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 Compiled by Philadelphia J. Morrow and Michael N. Machette

Geochemistry of Archeological Obsidian Sources in the Saline Range, Death Valley National Park, California

Lynn Johnson,¹ David L. Wagner,² and Craig E. Skinner³

¹Archaeological Research Center, California State University—Sacramento, Sacramento, CA 95819
<ljohnson@cwo.com>

²California Division of Mines and Geology, Sacramento, CA 95814 <dwagner@consrv.ca.gov>

³Northwest Research Obsidian Studies Laboratory, 1414 NW Polk, Corvallis, OR 97330
<cskinner@obsidianlab.com>

The Saline Range, a remote volcanic tableland located within Death Valley National Park, has recently been reported as a source for archeological obsidian (Johnson and Wagner, 1998). Obsidian-bearing rhyolitic flows and tuffs in the Saline Range were emplaced over preexisting topography and later disrupted by Basin and Range faulting, creating complex outcrop patterns. Furthermore, obsidian nodules have been transported and redeposited more than 20 km from outcrops of the source rocks. In some instances, these deposits contain nodules derived from different stratigraphic units. The geologic complexity of the Saline Range volcanic field presents substantial interpretive problems as discussed by Hughes and Smith (1993), Hughes (1998a), and Shackley (1994, 1998a, 1998b).

Our research in the Saline Range began in 1989. Initial efforts focused on locating and mapping both primary outcrops and secondary deposits in the eastern and western portions of the range, as well as documenting evidence of prehistoric exploitation. In addition, a systematic sampling program was conducted in order to establish a geochemical database for fingerprinting archeological obsidian.

A small population of obsidian nodules sampled from both primary and secondary contexts was analyzed at the University of Missouri Research Reactor Facility (MURR) by Jelmer Eerkens and Michael Glascock. Data from neutron-activation analysis suggested the presence of three geochemically distinct obsidians in the Saline Range. A much larger population was recently analyzed at Northwest Research Obsidian Studies Lab in Corvallis, Oregon. X-ray fluorescence (XRF) data confirm that the Saline Range obsidians can indeed be separated geochemically into three source groups, provisionally named Saline Valley 1, Saline Valley 2, and Saline Valley 3 (fig. 28).

Although Saline Valley has previously been reported as a source for archeological obsidian (Norwood and others, 1980; Delacorte and others, 1995; Burton, 1996a, 1996b; Burton and Farrell, 1996; Reynolds, 1996), the geologic provenance of the obsidian nodules used to characterize the "Saline Valley" glass type and the sample provenance were uncertain. Nodules were likely collected in Saline Valley from alluvial fans emanating from the east side of the Saline Range. The samples analyzed at Northwest Research Obsidian Studies Lab were collected from source-area outcrops in

the Saline Range. The trace-element chemistry of the Saline Range samples was compared with data from XRF analysis of artifacts recovered from archeological sites in Owens Valley (Hughes, 1996b, 1998b; Hughes, 1997; Delacorte, 1999; Gilreath and Nelson, 1999) and on Hunter Mountain (Hughes, 1996a). A strong correlation between Saline Valley 3 and the "Saline Valley" glass type and Saline Valley 1 and an unknown glass type dubbed "Queen Imposter" was noted (fig. 29). Although it has yet to be determined, Saline Valley 2 probably correlates with one of the other "unknown" glass types found at archeological sites in the region.

This study underscores the need to conduct a systematic sampling strategy in order to document possible intra-source geochemical variability within a particular "source" area. Continued research on the geochemical variability of obsidians in the Saline Range, as well as on spatial and temporal patterns of exploitation, will aid our understanding of obsidian procurement and use in the southwestern Great Basin.

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Saline Range obsidian compared to artifact

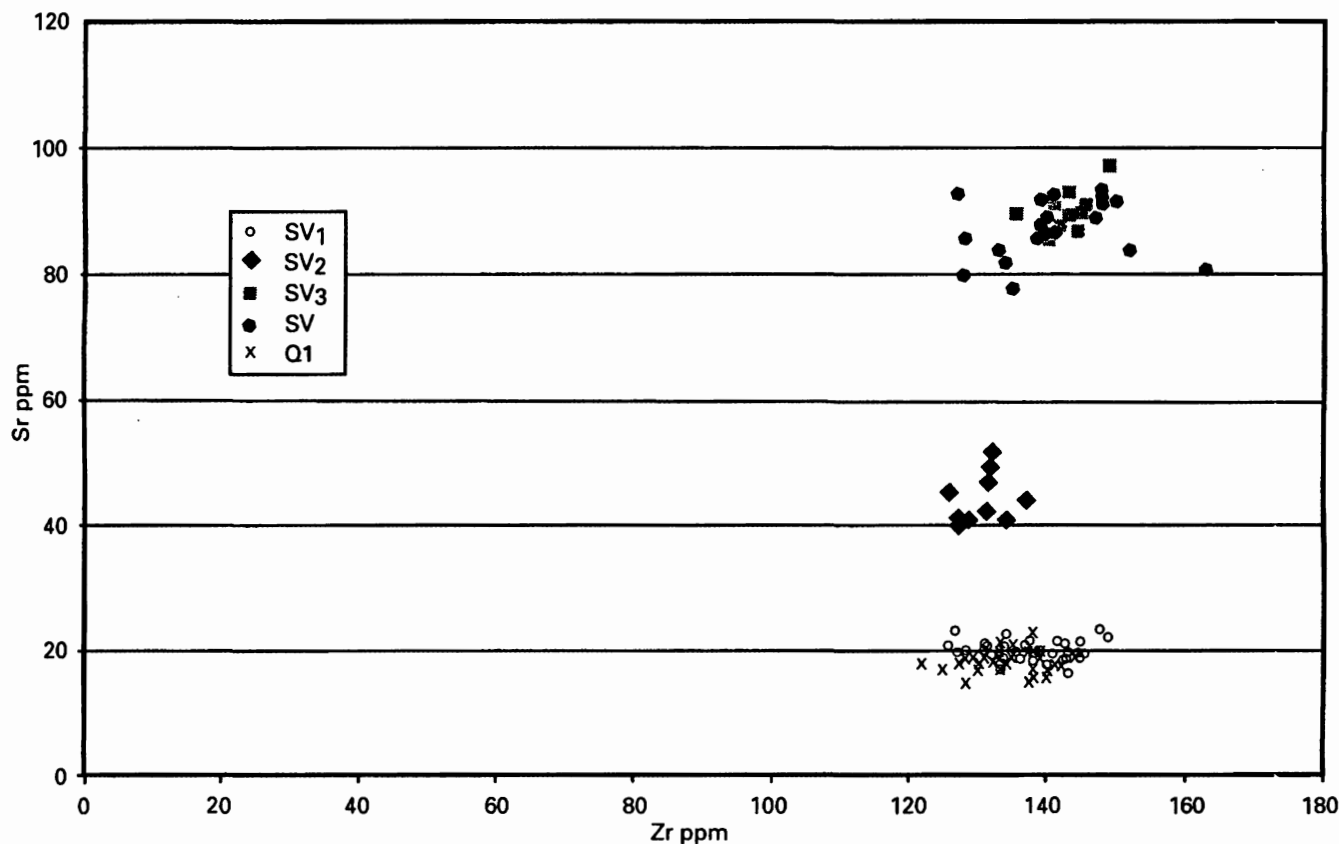


Figure 28. Scatterplot based on XRF data showing Saline Valley glass types.

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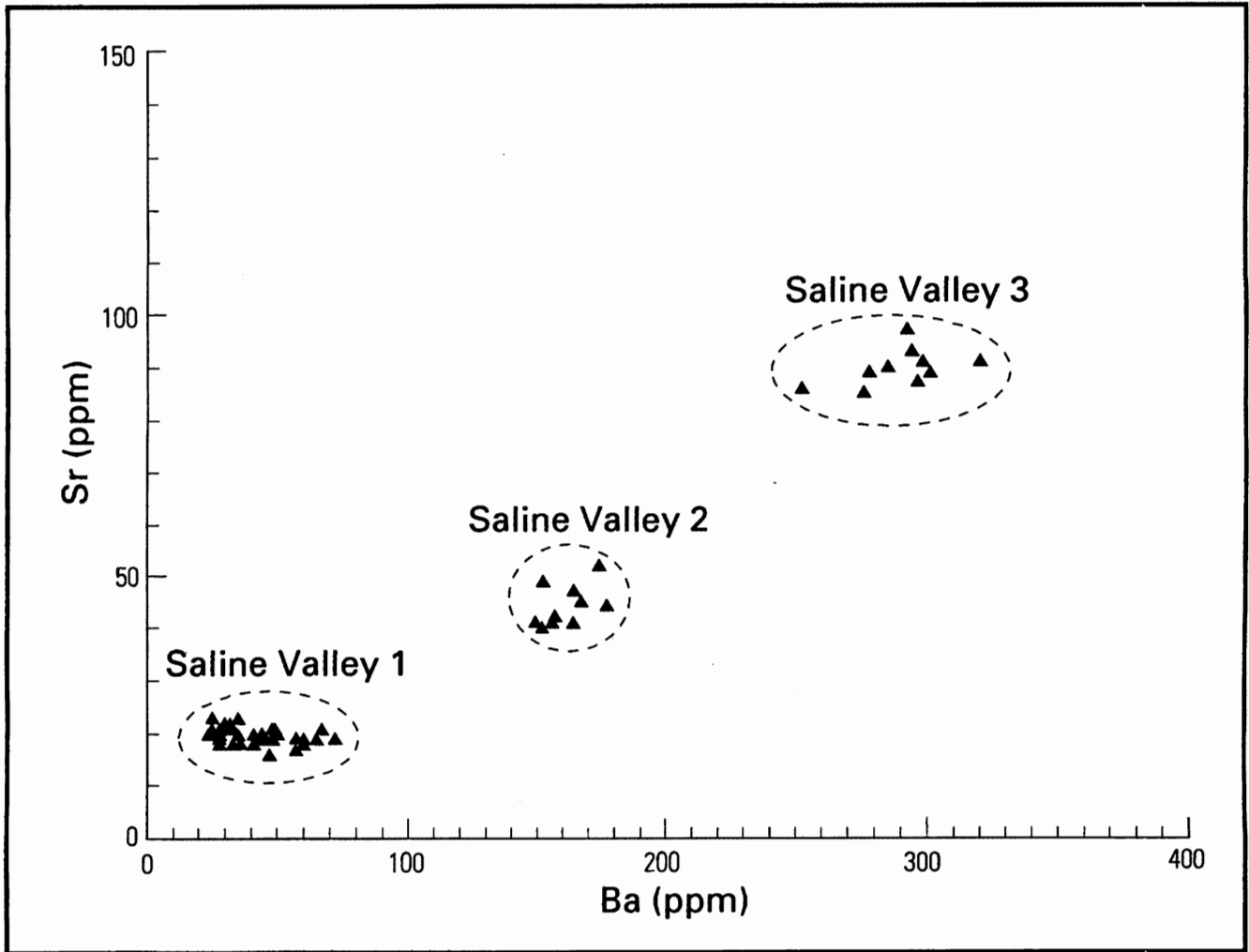


Figure 29. Scatterplot showing correlation of artifacts manufactured from the "Saline Valley" (SV) and "Queen Imposter" (QI) glass types and geologic samples of the Saline Valley 1, 2, and 3 (SV1, SV2, and SV3, respectively) glass types.