Supplemental Table 2. U.S. Geological Survey Tephrochronology Report

Crossey, L.C., Karlstrom, K.E., Dorsey, R., Pearce, J., Wan, E., Beard, L.S., Asmerom, Y., Polyak, V., Crow, R.S., Cohen, A., Bright, J., and Pecha, M.E., 2015, The importance of groundwater in propagating downward integration of the 6-5 Ma Colorado River System: Geochemistry of springs, travertines and lacustrine carbonates of the Grand Canyon region over the past 12 million years: Geosphere, v. 11, doi:10.1130/GES01073.1.

Tephrochronology Methods

Six tephra samples found in measured sections within the Hualapai Limestone in the Detrital basin, Temple basin, Gregg basin, and Grand Wash trough were sent to the USGS Tephrochronology laboratory for geochemical dating. This investigation was conducted in collaboration with the USGS Lake Mead Project.

Sample Name	Facies	Location	UTM E	UTM N	elevation (m)	Tephrochronology
Grand Wash Trough						
JLP-09-132	ash-fall tuff	Grapevine Wash measured section	767629	3992426	711	discontinued: no glass
JLP-08-54	ash-fall tuff	Grapevine Wash measured section	769402	3995872	521	12.07 to 11.31 Ma
Gregg Basin						
JLP-09-116	ash-fall tuff	Spring Wash measured section base	754598	3986182	600	discontinued: no glass
Temple Basin						
JLP-08-112	ash-fall tuff	Mine Road measured section	733060	3984077	626	no matches
JLP-08-109	ash-fall tuff	Mine Road measured section	733225	3983938	571	no matches
Detrital Basin						
JLP-08-115	ash-fall tuff	Detrital Wash	727466	3978393	584	no matches
*UTM coordinates based on NAD27, Z12.						

USGS TEPHROCHRONOLOGY REPORT: JLP-08-54, -108, -112, and -115

Nine major and minor oxides (SiO_2 Al_2O_3, FeO, MgO, MnO, CaO, TiO_2, Na_2O, K_2O) were analyzed using electron microprobe. The raw data was then recalculated to a 100% fluid-free basis. Similarity coefficient analyses were performed on the chemical data, and the normalized values compared to geochemical "fingerprints" (currently >5,800) in the USGS Tephrochronology Project reference database. For a complete tephrochronologic interpretation of the tephra samples, independent age control, stratigraphic positions, field and petrographic characteristics, and mineralogy were also considered.

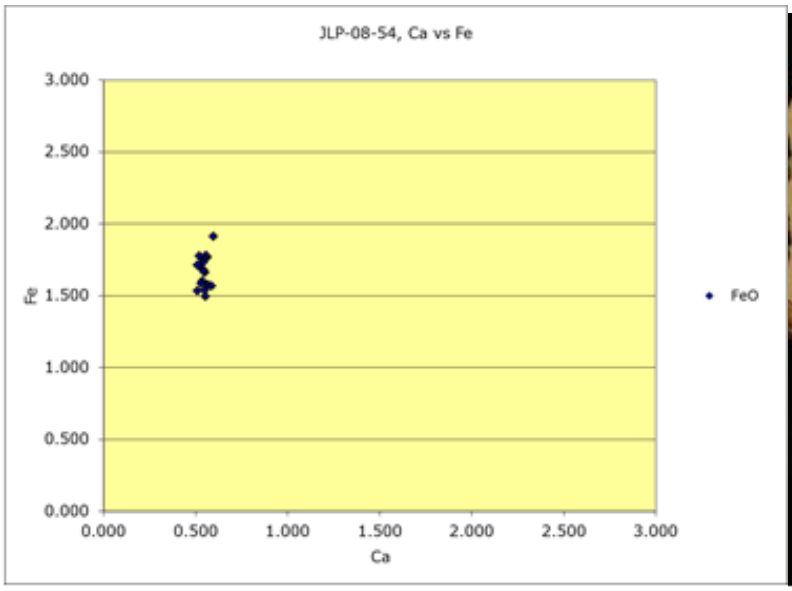
Attached are raw and normalized chemical data, comparative chemical data, and lists of chemical correlatives for your examination. Holly Olson performed the lab processing and petrography, Dave Wahl conducted the instrumental and computer analyses, and I interpreted all of the data.

Sample JLP-08-54 (Locality: Hualapai Limestone (late Miocene), Grand Wash Trough, AZ.) This sample is composed of 99% predominantly angular to subangular, clear to light brown, slightly coated, delicate, platy glass shards. Ribbed shards are also common. Less common are slightly devitrified, bw/bwj, blocky, or well-hydrated vesicular shards. Vesicles are equant and irregular in shape. A few minerals were noted on smear slide: partially altered calcite, qtz & plag xtls.

EMA shows that JLP-08-54 is a fairly leached (mean total = 93.06%, see file: JLP-08-54 T575-3.xls), middle and late Miocene tephra possibly derived from the Snake River Caldera hot spot area of southern Idaho. The closest matches (≥0.957 similarity coefficient, without alkalis) fall within an age range of 12.07-11.31 Ma, based on correlations to Ar/Ar dated samples from the Trapper Creek section of south-central Idaho (*e.g.,* TC89-18a, -27c, -25a; collector: M. Perkins, U. of Utah). In turn, the Trapper Creek samples can be correlated to other western and central U.S. (NV, UT, NM) samples within this age bracket: BE-26, etc. (collector: Bill Eastwood, UCB, Master's thesis); M90TM-, M89TR-, 1-36-23J, etc., (collectors: Dave Miller (USGS, Menlo Park), Marith Reheis (USGS, Denver), and John Stewart (USGS, Emeritus); and

ML-482u101103-djk, ML-372a-S161003-djk (Dan Koning, New Mexico Bureau of Geology and Mineral Resources), among others (see MS-Word file: rec JLP-08-54 T575-3, yellow highlighted samples). There is also a correlation to DSDP 173-23-1, a sample from offshore northern California, which has a biostratigraphic age (based on marine microfossils) of 12.2 Ma. Chemical correlations to 96TT151 (15.10 ±0.08 Ma), and 96TT137 (14.97±0.08 Ma) from Carlin, Nevada (Ted Theodore, coll.), and vvy-93-12 (15.18 Ma, Perkins) from Virgin Valley, NV, lower the basal age of JLP-08-54. However, the levels of magnesium and/or calcium (blue highlight) in these older samples are relatively high, and these preclude convincing matches with JLP-08-54. If minor and trace element data for this sample could be obtained (by INAA for example), the age of the sample may be better constrained.

No.	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	MnO	FeO	Total	
356	1.355	0.050	11.941	73.048	4.215	0.554	0.211	0.014	1.495	92.883	JLP-08-54 T575-3 1
357	1.517	0.075	11.759	73.995	4.417	0.552	0.189	0.031	1.660	94.195	JLP-08-54 T575-3 2
358	0.928	0.064	11.430	73.618	3.758	0.553	0.146	0.007	1.539	92.043	JLP-08-54 T575-3 3
359	1.578	0.059	11.656	73.303	4.367	0.536	0.172	0.041	1.759	93.471	JLP-08-54 T575-3 4
360	0.948	0.044	11.611	72.637	3.911	0.565	0.217	0.002	1.769	91.704	JLP-08-54 T575-3 5
361	1.508	0.041	11.847	72.762	4.324	0.568	0.217	0.030	1.576	92.873	JLP-08-54 T575-3 6
362	1.533	0.050	11.741	72.884	4.385	0.557	0.176	0.000	1.779	93.105	JLP-08-54 T575-3 7
363	1.531	0.050	11.555	73.057	4.406	0.553	0.222	0.034	1.752	93.160	JLP-08-54 T575-3 8
364	1.816	0.065	11.766	73.777	4.213	0.540	0.169	0.063	1.730	94.139	JLP-08-54 T575-3 9
365	1.754	0.063	11.749	73.158	4.474	0.521	0.233	0.017	1.776	93.745	JLP-08-54 T575-3 10
366	1.276	0.045	11.817	72.820	4.227	0.537	0.192	0.028	1.601	92.543	JLP-08-54 T575-3 11
367	1.450	0.053	11.735	74.029	3.940	0.546	0.256	0.035	1.678	93.722	JLP-08-54 T575-3 12
368	1.578	0.059	11.412	72.854	4.250	0.512	0.263	0.016	1.533	92.477	JLP-08-54 T575-3 13
369	1.504	0.056	11.434	72.931	4.318	0.527	0.245	0.034	1.699	92.748	JLP-08-54 T575-3 14
370	0.976	0.032	11.366	72.887	3.775	0.510	0.190	0.024	1.712	91.472	JLP-08-54 T575-3 15
371	1.114	0.037	11.701	73.135	4.109	0.588	0.156	0.006	1.569	92.415	JLP-08-54 T575-3 16
372	1.780	0.039	11.797	74.215	4.287	0.546	0.162	0.058	1.671	94.555	JLP-08-54 T575-3 17
373	1.803	0.036	11.881	73.389	4.263	0.597	0.195	0.026	1.912	94.102	JLP-08-54 T575-3 18
375	1.562	0.042	11.497	73.127	4.253	0.533	0.202	0.027	1.586	92.829	JLP-08-54 T575-3 20
Lo Total											
374	0.515	0.007	4.267	41.392	1.591	0.137	0.117	0.000	1.067	49.093	JLP-08-54 T575-3 19
Column1											
Mean	1.448	0.051	11.668	73.243	4.205	0.547	0.201	0.026	1.673	93.062	
Std Deviation	0.282	0.012	0.173	0.469	0.212	0.023	0.034	0.017	0.108	0.866	
Range	0.888	0.043	0.575	1.578	0.716	0.087	0.117	0.063	0.417	3.083	
Minimum	0.928	0.032	11.366	72.637	3.758	0.510	0.146	0.000	1.495	91.472	
Maximum	1.816	0.075	11.941	74.215	4.474	0.597	0.263	0.063	1.912	94.555	
Count	19.000	19.000	19.000	19.000	19.000	19.000	19.000	19.000	19.000	19.000	
Confidence (95.0%)	0.136	0.006	0.083	0.226	0.102	0.011	0.016	0.008	0.052	0.417	



Hand sample photo, Sample JLP-08-54

JLP-08-54 Listing of 37 closest matches for COMP. NO. 5769 for elements: **Na, Al, Si, K , Ca, Ti, Fe** Date of Update: 8/12/09

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total	R	Sim. Co	
1	5769	JLP-08-54 T575-3	8/4/09	78.55	12.51	1.99	0.05	0.03	0.59	0.22	1.55	4.51	100.00		1.0000	
2	5498	CW05NV126 T542-2(pop2)	9/19/06	78.14	12.18	1.89	0.06	0.03	0.59	0.27	1.56	5.27	99.99		0.9403	11.59-11.5 Ma
3	3602	EL-8-F (2SH) T333-5	3/96	77.32	12.46	1.94	0.07	0.03	0.59	0.21	1.89	5.48	99.99		0.9361	
4	4639	JMZ-PV-2_pop1 T442-3	8-3-00	77.38	12.13	1.93	0.07	0.03	0.65	0.22	1.62	5.98	100.01		0.9347	
5	5497	CW05NV126 T542-2(pop1)	9/19/06	79.11	12.35	1.57	0.07	0.03	0.56	0.24	1.42	4.65	100.00		0.9316	
6	2813	M91TR-37 T257-37	5/14/92	76.85	12.41	1.88	0.06	0.04	0.59	0.22	1.78	6.17	100.00		0.9310	Trapper Ck, ID
7	3308	Y72-11-1p VIII (634-636cm) T312	9/21/94	76.53	12.33	1.94	0.04	0.03	0.59	0.20	1.64	6.77	100.07		0.9222	
8	2730	KNL396.2 m2		77.41	12.01	2.17	0.03	0.04	0.67	0.22	1.71	5.74	100.00		0.9193	
9	5505	CW05NV129 T542-3(pop1)	9/19/06	78.36	12.22	2.00	0.11	0.04	0.61	0.31	1.35	4.99	99.99		0.9173	
10	2131	CCPC-5.36 C lo Na lsh		77.67	13.78	1.54	0.21	0.09	0.61	0.20	1.36	4.53	99.99		0.9171	
11	3318	1-36-23J T312-8 major	10/21/94	76.66	12.27	1.95	0.04	0.05	0.58	0.19	1.70	6.56	100.00		0.9118	Middlegate, NV
12	4102	SPT8/26/97-1 T376	1-30-97	77.09	12.08	2.00	0.04	0.02	0.61	0.22	2.58	5.34	99.98		0.9078	
13	1336	BE-26 T105-14	8/29/85	75.95	11.97	2.00	0.06	0.03	0.62	0.22	1.82	7.33	100.00		0.9053	Aldrich Stn, NV
14	3578	TC89-15 (25)		76.80	12.03	1.71	0.08	0.02	0.58	0.23	1.48	7.07	100.00		0.9044	
15	5599	GL-SCS-KMI T559-9	3/19/08	76.44	12.30	1.97	0.06	0.04	0.65	0.21	1.90	6.42	99.99		0.9038	Smith Cty, KS
16	3309	Y72-11-1p VIII(636-638cm) Majo	9/21/94	76.28	12.54	1.93	0.04	0.04	0.56	0.18	1.64	6.79	100.00		0.9022	
17	119	GV-77-2, T16-14		76.02	12.46	1.94	0.04	0.00	0.65	0.22	2.00	6.66	99.99		0.8998	
18	5466	WMR-RM-01 T538-10 Pop1	4/13/06	77.61	12.26	1.88	0.09	0.03	0.63	0.29	1.82	5.39	100.00		0.8995	
19	4159	suc92-06a 9perkins0		77.35	12.12	2.04	0.03	0.03	0.62	0.18	1.93	5.69	99.99		0.8992	
20	2735	BUR-101.4 HiFe		78.00	11.60	1.98	0.13	0.05	0.62	0.28	1.93	5.41	100.00		0.8985	
21	1350	BE-250 T106-13	8/30/85	76.35	11.80	1.98	0.06	0.03	0.63	0.24	1.73	7.19	100.01		0.8981	
22	2090	ALVES-1 (2) T173-12	10/6/88	77.06	12.12	2.05	0.05	0.03	0.65	0.22	2.70	5.12	100.00		0.8976	Neroly Fm., CA
23	5041	JRK-SB-1 T496-5	3-17-03	76.71	12.32	2.04	0.05	0.03	0.64	0.22	2.79	5.20	100.00		0.8974	
24	4396	DLS1100_12.4.98 T402-2	12-3-98	77.50	12.18	1.95	0.04	0.02	0.63	0.19	2.36	5.13	100.00		0.8966	
25	4025	1-36-39J T313-1		75.89	12.82	2.12	0.08	0.04	0.64	0.25	1.75	6.40	99.99		0.8961	
26	4160	vvy93-12 (perkins)		75.74	12.31	2.09	0.08	0.03	0.59	0.24	1.91	7.00	99.99		0.8961	15.18 Ma
27	1341	BE-23 T105-4	8/29/85	76.00	12.05	1.91	0.08	0.03	0.61	0.25	1.45	7.61	99.99		0.8951	11.66 Ma
28	1139	DW-8-83 (rerun) T84-15	12/3/84	76.92	12.36	1.91	0.07	0.03	0.63	0.21	2.76	5.12	100.01		0.8944	
29	2387	LVWG-1 T204-4	4/17/90	76.93	12.22	1.85	0.06	0.02	0.62	0.22	2.60	5.47	99.99		0.8940	
30	5756	CHO0701 T573-5(pop1)	6/4/09	76.79	12.22	2.32	0.02	0.04	0.59	0.24	2.13	5.65	100.00		0.8935	
31	1332	BE-210 T105-10	8/29/85	76.07	12.08	2.01	0.03	0.03	0.65	0.21	1.89	7.02	99.99		0.8927	
32	4674	M1SC T456-10	1-18-01	76.74	12.05	1.91	0.05	0.03	0.61	0.22	2.59	5.80	100.00		0.8919	
33	5302	WENT-1 T520-8	12/21/04	77.56	12.10	2.07	0.06	0.04	0.63	0.24	3.00	4.30	100.00		0.8913	
34	2415	GREFCO-1 T208-7	5/24/90	76.88	12.18	2.08	0.05	0.03	0.63	0.23	2.81	5.10	99.99		0.8911	
35	3570	TC89-27c (34)		76.61	11.96	2.02	0.05	0.03	0.61	0.21	2.31	6.19	99.99		0.8911	CPT XI, 11.31±0.10 Ma
36	2370	083089-A T201-1	10/12/89	76.95	12.15	1.84	0.05	0.03	0.59	0.21	2.60	5.58	100.00		0.8906	
37	5566	KP06P49(391-393cm) T546-6 (pop	3/7/07	75.42	12.67	1.93	0.07	0.03	0.67	0.21	1.82	7.18	100.00		0.8903	

Sample JLP-08-54, Listing of 37 closest matches for COMP. NO. 5769 for elements: Na, Al, Si, K , Ca, Ti, Fe

JLP-08-54 Listing of 37 closest matches for COMP. NO. 5769 for elements: Al, Si, Ca, Ti, Fe Date of Update: 8/12/09

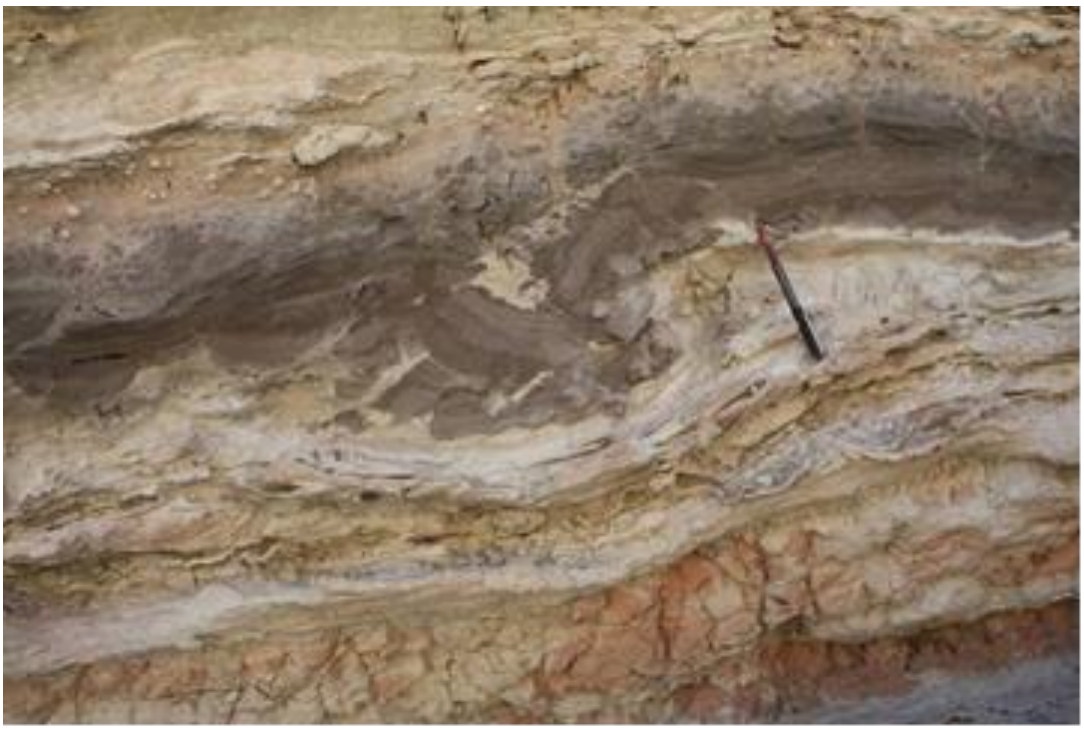
	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co	
1	5769	JLP-08-54 T575-3	8/4/09	78.55	12.51	1.99	0.05	0.03	0.59	0.22	1.55	4.51	100.00	1.0000	
2	2813	M91TR-37 T257-37	5/14/92	76.85	12.41	1.88	0.06	0.04	0.59	0.22	1.78	6.17	100.00	0.9830	
3	3602	EI-8-F (28H) T333-5	3/96	77.32	12.46	1.94	0.07	0.03	0.59	0.21	1.89	5.48	99.99	0.9820	Hazen, NV
4	4102	SPT8/26/97-1 T376	1-30-97	77.09	12.08	2.00	0.04	0.02	0.61	0.22	2.58	5.34	99.98	0.9819	
5	1336	BE-26 T105-14	8/29/85	75.95	11.97	2.00	0.06	0.03	0.62	0.22	1.82	7.33	100.00	0.9741	CPT XI, 11.31±0.10 Ma
6	4674	M18C T456-10	1-18-01	76.74	12.05	1.91	0.05	0.03	0.61	0.22	2.59	5.80	100.00	0.9734	
7	4051	96TT151 T371-9	10/97	75.96	12.27	1.94	0.07	0.04	0.58	0.21	2.57	6.35	99.99	0.9721	15.10±0.08 Ma, Carlin Fm
8	5041	JRK-8B-1 T496-5	3-17-03	76.71	12.32	2.04	0.05	0.03	0.64	0.22	2.79	5.20	100.00	0.9718	
9	2814	M91TR-38 T257-5	5/14/92	75.99	12.35	1.92	0.06	0.05	0.63	0.22	2.89	5.89	100.00	0.9712	
10	2531	M90TM-145 T223-2	4/2/91	76.49	12.10	1.97	0.04	0.04	0.61	0.23	2.63	5.90	100.01	0.9709	Mio. Salt Lake Grp
11	2592	MMSM-1 T230-2	7/2/91	78.19	12.38	2.04	0.05	0.02	0.63	0.21	3.33	3.16	100.01	0.9703	
12	119	GV-77-2, T16-14		76.02	12.46	1.94	0.04	0.00	0.65	0.22	2.00	6.66	99.99	0.9693	
13	3308	Y72-11-1p VIII (634-636cm) T312	9/21/94	76.53	12.33	1.94	0.04	0.03	0.59	0.20	1.64	6.77	100.07	0.9688	
14	3570	TC89-27c (34)		76.61	11.96	2.02	0.05	0.03	0.61	0.21	2.31	6.19	99.99	0.9676	CPT XI, 11.31±0.10 Ma
15	2387	LVWG-1 T204-4	4/17/90	76.93	12.22	1.85	0.06	0.02	0.62	0.22	2.60	5.47	99.99	0.9675	
16	3575	TC89-18a (28)		76.31	11.97	1.96	0.06	0.03	0.61	0.21	2.39	6.45	99.99	0.9670	CPT V, 12.07±0.04 Ma
17	3238	M92TR-98 T295-6	4/14/94	75.96	12.42	2.03	0.05	0.03	0.63	0.23	2.56	6.08	99.99	0.9666	
18	4639	JM2-PV-2_pop1 T442-3	8-3-00	77.38	12.13	1.93	0.07	0.03	0.65	0.22	1.62	5.98	100.01	0.9665	
19	2370	083089-A T201-1	10/12/89	76.95	12.15	1.84	0.05	0.03	0.59	0.21	2.60	5.58	100.00	0.9660	
20	2532	M90TM-146 T223-3	4/2/91	76.34	12.25	1.93	0.05	0.03	0.65	0.22	2.67	5.85	99.99	0.9657	Mio. Salt Lake Grp
21	2090	ALVES-1 (2) T173-12	10/6/88	77.06	12.12	2.05	0.05	0.03	0.65	0.22	2.70	5.12	100.00	0.9657	11.93 Ma Ibex Hollow
22	2509	M90PR-27 LO FE CA FRACT T220-8	1/31/91	76.38	12.50	1.89	0.08	0.03	0.60	0.24	2.79	5.49	100.00	0.9643	
23	1139	DW-8-83 (rerun) T84-15	12/3/84	76.92	12.36	1.91	0.07	0.03	0.63	0.21	2.76	5.12	100.01	0.9636	
24	4160	vvy93-12 (perkins)		75.74	12.31	2.09	0.08	0.03	0.59	0.24	1.91	7.00	99.99	0.9634	15.18 Ma
25	2212	M87TH-118A T181A-5	12/22/88	76.63	11.85	2.05	0.04	0.02	0.64	0.22	2.67	5.87	99.99	0.9631	
26	2395	M89TH-33 T205-4	4/17/90	76.54	11.94	1.95	0.05	0.03	0.60	0.24	2.32	6.33	100.00	0.9617	
27	5599	GL-8C8-RMI T559-9	3/19/08	76.44	12.30	1.97	0.06	0.04	0.65	0.21	1.90	6.42	99.99	0.9617	
28	1140	D8DP 173-23-1 (148-150CM) T85	12/3/84	76.31	12.20	1.96	0.07	0.03	0.64	0.21	3.16	5.41	99.99	0.9616	12.2 Ma
29	2830	M91GC-30 LO-FE FR. T258-8	6/24/92	76.58	11.78	1.83	0.08	0.03	0.57	0.22	2.64	6.27	100.00	0.9605	
30	2415	GREFCO-1 T208-7	5/24/90	76.88	12.18	2.08	0.05	0.03	0.63	0.23	2.81	5.10	99.99	0.9604	
31	4050	96TT137 T371-8	10/97	75.50	12.40	2.03	0.08	0.04	0.62	0.24	2.30	6.78	99.99	0.9602	14.97±0.08 Ma, Carlin Fm
32	5362	MI-482u-101103-djk T525-9	04/25/20	76.06	12.11	1.93	0.06	0.03	0.63	0.21	2.97	6.00	100.00	0.9594	Mio. Santa Fe Grp, NM
33	5360	MI-372a-8161003-djk T525-7	04/25/20	75.90	12.08	1.99	0.05	0.02	0.62	0.20	2.84	6.30	100.00	0.9585	Mio. Santa Fe Grp, NM
34	3571	TC89-25a (32)		76.61	11.96	1.91	0.07	0.03	0.58	0.24	2.20	6.40	100.00	0.9582	11.59 Ma
35	1332	BE-210 T105-10	8/29/85	76.07	12.08	2.01	0.03	0.03	0.65	0.21	1.89	7.02	99.99	0.9573	
36	1857	RB-FS-SM1 T148-11	10/28/87	78.12	11.96	1.94	0.04	0.03	0.62	0.20	3.17	3.91	99.99	0.9572	
37	2180	M87TH-109 T180-1	12/22/88	76.11	12.13	2.15	0.05	0.04	0.61	0.21	3.00	5.71	100.01	0.9572	

Sample JLP-08-54, Listing of 37 closest matches for COMP. NO. 5769 for elements: Al, Si, Ca, Ti, Fe

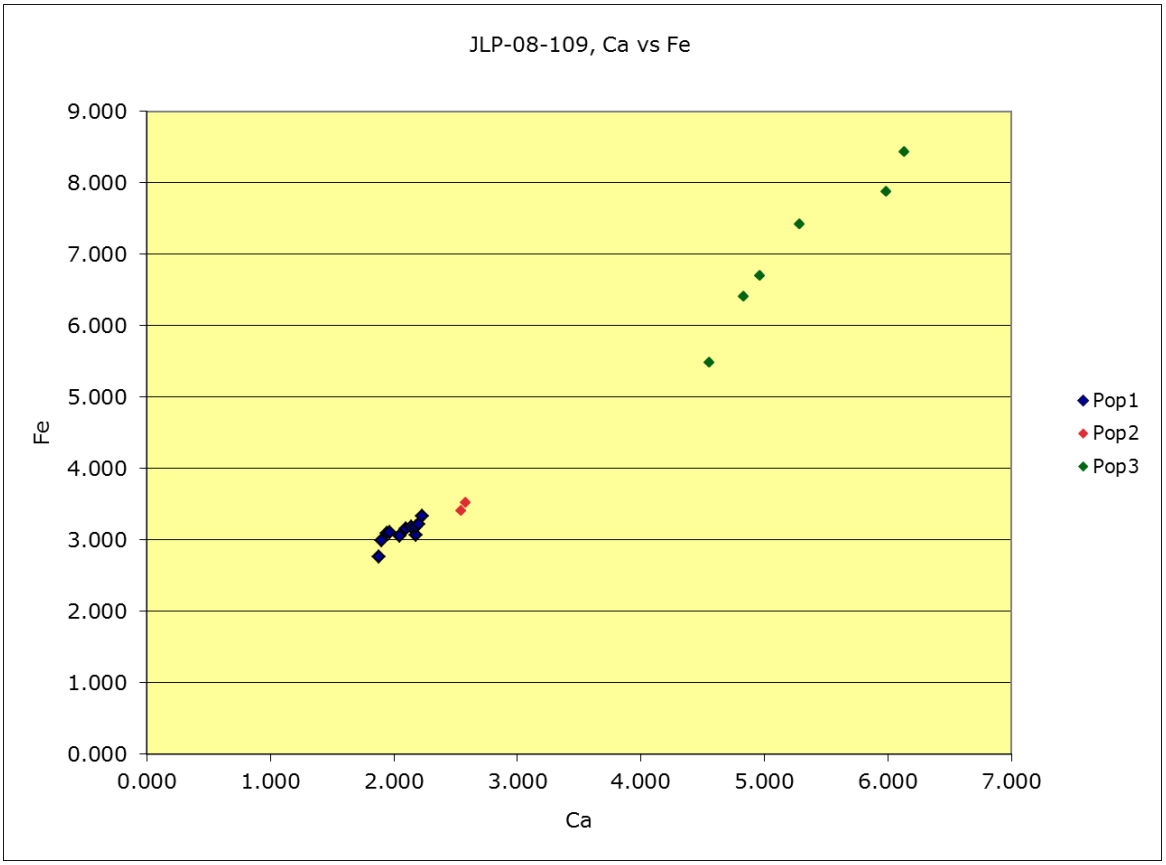
Sample JLP-08-109 (Locality: Hualapai Limestone. From western side of Temple Basin, AZ. One of six ashes in the base of the HL deposit along BR132; collected ~20 m below 5.97 ±0.07 Ma ash (Spencer, 1998). JLP-08-109 consists of ~77% clear to medium brown, slightly to moderately coated, angular to subangular, predominately webby/frothy, pumiceous shards. Ribbed, bw/bwj, chunky/blocky, microphenocrystic, and vesiculated shards are common. Vesicles are well-hydrated, equant to irregular bubble-types, or elongate spindle or conical shaped. Platy shards are rare. Remaining 13% includes slightly to highly altered tectosilicates, biotite, and altered grains.

Microprobe results show that this is a polymodal, andesitic-dacitic tephra that may be locally derived.

- Pop 1 (11 shards): No good match. This is a well-hydrated (~0.93 %) subpopulation that best correlates with JLP-08-115, and only moderately resembles JLP-08-109 Pop 2. (Fe, Mg, Ca, and Ti values are substantially higher in Pop 2.) These tephra/modes exhibit a generic similarity to Miocene Cascade volcanic center tephra deposits from the central coastal of California (Dos Pueblos Beach section) to Quaternary tephra from the Pringle Falls area of Oregon. The Fe, Mg, Mn, and Ti values of these volcanic glass shards vary widely when compared to JLP-08-109 Pop 1.
- Pop 2 (2 shards) No match. Another highly leached mode whose closest correlation is JLP-08-109 Pop 1. Again, generically similar to Cascade-type tephra found in CA and OR.
- Pop 3 (6 shards) Moderately hydrated (~96%) highly mafic mode. No Match. Also generically similar to Cascade Range tephra from Dos Pueblos Beach, central CA to Pringle Falls, OR.



Field photo of sample JLP-08-1


JLP-08-109, Ca vs Fe
9.000
8.000
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
Fe
0.000
1.000
2.000
3.000
4.000
5.000
6.000
7.000
Ca
Pop1
Pop2
Pop3

No.	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	MnO	FeO	Total	
Pop1											
394	2.971	0.772	15.279	65.118	1.857	1.880	0.596	0.160	2.759	91.392	JLP-08-109 T575-4 19
383	3.030	0.773	15.364	66.602	1.816	1.900	0.667	0.101	2.995	93.248	JLP-08-109 T575-4 8
395	2.826	0.753	15.283	65.449	1.881	1.947	0.617	0.161	3.097	92.014	JLP-08-109 T575-4 20
376	3.310	0.710	15.562	66.216	1.982	1.970	0.606	0.157	3.098	93.611	JLP-08-109 T575-4 1
380	3.119	0.834	15.313	64.947	1.799	2.045	0.683	0.151	3.058	91.949	JLP-08-109 T575-4 5
386	2.901	0.864	15.548	65.435	1.894	2.097	0.709	0.145	3.153	92.746	JLP-08-109 T575-4 11
384	3.133	0.836	15.380	64.752	1.872	2.143	0.697	0.108	3.182	92.103	JLP-08-109 T575-4 9
393	3.168	0.881	15.323	64.660	1.879	2.177	0.649	0.125	3.072	91.934	JLP-08-109 T575-4 18
385	3.007	0.822	15.310	65.060	1.801	2.181	0.796	0.123	3.176	92.276	JLP-08-109 T575-4 10
392	3.106	0.955	15.684	65.564	1.867	2.198	0.803	0.117	3.219	93.513	JLP-08-109 T575-4 17
387	3.293	0.871	15.636	65.200	1.810	2.230	0.768	0.154	3.333	93.295	JLP-08-109 T575-4 12
Pop2											
382	3.130	0.952	15.434	64.603	1.757	2.547	0.733	0.165	3.412	92.733	JLP-08-109 T575-4 7
379	2.973	1.080	15.814	64.588	1.761	2.584	0.747	0.114	3.524	93.185	JLP-08-109 T575-4 4
Pop3											
377	3.597	2.087	16.123	59.395	1.523	4.553	1.019	0.184	5.480	93.961	JLP-08-109 T575-4 2
378	3.497	2.481	16.126	58.376	1.325	4.830	1.002	0.201	6.409	94.247	JLP-08-109 T575-4 3
391	3.260	2.641	16.803	58.408	1.489	4.964	1.080	0.219	6.696	95.560	JLP-08-109 T575-4 16
381	4.152	2.667	16.756	58.498	1.427	5.285	1.073	0.199	7.426	97.483	JLP-08-109 T575-4 6
389	4.053	3.025	16.855	58.325	1.539	5.985	1.161	0.240	7.871	99.054	JLP-08-109 T575-4 14
388	4.235	3.137	16.699	57.534	1.410	6.135	1.143	0.243	8.433	98.969	JLP-08-109 T575-4 13
Feldspar											
390	6.175	0.122	28.298	55.105	0.223	10.469	0.036	0.057	0.720	101.205	JLP-08-109 T575-4 15

JLP-08-109 T575-4

POP1										
Mean	3.079	0.825	15.426	65.364	1.860	2.070	0.690	0.137	3.104	92.553
Std Deviation	0.151	0.069	0.151	0.595	0.054	0.128	0.073	0.022	0.146	0.760
Range	0.484	0.245	0.405	1.942	0.183	0.350	0.207	0.060	0.574	2.219
Minimum	2.826	0.710	15.279	64.660	1.799	1.880	0.596	0.101	2.759	91.392
Maximum	3.310	0.955	15.684	66.602	1.982	2.230	0.803	0.161	3.333	93.611
Count	11.000	11.000	11.000	11.000	11.000	11.000	11.000	11.000	11.000	11.000
C.L. (95.0%)	0.101	0.046	0.102	0.399	0.036	0.086	0.049	0.015	0.098	0.511

POP2										
Mean	3.052	1.016	15.624	64.596	1.759	2.566	0.740	0.140	3.468	92.959
Std Deviation	0.111	0.091	0.269	0.011	0.003	0.026	0.010	0.036	0.079	0.320
Range	0.157	0.128	0.380	0.015	0.004	0.037	0.014	0.051	0.112	0.452
Minimum	2.973	0.952	15.434	64.588	1.757	2.547	0.733	0.114	3.412	92.733
Maximum	3.130	1.080	15.814	64.603	1.761	2.584	0.747	0.165	3.524	93.185
Count	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
C.L. (95.0%)	0.997	0.813	2.414	0.095	0.025	0.235	0.089	0.324	0.712	2.872

POP 3										
Mean	3.799	2.673	16.560	58.423	1.452	5.292	1.080	0.214	7.053	96.546
Std Deviation	0.400	0.380	0.342	0.592	0.081	0.642	0.064	0.024	1.070	2.279
Range	0.975	1.050	0.732	1.861	0.214	1.582	0.159	0.059	2.953	5.093
Minimum	3.260	2.087	16.123	57.534	1.325	4.553	1.002	0.184	5.480	93.961
Maximum	4.235	3.137	16.855	59.395	1.539	6.135	1.161	0.243	8.433	99.054
Count	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
C.L. (95.0%)	0.420	0.398	0.358	0.621	0.085	0.673	0.067	0.025	1.123	2.392

No Match. Generically similar to Miocene to Quaternary, Cascade-type tephra from central California to Oregon.

JLP-08-109(Pop 1) Listing of 37 closest matches for COMP. NO. 5770 for elements: Na, Mg, Al, Si, K , Ca, Ti, Mn, Fe Date of Update: 8/12/09

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	5770	JLP-08-109 T575-4(pop1)	8/4/09	70.36	16.61	3.71	0.89	0.15	2.23	0.74	3.31	2.00	100.00	1.0000
2	5774	JLP-08-115 T575-6	8/4/09	71.10	16.49	3.29	0.85	0.12	2.18	0.73	3.35	1.89	100.00	0.9468
3	5771	JLP-08-109 T575-4(pop2)	8/4/09	69.20	16.74	4.13	1.09	0.15	2.75	0.79	3.27	1.88	100.00	0.9296
4	5764	ALT-27 T574-2	8/4/09	70.08	15.99	4.01	0.95	0.10	2.60	0.70	3.15	2.42	100.00	0.8966
5	3500	DRE-2 T323-3 silicic fr.	5/6/95	67.93	15.85	3.79	0.81	0.14	2.29	0.69	6.15	2.35	100.00	0.8931
6	2120	PF-88-Q (MAFIC)(2) T175-12	10/28/88	68.00	16.14	3.85	0.78	0.13	2.28	0.75	5.70	2.37	100.00	0.8927
7	2039	PF-88-MD (MAFIC) T169-9	10/2/88	68.34	15.53	3.92	0.82	0.13	2.31	0.77	5.82	2.37	100.01	0.8866
8	2041	PF-88-O (SILICIC-CT) T169-12	10/2/88	68.64	15.68	3.85	0.80	0.12	2.27	0.71	5.56	2.38	100.01	0.8844
9	1377	ASW-61085-17 T108-4	9/23/85	69.65	14.90	3.65	0.94	0.10	2.32	0.70	5.71	2.04	100.01	0.8835
10	2035	PF-88-Q (SILICIC) T169-5	10/2/88	68.38	15.51	3.85	0.79	0.12	2.23	0.73	5.94	2.37	99.92	0.8827
11	2040	PF-88-O (SILICI-CB) T169-11	10/2/88	69.36	15.27	3.91	0.74	0.14	2.11	0.65	5.44	2.38	100.00	0.8769
12	1545	BPT-CC T126-1	7/17/86	69.34	15.31	3.70	0.72	0.13	2.12	0.67	5.70	2.30	99.99	0.8763
13	2437	DPB-4 T210-2	8/10/90	71.75	15.08	3.61	0.76	0.12	2.03	0.75	2.76	3.13	99.99	0.8761
14	3710	SPAT-4 T343-3	11/96	68.45	15.63	3.83	0.83	0.11	2.20	0.69	5.91	2.34	99.99	0.8758
15	4080	EL-72-KV LO FE T374-9	11/97	69.86	15.46	3.68	0.79	0.10	2.14	0.70	4.71	2.55	99.99	0.8736
16	2790	dpb-4 avg 23ss		71.63	15.38	3.62	0.75	0.12	2.07	0.77	2.61	3.05	100.00	0.8734
17	5773	JLP-08-112 T575-5	8/4/09	71.81	15.85	3.73	0.62	0.10	2.06	0.57	3.08	2.16	99.98	0.8714
18	2865	HR-FF-1 HI-FE FRACT T264-3	8/20/92	67.97	15.47	4.38	0.76	0.15	2.22	0.64	6.00	2.41	100.00	0.8711
19	5076	DPB-17_POP2 T212-1(2)	4-23-03	68.27	16.70	3.26	0.87	0.12	2.06	0.77	3.00	4.95	100.00	0.8685
20	2036	PF-88-Q (MAFIC) T169-6	10/2/88	68.48	15.31	3.86	0.82	0.11	2.34	0.71	5.92	2.45	100.00	0.8665
21	2042	PF-88-O (MAFIC) T169-13	10/2/88	69.21	15.37	3.81	0.73	0.12	2.14	0.69	5.40	2.53	100.00	0.8665
22	5068	DPB-4_(2) T210-2	4-23-03	71.94	15.68	3.59	0.74	0.12	2.11	0.69	2.24	2.89	100.00	0.8632
23	1840	flv-16-ww t146-4 dk fr.	8/25/87	69.56	14.95	3.97	0.81	0.11	2.37	0.78	4.44	3.02	100.01	0.8627
24	2119	PF-88-O (SILICIC)(2) T175-11	10/28/88	68.45	16.19	3.64	0.67	0.11	2.16	0.67	5.81	2.30	100.00	0.8587
25	5685	ALT-11A T567-2	1/8/09	69.02	15.32	3.85	0.88	0.09	2.38	0.72	4.55	3.19	100.00	0.8578
26	2868	HR-FF-1-ORIG	08/28/92	68.47	15.49	4.27	0.72	0.13	2.17	0.65	5.59	2.50	99.99	0.8549
27	4766	SL-AS8-2iU T467-4	7-23-01	68.70	15.12	4.11	0.91	0.10	2.47	0.68	5.48	2.43	100.00	0.8537
28	5087	DPB-21 T212-5(2)	4-23-03	68.66	16.99	3.06	0.80	0.11	2.09	0.71	3.07	4.52	100.01	0.8530
29	5666	EB-ASF-13 T565-7	11/18/08	70.05	15.71	3.28	0.78	0.12	2.11	0.81	2.78	4.37	100.01	0.8510
30	2063	PF-88-P T170-10	9/3/88	69.95	15.17	3.87	0.69	0.11	2.12	0.61	5.00	2.47	99.99	0.8468
31	1321	ASW-61085-13-A T103-15	8/26/85	71.35	14.35	3.45	0.72	0.09	2.38	0.69	4.57	2.40	100.00	0.8462
32	1320	ASW-61085-12A T103-13	8/26/85	71.29	14.36	3.46	0.71	0.09	2.31	0.69	4.62	2.48	100.01	0.8447
33	1089	61284-10 ASW T81-6	9/4/84	68.55	15.37	4.26	0.66	0.14	2.03	0.65	5.85	2.50	100.01	0.8444
34	824	GS-70		70.64	14.97	3.96	0.83	0.05	2.40	0.81	3.52	2.81	99.99	0.8439
35	2302	61284-10_ASW.11MTB;2, T81-6	04/21/89	68.25	16.03	4.25	0.72	0.12	2.03	0.64	5.42	2.55	100.01	0.8430
36	1655	AA-23b JOD	09/12/86	67.89	15.73	4.87	1.23	0.13	3.31	0.88	3.86	2.11	100.01	0.8427
37	1322	ASW-61085-13-P T104-1	8/23/85	71.45	14.30	3.49	0.67	0.09	2.22	0.67	4.65	2.45	99.99	0.8409

Sample JLP-08-109 pop1, Listing of 37 closest matches for COMP. NO. 5770 for elements: Na, Mg, Al, Si, K , Ca, Ti, Mn, Fe

JLP-08=109(Pop 1) Listing of 37 closest matches for COMP. NO. 5770 for elements: Mg, Al, Si, Ca, Ti, Mn, Fe Date of Update: 8/12/09

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	5770	JLP-08-109 T575-4(pop1)	8/4/09	70.36	16.61	3.71	0.89	0.15	2.23	0.74	3.31	2.00	100.00	1.0000
2	3500	DRE-2 T323-3 silicic fr.	5/6/95	67.93	15.85	3.79	0.81	0.14	2.29	0.69	6.15	2.35	100.00	0.9498
3	2120	PF-88-Q (MAFIC)(2) T175-12	10/28/88	68.00	16.14	3.85	0.78	0.13	2.28	0.75	5.70	2.37	100.00	0.9442
4	5774	JLP-08-115 T575-6	8/4/09	71.10	16.49	3.29	0.85	0.12	2.18	0.73	3.35	1.89	100.00	0.9412
5	2039	PF-88-MD (MAFIC) T169-9	10/2/88	68.34	15.53	3.92	0.82	0.13	2.31	0.77	5.82	2.37	100.01	0.9382
6	2035	PF-88-Q (SILICIC) T169-5	10/2/88	68.38	15.51	3.85	0.79	0.12	2.23	0.73	5.94	2.37	99.92	0.9348
7	2041	PF-88-O (SILICIC-CT) T169-12	10/2/88	68.64	15.68	3.85	0.80	0.12	2.27	0.71	5.56	2.38	100.01	0.9320
8	5076	DPB-17_POP2 T212-1(2)	4-23-03	68.27	16.70	3.26	0.87	0.12	2.06	0.77	3.00	4.95	100.00	0.9294
9	3710	SPAT-4 T343-3	11/96	68.45	15.63	3.83	0.83	0.11	2.20	0.69	5.91	2.34	99.99	0.9239
10	2865	HR-FF-1 HI-FE FRACT T264-3	8/20/92	67.97	15.47	4.38	0.76	0.15	2.22	0.64	6.00	2.41	100.00	0.9227
11	2040	PF-88-O (SILICI-CB) T169-11	10/2/88	69.36	15.27	3.91	0.74	0.14	2.11	0.65	5.44	2.38	100.00	0.9205
12	5771	JLP-08-109 T575-4(pop2)	8/4/09	69.20	16.74	4.13	1.09	0.15	2.75	0.79	3.27	1.88	100.00	0.9197
13	1545	BPT-CC T126-1	7/17/86	69.34	15.31	3.70	0.72	0.13	2.12	0.67	5.70	2.30	99.99	0.9195
14	2036	PF-88-Q (MAFIC) T169-6	10/2/88	68.48	15.31	3.86	0.82	0.11	2.34	0.71	5.92	2.45	100.00	0.9176
15	2790	dpb-4 avg 23ss		71.63	15.38	3.62	0.75	0.12	2.07	0.77	2.61	3.05	100.00	0.9166
16	2437	DPB-4 T210-2	8/10/90	71.75	15.08	3.61	0.76	0.12	2.03	0.75	2.76	3.13	99.99	0.9161
17	5068	DPB-4_(2) T210-2	4-23-03	71.94	15.68	3.59	0.74	0.12	2.11	0.69	2.24	2.89	100.00	0.9143
18	2042	PF-88-O (MAFIC) T169-13	10/2/88	69.21	15.37	3.81	0.73	0.12	2.14	0.69	5.40	2.53	100.00	0.9136
19	1377	ASW-61085-17 T108-4	9/23/85	69.65	14.90	3.65	0.94	0.10	2.32	0.70	5.71	2.04	100.01	0.9131
20	4080	EL-72-KV LO FE T374-9	11/97	69.86	15.46	3.68	0.79	0.10	2.14	0.70	4.71	2.55	99.99	0.9108
21	5685	ALT-11A T567-2	1/8/09	69.02	15.32	3.85	0.88	0.09	2.38	0.72	4.55	3.19	100.00	0.9094
22	5666	EB-ASF-13 T565-7	11/18/08	70.05	15.71	3.28	0.78	0.12	2.11	0.81	2.78	4.37	100.01	0.9088
23	5511	OC-187-281006-FGA-djk T544-1	12/4/06	70.48	15.45	3.38	0.78	0.12	2.10	0.82	2.13	4.75	100.01	0.9086
24	1840	flv-16-ww t146-4 dk fr.	8/25/87	69.56	14.95	3.97	0.81	0.11	2.37	0.78	4.44	3.02	100.01	0.9080
25	5087	DPB-21 T212-5(2)	4-23-03	68.66	16.99	3.06	0.80	0.11	2.09	0.71	3.07	4.52	100.01	0.9010
26	2868	HR-FF-1-ORIG	08/28/92	68.47	15.49	4.27	0.72	0.13	2.17	0.65	5.59	2.50	99.99	0.9002
27	5764	ALT-27 T574-2	8/4/09	70.08	15.99	4.01	0.95	0.10	2.60	0.70	3.15	2.42	100.00	0.8987
28	2119	PF-88-O (SILICIC)(2) T175-11	10/28/88	68.45	16.19	3.64	0.67	0.11	2.16	0.67	5.81	2.30	100.00	0.8984
29	4766	SL-AS8-2iU T467-4	7-23-01	68.70	15.12	4.11	0.91	0.10	2.47	0.68	5.48	2.43	100.00	0.8937
30	1089	61284-10 ASW T81-6	9/4/84	68.55	15.37	4.26	0.66	0.14	2.03	0.65	5.85	2.50	100.01	0.8906
31	2302	61284-10_ASW.11MTB;2, T81-6	04/21/89	68.25	16.03	4.25	0.72	0.12	2.03	0.64	5.42	2.55	100.01	0.8846
32	1080	DSDP 173-25-3 (135-137 cm) T77	7/30/84	67.97	15.09	4.13	0.94	0.11	2.67	0.83	5.21	3.05	100.00	0.8828
33	2892	EVM-TFM-2		66.26	16.70	3.17	0.85	0.09	2.05	0.67	4.56	5.67	100.02	0.8815
34	1536	M7811 T124-8	5/5/86	69.23	15.14	3.88	0.69	0.10	2.28	0.66	5.15	2.86	99.99	0.8805
35	1930	4IX87-11 t154-6	4/30/88	67.98	15.58	3.67	0.93	0.08	2.43	0.86	4.97	3.49	99.99	0.8803
36	2063	PF-88-P T170-10	9/3/88	69.95	15.17	3.87	0.69	0.11	2.12	0.61	5.00	2.47	99.99	0.8785
37	3054	ANA-D T283-3	7/26/93	68.85	15.21	3.80	0.70	0.09	2.24	0.65	5.59	2.86	99.99	0.875

Sample JLP-08-109 pop1, Listing of 37 closest matches for COMP. NO. 5770 for elements: Mg, Al, Si, Ca, Ti, Mn, Fe

No Match. Generically similar (very high Fe, Mg, Mn, Ti) to Cascade-type tephra from central CA to OR.

JLP-08-109(Pop2)Listing of 37 closest matches for COMP. NO. 5771 for elements: Na, Mg, Al, Si, K , Ca, Ti, Mn, Fe Date of Update: 8/12/09

C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co	
1	5771 JLP-08-109 T575-4(pop2)	8/4/09	69.20	16.74	4.13	1.09	0.15	2.75	0.79	3.27	1.88	100.00	1.0000	
2	5770 JLP-08-109 T575-4(pop1)	8/4/09	70.36	16.61	3.71	0.89	0.15	2.23	0.74	3.31	2.00	100.00	0.9296	
3	5764 AIT-27 T574-2	8/4/09	70.08	15.99	4.01	0.95	0.10	2.60	0.70	3.15	2.42	100.00	0.8915	Alturas, CA
4	5774 JLP-08-115 T575-6	8/4/09	71.10	16.49	3.29	0.85	0.12	2.18	0.73	3.35	1.89	100.00	0.8914	
5	1655 AA-23b JOD	09/12/86	67.89	15.73	4.87	1.23	0.13	3.31	0.88	3.86	2.11	100.01	0.8876	
6	949 DR-61		68.55	15.16	4.51	1.00	0.10	2.93	0.82	4.82	2.11	100.00	0.8742	
7	3053 ANA-B HIFE(8) T283-2	7/26/93	66.66	15.94	4.09	1.06	0.11	2.90	0.80	5.60	2.84	100.00	0.8659	Ana River
8	1206 TULELAKE 2080 LAP (50.32M) T91	3/1/85	67.66	15.65	4.13	1.05	0.09	2.88	0.77	4.94	2.83	100.00	0.8591	Tulelake
9	1086 RBT-3 T81-3	9/4/84	68.33	15.25	4.38	1.26	0.08	3.69	0.81	4.32	1.87	99.99	0.8569	
10	2039 PF-88-MD (MAFIC) T169-9	10/2/88	68.34	15.53	3.92	0.82	0.13	2.31	0.77	5.82	2.37	100.01	0.8504	Pringle Falls, OR
11	1080 DSDP 173-25-3 (135-137 cm) T77	7/30/84	67.97	15.09	4.13	0.94	0.11	2.67	0.83	5.21	3.05	100.00	0.8496	
12	471 758-190B, T1-7, P		63.55	16.15	6.98	1.07	0.15	3.27	0.92	6.13	1.79	100.01	0.8491	
13	5089 DPB-21_POP2 T212-5(2)	4-23-03	65.42	17.73	3.95	1.25	0.12	2.98	0.92	3.04	4.58	99.99	0.8488	
14	1397 ASW-61485-34D T110-1	9/24/85	67.50	15.34	4.40	1.15	0.10	3.06	0.87	4.95	2.64	100.01	0.8472	
15	2120 PF-88-Q (MAFIC)(2) T175-12	10/28/88	68.00	16.14	3.85	0.78	0.13	2.28	0.75	5.70	2.37	100.00	0.8452	
16	1428 ASW-6985-4A T103-4	08/26/85	69.97	13.94	4.41	1.21	0.09	2.90	0.70	4.22	2.57	100.01	0.8444	
17	2294 T2019.15MTB;4, T117-4	04/22/89	67.29	15.75	4.25	1.10	0.08	3.21	0.83	4.70	2.81	100.02	0.8425	
18	1398 ASW-61485-39F T110-3	9/24/85	67.06	15.66	4.57	1.16	0.10	3.11	0.91	4.91	2.52	100.00	0.8421	
19	1396 ASW-61485-39C T109-14	9/24/85	66.94	15.58	4.58	1.20	0.11	3.16	0.91	4.88	2.64	100.00	0.8402	
20	3500 DRE-2 T323-3 silicic fr.	5/6/95	67.93	15.85	3.79	0.81	0.14	2.29	0.69	6.15	2.35	100.00	0.8401	
21	1840 flv-16-ww t146-4 dk fr.	8/25/87	69.56	14.95	3.97	0.81	0.11	2.37	0.78	4.44	3.02	100.01	0.8371	
22	2307 61284-14_ASW.12MTB;2, T81-8	04/21/89	67.11	15.59	4.37	1.18	0.09	3.11	0.82	4.62	3.11	100.00	0.8367	
23	4766 SL-AS8-2ĪU T467-4	7-23-01	68.70	15.12	4.11	0.91	0.10	2.47	0.68	5.48	2.43	100.00	0.8358	
24	1377 ASW-61085-17 T108-4	9/23/85	69.65	14.90	3.65	0.94	0.10	2.32	0.70	5.71	2.04	100.01	0.8356	
25	2041 PF-88-O (SILICIC-CT) T169-12	10/2/88	68.64	15.68	3.85	0.80	0.12	2.27	0.71	5.56	2.38	100.01	0.8330	
26	2865 HR-FF-1 HI-FE FRACT T264-3	8/20/92	67.97	15.47	4.38	0.76	0.15	2.22	0.64	6.00	2.41	100.00	0.8321	
27	1548 P1-G (0.4CM)	7/17/86	69.18	14.86	3.85	1.05	0.06	3.24	0.76	4.38	2.61	99.99	0.8290	
28	1842 FLV-18-WW T146-6	8/25/87	67.74	15.76	4.12	1.34	0.09	3.56	0.65	4.26	2.48	100.00	0.8280	
29	2035 PF-88-Q (SILICIC) T169-5	10/2/88	68.38	15.51	3.85	0.79	0.12	2.23	0.73	5.94	2.37	99.92	0.8278	
30	2040 PF-88-O (SILICI-CB) T169-11	10/2/88	69.36	15.27	3.91	0.74	0.14	2.11	0.65	5.44	2.38	100.00	0.8278	
31	2309 ASW_61385-8A.49MTB;1, T103-8	04/21/89	67.70	15.65	4.17	1.20	0.07	2.98	0.71	4.47	3.05	100.00	0.8276	
32	4470 94RE364 T414-4	8-28-99	67.46	15.54	4.29	1.18	0.07	3.31	0.83	4.60	2.73	100.01	0.8265	
33	2310 ASW_61385-8A.24MTB;2, T103-8	04/21/89	68.01	15.77	3.95	0.98	0.06	2.68	0.77	4.70	3.08	100.00	0.8262	
34	2450 DPB-18 T212-2	9/5/90	65.70	17.27	5.57	1.67	0.18	3.76	1.05	2.78	2.02	100.00	0.8234	
35	4213 DSDP-64-480-28-1W-109-110(SNMB	5-29-98	70.61	14.62	4.07	0.95	0.06	3.44	0.62	3.95	1.67	99.99	0.8234	
36	672 WADS-1, T54-7	xx/xx/xx	67.60	15.37	4.34	1.28	0.07	3.60	0.83	4.54	2.37	100.00	0.8216	
37	2036 PF-88-Q (MAFIC) T169-6	10/2/88	68.48	15.31	3.86	0.82	0.11	2.34	0.71	5.92	2.45	100.00	0.8215	

Sample JLP-08-109 pop2, Listing of 37 closest matches for COMP. NO. 5770 for elements: Na, Mg, Al, Si, K , Ca, Ti, Mn, Fe

JLP-08-109(Pop2)listing of 37 closest matches for COMP. NO. 5771 for elements: Mg, Al, Si, Ca, Ti, Mn, Fe Date of Update: 8/12/09

C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	5771 JLP-08-109 T575-4(pop2)	8/4/09	69.20	16.74	4.13	1.09	0.15	2.75	0.79	3.27	1.88	100.00	1.0000
2	3053 ANA-B HIFE(8) T283-2	7/26/93	66.66	15.94	4.09	1.06	0.11	2.90	0.80	5.60	2.84	100.00	0.9353
3	5770 JLP-08-109 T575-4(pop1)	8/4/09	70.36	16.61	3.71	0.89	0.15	2.23	0.74	3.31	2.00	100.00	0.9197
4	1206 TULELAKE 2080 LAP (50.32M) T91	3/1/85	67.66	15.65	4.13	1.05	0.09	2.88	0.77	4.94	2.83	100.00	0.9151
5	1080 DSDP 173-25-3 (135-137 cm) T77	7/30/84	67.97	15.09	4.13	0.94	0.11	2.67	0.83	5.21	3.05	100.00	0.9146
6	5089 DPB-21_POP2 T212-5(2)	4-23-03	65.42	17.73	3.95	1.25	0.12	2.98	0.92	3.04	4.58	99.99	0.8999
7	2039 PF-88-MD (MAFIC) T169-9	10/2/88	68.34	15.53	3.92	0.82	0.13	2.31	0.77	5.82	2.37	100.01	0.8997
8	949 DR-61		68.55	15.16	4.51	1.00	0.10	2.93	0.82	4.82	2.11	100.00	0.8997
9	5764 ALT-27 T574-2	8/4/09	70.08	15.99	4.01	0.95	0.10	2.60	0.70	3.15	2.42	100.00	0.8976
10	1397 ASW-61485-34D T110-1	9/24/85	67.50	15.34	4.40	1.15	0.10	3.06	0.87	4.95	2.64	100.01	0.8931
11	1655 AA-23b JOD	09/12/86	67.89	15.73	4.87	1.23	0.13	3.31	0.88	3.86	2.11	100.01	0.8929
12	2120 PF-88-Q (MAFIC)(2) T175-12	10/28/88	68.00	16.14	3.85	0.78	0.13	2.28	0.75	5.70	2.37	100.00	0.8914
13	3500 DRE-2 T323-3 silicic fr.	5/6/95	67.93	15.85	3.79	0.81	0.14	2.29	0.69	6.15	2.35	100.00	0.8898
14	2294 T2019.15MTB;4, T117-4	04/22/89	67.29	15.75	4.25	1.10	0.08	3.21	0.83	4.70	2.81	100.02	0.8883
15	2307 61284-14_ASW.12MTB;2, T81-8	04/21/89	67.11	15.59	4.37	1.18	0.09	3.11	0.82	4.62	3.11	100.00	0.8882
16	1396 ASW-61485-39C T109-14	9/24/85	66.94	15.58	4.58	1.20	0.11	3.16	0.91	4.88	2.64	100.00	0.8828
17	1840 flv-16-ww t146-4 ck fr.	8/25/87	69.56	14.95	3.97	0.81	0.11	2.37	0.78	4.44	3.02	100.01	0.8821
18	1398 ASW-61485-39F T110-3	9/24/85	67.06	15.66	4.57	1.16	0.10	3.11	0.91	4.91	2.52	100.00	0.8810
19	2865 HR-FF-1 HI-FE FRACT T264-3	8/20/92	67.97	15.47	4.38	0.76	0.15	2.22	0.64	6.00	2.41	100.00	0.8806
20	471 758-190B, T1-7, P		63.55	16.15	6.98	1.07	0.15	3.27	0.92	6.13	1.79	100.01	0.8794
21	4766 SL-AS8-2iU T467-4	7-23-01	68.70	15.12	4.11	0.91	0.10	2.47	0.68	5.48	2.43	100.00	0.8788
22	2310 ASW_61385-8A.24MTB;2, T103-8	04/21/89	68.01	15.77	3.95	0.98	0.06	2.68	0.77	4.70	3.08	100.00	0.8757
23	2041 PF-88-O (SILICIC-CT) T169-12	10/2/88	68.64	15.68	3.85	0.80	0.12	2.27	0.71	5.56	2.38	100.01	0.8741
24	2035 PF-88-Q (SILICIC) T169-5	10/2/88	68.38	15.51	3.85	0.79	0.12	2.23	0.73	5.94	2.37	99.92	0.8724
25	5453 LBS-L-071205-djk T537-4(Pop2)	2/14/06	70.80	16.58	5.00	1.14	0.09	3.26	0.87	0.94	1.32	100.00	0.8717
26	2309 ASW_61385-8A.49MTB;1, T103-8	04/21/89	67.70	15.65	4.17	1.20	0.07	2.98	0.71	4.47	3.05	100.00	0.8715
27	5076 DPB-17_POP2 T212-1(2)	4-23-03	68.27	16.70	3.26	0.87	0.12	2.06	0.77	3.00	4.95	100.00	0.8708
28	1428 ASW-6985-4A T103-4	08/26/85	69.97	13.94	4.41	1.21	0.09	2.90	0.70	4.22	2.57	100.01	0.8705
29	1317 ASW-61385-8A T103-8	8/26/85	68.50	15.32	3.92	0.94	0.08	2.61	0.70	4.74	3.19	100.00	0.8693
30	2036 PF-88-Q (MAFIC) T169-6	10/2/88	68.48	15.31	3.86	0.82	0.11	2.34	0.71	5.92	2.45	100.00	0.8677
31	2040 PF-88-O (SILICI-CB) T169-11	10/2/88	69.36	15.27	3.91	0.74	0.14	2.11	0.65	5.44	2.38	100.00	0.8656
32	5774 JLP-08-115 T575-6	8/4/09	71.10	16.49	3.29	0.85	0.12	2.18	0.73	3.35	1.89	100.00	0.8645
33	4470 94RE364 T414-4	8-28-99	67.46	15.54	4.29	1.18	0.07	3.31	0.83	4.60	2.73	100.01	0.8627
34	5685 ALT-11A T567-2	1/8/09	69.02	15.32	3.85	0.88	0.09	2.38	0.72	4.55	3.19	100.00	0.8613
35	1377 ASW-61085-17 T108-4	9/23/85	69.65	14.90	3.65	0.94	0.10	2.32	0.70	5.71	2.04	100.01	0.8609
36	2868 HR-FF-1-ORIG	08/28/92	68.47	15.49	4.27	0.72	0.13	2.17	0.65	5.59	2.50	99.99	0.8602
37	3710 SPAT-4 T343-3	11/96	68.45	15.63	3.83	0.83	0.11	2.20	0.69	5.91	2.34	99.99	0.8598

Sample JLP-08-109 pop2, Listing of 37 closest matches for COMP. NO. 5770 for elements: Mg, Al, Si, Ca, Ti, Mn, Fe

No Match. Generically similar mafic Cascade-type tephra from central CA to OR.
JLP-08-109(Pop 3) Listing of 37 closest matches for COMP. NO. 5772 for elements: **Na, Mg, Al, Si, K , Ca, Ti, Mn, Fe** Date of Update: 8/12/09

C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	5772 JLP-08-109 T575-4(pop3)	8/4/09	60.03	17.01	8.05	2.75	0.22	5.44	1.11	3.90	1.49	100.00	1.0000
2	1662 MOD-18 T132-4	10/21/86	59.01	15.58	9.10	3.14	0.13	6.30	1.13	3.96	1.66	100.01	0.8865
3	5146 MOD-18 T132-4(2)	9-2-03	57.36	16.65	9.20	3.47	0.15	6.97	1.00	3.69	1.52	100.01	0.8768
4	2065 PF-88-F T170-12	9/3/88	57.95	16.98	8.55	2.78	0.16	7.28	1.26	4.04	1.00	100.00	0.8763
5	1364 SPAT-1 T107-11	8/30/85	58.95	14.87	9.22	3.15	0.18	6.31	1.60	4.17	1.55	100.00	0.8748
6	1598 MOD-13 T130-9	9/19/86	61.37	16.03	6.81	2.47	0.15	5.29	1.21	4.85	1.82	100.00	0.8732
7	4081 EL-72-KV HI FE T374-9	11/97	61.09	16.78	6.84	2.28	0.14	5.04	1.28	5.02	1.53	100.00	0.8699
8	2066 PF-88-L	9/3/88	60.04	16.59	8.22	1.99	0.14	6.23	1.43	4.03	1.33	100.00	0.8694
9	923 DR-30B		57.52	16.29	9.22	3.04	0.15	6.15	1.59	4.53	1.51	100.00	0.8673
10	1606 MOD-24 T131-2	9/20/86	62.46	15.41	6.76	2.49	0.15	5.14	1.28	4.45	1.87	100.01	0.8644
11	3590 CDGD-1 T330-T337 minor3	4/96	60.70	16.14	7.71	2.27	0.15	4.92	1.36	5.08	1.68	100.01	0.8642
12	1539 B1SH T124-11	5/5/86	60.60	15.44	8.87	2.27	0.14	5.15	1.59	4.41	1.52	99.99	0.8641
13	5162 MOD-13 T130-9(2)	9-2-03	60.80	17.19	6.76	2.32	0.15	4.84	1.19	4.82	1.94	100.01	0.8602
14	1111 61484-44 ASW T82-13	10/11/84	57.97	14.51	10.44	3.67	0.19	6.26	1.64	3.89	1.43	100.00	0.8562
15	3807 JEO 9/18/96-1 (2)TMU T351-6	11/96	60.20	15.35	8.73	2.23	0.15	5.31	1.53	4.70	1.80	100.00	0.8526
16	5082 DPB-18_pop3 T212-2(2)	4-23-03	64.63	16.95	6.19	1.93	0.20	4.40	1.14	2.73	1.83	100.00	0.8447
17	1443 TULE LAKE 1228 T75-4 8e1 ud		62.57	16.40	6.16	2.35	0.14	4.94	0.97	4.40	2.08	100.01	0.8405
18	3494 DRE-2 T323-3 Hi Fe fract	5/6/95	56.85	16.50	9.05	3.19	0.16	6.50	1.47	5.12	1.15	99.99	0.8357
19	1566 SPAT-2 T127-10	8/18/86	56.83	16.32	9.76	3.29	0.16	6.61	1.63	4.22	1.18	100.00	0.8349
20	1640 AA-13 JOD	09/12/86	61.58	17.01	5.67	2.72	0.09	5.66	0.86	4.67	1.74	100.00	0.8339
21	1490 RCO-3	10/23/85	53.04	18.68	8.84	3.76	0.16	9.20	1.31	3.51	1.51	100.01	0.8321
22	2996 JY-92-2A T277-3 POP2	5/3/93	58.73	18.11	6.97	3.07	0.11	6.18	0.96	4.77	1.11	100.01	0.8319
23	1540 B2SH T124-12	5/5/86	57.66	15.43	10.22	3.11	0.15	6.23	1.81	4.15	1.25	100.01	0.8318
24	4760 SL-AS10-2i T466-6	7-23-01	57.74	17.93	8.20	2.34	0.12	6.71	1.36	4.59	1.03	100.02	0.8285
25	4792 SL-AS06-1ii_pop2 T468-3	8-1-01	61.09	17.68	5.43	2.62	0.11	5.36	0.89	4.95	1.87	100.00	0.8271
26	5557 HTH-3 T546-1 Hi Ca Fe	03/13/07	61.65	16.05	6.95	2.30	0.10	5.00	1.07	4.15	2.74	100.01	0.8265
27	1653 AA-21m JOD	09/12/86	62.09	15.67	7.29	1.91	0.17	4.52	1.29	4.68	2.38	100.00	0.8235
28	3587 CDGD-1 T330-1 T337-6	4/96	62.13	16.88	6.18	1.68	0.12	4.85	1.09	5.43	1.63	99.99	0.8209
29	1374 ASW-61085-14 MAFIC T108-1	9/23/85	63.69	14.75	7.13	1.84	0.10	4.86	1.26	4.87	1.50	100.00	0.8208
30	2777 #4087 T252-4	3/10/92	62.98	16.72	5.79	2.04	0.09	5.07	0.94	4.82	1.55	100.00	0.8173
31	4473 98RE699 T414-7	8-28-99	62.29	16.40	6.10	2.28	0.09	5.05	1.26	4.38	2.14	99.99	0.8133
32	3378 ELEG-3 min T315-10	11/23/94	56.84	16.73	7.84	4.43	0.13	8.00	1.22	3.98	0.83	100.00	0.8048
33	5415 JDN-203J-2 HiCa,Fe T529-1	8/9/05	63.77	15.22	7.55	1.43	0.16	3.96	1.18	4.56	2.17	100.00	0.8035
34	2308 61284-14 ASW.7MTB;3, T81-8	04/21/89	62.93	16.22	6.10	2.10	0.11	4.82	0.95	4.63	2.13	99.99	0.8014
35	4837 ML-PP-1 T473-2	12-14-01	54.73	18.22	7.90	4.28	0.14	9.01	1.03	3.80	0.88	99.99	0.8002
36	5079 DPB-18 T212-2(2)	4-23-03	66.27	16.73	5.67	1.65	0.21	3.84	1.09	2.49	2.05	100.00	0.8002
37	4793 SL-AS07-2i(M) T468-4	8-1-01	56.12	19.41	6.85	2.59	0.13	8.28	1.18	4.60	0.83	99.99	0.7997

Sample JLP-08-109 pop3, Listing of 37 closest matches for COMP. NO. 5770 for elements: Na, Mg, Al, Si, K , Ca, Ti, Mn, Fe

JLP-08-109(Pop 3) Listing of 37 closest matches for COMP. NO. 5772 for elements: Mg, Al, Si, Ca, Ti, Mn, Fe Date of Update: 8/12/09

C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	5772 JLP-08-109 T575-4(pop3)	8/4/09	60.03	17.01	8.05	2.75	0.22	5.44	1.11	3.90	1.49	100.00	1.0000
2	2065 PF-88-F T170-12	9/3/88	57.95	16.98	8.55	2.78	0.16	7.28	1.26	4.04	1.00	100.00	0.8928
3	1598 MOD-13 T130-9	9/19/86	61.37	16.03	6.81	2.47	0.15	5.29	1.21	4.85	1.82	100.00	0.8909
4	5162 MOD-13 T130-9(2)	9-2-03	60.80	17.19	6.76	2.32	0.15	4.84	1.19	4.82	1.94	100.01	0.8806
5	3590 CDGD-1 T330-T337 minor3	4/96	60.70	16.14	7.71	2.27	0.15	4.92	1.36	5.08	1.68	100.01	0.8748
6	1606 MOD-24 T131-2	9/20/86	62.46	15.41	6.76	2.49	0.15	5.14	1.28	4.45	1.87	100.01	0.8723
7	1662 MOD-18 T132-4	10/21/86	59.01	15.58	9.10	3.14	0.13	6.30	1.13	3.96	1.66	100.01	0.8709
8	5082 DPB-18_pop3 T212-2(2)	4-23-03	64.63	16.95	6.19	1.93	0.20	4.40	1.14	2.73	1.83	100.00	0.8697
9	4081 EL-72-KV HI FE T374-9	11/97	61.09	16.78	6.84	2.28	0.14	5.04	1.28	5.02	1.53	100.00	0.8683
10	3807 JEO 9/18/96-1 (2)TMU T351-6	11/96	60.20	15.35	8.73	2.23	0.15	5.31	1.53	4.70	1.80	100.00	0.8594
11	3494 DRE-2 T323-3 Hi Fe fract	5/6/95	56.85	16.50	9.05	3.19	0.16	6.50	1.47	5.12	1.15	99.99	0.8554
12	1364 SPAT-1 T107-11	8/30/85	58.95	14.87	9.22	3.15	0.18	6.31	1.60	4.17	1.55	100.00	0.8538
13	5146 MOD-18 T132-4(2)	9-2-03	57.36	16.65	9.20	3.47	0.15	6.97	1.00	3.69	1.52	100.01	0.8522
14	2066 PF-88-L	9/3/88	60.04	16.59	8.22	1.99	0.14	6.23	1.43	4.03	1.33	100.00	0.8520
15	1443 TULE LAKE 1228 T75-4 8el ud		62.57	16.40	6.16	2.35	0.14	4.94	0.97	4.40	2.08	100.01	0.8517
16	923 DR-30B		57.52	16.29	9.22	3.04	0.15	6.15	1.59	4.53	1.51	100.00	0.8512
17	5557 HTH-3 T546-1 Hi Ca Fe	03/13/07	61.65	16.05	6.95	2.30	0.10	5.00	1.07	4.15	2.74	100.01	0.8507
18	1653 AA-21m JOD	09/12/86	62.09	15.67	7.29	1.91	0.17	4.52	1.29	4.68	2.38	100.00	0.8503
19	2996 JY-92-2A T277-3 POP2	5/3/93	58.73	18.11	6.97	3.07	0.11	6.18	0.96	4.77	1.11	100.01	0.8463
20	4760 SI-AS10-2i T466-6	7-23-01	57.74	17.93	8.20	2.34	0.12	6.71	1.36	4.59	1.03	100.02	0.8451
21	1539 B18H T124-11	5/5/86	60.60	15.44	8.87	2.27	0.14	5.15	1.59	4.41	1.52	99.99	0.8446
22	4792 SI-AS06-1ii_pop2 T468-3	8-1-01	61.09	17.68	5.43	2.62	0.11	5.36	0.89	4.95	1.87	100.00	0.8370
23	5079 DPB-18 T212-2(2)	4-23-03	66.27	16.73	5.67	1.65	0.21	3.84	1.09	2.49	2.05	100.00	0.8337
24	1640 AA-13 JOD	09/12/86	61.58	17.01	5.67	2.72	0.09	5.66	0.86	4.67	1.74	100.00	0.8305
25	5081 DPB-18_pop2 T212-2(2)	4-23-03	66.55	16.71	5.54	1.61	0.22	3.76	1.07	2.48	2.05	99.99	0.8305
26	1566 SPAT-2 T127-10	8/18/86	56.83	16.32	9.76	3.29	0.16	6.61	1.63	4.22	1.18	100.00	0.8283
27	4793 SI-AS07-2i(M) T468-4	8-1-01	56.12	19.41	6.85	2.59	0.13	8.28	1.18	4.60	0.83	99.99	0.8275
28	3587 CDGD-1 T330-1 T337-6	4/96	62.13	16.88	6.18	1.68	0.12	4.85	1.09	5.43	1.63	99.99	0.8223
29	1111 61484-44 ASW T82-13	10/11/84	57.97	14.51	10.44	3.67	0.19	6.26	1.64	3.89	1.43	100.00	0.8212
30	4473 98RE699 T414-7	8-28-99	62.29	16.40	6.10	2.28	0.09	5.05	1.26	4.38	2.14	99.99	0.8190
31	1540 B28H T124-12	5/5/86	57.66	15.43	10.22	3.11	0.15	6.23	1.81	4.15	1.25	100.01	0.8154
32	3378 ELEG-3 min T315-10	11/23/94	56.84	16.73	7.84	4.43	0.13	8.00	1.22	3.98	0.83	100.00	0.8151
33	5415 JDN-203J-2 HiCa,Fe T529-1	8/9/05	63.77	15.22	7.55	1.43	0.16	3.96	1.18	4.56	2.17	100.00	0.8128
34	2064 PF-88-R T170-11	9/3/88	54.67	19.84	7.50	2.91	0.12	9.30	1.00	4.01	0.66	100.01	0.8109
35	2308 61284-14_ASW.7MTB;3, T81-8	04/21/89	62.93	16.22	6.10	2.10	0.11	4.82	0.95	4.63	2.13	99.99	0.8101
36	925 DR-33		62.79	16.28	6.19	1.98	0.11	4.73	0.98	4.82	2.11	99.99	0.8078
37	2450 DPB-18 T212-2	9/5/90	65.70	17.27	5.57	1.67	0.18	3.76	1.05	2.78	2.02	100.00	0.8076

Sample JLP-08-109 pop3, Listing of 37 closest matches for COMP. NO. 5770 for elements: Mg, Al, Si, Ca, Ti, Mn, Fe

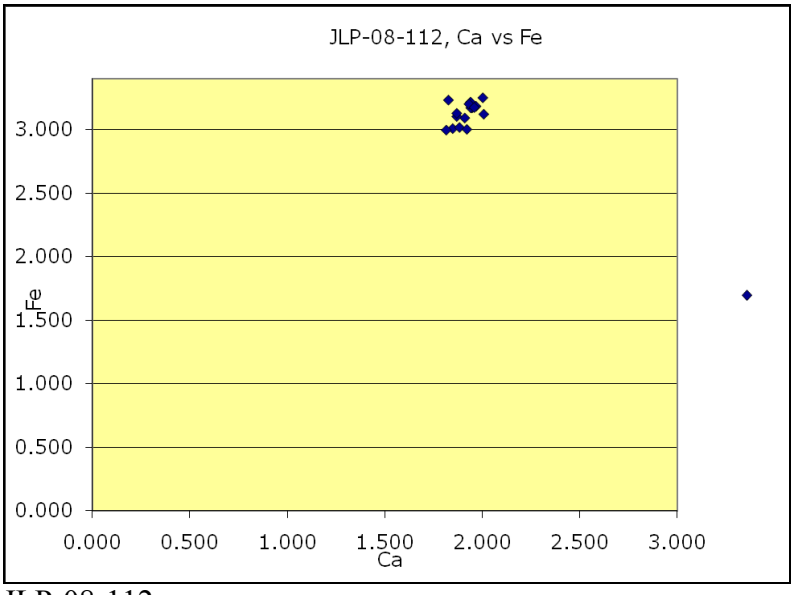
JLP-08-112 (Locality: Hualapai Limestone, Collected from an ash bed stratigraphically higher than the 5.97 Ma ash) Approx. 92% slightly to moderately coated, clear to medium brown, angular to subrounded, often slightly devitrified shards. Predominately ribbed (often v. tightly & thinly ribbed), and webby/frothy pumiceous shards. The pumiceous shards are often hydrated, and contain spherical, irregular bubble-type, or elongate spindle or conical shaped vesicles. Commonly, shards are thin/platy, chunky, bw/bwj, microphenocrystic or microlitic. Also present: ~8% moderately to heavily altered tectosilcate and biotite xtls.

No match. Resembles LBS-U-121205-djk which is a highly leached, heterogenous, andesitic or andesitic-dacitic tephra that also does not match well with any of our analyzed samples. Compositionally, JLP-08-112 and its chemical correlatives are most similar to Cascade Range tephra. This may be another tephra from a local source, possibly derived from a subduction volcano.

Field photo of sample JLP-08-112

No.	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	MnO	FeO	Total	
412	2.951	0.587	14.811	67.073	1.957	1.825	0.522	0.062	3.231	93.019	JLP-08-112 T575-5 2
413	2.734	0.532	14.746	66.630	1.872	1.947	0.527	0.057	3.170	92.215	JLP-08-112 T575-5 3
414	2.712	0.589	14.879	66.462	2.054	1.939	0.561	0.107	3.215	92.518	JLP-08-112 T575-5 4
415	2.931	0.621	14.950	66.784	1.979	2.007	0.596	0.112	3.120	93.100	JLP-08-112 T575-5 5
416	3.075	0.513	14.848	67.240	2.093	1.847	0.546	0.079	3.007	93.248	JLP-08-112 T575-5 6
417	2.987	0.606	14.700	66.795	1.960	1.940	0.532	0.088	3.170	92.778	JLP-08-112 T575-5 7
418	2.761	0.572	14.760	66.553	1.939	1.931	0.568	0.076	3.200	92.360	JLP-08-112 T575-5 8
419	2.718	0.619	14.727	66.956	2.040	1.909	0.486	0.111	3.090	92.656	JLP-08-112 T575-5 9
420	2.875	0.553	14.672	67.189	1.941	1.882	0.582	0.123	3.016	92.833	JLP-08-112 T575-5 10
423	2.802	0.627	14.847	67.009	1.967	1.967	0.472	0.116	3.182	92.989	JLP-08-112 T575-5 13
424	2.618	0.567	14.620	66.726	2.088	1.958	0.516	0.104	3.173	92.370	JLP-08-112 T575-5 14
425	2.865	0.555	14.772	67.004	2.089	1.920	0.573	0.124	3.001	92.903	JLP-08-112 T575-5 15
427	2.973	0.608	14.895	68.055	2.056	1.868	0.494	0.105	3.102	94.156	JLP-08-112 T575-5 17
428	3.075	0.580	14.680	66.745	2.061	1.814	0.496	0.115	2.995	92.561	JLP-08-112 T575-5 18
429	2.828	0.558	14.618	66.533	1.947	1.868	0.537	0.092	3.127	92.108	JLP-08-112 T575-5 19
430	3.050	0.624	14.709	66.293	2.079	2.002	0.555	0.088	3.249	92.649	JLP-08-112 T575-5 20
Hi Fe											
411	4.313	2.752	16.407	58.335	1.630	5.924	1.535	0.166	7.219	98.281	JLP-08-112 T575-5 1
422	4.168	2.565	16.184	58.770	1.787	5.568	1.353	0.178	6.724	97.297	JLP-08-112 T575-5 12
421	3.154	2.111	16.077	60.218	1.541	4.222	0.977	0.109	5.436	93.845	JLP-08-112 T575-5 11
Lo Fe											
426	2.418	0.416	14.486	67.509	1.975	1.492	0.362	0.077	2.585	91.320	JLP-08-112 T575-5 16
Column1											
Mean	2.872	0.582	14.765	66.878	2.008	1.914	0.535	0.097	3.128	92.779	
Std Deviation	0.141	0.034	0.099	0.412	0.069	0.059	0.036	0.021	0.086	0.490	
Range	0.457	0.114	0.332	1.762	0.221	0.193	0.124	0.067	0.254	2.048	
Minimum	2.618	0.513	14.618	66.293	1.872	1.814	0.472	0.057	2.995	92.108	
Maximum	3.075	0.627	14.950	68.055	2.093	2.007	0.596	0.124	3.249	94.156	
Count	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	
C.L. (95.0%)	0.075	0.018	0.053	0.220	0.037	0.031	0.019	0.011	0.046	0.261	

JLP-08-112
Raw Data Table



JLP-08-112
Raw Data Graph

Mafic tephra, cascade source. Correlatives:

JLP-08-112 Listing of 37 closest matches for COMP. NO. 5761 for elements: Na, Al, Si, K , Ca, Ti, Mn, Fe Date of Update: 3/4/10

C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	5761 JLP-08-112 T575-5	8/4/09	71.81	15.85	3.73	0.62	0.10	2.06	0.57	3.08	2.16	99.98	1.0000
2	5780 ALT-30A T574-8(pop2)	8/4/09	70.51	15.95	3.91	0.96	0.10	2.52	0.69	3.03	2.33	100.00	0.9355
3	5779 ALT-30A T574-8(pop1)	8/4/09	71.44	15.29	3.95	0.84	0.10	2.17	0.76	2.93	2.52	100.00	0.9264
4	2723 BUR871.11		71.98	15.22	3.54	0.60	0.10	1.91	0.49	3.19	2.97	100.00	0.9233
5	5753 ALT-27 T574-2	8/4/09	70.08	15.99	4.01	0.95	0.10	2.60	0.70	3.15	2.42	100.00	0.9218
6	5782 ALT-30AB T574-9(pop2)	8/4/09	70.88	15.72	3.96	0.90	0.11	2.31	0.75	2.94	2.42	99.99	0.9161
7	929 DR-39		68.99	15.46	3.71	0.65	0.10	2.01	0.64	6.13	2.31	100.00	0.9043
8	4079 EL-72-KV LO FE T374-9	11/97	69.86	15.46	3.68	0.79	0.10	2.14	0.70	4.71	2.55	99.99	0.9016
9	2062 PF-88-P T170-10	9/3/88	69.95	15.17	3.87	0.69	0.11	2.12	0.61	5.00	2.47	99.99	0.9001
10	5762 JLP-08-115 T575-6	8/4/09	71.10	16.49	3.29	0.85	0.12	2.18	0.73	3.35	1.89	100.00	0.8984
11	2033 PF-88-K T169-4	10/2/88	69.76	15.33	3.64	0.58	0.10	1.91	0.51	5.82	2.35	100.00	0.8981
12	2300 61284-10 ASW.15MTB;1, T81-6	04/21/89	68.74	15.97	4.18	0.70	0.10	2.02	0.63	5.00	2.67	100.01	0.8941
13	5758 JLP-08-109 T575-4(pop1)	8/4/09	70.36	16.61	3.71	0.89	0.15	2.23	0.74	3.31	2.00	100.00	0.8932
14	5781 ALT-30AB T574-9(pop1)	8/4/09	72.76	15.40	3.20	0.59	0.08	1.74	0.63	2.93	2.66	99.99	0.8912
15	5786 ALT-24A T575-1	8/4/09	72.81	15.41	3.30	0.57	0.09	1.65	0.71	2.86	2.60	100.00	0.8883
16	930 DR-40		69.30	15.37	3.68	0.55	0.11	1.86	0.59	6.13	2.41	100.00	0.8873
17	2100 PF-88-Q (2) (SILICIC) T173-7	9/28/88	70.50	15.16	3.33	0.54	0.10	1.74	0.57	5.54	2.51	99.99	0.8865
18	2118 PF-88-O (SILICIC)(2) T175-11	10/28/88	68.45	16.19	3.64	0.67	0.11	2.16	0.67	5.81	2.30	100.00	0.8864
19	2436 DPB-4 T210-2	8/10/90	71.75	15.08	3.61	0.76	0.12	2.03	0.75	2.76	3.13	99.99	0.8854
20	927 DR-37		69.40	15.55	3.41	0.62	0.11	1.89	0.60	6.12	2.31	100.01	0.8846
21	1376 ASW-61085-17 T108-4	9/23/85	69.65	14.90	3.65	0.94	0.10	2.32	0.70	5.71	2.04	100.01	0.8843
22	4795 SL-AS07-2ii T468-6	8-1-01	69.24	15.13	3.65	0.66	0.10	2.18	0.61	5.52	2.92	100.01	0.8843
23	2099 PF-88-D (2) T173-5	9/28/88	69.96	15.61	3.62	0.50	0.10	1.80	0.47	5.49	2.45	100.00	0.8838
24	5509 AZGS-031606-CW3 T545-7(pop1)	1/17/07	72.69	13.97	3.93	0.49	0.08	1.95	0.50	3.41	2.99	100.01	0.8835
25	2789 dpb-4 avg 23ss		71.63	15.38	3.62	0.75	0.12	2.07	0.77	2.61	3.05	100.00	0.8828
26	5067 DPB-4_(2) T210-2	4-23-03	71.94	15.68	3.59	0.74	0.12	2.11	0.69	2.24	2.89	100.00	0.8825
27	3725 PF-93-AL T345-4	11/96	70.22	15.62	3.54	0.51	0.10	1.75	0.48	5.33	2.46	100.01	0.8825
28	1321 ASW-61085-13-P T104-1	8/23/85	71.45	14.30	3.49	0.67	0.09	2.22	0.67	4.65	2.45	99.99	0.8819
29	3709 SPAT-4 T343-3	11/96	68.45	15.63	3.83	0.83	0.11	2.20	0.69	5.91	2.34	99.99	0.8786
30	2066 PF-88-I T170-14	9/3/88	71.73	14.87	3.59	0.50	0.11	1.73	0.48	4.38	2.62	100.01	0.8773
31	1535 M7811 T124-8	5/5/86	69.23	15.14	3.88	0.69	0.10	2.28	0.66	5.15	2.86	99.99	0.8751
32	956 DR-70		69.70	15.07	3.79	0.67	0.09	2.16	0.68	5.12	2.71	99.99	0.8745
33	2043 PF-88-J T169-15	10/2/88	70.48	15.45	3.49	0.56	0.12	1.75	0.62	5.12	2.40	99.99	0.8745
34	1544 BPT-CC T126-1	7/17/86	69.34	15.31	3.70	0.72	0.13	2.12	0.67	5.70	2.30	99.99	0.8743
35	1311 ASW-61085-12-P T103-14	8/26/85	71.55	14.49	3.30	0.65	0.08	2.18	0.63	4.67	2.44	99.99	0.8737
36	1320 ASW-61085-13-A T103-15	8/26/85	71.35	14.35	3.45	0.72	0.09	2.38	0.69	4.57	2.40	100.00	0.8737
37	4546 RML-2 T431-5	12-5-199	69.63	15.06	3.77	0.68	0.09	2.26	0.64	5.06	2.81	100.00	0.8736

JLP-08-112, Listing of 37 closest matches for COMP. NO. 5769 for elements: Na, Al, Si, K , Ca, Ti, Fe

JLP-08-112 Listing of 37 closest matches for COMP. NO. 5761 for elements: **Al, Si, Ca, Ti, Mn, Fe** Date of Update: 3/4/10

C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co	
1	5761 JLP-08-112 T575-5	8/4/09	71.81	15.85	3.73	0.62	0.10	2.06	0.57	3.08	2.16	99.98	1.0000	
2	5838 LBS-U-121205-djk T537-4(pop1)	2/14/06	74.58	15.70	3.93	0.62	0.10	2.09	0.57	0.74	1.67	100.00	0.9814	Santa Fe Grp, NM
3	929 DR-39		68.99	15.46	3.71	0.65	0.10	2.01	0.64	6.13	2.31	100.00	0.9662	Klamath
4	4795 SL-AS07-2ii T468-6	8-1-01	69.24	15.13	3.65	0.66	0.10	2.18	0.61	5.52	2.92	100.01	0.9628	Summer Lake
5	2033 PF-88-K T169-4	10/2/88	69.76	15.33	3.64	0.58	0.10	1.91	0.51	5.82	2.35	100.00	0.9561	Pringle Falls
6	2300 61284-10_ASW.15MTB;1, T81-6	04/21/89	68.74	15.97	4.18	0.70	0.10	2.02	0.63	5.00	2.67	100.01	0.9546	
7	4079 EL-72-KV_LO FE T374-9	11/97	69.86	15.46	3.68	0.79	0.10	2.14	0.70	4.71	2.55	99.99	0.9520	
8	2062 PF-88-P T170-10	9/3/88	69.95	15.17	3.87	0.69	0.11	2.12	0.61	5.00	2.47	99.99	0.9517	
9	930 DR-40		69.30	15.37	3.68	0.55	0.11	1.86	0.59	6.13	2.41	100.00	0.9499	Klamath
10	2723 BUR871.11		71.98	15.22	3.54	0.60	0.10	1.91	0.49	3.19	2.97	100.00	0.9490	
11	2100 PF-88-Q (2) (SILICIC) T173-7	9/28/88	70.50	15.16	3.33	0.54	0.10	1.74	0.57	5.54	2.51	99.99	0.9459	
12	1535 M7811 T124-8	5/5/86	69.23	15.14	3.88	0.69	0.10	2.28	0.66	5.15	2.86	99.99	0.9413	
13	927 DR-37		69.40	15.55	3.41	0.62	0.11	1.89	0.60	6.12	2.31	100.01	0.9397	
14	1314 ASW-6985-4C T103-6	8/26/85	69.82	15.16	3.25	0.68	0.10	1.92	0.63	5.30	3.12	99.98	0.9395	
15	2099 PF-88-D (2) T173-5	9/28/88	69.96	15.61	3.62	0.50	0.10	1.80	0.47	5.49	2.45	100.00	0.9380	
16	3365 MA-359 T315-2	11/23/94	67.96	15.44	4.59	0.54	0.10	1.87	0.58	5.15	3.76	99.99	0.9373	
17	1093 61384-24 ASW T81-12	9/4/84	70.95	14.70	3.20	0.56	0.10	1.82	0.55	3.94	4.16	99.98	0.9370	
18	2118 PF-88-O (SILICIC)(2) T175-11	10/28/88	68.45	16.19	3.64	0.67	0.11	2.16	0.67	5.81	2.30	100.00	0.9369	
19	1312 ASW-6985-1 T103-1	8/26/85	69.68	15.16	3.27	0.71	0.10	1.98	0.67	5.25	3.18	100.00	0.9359	
20	1424 ASW-6985-1 T103-1 8e1	08/26/85	69.68	15.16	3.27	0.71	0.10	1.98	0.67	5.25	3.18	100.00	0.9359	
21	4546 RML-2 T431-5	12-5-199	69.63	15.06	3.77	0.68	0.09	2.26	0.64	5.06	2.81	100.00	0.9352	
22	3725 PF-93-AL T345-4	11/96	70.22	15.62	3.54	0.51	0.10	1.75	0.48	5.33	2.46	100.01	0.9340	
23	5779 ALT-30A T574-8(pop1)	8/4/09	71.44	15.29	3.95	0.84	0.10	2.17	0.76	2.93	2.52	100.00	0.9339	
24	956 DR-70		69.70	15.07	3.79	0.67	0.09	2.16	0.68	5.12	2.71	99.99	0.9329	
25	3053 ANA-D T283-3	7/26/93	68.85	15.21	3.80	0.70	0.09	2.24	0.65	5.59	2.86	99.99	0.9328	
26	1376 ASW-61085-17 T108-4	9/23/85	69.65	14.90	3.65	0.94	0.10	2.32	0.70	5.71	2.04	100.01	0.9318	
27	258 PAOH-2(2), T12-12		68.94	15.43	3.81	0.64	0.09	2.29	0.65	5.32	2.82	99.99	0.9315	
28	5067 DPB-4_(2) T210-2	4-23-03	71.94	15.68	3.59	0.74	0.12	2.11	0.69	2.24	2.89	100.00	0.9309	
29	3709 SPAT-4 T343-3	11/96	68.45	15.63	3.83	0.83	0.11	2.20	0.69	5.91	2.34	99.99	0.9308	
30	1313 ASW-6985-4B T103-5	8/26/85	69.83	15.17	3.27	0.66	0.10	1.88	0.66	5.33	3.09	99.99	0.9304	
31	3630 EL-46-RM T336-7	3/96	70.93	14.57	3.06	0.68	0.09	2.09	0.55	4.84	3.18	99.99	0.9297	
32	5780 ALT-30A T574-8(pop2)	8/4/09	70.51	15.95	3.91	0.96	0.10	2.52	0.69	3.03	2.33	100.00	0.9289	
33	223 MLG-5, T12-5		69.17	15.93	3.16	0.62	0.12	1.99	0.61	5.73	2.67	100.00	0.9232	
34	1092 61384-22 ASW T81-11	9/4/84	70.20	14.86	3.32	0.66	0.09	1.99	0.66	5.12	3.10	100.00	0.9225	
35	2041 PF-88-O (MAFIC) T169-13	10/2/88	69.21	15.37	3.81	0.73	0.12	2.14	0.69	5.40	2.53	100.00	0.9224	
36	3201 DJP-15-155 T302-2	3/25/94	70.72	14.89	3.14	0.66	0.10	2.36	0.64	4.33	3.17	100.01	0.9216	
37	1671 PAOH-2(A) T132-14	10/21/86	69.72	14.54	3.96	0.70	0.09	2.31	0.63	5.09	2.95	99.99	0.9211	

JLP-08-112, Listing of 37 closest matches for COMP. NO. 5769 for elements: Al, Si, Ca, Ti, Fe

JLP-08-115 (Locality: Late Miocene Hualapai Limestone. Detrital Wash Basin, AZ.) ~83% clear to dark brown, angular to subrounded, mostly platy and ribbed glass shards. Bw/bwj and webby shards are common, and are often slightly to well-vesiculated. Vesicles are well-hydrated and may be elongate spindle and cone-shaped, or equant to irregular bubble-types. Some shards are moderately to heavily altered, and a minor % contain microphenocrysts. ~17% of spl = euhedral to anhedral, slightly to moderately altered, tectosilicates, biotite, rare apatite, some grain too altered for identification.

Again, no match. Closest chemical correlation (~0.947, Similarity coefficient) is to JLP-08-109 Pop 1 (see above interpretation). Probable local tephra that shows a generic similarity (very high Fe, Mg, Mn, Ti) to Cascade-type tephra from California and Oregon.

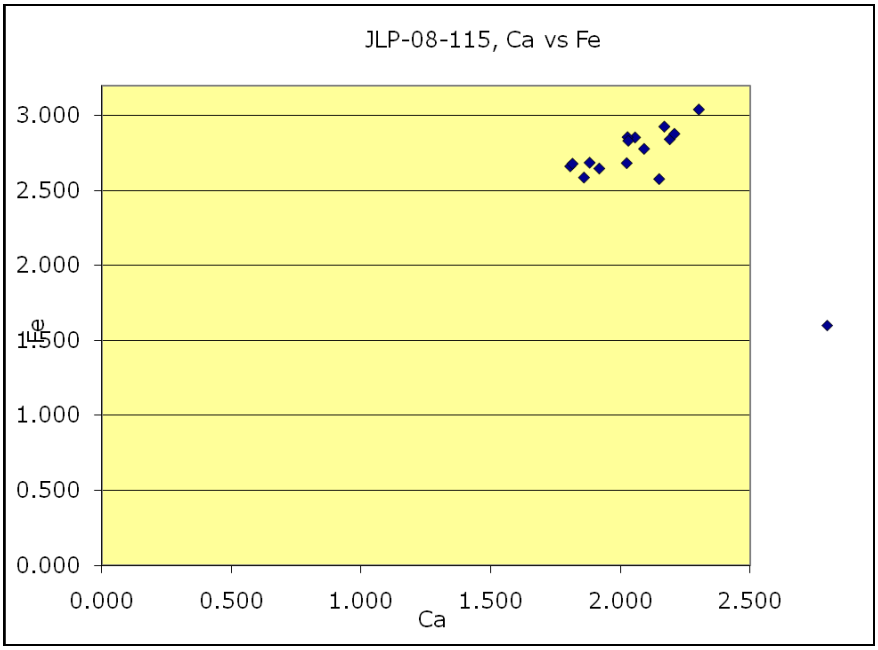
JLP-09-116: Discontinued. No glass present/altered sample. Processed residue consists of highly weathered, detrital minerals, mostly mica (biotite), moderate amounts of felspars and qtz, some magnetite and minor non-mag opaques.

JLP-09-132: Discontinued. No glass present/altered sample. Carbonate-cemented, weathered, detrital mineral-rich sediment.

Field Photo of Sample JLP-08-115

No.	Na2O	MgO	Al2O3	SiO2	K2O	CaO	TiO2	MnO	FeO	Total	
431	2.988	0.713	15.499	66.923	1.772	1.919	0.605	0.137	2.647	93.203	JLP-08-115 T575-6 1
432	3.170	0.842	15.398	66.298	1.811	2.057	0.742	0.121	2.854	93.293	JLP-08-115 T575-6 2
433	2.970	0.764	15.195	66.204	1.954	2.025	0.667	0.087	2.683	92.549	JLP-08-115 T575-6 3
434	2.834	0.746	15.073	66.687	1.811	1.882	0.662	0.114	2.686	92.495	JLP-08-115 T575-6 4
436	3.402	0.834	15.581	66.481	1.726	2.092	0.693	0.072	2.778	93.659	JLP-08-115 T575-6 6
437	3.204	0.841	15.360	66.233	1.750	2.191	0.713	0.114	2.842	93.248	JLP-08-115 T575-6 7
438	3.238	0.717	15.113	67.770	1.874	1.807	0.602	0.072	2.662	93.855	JLP-08-115 T575-6 8
441	3.366	0.841	15.806	66.307	1.771	2.028	0.687	0.107	2.856	93.769	JLP-08-115 T575-6 11
443	2.550	0.856	15.345	65.054	1.547	2.209	0.778	0.148	2.878	91.365	JLP-08-115 T575-6 13
444	3.037	0.729	15.220	66.332	1.670	1.860	0.633	0.142	2.587	92.210	JLP-08-115 T575-6 14
445	3.393	0.794	15.364	66.254	1.693	2.150	0.615	0.137	2.577	92.977	JLP-08-115 T575-6 15
446	3.111	0.802	15.812	66.979	1.789	2.031	0.700	0.104	2.832	94.160	JLP-08-115 T575-6 16
447	3.486	0.848	15.734	66.036	1.801	2.170	0.777	0.132	2.926	93.910	JLP-08-115 T575-6 17
448	3.186	0.683	15.237	67.830	1.820	1.816	0.557	0.100	2.679	93.908	JLP-08-115 T575-6 18
450	3.004	0.932	15.480	65.474	1.721	2.303	0.752	0.121	3.040	92.827	JLP-08-115 T575-6 20
Lo Total											
439	3.819	1.478	0.000	0.000	1.569	2.414	0.734	0.086	3.179	13.279	JLP-08-115 T575-6 9
440	3.613	1.105	0.000	0.000	1.457	1.644	0.674	0.081	2.580	11.154	JLP-08-115 T575-6 10
Hi Fe											
449	2.937	1.671	15.759	62.590	1.546	3.604	0.780	0.127	4.639	93.653	JLP-08-115 T575-6 19
Lo fe/Ca											
435	3.593	0.657	15.073	68.127	1.838	1.686	0.638	0.086	2.164	93.862	JLP-08-115 T575-6 5
442	3.156	0.330	14.202	69.467	2.019	1.052	0.367	0.106	1.872	92.571	JLP-08-115 T575-6 12
Column1											
Mean	3.129	0.796	15.414	66.457	1.767	2.036	0.679	0.114	2.768	93.162	
Std Deviation	0.245	0.069	0.237	0.731	0.093	0.153	0.067	0.024	0.134	0.772	
Range	0.936	0.249	0.739	2.776	0.407	0.496	0.221	0.076	0.463	2.795	
Minimum	2.550	0.683	15.073	65.054	1.547	1.807	0.557	0.072	2.577	91.365	
Maximum	3.486	0.932	15.812	67.830	1.954	2.303	0.778	0.148	3.040	94.160	
Count	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	
C. l. (95.0%)	0.136	0.038	0.131	0.405	0.052	0.085	0.037	0.013	0.074	0.427	

JLP-08-115
Raw Data Table



JLP-08-115
Raw Data Graph

No Match. Closest chemical correlation (~0.947, Similarity coefficient) is to JLP-08-109 Pop 1. Generic similarity (very high Fe, Ti) to Cascade-type tephra from Dos Pueblos Beach, CA, and Pringle Falls, OR.

Listing of 37 closest matches for COMP. NO. 5774 for elements: **Na, Mg, Al, Si, K , Ca, Ti, Mn, Fe** Date of Update: 8/12/09

C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	5774 JLP-08-115 T575-6	8/4/09	71.10	16.49	3.29	0.85	0.12	2.18	0.73	3.35	1.89	100.00	1.0000
2	5770 JLP-08-109 T575-4(pop1)	8/4/09	70.36	16.61	3.71	0.89	0.15	2.23	0.74	3.31	2.00	100.00	0.9468
3	5076 DPB-17 POP2 T212-1(2)	4-23-03	68.27	16.70	3.26	0.87	0.12	2.06	0.77	3.00	4.95	100.00	0.8984
4	2437 DPB-4 T210-2	8/10/90	71.75	15.08	3.61	0.76	0.12	2.03	0.75	2.76	3.13	99.99	0.8937
5	2041 PF-88-O (SILICIC-CT) T169-12	10/2/88	68.64	15.68	3.85	0.80	0.12	2.27	0.71	5.56	2.38	100.01	0.8935
6	2035 PF-88-Q (SILICIC) T169-5	10/2/88	68.38	15.51	3.85	0.79	0.12	2.23	0.73	5.94	2.37	99.92	0.8917
7	5764 ALT-27 T574-2	8/4/09	70.08	15.99	4.01	0.95	0.10	2.60	0.70	3.15	2.42	100.00	0.8914
8	5771 JLP-08-109 T575-4(pop2)	8/4/09	69.20	16.74	4.13	1.09	0.15	2.75	0.79	3.27	1.88	100.00	0.8914
9	2790 dpb-4 avg 23ss		71.63	15.38	3.62	0.75	0.12	2.07	0.77	2.61	3.05	100.00	0.8903
10	5087 DPB-21 T212-5(2)	4-23-03	68.66	16.99	3.06	0.80	0.11	2.09	0.71	3.07	4.52	100.01	0.8878
11	5666 EB-ASF-13 T565-7	11/18/08	70.05	15.71	3.28	0.78	0.12	2.11	0.81	2.78	4.37	100.01	0.8871
12	3710 SPAT-4 T343-3	11/96	68.45	15.63	3.83	0.83	0.11	2.20	0.69	5.91	2.34	99.99	0.8859
13	4080 EL-72-KV LO FE T374-9	11/97	69.86	15.46	3.68	0.79	0.10	2.14	0.70	4.71	2.55	99.99	0.8855
14	5068 DPB-4_(2) T210-2	4-23-03	71.94	15.68	3.59	0.74	0.12	2.11	0.69	2.24	2.89	100.00	0.8847
15	2120 PF-88-Q (MAFIC)(2) T175-12	10/28/88	68.00	16.14	3.85	0.78	0.13	2.28	0.75	5.70	2.37	100.00	0.8828
16	1377 ASW-61085-17 T108-4	9/23/85	69.65	14.90	3.65	0.94	0.10	2.32	0.70	5.71	2.04	100.01	0.8815
17	2042 PF-88-O (MAFIC) T169-13	10/2/88	69.21	15.37	3.81	0.73	0.12	2.14	0.69	5.40	2.53	100.00	0.8802
18	5773 JLP-08-112 T575-5	8/4/09	71.81	15.85	3.73	0.62	0.10	2.06	0.57	3.08	2.16	99.98	0.8796
19	2039 PF-88-MD (MAFIC) T169-9	10/2/88	68.34	15.53	3.92	0.82	0.13	2.31	0.77	5.82	2.37	100.01	0.8772
20	2036 PF-88-Q (MAFIC) T169-6	10/2/88	68.48	15.31	3.86	0.82	0.11	2.34	0.71	5.92	2.45	100.00	0.8741
21	1545 BPT-CC T126-1	7/17/86	69.34	15.31	3.70	0.72	0.13	2.12	0.67	5.70	2.30	99.99	0.8736
22	2119 PF-88-O (SILICIC)(2) T175-11	10/28/88	68.45	16.19	3.64	0.67	0.11	2.16	0.67	5.81	2.30	100.00	0.8734
23	3500 DRE-2 T323-3 silicic fr.	5/6/95	67.93	15.85	3.79	0.81	0.14	2.29	0.69	6.15	2.35	100.00	0.8712
24	1840 flv-16-ww t146-4 dk fr.	8/25/87	69.56	14.95	3.97	0.81	0.11	2.37	0.78	4.44	3.02	100.01	0.8688
25	1321 ASW-61085-13-A T103-15	8/26/85	71.35	14.35	3.45	0.72	0.09	2.38	0.69	4.57	2.40	100.00	0.8666
26	1320 ASW-61085-12A T103-13	8/26/85	71.29	14.36	3.46	0.71	0.09	2.31	0.69	4.62	2.48	100.01	0.8645
27	2040 PF-88-O (SILICI-CB) T169-11	10/2/88	69.36	15.27	3.91	0.74	0.14	2.11	0.65	5.44	2.38	100.00	0.8599
28	1322 ASW-61085-13-P T104-1	8/23/85	71.45	14.30	3.49	0.67	0.09	2.22	0.67	4.65	2.45	99.99	0.8594
29	2063 PF-88-P T170-10	9/3/88	69.95	15.17	3.87	0.69	0.11	2.12	0.61	5.00	2.47	99.99	0.8584
30	2302 61284-10 ASW.11MTB;2, T81-6	04/21/89	68.25	16.03	4.25	0.72	0.12	2.03	0.64	5.42	2.55	100.01	0.8578
31	5511 OC-187-281006-FGA-djk T544-1	12/4/06	70.48	15.45	3.38	0.78	0.12	2.10	0.82	2.13	4.75	100.01	0.8563
32	5685 ALT-11A T567-2	1/8/09	69.02	15.32	3.85	0.88	0.09	2.38	0.72	4.55	3.19	100.00	0.8557
33	2868 HR-FF-1-ORIG	06/28/92	68.47	15.49	4.27	0.72	0.13	2.17	0.65	5.59	2.50	99.99	0.8538
34	223 MLG-5, T12-5		69.17	15.93	3.16	0.62	0.12	1.99	0.61	5.73	2.67	100.00	0.8522
35	1312 ASW-61085-12-P T103-14	8/26/85	71.55	14.49	3.30	0.65	0.08	2.18	0.63	4.67	2.44	99.99	0.8506
36	4766 SL-AS8-2iU T467-4	7-23-01	68.70	15.12	4.11	0.91	0.10	2.47	0.68	5.48	2.43	100.00	0.8505
37	2995 JY-92-2A T277-3 POP1	5/3/93	69.45	16.25	3.03	0.65	0.11	2.28	0.46	5.69	2.07	99.99	0.8503

Sample JLP-08-115
Listing of 37 closest matches for COMP. NO. 5769 for elements:
Na, Al, Si, K , Ca, Ti, Fe

Listing of 37 closest matches for COMP. NO. 5774 for elements: **Mg, Al, Si, Ca, Ti, Mn, Fe** Date of Update: 8/12/09

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	5774	JLP-08-115 T575-6	8/4/09	71.10	16.49	3.29	0.85	0.12	2.18	0.73	3.35	1.89	100.00	1.0000
2	5076	DPB-17_POP2 T212-1(2)	4-23-03	68.27	16.70	3.26	0.87	0.12	2.06	0.77	3.00	4.95	100.00	0.9726
3	5666	EB-ASF-13 T565-7	11/18/08	70.05	15.71	3.28	0.78	0.12	2.11	0.81	2.78	4.37	100.01	0.9602
4	5511	OC-187-281006-FGA-djk T544-1	12/4/06	70.48	15.45	3.38	0.78	0.12	2.10	0.82	2.13	4.75	100.01	0.9533
5	2035	PF-88-Q (SILICIC) T169-5	10/2/88	68.38	15.51	3.85	0.79	0.12	2.23	0.73	5.94	2.37	99.92	0.9520
6	5087	DPB-21 T212-5(2)	4-23-03	68.66	16.99	3.06	0.80	0.11	2.09	0.71	3.07	4.52	100.01	0.9508
7	2041	PF-88-O (SILICIC-CT) T169-12	10/2/88	68.64	15.68	3.85	0.80	0.12	2.27	0.71	5.56	2.38	100.01	0.9493
8	5068	DPB-4_(2) T210-2	4-23-03	71.94	15.68	3.59	0.74	0.12	2.11	0.69	2.24	2.89	100.00	0.9485
9	2437	DPB-4 T210-2	8/10/90	71.75	15.08	3.61	0.76	0.12	2.03	0.75	2.76	3.13	99.99	0.9451
10	2790	dpb-4 avg 23ss		71.63	15.38	3.62	0.75	0.12	2.07	0.77	2.61	3.05	100.00	0.9449
11	3710	SPAT-4 T343-3	11/96	68.45	15.63	3.83	0.83	0.11	2.20	0.69	5.91	2.34	99.99	0.9427
12	5770	JLP-08-109 T575-4(pop1)	8/4/09	70.36	16.61	3.71	0.89	0.15	2.23	0.74	3.31	2.00	100.00	0.9412
13	2120	PF-88-Q (MAFIC)(2) T175-12	10/28/88	68.00	16.14	3.85	0.78	0.13	2.28	0.75	5.70	2.37	100.00	0.9371
14	2042	PF-88-O (MAFIC) T169-13	10/2/88	69.21	15.37	3.81	0.73	0.12	2.14	0.69	5.40	2.53	100.00	0.9364
15	2036	PF-88-Q (MAFIC) T169-6	10/2/88	68.48	15.31	3.86	0.82	0.11	2.34	0.71	5.92	2.45	100.00	0.9328
16	2039	PF-88-MD (MAFIC) T169-9	10/2/88	68.34	15.53	3.92	0.82	0.13	2.31	0.77	5.82	2.37	100.01	0.9317
17	4080	EL-72-KV LO FE T374-9	11/97	69.86	15.46	3.68	0.79	0.10	2.14	0.70	4.71	2.55	99.99	0.9311
18	3500	DRE-2 T323-3 silicic fr.	5/6/95	67.93	15.85	3.79	0.81	0.14	2.29	0.69	6.15	2.35	100.00	0.9274
19	2892	EVT-TFM-2		66.26	16.70	3.17	0.85	0.09	2.05	0.67	4.56	5.67	100.02	0.9273
20	2119	PF-88-O (SILICIC)(2) T175-11	10/28/88	68.45	16.19	3.64	0.67	0.11	2.16	0.67	5.81	2.30	100.00	0.9231
21	1545	BPT-CC T126-1	7/17/86	69.34	15.31	3.70	0.72	0.13	2.12	0.67	5.70	2.30	99.99	0.9219
22	1840	flv-16-ww t146-4 dk fr.	8/25/87	69.56	14.95	3.97	0.81	0.11	2.37	0.78	4.44	3.02	100.01	0.9199
23	1377	ASW-61085-17 T108-4	9/23/85	69.65	14.90	3.65	0.94	0.10	2.32	0.70	5.71	2.04	100.01	0.9172
24	2797	V-6-KH T254-8	4/14/92	66.34	16.89	3.10	0.81	0.09	1.95	0.69	4.29	5.83	99.99	0.9135
25	1313	ASW-6985-1 T103-1	8/26/85	69.68	15.16	3.27	0.71	0.10	1.98	0.67	5.25	3.18	100.00	0.9126
26	1425	ASW-6985-1 T103-1 8el	08/26/85	69.68	15.16	3.27	0.71	0.10	1.98	0.67	5.25	3.18	100.00	0.9126
27	223	MLG-5, T12-5		69.17	15.93	3.16	0.62	0.12	1.99	0.61	5.73	2.67	100.00	0.9110
28	5685	ALT-11A T567-2	1/8/09	69.02	15.32	3.85	0.88	0.09	2.38	0.72	4.55	3.19	100.00	0.9104
29	2302	61284-10_ASW.11MTB;2, T81-6	04/21/89	68.25	16.03	4.25	0.72	0.12	2.03	0.64	5.42	2.55	100.01	0.9087
30	2040	PF-88-O (SILICI-CB) T169-11	10/2/88	69.36	15.27	3.91	0.74	0.14	2.11	0.65	5.44	2.38	100.00	0.9041
31	2868	HR-FF-1-ORIG	08/28/92	68.47	15.49	4.27	0.72	0.13	2.17	0.65	5.59	2.50	99.99	0.9041
32	3964	SM-ASH 22 T361-6	4/97	70.85	14.47	3.40	0.70	0.09	1.98	0.74	4.77	2.99	99.99	0.9014
33	5764	ALT-27 T574-2	8/4/09	70.08	15.99	4.01	0.95	0.10	2.60	0.70	3.15	2.42	100.00	0.9002
34	3285	J697-a T308-8	8/1/94	69.14	15.47	3.30	0.73	0.09	1.91	0.66	5.62	3.08	100.00	0.8995
35	1320	ASW-61085-12A T103-13	8/26/85	71.29	14.36	3.46	0.71	0.09	2.31	0.69	4.62	2.48	100.01	0.8990
36	2063	PF-88-P T170-10	9/3/88	69.95	15.17	3.87	0.69	0.11	2.12	0.61	5.00	2.47	99.99	0.8986
37	1321	ASW-61085-13-A T103-15	8/26/85	71.35	14.35	3.45	0.72	0.09	2.38	0.69	4.57	2.40	100.00	0.8969

Sample JLP-08-115
Listing of 37 closest matches for COMP. NO. 5769 for elements:
Al, Si, Ca, Ti, Fe