AREVA

10 CFR 70.5

July 6, 2011

AES-O-NRC-11-01513

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

AREVA Enrichment Services LLC
Eagle Rock Enrichment Facility
NRC Docket No: 70-7015

Subject: Geochemical Analysis of Obsidian Artifacts Collected at the Eagle Rock Enrichment Facility Site

AREVA Enrichment Services LLC (AES) hereby submits the subject report documenting the geochemical analysis of five obsidian artifacts collected at the Eagle Rock Enrichment Facility (EREF) site in 2010. Based on cultural resource inventories performed in 2008 and 2009, archaeological site 10BV246 (MW004) was determined eligible to the National Register of Historic Places (NRHP) by the Nuclear Regulatory Commission. The Idaho State Historic Preservation Office (SHPO) concurred with this determination in a letter dated September 29, 2009. Subsequently, a data recovery plan was prepared detailing treatment recommendations to mitigate adverse impacts of the proposed EREF to eligible archaeological site 10BV246 (MW004) (Reference 1). As part of the data recovery plan, the collection of the remaining obsidian bifacial artifacts found within the project area was proposed for x-ray fluorescence (XRF) analysis to determine the geochemical source of the obsidian. The analysis determined that all five of the obsidian artifacts were manufactured from obsidian that originated at the Big Southern Butte located approximately 50 kilometers southwest of the EREF site. A copy of the report and geochemical analysis is provided in Enclosure 1. By copy of this letter, AES is also submitting two copies of this report to the Idaho SHPO to satisfy license application documentation requirements.

If you have any questions regarding this submittal, please contact me at (508) 573-6554.

Respectfully,

Jim A. Kay
Licensing Manager

NMSSD1

AREVA ENRICHMENT SERVICES LLC
Solomon Pond Park - 400 Donald Lynch Boulevard, Marlborough, MA 01752
Tel. : 508 229 2100 - Fax : 508 573 6610 - www.areva.com

Reference:

1) Western Cultural Resource Management, "A Treatment Plan for Historic Site MW004 in the Area of the Proposed Eagle Rock Enrichment Facility, Bonneville County, Idaho", January 28, 2010

Enclosure:

1) Geochemical Analysis of Obsidian Artifacts Collected at the Eagle Rock Enrichment Facility Site

cc:
Breeda Reilly, U.S. NRC Senior Project Manager
Steve Lemont, U.S. NRC Senior Project Manager
Bruce Biwer, Argonne National Laboratory
Ken Reid, Idaho State Historic Preservation Officer (2 copies)

Geochemical Analysis of Obsidian Artifacts Collected at the Eagle Rock Enrichment Facility Site

WCRM
Western Cultural Resource Management, Inc.

June 28, 2011

Kenneth Reid, Ph.D.
State Archaeologist
Deputy State Historic Preservation Officer
Idaho State Historical Society
210 Main Street
Boise, ID 83702

Dear Dr. Reid,

In 2009 at the request of the Idaho State Historic Preservation Office (SHPO) State Archaeologist Dr. Kenneth Reid, WCRM collected five of the obsidian projectile point fragments recorded during the Class III inventory of the proposed Eagle Rock Enrichment Facility located in Bonneville County, Idaho in order to geologically source them. The results of this analysis are detailed in a letter report dated December 18, 2009 (Stoner 2009). As part of the treatment plan to mitigate adverse effects of the Eagle Rock project to the John Leopard Homestead site (MW04/10BV246) the collection of the remaining obsidian bifacial artifacts within the project area for x-ray fluorescence (XRF) was proposed (Ringhoff and Stoner 2010).

This letter reports on the geochemical analysis of five obsidian artifacts collected in 2010 as part of the data recovery effort noted above. Of these, four of the obsidian artifacts were recovered from two sites (MW04/10BV246 and MW12) along with one isolated find (IF-18) by archaeologists from WCRM, Inc. in October of 2010 (**Figure 1**). Collected specimens were sent to Dr. Richard Hughes of Geochemical Research Laboratory for x-ray fluorescence analysis to determine the geochemical source of the obsidian used in their manufacture; a copy of his report is attached. Two specimens came from site MW12 (FS-4 and FS-5). FS-4 is a small biface fragment made on a flake. FS-5 is a Stage II biface in two pieces. Two other specimens came from site MW04/10BV246 and include a late stage biface or projectile point mid-section (FS-4) and (FS-10) the base of an Elko Series projectile point. All five of the obsidian artifacts were manufactured from obsidian that originated at the Big Southern Butte source (**Figure 2**).

The Elko Series projectile point base (FS-10) dates to the Archaic Period (8000-1000 BP) in the Great Basin (Holmer 1986; Thomas 1981) and the Middle Prehistoric Period (7500-1300 BP) in the Snake River Plain (Plew 2000). The Big Southern Butte is about 50 km from the project area. While the results we obtained in 2009 and those reported herein are based on only a handful specimens, the pattern seems to fit the conclusions reached by Jones and others

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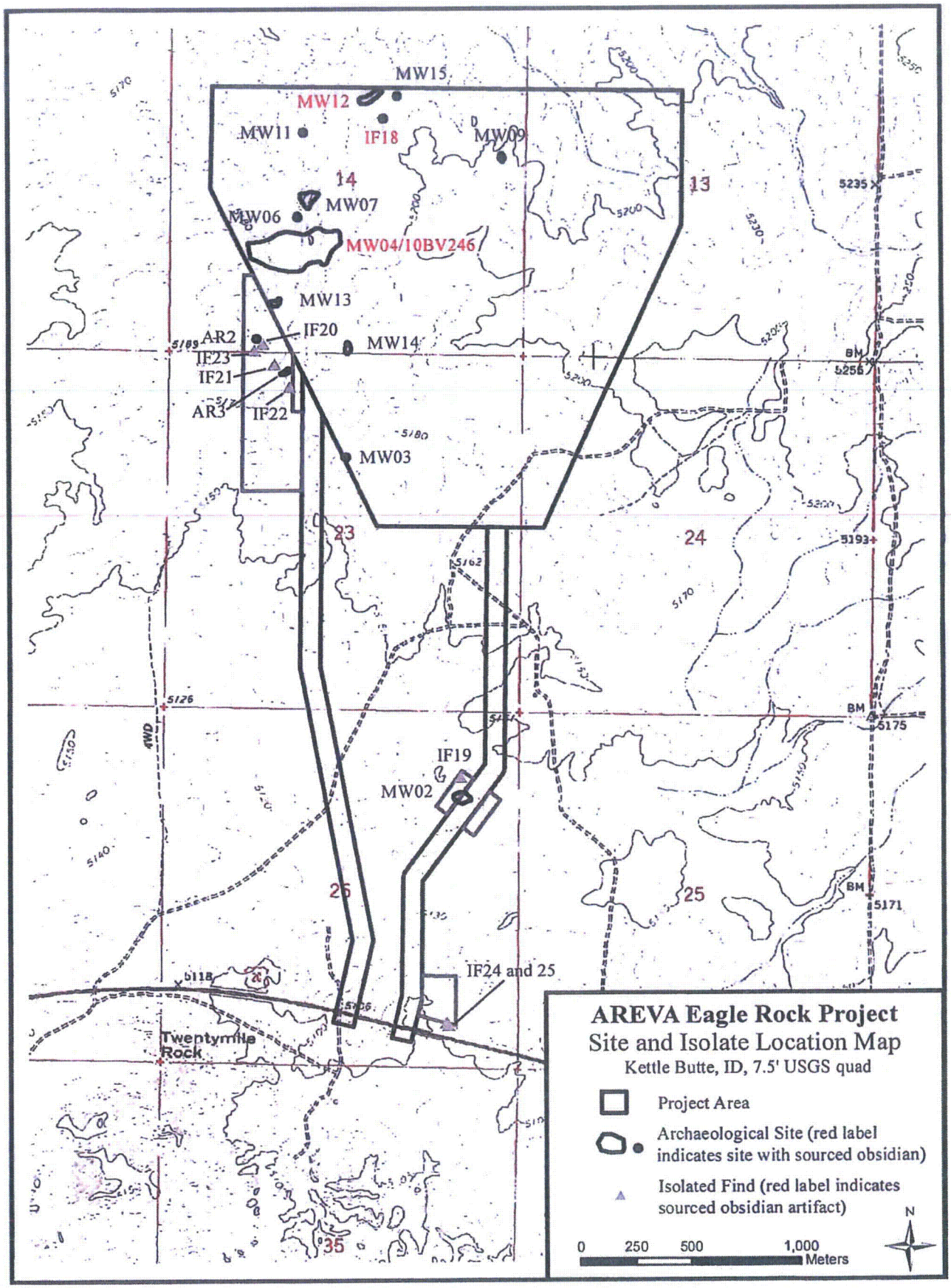

MW15
MW12
MW11
IF18
MW09
14
13
MW07
MW06
MW04/10BV246
MW13
AR2
IF20
MW14
IF23
IF21
AR3
IF22
MW03
23
24
IF19
MW02
26
25
IF24 and 25
Twentymile Rock
35
AREVA Eagle Rock Project
Site and Isolate Location Map
Kettle Butte, ID, 7.5' USGS quad
Project Area
Archaeological Site (red label indicates site with sourced obsidian)
Isolated Find (red label indicates sourced obsidian artifact)
N
0 250 500 1,000
Meters

Figure 1

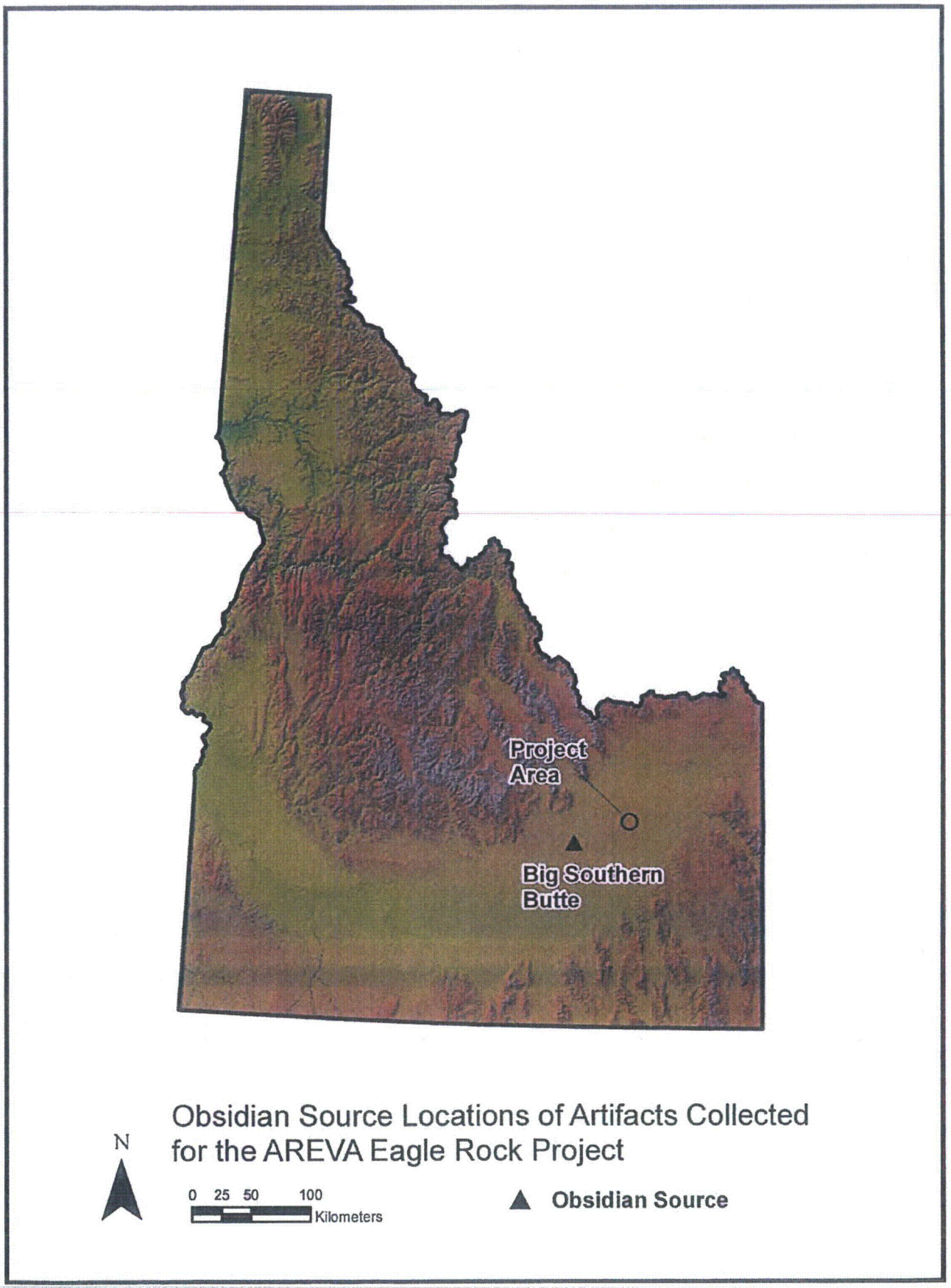

Project Area
Big Southern Butte
Obsidian Source Locations of Artifacts Collected for the AREVA Eagle Rock Project
N
0 25 50 100
Kilometers
Obsidian Source

Figure 2

(2003) where the Archaic obsidian conveyance zones are more restricted than the earlier Paleoarchaic obsidian conveyance zones.

I hope you find this information useful. If you should have any questions or comments please do not hesitate to call me at (775) 358-9003.

Sincerely,

Edward J. Stoner, RPA
Senior Project Manager
WCRM, Inc.

Encl: Geochemical Research Laboratory Letter Report 2011-51.

Cc: Tom Lennon (WCRM)
Stacy Thomson (Areva)

References Cited

Holmer, Richard N.
1986 Projectile points of the Intermountain Region. In *Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings,* edited by Carol J. Condie and Don D. Fowler, pp. 89-115. University of Utah Press, Salt Lake City.

Jones, George T., Charlotte Beck, Eric E. Jones, and Richard E. Hughes
2003 Lithic Source Use and Paleoarchaic Foraging Territories in the Great Basin. *American Antiquity* 68(1):5-38.

Plew, Mark G.
2000 *The Archaeology of the Snake River Plain.* Boise State University, Boise.

Ringhoff, Mary C. and Edward J. Stoner
2010 *A Treatment Plan for Historic Site MW004 in the Area of the Proposed Eagle Rock Enrichment Facility, Bonneville County, Idaho.* WCRM Report No. 09R130. Ms. on file Idaho State Historic Preservation Office, Boise.

Stoner, Edward J.
2010 Letter report to Dr. Ken Reid of the Idaho SHPO on the results of geochemical analysis of five obsidian artifacts collected from the proposed Eagle Rock Enrichment Facility in Bonneville County, Idaho dated December 18, 2009.

Thomas, David. H.
1981 How to Classify the Projectile Points from Monitor Valley, Nevada. *Journal of California and Great Basin Anthropology* 3(1):7-47.

Geochemical Research Laboratory Letter Report 2011-51

June 23, 2011

Mr. Edward J. Stoner
Western Cultural Resource Management, Inc.
50 Freeport Boulevard, Suite 15
Sparks, NV 89431

Dear Ed:

Enclosed with this letter you will find a table and figure presenting x-ray fluorescence (xrf) data generated from the analysis of five obsidian artifacts from archaeological sites and localities from the Eagle Rock project, west of Idaho Falls, Idaho. This research was conducted pursuant to your letter request of June 20, 2011.

Laboratory equipment, instrumentation, and literature references follow Hughes (2009). Otherwise, artifact-to-source (geochemical type) attribution procedures (except as indicated), element-specific measurement resolution specifications, and additional literature references applicable to these samples follow those I reported for obsidian from sites in the Ely area (Hughes 1998).

Table 1

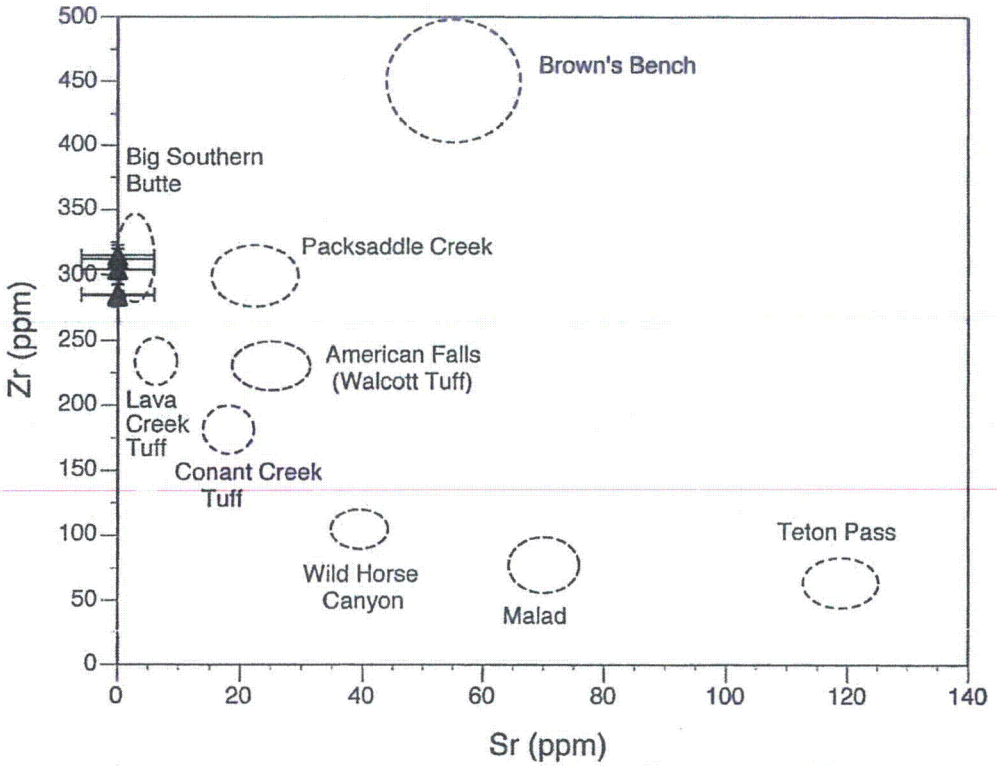
Quantitative Composition Estimates for Artifacts from the Eagle Rock Project, Idaho

	Trace Element Concentrations											Ratio	
Cat. Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Fe/Mn	Obsidian Source (Chemical Type)
MW4, # 86	nm	nm	277 ±4	0 ±3	223 ±3	312 ±4	345 ±3	nm	nm	nm	nm	58	Big Southern Butte
MW12, # 87	nm	nm	298 ±4	0 ±3	221 ±3	304 ±4	342 ±3	nm	nm	nm	nm	56	Big Southern Butte
MW12, # 88	nm	nm	274 ±4	0 ±3	207 ±3	285 ±4	324 ±3	nm	nm	nm	nm	55	Big Southern Butte
MW12, # 89	nm	nm	286 ±4	0 ±3	225 ±3	315 ±4	343 ±3	nm	nm	nm	nm	56	Big Southern Butte
IF18, # 90	nm	nm	269 ±4	0 ±3	204 ±3	284 ±4	320 ±3	nm	nm	nm	nm	59	Big Southern Butte
U.S. Geological Survey Reference Standard													
RGM-1 (measured)	nm	nm	148 ±4	109 ±3	25 ±3	216 ±4	9 ±3	nm	nm	nm	1.87 ±.02	63	Glass Mtn., CA
RGM-1 (recommended)	32	15	149	108	25	219	9	807	1600	279	1.86	nr	Glass Mtn., CA

Values in parts per million (ppm) except total iron [in weight %] and Fe/Mn intensity ratios; ± = two σ estimate of x-ray counting uncertainty and regression fitting error at 120-240 seconds livetime. nm= not measured. nr= not reported.

Figure 1

Zr vs. Sr Composition for Artifacts from the Eagle Rock Project, Idaho



Dashed lines represent range of variation measured in archaeologically significant geologic obsidian source samples. Filled triangles plot artifacts listed in Table 1. Error bars are two-sigma (95% confidence interval) composition estimates for each specimen (from Table 1).

Edxrf data (in Table 1 and Figure 1) indicate that all five specimens were manufactured from obsidian of the Big Southern Butte chemical type. I hope this information will help in your overall analysis of material from these sites. Please contact me at my laboratory ([650] 851-1410; e-mail: rehughes@silcon.com) if I can be of further assistance.

Sincerely,

Richard E. Hughes, Ph.D., RPA
Director, Geochemical Research Laboratory

REFERENCES

Hughes, Richard E.

1998 X-ray Fluorescence Analysis of Obsidian Artifacts from Three Archaeological Sites in White Pine County, Nevada. Geochemical Research Laboratory Letter Report 98-80 submitted to Edward J. Stoner, Western Cultural Resource Management, September 4, 1998.

2009 X-ray Fluorescence Analysis of Obsidian Artifacts from Two Archaeological Sites (26WP2353 and 26WP7420) Located Near Ely in White Pine County, Nevada. Geochemical Research Laboratory Letter Report 2009-3 submitted to Edward J. Stoner, Western Cultural Resource Management, February 9, 2009.