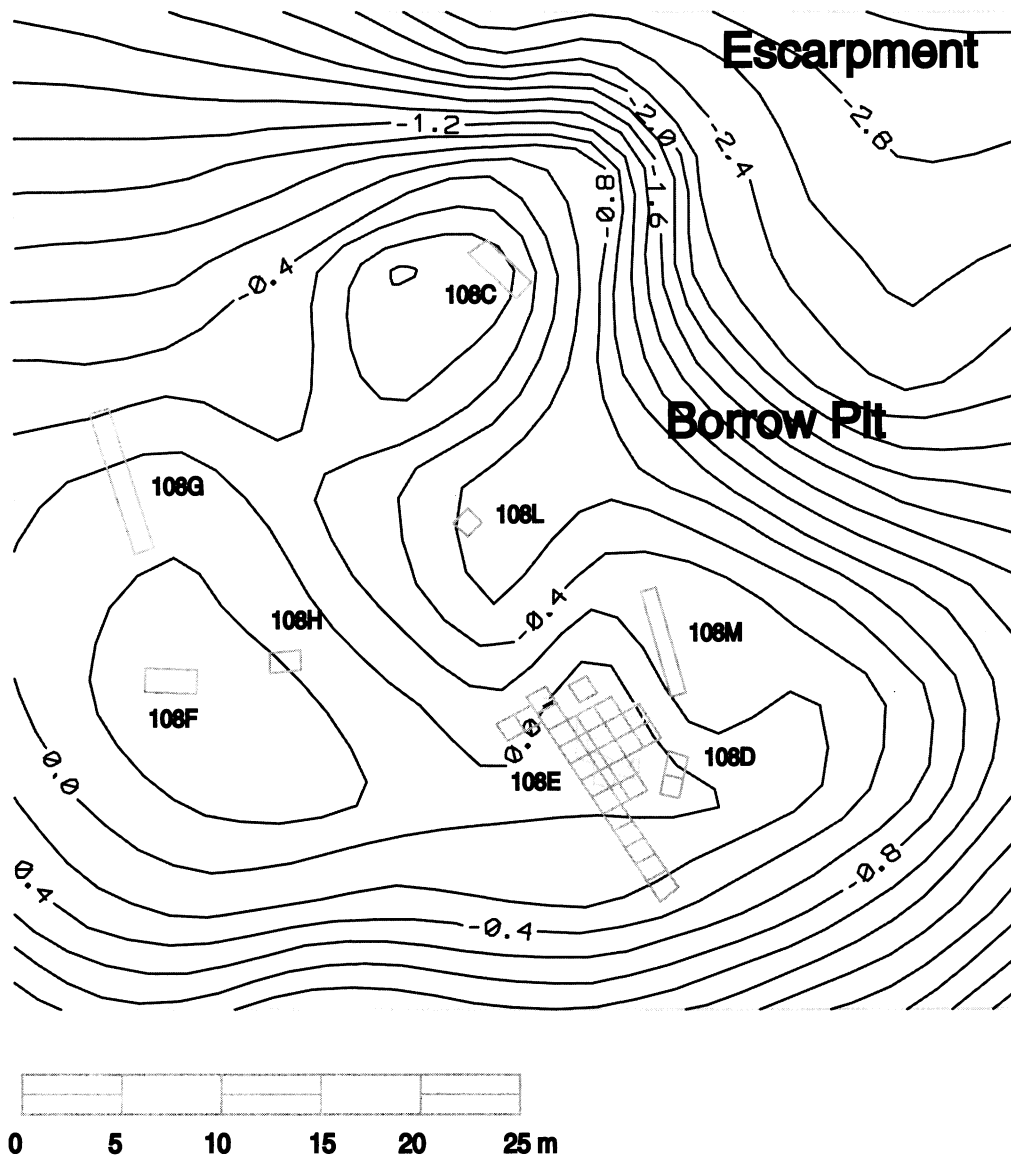


Figure 7. Manacal Ranch Site 108's raised natural earthen feature with excavations.

raised natural earthen feature is made up entirely of clay exposed through a head-cutting erosion process that shaves back blocks of earth in the same fashion that a waterfall retreats. At Manacal Ranch, much of the surrounding landmass was carried away, leaving a resistant topographic high and an easy target for clay removal.

Significantly, the 2-m-high northeast escarpment today yields one of the Naco Valley's most highly recommended clays. Multiple informants interviewed during the clay source survey separately iden-

tified Site 108 clay, each praising its quality as well as its ease of accessibility. It is an example of very fine-grained alluvial clay likely formed by an ancient stranded oxbow lake. In a remarkable case of ecological uniformitarianism, an active oxbow lake lies just below the second terrace of the river (see Figure 4). This characteristic of alluvial clay formation is important to keep in mind when searching for areas where there may have been ancient pottery production. As noted for the *tejas*, the lateral breadth of alluvial clay strata provides the opportu-

nity for clay mining to occur over a long period of time, thus modifying the natural topography through the formation of irregular borrow pits.

At Site 108's topographic high, two critical features were interpreted as potential evidence of prehistoric clay removal: (1) the 2-m-high escarpment on the northeast side of the hummock where potters are currently extracting clay, and (2) an apparently prehistoric 25-m-diameter borrow pit in the center of the clay eminence. The pit is not a recent intrusion. Comparisons of test units, including a 1-x-1-m test unit placed in the middle of the borrow pit (108L, Figure 7), show that the thickness of overburden is uniform throughout the site. Of equal importance is the fact that virtually no sherds were recovered in this center unit, while the units surrounding the pit recorded some of the highest densities in the valley (see below).

If the ethnoarchaeological pattern holds true, evidence for pottery production should be found directly associated with intensive removal of alluvial clays. Excavations conducted at Site 108 concentrated on the hummock. Circumscribing the borrow pit, seven operations were placed on top of or adjacent to surface irregularities that were potentially indicative of ceramic production activity (Figure 7). These archaeological investigations recovered four separate lines of evidence for prehistoric ceramic production: (1) associated features of ceramic production, such as a workshop structure and a firing feature; (2) associated debris from production, such as high sherd densities and wasters; (3) associated tools of production, such as groundstone, smoothing stones, and molds; and (4) associated raw materials of production, such as pigment stones. The following sections cover the data on each of these classes of evidence in detail.

Architectural Features

A small Classic period structure was discovered on the southern edge of the borrow pit (Figure 7—108E). Nothing was visible on the ground surface except for a few river cobbles. Most of the 52 m² cleared at Site 108 was excavated on and around this subsurface structure (32 m² or 62 percent). It is defined by a low stone foundation with one course of basal cobbles that probably supported a *bajareque* superstructure (Figure 8). The building measures 4 m north-south by 3.5 m east-west, its foundations .5–.7 m wide and sitting on top of the pure clay stratum, approximately 30–40 cm below ground surface.

Much of the evidence indicates that this is a “special structure” of the type referred to by Stark (1985:164) in her discussion of nonelite-level ceramic production in ancient Mesoamerica. These structures also resemble the workshops and storage sheds found at the modern *tejas*. The structure is small relative to the typical size-range of household structures uncovered in the Naco Valley, though not significantly. There are three distinctive features setting this building apart from most households suggesting, instead, that it is part of a workshop. First, the doorway would be exceptionally large for a household entrance in Mesoamerica. The enclosed tamped earthen floor space, measuring ca. 2-x-2.5-m, was entered through a door measuring 1.6-m wide (Figure 8). The entranceway is significantly wider than those uncovered in NVAP household excavations and doors of traditional *bajareque* households in the area (Edward Schortman, personal communication 1993; Schortman and Urban 1994:83–87). Not surprisingly, the work sheds at local *tejas* have comparatively similar extra-wide doorways (unfortunately no measurements were taken). We may infer that this architectural attribute is indicative of extra-household activities. A larger doorway would ease passage over the threshold with bulky or fragile loads, such as pottery vessels, as well as permit breezes that dry vessels during periods of the year when they cannot dry outside.

The second distinctive feature associated with the structure is a shallow cobble platform located in the northwest corner (Figure 8). The platform, or bench, was probably used as a work station or storage area. I observed that Naco Valley *alfareras* (traditional potters) set aside jars on shelves or corner tables during the production process (see also Castegnaro de Folletti 1989).

Third, and lastly, a few meters to the north of the structure a “firing feature” was found on the edge of the borrow pit (Figure 8). The small .6-x-.5-m feature consisted of a few aligned stones and an area of friable reddish-brown burnt earth that lipped up on the sides of the stones facing away from the borrow pit. Firing of pottery at contemporary *alfarera* households in the Naco Valley and elsewhere in Mesoamerica traditionally takes place outdoors and cobbles can be used as props, or stabilizers, during the firing process. Although Site 108 was far from completely tested, and we very definitely could have missed a kiln feature, I suspect that manufacturers at the site

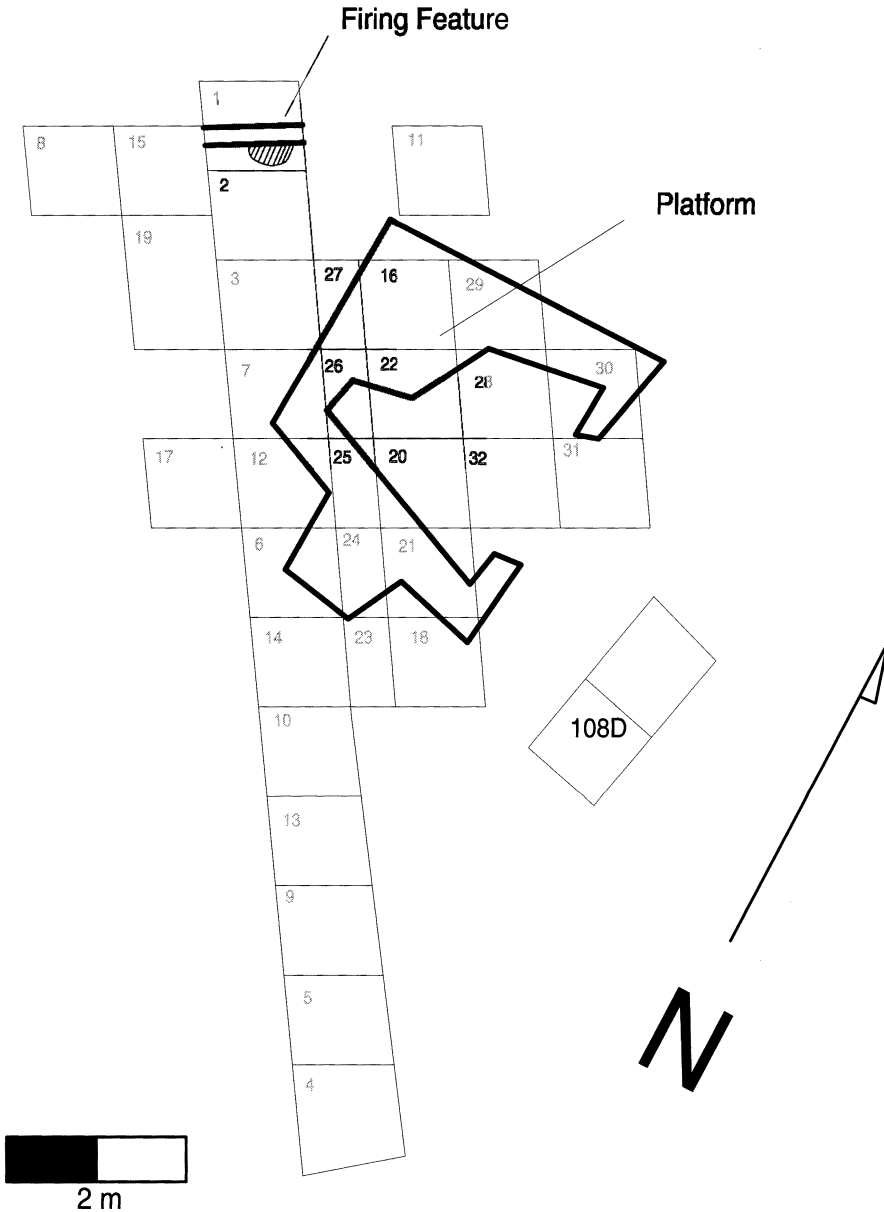


Figure 8. "Special structure" excavation units and architecture (Operation 108E).

used open-air bonfires. Large amounts of pottery can be fired in open-air bonfires (Rice 1987:153–158).

Associated Debris

The artifacts found at Site 108 demonstrate ceramic production both indirectly and directly. Comparatively high sherd densities make for good indirect evidence of ceramic production if it is assumed (and ethnographic observations corroborate) that at pro-

duction loci there will be pottery-breaking during various stages of production (Feinman 1985). In the Naco Valley calculation of sherds per square meter for horizontal excavations is the most feasible and effective measure for making valley-wide comparisons. This is true for three reasons. First, the bulk of activity at all sites in the valley, including Site 108, took place primarily during a single Late Classic occupation phase. Second, most sites in the Naco Val-

ley were excavated to similar average depths. Manacal Ranch's Site 108 is a representative example. All cultural material is found within the upper clay loam stratum or humus horizon, which abruptly changes to sterile montmorillonitic clay 30–40 cm below ground surface. Last, in most cases cattle ranching and plowing effectively erased any possibility for an analysis of vertical relationships within assemblages.

Site 108 has the highest sherd density per m² in the Naco Valley periphery (Table 1). The aggregate sherd density of all excavations at Site 108 is 146.23 sherds per m², which is almost three times the mean for all valley sites (49.70 sherds per m²) and more than four times the mean for the periphery sites (38.54 sherds per m²). In addition, the mean density of sherds specifically associated with the special structure or workshop (Suboperation 108E) is 281.56 sherds per m², more than seven times the periphery's mean (Table 2). This value is incredibly high considering sterile clay was no more than 40 cm below ground surface. The only comparable numbers in the Naco Valley are in deposits associated with the La Sierra kiln (Group 31, 354–488 sherds/m²). At Site 108 the highest sherd densities are found in the units inside (20, 21, 31) and behind (3, 10, 11, 16) the special structure (see Table 2 and Figure 8). In fact, some of the 1-x-1-m units inside the special structure contained more than 700 sherds.

Direct artifactual evidence of ceramic production in the form of wasters was also found at Site 108. The presence of wasters as by-products of ceramic production has come under some discussion. Scholars have shown that early open-air Mesoamerican firing techniques may not have reached the temperatures needed to cause distortions and that wasters, if they are created, need not show these characteristics (Stark 1985; Winter and Payne 1976). Nevertheless, several wasters were identified on the basis of distinctive bubbling.

Tools

Ceramic production can also be directly inferred from associated tools of the manufacturing process. Although most tools of the trade are biodegradable, three relevant tool types were found: figurine molds, smoothing stones, and groundstone. Molds are a commonly known indicator of ceramic production (Schortman and Urban 1994; Stark 1985), but smoothing stones are easily misidentified and dis-

Table 2. Sherd Distributions at "Special Structure" (108E).

Unit No.	No. sherds/ excavation lot	Total No. sherds/unit
1	177	
	28	205
2	68	68
3	370	
	91	461
4	159	159
5	224	
	117	341
6	131	
	82	213
7	205	
	81	286
8	114	114
9	341	
	133	474
10	216	
	206	422
11	259	
	173	432
12	129	129
13	195	
	191	386
14	44	
	115	159
15	150	150
16	191	
	239	430
17	122	
	199	321
18	95	
	104	199
19	295	295
20	119	
	212	
	422	753
21	411	
	119	
	186	716
23	158	158
24	81	81
25	57	57
26	209	209
27	71	71
28	75	75
29	334	334
30	340	340
31	339	339
32	186	186
34	166	166
35	281	281
Total		9,010

carded (Deal 1987). Several of these small, highly polished stones, likely used for burnishing clay surfaces, were recovered.

Grinding stones discarded for food preparation are reused in temper, clay, and pigment preparation, and therefore turn up in higher frequencies at potter's households (Deal 1987:117). At Site 108's special structure a high percentage of groundstone fragments was recovered (.281 per m²), a value more than twice that of Naco Valley households (.112 per m²). Potters grind up red hematite ore to make slips and paints, leaving behind a greater diversity of groundstone. Rough, heavy grinding expands vesicle sizes in basalt groundstone and finer grinding smoothes out surfaces (Deal 1987). At Site 108 there are thin, highly smoothed manos with oblong profiles that appear to have been used for fine-grained crushing, likely for powdering pigment stones. There are also odd pestle-like forms that might have been used for crushing larger chunks of stone or clay. These crusher pestles are likely associated with large three-footed metate fragments whose basins contain vesicles ranging in size up to .5 cm in diameter. Remarkably, unmistakable red pigment residue was found in the vesicles of some of these metate fragments.

Raw Materials

Last, associated raw materials of production were found at Site 108. This includes the most obvious and important raw material, the clay resource upon which the site sits. Site 108 was the longest-lived site in the Naco Valley with activity from the Preclassic through the Early Postclassic (200 B.C.–A.D. 1000). Although evidence of occupation outside of the Late Classic period is significantly less prominent, this protracted use of the clay suggests its enduring appeal and value as a resource.

Other raw materials possibly used in the production process are hematite ore and colored chalk, both of which were found in heavy concentrations. Out of a total of 53 excavation lots (collection units) in and around the special workshop structure, 23 (44 percent) contained pigment stones. Some stones showed signs of being ground down, probably from temper and paint preparation. The highest densities of pigment stones were located inside the structure, both on the platform and in the southeast corner, where storage of production materials likely took place (Figure 8, Units 16, 20, 21).

The unmistakable deep reds of hematite pigment stones are the most common ingredient of red/orange slips and paints. Many of the ceramic type-varieties

found at Site 108 use different strengths of this reddish pigment as part of the slip or painted designs. The only source for hematite ore in the region is 6 km to the northwest (#560, see Figure 2). In addition, deposits of multicolored chalk (#501) are located along the east side of the Chamelecon River on the southern edge of the valley. These colors range from deep purples to light pinks. Distances to slip and paint resources are relatively close, considering that ethnographically potters have been observed to travel great distances for these resources (Arnold 1985:47–56).

Discussion

This paper has focused on the overlooked process of clay extraction as not only an important variable in the pottery manufacturing process, but also as a key variable that can help us identify an important kind of production location. With the knowledge that clay resources may be tied directly to ceramic production, surface surveys can be designed to seek onsite transformations brought about by intensive clay removal (borrow pits and escarpments), particularly in areas where alluvial clays are known to be prevalent. Presented with the ideal situation in the Naco Valley, Honduras, I used a combination of ethnoarchaeological observations and archaeological comparisons to formulate a signature pattern and subsequently returned to the archaeological record to evaluate these understandings.

The spatial configuration at modern *tejas* is beneficial for intensive production on a large scale. It is cost effective to work at the clay source and living onsite also makes sense as a security measure. But what is the significance of finding prehistoric Naco Valley ceramic production taking place at clay sources both at the major center of La Sierra and at the peripheral Manacal Ranch Site 108? On the one hand, the La Sierra data support models for an attached specialist workshop that includes a kiln and secondary structures located next to the clay source. La Sierra's leaders could easily have taken advantage of the fact that La Sierra itself is located on top of good alluvial clay and sponsored pottery production within the city limits. On the other hand, the discovery of ceramic production at a clay source in the hinterlands of La Sierra does not appear to fit the model for household production.

Based on Manacal Ranch Site 108 findings, we can begin to appreciate the complexities of

Mesoamerican ceramic economies and move away from strictly two-tier models. We know, in this case, that some form of locally focused pottery production was taking place more than 5 km from the central site of La Sierra, and that this was neither low-intensity household production nor attached full-time production. The evidence (special-purpose structure and associated materials) may or may not fit into predefined categories of craft specialization (Costin 1991; Peacock 1982; van der Leeuw 1977). Many intangibles remain, such as the extent to which the area was being used through time, and the sorts of items that were being produced. Who was controlling production and distribution, and how many manufacturers were using Site 108? These are the kinds of questions that cut to the heart of the organization and complexities of these early economies. For example, the concept of "site specialization" proposes that multiple individuals or families may use one site during the same time period (Muller 1984). This often happens with lithic resources, where core reduction and preform manufacture are carried out at the raw material resource. In these cases, the degree of specialized production actually may not be that high; many people may simply be using the site over time. Despite extremely high densities of broken ceramics at Manacal Ranch Site 108, the site exhibits one of the longest occupation sequences in the Naco Valley. Although most of the production activity at the site appears to be Late Classic, the long time span suggests the possibility of a lower degree of specialization than otherwise would be interpreted.

Nevertheless, by discovering locations of production we are taking steps toward piecing together a fuller and more accurate perspective on the evolving ceramic economy. The Site 108 case parallels several cases described by Arnold (1985:168–198) in which pottery production is found to take place in marginal agricultural areas with access to favorable ceramic resources. This distinctive configuration appears to be favored by selection that arises from consistent differentials in comparative advantage, as pointed out by Neff and Larson (1997).

The ancient ceramic economies of Mesoamerica have for too long been interpreted on the basis of negative evidence. The idea of using a dearth of evidence for production to validate the two-tier (attached and household) production system without considering additional ways of organizing ceramic production should be reexamined. Using an ethnographic link

to *tejeras*, I have shown that rural-based production can also be found at the clay source. As we begin to expose more signs of production in the hinterlands of large centers we can expand our models of ceramic production to incorporate these significant new factors in the complexities of Mesoamerican economies.

Acknowledgments. This field research was carried out under the aegis of the Naco Valley Archaeological Project (NVAP), under the gracious guidance of Patricia Urban and Edward Schortman, with permission of the Instituto Hondureño de Antropología e Historia, tirelessly represented by Fancho Orellana. It was supported by National Science Foundation (BNS-9022247 and BNS-9121386) and the Kenyon Student Field Project. None of the work would have been possible without support of many colleagues, including Marne Ausec, Ellen Bell, and their wonderful laboratory crew. Help in the field came from Christopher Attarian, Kirk Anderson, Elizabeth Brown, Laura Aldrete, Stephen Yates, Sharon DeSipio, and last, but certainly not least, Don Luis Nolasco, a true gentlemen. Thank you as well to Richard Leventhal, Jeanne Arnold, John Morris, Jay Kotliar, Marilyn Beaudry-Corbett, Katharina Schreiber, and three (not so) anonymous reviewers for commenting on versions of this manuscript. Spanish translation was generously provided by Ana Lucía González, Natasha Tavez, and Aleksander Borejsz. This work has been published in honor of James N. Hill, a man whose dedication and good heart touched many.

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Received June 13, 2001; revised December 18, 2001;
accepted March 14, 2002.