FINAL TECHNICAL REPORT

Paleoseismic Studies in the Central Nevada Seismic Belt

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TECHNICAL REPORT

BACKGROUND

The contemporary seismotectonics of the western Basin and Range province are largely related to a broad zone of diffuse right-lateral shear separating the Sierra Nevada microplate from the Basin and Range (Thatcher et al., in press; Fig. 1). The Walker Lane (WL) is a northwest-trending, 700-km-long zone of late Cenozoic strike-slip faulting which forms a narrow structural-physiographic line in western Nevada. The term Walker Lane belt describes a wider range of strike-slip features lying between the Sierra Nevada on the west and the original Walker Lane on the east.

The central Nevada seismic belt (CNSB) is a semi-continuous, north-northeast-trending zone of large-magnitude historical seismicity and surface faulting which splays from the WL (Fig. 1). Modern deformation within the WL region is best illustrated by the1932 Cedar Mountain earthquake (M 7.2) (Bell et al., 1999) and the1954 Fairview Peak (M 7.2), 1954 Dixie Valley (M6.8) (Caskey et al., 1996), and 1954 Rainbow Mountain sequence (M6.6, 6.8) (Caskey et al., 1999), which collectively formed a continuous, left-stepping rupture zone nearly 200 km in length extending from the northwest-trending Walker Lane (Fig. 2). Other principal surface faulting events in the CNSB include the 1903 Wonder (M>6.5), 1915 Pleasant Valley (M7.6), and 1934 Excelsior Mountain (M6.5) events.

This study examined the paleoseismic history of a selected portion of the central Nevada seismic belt through Quaternary stratigraphic and trenching investigations in the 1954 Fairview Peak and 1954 Rainbow Mountain fault zones. This study was conducted jointly with NEHRP External Award Project 1434-HQ-98-GR-00016 "Surface faulting and slip distribution for the 1954 Rainbow Mountain and Stillwater earthquakes", and some portions of this study (cf., age dating) were performed in support of that project. Detailed paleoseismic studies were conducted within the 1954 Fairview Peak rupture zone and along faults structurally connecting the Fairview Peak and 1954 Dixie Valley fault zones, and the results were integrated with previous paleoseismic results in the Dixie Valley and 1932 Cedar Mountain rupture zones (Bell and Katzer, 1990; Bell et al., 1999).

INVESTIGATIONS UNDERTAKEN

The principal topics addressed by the study included:

- The nature of neotectonic processes in historical rupture zones of the western Basin and Range Province.
- The paleoseismic behavior of non-historical, late Quaternary faults within and adjacent to historical rupture zones.
- The significance of slip rates and other paleoseismic parameters in defining seismogenic

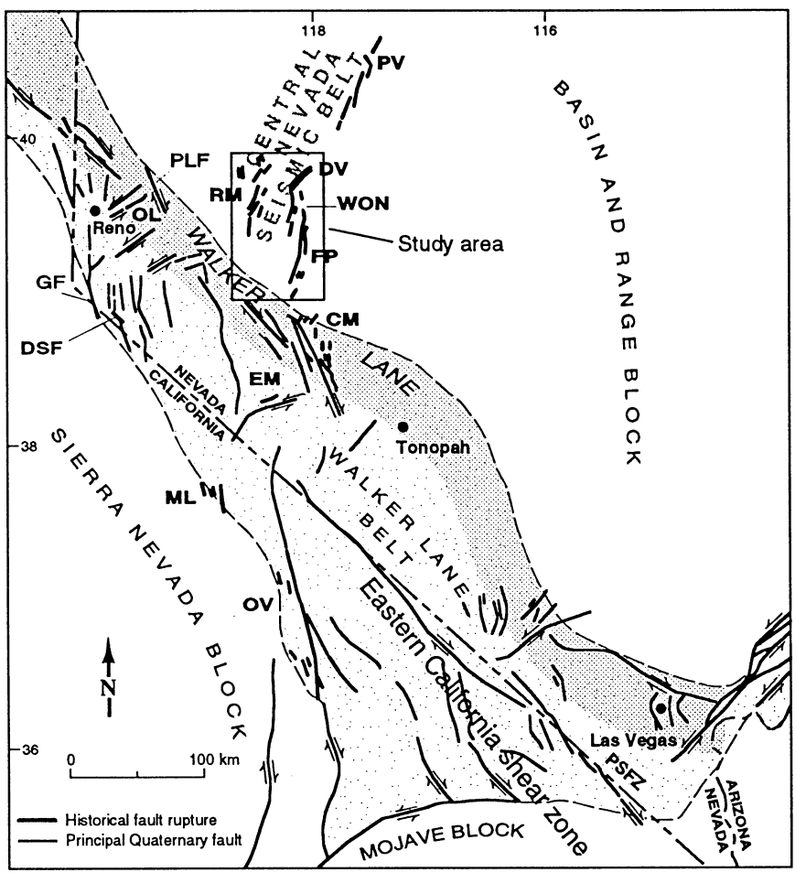

Figure 1. Principal seismotectonic features of the western Basin and Range province showing Walker Lane region and major Quaternary faults and historical surface ruptures (bold). Historical faulting events associated with the central Nevada seismic belt include 1903 Wonder (WON), 1915 Pleasant Valley (PV), 1932 Cedar Mt (CM), 1934 Excelsior Mt (EM), 1954 Fairview Peak (FP), 1954 Dixie Valley (DV), and 1954 Rainbow Mt (RM) events. Study area for this project is outlined.

potential of historical and non-historical faults.

- The frequency and significance of spatially and temporally clustered surface faulting.

Detailed chronostratigraphic mapping was conducted along the Fairview Peak rupture zone utilizing 1:12,000-scale low-sun-angle aerial photography; the surficial mapping was combined with the detailed fault mapping of Caskey et al. (1996). Stratigraphic units were delineated based on soil-geomorphic relations described in Bell and Katzer (1990) and Bell et al. (1999). Age constraints for the units were developed through conventional radiocarbon and tephrochronology analyses. Quaternary tephra beds found in several chronostratigraphic and trench units were submitted to Andrei Sarna-Wojcicki at the U.S. Geological Survey for microprobe analysis and chemical identification.

Four exploratory trenches were excavated across traces of 1954 and older faults (Fig. 2):

- Fairview Peak trench located on scarp at main 1954 Fairview Peak faulting site.
- Bell Canyon trench located at southern end of 1954 Fairview Peak fault trace.
- La Plata trench located on 7-m-high Holocene scarp situated at the left step-over between surface ruptures of 1954 Fairview Peak and 1954 Dixie Valley zones.
- Rainbow trench located on southeastern trace of 1954 Rainbow Mountain rupture zone in Fourmile Flat.

RESULTS

Radiocarbon dating and tephra analyses

Results of radiocarbon dating are listed in Table 1, and summary results of volcanic tephra correlations are listed in Table 2. Detailed tephra chemistries and best-fit correlation data are provided in Appendix 1.

Fairview Peak

Detailed chronostratigraphic mapping along the Fairview Peak rupture zone (Fig. 3) revealed a series of allostratigraphic units correlative with similar soil-geomorphic units delineated in the Dixie Valley zone by Bell and Katzer (1990). Four principal units are recognized:

- Qfy, late Holocene alluvial fan deposits; contains several regionally extensive Mono Craters tephra beds radiocarbon dated at < 2.0 ka.

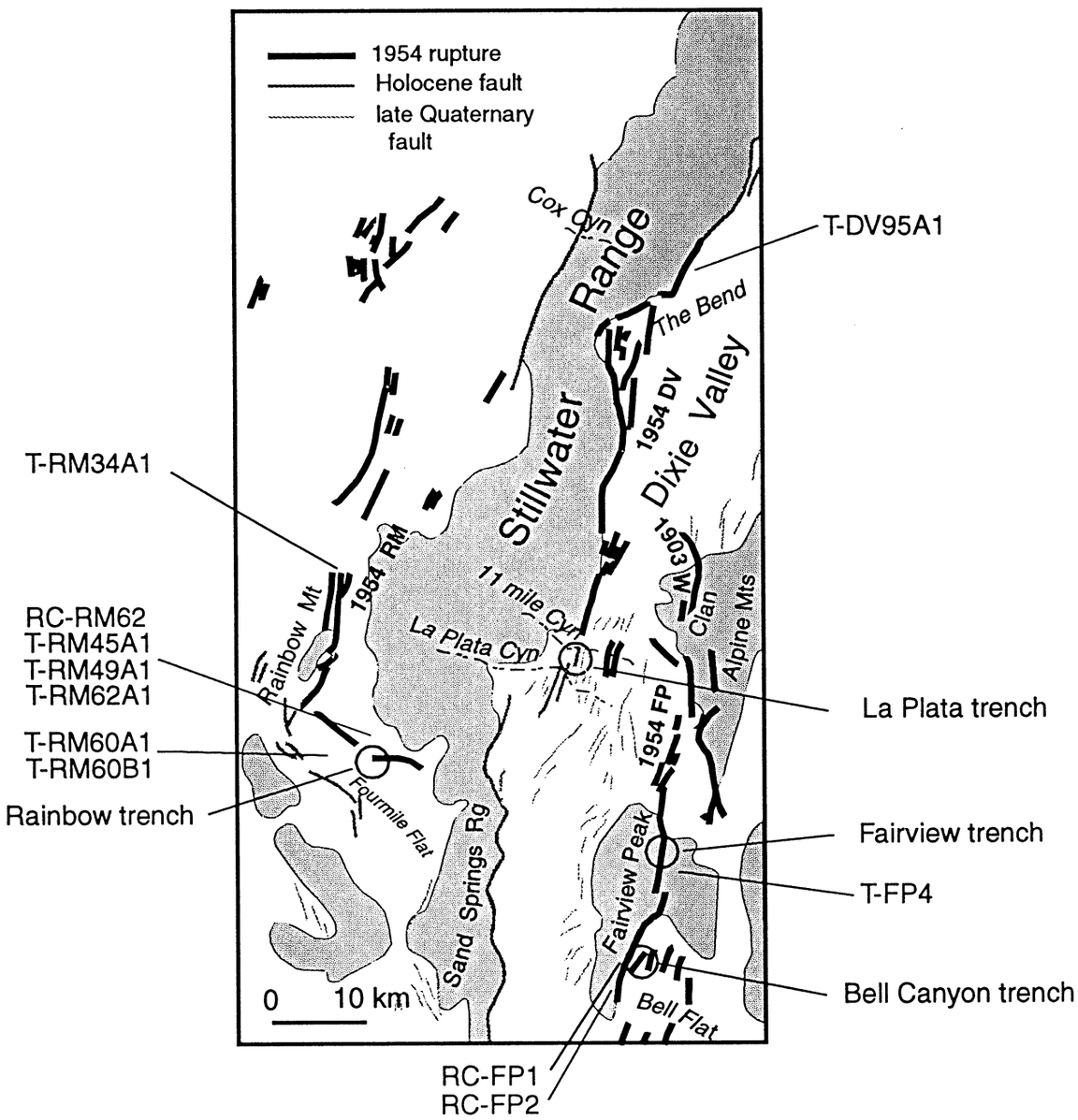

Figure 2. Map showing location of historical surface ruptures (bold), and other Holocene and undifferentiated late Quaternary faults in the Fairview Peak, Dixie Valley, and Carson Sink region. Historical rupture zones include: 1903 Wonder, 1954 Fairview Peak, 1954 Dixie Valley, and 1954 Rainbow Mountain. Exploratory trench sites are circled; locations are indicated for tephra beds (T) and radiocarbon (RC) samples listed in Tables 1 and 2.

Table 1. Tephra samples collected from 1954 Rainbow Mountain, Dixie Valley, and Fairview Peak fault zones with best matches based on chemical correlations (Appendix 1). Tephra analyses, correlations, and estimated ages provided by Andrei Sarna-Wojcicki, U.S. Geological Survey.

Tephra sample number	Sample location	Best matches	Estimated age (^{14}C ka)
RM34A1	Faulted Lake Lahontan lacustrine sediments at northern end of main 1954 Rainbow Mt rupture zone	Wilson Creek bed 15; Rush Creek ash bed	27.6-31.9
RM45A1	Folded Lake Lahontan sediments along 1954 fault ruptures in Fourmile Flat	Two Barrett Lake and Walker Lake beds; Cedar Mt sample JB-BS-2	1.6-2.3
RM49A1	Highly folded Lake Lahontan sediments along northern margin of Fourmile Flat	Several matches: two Walker Lake beds; Wilson Creek bed 7; not well constrained	1.5-21.4
RM60A1	Faulted Lake Lahontan lacustrine clay in Fourmile Flat	Several possible matches with Holocene age tephra beds from Walker Lake and Crooked Meadow	<10
RM60B1	Faulted Lake Lahontan lacustrine clay in Fourmile Flat	Wilson Creek beds 3-13; best match with beds 10-11	14-25.8
RM62A1	Near base of 20m section of faulted Lake Lahontan lacustrine deposits	Not well constrained; closest match is a 7-8 ka Walker Lake bed; lies several meters below RC-RM62 which provides best age control.	>14.9
DV95A1	Faulted Lake Dixie lacustrine sediments in 1954 Dixie Valley rupture zone	Mazama ash bed	6.8
FP-4	Alluvial fan deposits in 1954 Fairview Peak rupture zone	Wilson Creek bed 19	35.4

Table 2. Results of radiocarbon dating in the 1954 Rainbow Mountain and Fairview Peak fault zones.

Sample number	Material dated and location	Lab number	^{14}C age (yrs BP)
RC-RM62	small snail, gastropod shells in Lake Lahontan sediments overlying tephra T-RM62A1	GX-24186	14,420 ± 420
RC-FP1	organic soil; buried A horizon underlying Mono tephra in Bell Canyon	GX-23995	515 ± 235
RC-FP2	disseminated charcoal underlying Mono tephra in Cabin Wash	GX-23996	1,335 ± 115
RC-FP3	organic soil; buried A/B horizons in Bell Canyon trench	Pending	Pending

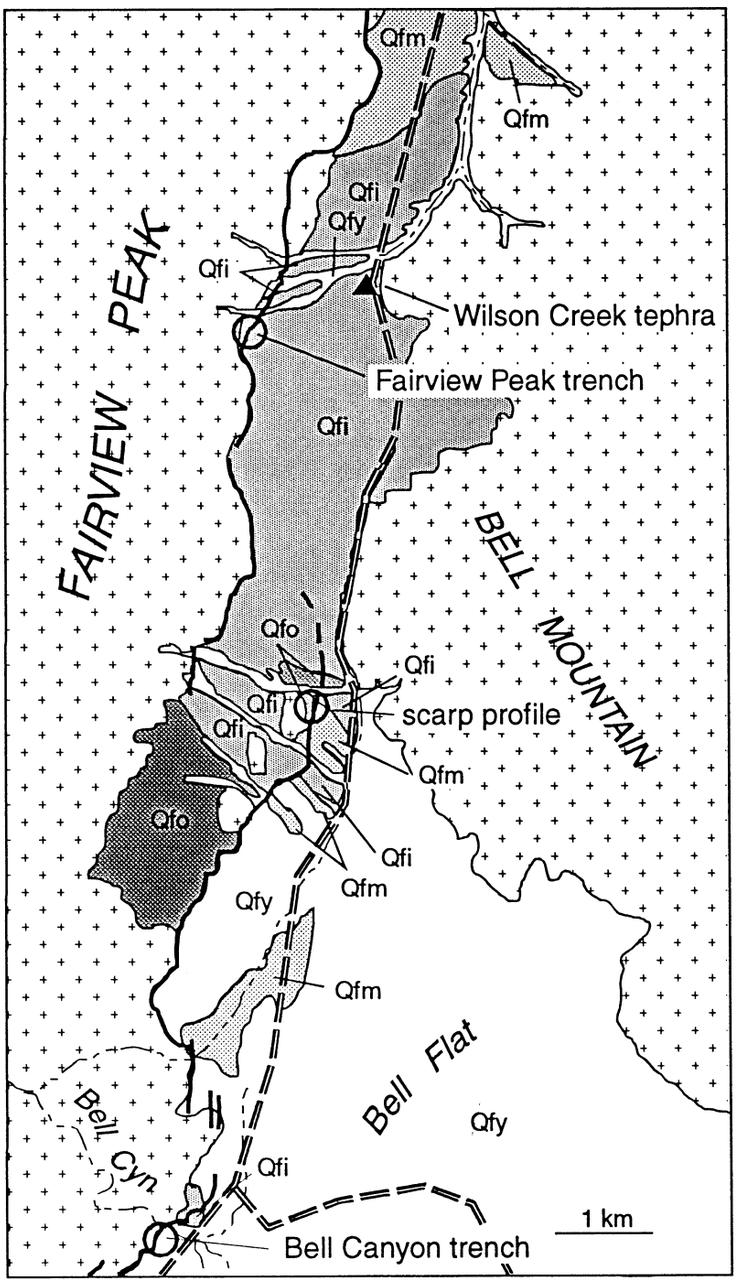

Figure 3. Surficial geologic map of the Fairview Peak-Bell Flat area of the 1954 Fairview Peak rupture zone (shown in bold). Units include, from youngest to oldest: Qfy, late Holocene alluvial fan and basin floor deposits; Qfm, early Holocene alluvial fan deposits; Qfi, late Pleistocene alluvial fan deposits; Qfo, mid- to late Pleistocene alluvial fan deposits. Trench locations are circled, and site of the 35.4 ka Wilson Creek tephra bed is marked by the triangle.

- Qfm, early Holocene alluvial deposits; in Dixie Valley this unit post-dates the high shoreline of Lake Dixie dated at 12-13 ka. and contains Mazama ash (6.8 ka) in upper part of unit.

- Qfi, late Pleistocene alluvial fan deposits; near Fairview Peak trench site, this unit contains the Wilson Creek bed 19 tephra (35.4 ka)

- Qfo, mid- to late Pleistocene deposits; based on soil-geomorphic relations, unit is similar to the Cedar Mountain unit Qf_{2a} which contains the 60-90 ka Negit Causeway tephra bed; similar unit was inferred to be on the order of 100 ka in age in Dixie Valley.

The Fairview Peak trench was excavated across a 4-m high scarp produced by 1954 faulting in Qfi-age alluvial fan deposits. Surficial mapping indicated that no paleoscarps occur in Qfi deposits, and the trench stratigraphy (Fig. 4) confirmed the lack of an earlier event in Qfi. Upper Qfi_3 deposits contain a well-developed 50-100 cm argillic (Bt) soil which is well exposed and continuous in the footwall and hanging wall portions of the trench, demonstrating that only one event (1954) has displaced the alluvial surface. Importantly, the Wilson Creek tephra bed 19 is exposed at the distal portion of the faulting Qfi fan (Fig. 3), indicating that this segment of the Fairview Peak fault had not ruptured since 35.4 ka.

The principal Fairview Peak fault trace extends south from the trench site and steps left to the Bell Flat segment (Fig. 3). The northern portion of the Bell Flat trace consists of a 2-3 m high 1954 scarp and a similar size paleoscarp in mid- to late Pleistocene (Qfo) alluvial fan deposits. A topographic profile surveyed across the compound scarp indicates that Qfo deposits are cumulatively offset 5 m, of which 2.5 m was produced in 1954 (Fig. 5). This paleoscarp was produced by the penultimate event and is bracketed by the ages of the faulted Qfo deposits (100 ka) and the unfaulted Qfi deposits (35 ka). Calcified rhizoliths were collected from carbonate-cemented fault gouge in the exposed Qfo deposits, and the sample is being submitted for uranium-series age dating in an effort to determine a more precise minimum age for the penultimate event.

La Plata Canyon fault

The La Plata fault is located at the left step-over between the Fairview Peak and Dixie Valley fault zones. Although it did not rupture in 1954, it exhibits one of the largest Holocene scarps (7 m) in the region and thus is considered important in understanding the spatial and temporal pattern of faulting within the CNSB. Fault mapping suggests that the La Plata fault may be structurally connected with the Sand Springs fault to the south (Fig. 2).

The exploratory trench was excavated at the mouth of La Plata Canyon (Fig. 2), and it exposed faulted Qfm alluvial fan deposits (5 m vertical separation) and a stacked sequence of four colluvial wedge deposits (Fig. 6).The three oldest colluvial wedge units (Qc_1, Qc_2, and Qc_3) are separated from the most recent wedge (Qc_4) by a weak argillic (B_{tj}) soil horizon and account for most of measured offset. The youngest wedge deposit is associated with a 50-100 cm scarp that locally

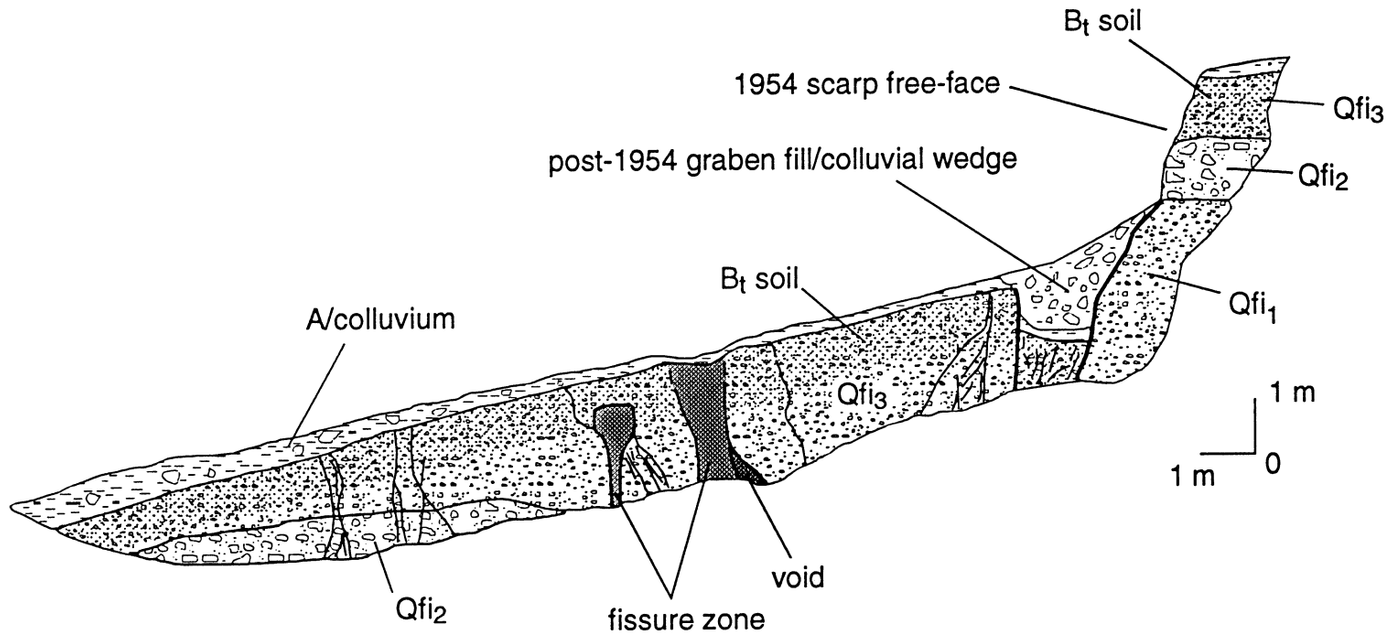

Figure 4. Generalized trench log for the Fairview Peak trench excavated across the main trace of the 1954 rupture (Fig. 3). Trench stratigraphic units are subunits of the Qfi alluvial fan deposits.

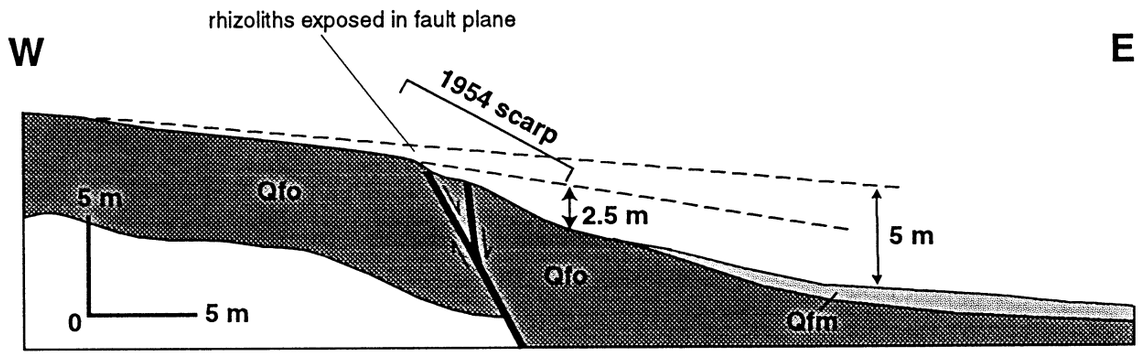

Figure 5. Topographic profile across the compond scarp in Qfo deposits at northern part of Bell Flat (Fig. 3). Vertical separation across the scarp is 5 m, of which 2.5 m is 1954 displacement. The penultimate event was comparable in displacement to 1954, and it is recognized only in Qfo-age deposits. The fault shear plane exposed in Qfo deposits contains carbonate-cemented rhizoliths that were sampled for uranium-series dating.

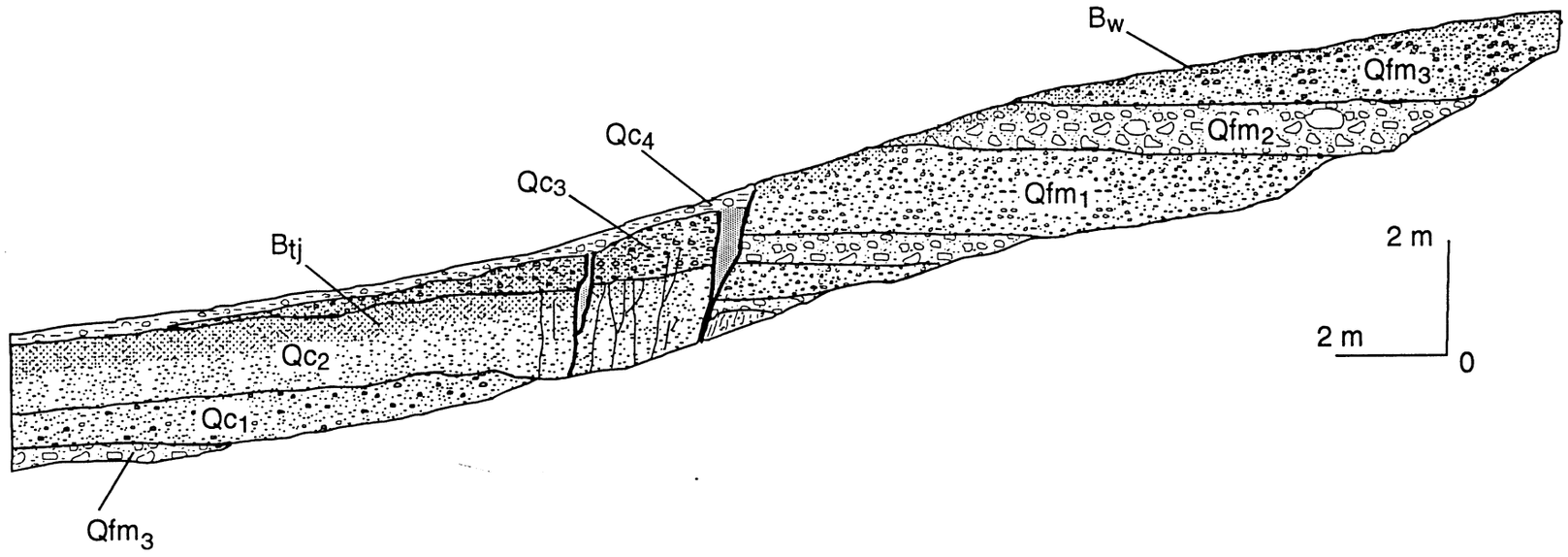

Figure 6. Generalized trench log of exploratory trench excavated across the La Plata fault (Fig. 2). Stratigraphic units in the footwall are subdivisions of Qfm alluvial fan deposits. Hanging wall stratigraphy is marked by a sequence of four colluvial wedge (Qc) deposits overlying downthrown Qfm deposits.

offsets late Holocene alluvium containing an A-C to weak cambic (B_w) soil.

Although we were unable to find datable material in the trench stratigraphy, we were able to approximately bracket the timing of faulting based on soil-geomorphic relations previously established in Dixie Valley (Bell and Katzer, 1990). The Qfm deposits post-date shoreline deposits of Lake Dixie which is radiocarbon dated at 12-13 ka; thus, the four La Plata faulting events are interpreted to be younger than this age. The argillic soil capping the lowermost colluvial wedges suggests that these events may have been temporally clustered during the early Holocene, and the weak A-C to cambic soil present in offset late Holocene alluvium suggests that the most recent faulting event is recent, possibly less than a few hundred years in age.

CONCLUSIONS

Results of event timing derived from paleoseismic studies in the Fairview Peak and La Plata Canyon areas are combined with previous results derived from similar studies in the 1932 Cedar Mountain and 1954 Dixie Valley rupture zones (Fig. 7). This comparison shows a varied and widely diverse range in slip histories and provides no indication of temporal or spatial rupture patterns during the last 100 ka that are comparable to the historical pattern.

Five surface faulting events have been documented in the 1932 Cedar Mountain zone during the last 20 ka , and additional events occurred during the last 100 ka. Slip rates are on the order of 0.4-0.5 mm/yr (Bell et al., 1999). In Dixie Valley, the penultimate event is between 1.5-6.8 ka in age, and an older event is bracketed by the ages of Qfm (12-13 ka) and Qfi (35.4 ka) alluvial fan deposits. Slip rates are between 0.2-0.5 mm/yr (Bell and Katzer, 1990). In contrast, the age of the penultimate event in the Fairview Peak zone is at least 35.4 ka, and apart from the 1954 rupture it is the only surface faulting event during the last 100 ka. These relations suggest that the late Quaternary slip rate of the Fairview fault zone is $<<0.1$ mm/yr. The sequence of four Holocene faulting events along the La Plata fault are not replicated in either the Fairview or Dixie Valley zones, further supporting the concept of widely diverse slip histories in this portion of the CNSB.

The results of this study suggest that the CNSB is a complex structural-tectonic region consisting of single and multiple, interconnected and overlapping fault segments. The pattern of historical surface rupture is complex and is not dependent upon paleoseismic history; the rupture zones contain single and multiple fault segments each exhibiting widely different paleoseismic histories. Although other non-historical late Pleistocene and Holocene faults remain to be studied in the region (Fig. 2), the widely differing slip histories found in this study strongly suggest that conventional paleoseismic parameters (cf., slip and recurrence rate) may not be reliable criteria for distinguishing the CNSB from other seismically active areas of the western Basin and Range.

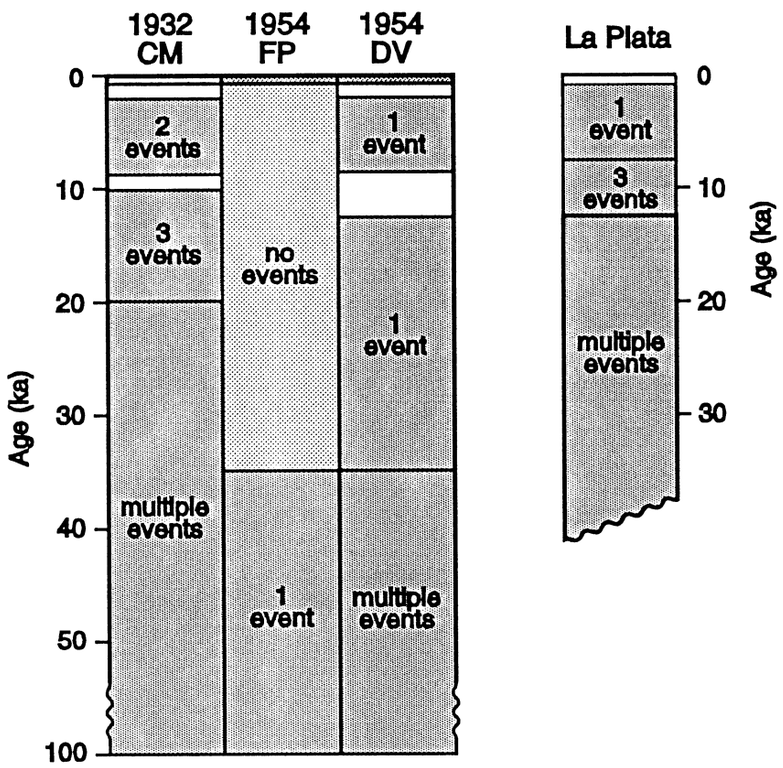

Figure 7. Comparison of timing of known and dated surface faulting events in the 1932 Cedar Mountain, 1954 Fairview Peak, 1954 Dixie Valley, and (prehistorical) La Plata fault zones.

REFERENCES CITED

Bell, J.W., and Katzer, T.L., 1990, Timing of late Quaternary faulting in the 1954 Dixie Valley earthquake area, central Nevada: Geology, v. 18, p. 622-625.

Bell, J.W., dePolo, C.M., Ramelli, A.R., Sarna-Wojcicki, A.M., and Meyer, C.E., 1999, Surface faulting and paleoseismic history of the 1932 Cedar Mountain earthquake area, west-central Nevada, and implications for modern tectonics of the Walker Lane: Geological Society of America Bulletin, in press.

Caskey, S.J., Wesnousky, S.G., Zhang, P., and Slemmons, D.B., 1996, Surface faulting of the 1954 Fairview Peak (Ms 7.2) and Dixie Valley (Ms 6.8) earthquakes, central Nevada: Seismological Society of America Bulletin, v. 86, no. 3, p. 761-787.

Caskey, S.J., Wesnousky, S.G., and Bell, J.W., 1999, Surface faulting and slip distribution for the 1954 Rainbow Mountain-Stillwater earthquake sequence, central Nevada: Geological Society of America Abstracts with Program (in press for Rocky Mountain section meeting).

Thatcher, W., Foulger, G.R., Julian, B.R., Svarc, J., Quilty, E., and Bawden, G.W., in press, Present day deformation across the Basin and Range Province, western United States: Science.

PROJECT RELATED PUBLICATIONS

Bell, J.W., Caskey, S.J., Ramelli, A.R., Guerrieri, L., and Sarna-Wojcicki, A.M., 1999, Timing of late Quaternary faulting in the central Nevada seismic belt: Geological Society of America Abstracts with Program (in press for Rocky Mountain section meeting).

Caskey, S.J., Wesnousky, S.G., and Bell, J.W., 1999, Surface faulting and slip distribution for the 1954 Rainbow Mountain-Stillwater earthquake sequence, central Nevada: Geological Society of America Abstracts with Program (in press for Rocky Mountain section meeting).

Appendix 1

Major element glass chemistry data
and
closest matches for tephra based on similarity coefficients

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Tephrochronology Laboratory
U.S. Geological Survey
Menlo Park, CA

Sample RM34A1

Listing of 38 closest matches for COMP. NO. 4258 for elements: Na, Al, Si, K , Ca, Fe Date of Update: 11/17/98

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	4258	RM34A1 T389-1	7-1-98	77.15	12.88	0.90	0.02	0.05	0.59	0.07	3.64	4.70	100.00	1.0000
2	2091	H88WH-7 T173-14	10/6/88	77.53	12.64	0.90	0.06	0.06	0.58	0.09	3.53	4.61	100.00	0.9850
3	1237	WL 2-7 20.53m T93-6	5/1/85	77.26	12.91	0.85	0.04	0.04	0.58	0.05	3.57	4.71	100.01	0.9837
4	3080	KRL-880605-E T285-2	8/6/93	76.92	13.13	0.90	0.03	0.04	0.58	0.06	3.78	4.56	100.00	0.9824
5	4271	RM-60B1 T390-7	7-1-98	77.13	12.82	0.93	0.02	0.04	0.60	0.05	3.79	4.63	100.01	0.9819
6	2105	KRL-82882-U T174-9	10/28/88	76.51	13.42	0.94	0.03	0.05	0.60	0.05	3.66	4.73	99.99	0.9801
7	1255	*WL 2-7 20.77M t95-2	5/29/85	77.10	12.65	0.87	0.04	0.05	0.59	0.07	3.89	4.75	100.01	0.9789
8	2566	SS-91-1 SS low Fe fraction	8/7/91	77.20	12.68	0.86	0.03	0.04	0.58	0.06	3.83	4.71	99.99	0.9784
9	1236	WL 2-7 20.39m T93-5	5/1/85	76.99	13.04	0.89	0.04	0.04	0.64	0.07	3.56	4.75	100.02	0.9773
10	177	KRL7982-9, T44-6		76.78	12.89	0.94	0.03	0.02	0.59	0.06	3.92	4.78	100.01	0.9773
11	179	KRL7982-11U, T45-1		76.81	12.97	0.95	0.03	0.03	0.60	0.05	3.84	4.72	100.00	0.9772
12	230	MONO-15, T40-3		76.86	12.90	0.91	0.04	0.03	0.63	0.07	3.81	4.76	100.01	0.9772
13	1955	WL-4-12 (31.81M) T162-9	5/15/88	76.98	12.89	0.92	0.03	0.04	0.65	0.04	3.65	4.79	99.99	0.9769
14	573	KRL91982-K, T64-15	09/06/83	76.84	13.01	0.90	0.02	0.05	0.66	0.06	3.70	4.75	99.99	0.9755
15	2109	KRL-82982-E T174-13	10/28/88	76.93	12.90	0.92	0.02	0.05	0.55	0.08	3.84	4.72	100.01	0.9750
16	2894	RL-3479 T266-7	10/15/92	77.64	12.29	0.88	0.12	0.02	0.60	0.16	3.49	4.80	100.00	0.9745
17	727	LD-96		77.04	13.01	0.89	0.05	0.07	0.65	0.08	3.50	4.70	99.99	0.9745
18	948	DR-60		76.95	12.91	0.97	0.03	0.05	0.63	0.06	3.70	4.70	100.00	0.9739
19	950	DR-62		77.18	12.91	0.93	0.02	0.05	0.63	0.06	3.70	4.50	99.98	0.9738
20	2486	FLV-146-VS T218-7	11/19/90	76.83	13.18	1.00	0.04	0.04	0.59	0.06	3.68	4.59	100.01	0.9731
21	3672	KDA96JPT-T1 T345-1	11/96	76.70	13.22	1.03	0.03	0.05	0.59	0.05	3.64	4.68	99.99	0.9730
22	4209	GL5-T2-Tt(-200+325)5nmbeam T38	5-29-98	77.67	12.44	0.93	0.02	0.06	0.58	0.03	3.76	4.51	100.00	0.9729
23	2880	WM-3367 T265-7	08/20/92	77.43	12.57	0.84	0.11	0.03	0.61	0.13	3.54	4.74	100.00	0.9728
24	2111	KRL-82982-G T174-15	10/28/88	77.05	12.80	0.97	0.03	0.06	0.56	0.07	3.74	4.73	100.01	0.9727
25	180	KRL7982-11L, T44-8		76.76	13.01	0.92	0.02	0.03	0.63	0.04	3.89	4.70	100.00	0.9726
26	2715	FLV-198-BC T249-2	1/30/92	76.82	12.82	0.97	0.01	0.04	0.59	0.06	3.85	4.84	100.00	0.9726
27	4208	GL5-T2-Tt(-100+200) T386-5	5-29-98	77.19	12.77	0.93	0.01	0.04	0.61	0.04	3.87	4.55	100.01	0.9724
28	2002	FLV-53-CC T166-3	19-JUL-8	76.88	12.86	0.96	0.03	0.05	0.57	0.06	3.89	4.70	100.00	0.9724
29	4288	JM-EC-2 T395-8	8-3-98	76.88	12.87	0.90	0.13	0.04	0.70	0.13	3.63	4.71	99.99	0.9723
30	3958	WG96-33 T360-8	4/97	77.04	12.84	0.97	0.02	0.05	0.64	0.05	3.69	4.70	100.00	0.9719
31	1035	WL 2-7-2.99, T78-8	18@08/18	77.22	12.77	0.81	0.03	0.04	0.61	0.05	3.66	4.80	99.99	0.9719
32	178	KRL7982-10, T44-7		76.52	13.08	0.93	0.03	0.04	0.60	0.05	3.91	4.85	100.01	0.9713
33	3083	KRL-880605-H T285-5	8/6/93	76.94	13.11	0.89	0.03	0.05	0.56	0.05	3.84	4.52	99.99	0.9712
34	181	KRL7982-13, T45-2		76.49	13.18	0.94	0.03	0.03	0.60	0.06	3.94	4.73	100.00	0.9712
35	2108	KRL-82982-D T174-12	10/28/88	77.13	12.80	0.93	0.02	0.05	0.53	0.06	3.69	4.81	100.02	0.9705
36	175	KRL7982-3, T44-4		76.72	12.95	0.94	0.01	0.04	0.60	0.04	4.04	4.66	100.00	0.9704
37	4265	RM62A1 T390-1	7-1-98	77.21	12.70	0.99	0.02	0.04	0.56	0.06	3.72	4.70	100.00	0.9703
38	540	KRL7982-4U, T49-5	12/09/82	76.91	12.96	0.96	0.02	0.05	0.59	0.03	3.94	4.55	100.01	0.9700

Sample RM45A1

Listing of 38 closest matches for COMP. NO. 4270 for elements: Na, Al, Si, K , Ca, Fe Date of Update: 11/17/98

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	4270	RM45A1 T390-6	7-1-98	76.68	12.78	1.14	0.02	0.04	0.54	0.08	4.00	4.72	100.00	1.0000
2	1972	WL-4-58 (144.77m) T164-1	5/21/88	76.73	12.71	1.15	0.00	0.03	0.54	0.12	4.02	4.69	99.99	0.9956
3	760	BO-16		76.59	12.92	1.11	0.03	0.03	0.54	0.07	4.00	4.71	100.00	0.9933
4	1240	WL 4-2 3.29m T93-9	5/2/85	76.75	12.79	1.13	0.03	0.04	0.55	0.05	4.02	4.64	100.00	0.9916
5	2721	FLV-199-BC T249-3	1/30/92	76.88	12.71	1.13	0.02	0.03	0.53	0.06	3.98	4.66	100.00	0.9912
6	431	YOS-1, T13-1		76.61	12.93	1.12	0.03	0.05	0.54	0.07	4.03	4.64	100.02	0.9909
7	2717	FLV-201-TO T249-5	1/30/92	76.85	12.77	1.10	0.02	0.04	0.54	0.04	3.99	4.65	100.00	0.9908
8	2060	FLV-64-CS T170-7	9/3/88	76.71	12.87	1.11	0.02	0.04	0.54	0.04	4.02	4.64	99.99	0.9907
9	2821	JB-BS-2 T226-7	6/24/92	76.56	12.91	1.12	0.02	0.04	0.53	0.08	4.04	4.72	100.02	0.9904
10	1416	BL-RSA-2 T112-7	10/23/85	76.78	12.85	1.12	0.04	0.03	0.54	0.06	3.90	4.68	100.00	0.9904
11	1241	WL 4-2 3.31m T93-10	5/2/85	76.69	12.91	1.14	0.04	0.04	0.55	0.06	3.92	4.67	100.02	0.9902
12	788	GS-32		76.58	12.90	1.13	0.03	0.04	0.56	0.06	4.00	4.70	100.00	0.9901
13	560	KRL82282, T66-4	xx/xx/83	76.74	12.90	1.13	0.02	0.06	0.54	0.06	3.87	4.68	100.00	0.9900
14	1029	KRL-99182K-1P (595) T58-6	6/22/84	76.79	12.72	1.13	0.03	0.00	0.54	0.05	3.91	4.83	100.00	0.9900
15	2716	FLV-200-LC T249-4	1/30/92	76.77	12.80	1.11	0.02	0.04	0.53	0.06	4.01	4.67	100.01	0.9899
16	750	HC-10		76.27	13.21	1.15	0.03	0.03	0.53	0.07	4.00	4.70	99.99	0.9884
17	758	BO-11		76.35	13.11	1.12	0.03	0.04	0.55	0.09	4.00	4.70	99.99	0.9884
18	2558	SS-91-1-SU T232-1	8/6/91	76.74	12.86	1.09	0.04	0.04	0.54	0.05	3.95	4.68	99.99	0.9880
19	2570	JB-BS-7 T227-4	6/13/91	76.73	12.89	1.10	0.03	0.05	0.54	0.06	3.91	4.69	100.00	0.9878
20	681	KRL-91882A', T66-8	10/25/83	76.79	12.83	1.10	0.03	0.06	0.54	0.07	3.91	4.67	100.00	0.9877
21	1417	BL-RSA-3 T112-8	10/23/85	76.83	12.80	1.15	0.04	0.05	0.55	0.05	3.89	4.64	100.00	0.9875
22	952	DR-64		76.57	13.01	1.13	0.03	0.05	0.53	0.07	3.90	4.70	99.99	0.9874
23	1224	WL CORE G 370cm T92-7	5/2/85	76.83	12.82	1.09	0.04	0.04	0.54	0.05	3.95	4.65	100.01	0.9873
24	2380	FLV-131-FC T203-4	4/16/90	77.18	12.43	1.12	0.01	0.04	0.54	0.06	3.93	4.68	99.99	0.9871
25	3269	OL-1 major fr. T307-5	8/1/94	75.80	13.64	1.14	0.02	0.05	0.54	0.06	4.03	4.72	100.00	0.9863
26	561	KRL82282A, T66-5	10/25/83	76.71	12.88	1.12	0.04	0.05	0.52	0.06	3.98	4.65	100.01	0.9862
27	2639	JB-BS-12 T241-3	10/21/91	76.51	12.85	1.11	0.03	0.08	0.54	0.05	4.16	4.67	100.00	0.9862
28	2820	JB-BS-1 T226-6	6/24/92	76.70	12.80	1.06	0.02	0.04	0.54	0.06	4.05	4.72	99.99	0.9859
29	972	DR-86		76.74	12.92	1.15	0.03	0.04	0.53	0.07	3.91	4.61	100.00	0.9859
30	192	LD-12, T3,4		76.94	12.70	1.12	0.03	0.07	0.53	0.07	3.91	4.64	100.01	0.9858
31	2638	JB-BS-11 T241-2	10/21/91	76.55	12.80	1.10	0.02	0.08	0.54	0.06	4.16	4.68	99.99	0.9858
32	2557	SS-91-1-1 T232-2	6/8/91	76.57	12.92	1.07	0.02	0.04	0.54	0.06	4.05	4.72	99.99	0.9857
33	2562	SS-91-1-5 T232-6	8/7/91	76.97	12.65	1.08	0.03	0.04	0.54	0.07	3.98	4.65	100.01	0.9856
34	1409	KRL 82182 (A1) (599) T112-1	10/22/85	76.60	12.87	1.11	0.04	0.04	0.55	0.06	4.08	4.65	100.00	0.9855
35	566	KRL91882B, T64-12	09/06/83	76.81	12.82	1.10	0.01	0.05	0.53	0.08	3.91	4.69	100.00	0.9855
36	1290	WL 8-1B 92-94cm T99-1	07/01/85	76.99	12.72	1.11	0.02	0.06	0.54	0.07	3.84	4.65	100.00	0.9850
37	701	LD-12		76.94	12.72	1.12	0.03	0.07	0.53	0.07	3.91	4.61	100.00	0.9850
38	2928	MMSC-1 MAJ T271-3 JEOL	2/24/93	76.54	13.08	1.12	0.02	0.05	0.55	0.06	3.94	4.65	100.01	0.9849

Sample RM49A1

Listing of 38 closest matches for COMP. NO. 4351 for elements: Na, Al, Si, K , Ca, Fe Date of Update: 11/17/98

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	4351	RM49A1 T389-10	7/1/98	77.00	12.79	1.04	0.02	0.05	0.59	0.08	3.69	4.74	100.00	1.0000
2	1294	WL 8-2A 112-114.5cm T99-6	07/01/85	77.01	12.76	1.05	0.03	0.06	0.61	0.07	3.68	4.74	100.01	0.9921
3	1298	WL 8-5 2-4.5cm T99-12	07/01/85	77.30	12.56	1.05	0.01	0.06	0.60	0.05	3.68	4.68	99.99	0.9894
4	4055	BH-DM-2 T372-2	10/97	77.11	12.82	1.07	0.03	0.06	0.59	0.06	3.65	4.61	100.00	0.9883
5	3672	KDA96JPT-T1 T345-1	11/96	76.70	13.22	1.03	0.03	0.05	0.59	0.05	3.64	4.68	99.99	0.9880
6	542	KRL7982-7L, T49-7	12/09/82	76.73	12.94	1.04	0.03	0.02	0.61	0.06	3.82	4.76	100.01	0.9856
7	2485	FLV-145B-VS T218-6	11/19/90	76.84	13.14	1.04	0.04	0.05	0.58	0.07	3.67	4.56	99.99	0.9852
8	2239	SL-673 T186-6	2/28/89	76.74	12.98	1.08	0.03	0.05	0.61	0.05	3.70	4.75	99.99	0.9846
9	2484	FLV-145A-VS T218-5	11/19/9	76.87	13.10	1.05	0.03	0.04	0.60	0.07	3.70	4.55	100.01	0.9843
10	1950	WL-4-7B (16.56M) T162-4	5/14/88	76.94	12.95	1.01	0.04	0.06	0.56	0.03	3.68	4.74	100.01	0.9841
11	1038	WL 4-2-0.72, T78-11	08/18/84	77.20	12.62	1.05	0.03	0.04	0.56	0.04	3.75	4.71	100.00	0.9836
12	1299	WL 8-5A 102-105.5cm T99-13	07/01/85	77.17	12.73	1.06	0.02	0.06	0.57	0.06	3.73	4.60	100.00	0.9833
13	2486	FLV-146-VS T218-7	11/19/90	76.83	13.18	1.00	0.04	0.04	0.59	0.06	3.68	4.59	100.01	0.9826
14	2607	LY-C-510 T232-7	8/15/91	77.08	12.76	1.00	0.04	0.05	0.57	0.06	3.76	4.68	100.00	0.9822
15	2608	LY-C-514 T232-8	8/15/91	76.89	12.88	1.05	0.05	0.06	0.58	0.06	3.85	4.57	99.99	0.9813
16	4264	RM60A1 T389-9	7-1-98	76.91	12.75	1.09	0.03	0.04	0.58	0.06	3.85	4.70	100.01	0.9805
17	2585	FLV-168-TC T229-3	6/14/91	76.89	12.90	1.05	0.03	0.05	0.54	0.06	3.74	4.74	100.00	0.9804
18	1235	WL 2-3 8.14m T93-4	5/1/85	77.06	12.80	1.08	0.03	0.05	0.56	0.05	3.73	4.65	100.01	0.9801
19	2718	FLV-202-D T249-6	1/30/92	76.79	12.79	1.06	0.02	0.04	0.58	0.07	3.96	4.68	99.99	0.9801
20	4054	BH-DM-1 T372-1	10/97	77.12	12.87	1.08	0.03	0.04	0.60	0.06	3.54	4.65	99.99	0.9798
21	2095	KRL-82882-O T174-4	10/6/88	77.28	12.62	1.03	0.03	0.05	0.55	0.06	3.73	4.66	100.01	0.9797
22	2166	KRL-82982-I T178-2	12/6/88	77.03	12.79	1.07	0.02	0.06	0.56	0.05	3.78	4.64	100.00	0.9793
23	1233	WL 2-3 7.59m T93-2	5/1/85	77.06	12.76	1.11	0.03	0.04	0.57	0.07	3.71	4.65	100.00	0.9793
24	1756	OD-ML-10-445 CM T139-15	5/28/87	77.05	12.73	1.08	0.04	0.05	0.55	0.07	3.72	4.71	100.00	0.9792
25	1424	BL-RSA-10 T112-15	10/23/85	76.98	12.88	1.08	0.04	0.05	0.56	0.03	3.61	4.78	100.01	0.9791
26	4265	RM62A1 T390-1	7-1-98	77.21	12.70	0.99	0.02	0.04	0.56	0.06	3.72	4.70	100.00	0.9791
27	1232	WL 2-2 5.69m T93-1	5/1/85	77.18	12.73	1.09	0.03	0.04	0.56	0.05	3.69	4.63	100.00	0.9788
28	1705	1986-122 T135-9	1/16/87	76.92	12.94	1.03	0.08	0.05	0.60	0.11	3.81	4.47	100.01	0.9788
29	1310	WL 8-2B 172-174.5CM T99-10	7/1/85	76.90	12.74	1.05	0.02	0.05	0.56	0.07	3.91	4.71	100.01	0.9786
30	1036	WL 2-3-2.01, T78-9	08/18/84	77.05	12.74	1.05	0.02	0.04	0.55	0.05	3.82	4.67	99.99	0.9782
31	4068	ORT-6 T373-9	10/97	76.80	12.86	1.05	0.03	0.05	0.55	0.05	3.87	4.74	100.00	0.9780
32	2715	FLV-198-BC T249-2	1/30/92	76.82	12.82	0.97	0.01	0.04	0.59	0.06	3.85	4.84	100.00	0.9776
33	2111	KRL-82982-G T174-15	10/28/88	77.05	12.80	0.97	0.03	0.06	0.56	0.07	3.74	4.73	100.01	0.9775
34	1004	RC-31		76.84	12.92	1.06	0.04	0.05	0.59	0.08	3.91	4.51	100.00	0.9774
35	1234	WL 2-3 8.10m T93-3	5/1/85	77.09	12.80	1.08	0.04	0.05	0.55	0.04	3.72	4.64	100.01	0.9773
36	4266	JM-GC-12 T390-2	7-1-98	77.10	12.62	0.99	0.03	0.04	0.57	0.04	3.75	4.86	100.00	0.9771
37	2110	KRL-82982-F T174-14	10/28/88	76.85	12.91	1.02	0.02	0.05	0.56	0.09	3.84	4.66	100.00	0.9771
38	1198	TULELAKE 2089 (50.32M) T90-14	3/1/85	76.94	12.69	1.08	0.07	0.04	0.57	0.11	3.85	4.65	100.00	0.9767

Sample RM60A1

Listing of 38 closest matches for COMP. NO. 4264 for elements: Na, Al, Si, K , Ca, Fe Date of Update: 11/17/98

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	4264	RM60A1 T389-9	7-1-98	76.91	12.75	1.09	0.03	0.04	0.58	0.06	3.85	4.70	100.01	1.0000
2	1198	TULELAKE 2089 (50.32M) T90-14	3/1/85	76.94	12.69	1.08	0.07	0.04	0.57	0.11	3.85	4.65	100.00	0.9930
3	741	HC-1		76.76	12.83	1.11	0.02	0.03	0.58	0.06	3.91	4.71	100.01	0.9927
4	1686	29IX86-1A T134-8	11/26/86	77.07	12.73	1.09	0.03	0.04	0.56	0.04	3.80	4.64	100.00	0.9894
5	2718	FLV-202-D T249-6	1/30/92	76.79	12.79	1.06	0.02	0.04	0.58	0.07	3.96	4.68	99.99	0.9893
6	1291	WL 8-1B 192-194cm T99-3	07/01/85	76.95	12.70	1.11	0.03	0.06	0.56	0.07	3.86	4.64	99.98	0.9880
7	2608	LY-C-514 T232-8	8/15/91	76.89	12.88	1.05	0.05	0.06	0.58	0.06	3.85	4.57	99.99	0.9875
8	1621	BO-18 JOD	09/12/86	76.98	12.70	1.10	0.03	0.05	0.55	0.07	3.83	4.68	99.99	0.9875
9	1245	WL 8-3A ASH B 59.5-64.0cm T93-	5/2/85	77.00	12.70	1.10	0.03	0.06	0.56	0.04	3.89	4.61	99.99	0.9870
10	1472	KRL 82182 (A-1) T117-3	3/6/86	76.80	12.75	1.10	0.03	0.04	0.55	0.07	3.87	4.77	99.98	0.9863
11	1233	WL 2-3 7.59m T93-2	5/1/85	77.06	12.76	1.11	0.03	0.04	0.57	0.07	3.71	4.65	100.00	0.9858
12	1353	WL 8-2B 142-144.5 CM PLATY T99	7/1/85	77.23	12.59	1.09	0.03	0.05	0.56	0.06	3.75	4.65	100.01	0.9854
13	2166	KRL-82982-I T178-2	12/6/88	77.03	12.79	1.07	0.02	0.06	0.56	0.05	3.78	4.64	100.00	0.9853
14	1229	WL 8-3A 14.5-20cm T92-13	5/2/85	77.03	12.78	1.09	0.03	0.04	0.55	0.06	3.78	4.63	99.99	0.9852
15	2568	JB-BS-5 T227-2	6/13/91	76.69	12.91	1.08	0.02	0.05	0.55	0.09	3.90	4.70	99.99	0.9852
16	2235	SL-103 T186-2	2/28/89	76.68	12.95	1.10	0.03	0.04	0.55	0.07	3.88	4.69	99.99	0.9851
17	1244	WL 8-3A ASH A 64-66cm T93-13	5/2/85	76.97	12.80	1.08	0.03	0.05	0.55	0.05	3.86	4.60	99.99	0.9851
18	1310	WL 8-2B 172-174.5CM T99-10	7/1/85	76.90	12.74	1.05	0.02	0.05	0.56	0.07	3.91	4.71	100.01	0.9851
19	1223	WL CORE G 180cm T92-6	5/2/85	76.64	12.88	1.11	0.04	0.05	0.57	0.06	3.99	4.67	100.01	0.9849
20	1235	WL 2-3 8.14m T93-4	5/1/85	77.06	12.80	1.08	0.03	0.05	0.56	0.05	3.73	4.65	100.01	0.9848
21	2236	SL-115.5 T186-3	2/28/89	76.76	12.91	1.07	0.03	0.04	0.55	0.06	3.84	4.73	99.99	0.9844
22	1948	WL-4-4 (12.25M) T162-2	5/14/88	76.87	12.86	1.09	0.02	0.05	0.54	0.06	3.80	4.72	100.01	0.9841
23	1232	WL 2-2 5.69m T93-1	5/1/85	77.18	12.73	1.09	0.03	0.04	0.56	0.05	3.69	4.63	100.00	0.9840
24	1034	WL 2-2-2.64, T78-7	08/18/84	77.06	12.62	1.06	0.03	0.05	0.55	0.06	3.86	4.71	100.00	0.9840
25	1680	KRL 860922 A T134-2	11/25/86	76.94	12.75	1.07	0.03	0.04	0.55	0.06	3.91	4.65	100.00	0.9839
26	1684	SCHURZ-1 T134-6	11/25/86	77.01	12.64	1.09	0.03	0.05	0.55	0.05	3.94	4.64	100.00	0.9838
27	682	KRL-91882G, T66-11	10/25/83	76.91	12.76	1.07	0.03	0.06	0.54	0.07	3.87	4.68	99.99	0.9837
28	1186	WALKER LAKE CORE G 380CM t89-1	2/28/85	76.98	12.79	1.08	0.02	0.05	0.54	0.05	3.86	4.64	100.01	0.9837
29	1293	WL 8-2A 92-94.5cm T99-5	07/01/85	77.03	12.66	1.13	0.03	0.05	0.56	0.06	3.86	4.62	100.00	0.9836
30	1191	TULELAKE 2038 (53.67M) T90-6	3/1/85	76.54	12.89	1.15	0.07	0.04	0.57	0.14	3.89	4.72	100.01	0.9834
31	784	GS-28		76.67	13.11	1.11	0.03	0.04	0.57	0.06	3.80	4.60	99.99	0.9833
32	1756	OD-ML-10-445 CM T139-15	5/28/87	77.05	12.73	1.08	0.04	0.05	0.55	0.07	3.72	4.71	100.00	0.9833
33	725	LD-86		76.40	13.22	1.12	0.04	0.07	0.57	0.08	3.80	4.71	100.01	0.9831
34	1299	WL 8-5A 102-105.5cm T99-13	07/01/85	77.17	12.73	1.06	0.02	0.06	0.57	0.06	3.73	4.60	100.00	0.9830
35	680	KRL-82282B, T54-4	xx//xx/x	76.99	12.71	1.08	0.02	0.06	0.53	0.04	3.86	4.70	99.99	0.9830
36	1228	WL 8-2B 130-134cm T92-12	5/2/85	77.03	12.81	1.08	0.04	0.04	0.55	0.04	3.77	4.63	99.99	0.9829
37	2344	FLV-70-TC T195-4	7/21/89	77.31	12.46	1.09	0.02	0.06	0.55	0.08	3.85	4.59	100.01	0.9828
38	1478	6VI84-1-2M T117-11	3/6/86	77.00	12.77	1.12	0.04	0.05	0.56	0.08	3.74	4.65	100.01	0.9828

Sample RM-60B1

Listing of 38 closest matches for COMP. NO. 4271 for elements: Na, Al, Si, K , Ca, Fe Date of Update: 11/17/98

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	4271	RM-60B1 T390-7	7-1-98	77.13	12.82	0.93	0.02	0.04	0.60	0.05	3.79	4.63	100.01	1.0000
2	4208	GL5-T2-Tt(-100+200) T386-5	5-29-98	77.19	12.77	0.93	0.01	0.04	0.61	0.04	3.87	4.55	100.01	0.9902
3	179	KRL7982-11U, T45-1		76.81	12.97	0.95	0.03	0.03	0.60	0.05	3.84	4.72	100.00	0.9885
4	175	KRL7982-3, T44-4		76.72	12.95	0.94	0.01	0.04	0.60	0.04	4.04	4.66	100.00	0.9843
5	4210	GL2-T3-Tt(-200+325)5nmbeam T38	5-29-98	77.70	12.37	0.92	0.02	0.07	0.61	0.04	3.78	4.50	100.01	0.9833
6	177	KRL7982-9, T44-6		76.78	12.89	0.94	0.03	0.02	0.59	0.06	3.92	4.78	100.01	0.9830
7	4209	GL5-T2-Tt(-200+325)5nmbeam T38	5-29-98	77.67	12.44	0.93	0.02	0.06	0.58	0.03	3.76	4.51	100.00	0.9827
8	178	KRL7982-10, T44-7		76.52	13.08	0.93	0.03	0.04	0.60	0.05	3.91	4.85	100.01	0.9827
9	181	KRL7982-13, T45-2		76.49	13.18	0.94	0.03	0.03	0.60	0.06	3.94	4.73	100.00	0.9824
10	950	DR-62		77.18	12.91	0.93	0.02	0.05	0.63	0.06	3.70	4.50	99.98	0.9822
11	4258	RM34A1 T389-1	7-1-98	77.15	12.88	0.90	0.02	0.05	0.59	0.07	3.64	4.70	100.00	0.9819
12	3080	KRL-880605-E T285-2	8/6/93	76.92	13.13	0.90	0.03	0.04	0.58	0.06	3.78	4.56	100.00	0.9817
13	230	MONO-15, T40-3		76.86	12.90	0.91	0.04	0.03	0.63	0.07	3.81	4.76	100.01	0.9814
14	540	KRL7982-4U, T49-5	12/09/82	76.91	12.96	0.96	0.02	0.05	0.59	0.03	3.94	4.55	100.01	0.9805
15	180	KRL7982-11L, T44-8		76.76	13.01	0.92	0.02	0.03	0.63	0.04	3.89	4.70	100.00	0.9803
16	2105	KRL-82882-U T174-9	10/28/88	76.51	13.42	0.94	0.03	0.05	0.60	0.05	3.66	4.73	99.99	0.9802
17	2715	FLV-198-BC T249-2	1/30/92	76.82	12.82	0.97	0.01	0.04	0.59	0.06	3.85	4.84	100.00	0.9799
18	176	KRL7982-5, T44-5		76.67	12.93	0.98	0.03	0.04	0.60	0.05	3.83	4.87	100.00	0.9791
19	2220	MORAN-2 T181B-8	1/23/88	76.91	13.21	0.95	0.00	0.05	0.58	0.04	3.80	4.46	100.00	0.9790
20	2002	FLV-53-CC T166-3	19-JUL-8	76.88	12.86	0.96	0.03	0.05	0.57	0.06	3.89	4.70	100.00	0.9786
21	2109	KRL-82982-E T174-13	10/28/88	76.93	12.90	0.92	0.02	0.05	0.55	0.08	3.84	4.72	100.01	0.9775
22	948	DR-60		76.95	12.91	0.97	0.03	0.05	0.63	0.06	3.70	4.70	100.00	0.9772
23	2607	LY-C-510 T232-7	8/15/91	77.08	12.76	1.00	0.04	0.05	0.57	0.06	3.76	4.68	100.00	0.9760
24	2111	KRL-82982-G T174-15	10/28/88	77.05	12.80	0.97	0.03	0.06	0.56	0.07	3.74	4.73	100.01	0.9759
25	1255	*WL 2-7 20.77M t95-2	5/29/85	77.10	12.65	0.87	0.04	0.05	0.59	0.07	3.89	4.75	100.01	0.9757
26	3958	WG96-33 T360-8	4/97	77.04	12.84	0.97	0.02	0.05	0.64	0.05	3.69	4.70	100.00	0.9754
27	2566	SS-91-1 SS low Fe fraction	8/7/91	77.20	12.68	0.86	0.03	0.04	0.58	0.06	3.83	4.71	99.99	0.9754
28	1705	1986-122 T135-9	1/16/87	76.92	12.94	1.03	0.08	0.05	0.60	0.11	3.81	4.47	100.01	0.9752
29	2097	KRL-82882-QR T174-6	10/6/88	77.14	12.74	1.00	0.02	0.04	0.56	0.04	3.80	4.65	99.99	0.9750
30	1681	KRL 860922 B T134-3	11/25/86	77.26	12.70	0.97	0.03	0.04	0.55	0.04	3.82	4.59	100.00	0.9746
31	2486	FLV-146-VS T218-7	11/19/90	76.83	13.18	1.00	0.04	0.04	0.59	0.06	3.68	4.59	100.01	0.9741
32	2091	H88WH-7 T173-14	10/6/88	77.53	12.64	0.90	0.06	0.06	0.58	0.09	3.53	4.61	100.00	0.9737
33	712	LD-60*		76.58	13.13	0.97	0.04	0.05	0.62	0.08	3.71	4.81	99.99	0.9729
34	1955	WL-4-12 (31.81M) T162-9	5/15/88	76.98	12.89	0.92	0.03	0.04	0.65	0.04	3.65	4.79	99.99	0.9724
35	543	KRL7982-8, 12/09/82	12/09/82	76.68	13.00	0.97	0.02	0.03	0.64	0.05	3.84	4.77	100.00	0.9724
36	541	KRL7932-6, T49-6	12/09/82	76.75	12.87	0.96	0.03	0.04	0.65	0.06	3.80	4.86	100.02	0.9722
37	2107	KRL-82982-C T174-11	10/28/88	76.88	12.88	1.00	0.03	0.05	0.56	0.07	3.84	4.69	100.00	0.9716
38	4265	RM62A1 T390-1	7-1-98	77.21	12.70	0.99	0.02	0.04	0.56	0.06	3.72	4.70	100.00	0.9715

Sample RM62A1

Listing of 38 closest matches for COMP. NO. 4265 for elements: Na, Al, Si, K , Ca, Fe Date of Update: 11/17/98

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	4265	RM62A1 T390-1	7-1-98	77.21	12.70	0.99	0.02	0.04	0.56	0.06	3.72	4.70	100.00	1.0000
2	2111	KRL-82982-G T174-15	10/28/88	77.05	12.80	0.97	0.03	0.06	0.56	0.07	3.74	4.73	100.01	0.9930
3	2097	KRL-82882-QR T174-6	10/6/88	77.14	12.74	1.00	0.02	0.04	0.56	0.04	3.80	4.65	99.99	0.9924
4	2607	LY-C-510 T232-7	8/15/91	77.08	12.76	1.00	0.04	0.05	0.57	0.06	3.76	4.68	100.00	0.9919
5	2107	KRL-82982-C T174-11	10/28/88	76.88	12.88	1.00	0.03	0.05	0.56	0.07	3.84	4.69	100.00	0.9897
6	1950	WL-4-7B (16.56M) T162-4	5/14/88	76.94	12.95	1.01	0.04	0.06	0.56	0.03	3.68	4.74	100.01	0.9897
7	4266	JM-GC-12 T390-2	7-1-98	77.10	12.62	0.99	0.03	0.04	0.57	0.04	3.75	4.86	100.00	0.9890
8	1038	WL 4-2-0.72, T78-11	08/18/84	77.20	12.62	1.05	0.03	0.04	0.56	0.04	3.75	4.71	100.00	0.9877
9	2095	KRL-82882-O T174-4	10/6/88	77.28	12.62	1.03	0.03	0.05	0.55	0.06	3.73	4.66	100.01	0.9875
10	1681	KRL 860922 B T134-3	11/25/86	77.26	12.70	0.97	0.03	0.04	0.55	0.04	3.82	4.59	100.00	0.9853
11	2110	KRL-82982-F T174-14	10/28/88	76.85	12.91	1.02	0.02	0.05	0.56	0.09	3.84	4.66	100.00	0.9850
12	2168	KRL-82982-KO T178-4	12/6/88	76.79	13.03	1.00	0.02	0.06	0.54	0.06	3.81	4.69	100.00	0.9830
13	1235	WL 2-3 8.14m T93-4	5/1/85	77.06	12.80	1.08	0.03	0.05	0.56	0.05	3.73	4.65	100.01	0.9823
14	1756	OD-ML-10-445 CM T139-15	5/28/87	77.05	12.73	1.08	0.04	0.05	0.55	0.07	3.72	4.71	100.00	0.9820
15	2002	FLV-53-CC T166-3	19-JUL-8	76.88	12.86	0.96	0.03	0.05	0.57	0.06	3.89	4.70	100.00	0.9820
16	1299	WL 8-5A 102-105.5cm T99-13	07/01/85	77.17	12.73	1.06	0.02	0.06	0.57	0.06	3.73	4.60	100.00	0.9816
17	2098	KRL-82882-S T174-7	10/6/88	77.25	12.70	0.96	0.02	0.04	0.52	0.06	3.73	4.73	100.01	0.9815
18	1036	WL 2-3-2.01, T78-9	08/18/84	77.05	12.74	1.05	0.02	0.04	0.55	0.05	3.82	4.67	99.99	0.9812
19	2166	KRL-82982-I T178-2	12/6/88	77.03	12.79	1.07	0.02	0.06	0.56	0.05	3.78	4.64	100.00	0.9812
20	1310	WL 8-2B 172-174.5CM T99-10	7/1/85	76.90	12.74	1.05	0.02	0.05	0.56	0.07	3.91	4.71	100.01	0.9808
21	1232	WL 2-2 5.69m T93-1	5/1/85	77.18	12.73	1.09	0.03	0.04	0.56	0.05	3.69	4.63	100.00	0.9804
22	1353	WL 8-2B 142-144.5 CM PLATY T99	7/1/85	77.23	12.59	1.09	0.03	0.05	0.56	0.06	3.75	4.65	100.01	0.9801
23	1234	WL 2-3 8.10m T93-3	5/1/85	77.09	12.80	1.08	0.04	0.05	0.55	0.04	3.72	4.64	100.01	0.9794
24	2585	FLV-168-TC T229-3	6/14/91	76.89	12.90	1.05	0.03	0.05	0.54	0.06	3.74	4.74	100.00	0.9790
25	1686	29IX86-1A T134-8	11/26/86	77.07	12.73	1.09	0.03	0.04	0.56	0.04	3.80	4.64	100.00	0.9784
26	2584	FLV-167-TC T229-2	6/14/91	77.12	12.70	1.07	0.02	0.06	0.55	0.06	3.80	4.63	100.01	0.9784
27	1034	WL 2-2-2.64, T78-7	08/18/84	77.06	12.62	1.06	0.03	0.05	0.55	0.06	3.86	4.71	100.00	0.9782
28	1806	OD-ML-65CM T143-7	6/24/87	76.81	12.80	1.05	0.03	0.05	0.56	0.05	3.96	4.70	100.01	0.9782
29	2559	SS-91-1-2 T232-3	8/7/91	77.11	12.63	1.03	0.03	0.05	0.54	0.06	3.89	4.67	100.01	0.9781
30	2093	KRL-82882-M T174-2	10/6/88	77.27	12.68	0.97	0.02	0.04	0.52	0.05	3.82	4.63	100.00	0.9775
31	2486	FLV-146-VS T218-7	11/19/90	76.83	13.18	1.00	0.04	0.04	0.59	0.06	3.68	4.59	100.01	0.9773
32	2342	FLV-68-IC T195-2	7/21/89	77.29	12.51	1.05	0.04	0.06	0.53	0.08	3.75	4.69	100.00	0.9772
33	2341	FLV-67-MA T195-1	7/21/89	77.02	12.94	1.05	0.02	0.06	0.54	0.06	3.72	4.59	100.00	0.9771
34	4068	ORT-6 T373-9	10/97	76.80	12.86	1.05	0.03	0.05	0.55	0.05	3.87	4.74	100.00	0.9767
35	1231	WL 8-7 62-64.5cm T92-15	5/1/85	77.25	12.78	0.98	0.03	0.05	0.51	0.05	3.76	4.59	100.00	0.9766
36	1478	6VI84-1-2M T117-11	3/6/86	77.00	12.77	1.12	0.04	0.05	0.56	0.08	3.74	4.65	100.01	0.9766
37	1228	WL 8-2B 130-134cm T92-12	5/2/85	77.03	12.81	1.08	0.04	0.04	0.55	0.04	3.77	4.63	99.99	0.9766
38	4061	ORR-1 T373-1	10/97	77.34	12.73	0.98	0.01	0.05	0.50	0.05	3.73	4.62	100.01	0.9765

Sample DV-95-A1

Listing of 38 closest matches for COMP. NO. 4259 for elements: Na, Al, Si, K , Ca, Fe Date of Update: 11/17/98

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	4259	DV-95-A1 T389-3	7-1-98	73.98	14.58	2.12	0.43	0.06	1.64	0.42	3.95	2.82	100.00	1.0000
2	2151	SCAS-88-4 (HI FE) T177-5	12/5/88	73.54	14.38	2.13	0.45	0.06	1.63	0.46	4.62	2.73	100.00	0.9654
3	951	DR-63		74.27	13.93	2.16	0.48	0.04	1.87	0.43	4.01	2.81	100.00	0.9652
4	4091	TLY-CW-2 T375-7	11/97	73.28	14.76	2.11	0.49	0.04	1.59	0.41	4.61	2.71	100.00	0.9602
5	585	PAICIN-1, T52-9	03/25/83	74.24	14.44	2.09	0.33	0.06	1.59	0.28	4.39	2.59	100.01	0.9601
6	3774	942-350 major		74.64	14.61	2.09	0.47	0.04	1.70	0.43	3.20	2.82	100.00	0.9583
7	3688	GBB 110 T340-3	11/96	73.28	14.45	2.14	0.46	0.04	1.62	0.40	4.86	2.74	99.99	0.9574
8	204	LD-94, T3,4		73.71	14.28	2.08	0.46	0.09	1.86	0.35	4.31	2.86	100.00	0.9569
9	3946	SQC-3 T359-6	3/97	72.83	14.84	2.19	0.48	0.06	1.69	0.41	4.71	2.80	100.01	0.9562
10	1435	WASCO-97 T114-4	12/12/85	73.25	14.51	2.10	0.45	0.06	1.60	0.45	4.84	2.72	99.98	0.9554
11	706	LD-38		72.74	14.75	2.11	0.46	0.08	1.61	0.43	5.02	2.81	100.01	0.9553
12	3800	JEO 9/11/96-1 (6) T351-2	12/96	73.38	14.44	2.23	0.52	0.05	1.62	0.38	4.66	2.71	99.99	0.9549
13	3705	VWB 180 #2 T341-5	11/96	72.94	14.70	2.10	0.46	0.04	1.58	0.41	4.94	2.83	100.00	0.9546
14	1627	AA-02 JOD	09/12/86	73.22	14.32	2.18	0.47	0.06	1.66	0.43	4.88	2.78	100.00	0.9546
15	2433	YOUNG 126-1	08/10/90	72.94	14.71	2.08	0.43	0.05	1.64	0.39	5.01	2.76	100.01	0.9542
16	3874	GL2-394 POP3 T357	2/97	74.12	14.12	2.03	0.46	0.02	1.85	0.36	4.03	3.02	100.01	0.9541
17	2435	YOUNG 126-7	08/10/90	72.97	14.68	2.10	0.45	0.05	1.61	0.40	4.98	2.76	100.00	0.9540
18	3699	PLB 130 #2 T341-2	11/96	73.13	14.41	2.08	0.47	0.05	1.62	0.41	5.04	2.80	100.01	0.9537
19	2434	YOUNG 126-6	08/10/90	72.94	14.88	2.07	0.45	0.04	1.60	0.40	4.83	2.78	99.99	0.9536
20	1219	CRL-5 T88-10	5/2/85	73.10	14.38	2.15	0.48	0.06	1.60	0.39	5.03	2.82	100.01	0.9536
21	2432	YOUNG 124-9	08/10/90	72.78	14.74	2.08	0.45	0.05	1.62	0.42	5.05	2.81	100.00	0.9534
22	726	LD-94		73.68	14.25	2.08	0.46	0.09	1.86	0.35	4.32	2.91	100.00	0.9533
23	2149	SCAS-88-3 T177-4	12/5/88	73.88	14.15	2.15	0.47	0.06	1.57	0.48	4.58	2.66	100.00	0.9530
24	2069	PF-88-E (2) T173-6	9/28/88	73.65	14.46	2.13	0.42	0.04	2.00	0.26	4.03	3.02	100.01	0.9528
25	3858	GL1-0.435 MAJOR T356-6	2/97	73.99	14.27	1.99	0.46	0.02	1.88	0.38	3.97	3.03	99.99	0.9525
26	2359	TWN-L-1.84		73.32	14.45	2.10	0.45	0.00	1.60	0.41	4.93	2.72	99.98	0.9523
27	1180	LRR-KP1 74-75 t89-9	2/28/85	72.95	14.67	2.12	0.46	0.05	1.61	0.40	5.03	2.72	100.01	0.9519
28	970	DR-84		72.85	14.75	2.15	0.47	0.06	1.66	0.43	4.92	2.71	100.00	0.9518
29	3839	JEO 9/11/96-1 (1) T354-10	1/97	73.48	14.45	2.10	0.43	0.06	1.50	0.37	4.80	2.81	100.00	0.9515
30	196	LD-38, T3,4		72.72	14.78	2.11	0.46	0.08	1.61	0.43	5.05	2.76	100.00	0.9512
31	1220	CRL-8 T88-11	5/2/85	72.98	14.29	2.11	0.47	0.05	1.64	0.40	5.25	2.80	99.99	0.9512
32	1179	DUMP CREEK-1 t89-8	2/28/85	72.99	14.49	2.10	0.47	0.05	1.63	0.43	5.11	2.73	100.00	0.9510
33	3921	T2-1/10-D (2) minor T357-10	3/97	73.33	14.63	2.06	0.48	0.06	1.57	0.42	4.75	2.70	100.00	0.9510
34	3828	CC10LH144-2 T353-10	1/97	73.16	14.60	2.12	0.46	0.05	1.57	0.38	4.94	2.71	99.99	0.9509
35	305	RBW-1286, T5-12		73.26	14.33	2.12	0.43	0.06	1.55	0.43	4.97	2.85	100.00	0.9504
36	961	DR-74		72.85	14.65	2.11	0.46	0.04	1.65	0.41	5.12	2.71	100.00	0.9503
37	1759	OD-ML-9-349 CM	5/28/87	73.15	14.42	2.12	0.48	0.05	1.65	0.39	5.07	2.67	100.00	0.9496
38	3819	KDA95CC-4-T1 T344-8	1/97	73.14	14.79	2.15	0.45	0.05	1.53	0.33	4.79	2.76	99.99	0.9495

Sample FP-4

Listing of 38 closest matches for COMP. NO. 4272 for elements: Na, Al, Si, K , Ca, Fe Date of Update: 11/17/98

	C.No	Sample Number	Date	SiO2	Al2O3	Fe2O3	MgO	MnO	CaO	TiO2	Na2O	K2O	Total,R	Sim. Co
1	4272	FP-4 T390-8	7-1-98	76.60	13.08	0.87	0.04	0.06	0.72	0.05	3.79	4.80	100.01	1.0000
2	1242	WL 4-26 66.33m T93-11	5/2/85	76.65	13.16	0.87	0.05	0.04	0.71	0.05	3.69	4.78	100.00	0.9915
3	1136	WL-5-13-1.11M T84-12	12/3/84	76.59	13.09	0.89	0.04	0.06	0.71	0.07	3.74	4.82	100.01	0.9909
4	1979	WL-5-12 (61.28m) T164-8	5/22/88	76.51	13.26	0.87	0.04	0.05	0.70	0.07	3.76	4.75	100.01	0.9899
5	495	IIB, T32-1		76.58	13.16	0.87	0.03	0.06	0.71	0.05	3.87	4.68	100.01	0.9890
6	545	KRL7982-17, T50-4	02/01/83	76.61	13.14	0.87	0.03	0.04	0.68	0.05	3.77	4.79	99.98	0.9887
7	1045	DSDP 36-10-2 SSA, T78-5	07/18/84	76.90	12.80	0.85	0.04	0.04	0.72	0.09	3.73	4.83	100.00	0.9883
8	2709	FLV-194-BC T246-3	12/12/91	76.50	12.97	0.88	0.05	0.05	0.72	0.06	4.00	4.75	99.98	0.9860
9	1259	*WL 4-26 66.87m t95-6	5/29/85	77.01	12.69	0.88	0.04	0.04	0.73	0.09	3.81	4.71	100.00	0.9860
10	1958	WL-4-17 (39.81M) T162-12	5/15/88	76.91	12.98	0.84	0.04	0.05	0.72	0.05	3.70	4.70	99.99	0.9849
11	3991	EL-67-WL T365-3	6/97	76.36	13.33	0.83	0.04	0.04	0.72	0.05	3.86	4.77	100.00	0.9846
12	1243	WL 4-26 66.40m T93-12	5/2/85	76.71	13.12	0.83	0.05	0.04	0.71	0.06	3.70	4.78	100.00	0.9846
13	3799	OL92-1 DR-18 SL-C T351-1	12/96	76.59	13.15	0.83	0.03	0.05	0.72	0.06	3.69	4.88	100.00	0.9843
14	549	KRL71082F, T55-5	11/25/83	76.59	13.26	0.86	0.05	0.05	0.71	0.07	3.59	4.82	100.00	0.9840
15	1982	WL-5-13 (64.49m) T164-11	5/22/88	76.59	13.19	0.83	0.03	0.05	0.70	0.07	3.73	4.80	99.99	0.9837
16	455	679-409-6, T31-1		76.71	13.04	0.88	0.03	0.03	0.66	0.07	3.78	4.80	100.00	0.9830
17	1480	6VI84-1-5.5M T117-13	3/6/86	76.73	13.08	0.87	0.06	0.05	0.74	0.08	3.55	4.85	100.01	0.9829
18	454	679-340, T31-2		76.57	13.20	0.84	0.03	0.03	0.70	0.07	3.84	4.71	99.99	0.9827
19	183	KRL7982-19B, T45-4		76.37	13.29	0.83	0.04	0.02	0.71	0.07	3.88	4.79	100.00	0.9827
20	1039	WL 4-26-3.06, T78-12	08/18/84	76.97	12.78	0.86	0.04	0.05	0.73	0.06	3.65	4.87	100.01	0.9826
21	1257	*WL 4-26 66.68m	5/29/85	76.78	12.82	0.88	0.05	0.05	0.75	0.07	3.86	4.73	99.99	0.9823
22	1033	KRL-71082 (II-4) (593) T58-4	6/22/84	76.44	13.18	0.88	0.05	0.00	0.70	0.07	3.69	4.98	99.99	0.9814
23	756	BO-5		76.29	13.42	0.90	0.04	0.06	0.70	0.08	3.80	4.71	100.00	0.9814
24	2569	JB-BS-6 T227-3	6/13/91	76.39	13.29	0.83	0.04	0.06	0.71	0.06	3.88	4.74	100.00	0.9810
25	1963	WL-4-26 (66.50M) T163-7	5/15/88	76.67	13.24	0.84	0.04	0.04	0.73	0.07	3.66	4.70	99.99	0.9806
26	1258	*WL 4-26 66.79m t95-5	5/29/85	76.94	12.84	0.81	0.05	0.04	0.73	0.07	3.77	4.75	100.00	0.9798
27	191	LD-10, T40-2		76.71	13.04	0.91	0.04	0.03	0.68	0.07	3.80	4.71	99.99	0.9791
28	4289	JM-EC-3 T395-9	8-3-98	76.44	13.08	0.80	0.09	0.02	0.70	0.18	3.85	4.82	99.98	0.9783
29	1964	WL-4-27 (68.59M) T163-8	5/15/88	76.85	13.06	0.85	0.04	0.06	0.75	0.06	3.64	4.69	100.00	0.9783
30	1238	WL 2-7 21.02m T93-7	5/1/85	76.85	13.15	0.89	0.05	0.04	0.71	0.05	3.48	4.78	100.00	0.9782
31	1300	WL 5-13 64.51M T99-15	07/01/85	77.18	12.74	0.88	0.04	0.06	0.73	0.07	3.53	4.78	100.01	0.9781
32	1569	WLC-85-2 (10.65M) T127-14	8/18/86	76.61	13.40	0.87	0.03	0.06	0.70	0.05	3.52	4.76	100.00	0.9781
33	1974	WL-5-5 (36.93m) T164-3	5/21/88	76.69	13.09	0.83	0.03	0.05	0.66	0.06	3.79	4.82	100.02	0.9774
34	588	PMR-1, T54-12	07/xx/83	77.00	12.77	0.86	0.13	0.07	0.72	0.13	3.88	4.44	100.00	0.9769
35	1998	WL-5-57 (144.18m) T165-13	5/22/88	77.70	11.93	0.88	0.05	0.08	0.71	0.09	3.76	4.82	100.02	0.9768
36	4288	JM-EC-2 T395-8	8-3-98	76.88	12.87	0.90	0.13	0.04	0.70	0.13	3.63	4.71	99.99	0.9764
37	1260	*WL 4-26 6a7.04m t95-7	5/29/85	77.27	12.59	0.84	0.04	0.05	0.74	0.06	3.73	4.70	100.02	0.9759
38	1975	WL-5-6 (39.31m) T164-4	5/21/88	76.69	13.10	0.82	0.04	0.05	0.66	0.07	3.79	4.78	100.00	0.9754