PHASED ARCHAEOLOGICAL RESEARCH WITHIN THE LOS VAQUEROS LOCALITY, CONTRA COSTA AND ALAMEDA COUNTIES, CALIFORNIA.

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ABSTRACT

A phased archaeological research program that emphasizes obsidian studies tailored for a locality context sparse in obsidian is reported here. Working hypotheses regarding the antiquity of use of the Los Vaqueros watershed, economic ties, and changes in obsidian procurement strategies and settlement-subsistence were tested. Several revised testable hypotheses are advanced that may explain study results and the nature of the inferred changes. Research implications for use of the proposed methodology in similar obsidian-poor localities are evaluated.

INTRODUCTION

Over the past 8 years, Sonoma State University's Anthropological Studies Center has conducted 9 large survey projects within and in the vicinity of the Los Vaqueros Land Grant. A total of about 25,000 contiguous acres have been studied. This paper presents a partial synthesis of information generated by all 9 projects, and reports preliminary findings of research conducted independently of cultural resource management.

After summarizing background and contextual information, I will briefly outline an analytical framework that we believe holds considerable potential for prehistory not only for Los Vaqueros, but for other archaeological regions of California as well. We have formulated an explicit theoretical model and analytical framework. The model is concerned with the social development of prehistoric hunting and gathering cultures, and is cast, for the most part, in the rubric of biological evolution. In the limited scope of this paper, we present only partial findings to date. We will attempt to show that surface obsidian samples, even when sparse, provide data sufficient to address several working hypotheses when obsidian analysis is phased, and the hypotheses are explicit, and when both are linked to the theoretical model through the analytical framework.

BACKGROUND

The study area lies at the western border of the Central Valley adjacent to the Delta (Figure 1). Archaeological evidence for sustained human use of adjoining regions is thought to

represent an excess of 5000 years, although there is little indisputible evidence for such antiquity. Several radiocarbon dates from the general region support human use of the area back to at least 3500 years. Use of the present study area at this time depth would probably have been sporadic.

We have more substantial evidence for relatively intense use of the Los Vaqueros locality during the late Emergent Period, beginning about 1500 years ago (Bramlette 1987). Dwight Simons (in Fredrickson 1982) argues that the distribution of important floral and faunal resources within the Los Vaqueros vicinity would encourage seasonal rather than year round use.

THE DATA BASE

Previous Investigations

Information regarding the prehistoric, protohistoric, or historic periods in the region are summarized in 2 studies within the study area: (1) the Los Vaqueros study (Fredrickson 1982) prepared for a Department of Water Resource's EIR; and (2) the Kellogg Reservoir study (Eidsness 1986) prepared for Jones & Stokes Associates, Inc. for a Contra Costa Water District EIR. Both studies were conducted by Sonoma State University. These summaries are not repeated here.

A total of 54 prehistoric sites have been identified within the 25,000 acre study area. Site characteristics range from sparse chert and obsidian flake scatters, to bedrock mortars, to substantial deposits including both the above as well as chipped or ground/pecked stone tools (e.g., arrow or spear points, pestles), and quartz crystals. One site, CCO-434 described below, represents almost 50 separate prehistoric loci, relatively closely spaced, each of which might legitimately be assigned a separate site number.

Near the central portion of the study area begin a contiguous series of massive natural sandstone outcrops that are spread out over an area nearly 3 kilometers in length. The outcrops are interspersed with oak and numerous buckeye, and are cut by seasonal creeks fed by springs. These natural outcrops contain countless caves and overhanging ledges, some of which were used by Native Americans as shelters. Also among the rocks, caves, and rockshelters, are polychrome pictographs, bedrock mortars, midden deposits marked by dietary remains, flakes and tools made from obsidian, chert, and quartzite, and hematite "loaves" (presumedly used as a pigment for drawing pictographs). Scores of distinct Native American cultural features have been identified to date.

Human graves have been encountered at 2 sites (CCO-320 and CCO-417), and undoubtedly more are present. In addition, archaeological deposits buried under as much as 1.5 meters of alluvium have been noted (Bramlette and Villemaire 1987); buried cultural deposits containing graves have been unearthed as deep as 7 meters elsewhere in Contra Costa County. Archaeological

excavation in the study area is limited to 3 prehistoric sites, worked on by various organizations several years prior to the work discussed here. Only brief descriptive summaries of this work are available for sites CCO-320, in Round Valley, and CCO-417 in the Los Vaqueros area (Parkman 1979, Smith 1970). The third site study, which focused upon historic deposits near John Marsh's home but also encountered a prehistoric component, is in progress and therefore unpublished.

Statements regarding site types or site function must remain tentative without the advantage of excavation; however, a few general predictions are possible at this time. We believe that many of the sites in the study area represent task-specific activity locations where natural resources were collected or hunted and processed on a seasonal basis. Several of these sites may also have functioned as base camps for conducting hunting and gathering activities. A few sites, situated at the valley edges near dependable water, may have been small hamlets or villages.

Surface Sampling and Obsidian Hydration

Current survey efforts have retrieved samples of surface obsidian from 17 of the 54 prehistoric sites; 1 of the 17 includes 13 loci at CCO-434. Ground visibility was optimal in most cases, and we believe that the obsidian specimens collected are reasonably representative of the proportions of the different sources present within the area as a whole. Obsidian visual sourcing techniques were used to determine the geological origin of over 200 specimens. Sourcing was conducted by 2 independent analysts with a 20% control sample subjected to XRF analyses which confirmed visual source determinations. All but 3 of the specimens were identified as originating from the Napa Valley; 2 specimens were from Annadel; and a single specimen originated from the Casa Diablo source in the Sierra Nevada. All whole, or nearly whole flakes were size-sorted into 3mm, 6mm, and 12mm size categories. A total of 112 obsidian specimens were subjected to obsidian hydration analysis.

ANALYTICAL FRAMEWORK AND ASSUMPTIONS

The analytical framework employed here seeks to explicate the development of socially complex hunter/gatherer cultures from earlier, presumedly simpler, wide-ranging groups. Very briefly, the framework is based upon the Darwin-Lotka energy law, a fundamental principle of evolutionary biology that helps explain natural selection. It states that organisms tend to optimize their energy outputs with respect to energy inputs. The well-known principal of least effort is a subset of the law. Energy optimization relates to reproductive success. Our focus, therefore, is upon assessing the qualitative energy cost of subsistence activities, exchange relationships, and social organization. Several assumptions are necessary to do this.

Chronological Control

Temporally diagnostic artifacts in the area are sparse in surface contexts. Source-specific obsidian hydration dating

provides chronological control. Absolute age conversions of hydration measurements are not stressed. We assumed the effective hydration temperature in the study area is greater than in the Santa Rosa area where hydration rim ranges have been tentatively assigned to cultural phases.

Settlement-Subistence Patterns

To address settlement-subsistence systems, we assume cultural materials deposited at various loci are indicative of activities associated with the loci. For example, certain broken bifaces are assumed to be associated with hunting. Patterns in settlement-subsistence will be examined through site constituent and habitat analysis. Obsidian hydration rim readings will be used to define patterns through time.

We also assume protected areas with dependable water were utilized during all time periods since they were necessary to all past cultural groups. Loci protected from the summer sun and prevailing wind would be especially important. We postulate that sites located in these environmental settings, probably serving as base camps, contain the highest diversity of artifact classes.

We further assume food resource productivity within the study area was marginal as compared with regions to the north and to the northeast. We assume prehistoric people will use marginal environments when carrying capacity of more provident habitats is approached, presumedly due to increased population size.

Interaction and Exchange Systems

In the model of exchange applied here, we assume nothing is received for free. The exchanged resource, in turn, must be a surplus resource. Given sedentism with relatively firm territorial boundaries, we assume regularized exchange is more energy efficient than ad hoc exchange. We also assume that the presence of cortex on finished tools was not preferred and was removed by prehistoric knappers. Thus, an efficient exchange strategy included procurement of obsidian with no cortex.

Expectations generated from a distance/decay model predicts obsidian sources should be represented inversely proportional to their distance from the project area. Put another way, the closer the source, the greater the amount of obsidian and vice-versa. Since Napa Valley obsidian sources are closest, they should comprise the greatest proportion of obsidian in the study area; Annadel is the next closest source and should represent the second highest proportion of obsidian.

HYPOTHESES AND FINDINGS

The following hypotheses are proposed as part of our research program for the locality. Although excavation and constituent analysis is needed to fully address these questions, obsidian research in progress seeks to focus on the predicted patterns that should occur in the obsidian hydration and source

data. Corroboration of expected obsidian hydration and sourcing results would support the more general research questions and potentially provide direction for refinement to them.

Hypothesis 1:

Due to its marginal resource productivity, the Los Vaqueros area would not be intensively utilized until population pressure on more productive adjoining environments increased.

Implications:

Relatively intensive use of the larger Los Vaqueros locality occurred during the Emergent Period.

Findings:

Obsidian hydration results supported the hypothesis. It was found that the cluster of the majority of rim readings ranged from approximately 1.0 to 3.0 Napa Valley microns (Table 1).

Hypothesis 2:

The upper Emergent Period in the Los Vaqueros locality was marked by a shift to more permanent habitation.

Implications:

(a) Rim readings from loci that offer the best year-round shelter will be less than 2.0 Napa Valley microns.

(b) There will be fewer upper Emergent Period sites as contrasted with the distribution of early Emergent sites.

Findings:

Obsidian hydration results shown in Table 2 do not appear to support this prediction. Specifically, only one less loci is used late as compared with early. On the other hand, it appears rim readings are fewer and more dispersed among different loci, early, and possibly more focused at fewer loci, late.

Hypothesis 3:

The upper Emergent Period was characterized by increased use of the uplands.

Implications:

Sites along the ridge of mountains in the western portion of the study area will contain obsidian with predominately late hydration.

Findings:

Obsidian hydration results supported the hypothesis. A total of 8 rim readings from a single ridge site ranged from 1.1 to 2.2 Napa Valley microns (Table 1).

Hypothesis 4:

Obsidian procurement strategies remained the same through time.

Implications:

(a) Although cortex should not be present, specimens with cortex will display readings that roughly correspond with the range of readings from the sites as a whole.

(b) Readings from different size flakes (3mm, 6mm, and 12mm categories) will conform to the range of readings as a whole.

Findings:

Obsidian hydration results only partially supported the hypothesis. While different size flakes did conform to the range of total readings, cortex was found to be present. As depicted in Table 3, cortex appears to be restricted to late time periods, represented by less than 2.2 Napa Valley microns, and only at several loci.

Hypothesis 5:

Obsidian sources found in the study area will be represented inversely proportional to their distance from the project area.

Implications:

Napa Valley obsidian will be most abundant.

Findings:

Virtually all specimens were identified as deriving from Napa Valley sources. XRF results corroborated visual determinations (a sample of visually sourced obsidian was checked).

Hypothesis 6:

Regularized economic ties between the Los Vaqueros and the Napa Valley (Annadel secondarily) were maintained throughout this timeframe.

Implications:

Source and hydration analyses will show that Napa Valley obsidians predominate over time and space.

Findings:

Virtually all specimens in all time periods were identified as deriving from Napa Valley sources (Table 1).

Hypothesis 7:

Sites within the project area were utilized more or less contemporaneously; their number is due to short term use of each loci within a single cultural period.

Implications:

Individual loci at each site were used at roughly the same time. This is a programmatic hypothesis meant to check whether obsidian clusters for sites were simply an artifact of shifting activity foci. It was predicted that no intra-site variability in readings would be found.

Findings:

It was found that different loci within CCO-320 and CCO-434 were used at different times; a bimodal distribution of rim clusters existed (Table 1). Moreover, it was noted that the later of the clusters at CCO-434 was derived from obsidian at a locus which appeared to be potentially more protected from the elements than the rest of the site. At CCO-320, obsidian with late readings were obtained from a lower flat that encompassed a much larger area than that occupied by the earlier obsidian locus; a housepit was also on the lower flat. In addition, it was found that readings from CCO-543 tended to match the later of the two clusters evident for the other two sites; however, CCO-543's cluster displayed a very narrow range restricted to the last few tenths of microns.

SUMMARY OF FINDINGS

In summary, obsidian source and dating analyses showed virtually all the obsidian specimens collected originated from the Napa Valley source and dated to a late prehistoric context. We conclude the majority of obsidian rim readings represent deposition during the Emergent Period.

The obsidian work also formed the basis for several preliminary hypotheses regarding the Los Vaqueros locality. These included the propositions that relatively intensive use of the area occurred during the Emergent Period and that regularized economic ties between Los Vaqueros and the Napa Valley were maintained throughout this time. It was also suggested that the upper Emergent Period was marked by a shift in obsidian procurement strategy, as indicated by the presence of cortex, as contrasted with its absence in the lower Emergent Period. We deduce from our model that obsidian in the study area should not exhibit cortex since its presence implies an extra energy cost of transporting it. However, obsidian hydration rim readings from specimens with cortex refutes our expectation. Not only is cortex present, but it appears to be restricted to late time periods, represented by less than 2.2 microns, and only at several loci. Presence of cortex on obsidian specimens indicates an obsidian procurement strategy which included the importation of raw obsidian or unfinished worked pieces, such as biface blanks. This requires that we more closely examine the factors which influence the exchange of obsidian.

Due to the intensifying processes of centralization, it was predicted fewer loci would be used late as compared with early. Obsidian hydration results do not appear to support this prediction. Although only one less loci is used late as compared with early, it appears rim readings are fewer and more dispersed among different loci, early, and possibly more focused at fewer loci, late. In addition, we infer bimodel obsidian hydration distributions indicate shifts in activity from some loci to others. It is possible aggregation processes produced a more qualitative than quantitative change at Los Vaqueros. It is hoped detailed analysis of site constituents at different loci

will provide contrasting assemblages that will correspond with such changes.

Based on inferred shifts of activity between various loci, coupled with the change in obsidian procurement strategy, we further propose that Phase I of the Emergent Period begins at about 3.0 Napa Valley microns and Phase II begins about 2.0 microns. The preliminary status of these working hypotheses and the need for confirmation by similar studies based upon excavated samples from a number of sites in the area is stressed.

REFERENCES CITED

Bramlette, Allan G.
1987 An Archaeological Study for Potential Landfill Locations in Southeastern Contra Costa County, California. Sonoma State University Anthropological Studies Center, Rohnert Park, California.

Bramlette, Allan G., and Albert J. Villemaire
1987 Archaeological Monitoring of Woodward-Clyde Consultants Geotechnical Excavations within the Los Vaqueros Project Area. Sonoma State University Anthropological Studies Center, Rohnert Park, California.

Eidsness, Janet P.
1986 Archaeological Survey of the Kellogg Reservoir, Contra Costa County, California. Sonoma State University Anthropological Studies Center, Rohnert Park, California.

Fredrickson, David A.
1982 Los Vaqueros: A Cultural Resource Study. Sonoma State University Anthropological Studies Center, Rohnert Park, California.

Parkman, E. Breck
1979 4-CCO-417: Archaeological Investigations by California State University, Hayward. California State University, Hayward.

Smith, C.E.
1970 California State College at Hayward. Society for California Archaeology Newsletter 4(2,3):20-21. California State University, Fullerton.

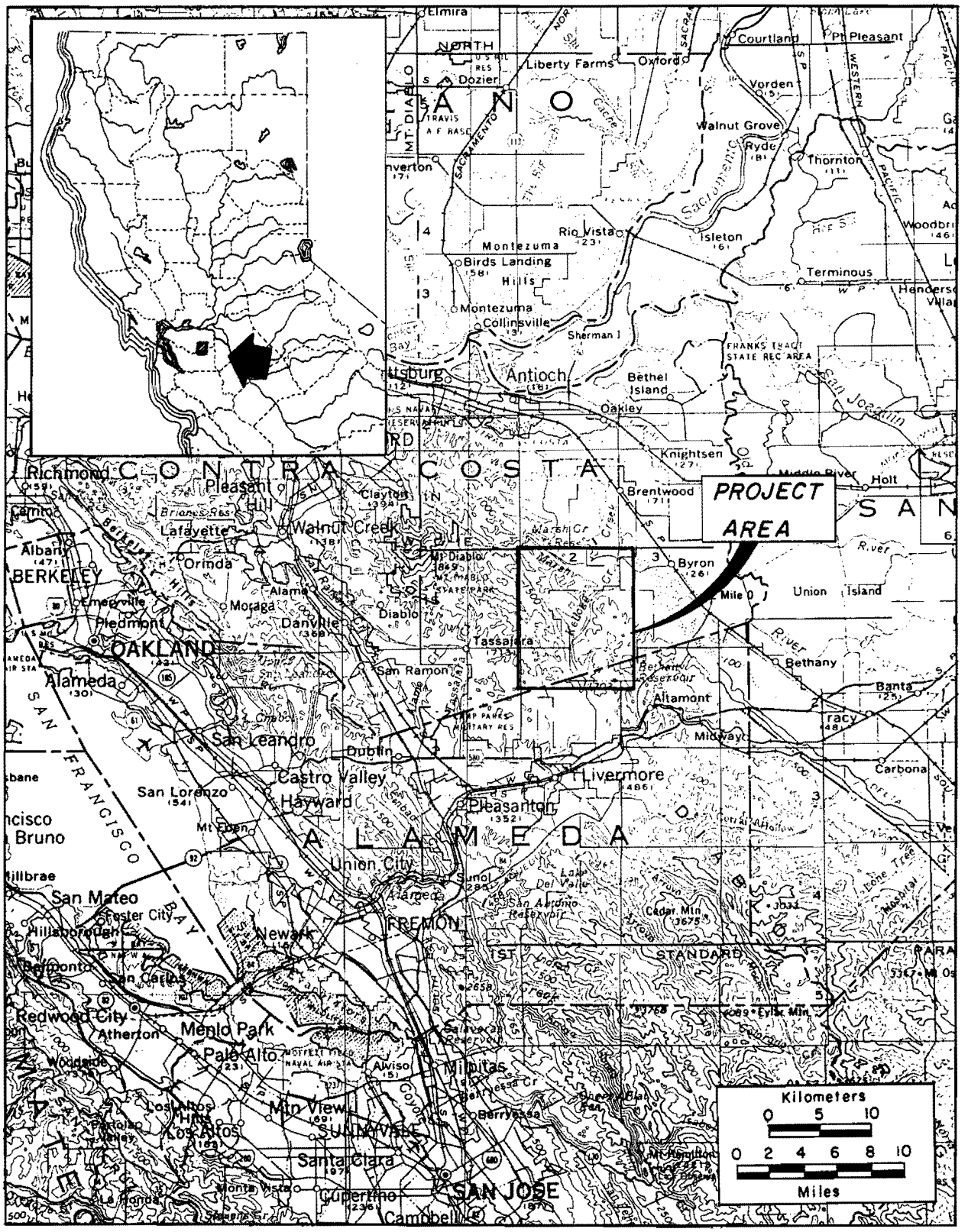

FIGURE 1: STUDY AREA VICINITY AND LOCATION

TABLE 1:
SUMMARY OF OBSIDIAN HYDRATION RIM VALUES FOR VARIOUS LOCI WITHIN THE LOS VAQUEROS LOCALITY

CULTURAL PERIOD	Site:	Environment: Valley Floor.....				Ridge	Rockshelter Uplands.....																	
		CCO-320		CCO-397	CCO-543/H	CCO-560/H	CCO-434 (within each separate locus and feature)																	
	Loci:	upper	lower	a1	a1	a1	L3-C1	L3-C2	L3-C3	L3-RS3	L4-RS2	L4-RS4	L5-RS1	L6-C1	L8-RS2	L8-RS3	L10-C2	L10-RS3	L15	MICRONS	TOTALS
	.9				1				2											.9	3
	1		2		1			1	6											1	10
Phase	1.1		3		5	1			5									2		1.1	16
	1.2		1			2			2					1				1		1.2	7
	1.3	1				3							1	1						1.3	6
	1.4	1			1				3								1			1.4	6
	1.5		2					1	3								1			1.5	7
EMIE	1.6		2															2		1.6	4
	1.7					1				1								1	1	1.7	4
	1.8		2																	1.8	2
RG	1.9		1					1												1.9	2
	2								1											2	1
	2.1	1					1			1					1	2				2.1	6
ENP	2.2	4		1		1	1		1			1								2.2	9
Th	2.3	3					1			1										2.3	5
a	2.4	1						1												2.4	2
s	2.5	2					1	1		1										2.5	5
e	2.6	2																		2.6	2
	2.7						1									1				2.7	2
I	2.8	1																1		2.8	2
	2.9	1																		2.9	1
	3																			3	
	3.1		2				1													3.1	3
	3.2			1																3.2	1
UP	3.3																			3.3	
PE	3.4											1								3.4	1
R	3.5																			3.5	
	3.6																			3.6	
	3.7	1																		3.7	1
	3.8																			3.8	
AR	3.9																			3.9	
C	4		1																	4	1
CH	4.1																			4.1	
AI	4.2																			4.2	
C	4.3																			4.3	
	4.4																			4.4	
	4.5																			4.5	
	4.6																			4.6	
	4.7		1																	4.7	1
?	4.8																			4.8	
	4.9																			4.9	
	5																			5	
?	5.1																			5.1	
	5.2																			5.2	
	5.3																			5.3	
?	5.4																			5.4	
	5.5																			5.5	
	5.6																			5.6	
?	5.7																			5.7	
	5.8																			5.8	
	5.9																			5.9	
?	6																			6	
	6.1																			6.1	
	6.2																			6.2	
?	6.3																			6.3	
	6.4								1											6.4	1
	6.5										1									6.5	1
	SUBTOTAL	18	17	2	8	8	6	5	24	4	1	2	1	2	1	3	2	7	1	TOTAL	112

TABLE 2:
SUMMARY OF OBSIDIAN HYDRATION RIM VALUES TESTING CENTRALIZATION, THE LOS VAQUEROS LOCALITY

Environs: Valley Floor..... Ridge Rockshelter Uplands.....

MICRONS	Site: CCO-320		CCO-397	CCO-543/H	CCO-560/H	CCO-434 (various loci).....							MICRONS	TOTALS
	Loci: upper	lower	a 1 1	a 1 1	a 1	L3-C1	L3-C2	L3-C3	L3-RS3	L4-RS2	L4-RS4	L5-RS1		
.9				1				2					.9	3
1		2		1			1	6					1	10
1.1		3		5	1			5					1.1	14
1.2		1			2			2					1.2	5
1.3	1				3							1	1.3	5
1.4	1			1				3					1.4	5
1.5		2					1	3					1.5	6
1.6		2											1.6	2
1.7					1				1				1.7	2
1.8		2											1.8	2
1.9		1					1						1.9	2
2								1					2	1
2.1	1					1			1				2.1	3
2.2	4		1		1	1		1			1		2.2	9
2.3	3					1			1				2.3	5
2.4	1						1						2.4	2
2.5	2					1	1		1				2.5	5
2.6	2												2.6	2
2.7						1							2.7	1
2.8	1												2.8	1
2.9	1												2.9	1
3													3	
3.1		2				1							3.1	3
3.2			1										3.2	1
3.3													3.3	
3.4											1		3.4	1
3.5													3.5	
3.6													3.6	
3.7	1												3.7	1
3.8													3.8	
3.9													3.9	
4		1											4	1
4.1													4.1	
4.2													4.2	
4.3													4.3	
4.4													4.4	
4.5													4.5	
4.6													4.6	
4.7		1											4.7	1
4.8													4.8	
4.9													4.9	
5													5	
5.1													5.1	
5.2													5.2	
5.3													5.3	
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5.5													5.5	
5.6													5.6	
5.7													5.7	
5.8													5.8	
5.9													5.9	
6													6	
6.1													6.1	
6.2													6.2	
6.3													6.3	
6.4								1					6.4	1
6.5										1			6.5	1
SUBTOTAL	18	17	2	8	8	6	5	24	4	1	2	1	TOTAL	96

TABLE 3:
SUMMARY OF OBSIDIAN HYDRATION RIM VALUES FOR SPECIMENS WITH CORTEX, LOS VAQUEROS LOCALITY

Environs:	Valley Floor.....				Ridge	Rockshelter Uplands.....														
Site:	CCO-320		CCO-397	CCO-543/H	CCO-560/H	CCO-434 (various loci and features).....														
MICRONS	Loci:	upper	lower	all	all	all	L3 - C1	L3 - C2	L3 - C3	L3 - RS3	L4 - RS2	L4 - RS4	L5 - RS1	L6 - C1	L8 - RS2	L8 - RS3	L10 - C2	L10 - RS3	L15	MICRONS	TOTALS
.7																				.7	
.8																				.8	
.9																				.9	
1																				1	
1.1			1															1		1.1	2
1.2																		1		1.2	1
1.3		1																		1.3	1
1.4																				1.4	
1.5			1																	1.5	1
1.6			1																	1.6	1
1.7																		1	1	1.7	2
1.8			1																	1.8	1
1.9																				1.9	
2																				2	
2.1															1					2.1	1
2.2				1										1						2.2	2
2.3																				2.3	
2.4																				2.4	
2.5																				2.5	
2.6																				2.6	
2.7																				2.7	
2.8																				2.8	
2.9																				2.9	
3																				3	
3.1																				3.1	
3.2				1																3.2	1
3.3																				3.3	
3.4																				3.4	
3.5																				3.5	
3.6																				3.6	
3.7																				3.7	
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4																				4	
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4.5																				4.5	
4.6																				4.6	
4.7																				4.7	
4.8																				4.8	
4.9																				4.9	
5																				5	
SUBTOTAL		1	4	2										1	1			3	1	TOTAL	13