

2-18-2022

Letter Report, re: Analysis of Obsidian Artifacts from the High Plains Project

Matthew Boulanger
mboulanger@smu.edu

Follow this and additional works at: https://scholar.smu.edu/hum_sci_anthropology_research



Part of the [Archaeological Anthropology Commons](#)

Recommended Citation

Boulanger, Matthew, "Letter Report, re: Analysis of Obsidian Artifacts from the High Plains Project" (2022).
Anthropology Research. 22.
https://scholar.smu.edu/hum_sci_anthropology_research/22

This document is brought to you for free and open access by the Anthropology at SMU Scholar. It has been accepted for inclusion in Anthropology Research by an authorized administrator of SMU Scholar. For more information, please visit <http://digitalrepository.smu.edu>.



SMU®

DEDMAN COLLEGE OF HUMANITIES & SCIENCES

Department of Anthropology

Matthew T. Boulanger, Ph.D.
Department of Anthropology
Southern Methodist University
Dallas, Texas 75205

Christy Bednar
Archaeological Research Collections
Southern Methodist University

February 18, 2022

Re: Analysis of obsidian artifacts from the High Plains Project

Dear Christy,

I have completed some additional XRF analyses of four more obsidian flakes from the High Plains Project conducted by Fred Wendorf in the early 1970s. In keeping with the analyses from November 29 of last year, I have assigned these pieces analytical identifiers LLE0004 through LLE0007, consecutive. Unlike the previous three artifacts, there was no artifact tag included with these, so any additional information that you or the ARC could provide would be useful for data management purposes.

Each specimen was analyzed using a Bruker Tracer 5i handheld portable X-ray fluorescence spectrometer. The Tracer 5i uses a Rh-based X-ray tube operating at 50 kV at 35 μ a, and a silicon drift detector. Spectra collected by the spectrometer are quantified using a custom calibration based on a suite of 43 well-characterized obsidian reference specimens developed by the Archaeometry Laboratory at the University of Missouri. Artifact specimens are analyzed on the Tracer 5i for at least 90 seconds. This protocol and the obsidian calibration routine permit quantification of the following minor and trace elements: Ti, Mn, Fe, Zn, Ga, Rb, Sr, Y, Zr, Nb, Ba, and Th. Analysis of our in-house check standard, a solid piece of Glass Mountain obsidian, is reported in Table 1. This table also includes the certified and consensus values for the same material, as well as values reported from two other laboratories.

Results of the analyses are provided in Table 2. As with the previous artifacts, the closest match for these pieces is the Antelope Creek East (*aka* Mule Creek 1) source in western New Mexico. As previously, I've included the average values (calculated from 26 assays of source specimens) for this particular source in the same table. Given the widespread nature of this particular obsidian source, and the fact that the source was widely used over a long

period of time by Native Americans in southern and eastern New Mexico, these results are not entirely unsurprising.

If you are able to locate any additional information regarding the location of the site(s) from which these pieces were collected, please let me know. At the moment, I have simply added them to our database as coming from the Llano Estacado in eastern New Mexico. If you happen to find additional obsidian pieces from Fred's research project, I am happy to assay them and compare them against our database of sources.

Sincerely,

A handwritten signature in black ink, appearing to read "Matt Boulanger". The signature is written in a cursive, flowing style with a prominent loop at the end.

Matthew T. Boulanger

Table 1. Elemental abundances determined for the obsidian check-standard (solid obsidian from Glass Mountain, California) based on 12 assays and preferred values for the RGM-1 standard from GeoRem and MURR. All values in ppm unless otherwise noted.

	Ti	Mn	Fe%	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Th
RGM-1/2	1569 ± 92	309 ± 20	1.303 ± .022	36 ± 3	15 ± 1	150 ± 3	112 ± 2	21 ± 1	238 ± 4	9 ± 1	835 ± 34	14 ± 1
USGS	1619 ± 120	280 ± 30	1.301 ± .021	(32)	15 ± 2	150 ± 8	110 ± 10	(25)	220 ± 20	9 ± 1	810 ± 46	15 ± 1
GeoRem	1591 ± 39	300 ± 16	1.309 ± .021	33 ± 1	16 ± 1	150 ± 2	105 ± 2	23 ± 1	228 ± 4	9 ± 1	827 ± 6	15 ± 1
UCB XRF	1568 ± 44	311 ± 1	1.331 ± .003			153 ± 2	113 ± 2	25 ± 2	230 ± 4	9 ± 2	942 ± 14	16 ± 3
MURR NAA/XRF	923 ± 140	287 ± 16	1.283 ± .044	36 ± 3	18 ± 2	147 ± 2	129 ± 19	22 ± 2	240 ± 10	9 ± 1	808 ± 14	14 ± 1

Table 2. Elemental abundances (in ppm) for obsidian artifacts from the High Plains Project and for the Mule Creek 1 (Antelope Creek East) source. < LOD indicates values at or below detection limits.

	Ti	Mn	Fe	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Th
LLE0001	310	363	7176	37	16	241	11	41	103	26	< LOD	28
LLE0002	491	368	6407	31	15	226	12	37	99	25	60	25
LLE0003	251	380	7089	38	16	248	12	38	106	26	< LOD	31
LLE0004	287	347	6704	39	16	225	11	35	94	24	< LOD	26
LLE0005	527	379	6975	34	16	238	12	37	104	27	36	29
LLE0006	281	368	6996	39	15	231	13	36	103	23	< LOD	27
LLE0007	414	308	6556	41	14	219	11	33	93	23	< LOD	25
Mule Creek 1	647	380	6489	34	16	225	10	38	98	24	73	29