Trace Element Analysis of Obsidian Artifacts from Six Archaeological Sites in Illinois

Richard E. Hughes and Andrew C. Fortier

Ten obsidian artifacts from six archaeological sites in Illinois were analyzed to determine their geologic source(s) of origin using nondestructive energy-dispersive X-ray fluorescence analysis. Results indicate that the majority of samples, representing Middle and perhaps Early Woodland period times, were manufactured from volcanic glass of the Obsidian Cliff chemical type, located in Yellowstone National Park, Wyoming, with one specimen derived from a more distant western North American obsidian source (Bear Gulch, Idaho).

Introduction

Ten years ago (Hughes and Fortier 1997), we presented the initial results of a long-term, collaborative project to determine the sources of various obsidian artifacts from prehistoric contexts in Illinois. The first-order objective of this project is to determine the sources of obsidian used to manufacture artifacts recovered from sites in Illinois, but we are concerned more generally with determining contextual patterns for obsidian at archaeological sites, investigating technological aspects of obsidian manufacture (i.e., are they lamellar blades, cores, or flakes), identifying potential regional variations in source use, and identifying any patterns that may be cross-correlated among the aforementioned components of our study. This article contributes further to these goals by presenting recent results derived from our ongoing research.

Earlier Obsidian Studies in Illinois

For this project, 10 obsidian artifacts from six Illinois sites were analyzed to determine their geologic source(s) of origin. Of these, six are formed tools and four are unutilized flakes. Although flakes occur at many sites in Illinois (Griffin 1965), obsidian tools are comparatively rare and few reports containing baseline elemental analysis data have been published (but see Griffin et al. 1969; Hughes and Fortier 1997). Obsidian has typically been recovered from surface contexts in Illinois, and more rarely from specific features.
However, 119 pieces of obsidian were reported from the Napoleon Hollow site in the lower Illinois River valley (Wiant and McGimsey 1986:333), and many of these were recovered from fills directly above features, including a circular post structure. Four of the 10 artifacts in this study are from pit feature contexts. The remaining six artifacts are from surface contexts.

Obsidian has also been identified in multiple mound contexts in Illinois (Griffin 1965; Perino 2006; see also Farnsworth 2006). In some cases, obsidian is definitely associated with specific tomb contexts; in others, contexts are mound fills or adjacent fills. Some better-known examples from excavated tomb or fill contexts from the Kaskaskia River region in Illinois include the North site, Mound 2, Tomb B (Perino 2006:341), and the Kraske site, Mound 8, Burial 2 (Perino 2006:329). From western Illinois contexts, examples include the Lawrence Gay Mound 5, Burial 1; Bedford Mound 12 (Perino 2006:267); Montezuma Mound 8, Burial 2 (Perino 2006:286); the Gibson Mound 2 site (Perino 2006:346); and the Frederick site, Mound 4 (Perkins 1965:Figure 47). There are at least twice as many other occurrences (K. Farnsworth 2007, personal communication), but they are too numerous to list here. Although it is beyond the scope of this article to correlate all of the known obsidian-bearing contexts with specific artifact types (documenting, for example, where blades or bifaces come from within specific sites), doing so could reveal some previously unrecognized patterns and relationships.

Virtually all of the obsidian documented in Illinois has come from Middle Woodland contexts, and it occurs mostly during a relatively restricted horizon that is commonly referred to as Hopewell. The dates for Hopewell vary somewhat by region but in Illinois probably range between cal. A.D. 50–200 (Fortier et al. 2006:173). One piece in the present sample (from Barnhill’s Farmstead), however, may date to the Black Sand horizon (the Ringering phase in the American Bottom) of the Early Woodland period (circa cal. 700–800 B.C.). If ongoing analysis confirms its Early Woodland age, this specimen would be temporally coeval with obsidian reported from Early Woodland (Marion/Red Ochre) contexts in Wisconsin and Michigan (Pleger 1998, 2000; Stoltman and Hughes 2004).

The Obsidian Artifacts and Their Contexts

Ten obsidian artifacts were available for sourcing. Four of these represent nonutilized flake debitage. The remaining six artifacts are either bifacially (N = 4) or unifacially worked (N = 2) tools, including one effigy biface, three biface fragments, a worked blade core fragment, and one unifacial knife. Six of the samples are lamellar blades, three of which are the tools.

The 10 prehistoric obsidian artifacts analyzed and reported here come from a variety of archaeological contexts in Illinois and include samples from the American Bottom, western Illinois, and the lower Kaskaskia River regions (Figure 1). A number of the samples from surface or midden contexts are included because they occur at single-component sites (based on other surface diagnostics). All but one of the 10 samples appear to date to the Middle Woodland period or Hopewell horizon. The other artifact may date to the Early Woodland period. Brief descriptions of each artifact and its context follow.
American Bottom

Two obsidian samples come from sites in the American Bottom, one each from the Simpson Floodplain #1 (11R231) and Barnhill’s Farmstead (11MS637) sites.

Simpson Floodplain #1

This sample (Marge Erb collection, Inloan 2006.012; Figure 2a) is a 3.45 cm long bifacially retouched lamellar blade, weighing 2.5 g and having a thickness of .38 cm. The blade is 1.64 cm wide at its widest point and there are three arrises or dorsal ridges. Approximately 80 percent of the dorsal edge is retouched, and about 60 percent of the ventral edge is retouched.
The artifact appears to represent some kind of effigy, possibly a bird (raptor). Two opposing notches, essentially accentuating what appear to be folded wings, demarcate the base from the upper torso. The head is notched on one side, giving the appearance of a beak turned sideways. There is also bilateral notching at the top of the artifact that may represent a top head tuft. This artifact is a surface find. The site has yielded a variety of Middle Woodland artifacts, dating probably to the Holding phase or Hopewell horizon. A portion of this site was identified during the 1970s Historic Sites Survey directed by James Porter (Porter and Linder 1974), but at that time, no diagnostics were recovered or component assignments made. This is the first obsidian artifact that we are aware of that was ever recovered or sourced from Randolph County.

**Barnhill’s Farmstead**

A fragment of a retouched obsidian blade core, weighing 5.4 g, was recovered as a midden piece plot from the Barnhill’s Farmstead site (11MS637), located at the north end of the American Bottom in Madison County on a colluvial slope (piece plot 1573; Figure 2b). Although this site was excavated by ITARP in 1992 and the material is curated by ITARP, the site has not yet been fully analyzed. The artifact was located on the colluvial slope located along the Mississippi floodplain/bluff edge. No Middle Woodland materials were recovered from the site; the midden yielded primarily Early Woodland Black Sand (Ringering phase) materials, although no datable features were identified. Because of this, a precise
chronological assignment cannot be made with confidence, but an Early Woodland association for this piece of obsidian certainly is possible. This artifact is approximately .86 cm thick, but because it is irregular in shape, no other measurements were taken. The piece appears to represent a fragment of a blade core: there are three parallel linear flake scars on one dorsal surface. Utilization scars occur on one dorsal edge. The striking platform is still intact and exhibits a crushed surface. There is a large white mineral inclusion (probably a phenocryst or spherulite) evident on the platform, which is often characteristic of geological (and archaeological) examples of Obsidian Cliff obsidian (see Iddings 1888).

Lower Kaskaskia River

Two obsidian artifacts were analyzed from the Kraske site (11S41), both surface finds from the Middle Woodland village portion of this site. There are also Middle Woodland mounds in the vicinity of the village, some excavated by Perino (2006).

Kraske

Knife Fragment. The first piece (11S41; ITARP Inloan 2006.011; Figure 2c) is a bifacially retouched knife fragment, weighing 2.4 g and measuring .64 cm in thickness. It is pressure flaked around the entire lateral edge as well as on both ventral and dorsal surfaces. It is made on a flake, not a blade.

Tool Fragment. The second piece (11S41; ITARP Inloan 2003.011; Figure 2d) is also bifacially retouched and represents a tool fragment made on a lamellar blade. It weighs 2.4 g and is 3.27 cm long, 1.50 cm wide, and .54 cm thick. It is pressure flaked, but only along the lateral edges.

Western Illinois

Six obsidian artifacts were analyzed from three sites in western Illinois: one from the Pool site (11PK1), one from the Irving site (11PK2), and four from the Spoon Toe site (11MG179).

Irving

A single obsidian artifact (11PK2; #1998.19.4000; Figure 3) was recovered from Feature 47, a Hopewell pit in Area S at the north end of the site. This artifact was excavated by McGregor and illustrated in the Pool/Irving report (McGregor 1958:120, Figure 40). This artifact is an unbroken unifacially worked outrepasse (over-shot flake) lamellar blade knife. It is 7.35 cm long, 1.72 cm wide with two arrises, and is .37 cm thick. It weighs 8.3 g. It is one of the longest utilized obsidian blades known from Illinois.

Pool

This specimen (11PK1; A6877; Figure 4a) is made on a nonutilized lamellar blade. It is unintentionally nicked along its edges, but not retouched. It was recovered during McGregor’s excavations of the Pool village, a large Hopewell habitation site in Pike County in the Illinois
River valley of western Illinois. It was described as a “broad flake knife” in the site report (McGregor 1958:122), but within-site provenience was not given. It is presently being curated by ITARP. The artifact is .47 cm long, 1.80 cm wide, and .45 cm thick. It weighs 2.3 g.

**Spoon Toe**

*Lamellar Blade.* This artifact (11MG179; Feature 20-9/piece plot 2; Figure 4b) was recovered from a pit feature (Feature 20) at the Spoon Toe site, a Hopewell camp located in the uplands of western Illinois, east of the Illinois River. It is a lamellar blade, but is not utilized. It is 5.84 cm long, 2.50 cm wide, and .39 cm thick. It weighs 5.9 g. It has a single dorsal ridge and is snapped horizontally at the distal end.

*Lamellar Blade.* This artifact (11MG179; Feature 20-10/piece plot 3; Figure 4c) also comes from pit Feature 20 and is also a nonutilized lamellar blade. It weighs 14.1 g and is 5.50 cm long, 3.05 cm wide, and .73 cm thick. It has a snapped base and two prominent dorsal ridges (arrises).
**Shatter Flake.** This is a smaller shatter flake (11MG179; Feature 37-11/piece plot 1; Figure 4d) recovered from pit Feature 37. It is not utilized and weighs .7g and is .29 cm thick.

**Shatter Flake.** This artifact (11MG179; 900-8/backdirt; Figure 4e) was recovered from the backdirt located near several excavated features. It is a nonutilized shatter flake weighing only .2 g and having a thickness of .20 cm.

All of the Spoon Toe materials are derived from recent excavations carried out by ITARP where the materials are curated. Analysis of this site is ongoing (D. Nolan, 2007 personal communication).

### X-Ray Fluorescence Laboratory Analysis and Results

Obsidian samples from the Spoon Toe (11MG179) and Barnhill’s Farmstead (11MS637) sites (Table 1) were analyzed by the senior author using the same energy-dispersive X-ray fluorescence (EDXRF) spectrometer and analytical conditions reported in Hughes and Fortier (1997). Laboratory analyses on specimens from the Kraske (11S41), Pool (11PK1), Irving (11PK2) and Simpson Floodplain #1 (11R231) sites were conducted by the senior author using a QuanX-EC™ (Thermo Electron Corporation) EDXRF spectrometer equipped with a silver (Ag) X-ray tube, a 50 kV X-ray generator, digital pulse processor with automated energy calibration, and a Peltier cooled solid state detector with 145 eV resolution (FWHM) at 5.9 keV. The X-ray tube was operated at differing voltage and current settings to optimize excitation of the elements selected for analysis. Analyses were conducted on all specimens for the elements rubidium (Rb Kα), strontium (Sr Kα), yttrium (Y Kα), zirconium (Zr Kα), and niobium (Nb Kα), and certain artifacts were analyzed to determine concentrations of barium (Ba Kα), titanium (Ti Kα), manganese (Mn Kα), and total iron (Fe2O3T). Iron vs. manganese (Fe Kα/Mn Kα) ratios also were computed for some samples. In all cases, X-ray tube current was scaled to the physical size of each specimen. Other details involving calibration procedures, element-specific measurement resolution, and comparative literature references appear elsewhere (Hughes 1988:257-258, 1994:265-267; Hughes and Pavesic 2005:221-222). The analyses were completely nondestructive; sample pretreatment was limited to a simple cleaning with distilled water to remove any possible surface contaminants.

Tables 1 and 2 present trace element data showing that nine of the 10 specimens analyzed were manufactured from volcanic glass of the Obsidian Cliff, Wyoming, geochemical type. A single specimen, from 11R231, was fashioned from Bear Gulch, Idaho, obsidian (see Figure 5). The artifact-to-source (chemical type) correspondences between these Illinois artifacts and geologic obsidian parent materials are illustrated graphically by contrasts in Y vs. Zr composition (see Figure 6). As noted elsewhere (Hughes 2007:note 2) Y/Zr ppm measurements separate Obsidian Cliff glass from all other obsidian sources (chemical types) identified in middle western archaeological sites, but they overlap slightly with values for obsidians erupted in the Jemez Mountains of northern New Mexico (i.e., Obsidian Ridge [a.k.a. Cerro Toledo Rhyolite] and Cerro del Medio [a.k.a. Valles Rhyolite]; Shackley 2005: Tables A.4 and A.5). However, because Nb values for Obsidian Ridge material are typically 90–100 ppm and those for Obsidian Cliff range from ca. 40–45 ppm, the two are readily distinguished from one another. Likewise, because Obsidian Cliff contains ca. 100 ppm more Rb than does Cerro del Medio (cf. Macdonald et al. 1992:Appendix I, 148–149), these two obsidians also are easily distinguished on the basis of mid-Z trace element contrasts (as well as by differing Fe/Mn ratios).
Table 1. X-ray Fluorescence Data for Obsidian Artifacts from the Spoon Toe (11MG179) and Barnhill’s Farmstead (11MS637) Archaeological Sites in Illinois.

<table>
<thead>
<tr>
<th>Cat. Number</th>
<th>Zn</th>
<th>Ga</th>
<th>Rb</th>
<th>Sr</th>
<th>Y</th>
<th>Zr</th>
<th>Nb</th>
<th>Ba</th>
<th>Ti</th>
<th>Mn</th>
<th>Fe$_2$O$_3^{T}$</th>
<th>Obsidian Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>11MG179, 900-8</td>
<td>83</td>
<td>21</td>
<td>250</td>
<td>4</td>
<td>80</td>
<td>164</td>
<td>44</td>
<td>nm</td>
<td>514</td>
<td>237</td>
<td>1.27</td>
<td>Obsidian Cliff, WY</td>
</tr>
<tr>
<td>11MG179, F37-1</td>
<td>78</td>
<td>20</td>
<td>246</td>
<td>7</td>
<td>79</td>
<td>166</td>
<td>42</td>
<td>nm</td>
<td>503</td>
<td>244</td>
<td>1.30</td>
<td>Obsidian Cliff, WY</td>
</tr>
<tr>
<td>11MG179, F20-10</td>
<td>69</td>
<td>18</td>
<td>230</td>
<td>6</td>
<td>73</td>
<td>160</td>
<td>36</td>
<td>nm</td>
<td>531</td>
<td>255</td>
<td>1.34</td>
<td>Obsidian Cliff, WY</td>
</tr>
<tr>
<td>11MG179, F20-9</td>
<td>79</td>
<td>22</td>
<td>249</td>
<td>7</td>
<td>78</td>
<td>168</td>
<td>43</td>
<td>nm</td>
<td>502</td>
<td>256</td>
<td>1.38</td>
<td>Obsidian Cliff, WY</td>
</tr>
<tr>
<td>11MS637, pp1573</td>
<td>67</td>
<td>19</td>
<td>238</td>
<td>6</td>
<td>80</td>
<td>165</td>
<td>36</td>
<td>nm</td>
<td>471</td>
<td>255</td>
<td>1.36</td>
<td>Obsidian Cliff, WY</td>
</tr>
</tbody>
</table>

All trace element values in parts per million (ppm) except total iron (expressed in weight percent composition; ± = pooled expression (in ppm) of x-ray counting uncertainty and regression fitting error at 300 seconds livetime. nm= not measured.
<table>
<thead>
<tr>
<th>Cat. Number</th>
<th>Zn</th>
<th>Ga</th>
<th>Rb</th>
<th>Sr</th>
<th>Y</th>
<th>Zr</th>
<th>Nb</th>
<th>Ba</th>
<th>Ti</th>
<th>Mn</th>
<th>$\text{Fe}_2\text{O}_3$</th>
<th>Fe/Mn</th>
<th>Obsidian Source (Chemical Type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11S41,</td>
<td>nm</td>
<td>nm</td>
<td>239</td>
<td>6</td>
<td>80</td>
<td>168</td>
<td>42</td>
<td>20</td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td>67</td>
<td>Obsidian Cliff, WY</td>
</tr>
<tr>
<td>2003.011</td>
<td>±4</td>
<td>±3</td>
<td>±3</td>
<td>±4</td>
<td>±3</td>
<td>±10</td>
<td></td>
<td></td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11S41,</td>
<td>nm</td>
<td>nm</td>
<td>235</td>
<td>5</td>
<td>78</td>
<td>168</td>
<td>44</td>
<td>17</td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td>60</td>
<td>Obsidian Cliff, WY</td>
</tr>
<tr>
<td>2006.011</td>
<td>±4</td>
<td>±3</td>
<td>±3</td>
<td>±4</td>
<td>±3</td>
<td>±10</td>
<td></td>
<td></td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11PK1,</td>
<td>nm</td>
<td>nm</td>
<td>237</td>
<td>5</td>
<td>78</td>
<td>170</td>
<td>43</td>
<td>8</td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td>62</td>
<td>Obsidian Cliff, WY</td>
</tr>
<tr>
<td>2003.011</td>
<td>±4</td>
<td>±3</td>
<td>±3</td>
<td>±4</td>
<td>±3</td>
<td>±10</td>
<td></td>
<td></td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11PK2,</td>
<td>nm</td>
<td>nm</td>
<td>238</td>
<td>6</td>
<td>80</td>
<td>173</td>
<td>43</td>
<td>0</td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td>66</td>
<td>Obsidian Cliff, WY</td>
</tr>
<tr>
<td>2006.013</td>
<td>±4</td>
<td>±3</td>
<td>±3</td>
<td>±4</td>
<td>±3</td>
<td>±10</td>
<td></td>
<td></td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11R231,</td>
<td>nm</td>
<td>nm</td>
<td>171</td>
<td>49</td>
<td>45</td>
<td>307</td>
<td>56</td>
<td>701</td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td>52</td>
<td>Bear Gulch, ID</td>
</tr>
<tr>
<td>2006.012</td>
<td>±4</td>
<td>±3</td>
<td>±3</td>
<td>±4</td>
<td>±3</td>
<td>±10</td>
<td></td>
<td></td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RGM-1</td>
<td>nm</td>
<td>nm</td>
<td>151</td>
<td>104</td>
<td>25</td>
<td>224</td>
<td>8</td>
<td>803</td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td>61</td>
<td>Glass Mtn., CA</td>
</tr>
<tr>
<td>(measured)</td>
<td>±4</td>
<td>±3</td>
<td>±3</td>
<td>±4</td>
<td>±3</td>
<td>±10</td>
<td></td>
<td></td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RGM-1</td>
<td>32</td>
<td>15</td>
<td>149</td>
<td>108</td>
<td>25</td>
<td>219</td>
<td>9</td>
<td>807</td>
<td>1600</td>
<td>279</td>
<td>1.86</td>
<td>nr</td>
<td>Glass Mtn., CA</td>
</tr>
<tr>
<td>(recommended)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Values are given in parts per million (ppm) except total iron (which is express in weight percentage composition and Fe/Mn intensity ratios; ± = X-ray counting uncertainty and regression fitting error at 120–360 seconds livetime. nm = not measured. nr = not reported.
Summary and Concluding Comments

Just as volcanic glass from Obsidian Cliff is the preponderant chemical type identified archaeologically in adjacent areas of the middle and upper Midwest (Anderson et al. 1986; Griffin et al. 1969; Hughes 2006, 2007), results of this research provide additional support for the results of our earlier study at sites in the American Bottom (Hughes and Fortier 1997) wherein Obsidian Cliff volcanic glass was the most frequent obsidian encountered. Although the number of artifacts analyzed in that pilot study was quite small, the sourcespecific results are remarkably similar to those generated here. In the present case, nine of
the 10 samples analyzed were manufactured from Obsidian Cliff material, with a single artifact (sample 2006.012 from 11R231) made from Bear Gulch, Idaho, obsidian. At the risk of imbuing this latter specimen with too much significance, it is worth noting that regardless of whether one subscribes to the notion that it is an effigy, it is clearly a formed tool. As such, its presence conforms to findings in the American Bottom and several Middle Woodland Hopewellian sites (Hughes 2006) that, to date, Bear Gulch obsidian debitage is rare or altogether absent. The sample analyzed from the Simpson Floodplain #1 site represents only the second documented occurrence of Bear Gulch obsidian in the American Bottom (Hughes and Fortier 1997:88). Furthermore, if sustained by ongoing analysis of the overall site assemblage, the Early Woodland age assignment for the specimen from Barnhill’s Farmstead (11MS637) would provide the first evidence for the use of Obsidian Cliff obsidian in the American Bottom during this time period. Because all obsidian samples analyzed from stratified, C14-dated Early Woodland contexts at the Tillmont (47CR460) site in Wisconsin were made from Obsidian Cliff volcanic glass (Stoltman and Hughes 2004), the presence of this obsidian in both Early Woodland and Middle Woodland contexts indicates a more complex pattern of acquisition and conveyance in the Midwest than previously proposed. The obsidian from the Tillmont site in Wisconsin is associated with the Indian Isle component, a variant of the Early Woodland Marion culture. The Barnhill’s Farmstead artifact was recovered from a sealed midden with only Black Sand pottery and contracting-stemmed.

Figure 6. Y vs. Zr composition of obsidian artifacts from Illinois archaeological sites. Data from Tables 1 and 2 herein. Open triangles represent values for artifacts, while dashed lined demarcate the range of variation measured in geological obsidian reference samples (from Hughes 1984: Table 3; 1995; Hughes and Nelson 1987: Table 1; Nelson 1984: Table 5, source # 38; Macdonald et al. 1992: Appendix 1, p. 142). The numbers of plots do not correspond exactly to the numbers in the tables because of convergence in data points at this scale.
Hughes and Fortier

projectile points, suggesting that two otherwise distinct Early Woodland groups apparently had access to the same obsidian. In addition, this complex pattern of acquisition during the Early Woodland period is further supported by a block of Obsidian Cliff obsidian found with a burial at the Riverside site in Michigan that is associated with the Early Woodland Red Ochre culture, a third distinct group within this period (Pleger 1998, 2000; Stoltman and Hughes 2004). Taken together, these data provide additional support for the view that, contra Griffin (1965:146), the initial arrival of obsidian in the Midwest predates Hopewell by several centuries.

Acknowledgments

We would like to thank Dr. Thomas E. Emerson, program director of the Illinois Transportation Archaeological Research Program (ITARP), for funding this obsidian-sourcing project and, as editor of this journal, for promoting timely publication of the results. Thanks are also due to the Spurlock Museum at the University of Illinois at Urbana-Champaign for the loan of one of the obsidian specimens from the Irving site, and to Laura Kozuch, curator at ITARP, for expediting the loan arrangement and tracking down various artifacts in ITARP’s curation facility in Champaign. Brad Koldehoff was very helpful in providing additional obsidian artifacts from the Kraske and Simpson Floodplain #1 sites that were in private collections in southern Illinois. The Simpson Floodplain #1 artifact belongs to the local landowner, Ms. Margie Erb, and was brought to our attention by Brad Koldehoff, who acquired the artifact on loan to ITARP so that we could obtain metric attributes as well as an illustration and photograph. The two Kraske items analyzed here were collected by Mr. Dean Burke, who made them known to Brad Koldehoff. ITARP received both pieces on loan and took measurements and illustrations before submitting the samples for analyses. We would like to thank Ms. Margie Erb and Mr. Dean Burke for entrusting the authors with these artifacts. Dave Nolan provided additional, as yet unanalyzed, specimens from the Spoon Toe site in western Illinois. We also thank Linda Alexander of ITARP for illustrations of the individual artifacts and Mike Farkas of ITARP for the production of Figure 1. Maps and illustrations created by ITARP are used with that organization’s permission. Finally, we thank Anne Rogers for editing the manuscript and very much appreciate the substantive comments and suggestions from Kenneth Farnsworth and Thomas Emerson.

References Cited

Anderson, Duane C., Joseph A. Tiffany, and Fred W. Nelson


Farnsworth, Kenneth B.

Fortier, Andrew C., Thomas E. Emerson, and Dale L. McElrath

Griffin, James B.

Griffin, James B., Adon A. Gordus, and Gary A. Wright

Hughes, Richard E.

Hughes, Richard E., and Andrew C. Fortier

Hughes, Richard E., and Fred W. Nelson

Hughes, Richard E., and Max G. Pavesic

Iddings, Joseph P.

Macdonald, Ray, Robert L. Smith, and John E. Thomas

McGregor, John C.

Nelson Fred W., Jr.
Perino, Gregory  

Perkins, Raymond W.  

Pleger, Thomas C.  


Porter, James W., and Jean R. Linder  

Shackley, M. Steven  

Stoltman, James B., and Richard E. Hughes  

Wiant, Michael D., and Charles R. McGimsey  