

Results of X-Ray Fluorescence Analysis 2018 - DEMO

35-LK-DEMOSITE, Lake County, Oregon



Alex J. Nyers

August 2018

Northwest Research Obsidian Studies Laboratory

Table 1. Summary of results of trace element analysis of the project specimens.

GEOCHEMICAL SOURCE	N=	PERCENTAGE
Cougar Mountain	142	53.2
Cowhead Lake	107	40.1
Drews Creek/Butcher Flat	18	6.7
TOTAL	267	100.0

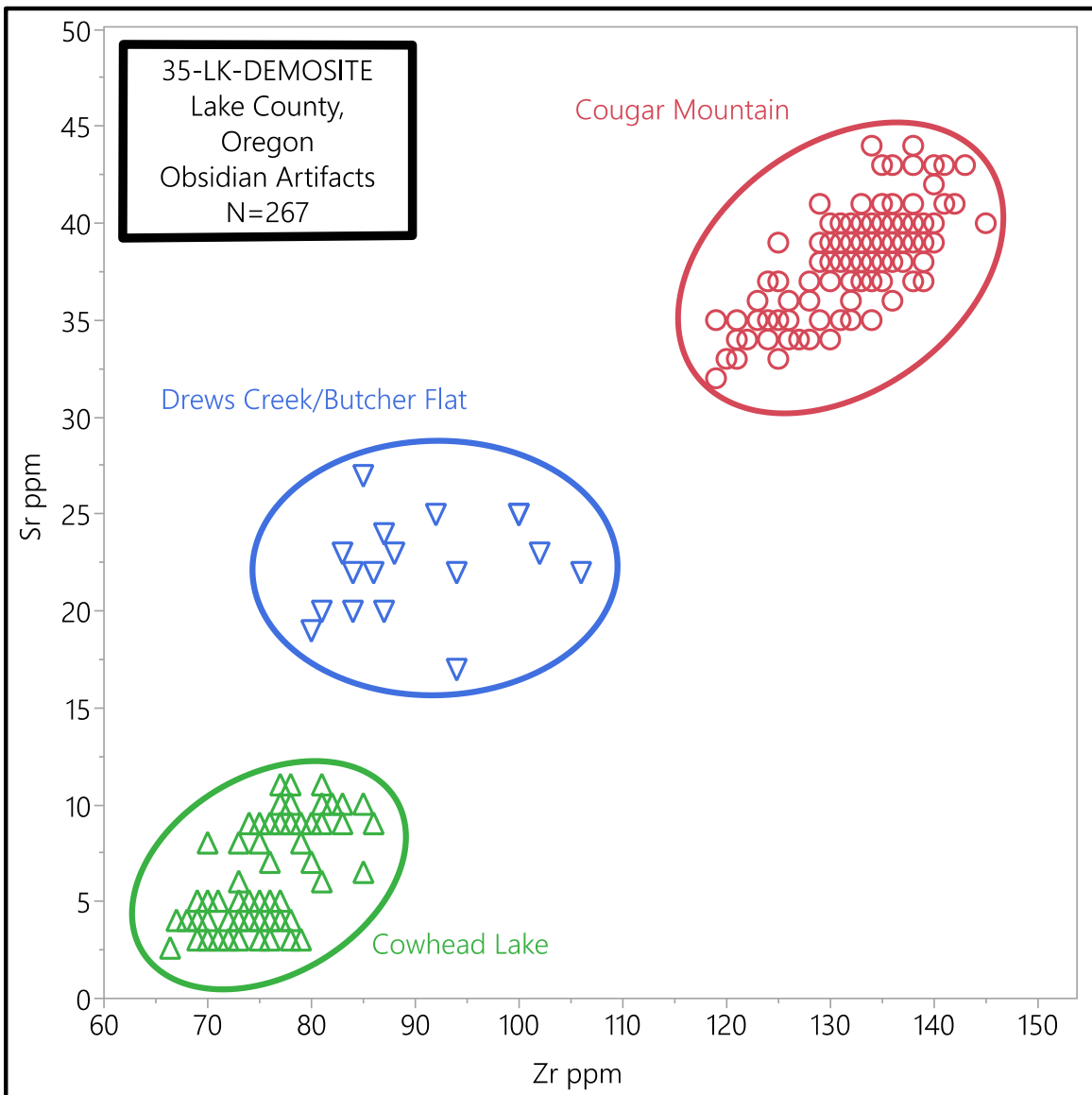


Figure 1 - Scatterplot of zirconium (Zr) plotted versus strontium (Sr) for analyzed obsidian artifacts.

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Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	1	1	100 ± 4	41 3	59 3	136 5	12 3	NM NM	NM NM	1369 49	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	2	2	119 ± 3	4 3	30 4	76 3	17 3	NM NM	NM NM	0 51	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	3	3	120 ± 3	10 2	27 3	78 2	12 2	NM NM	NM NM	0 47	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	4	4	103 ± 5	39 2	53 4	137 3	15 2	NM NM	NM NM	1352 36	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	5	5	117 ± 5	4 3	31 2	74 5	15 5	NM NM	NM NM	0 51	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	6	6	119 ± 2	4 5	30 5	75 2	18 4	NM NM	NM NM	0 54	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	7	7	99 ± 3	3 4	29 4	69 2	16 5	NM NM	NM NM	0 37	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	8	8	112 ± 3	3 3	32 4	73 3	15 3	NM NM	NM NM	0 43	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	9	9	118 ± 4	9 4	25 4	77 2	14 2	NM NM	NM NM	0 54	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	10	10	103 ± 5	2 5	29 3	66 5	17 4	NM NM	NM NM	0 36	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	11	11	110 ± 2	3 5	30 3	73 4	15 5	NM NM	NM NM	0 31	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	12	12	113 ± 5	8 2	25 4	75 3	13 2	NM NM	NM NM	0 38	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	13	13	95 ± 3	37 4	49 3	132 4	11 2	NM NM	NM NM	1228 28	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	14	14	123 ± 3	5 3	31 2	77 5	16 2	NM NM	NM NM	0 57	NM NM	NM	NM	Cowhead Lake

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.

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Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	15	15	99 ± 4	39 3	54 5	136 4	9 3	NM NM	NM NM	1333 38	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	16	16	120 ± 5	4 3	33 2	76 4	16 4	NM NM	NM NM	0 54	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	17	17	100 ± 4	37 4	58 4	139 2	13 3	NM NM	NM NM	1397 32	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	18	18	111 ± 2	4 2	31 4	72 4	16 2	NM NM	NM NM	0 52	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	19	19	112 ± 5	6 4	31 2	73 4	17 4	NM NM	NM NM	0 30	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	20	20	119 ± 5	10 4	26 4	81 5	12 5	NM NM	NM NM	0 47	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	21	21	98 ± 4	37 2	55 4	128 5	12 5	NM NM	NM NM	1084 51	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	22	22	110 ± 4	5 4	31 5	71 5	15 4	NM NM	NM NM	0 45	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	23	23	96 ± 2	38 3	53 4	131 2	12 5	NM NM	NM NM	1200 59	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	24	24	98 ± 2	40 3	57 5	130 5	14 5	NM NM	NM NM	1359 29	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	25	25	97 ± 5	37 2	56 2	132 2	10 5	NM NM	NM NM	1213 41	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	26	26	131 ± 4	10 5	29 3	85 4	14 4	NM NM	NM NM	0 56	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	27	27	96 ± 4	40 5	54 5	132 3	12 3	NM NM	NM NM	1190 51	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	28	28	118 ± 3	4 3	32 4	77 5	17 4	NM NM	NM NM	0 36	NM NM	NM NM	NM NM	Cowhead Lake

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

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Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	29	29	91 ± 5	36 4	54 3	128 3	11 3	NM NM	NM NM	1228 55	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	30	30	116 ± 4	4 3	31 2	73 2	16 3	NM NM	NM NM	0 44	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	31	31	106 ± 4	3 5	28 4	69 5	15 3	NM NM	NM NM	0 39	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	32	32	124 ± 5	10 3	29 3	77 5	12 4	NM NM	NM NM	0 33	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	33	33	94 ± 5	37 5	53 4	135 5	14 5	NM NM	NM NM	1203 28	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	34	34	106 ± 2	41 3	60 4	141 5	16 2	NM NM	NM NM	1299 57	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	35	35	105 ± 5	43 4	59 2	141 2	13 4	NM NM	NM NM	1341 28	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	36	36	90 ± 2	34 3	54 4	127 5	11 4	NM NM	NM NM	1170 43	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	37	37	95 ± 4	39 4	54 3	130 3	12 4	NM NM	NM NM	1389 30	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	38	38	93 ± 4	37 3	54 3	125 5	12 5	NM NM	NM NM	1252 50	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	39	39	86 ± 5	34 4	52 5	122 5	10 3	NM NM	NM NM	1072 38	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	40	40	89 ± 4	34 5	57 5	128 4	10 3	NM NM	NM NM	1189 59	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	41	41	95 ± 3	37 3	54 4	134 3	11 3	NM NM	NM NM	1155 54	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	42	42	108 ± 2	5 4	30 4	70 3	17 2	NM NM	NM NM	0 37	NM NM	NM NM	NM NM	Cowhead Lake

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Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	43	43	98 ± 4	39 5	53 4	132 4	10 3	NM NM	NM NM	776 55	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	44	44	102 ± 4	44 5	57 2	138 4	10 3	NM NM	NM NM	1327 54	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	45	45	116 ± 2	4 5	31 2	74 5	16 2	NM NM	NM NM	0 48	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	46	46	113 ± 4	3 2	32 5	75 4	18 3	NM NM	NM NM	0 33	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	47	47	94 ± 5	37 5	54 3	125 2	10 2	NM NM	NM NM	1057 45	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	48	48	104 ± 2	22 5	23 4	106 3	10 3	NM NM	NM NM	85 41	NM NM	NM	NM	Drews Creek/Butcher Flat
35-LK-DEMO	49	49	88 ± 3	33 3	52 4	121 5	12 3	NM NM	NM NM	1176 50	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	50	50	87 ± 2	35 5	52 4	123 4	13 4	NM NM	NM NM	1189 51	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	51	51	109 ± 5	4 2	31 5	68 3	16 3	NM NM	NM NM	0 32	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	52	52	94 ± 5	38 2	51 5	130 2	7 5	NM NM	NM NM	1160 42	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	53	53	116 ± 5	4 4	32 2	77 5	15 3	NM NM	NM NM	0 59	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	54	54	110 ± 2	17 3	23 5	94 4	10 5	NM NM	NM NM	0 52	NM NM	NM	NM	Drews Creek/Butcher Flat
35-LK-DEMO	55	55	97 ± 2	37 3	57 4	139 5	12 2	NM NM	NM NM	1148 32	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	56	56	100 ± 3	43 3	61 4	135 2	14 4	NM NM	NM NM	1281 37	NM NM	NM	NM	Cougar Mountain

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			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	57	57	123 ± 3	9 5	28 2	80 2	12 2	NM NM	NM NM	0 43	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	58	58	96 ± 5	40 4	53 3	134 5	10 2	NM NM	NM NM	1259 53	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	59	59	127 ± 2	8 5	29 5	79 2	12 5	NM NM	NM NM	0 48	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	60	60	103 ± 3	41 2	55 2	133 4	13 5	NM NM	NM NM	1300 44	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	61	61	90 ± 5	35 4	52 4	124 2	12 3	NM NM	NM NM	1005 32	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	62	62	101 ± 5	39 5	52 3	137 2	12 4	NM NM	NM NM	1270 45	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	63	63	110 ± 4	4 4	31 5	72 5	17 2	NM NM	NM NM	0 57	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	64	64	102 ± 2	40 2	57 3	137 3	12 3	NM NM	NM NM	1192 51	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	65	65	115 ± 2	5 3	30 4	74 2	15 4	NM NM	NM NM	0 32	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	66	66	107 ± 5	43 5	59 5	138 3	10 4	NM NM	NM NM	1284 49	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	67	67	103 ± 3	39 2	55 3	134 4	18 2	NM NM	NM NM	1384 57	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	68	68	122 ± 4	9 5	28 5	77 5	14 4	NM NM	NM NM	0 37	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	69	69	93 ± 4	38 3	54 5	133 2	13 3	NM NM	NM NM	1202 35	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	70	70	95 ± 4	40 5	59 3	137 4	14 5	NM NM	NM NM	1332 29	NM NM	NM NM	NM NM	Cougar Mountain

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			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	71	71	98 ± 4	40 3	58 3	135 4	9 2	NM NM	NM NM	1282 36	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	72	72	93 ± 3	41 4	54 5	129 3	19 4	NM NM	NM NM	1245 36	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	73	73	93 ± 2	35 3	55 2	132 3	11 2	NM NM	NM NM	1371 53	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	74	74	119 ± 5	3 2	31 4	78 3	16 3	NM NM	NM NM	0 47	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	75	75	91 ± 4	38 3	53 2	135 5	15 4	NM NM	NM NM	1082 48	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	76	76	102 ± 4	27 4	23 4	85 4	12 4	NM NM	NM NM	55 39	NM NM	NM NM	NM NM	Drews Creek/Butcher Flat
35-LK-DEMO	77	77	98 ± 5	38 5	56 5	131 3	11 2	NM NM	NM NM	1261 56	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	78	78	92 ± 2	34 5	53 5	127 4	10 5	NM NM	NM NM	1163 47	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	79	79	93 ± 3	36 3	57 2	136 2	12 2	NM NM	NM NM	1117 59	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	80	80	123 ± 5	6 4	32 2	81 4	20 5	NM NM	NM NM	46 52	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	81	81	89 ± 5	35 4	48 3	119 2	9 4	NM NM	NM NM	1236 53	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	82	82	121 ± 3	4 4	32 4	75 3	18 5	NM NM	NM NM	0 46	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	83	83	99 ± 3	38 5	56 4	133 2	7 4	NM NM	NM NM	1286 46	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	84	84	116 ± 4	20 5	24 4	87 4	10 4	NM NM	NM NM	0 40	NM NM	NM NM	NM NM	Drews Creek/Butcher Flat

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			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	85	85	107 ± 4	5 4	29 4	69 4	17 3	NM NM	NM NM	0 52	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	86	86	96 ± 3	35 3	53 3	121 4	10 4	NM NM	NM NM	1053 38	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	87	87	92 ± 5	38 3	51 2	129 4	15 5	NM NM	NM NM	1237 38	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	88	88	104 ± 2	43 2	58 2	136 2	10 3	NM NM	NM NM	1345 41	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	89	89	100 ± 4	37 5	56 3	133 5	8 3	NM NM	NM NM	1161 59	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	90	90	107 ± 3	4 2	31 3	69 2	16 4	NM NM	NM NM	0 42	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	91	91	107 ± 2	10 3	29 5	78 4	15 4	NM NM	NM NM	68 30	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	92	92	122 ± 5	9 2	27 2	80 2	13 2	NM NM	NM NM	0 59	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	93	93	105 ± 4	4 4	30 4	74 4	18 5	NM NM	NM NM	0 31	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	94	94	109 ± 4	40 5	57 3	145 3	10 4	NM NM	NM NM	1277 37	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	95	95	91 ± 4	37 2	53 2	132 2	15 4	NM NM	NM NM	1342 35	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	96	96	113 ± 4	4 2	30 2	72 5	17 3	NM NM	NM NM	0 50	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	97	97	93 ± 2	38 2	58 4	132 5	12 5	NM NM	NM NM	1150 60	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	98	98	116 ± 5	11 5	25 2	77 5	12 5	NM NM	NM NM	0 35	NM NM	NM NM	NM NM	Cowhead Lake

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			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	99	99	129 ± 3	9 3	28 2	81 5	13 5	NM NM	NM NM	0 46	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	100	100	121 ± 5	3 5	33 5	75 4	18 4	NM NM	NM NM	0 53	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	101	101	121 ± 3	10 2	27 5	77 5	12 4	NM NM	NM NM	0 32	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	102	102	93 ± 5	36 2	55 4	128 4	11 3	NM NM	NM NM	1203 40	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	103	103	93 ± 2	39 3	53 3	136 5	9 4	NM NM	NM NM	1124 60	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	104	104	96 ± 4	36 3	54 2	132 3	9 5	NM NM	NM NM	1188 59	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	105	105	93 ± 4	37 3	54 3	133 5	12 5	NM NM	NM NM	1336 30	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	106	106	99 ± 4	37 4	54 4	130 2	13 2	NM NM	NM NM	1250 29	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	107	107	96 ± 3	39 4	57 2	130 4	13 5	NM NM	NM NM	1274 45	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	108	108	115 ± 2	8 4	32 3	75 2	19 3	NM NM	NM NM	0 40	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	109	109	100 ± 5	40 3	58 4	131 4	11 4	NM NM	NM NM	1277 39	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	110	110	107 ± 5	8 3	24 3	70 3	14 4	NM NM	NM NM	0 39	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	111	111	99 ± 4	40 3	56 5	138 2	14 4	NM NM	NM NM	1322 54	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	112	112	101 ± 2	40 3	54 2	136 5	16 2	NM NM	NM NM	1315 54	NM NM	NM	NM	Cougar Mountain

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35-LK-DEMO	113	113	93 ± 3	38 5	53 2	134 3	14 5	NM NM	NM NM	1196 52	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	114	114	106 ± 4	23 4	22 5	88 5	11 3	NM NM	NM NM	0 52	NM NM	NM	NM	Drews Creek/Butcher Flat
35-LK-DEMO	115	115	115 ± 5	7 4	30 2	76 4	16 3	NM NM	NM NM	0 55	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	116	116	102 ± 3	41 2	57 5	142 5	9 4	NM NM	NM NM	1346 32	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	117	117	118 ± 5	10 4	28 2	78 2	12 4	NM NM	NM NM	0 29	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	118	118	103 ± 5	39 5	53 3	140 4	15 5	NM NM	NM NM	1297 40	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	119	119	104 ± 3	40 5	54 5	133 5	12 2	NM NM	NM NM	1185 28	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	120	120	105 ± 5	40 3	58 2	139 3	14 4	NM NM	NM NM	1311 57	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	121	121	95 ± 5	36 2	53 4	132 5	14 5	NM NM	NM NM	798 44	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	122	122	130 ± 2	9 3	27 4	79 2	12 2	NM NM	NM NM	0 56	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	123	123	96 ± 3	35 4	50 2	134 3	9 4	NM NM	NM NM	1069 28	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	124	124	123 ± 4	9 3	27 3	75 4	13 5	NM NM	NM NM	0 46	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	125	125	98 ± 2	39 4	58 5	136 5	11 3	NM NM	NM NM	1297 54	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	126	126	117 ± 4	20 4	19 4	81 5	11 2	NM NM	NM NM	55 49	NM NM	NM	NM	Drews Creek/Butcher Flat

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	127	127	97 ± 3	37 5	57 3	138 5	15 5	NM NM	NM NM	1158 39	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	128	128	118 ± 3	9 2	27 4	74 5	11 5	NM NM	NM NM	0 43	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	129	129	109 ± 4	24 2	22 3	87 2	10 5	NM NM	NM NM	65 52	NM NM	NM NM	NM NM	Drews Creek/Butcher Flat
35-LK-DEMO	130	130	101 ± 4	22 5	24 3	86 4	12 2	NM NM	NM NM	52 31	NM NM	NM NM	NM NM	Drews Creek/Butcher Flat
35-LK-DEMO	131	131	93 ± 3	36 2	53 3	126 3	13 3	NM NM	NM NM	1225 48	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	132	132	113 ± 3	4 4	31 5	72 4	16 2	NM NM	NM NM	0 51	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	133	133	102 ± 4	4 3	27 4	67 3	16 5	NM NM	NM NM	0 31	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	134	134	117 ± 2	5 5	32 3	75 2	18 5	NM NM	NM NM	0 54	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	135	135	90 ± 5	35 2	53 3	126 4	12 4	NM NM	NM NM	1154 59	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	136	136	106 ± 5	41 3	60 3	142 5	13 2	NM NM	NM NM	1249 31	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	137	137	92 ± 2	35 3	54 5	131 3	10 3	NM NM	NM NM	1289 46	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	138	138	92 ± 5	34 5	54 5	130 2	11 5	NM NM	NM NM	1238 59	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	139	139	117 ± 3	9 2	26 3	79 2	13 3	NM NM	NM NM	0 59	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	140	140	113 ± 5	3 3	29 3	76 4	16 4	NM NM	NM NM	0 47	NM NM	NM NM	NM NM	Cowhead Lake

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	141	141	95 ± 5	38 4	55 4	135 4	12 5	NM NM	NM NM	1235 41	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	142	142	105 ± 2	40 3	56 2	131 2	12 5	NM NM	NM NM	1240 54	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	143	143	96 ± 3	39 3	56 4	125 4	12 2	NM NM	NM NM	1127 30	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	144	144	120 ± 2	9 2	26 2	78 3	11 5	NM NM	NM NM	0 42	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	145	145	118 ± 5	4 3	30 4	76 5	17 3	NM NM	NM NM	0 55	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	146	146	100 ± 4	41 4	57 2	142 4	11 5	NM NM	NM NM	1260 37	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	147	147	131 ± 4	10 4	28 5	83 3	11 2	NM NM	NM NM	0 54	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	148	148	105 ± 5	4 5	30 3	69 2	15 4	NM NM	NM NM	0 56	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	149	149	101 ± 4	40 2	54 3	133 3	12 5	NM NM	NM NM	1333 50	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	150	150	101 ± 2	38 5	55 2	135 2	12 3	NM NM	NM NM	1336 28	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	151	151	116 ± 5	9 3	26 3	76 5	12 4	NM NM	NM NM	0 33	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	152	152	101 ± 3	39 3	57 3	138 2	12 2	NM NM	NM NM	1387 48	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	153	153	112 ± 4	23 2	24 4	102 5	12 5	NM NM	NM NM	98 44	NM NM	NM NM	NM NM	Drews Creek/Butcher Flat
35-LK-DEMO	154	154	96 ± 4	39 3	53 2	133 2	12 5	NM NM	NM NM	1294 43	NM NM	NM NM	NM NM	Cougar Mountain

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	155	155	102 ± 5	41 5	58 2	133 5	12 2	NM NM	NM NM	1265 36	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	156	156	101 ± 5	43 4	60 3	140 5	13 5	NM NM	NM NM	1363 60	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	157	157	110 ± 4	11 3	29 3	81 5	15 2	NM NM	NM NM	95 55	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	158	158	115 ± 3	4 3	30 5	74 3	15 4	NM NM	NM NM	0 53	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	159	159	92 ± 4	34 4	54 3	126 4	12 5	NM NM	NM NM	1289 38	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	160	160	99 ± 2	38 3	58 4	139 2	16 5	NM NM	NM NM	1190 28	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	161	161	123 ± 2	9 5	26 5	83 5	11 5	NM NM	NM NM	0 42	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	162	162	126 ± 3	11 2	27 2	81 2	13 5	NM NM	NM NM	0 44	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	163	163	121 ± 5	9 2	27 2	77 3	13 5	NM NM	NM NM	0 46	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	164	164	100 ± 5	41 5	58 4	135 4	12 3	NM NM	NM NM	1341 43	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	165	165	96 ± 4	38 3	58 4	137 3	12 3	NM NM	NM NM	1261 28	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	166	166	101 ± 2	38 4	55 2	136 5	10 4	NM NM	NM NM	1228 38	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	167	167	118 ± 5	4 2	31 3	73 5	16 4	NM NM	NM NM	0 60	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	168	168	93 ± 5	40 3	55 3	134 4	11 5	NM NM	NM NM	1193 55	NM NM	NM	NM	Cougar Mountain

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.

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Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	169	169	101 ± 4	44 3	58 3	134 4	12 2	NM NM	NM NM	1161 56	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	170	170	106 ± 2	41 2	55 2	136 2	12 5	NM NM	NM NM	1283 57	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	171	171	96 ± 2	39 4	56 4	134 4	14 2	NM NM	NM NM	1069 55	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	172	172	121 ± 2	6 2	30 3	86 5	15 2	NM NM	NM NM	22 28	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	173	173	110 ± 3	3 5	31 3	72 2	13 5	NM NM	NM NM	0 35	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	174	174	122 ± 3	10 3	27 5	78 3	12 5	NM NM	NM NM	0 60	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	175	175	126 ± 2	9 4	28 2	78 2	14 3	NM NM	NM NM	0 32	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	176	176	90 ± 4	35 4	53 2	123 4	12 5	NM NM	NM NM	1062 33	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	177	177	93 ± 4	39 5	56 4	135 5	14 3	NM NM	NM NM	1323 59	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	178	178	102 ± 2	40 4	58 5	136 3	14 3	NM NM	NM NM	1279 46	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	179	179	90 ± 5	37 2	53 4	124 4	11 5	NM NM	NM NM	1124 37	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	180	180	103 ± 2	41 5	60 5	138 5	10 2	NM NM	NM NM	1111 30	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	181	181	101 ± 4	23 4	20 4	83 3	12 2	NM NM	NM NM	65 51	NM NM	NM	NM	Drews Creek/Butcher Flat
35-LK-DEMO	182	182	130 ± 3	10 5	28 3	85 3	14 5	NM NM	NM NM	0 28	NM NM	NM	NM	Cowhead Lake

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.

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Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	183	183	116 ± 5	25 4	25 3	100 4	13 3	NM NM	NM NM	67 31	NM NM	NM	NM	Drews Creek/Butcher Flat
35-LK-DEMO	184	184	108 ± 5	9 5	29 3	75 3	17 5	NM NM	NM NM	59 40	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	185	185	122 ± 3	11 2	27 5	78 3	15 3	NM NM	NM NM	0 33	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	186	186	105 ± 2	41 5	56 4	141 4	10 5	NM NM	NM NM	1278 36	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	187	187	103 ± 5	39 5	62 5	139 4	10 3	NM NM	NM NM	1180 43	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	188	188	97 ± 4	39 3	60 5	137 3	11 3	NM NM	NM NM	1266 42	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	189	189	104 ± 3	43 4	60 4	143 4	9 5	NM NM	NM NM	1370 56	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	190	190	86 ± 4	34 5	49 4	121 2	12 3	NM NM	NM NM	1190 58	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	191	191	114 ± 5	5 2	31 4	77 2	15 2	NM NM	NM NM	0 55	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	192	192	97 ± 4	34 3	54 3	127 5	11 3	NM NM	NM NM	1285 46	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	193	193	121 ± 5	4 2	33 3	77 4	16 3	NM NM	NM NM	0 51	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	194	194	89 ± 4	34 5	55 2	122 3	10 5	NM NM	NM NM	1269 41	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	195	195	99 ± 4	39 5	57 4	136 2	13 5	NM NM	NM NM	1179 46	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	196	196	112 ± 5	19 2	20 5	80 4	11 4	NM NM	NM NM	58 54	NM NM	NM	NM	Drews Creek/Butcher Flat

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.

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Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	197	197	102 ± 5	43 5	59 5	138 5	10 3	NM NM	NM NM	1224 35	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	198	198	91 ± 3	32 5	51 4	119 3	11 3	NM NM	NM NM	1152 43	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	199	199	97 ± 4	40 2	59 2	139 3	14 3	NM NM	NM NM	1328 28	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	200	200	104 ± 2	43 2	58 2	136 5	10 5	NM NM	NM NM	1345 29	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	201	201	117 ± 2	4 2	30 3	75 5	16 4	NM NM	NM NM	0 55	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	202	202	93 ± 2	38 4	52 3	132 4	11 5	NM NM	NM NM	1314 54	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	203	203	93 ± 4	35 3	51 3	129 2	13 4	NM NM	NM NM	1271 41	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	204	204	101 ± 5	41 4	54 2	135 5	12 3	NM NM	NM NM	1305 37	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	205	205	99 ± 2	40 4	55 5	139 4	10 5	NM NM	NM NM	1243 57	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	206	206	110 ± 3	3 2	31 4	73 3	17 5	NM NM	NM NM	0 43	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	207	207	116 ± 3	5 4	32 5	73 2	17 5	NM NM	NM NM	0 33	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	208	208	108 ± 3	3 3	31 4	72 3	17 5	NM NM	NM NM	0 42	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	209	209	106 ± 4	4 3	30 5	69 3	16 3	NM NM	NM NM	0 39	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	210	210	112 ± 5	3 4	32 4	71 4	18 4	NM NM	NM NM	0 35	NM NM	NM	NM	Cowhead Lake

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

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Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	211	211	94 ± 3	38 5	55 5	136 3	12 2	NM NM	NM NM	1211 34	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	212	212	117 ± 5	25 5	24 5	100 5	9 4	NM NM	NM NM	75 36	NM NM	NM NM	NM NM	Drews Creek/Butcher Flat
35-LK-DEMO	213	213	111 ± 4	7 5	29 3	80 2	17 3	NM NM	NM NM	51 41	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	214	214	123 ± 2	3 3	36 5	79 4	20 2	NM NM	NM NM	0 53	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	215	215	117 ± 3	5 4	31 3	74 2	16 5	NM NM	NM NM	0 56	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	216	216	89 ± 3	35 4	49 2	121 4	11 4	NM NM	NM NM	1071 56	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	217	217	124 ± 4	10 4	26 3	78 5	14 2	NM NM	NM NM	0 59	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	218	218	95 ± 2	39 2	57 2	134 2	12 5	NM NM	NM NM	1349 28	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	219	219	95 ± 3	35 2	55 5	132 4	12 2	NM NM	NM NM	1194 54	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	220	220	95 ± 3	38 4	51 2	134 3	13 2	NM NM	NM NM	1214 34	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	221	221	115 ± 4	3 3	30 3	73 2	16 3	NM NM	NM NM	0 49	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	222	222	91 ± 2	35 2	53 4	126 2	11 2	NM NM	NM NM	1090 34	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	223	223	114 ± 5	5 4	31 4	71 3	17 2	NM NM	NM NM	0 50	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	224	224	87 ± 5	35 5	51 5	125 4	10 2	NM NM	NM NM	1174 52	NM NM	NM NM	NM NM	Cougar Mountain

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

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Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	225	225	109 ± 2	4 4	30 5	70 3	15 5	NM NM	NM NM	0 38	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	226	226	109 ± 2	3 3	30 2	70 3	15 2	NM NM	NM NM	0 32	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	227	227	112 ± 5	25 5	23 3	92 2	10 5	NM NM	NM NM	56 30	NM NM	NM NM	NM NM	Drews Creek/Butcher Flat
35-LK-DEMO	228	228	113 ± 5	4 4	29 3	73 5	16 2	NM NM	NM NM	0 46	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	229	229	103 ± 2	41 4	60 3	138 2	10 2	NM NM	NM NM	1111 50	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	230	230	95 ± 2	37 5	52 2	134 2	12 5	NM NM	NM NM	1059 53	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	231	231	121 ± 4	9 4	25 3	78 5	13 2	NM NM	NM NM	0 57	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	232	232	108 ± 4	8 4	24 2	75 5	11 2	NM NM	NM NM	0 60	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	233	233	99 ± 5	39 4	54 5	135 2	14 4	NM NM	NM NM	1201 28	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	234	234	90 ± 5	33 4	52 4	125 5	11 3	NM NM	NM NM	1246 34	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	235	235	127 ± 2	10 2	28 3	78 2	13 4	NM NM	NM NM	0 33	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	236	236	121 ± 3	4 3	32 3	78 3	16 4	NM NM	NM NM	0 49	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	237	237	119 ± 5	4 3	30 5	77 5	16 2	NM NM	NM NM	0 36	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	238	238	115 ± 4	8 2	25 4	73 2	12 4	NM NM	NM NM	0 40	NM NM	NM NM	NM NM	Cowhead Lake

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.

Northwest Research Obsidian Studies Laboratory

Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	239	239	114 ± 3	9 3	26 2	78 2	11 3	NM NM	NM NM	0 39	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	240	240	119 ± 4	25 5	24 3	100 3	12 2	NM NM	NM NM	90 39	NM NM	NM NM	NM NM	Drews Creek/Butcher Flat
35-LK-DEMO	241	241	99 ± 3	22 2	23 4	84 2	11 2	NM NM	NM NM	0 36	NM NM	NM NM	NM NM	Drews Creek/Butcher Flat
35-LK-DEMO	242	242	96 ± 3	38 3	55 5	136 3	12 2	NM NM	NM NM	1279 32	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	243	243	131 ± 5	10 5	27 4	82 4	12 2	NM NM	NM NM	0 46	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	244	244	118 ± 5	4 4	32 2	76 5	15 3	NM NM	NM NM	0 54	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	245	245	112 ± 5	22 2	23 5	94 5	10 5	NM NM	NM NM	48 30	NM NM	NM NM	NM NM	Drews Creek/Butcher Flat
35-LK-DEMO	246	246	113 ± 4	5 4	31 3	76 3	15 4	NM NM	NM NM	0 51	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	247	247	92 ± 2	36 5	53 3	123 3	12 3	NM NM	NM NM	1130 42	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	248	248	101 ± 4	40 3	54 3	140 3	13 2	NM NM	NM NM	1377 59	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	249	249	95 ± 4	39 4	52 5	131 2	13 3	NM NM	NM NM	1175 57	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	250	250	100 ± 3	39 4	57 4	135 4	16 5	NM NM	NM NM	1228 28	NM NM	NM NM	NM NM	Cougar Mountain
35-LK-DEMO	251	251	107 ± 5	6 3	31 4	73 2	15 2	NM NM	NM NM	0 38	NM NM	NM NM	NM NM	Cowhead Lake
35-LK-DEMO	252	252	94 ± 5	39 2	54 2	129 4	9 3	NM NM	NM NM	1113 40	NM NM	NM NM	NM NM	Cougar Mountain

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.

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Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ² O ³ T	Fe:Mn	Fe:Ti	
35-LK-DEMO	253	253	103 ± 3	43 2	58 3	143 4	13 4	NM NM	NM NM	1237 34	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	254	254	112 ± 3	4 5	30 2	72 3	17 4	NM NM	NM NM	0 49	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	255	255	90 ± 5	36 5	53 4	128 5	9 5	NM NM	NM NM	1191 45	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	256	256	122 ± 2	9 5	27 4	79 3	11 4	NM NM	NM NM	0 55	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	257	257	110 ± 2	4 4	29 5	70 2	16 2	NM NM	NM NM	0 45	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	258	258	102 ± 4	41 3	57 4	142 4	12 4	NM NM	NM NM	1217 51	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	259	259	108 ± 2	20 2	24 4	84 3	9 4	NM NM	NM NM	0 40	NM NM	NM	NM	Drews Creek/Butcher Flat
35-LK-DEMO	260	260	103 ± 5	42 2	56 3	140 2	14 5	NM NM	NM NM	1208 59	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	261	261	121 ± 3	9 5	26 5	86 3	12 3	NM NM	NM NM	0 54	NM NM	NM	NM	Cowhead Lake
35-LK-DEMO	262	262	93 ± 5	34 4	50 2	128 4	13 5	NM NM	NM NM	1074 36	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	263	263	89 ± 3	33 3	50 3	120 3	11 5	NM NM	NM NM	1247 34	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	264	264	98 ± 5	37 5	57 5	138 2	15 5	NM NM	NM NM	1336 35	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	265	265	102 ± 4	40 3	56 5	140 5	13 5	NM NM	NM NM	1311 30	NM NM	NM	NM	Cougar Mountain
35-LK-DEMO	266	266	103 ± 5	5 2	31 3	69 2	17 3	NM NM	NM NM	0 30	NM NM	NM	NM	Cowhead Lake

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide.

NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.

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Table A-1. Results of XRF Studies: 35-LK-DEMOSITE, Lake County, Oregon

Site	Specimen No.	Catalog No.	Trace Element Concentrations									Ratios		Geochemical Source
			Rb	Sr	Y	Zr	Nb	Ti	Mn	Ba	Fe ²⁺ O ^{3T}	Fe:Mn	Fe:Ti	
35-LK-DEMO	267	267	89	34	52	124	10	NM	NM	1229	NM	NM	NM	Cougar Mountain
			± 5	2	5	4	3	NM	NM	29	NM			
NA	RGM-1	RGM-1	148	109	22	222	9	NM	NM	794	NM	NM	NM	RGM-1 Reference Standard
			± 2	2	5	2	2	NM	NM	31	NM			

All trace element values reported in parts per million; ± = analytical uncertainty estimate (in ppm). Iron content reported as weight percent oxide. NA = Not available; ND = Not detected; NM = Not measured; * = Small sample; FGV = Fine-grained volcanic specimen.