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Title

AN ENERGY-DISPERSIVE X-RAY FLUORESCENCE ANALYSIS OF OBSIDIAN ARTIFACTS FROM SITES CA-INY-5728, INY-9839, AND X3JA03, NAVAL WEAPONS STATION CHINA LAKE, INYO COUNTY, CALIFORNIA

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LETTER REPORT

AN ENERGY-DISPERSIVE X-RAY FLUORESCENCE ANALYSIS OF OBSIDIAN ARTIFACTS FROM SITES CA-INY-5728, INY-9839, AND X3JA03, NAVAL WEAPONS STATION CHINA LAKE, INYO COUNTY, CALIFORNIA

2 May 2017

Theresa Lechner
Epsilon Systems Solutions
901 Heritage Drive, Ste 204
Ridgecrest, CA 93555

Dear Theresa:

As before, I have taken the liberty of sending a letter report in the interest of time. All the artifacts were produced from the West Sugarloaf dome in the Coso Volcanic Field (Table 1, Figure 1; see Shackley 2016). I refer you to the previous report for more detailed discussion of sources and source assignment (Shackley 2016). Specific instrumental methods can be found at <http://www.swxrflab.net/anlysis.htm>, and Shackley (2005). Source assignment was made by comparison to source data at this laboratory, Ericson and Glascock (2004) and Hughes (1988). Analysis of the USGS RGM-1 standard indicates high machine precision for the elements of interest (Table 1 here).

Sincerely,

M. Steven Shackley, Ph.D.
Director

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<http://www.swxrflab.net/>

REFERENCES CITED

Ericson, J.E., and M.D. Glascock

2004 Subsource Characterization: Obsidian Utilization of Subsources of the Coso Volcanic Field, Coso Junction, California, USA. *Geoarchaeology* 19:779-805.

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1988 The Coso Volcanic Field Reexamined: Implications for Obsidian Sourcing and Hydration Dating Research. *Geoarchaeology* 3:253-265.

Shackley, M.S.

2005 *Obsidian: Geology and Archaeology in the North American Southwest*. University of Arizona Press, Tucson.

2016 Source Provenance of Obsidian Artifacts from Ca-INY-2845, Ca-INY-9364, BC-BA-01, and BC-BA-03 on the Naval Weapons Station China Lake, Inyo, County, California. Report prepared for Epsilon Systems, Inc., Ridgecrest, California

Table 1. Elemental concentrations for the archaeological samples, and USGS RGM-1. All measurements in parts per million (ppm).

Sample	Site	Ti	Mn	Fe	Zn	Rb	Sr	Y	Zr	Nb	Pb	Th	Source
1A	INY-5728	652	28 0	0.88	60	19 7	16	47	16 6	37	26	29	West Sugarloaf
1B	INY-5728	522	26 7	0.97	62	20 4	19	41	16 3	36	28	40	West Sugarloaf
1C	INY-5728	622	31 3	1.18	79	24 2	21	53	18 0	45	33	33	West Sugarloaf
1D	INY-5728	581	30 6	1.08	73	21 3	18	45	15 8	38	29	34	West Sugarloaf
5A	INY-5728	570	27 9	1.00	71	21 2	22	46	16 2	40	28	35	West Sugarloaf
5B	INY-5728	591	26 6	0.97	87	21 1	16	40	16 2	38	25	32	West Sugarloaf
6A	INY-5728	671	28 5	0.98	70	19 8	18	43	15 8	39	24	25	West Sugarloaf
8A	INY-5728	552	28 3	0.90	65	19 9	16	42	15 9	39	20	24	West Sugarloaf
9A	INY-5728	590	30 8	1.07	70	22 1	15	49	16 6	36	31	32	West Sugarloaf
10A	INY-5728	584	27 4	1.09	98	21 6	24	45	16 5	43	29	38	West Sugarloaf
1A-3	X3JA03	540	29 9	0.97	63	20 7	19	49	17 0	37	29	34	West Sugarloaf
1B-3	X3JA03	586	29 5	1.02	70	21 7	16	43	16 1	31	27	33	West Sugarloaf
1C-3	X3JA03	645	28 4	1.03	77	21 2	17	48	15 7	33	31	24	West Sugarloaf
1D-3	X3JA03	505	30 0	0.88	67	20 2	16	45	15 7	37	28	37	West Sugarloaf
1E	X3JA03	614	31 9	1.02	87	21 2	20	40	16 0	44	23	37	West Sugarloaf
1F	X3JA03	621	26 6	0.97	61	20 7	17	44	16 3	42	27	30	West Sugarloaf
	Site	Ti	Mn	Fe	Zn	Rb	Sr	Y	Zr	Nb	Pb	Th	Source

Sample													
2	X3JA03	495	28 4	1.03	63	20 1	19	44	16 7	39	30	28	West Sugarloaf
3	X3JA03	573	29 3	1.01	80	20 5	21	48	16 4	38	30	22	West Sugarloaf
4A	X3JA03	732	30 1	1.15	10 9	22 1	19	45	15 8	40	32	32	West Sugarloaf
5A	X3JA03	776	31 9	1.18	12 4	22 4	22	41	17 0	35	35	38	West Sugarloaf
1	INY- 9839	662	31 6	1.13	87	22 5	21	45	17 1	40	36	28	West Sugarloaf
2	INY- 9839	672	31 3	1.15	13 5	22 2	21	45	16 2	33	30	35	West Sugarloaf
RGM1- S5		147 6	31 2	1.29	37	14 7	10 3	22	22 4	11	19	18	standard
RGM1- S5		144 9	28 3	1.31	45	14 9	11 0	24	22 0	16	21	19	standard

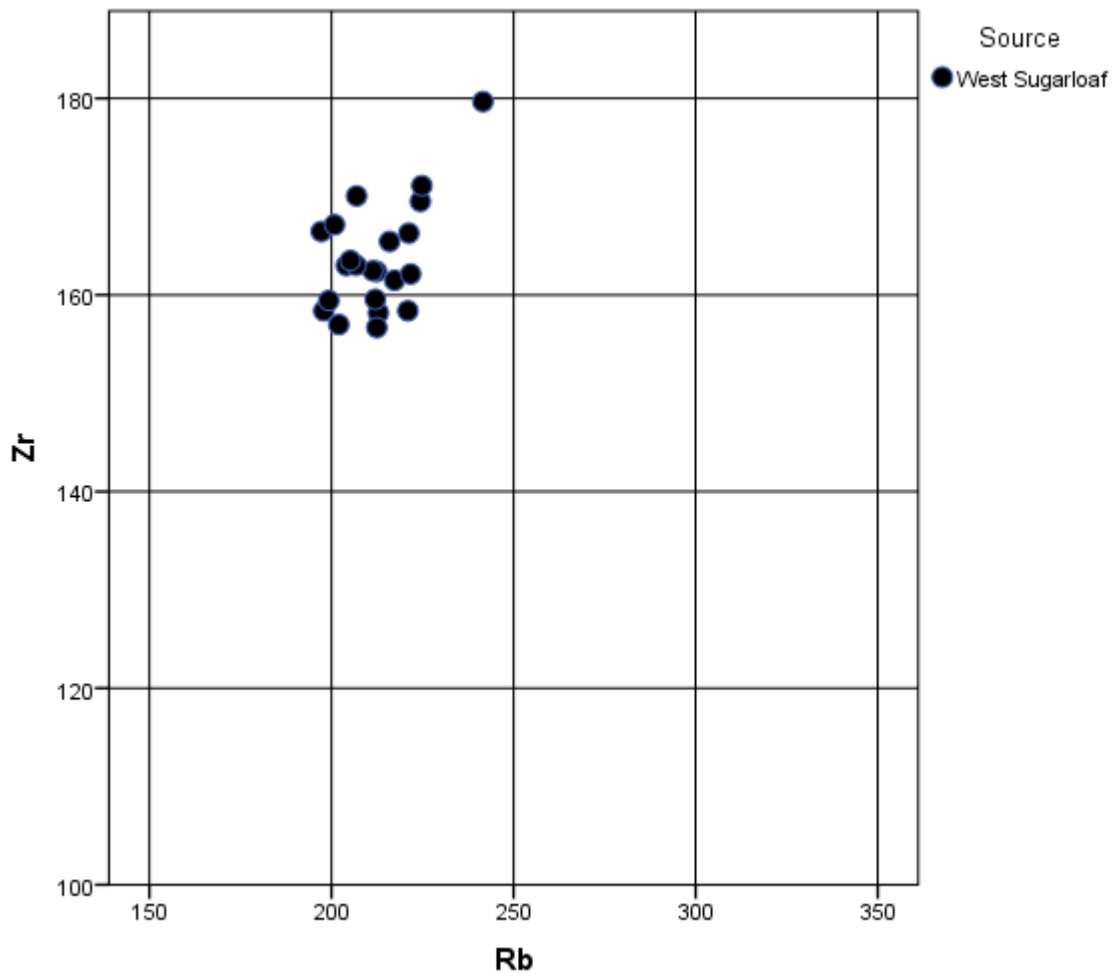


Figure 1. Bivariate plot of Rb/Zr concentrations for archaeological specimens from all sites (after Hughes 1988).