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LETTER REPORT

A WAVELENGTH DISPERSIVE X-RAY FLUORESCENCE ANALYSIS OF OBSIDIAN ARTIFACTS FROM ARCHAEOLOGICAL SITES NEAR SEAL BEACH, ORANGE COUNTY, CALIFORNIA

14 June 2002

Cheryl Bowden-Renna
EDAW, Inc.
1420 Kettner Boulevard, Suite 620
San Diego, CA 92101

Dear Ms. Bowden-Renna:

The source provenance of the artifacts from these three sites is rather typical of Orange County assemblages. The collection is dominated by artifacts produced from obsidian procured from the Coso Volcanic Field in Inyo County, one piece from Casa Diablo in Mono County, and the remainder from one of the fused shale sources on the southern California coast (see Ericson et al. 1976). Many of these samples are so small that source provenance cannot be confidently determined (see Davis et al. 1998). One sample (CA-ORA-263-1018) appears to be one of the fused shale sources or a vitrophyre, but does not fit the range of concentrations known from these sources. (Table 1 and Figure 1).

The samples were analyzed with a Philips PW2400 sequential wavelength dispersive x-ray spectrometer in the Department of Geology/Geophysics, University of California, Berkeley. This crystal spectrometer uses specific software written by Philips (SuperQ/quantitative) and modifies the instrument settings between elements of interest. Sample selection is automated and controlled by the Philips software. Analysis of the USGS RGM-1 standard indicates high machine precision for the elements of interest (Govnidaraju 1994; Table 1 here). Further information on this instrument is available in Shackley (1998), and at http://obsidian.pahma.berkeley.edu/philipspw2400.htm. Source determination was made using source standards at Berkeley, and reference to Hughes (1988, 1994), and data supplied by Craig Skinner.

Sincerely,

M. Steven Shackley, Ph.D.
Director

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INTERNET: shackley@sscl.berkeley.edu
http://obsidian.pahma.berkeley.edu/
REFERENCES CITED

Davis, M. Kathleen, Thomas L. Jackson, M. Steven Shackley, Timothy Teague, and Joachim H. Hampel
1998  Factors Affecting the Energy-Dispersive X-Ray Fluorescence (EDXRF) Analysis of
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Ericson, J.E., T.A. Hagan, and C.W. Chesterman
1976  Prehistoric Obsidian in California II: Geologic and Geographic Aspects.  In Advances in
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Hughes, R.E.
1988  The Coso Volcanic Field Reexamined: Implications for Obsidian Sourcing Studies and

1994  Intrasource Chemical Variability of Artefact-Quality Obsidians from the Casa Diablo Area,

Govindaraju, K.
1994  1994 Compilation of Working Values and Sample Description for 383

Shackley, M. S.
1998  Geochemical Differentiation and Prehistoric Procurement of Obsidian in the Mount Taylor

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

<table>
<thead>
<tr>
<th>Sample</th>
<th>Rb</th>
<th>Sr</th>
<th>Y</th>
<th>Zr</th>
<th>Nb</th>
<th>Ba</th>
<th>Source</th>
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<td>CA-ORA-261-258</td>
<td>189</td>
<td>31</td>
<td>44</td>
<td>297</td>
<td>37</td>
<td>600</td>
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<td>CA-ORA-262-156</td>
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<td>15</td>
<td>47</td>
<td>132</td>
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<td>141</td>
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<td>30</td>
<td>58</td>
<td>336</td>
<td>39</td>
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<td>15</td>
<td>53</td>
<td>154</td>
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<td>47</td>
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<tr>
<td>CA-ORA-262-54B</td>
<td>238</td>
<td>12</td>
<td>44</td>
<td>120</td>
<td>35</td>
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<tr>
<td>CA-ORA-263-1018</td>
<td>208</td>
<td>88</td>
<td>23</td>
<td>76</td>
<td>2</td>
<td>901</td>
<td>Grimes Canyon? Or vitrophyre</td>
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<td>CA-ORA-263-367</td>
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<td>51</td>
<td>136</td>
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<td>159</td>
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<tr>
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Figure 1. Rb, Sr, Zr three dimensional plot of archaeological sample elemental concentrations.