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SOURCE PROVENANCE OF OBSIDIAN ARTIFACTS FROM CA-LAN-63, WEST LOS ANGELES COUNTY CALIFORNIA

by

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Director

Report Prepared for
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Statistical Research, Inc.
Redlands, California

30 September 2004
INTRODUCTION

As expected for Intermediate and Archaic (Millingstone) periods in southern California, all the obsidian artifacts from these sites were produced from Inyo and Mono County sources in eastern California; the West Sugarloaf dome in the Coso Volcanic Field, Inyo County, the Mono Glass Mountain source and the Casa Diablo source in Mono County farther north.

ANALYSIS AND INSTRUMENTATION

All archaeological samples are analyzed whole. The results presented here are quantitative in that they are derived from "filtered" intensity values ratioed to the appropriate x-ray continuum regions through a least squares fitting formula rather than plotting the proportions of the net intensities in a ternary system (McCarthy and Schamber 1981; Schamber 1977). Or more essentially, these data through the analysis of international rock standards, allow for inter-instrument comparison with a predictable degree of certainty (Hampel 1984).

The trace element analyses were performed in the Archaeological XRF Laboratory, Department of Earth and Planetary Sciences, University of California, Berkeley, using a Spectrace/ThermoNoran™ QuanX energy dispersive x-ray fluorescence spectrometer. The spectrometer is equipped with an air cooled Cu x-ray target with a 125 micron Be window, an x-ray generator that operates from 4-50 kV/0.02-2.0 mA at 0.02 increments, using an IBM PC based microprocessor and WinTrace™ reduction software. The x-ray tube is operated at 30 kV, 0.14 mA, using a 0.05 mm (medium) Pd primary beam filter in an air path at 200 seconds livetime to generate x-ray intensity Kα-line data for elements titanium (Ti), manganese (Mn), iron (as FeT), thorium (Th), rubidium (Rb), strontium (Sr), yttrium (Y), zirconium (Zr), and niobium (Nb). Trace element intensities were converted to concentration estimates by employing a least-squares calibration line established for each element from the analysis of international rock standards certified by the National Institute of Standards and Technology.
The data from the WinTrace software were translated directly into Excel for Windows software for manipulation and on into SPSS for Windows for statistical analyses. In order to evaluate these quantitative determinations, machine data were compared to measurements of known standards during each run. RGM-1 is analyzed during each sample run to check machine calibration (Table 1).

Trace element data exhibited in Table 1 and Figure 1 is reported in parts per million (ppm), a quantitative measure by weight. Source nomenclature is from Hughes (1988, 1994) Jack (1976), and Gilreath and Hildebrandt (1997).

Discussion

The presence of Inyo and Mono County, California obsidian in southern California Intermediate and Archaic period sites is typical (Hughes and True 1985). The one biface produced from obsidian originally procured from Mono Glass Mountain exhibits a quality not generally found today at that dome. I have seen good quality Mono Glass Mountain obsidian,
but it is relatively uncommon. Much of the glass at the source today is more vitrophyric than this specimen.

REFERENCES CITED

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Govindaraju, K.

Hampel, Joachim H.

Hughes, R.E.


Hughes, Richard E., and Robert L. Smith

Hughes, Richard E., and Delbert L. True

Jack, R.N.

Mahood, Gail A., and James A. Stimac

McCarthy, J.J., and F.H. Schamber
Schamber, F.H.

Shackley, M. Steven

Table 1. Elemental concentrations for archaeological samples. All measurements in parts per million (ppm).

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<tr>
<th>Sample</th>
<th>Ti</th>
<th>Mn</th>
<th>Fe</th>
<th>Rb</th>
<th>Sr</th>
<th>Y</th>
<th>Zr</th>
<th>Nb</th>
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Figure 1. Rb, Sr, Zr three-dimensional plot of the archaeological specimens. Assignment to West Sugarloaf dome in the Coso Volcanic Field based on compositional ranges reported by Hughes (1988).