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Title of article Origin of conglomerate stratigraphy in the Franciscan assemblage and Great Valley sequence, northern California

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see Geology v. 16, p. 783 - 787

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Origin of conglomerate stratigraphy in the Franciscan assemblage and Great Valley sequence, northern California, by Victor M. Seiders

All availably pebble counts are given in Tables A-D. Most localities are shown on Figure 1; a few localities are to the north and south of the area of Figure 1 but have been shown by Seiders and Blome (1988). The locations of sampled conglomerates not previously published are given below. Other conglomerate locations are given by Seiders and Blome (1984, 1988). Except as noted, locations are given by 7-1/2-minute quadrangle and 1,000-m Universal Transverse Mercator grid.

Table A. 196 - Newville, 4,404,645, 540,740. 197 - Lake Pillsbury, 4,361,795, 504,305. 198 - Potato Hill, 4,352,800, 518,190. 199 - Clearlake Oaks 15', 4,334,410, 529,110. 200 - Wilbur Springs 15', 4,319,120 550,500. 201 - Knoxville, 4,330,830, 555,140. 202 - Jericho Valley, 4,297,020, 548,685. 203 - St. Helena 15', 4,279,410, 547,770. 204 - Walter Springs, 4,279,890, 562,975. 205 - Walter Springs, 4,280,270, 563,100. 206 - Chiles Valley, 4.262,875, 560,490. 207 - Capell Valley, 4,261,300, 566,370. 208 - Knoxville, 4,300,680, 554,900. 209 - Knoxville, 4,300,720, 554,950. 229 - Alder Springs, 4,395,650, 530,700. 230 - Alder Springs, 4,395,390, 531,090. 231 - Kneecap Ridge, 4,378,970, 511,560. 232 - Kneecap Ridge, 4,376,410, 512,080.

Table B. 210 - Jericho Valley, 4,289,900, 550,550. 211 - Jericho Valley, 4,289,730, 550,540. 212 - Knoxville, 4,302,040, 554,385. 213 - Knoxville, 4,301,620, 555,815. 214 - Walter Springs, 4,280,505, 563,090. 215 - Walter Springs, 4,280,940, 563,110. 216 - St. John Mtn., 4,370,180, 521,930. 217 - Potato Hill, 4,352,505, 512,190.

Table C. 218 - Chiles Valley, 4,261,990, 563,010. 219 - Geyserville, 4,279,740, 510,680. 220 - Camp Meeker, 4,249,350, 502,790. 233 - Cloverdale, 4,291,030, 497,980. 234 - Healdsburg, 4,274,000, 514,780. 235 - Novato, 4,218,500, 541,610. 236 - Oakland East, 4,178,950, 576,520. 237 - Hayward, 4,170,210, 581,920. 238 - Hayward, 4,165,540, 586,220.

Table D. 221 - Lake Pillsbury, 4,363,020, 501,400. 222 - Crockett Peak, 4,360,490, 511,820, stream boulder. 223 - Chiles Valley, 4,272,610, 560,480. 224 - Chiles Valley, 4,271,860, 561,220. 225 - Crockett Peak, 4,366,550, 520,690. 226 - Fouts Springs - 4,355,380, 521,550. 227 - Potato Hill, 4,345,000, 520,060, stream boulder, probably derived from large landslide to the east. 228 - Lake Berryessa, 4,265,570, 565,740. 239 - Lake Pillsbury, 4,370,490, 506,000.

ADDITIONAL REFERENCE CITED

Seiders, V.M., and Blome, C.D., 1984, Clast compositions of upper Mesozoic conglomerate of the California Coast Ranges and their tectonic significance, in Blake, M.C., Jr., ed., Franciscan geology of northern California: Society of Economic Paleontologists and Mineralogists, Pacific Section, v. 43, p. 135-148.

Table A. Pebble counts of chert-rich conglomerates in southwestern Oregon and the northern California Coast Ranges, and of two anomalous mixed-clast conglomerates near Knoxville, California (locs. 208 and 209).

Area	southwestern Oreg.			northern California Coast Ranges													
Stratigraphic unit	Myrtle Group			Great Valley sequence													
Locality no.	181	74	75	1	2	72	196	3	73	4	5	197	198	199	200	201	202
chert	84.3	86.8	87.9	85.5	85.6	89.1	88.3	84.1	89.1	89.6	90.5	89.8	84.2	87.8	83.1	85.9	89.2
mudstone	6.9	5.2	2.6	5.3	7.9	6.4	9.3	9.3	5.2	6.8	2.2	5.6	7.2	7.0	9.2	6.1	4.5
sandstone and siltstone	.5	.6	-	.4	2.3	.3	-	1.8	1.1	-	.4	.3	1.9	-	.3	.3	.5
quartzite	-	-	.3	1.4	1.4	-	.3	-	-	-	-	-	-	-	.5	.3	.5
vein quartz	.5	1.1	-	1.8	.5	-	.3	.3	.5	-	.4	.5	-	.2	.3	1.6	.3
felsic volcanic rocks	6.4	5.7	8.1	2.5	1.4	3.7	1.9	3.9	3.8	3.6	5.6	3.1	5.6	3.6	5.6	4.2	4.0
other volcanic rocks	.7	-	-	-	-	.5	-	-	-	-	-	.3	.6	-	-	.3	-
granitic rocks	-	.6	.3	-	.5	-	-	.3	.3	-	-	.3	.6	1.0	.5	-	.5
other	.7	-	.9	3.2	.5	-	-	.3	-	-	.9	.3	-	.5	.5	1.3	.5
total (percent)	100.0	100.0	100.1	100.1	100.1	100.0	100.1	100.0	100.1	100.0	100.0	100.2	100.1	100.1	100.0	100.0	100.0
pebbles counted	408	174	346	283	215	376	367	338	366	222	232	391	360	417	391	377	397
Q	0	0	0	2	2	0	0	0	0	0	0	0	0	0	1	0	0
I	8	7	9	3	2	5	2	5	4	4	6	4	7	5	7	5	5
C	92	93	91	95	96	95	98	95	96	96	94	96	93	95	92	95	95
Q/C	.00	.00	.00	.02	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
S	7	6	2	6	10	7	9	11	6	7	2	6	9	7	10	6	5
I	7	6	9	3	2	4	2	2	4	4	6	4	7	5	6	5	5
C	86	88	89	91	88	96	89	87	90	89	92	90	84	88	84	89	90
age	Tith.	-	-	Val.	-	Tith.	Tith.	Tith.	Tith.	Tith.	Berr.	Tith.	-	-	-	-	-

Area	N. Cal. Coast Ranges (cont.)					Or. & Cal.			Knoxville		southwestern Oregon				N.C.C.R.	
Stratigraphic unit	Great Valley sequence (cont.)					Myrtle Gp. & GVs			GVs		Otter Point Formation			Dothan Fm.	Franciscan assemblage	
Locality no.	203	204	205	206	6	mean	std. dev.	range	208	209	77	78	79	80	7	8
chert	82.1	87.8	88.4	82.3	95.6	87.1	3.2	82-96	62.1	13.3	84.8	85.1	91.2	82.3	82.7	84.6
mudstone	7.7	7.8	5.8	6.7	2.8	6.3	2.0	2-9	7.1	4.5	7.7	8.0	4.0	8.7	9.1	7.4
sandstone and siltstone	-	-	-	1.1	-	.5	.7	0-2	1.3	2.0	.8	.3	-	.6	3.7	-
quartzite	.3	-	-	.8	-	.3	.4	0-1	.3	.3	.8	.3	.3	.9	.4	-
vein quartz	-	1.0	-	1.7	-	.5	.6	0-2	-	-	1.1	-	-	-	-	1.1
felsic volcanic rocks	8.7	2.8	5.2	5.9	1.6	4.4	1.9	1-9	26.0	73.4	3.7	5.0	4.6	5.3	4.1	6.2
other volcanic rocks	-	-	-	.3	-	.1	.2	0-1	.3	1.1	-	-	-	.6	-	-
granitic rocks	.8	.5	.3	.6	-	.3	.3	0-1	2.5	3.7	-	.5	-	-	-	-
other	.5	-	.3	.6	-	.5	.7	0-3	.5	1.7	1.1	.8	-	1.6	-	.6
total (percent)	100.1	99.9	100.0	100.0	100.0	100.0			100.1	100.0	100.0	100.0	100.1	100.0	100.0	99.9
pebbles counted	379	395	362	356	253	337			393	353	376	377	328	322	243	351
Q	0	0	0	1	0	0	1		0	0	1	0	0	1	0	0
I	10	4	6	7	2	5	2		32	85	4	6	5	7	5	7
C	90	96	94	92	98	95	2		68	15	95	94	95	92	95	93
Q/C	.00	.00	.00	.01	.00	.00			.00	.02	.01	.00	.00	.01	.01	.00
S	8	8	6	8	3	7	2		8	7	9	8	4	10	13	8
I	9	3	5	7	2	5	2		29	80	4	6	5	6	4	6
C	83	89	89	85	95	88	3		63	13	87	86	91	84	83	86
age	Tith.	Tith.	Tith.	-	--				Tith.	Tith.	Tith.	Tith.	Tith.	-	-	-

Area	northern California Coast Ranges (continued)																Or. & Cal.
Stratigraphic unit	Franciscan assemblage																Otter Pt., Dothan, & Fran.
Locality no.	9	10	11	12	13	229	230	182	14	231	232	76	207	mean	std. dev.	range	
chert	88.5	88.8	91.9	87.4	87.3	83.5	83.3	81.4	94.5	72.2	84.3	91.3	75.8	85.3	5.4	72-92	
mudstone	4.9	6.2	5.6	7.9	8.2	4.9	4.1	7.8	4.1	5.4	7.7	3.6	14.7	6.8	2.6	4-15	
sandstone and siltstone	-	-	.7	-	.8	.8	1.0	1.6	-	.5	.5	-	4.7	.8	1.3	0-4	
quartzite	-	-	1.1	-	.8	.3	.7	.3	.5	.3	.5	.2	-	.4	.3	0-1	
vein quartz	.5	3.7	-	.3	.3	-	.2	-	-	.5	.3	.5	-	.5	.9	0-4	
felsic volcanic rocks	5.6	1.3	.7	4.5	2.1	6.9	8.2	3.5	.5	17.0	3.6	3.6	2.2	4.7	3.6	1-17	
other volcanic rocks	-	-	-	-	-	-	-	-	-	.8	-	-	-	.1	.2	0-1	
granitic rocks	.3	-	-	-	.3	.3	-	-	-	.8	-	-	-	.1	.2	0-1	
other	.3	-	-	-	.3	3.3	2.4	5.4	.5	2.4	3.0	.7	2.5	1.3	1.5	0-5	
total (percent)	100.1	100.0	100.0	100.1	100.1	100.0	99.9	100.0	100.1	99.9	99.9	99.9	99.9	100.0			
pebbles counted	390	160	270	381	373	364	413	370	220	371	364	416	360	339			
Q	0	0	1	0	1	0	1	0	0	0	1	0	0	0	1		
I	6	1	1	5	3	8	9	4	1	21	4	4	3	6	4		
C	94	99	98	95	96	92	90	96	99	79	95	96	97	94	4		
Q/C	.00	.00	.01	.00	.01	.00	.01	.00	.00	.00	.01	.00	.00	.00			
S	5	7	6	8	9	6	5	10	4	6	8	4	20	8	4		
I	6	1	1	4	2	7	9	4	1	19	4	4	2	5	4		
C	89	92	93	88	89	87	86	86	95	75	88	92	78	87	5		
age	Val.	-	-	-	-	-	-	-	-	-	-	-	-				

Q, quartzite; I, volcanic and granitic rocks; C, chert; S, sandstone, siltstone, conglomerate, and mudstone.

Table B. Pebble counts of conglomerates rich in volcanic clasts in the northern California Coast Ranges and southwestern Oregon.

Area	northern California Coast Ranges												
Stratigraphic unit	Great Valley sequence												
Locality no.	15	16	17	18	210	211	212	213	214	215	mean	std. dev.	range
chert	-	1.6	-	-	.5	1.1	2.9	-	-	-	.6	1.0	0-3
mudstone	1.9	.6	-	1.2	.5	.5	1.3	1.8	-	3.3	1.1	1.0	0-3
sandstone and siltstone	-	.3	-	-	-	-	.5	2.3	.3	.3	.4	.7	0-1
quartzite	-	.3	-	-	-	-	-	-	.3	.8	.1	.3	0-1
vein quartz	.4	.3	-	-	.3	.3	.3	-	.3	.3	.2	.2	0-.4
felsic volcanic rocks	85.1	85.5	86	60.2	65.9	68.4	75.1	53.0	78.1	55.7	71.3	12.5	53-86
other volcanic rocks	5.8	-	6	27.7	12.0	16.8	1.0	3.4	5.7	7.7	8.6	8.3	0-28
granitic rocks	5.7	8.8	7	10.1	19.7	11.4	17.9	33.2	13.1	27.0	15.4	8.9	6-33
other	1.1	2.5	1	.9	2.1	1.6	1.0	6.2	2.3	4.9	2.4	1.8	1-6
total (percent)	100.0	99.9	100	100.1	100.0	100.1	100.0	99.9	100.1	100.0	100.1		
pebbles counted	262	318	100	347	376	376	385	385	351	366	327		
Q	0	0	0	0	0	0	0	0	0	1	0	0	
I	100	98	100	100	99	99	97	100	100	99	99	1	
C	0	2	0	0	1	1	3	0	0	0	1	1	
Q/C	.00	.19	.00	.00	.00	.00	.00	.00	-	-	.17		
S	2	1	0	1	0	1	2	4	0	3	1	1	
I	98	97	100	99	99	98	95	96	100	97	98	2	
C	0	2	0	0	1	1	3	0	0	0	1	1	
age	Val.	Val.	Val.	Val.	-	Val.	Tith.	Val.	Tith.	Val.			

Area	southwest Oregon	northern California Coast Ranges		
Stratigraphic unit	Otter Point Formation	Franciscan assemblage, Valentine Spring Fm.	Franciscan assemblage	Franciscan assemblage(?)
Locality no.	183	216	19	217
chert	-	1.0	1.4	1.2
mudstone	4	7.0	.5	1.2
sandstone and siltstone	-	9.1	-	-
quartzite	-	2.6	-	-
vein quartz	-	-	-	.9
felsic volcanic rocks	85	74.3	90.1	83.6
other volcanic rocks	8	2.3	.5	.3
granitic rocks	1	1.3	7.1	12.4
other	2	2.3	.5	.6
total (percent)	100	99.9	100.1	100.2
pebbles counted	129	385	212	347
Q	0	3	0	0
I	100	96	99	99
C	0	1	1	1
Q/C	.00	2.50	.00	.00
S	4	18	1	1
I	96	81	99	98
C	0	1	1	1

Q, quartzite; I, volcanic and granitic rocks; C, chert; S, sandstone, siltstone,

Table C. Pebble counts of mixed-clast conglomerates rich in chert and volcanic rocks from the Great Valley sequence of the northern California Coast Ranges and the northwestern Diablo Range (Oakland Conglomerate of Crittenden, 1951) and one conglomerate rich in detrital sedimentary and volcanic rocks from the western outliers of the Great Valley sequence (loc. 220).

Area	west side of Sacramento Valley and Middle Mountain area													
Locality no.	20	21	22	23	24	25	81	26	27	28	218	mean	std. dev.	range
chert	57.3	28.3	11.8	36.3	31.3	9.7	22.8	19.6	6.6	22.5	23.6	24.5	14.2	7-57
mudstone	1.8	6.9	20.2	6.5	10.7	2.8	4.7	8.1	7.1	7.4	8.0	7.7	4.9	2-20
sandstone and siltstone	2.8	6.9	6.3	14.6	6.7	1.2	4.1	7.8	3.1	5.2	4.7	5.8	3.5	1-15
quartzite	3.7	1.7	1.3	3.1	5.0	1.6	.6	2.4	-	.3	1.2	1.9	1.5	0-5
vein quartz	4.6	1.2	.8	4.3	3.5	1.2	1.2	2.4	-	1.8	2.1	2.1	1.5	0-5
felsic volcanic rocks	16.5	45.1	54.6	29.2	22.9	78.2	48.0	58.1	69.9	59.4	58.4	49.1	19.4	16-78
other volcanic rocks	-	.6	-	.3	.5	-	12.3	-	.9	-	.9	1.4	3.6	0-12
granitic rocks	3.7	1.7	3.8	2.2	1.7	4.0	.3	1.7	10.2	.9	.3	2.8	2.8	0-10
limestone	-	-	-	-	17.4	-	-	-	-	-	-	1.6	5.2	0-17
other	9.6	7.5	1.3	3.4	.2	1.2	4.1	-	2.2	2.5	.9	3.0	3.1	0-10
total (percent)	100.0	99.9	100.1	99.9	99.9	99.9	100.1	100.1	100.0	100.0	100.1	99.9		
pebbles counted	219	173	238	322	402	321	342	296	226	325	339	291		
O	4	2	2	4	8	2	1	3	0	0	1	2	2	
I	25	61	81	45	41	88	73	73	92	72	71	66	21	
C	71	37	17	51	51	10	26	24	8	27	28	32	19	
O/C	.06	.06	.11	.08	.16	.16	.03	.12	.00	.01	.05	.08		
S	5	15	28	24	24	4	9	17	10	13	13	15	8	
I	25	53	60	35	34	86	67	63	83	63	62	57	19	
C	70	32	12	41	42	10	24	20	7	24	25	28	18	
age	Late Val.	Haut.	Haut.-Barr.	Haut.-Barr.	Apt.-Alb.	Alb.	-	Cen.	Cen.	Tur.	Early Cret.			

Area	western outliers												
Locality no.	233	82	29	219	234	30	31	235	32	33	mean	std. dev.	range
chert	45.3	17.6	36	42.1	25.4	27.5	19.6	49.0	52.6	47.9	36.3	12.9	18-53
mudstone	7.7	5.0	6	5.2	2.7	10.2	5.5	2.8	4.6	6.1	5.6	2.2	3-10
sandstone and siltstone	4.9	1.4	-	5.7	2.5	4.2	1.8	3.9	5.4	6.3	3.6	2.1	0-6
quartzite	1.9	2.9	4	2.7	1.5	3.9	1.8	7.0	3.0	9.6	3.8	2.6	2-10
vein quartz	1.1	1.4	-	.5	2.0	1.0	3.6	.8	3.5	8.0	2.2	2.4	0-8
felsic volcanic rocks	35.2	46.2	32	35.1	54.1	43.6	54.5	30.1	25.3	17.6	37.4	12.1	18-54
other volcanic rocks	-	20.4	10	3.3	7.2	7.1	6.2	1.6	1.1	.6	5.8	6.2	0-20
granitic rocks	1.6	2.9	5	2.2	3.5	1.4	4.7	.8	2.5	1.7	2.6	1.4	1-5
other	2.2	2.2	7	3.3	1.0	1.2	2.2	4.1	1.9	2.2	2.7	1.8	1-7
total (percent)	99.9	100.0	100	100.1	99.9	100.1	99.9	100.1	99.9	100.0	100.0		
pebbles counted	364	279	100	368	401	590	275	386	367	363	349		
O	2	3	5	3	1	5	2	8	4	12	4	3	
I	44	77	54	48	71	62	75	37	34	26	53	18	
C	54	20	41	49	28	33	23	55	62	62	43	16	
O/C	.04	.16	.11	.06	.06	.14	.09	.14	.06	.20	.11		
S	13	7	7	12	6	15	8	8	11	15	10	3	
I	39	74	53	43	63	56	71	37	32	25	49	17	
C	48	19	40	45	31	29	21	55	57	60	41	15	
age	only Valanginian fossils reported												

Area	northwestern Diablo Range (Oakland Cgl. of Crittenden, 1951)											west. outliers & Oakland Cgl.		western outliers
Locality no.	236	52	53	237	238	54	55	88	mean	std. dev.	range	grand mean	std. dev.	220
chert	41.1	43.8	49	47.4	43.6	35.4	33.2	31.0	40.6	6.7	31-49	38.2	10.6	3.8
mudstone	7.1	7.1	9	4.0	6.1	17.3	5.7	8.1	8.1	4.0	4-17	6.7	3.3	13.1
sandstone and siltstone	7.1	4.9	5	3.7	5.0	5.9	2.9	1.7	4.5	1.7	2-7	4.0	1.9	42.0
quartzite	5.1	11.1	12	7.7	7.3	6.3	3.3	6.7	7.4	2.9	3-12	5.4	3.2	1.1
vein quartz	5.1	4.0	1	3.4	3.6	.4	.4	1.4	2.4	1.8	0-5	2.3	2.1	-
felsic volcanic rocks	28.0	22.7	17	28.0	26.0	28.7	47.1	44.9	30.3	10.4	17-47	34.2	11.6	31.3
other volcanic rocks	1.4	.2	2	2.1	1.1	4.3	4.1	1.9	2.1	1.4	0-4	4.1	4.9	.5
granitic rocks	2.8	2.0	-	1.6	3.1	-	-	2.4	1.5	1.3	0-3	2.1	1.4	2.2
other	2.3	4.2	5	2.1	4.2	1.6	3.3	1.9	3.1	1.3	2-5	2.9	1.5	6.0
total (percent)	100.0	100.0	100	100.0	100.0	99.9	100.0	100.0	100.0			99.9		100.0
pebbles counted	353	450	131	378	358	254	244	419	323			338		367
O	7	14	15	9	9	8	4	8	9	4		6	4	3
I	41	31	24	36	37	44	58	56	41	12		48	16	87
C	52	55	61	55	54	48	38	36	50	9		46	14	10
O/C	.12	.25	.24	.16	.17	.18	.10	.21	.18			.14		.29
S	16	15	17	9	13	25	9	11	14	5		12	5	59
I	37	31	23	36	36	36	55	55	39	11		45	15	37
C	47	54	60	55	51	39	36	34	47	10		43	13	4
age	only Valanginian fossils reported											Valanginian		-

O, quartzite; I, volcanic and granitic rocks; C, chert; S, sandstone, siltstone, conglomerate, and mudstone.

Table D. Pebble counts of conglomerates with both chert and volcanic clasts in the Franciscan assemblage of the northern California Coast Ranges and correlative rocks in southwestern Oregon.

Area	Oregon	northern California Coast Ranges											
Conglomerate variety	low-quartzite												
Locality no.	184	34	35	36	37	38	39	40	41	42	69	239	221
chert	54.5	21.6	29.0	44.0	32.9	52.6	41.1	52.6	33.2	36.5	23.3	36.2	29.0
mudstone	9.6	11.3	8.5	7.7	10.0	3.9	14.8	6.6	6.7	7.6	5.4	10.5	7.9
sandstone and siltstone	3.6	1.3	1.6	3.7	5.9	5.6	6.9	6.6	5.2	2.0	2.4	23.8	2.5
quartzite	1.7	5.6	2.4	3.4	4.6	1.0	1.4	1.9	.7	1.3	4.1	4.4	4.1
vein quartz	2.4	3.0	.4	2.2	2.7	8.9	5.7	9.1	6.0	4.8	1.1	1.7	3.3
felsic volcanic rocks	24.4	48.9	42.7	29.8	38.5	23.5	22.9	16.8	44.0	44.6	52.6	17.7	46.3
other volcanic rocks	.2	1.7	6.0	1.2	2.2	-	1.4	-	1.1	.3	6.0	2.2	.5
granitic rocks	.2	5.6	6.5	3.1	2.2	2.6	2.2	.3	2.2	.8	1.1	.6	2.7
limestone	-	-	-	-	-	-	1.6	5.8	-	-	-	-	-
other	3.3	.9	2.8	4.9	1.0	2.0	2.0	.3	.7	2.3	4.1	3.0	3.6
total (percent)	99.9	99.9	99.9	100.0	100.0	100.1	100.0	100.0	99.8	100.2	100.1	100.1	99.9
pebbles counted	418	231	248	325	410	306	494	363	268	395	369	362	365
Q	2	7	3	4	6	1	2	3	1	1	5	7	5
I	31	67	64	42	53	33	38	24	58	55	68	34	60
C	67	26	33	54	41	66	60	73	41	44	27	59	35
Q/C	.03	.26	.08	.08	.14	.02	.03	.04	.02	.03	.17	.12	.14
S	14	14	11	13	17	11	24	16	13	10	8	38	12
I	27	62	58	38	47	30	30	21	51	50	66	22	56
C	59	24	31	49	36	59	46	63	36	40	26	40	32

Area	northern California Coast Ranges (continued)											Or. & Cal.	
Conglomerate variety	low-quartzite (continued)												
Locality no.	222	44	45	70	46	47	48	223	224	66	mean	std. dev.	range
chert	30.7	32.1	29.8	18.3	36	33.2	61.1	33.1	33.3	5.8	34.8	12.7	6-61
mudstone	6.6	9.9	4.6	5.8	4	6.3	6.1	11.4	10.0	6.5	7.9	2.7	4-11
sandstone and siltstone	4.7	4.2	2.8	3.0	3	7.2	3.3	3.9	3.6	6.5	4.9	4.5	1-24
quartzite	2.5	2.7	3.2	4.3	5	4.5	5.8	2.5	3.3	3.6	3.2	1.5	1-6
vein quartz	2.2	3.1	2.8	1.3	1	.9	1.9	2.5	1.7	.4	3.0	2.4	0-9
felsic volcanic rocks	46.8	44.7	51.4	53.3	39	41.7	19.4	39.6	42.8	59.6	38.7	12.5	17-53
other volcanic rocks	1.7	-	.9	7.8	3	3.6	-	.3	1.7	4.0	2.0	2.2	0-8
granitic rocks	.3	.4	1.4	2.0	9	.9	1.9	2.8	.8	1.5	2.2	2.2	0-6
limestone	-	-	-	-	-	-	-	1.1	-	9.8	.8	2.3	0-10
other	4.4	3.1	3.2	4.1	1	1.8	.3	2.8	2.8	2.2	2.5	1.3	0-5
total (percent)	99.9	100.2	100.1	99.9	101	100.1	99.8	100.0	100.0	99.9	100.0		
pebbles counted	361	262	218	394	107	223	360	359	360	275	312		
Q	3	3	4	5	5	5	7	3	4	5	4	2	
I	60	57	62	74	56	55	24	55	55	87	53	16	
C	37	40	34	21	39	40	69	42	41	8	43	16	
Q/C	.08	.08	.11	.24	.13	.14	.09	.08	.10	.62	.09		
S	12	16	8	10	8	14	10	17	15	16	14	6	
I	54	49	59	70	54	50	23	47	49	77	47	16	
C	34	35	33	20	38	36	67	36	36	7	39	14	

Area	northern California Coast Ranges											Or. & N. Cal.		
Conglomerate variety	high-quartzite											both		
Locality no.	83	84	43	225	85	226	227	228	mean	std. dev.	range	grand mean	std. dev.	range
chert	58.5	62.2	25.2	34.9	39.4	36.5	31.4	52.9	42.6	13.5	25-58	36.8	13.0	6-62
mudstone	4.8	7.4	4.3	6.3	4.7	19.6	5.7	7.8	7.6	5.0	4-20	7.8	3.4	4-20
sandstone and siltstone	4.5	2.6	-	4.7	3.2	15.6	7.5	2.4	5.1	4.8	0-16	5.0	4.5	0-24
quartzite	9.0	7.4	6.2	10.5	10.0	13.5	10.7	5.8	9.1	2.6	6-13	4.7	3.2	1-13
vein quartz	1.3	3.2	1.9	1.0	7.6	2.6	-	2.2	2.5	2.3	0-8	2.9	2.4	0-9
felsic volcanic rocks	19.3	13.5	57.6	33.1	28.2	8.2	28.2	21.1	26.1	15.1	8-58	35.5	14.1	8-60
other volcanic rocks	.3	-	-	.5	-	.5	8.7	-	1.2	3.0	0-9	1.8	2.4	0-8
granitic rocks	.3	.6	1.9	.3	1.2	.3	.2	2.2	.9	.8	0-2	1.9	2.0	0-6
limestone	-	-	-	-	-	-	-	*	-		-	.6	2.0	0-10
other	2.1	3.2	2.9	8.7	5.6	3.3	7.5	5.6	4.9	2.4	2-9	3.1	1.9	0-9
total (percent)	100.1	100.1	100.0	100.0	99.9	100.1	99.9	100.0	100.0			100.1		
pebbles counted	378	312	210	381	340	392	401	412	353			323		
Q	10	9	7	13	13	23	13	7	12	5		6	5	
I	23	17	65	43	37	15	47	28	34	17		48	18	
C	67	74	28	44	50	62	40	65	54	16		46	17	
Q/C	.15	.12	.24	.30	.25	.37	.34	.11	.21			.13		
S	10	12	15	14	11	44	16	12	17	11		15	8	
I	23	16	50	42	38	11	46	27	32	14		43	17	
C	67	72	35	44	51	45	38	61	51	14		42	15	

228 contained a few limestone clasts that were lost in processing. Q, quartzite; I, volcanic and granitic rocks; C, chert; S, sandstone, siltstone, conglomerate, and mudstone.