Emerging Patterns in Obsidian Usage in the Southern San Joaquin Valley, California

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Abstract

Over the last 10 years, obsidian data have been obtained from a number of sites in the southern San Joaquin Valley. In this paper, these data are reviewed as to age, source, and geographic distribution. Several interesting patterns are beginning to emerge, including differential use of eastern California sources through time, an absence of northern California sources, and some detail of how obsidian material was utilized in technology.

Introduction

Interest in understanding the geographic, temporal, and cultural aspects of obsidian trade in California is considerable, and discussions of research into these patterns are many (see Jackson 1974; Jack 1976; Ericson 1982; Bouey and Basgall 1984; Hughes and Bettinger 1984; Jackson and Ericson 1994). Much of this work has centered on sources in eastern California and on sites in the northern and central San Joaquin Valley. Until recently, little obsidian data had been obtained from sites in the southern San Joaquin Valley.

Ericson (1982) developed a model of obsidian use and trade for central California. The model stated that beginning about 4,000 years ago, obsidian products were produced at the quarries in eastern California and traded westward to consumers in the Sierra Nevada and San Joaquin Valley. Materials from the Bodie Hills source dominated the northern San Joaquin Valley, and obsidian from Casa Diablo dominated the central San Joaquin Valley (Fig. 1). Data from the southern San Joaquin Valley were not included in the study.

Further, Ericson (1982:139, Fig. 6.8) suggested that by the Late Horizon (ca. 1500 BP), use of the Casa Diablo and Bodie Hills sources had greatly diminished and that there was a change from "biface" to "flake/blade" utilization technologies reflecting a shift from "fancy" items to more utilitarian use of obsidian; that is, there is a shift from the manufacture of large items to small arrow points (Ericson 1982:144). It is also possible that increasing demand on a relatively limited supply (as a result of population expansion and/or the introduction of the bow and arrow) resulted in the change from biface to blades as a way in which to maintain supply (see Ericson 1982:145). Jackson (1984:123-124) disagreed about the timing of the change and argued that the decline of the use of those sources dated to about the time of contact.

The Ericson model was not extended to the southern San Joaquin Valley as few data were available at that time. The ethnographic data regarding Yokuts trade (Sample 1950; Davis 1961; Arkush 1993a, 1993b) indicate that most Yokuts groups had individuals that were professional traders and that obsidian was an important trade item moving west into the San Joaquin

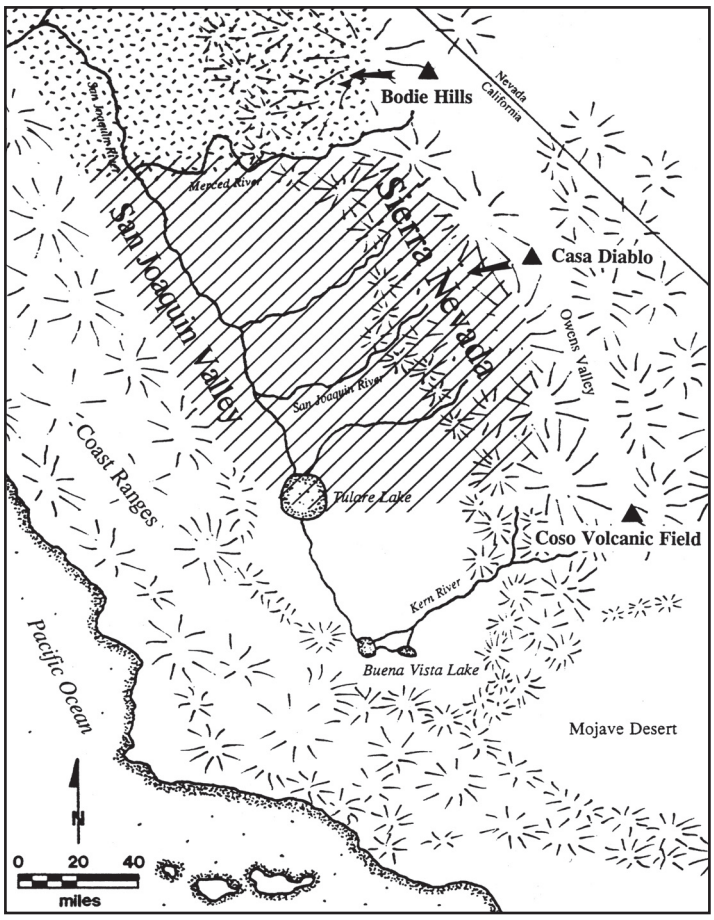

Fig. 1. Stylized distribution of Bodie Hills and Casa Diablo obsidian in the northern and central San Joaquin Valley (after Ericson 1982: Figs. 6.3 and 6.6).

Valley from eastern California (Gayton 1948:215). While this pattern is obviously late, one question is whether this pattern persists into the past. Arkush (1993a:195) suggested that it was possible that the ethnographic Yokuts pattern of obsidian trade had a time depth of between 2,300 and 3,300 years.

Obsidian Distribution and Use in the Southern San Joaquin Valley

The first major study of obsidian in the southern San Joaquin Valley was conducted at the Goose Lake site (Moreland 1992). It was thought that any obsidian at the site might have originated from northern sources, such as Napa Glass Mountain, given the waterway trade connections. However, that idea turned out not to be the case, with most of the obsidian being sourced to the Coso Volcanic Field. Subsequently, there have been studies conducted at a number of southern valley sites. These data (N = 293) were tabulated (Fig. 2, and Table 1, beginning on page 10), and several interesting patterns are beginning to appear.

Source Utilization

Several patterns of obsidian source utilization are emerging for the San Joaquin Valley. Obsidian was being traded west across the Sierra Nevada from sources latitudinally parallel to portions of the valley. Obsidian from the Bodie Hills source, located in central eastern California, dominates the northern valley north of the Merced River (Jackson and Ericson 1994:397). In the

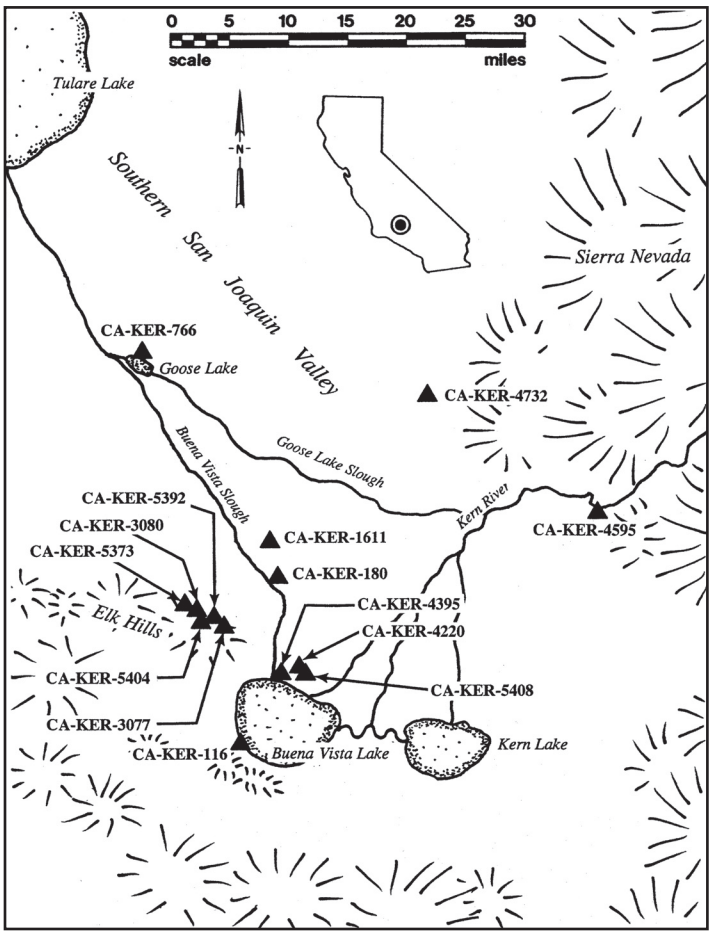

Fig. 2. Sites in the southern San Joaquin Valley producing obsidian data used in this study.

west-central Sierra Nevada and central valley, obsidian from the Casa Diablo source, located in central eastern California, dominates (see Bouey and Basgall 1984:138; Jackson and Ericson 1994:397), although a variety of other sources are represented in small quantities, including Queen and Coso (e.g., Roper-Wickstrom 1993; McGuire 1995).

In the southern San Joaquin Valley, mostly the Kern River drainage, obsidian from the Coso Volcanic Field, located in the southern portion of eastern California, dominates the obsidian assemblages (see Hartzell 1992:219; Moreland 1992). Obsidian from Coso also dominates the sites so far investigated on the western slope of the southern Sierra Nevada, from Porterville south (Garfinkel and Schiffman 1981; Dillon 1988; Parr 1991; Sutton, Jackson, and Riddell 1994; Collins, Dutcher, and Sutton 1995; Hinshaw and Rubin 1996; Gilreath and Hildebrandt 1997). This is an extension of Ericson's basic model; the addition of the Coso "sphere" in the southern valley (Fig. 3).

The distribution of Coso obsidian suggests that the materials were entering the valley through the major passes in the southern Sierra Nevada, as expected. The small percentage (ca. 5%) of specimens from the Casa Diablo source to the north were only represented in sites in the valley itself, suggesting that those materials were not coming down the Owens Valley then across the southern Sierra Nevada, but directly across the Sierra Nevada then down from the central valley to the north.

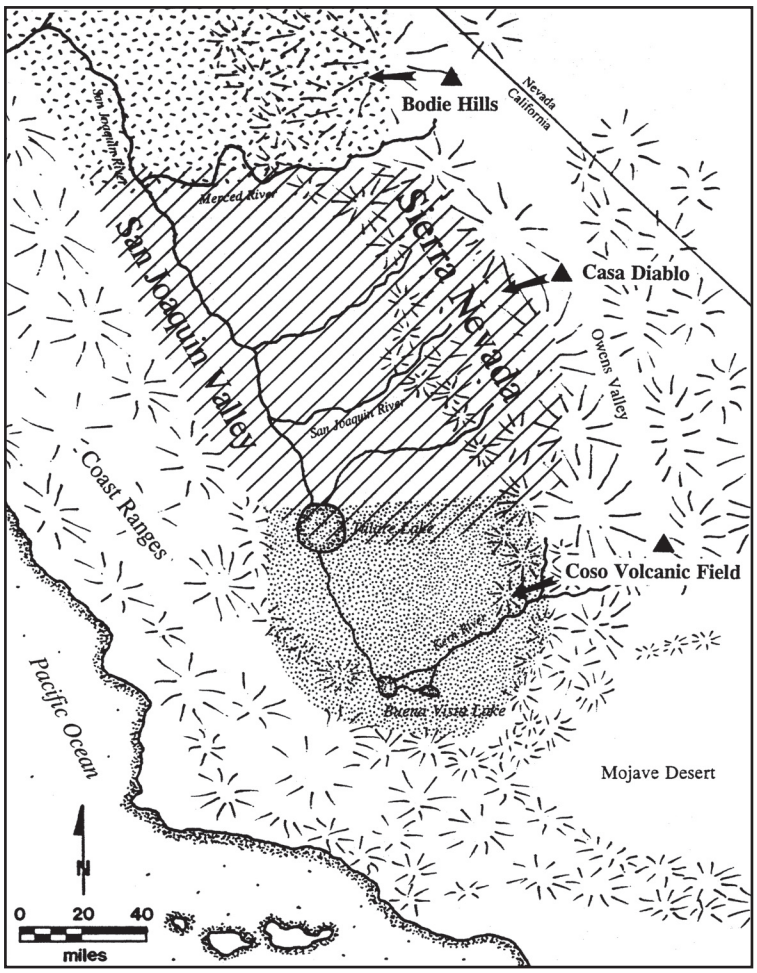

Fig. 3. Stylized distribution of Bodie Hills, Casa Diablo, and Coso obsidian in the northern, central, and southern San Joaquin Valley (after Ericson [1982: Figs. 6.3 and 6.6] and the data from this study).

What seems clear so far is that the dominant trade in obsidian was east to west, with relatively little obsidian moving north or south. This apparent pattern may reflect a larger indirect trade system with coastal materials, primarily shell beads, moving west to east. Thomas L. Jackson (personal communication 1999) suggested that the people of the northern and central San Joaquin Valley were oriented to the north while the southern valley people were focused on the Santa Barbara coast region, with little obsidian interaction between the two groups.

A related, but more detailed, explanation may lie in the ecological diversity of the region. The San Joaquin Valley is a relatively homogeneous ecozone that extends some 250 miles from north to south but is only about 60 miles wide. The same basic suite of natural resources present in the southern valley were also present in the northern valley, perhaps decreasing the incentives to trade north or south. However, the coast and the Sierra Nevada lay close to the west and east respectively and contained different and desired resources. People in the valley would most likely seek trading opportunities to the west or to the east where diverse materials could be obtained. A similar situation would have existed along the coast and in eastern California, where north to south ecological diversity would be relatively less compared to that of the west or east. Thus, a similar incentive for the establishment of east/west trading routes would have existed.

If the people (the Yokuts?) of the southern San Joaquin Valley functioned strictly as middlemen, they may have been doing business with people at the opposite ends of the shortest distance trade route between the obsidian from Coso and the shell from the coast. However, there is considerable evidence of a heavy trade between coast and desert peoples, a trade that presumably included obsidian (see Sutton 1988:77). Thus, it is possible that the trade of Coso obsidian to the coast was not controlled by the Yokuts.

Temporal Aspects

An unexpected finding of this analysis was the temporal distribution of obsidian. First, the excavations at CA-KER-116, located along the southwestern shore of Buena Vista Lake (see Fig. 2), produced many pieces of obsidian, and sourcing and hydration data were obtained on 70 samples. Of great interest was the absence of obsidian from the Basal Deposit, that portion of the site dated to the early Holocene (Fredrickson and Grossman 1977; Hartzell 1992). This suggests the possibility that trade in Coso obsidian had not yet been initiated in the southern San Joaquin Valley during the early Holocene.

The hydration values so far plotted for the southern San Joaquin Valley suggest that trade in obsidian declined beginning about 1000 BP, a pattern seen both in the western Mojave Desert (see Sutton 1996:240) and along the Santa Barbara Coast (e.g., Ericson and Meighan 1984:149). The reasons for this change are not clear but may reflect important political changes and/or population movements in the regions where the obsidian sources are located.

One further pattern was noted. The average micron readings from sites located along the foothills on both sides of the valley were fairly high, with lower averages from sites in the valley proper. Along the eastern margin of the valley, the average readings from the two sites (CA-KER-4595 and -4732) are 8.8 and 8.6 microns respectively (see Table 1). For the Elk Hills sites (the western margin), the average hydration values are between 8.0 and 11.8 microns with only 15 (12%) of the individual readings being below 6.0 microns. In contrast, the average hydration values for the valley floor sites range from 2.7 to 6.9 microns.

Ignoring the ever-present sampling problem of few excavations and buried sites, this pattern suggests several possibilities. One possibility is that there was some differential pattern of obsidian use between valley floor and margins. For example, if "villages" were located on the valley floor and "special purpose" sites were located along the margins, obsidian tools may have been used and discarded or rejuvenated more often at "special purpose" sites than at "villages," reflecting some differences in function and generating the archaeological pattern observed here.

Another possibility is that we are beginning to detect a shift in the settlement pattern from the valley margins to the valley floor. One model might be as follows. Early Period occupation centered along the margins of the valley, with people using the valley floor less frequently. Later, at some time between 8.0 and 7.0 microns ago (Coso time), people moved out onto the valley floor and began to use the margins less frequently, perhaps just for specialized resource procurement. Such a change might reflect population growth, decreased need for margin resources, changes in valley habitat, a combination of these factors, or none of these factors. At this time, we just do not know.

Technological Aspects

The form of obsidian moving into the southern San Joaquin Valley is not clear. Some bulk obsidian has been found in the central Sierra Nevada and sourced to Casa Diablo, suggesting the transport of unreduced material into the northern San Joaquin Valley (see Jackson 1988). Based on this, it was argued (Jackson 1988; Jackson and Ericson 1994) that prior to about

1500 BP, people in the northern San Joaquin Valley had "direct access" to Casa Diablo obsidian.

However, no caches of raw material from the Coso Volcanic Field have been found in the southern Sierra Nevada, suggesting that Coso obsidian was being traded to the southern San Joaquin Valley in more finished form, such as preforms or bifaces (see Jackson 1988:68). This pattern, lack of raw materials, may suggest that the southern San Joaquin Valley may have been part of a more regional exchange system, where direct access was not present.

This idea is supported by a cursory examination of the artifact types from sites in the southern valley made from Coso obsidian, with small debitage forming the majority of materials recovered. Finished artifacts are usually projectile points, although a few small cores have been found in the northern portion of the southern valley (at CA-KER-4732; Shapiro and Jackson 1988). Also, very few obsidian artifacts exhibiting cortex have been found, suggesting that raw materials were not present.

Summary and Conclusions

The above discussion and speculation is based on our initial analysis of a fairly limited data set, and it is important that researchers do not put too much stock in the ideas outlined here. However, we do believe that there are a number of questions worthy of further investigation.

1. When did trade in obsidian begin in the southern San Joaquin Valley, and how is that timing related to the inception of other trade, such as in shell beads? The absence of obsidian in the Early Holocene components of CA-KER-116 suggests the possibility that obsidian trade had not yet begun at that time and was initiated sometime after ca. 8000 BP. It also seems that obsidian was being traded into the southern San Joaquin Valley in the form of late-stage bifaces or finished artifacts.

2. How far does the ethnographic pattern of trade extend into prehistory and how might that influence our thinking about the time depth and continuity of the Yokuts occupation of the southern San Joaquin Valley? The trade networks known for the protohistoric period were fairly robust (e.g., Arkush 1993a, 1993b). The apparent decline in obsidian trade at about 1000 BP suggests that the trade networks and activity prior to that time may have been even more extensive and robust than during ethnographic times.

3. If the Southern Valley Yokuts were not trading much obsidian in a north/south direction, what was the nature of their other contacts and relationships? Obsidian from the Coso Volcanic Field, to the east, dominates the record in the southern San Joaquin Valley through time, with sources from the north being uncommon. This pattern suggests a dominant east-west trading network that may have included other material culture and/or socio-political influences in addition to obsidian. Even though obsidian trade appears to decline after about 1000 BP, the basic east-west pattern remained, suggesting a resilience in the other aspects of the trading network, although the disruption of the obsidian trade may reflect a changing political situation in the Coso region.

Obviously, as we obtain more information, we will be able to begin addressing these issues.

Acknowledgements

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Table 1. Obsidian Data From the Southern San Joaquin Valley.

Catalog No.	Obsidian Lab Number	Provenience	Artifact	Microns	Source
CA-KER-116 (Buena Vista Lake; Hartzell 1992:218-229, Table 6.14)					
W-2-1999	unspecified	EU 2, 50-60	debitage	4	Coso
W-2-2354	unspecified	EU 3, 130-140	biface	8.1	Coso
W-2-1953	unspecified	EU 6, 100-110	debitage	7.5	Coso
W-2-1959	unspecified	EU 6, 160-170	debitage	7.3	Coso
W-2-1289a	unspecified	EU 8, 140-150	debitage	8.1	Coso
W-2-1289b	unspecified	EU 8, 140-150	debitage	10	Coso
W-2-1290	unspecified	EU 8, 150-160	debitage	7.7	Coso
W-2-1317	unspecified	EU 10, 70-80	debitage	8.6	Coso
W-2-2307	unspecified	EU 11, 40-50	biface	4.2	Coso
W-2-1333	unspecified	EU 11, 50-60	debitage	6.3	Coso
W-2-1345	unspecified	EU 11, 170-180	debitage	7.6	Coso
W-2-1352a	unspecified	EU 12, 60-70	debitage	7.4	Coso
W-2-1352b	unspecified	EU 12, 60-70	debitage	6.1	Coso
W-2-1354	unspecified	EU 12, 80-90	debitage	7.5	Coso
W-2-2356	unspecified	EU 14, 30-40	core	3.9	Fish Springs
W-2-1379	unspecified	EU 14, 40-50	debitage	6.5	Coso
W-2-1382	unspecified	EU 14, 80-90	debitage	7.1	Coso
W-2-2288	unspecified	EU 14, 160-170	unclassified point	6.8	Coso
W-2-1391	unspecified	EU 14, 180-190	debitage	5.3	Coso
W-2-0096	unspecified	EU 15, 40-50	unclassified point	3.5	Coso
W-2-1418	unspecified	EU 17, 110-120	debitage	4.9	Coso
W-2-2519	unspecified	EU 24, 60-70	biface	8.0/9.1	Coso
W-2-1491	unspecified	EU 24, 60-70	debitage	7.5	Coso
W-2-1509	unspecified	EU 26, 10-20	debitage	7.4	Coso
W-2-0133	unspecified	EU 29, 10-20	unclassified point	6.6	Coso
W-2-1539	unspecified	EU 29, 20-30	debitage	7.2/8.9	Coso
W-2-1548	unspecified	EU 29a, 10-20	debitage	6.2	Coso
W-2-1566	unspecified	EU 30, 90-100	debitage	6.3	Coso
W-2-0150	unspecified	EU 31, 90-100	unclassified point	8.8	Coso
W-2-2266	unspecified	EU 35, 30-40	Cottonwood point	3.2	Coso
W-2-1600a	unspecified	EU 38, 30-40	debitage	6.3	Coso
W-2-1600b	unspecified	EU 38, 30-40	debitage	4.3	Coso
W-2-1604	unspecified	EU 38, 70-80	debitage	6.5	Coso
W-2-2182	unspecified	EU 39, 70-80	debitage	3.9	Coso

Table 1. Obsidian Data From the Southern San Joaquin Valley, continued.

Catalog No.	Obsidian Lab Number	Provenience	Artifact	Microns	Source
W-2-2186	unspecified	EU 39, 90-100	debitage	4.2	Casa Diablo
W-2-0159	unspecified	EU 42, 10-20	modified flake	2.8	Casa Diablo
W-2-1635	unspecified	EU 44, 80-90	biface	6.1	Coso
W-2-1673a	unspecified	EU 48, 90-100	debitage	9	Coso
W-2-1673b	unspecified	EU 48, 90-100	debitage	9.7	Coso
W-2-1673c	unspecified	EU 48, 90-100	debitage	9.8	Coso
W-2-0176	unspecified	EU 50, 30-40	biface	8.2/9.6	Coso
W-2-1681	unspecified	EU 50, 70-80	debitage	6	Coso
W-2-1683	unspecified	EU 50, 90-100	debitage	9.1	Coso
W-2-1687	unspecified	EU 51, 20-30	biface	6	Coso
W-2-1722	unspecified	EU 54, 60-70	debitage	5.4	Coso
W-2-1734	unspecified	EU 55, 40-50	biface	4.8	Coso
W-2-1736	unspecified	EU 55, 60-70	biface	5	Coso
W-2-1773	unspecified	EU 58, 130-140	debitage	5.7	Coso
W-2-0191	unspecified	EU 59, 10-20	unclassified point	6.8	Casa Diablo
W-2-0192	unspecified	EU 61, 0-10	biface	7.1	Coso
W-2-0204	unspecified	EU 61a, 10-20	Cottonwood point	5.7	Coso
W-2-1842	unspecified	EU 65, 70-80	debitage	8	Coso
W-2-1927a	unspecified	EU 68, 40-50	debitage	7.5	Coso
W-2-1927b	unspecified	EU 68, 40-50	debitage	8.2	Coso
W-2-1927c	unspecified	EU 68, 40-50	debitage	8.5	Coso
W-2-1892	unspecified	EU 76, 20-30	debitage	5.3	Coso
W-2-0226	unspecified	EU 78, 10-20	unclassified point	4.2	Coso
W-2-1909	unspecified	EU 78, 90-100	uniface	4.9	Coso
W-2-0308	unspecified	surface	biface	5.8	Coso
W-2-0313	unspecified	surface	Cottonwood point	4.3	Coso
W-2-0350	unspecified	surface	biface	5.2	Coso
W-2-0395	unspecified	surface	biface	5.4	Coso
W-2-2893	unspecified	surface	biface	3.8	Fish Springs
W-2-2259	unspecified	T1, Level B	unclassified point	4.1	Coso
W-2-2252	unspecified	T2, Level B	unclassified point	7.1	Coso
W-2-2365	unspecified	T2, 50-60	core	3.9	Coso
W-2-2735	unspecified	T4, Level C	biface	2.9	Coso
W-2-2740	unspecified	T4, Level E	biface	6.1	Coso
W-2-0043	unspecified	Burial 12	unclassified point	4.7	Casa Diablo

Table 1. Obsidian Data From the Southern San Joaquin Valley, continued.

Catalog No.	Obsidian Lab Number	Provenience	Artifact	Microns	Source
W-2-2289	unspecified	ST3, profile	unclassified point	9.8	Coso
CA-KER-180 (Tule Elk Preserve; Hartzell 1992:274-275, Table 7.2)					
P837-0003	unspecified	EU 4E/0S	debitage	4.7	Coso
P837-0038	unspecified	EU 8E/4N	Cottonwood point	2.3	Coso
P837-0069a	unspecified	EU 43N/0E	debitage	2.5	Coso
P837-0069c	unspecified	EU 43N/0E	debitage	2.6	Coso
P837-0069d	unspecified	EU 43N/0E	debitage	2.3	Coso
P837-0069e	unspecified	EU 43N/0E	debitage	2.5	Coso
P837-0069g	unspecified	EU 43N/0E	debitage	2.9	Coso
P837-0069h	unspecified	EU 43N/0E	debitage	3	Coso
P837-0098	unspecified	EU 43N/0E	debitage	2.6	Coso
P837-0111a	unspecified	EU 43N/0E	debitage	2.4	Coso
P837-0111b	unspecified	EU 43N/0E	debitage	2.4	Coso
P837-0111c	unspecified	EU 43N/0E	debitage	2.5	Coso
P837-0111d	unspecified	EU 43N/0E	debitage	2.4	Coso
P837-0154	unspecified	EU 43N/0E	debitage	2.3	Coso
P837-0194	unspecified	EU 43N/0E	debitage	2.4	Coso
CA-KER-1611 (Tule Elk Preserve; Hartzell 1992:287-288, Table 7.7)					
P838-0003	unspecified	surface	debitage	NHV	Coso
P838-0008	unspecified	surface	debitage	NHV	Coso
P838-0009	unspecified	surface	debitage	6.5	Coso
P838-0013	unspecified	surface	flake tool	5.5	Coso
P838-0061	unspecified	surface	flake tool	9.3	Casa Diablo
P838-0068	unspecified	surface	biface	4.9	Casa Diablo
P838-0069	unspecified	surface	debitage	5.5/17.0	Coso
P838-0070	unspecified	surface	debitage	6.4	Coso
CA-KER-766 (The Goose Lake Site; Moreland 1992)					
S-004	UCLA-13649	surface	flake	9.8	Coso
S-004	UCLA-13649	surface	flake	9.8	Coso
S-007	UCLA-13646	surface	flake	SD	Coso
S-019	UCLA-13647	surface	flake	8.1	Coso
S-035	UCLA-13648	surface	unclassified point	NHV	Truman Meadows
S-040	UCLA-13655	surface	biface	NHV	Casa Diablo
S-041	UCLA-13656	surface	biface	9.8	Coso
S-054	UCLA-13650	surface	Cottonwood point	5	Coso?

Table 1. Obsidian Data From the Southern San Joaquin Valley, continued.

Catalog No.	Obsidian Lab Number	Provenience	Artifact	Microns	Source
S-056	UCLA-13657	surface	unclassified point	4.6	Casa Diablo
S-060	UCLA-13651	surface	flake	6.6	Coso
S-061	UCLA-13658	surface	lanceolate point	7.2	Casa Diablo
S-068	UCLA-13659	surface	biface	4.4	Coso
S-084	UCLA-13653	surface	flake	9	Casa Diablo
S-107	UCLA-13654	surface	flake	6.8	Coso?
SS-1-004	UCLA-13660	Surface Scrape 1	flake	NHV	Coso
SS-2-001a	UCLA-13661	Surface Scrape 2	flake	NHV	Coso
SS-2-001b	UCLA-13662	Surface Scrape 2	flake	NHV	Coso?
1-002	UCLA-13639	TU-1, 0-10	flake	NHV	Coso
1-013	UCLA-13540	TU-1, 10-20	flake	11.5	Coso
1-031	UCLA-13641	TU-1, 30-40	flake	6.9	Coso
2-003	UCLA-13642	TU-2, 0-10	flake	NHV	Coso
2-019	UCLA-13643	TU-2, 10-20	flake	5.4	Coso
3-003a	UCLA-13644	TU-3, 0-10	flake	SD	Coso
3-003b	UCLA-13645	TU-3, 0-10	flake	8.5	Coso
3-025a	UCLA-13663	TU-3, 20-30	flake	NHV	Coso
3-025b	UCLA-13664	TU-3, 20-30	flake	8.4	Coso
CA-KER-3077, Locus A (Elk Hills; Jackson, Shapiro, and King 1998)					
35001-03	PL-96-211-005-90	RRU 21, 0-40	debitage	6.05	Coso
35002-02	PL-96-211-005-91	RRU 21, 40-80	debitage	6.1	Coso
35041-02	PL-96-211-005-93	EU 2, 40-60	debitage	6.05	Coso
CA-KER-3077, Locus B (Elk Hills; Jackson, Shapiro, and King 1998)					
39016-01	PL-96-211-005-94	SCA 6, surface	debitage	13.19	Coso
39006-03	PL-96-211-005-121	RRU 46, 0-40	debitage	8.72	Coso
CA-KER-3080, Locus A (Elk Hills; Jackson, Shapiro, and King 1998)					
31005-01	PL-96-211-005-1	SCA 25, surface	biface	18.07	Coso
31006-01	PL-96-211-005-2	SCA 26, surface	biface	6.48	Coso
31007-01	PL-96-211-005-3	SCA 27, surface	debitage	12.65	Coso
31008-01	PL-96-211-005-4	SCA 28, surface	debitage	7.27	Coso
31015-01	PL-96-211-005-5	SCA 29, surface	biface	9.73	Coso
31033-02	PL-96-211-005-7	RRU 24, 0-10	debitage	5.11	Coso
31040-02	PL-96-211-005-8	RRU 29, 40-80	debitage	9.49	Coso
31012-05	PL-96-211-005-113	EU 2, 0-20	debitage	6.01	Casa Diablo?
31013-02	PL-96-211-005-114	EU 2, 20-40	debitage	5.72	Coso

Table 1. Obsidian Data From the Southern San Joaquin Valley, continued.

Catalog No.	Obsidian Lab Number	Provenience	Artifact	Microns	Source
31019-03	PL-96-211-005-116	EU 2, 40-60	debitage	7.11	Coso
31035-02	PL-96-211-005-117	RRU 26, 0-10	debitage	5.81	Coso
CA-KER-3080, Locus B (Elk Hills; Jackson , Shapiro, and King 1998)					
16005-01	PL-96-211-005-107	SCA 5, surface	biface	6.77	Coso
CA-KER-3080, Locus C (Elk Hills; Jackson , Shapiro, and King 1998)					
32027-03	PL-96-211-005-11	RRU 32, 0-40	debitage	10.36	Coso
32030-02	PL-96-211-005-12	RRU 34, 0-40	debitage	5.67	Coso?
32032-02	PL-96-211-005-13	RRU 35, 0-40	debitage	10.02	Coso
32035-01	PL-96-211-005-14	RRU 36, 0-40	debitage	8.59	Coso
32006-02	PL-96-211-005-15	EU 6, 20-40	debitage	10.56	Coso
32020-04	PL-96-211-005-16	EU 8, 20-40	debitage	2.18	Coso
32021-06	PL-96-211-005-18	EU 8, 40-60	debitage	3.99	Coso
32021-07	PL-96-211-005-20	EU 8, 40-60	debitage	8.59	Coso
32036-07	PL-96-211-005-21	EU 9, 0-20	debitage	11.12	Coso
32036-08	PL-96-211-005-22	EU 9, 0-20	debitage	16.33	Coso
16004-01	PL-96-211-005-106	SCA 4, surface	biface	6.41	Coso
16009-01	PL-96-211-005-108	SCA 9, surface	biface	8.3	Coso
16108-02	PL-96-211-005-109	SP 8, 0-50	debitage	8.41	Coso
16123-02	PL-96-211-005-110	SP 23, 0-50	debitage	9.28	Coso
16123-04	PL-96-211-005-111	SP 23, 0-50	debitage	6.62	Coso
16206-02	PL-96-211-005-112	TEU 1, 50-60	debitage	9.06	Coso
32002-02	PL-96-211-005-118	EU 5, 20-40	debitage	13.9	Coso
32027-02	PL-96-211-005-119	EU 6, 40-60	debitage	10.09	Coso
39006-02	PL-96-211-005-120	RRU 46, 0-40	debitage	13.68	Coso
CA-KER-4220 (The Manifold Site)					
1	PL-98-474-1	surface	biface	4.64	Coso
CA-KER-5373/H, Locus C (Elk Hills; Jackson , Shapiro, and King 1998)					
13129-01	PL-96-211-005-23	SP 29, 0-50	debitage	4.66/17.24	Coso
13008-01	PL-96-211-005-24	SCA 8, surface	Elko point	10.18	Coso
41041-01	PL-96-211-005-25	SCA 10, surface	debitage	10.85	Coso
41043-01	PL-96-211-005-26	SCA 12, surface	debitage	12.29	Coso
41045-01	PL-96-211-005-27	SCA 14, surface	debitage	9.62	Coso
41046-01	PL-96-211-005-28	SCA 15, surface	debitage	10.02	Coso
41001-02	PL-96-211-005-29	RRU 21, 0-40	debitage	5.29	Coso
41004-04	PL-96-211-005-30	RRU 22, 40-80	debitage	8.1	Coso

Table 1. Obsidian Data From the Southern San Joaquin Valley, continued.

Catalog No.	Obsidian Lab Number	Provenience	Artifact	Microns	Source
41004-03	PL-96-211-005-31	RRU 22, 40-80	debitage	13.68	Coso
41016-02	PL-96-211-005-33	RRU 22, 80-120	debitage	11.64	Coso
41016-06	PL-96-211-005-34	RRU 22, 80-120	debitage	12.42	Coso
41005-02	PL-96-211-005-35	RRU 23, 0-40	debitage	11.35	Coso
41005-05	PL-96-211-005-36	RRU 23, 0-40	debitage	2	Coso
41005-06	PL-96-211-005-37	RRU 23, 0-40	debitage	15.92	Coso
41006-02	PL-96-211-005-38	RRU 23, 40-80	debitage	11.82	Coso
41009-02	PL-96-211-005-39	RRU 25, 0-40	debitage	8.36	unknown
41012-04	PL-96-211-005-40	EU 1, 0-20	debitage	12.78	Coso
41014-02	PL-96-211-005-41	EU 1, 40-60	debitage	13.63	Coso
41020-04	PL-96-211-005-42	EU 1, 80-100	debitage	12.58	Coso?
41021-02	PL-96-211-005-43	EU 1, 100-120	debitage	12.31	Coso
41021-04	PL-96-211-005-44	EU 1, 100-120	debitage	13.68	Coso
41015-07	PL-96-211-005-45	EU 2, 0-20	debitage	15.59	Coso
41047-02	PL-96-211-005-46	EU 2, 20-40	debitage	12.47	Coso
41047-08	PL-96-211-005-48	EU 2, 20-40	debitage	12.58	Coso?
13205-02	PL-96-211-005-49	TEU 1, 40-50	debitage	10.45	Coso
13208-02	PL-96-211-005-50	TEU 1, 70-80	debitage	13.03	Coso
41011-02	PL-96-211-005-51	RRU 25, 70-120	debitage	12.04	Coso
41013-02	PL-96-211-005-52	EU 1, 20-40	debitage	12.02	Coso
41015-02	PL-96-211-005-53	EU 2, 0-20	debitage	12.69	Coso
41015-08	PL-96-211-005-54	EU 2, 0-20	debitage	12.65	Coso
41019-02	PL-96-211-005-55	EU 1, 60-80	debitage	12.04	Coso
41049-01	PL-96-211-005-56	RRU 26, 0-40	debitage	12.27	Coso
41051-02	PL-96-211-005-57	RRU 27, 0-40	debitage	13.59	Coso
41051-05	PL-96-211-005-58	RRU 27, 0-40	debitage	12.6	Coso
41051-06	PL-96-211-005-59	RRU 27, 0-40	debitage	13.93	Coso
41051-07	PL-96-211-005-60	RRU 27, 0-40	debitage	11.97	Coso
41052-02	PL-96-211-005-61	RRU 27, 40-80	debitage	1.82/13.03	Coso
41052-04	PL-96-211-005-62	RRU 27, 40-80	debitage	13.3	Coso
41052-05	PL-96-211-005-63	RRU 27, 40-80	debitage	13.59	Coso
41053-02	PL-96-211-005-64	EU 2, 40-60	debitage	11.84	Coso
41053-06	PL-96-211-005-65	EU 2, 40-60	debitage	13.79	Coso
41054-03	PL-96-211-005-66	EU 2, 60-80	biface	8.7	Coso
41058-02	PL-96-211-005-67	RRU 26, 80-120	debitage	13.61	Coso

Table 1. Obsidian Data From the Southern San Joaquin Valley, continued.

Catalog No.	Obsidian Lab Number	Provenience	Artifact	Microns	Source
41060-02	PL-96-211-005-68	RRU 27, 80-120	debitage	13.21	Coso
41060-03	PL-96-211-005-69	RRU 27, 80-120	debitage	13.1	Coso
41060-04	PL-96-211-005-70	RRU 27, 80-120	debitage	12.38	Coso
41060-05	PL-96-211-005-71	RRU 27, 80-120	debitage	12.29	Coso
41060-06	PL-96-211-005-72	RRU 27, 80-120	debitage	12.67	Coso
41060-07	PL-96-211-005-73	RRU 27, 80-120	debitage	13.12	Coso
41060-08	PL-96-211-005-74	RRU 27, 80-120	debitage	13.3	Coso
41064-02	PL-96-211-005-75	EU 3, 40-60	debitage	12	Coso
41066-02	PL-96-211-005-76	EU 4, 20-40	debitage	12.69	Coso
41070-02	PL-96-211-005-77	EU 3, 60-80	debitage	5.4	Coso
41071-02	PL-96-211-005-78	EU 3, 80-100	debitage	12.47	Coso
41072-02	PL-96-211-005-79	EU 3, 100-120	debitage	11.59	Coso
41072-05	PL-96-211-005-80	EU 3, 100-120	debitage	12.29	Coso
41074-02	PL-96-211-005-81	EU 4, 60-80	debitage	11.89	Coso
41074-11	PL-96-211-005-82	EU 4, 60-80	debitage	13.84	Coso
41075-02	PL-96-211-005-83	EU 4, 80-100	debitage	12.6	Coso
41076-02	PL-96-211-005-84	EU 5, 0-20	debitage	11.44	Coso
41077-02	PL-96-211-005-85	EU 5, 20-40	debitage	12.63	Coso
41077-11	PL-96-211-005-86	EU 5, 20-40	debitage	12.87	Coso
41077-12	PL-96-211-005-87	EU 5, 20-40	debitage	12.74	Coso
41083-02	PL-96-211-005-88	CU 1, 10-20	debitage	4.26	Coso
41087-02	PL-96-211-005-89	CU 1, 50-60	debitage	13.07	Coso
CA-KER-5392, Locus B (Elk Hills; Jackson , Shapiro, and King 1998)					
43005-02	PL-96-211-005-99	RRU 41, 120-150	debitage	7.51	Coso
43010-03	PL-96-211-005-100	RRU 44, 40-80	biface	8.21	Coso
43010-09	PL-96-211-005-101	RRU 44, 40-80	biface	5.11	Coso
43012-02	PL-96-211-005-102	RRU 45, 40-80	debitage	12.56	Coso
43013-02	PL-96-211-005-103	RRU 46, 0-40	debitage	4.53	Coso
43013-08	PL-96-211-005-104	RRU 46, 0-40	debitage	13.79	Coso
43025-02	PL-96-211-005-105	EU 1, 0-20	debitage	7.22	Coso
43002-02	PL-96-211-005-122	RRU 41, 40-80	debitage	7.29	Casa Diablo?
43014-02	PL-96-211-005-123	RRU 46, 40-80	debitage	7.42	Coso
43030-02	PL-96-211-005-125	EU 1, 80-100	debitage	5.83	Coso
43040-02	PL-96-211-005-126	EU 4, 0-20	debitage	9.28	Coso
43041-04	PL-96-211-005-127	EU 4, 20-40	biface	5.58	Coso

Table 1. Obsidian Data From the Southern San Joaquin Valley, continued.

Catalog No.	Obsidian Lab Number	Provenience	Artifact	Microns	Source
43042-01	PL-96-211-005-128	SCA 10, surface	debitage	8.34	Coso
43046-02	PL-96-211-005-129	EU 3, 60-80	debitage	7.33	Coso
43050-02	PL-96-211-005-130	EU 4, 80-100	debitage	5.63/7.15	Coso
43053-06	PL-96-211-005-131	EU 5, 40-60	biface	13.66	Coso
CA-KER-5404 (Elk Hills; Jackson , Shapiro, and King 1998)					
37008-02	PL-96-211-005-95	RRU 25, 0-40	biface	5.9	Coso
37017-02	PL-96-211-005-96	RRU 27, 0-40	biface	8.41	Coso
37063-02	PL-96-211-005-98	EU 6, 40-60	Elko (?) point	9.93	Coso
08015-01	PL-96-211-005-132	STP 8, 0-20	biface	6.5	Coso
08027-01	PL-96-211-005-133	TU 1, 30-40	debitage	14.31	Coso
CA-KER-4395 (The Big Cut Site)					
6	PL-98-474-8	surface	biface	4.82	Coso
7	PL-98-474-9	surface	debitage	8.34	Coso
8	PL-98-474-10	surface	debitage	6.14	Coso
86	PL-98-474-11	surface	biface	7.76	Coso
94	PL-98-474-12	surface	Rose Spring point	7.33	Coso
95	PL-98-474-13	surface	Rose Spring point	5.34	unidentified
CA-KER-4595 (The Kern Canyon Site; Parr 1998)					
SC-490	97-H1648-1	surface	debitage	5.2	Coso (West Sugarloaf)
068a	97-H1648-2	TU-2, 20-30	debitage	11.3	Coso (West Sugarloaf)
098a	97-H1648-3	TU-3, 0-10	debitage	6.2	Coso (West Sugarloaf)
104a	97-H1648-4	TU-3, 10-20	debitage	6.5	Coso (West Sugarloaf)
123a	97-H1648-5	TU-3, 20-30	debitage	9.8	Coso (West Sugarloaf)
131a	97-H1648-6	TU-3, 30-40	debitage	9.6	Coso (West Sugarloaf)
134a	97-H1648-7	TU-3, 40-50	debitage	10	Coso (West Sugarloaf)
142a	97-H1648-8	TU-3, 50-60	debitage	10.5	Coso (West Sugarloaf)
269a	97-H1648-9	TU-6, 40-50	debitage	12.0/ë20	Coso (West Sugarloaf)
309a	97-H1648-10	TU-7, 10-20	debitage	7.7	Coso (West Sugarloaf)
309b	97-H1648-11	TU-7, 10-20	debitage	8.1	Coso (West Sugarloaf)
330a	97-H1648-12	TU-7, 30-40	debitage	7.6	Coso (West Sugarloaf)
363a	97-H1648-13	TU-7, 60-70	debitage	8.9	Coso (West Sugarloaf)
374a	97-H1648-14	TU-7, 70-80	debitage	10.2	Coso (West Sugarloaf)
CA-KER-4732 (The Poso Creek Site; Shapiro and Jackson 1998)					
0034-01	PL-98-265-08-1	Trench 2, 0-50	concave-base point	13.21	Coso
0122-01	PL-98-265-08-3	CU 5, 30-40	biface	6.19	Coso

Table 1. Obsidian Data From the Southern San Joaquin Valley, continued.

Catalog No.	Obsidian Lab Number	Provenience	Artifact	Microns	Source
0036-01-a	PL-98-265-08-4	SSU 1, 0-10	debitage	5.43	Coso
0038-01-b	PL-98-265-08-6	SSU 2, 0-10	debitage	8.05	Coso
0042-01	PL-98-265-08-7	CU 1, 10-20	core	8.32	Coso
0044-01-a	PL-98-265-08-8	CU 1, 20-30	debitage	8.77	Coso
0044-01-b	PL-98-265-08-9	CU 1, 20-30	debitage	11.64	Coso
0077-01-a	PL-98-265-08-10	CU 2, 30-40	debitage	12.49	Coso
0081-01	PL-98-265-08-11	CU 2, 50-60	debitage	8.45	Coso
0091-01	PL-98-265-08-12	CU 3, 0-10	core	8.95	Coso
0098-01-a	PL-98-265-08-13	CU 4, 0-10	core	9.33	Coso
0098-01-b	PL-98-265-08-14	CU 4, 0-10	debitage	6.41	Coso
0116-01-a	PL-98-265-08-15	CU 5, 0-10	debitage	9.6	Coso
0118-01-a	PL-98-265-08-16	CU 5, 10-20	debitage	7.76	Coso
0127-01-a	PL-98-265-08-17	CU 5, 40-50	core	4.91	Coso
CA-KER-5408 (The Grasse Site)					
2	PL-98-474-2	surface	debitage	4.28	Casa Diablo
3	PL-98-474-3	surface	debitage	5.65	unidentified
4	PL-98-474-4	surface	biface	6.35	Casa Diablo
26	PL-98-474-5	surface	debitage	8.66	Coso
27	PL-98-474-6	surface	debitage	3.52	Coso
28	PL-98-474-7	surface	debitage	3.61	Coso
6	PL-99-562-1	surface	debitage	3.95	Obsidian Butte
9	PL-99-562-2	surface	debitage	3.74	Queen?
12	PL-99-562-3	surface	debitage	6.41	Coso
15	PL-99-562-4	surface	debitage	2.35	Queen
48	PL-99-562-5	surface	debitage	2.09	Coso
54	PL-99-562-7	surface	debitage	7.13	Coso
56	PL-99-562-8	surface	debitage	4.75	Coso
58	PL-99-562-9	surface	debitage	5.92	Coso

a only samples with both hydration readings and sourcing data are included

SCA= surface collection area
TEU = test excavation unit
SP = shovel pit
SD = sample disintegrated
EU= excavation unit
RRU = rapid recovery unit
STP = shovel test pit
ST = strata trench
TU = test unit
CU = control unit
NHV = no hydration visible
T = trench