SURFACE FAULT TRACES AND HISTORICAL EARTHQUAKE EFFECTS NEAR LOS ALAMOS VALLEY, SANTA BARBARA COUNTY, CALIFORNIA

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FINAL TECHNICAL REPORT

November 1980

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APPENDIX A

EARTHQUAKE CATALOG

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	LOCATION AND COMMENTS
1	29 JUN 1925	14:42:16.0	34.300N	119.800W			6.25N'					N	ORIGINAL DATA SOURCE = GUT LOCAL MAGNITUDE = 6.25 SCALE =ML AUTHORITY= PAS
2	14 JAN 1932	00:51:08.0	34.433N	119.866W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
3	30 JAN 1932	00:48:58.0	34.916N	120.733W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
4	13 MAR 1932	23:09:23.7	34.433N	120.183W			3.50N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
5	6 APR 1932	22:42:00.0	34.583N	120.750W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
6	6 JUN 1933	18:17:33.0	34.283N	119.766W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
7	26 JUN 1933	06:25:42.0	34.333N	119.833W		V	4.30N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.30 SCALE =ML AUTHORITY= PAS
8	26 JUN 1933	06:27:52.0	34.333N	119.833W		V	4.30N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.30 SCALE =ML AUTHORITY= PAS
9	19 MAY 1934	06:37:00.0	34.583N	120.750W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
													ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
10	24 MAY 1934	06:52:00.0	34.416N	119.750W			2.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
11	24 MAY 1934	09:04:00.0	34.416N	119.750W			2.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
12	25 AUG 1934	18:52:00.0	34.416N	119.750W			2.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
13	17 DEC 1934	11:10:00.0	34.583N	120.333W		IV	4.50N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.50 SCALE =ML AUTHORITY= PAS
14	17 DEC 1934	13:51:00.0	34.583N	120.333W			2.50N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
15	17 DEC 1934	15:35:00.0	34.583N	120.333W			2.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
16	18 DEC 1934	03:09:00.0	34.583N	120.333W			4.00N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.00 SCALE =ML AUTHORITY= PAS
17	18 DEC 1934	04:34:00.0	34.583N	120.333W			3.00N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL INTEN (MM)	MAG SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
											ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
18	18 DEC 1934	05:28:00.0	34.583N	120.333W		3.00N'	16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
19	20 DEC 1934	12:37:00.0	34.583N	120.333W		2.50N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
20	20 DEC 1934	12:39:00.0	34.583N	120.333W	III	3.00N'	16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
21	20 DEC 1934	22:21:00.0	34.583N	120.333W		3.00N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
22	23 DEC 1934	16:08:00.0	34.583N	120.333W		2.50N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
23	24 DEC 1934	10:22:00.0	34.583N	120.333W		3.00N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
24	25 DEC 1934	04:03:00.0	34.583N	120.333W		3.00N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
25	23 JAN 1935	03:16:00.0	34.583N	120.333W	IV	3.50N'	16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
													LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
26	6 MAR 1935	23:14:00.0	34.433N	119.866W		III	3.50N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
27	18 MAY 1935	04:36:00.0	34.583N	120.333W			3.50N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
28	19 MAY 1935	03:44:00.0	34.583N	120.333W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
29	20 MAY 1935	23:44:00.0	34.583N	120.333W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
30	3 FEB 1936	09:12:00.0	34.750N	119.750W			2.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
31	22 JUL 1936	04:03:00.0	34.500N	119.800W			2.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
32	7 SEP 1936	16:47:00.0	34.366N	120.383W			3.00N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
33	9 SEP 1936	04:54:57.8	34.433N	120.466W		V	4.00N'		10		P	N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITA ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.00 SCALE =ML AUTHORITY= PAS

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL INTEN (MM)	MAG SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
34	10 SEP 1936	21:21:00.0	34.400N	120.400W		3.00N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
35	12 SEP 1936	13:56:00.0	34.750N	120.333W		3.50N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
36	15 SEP 1936	00:09:00.0	34.500N	120.500W		2.50N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
37	16 OCT 1936	15:30:00.0	34.833N	120.583W		4.00N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.00 SCALE =ML AUTHORITY= PAS
38	16 OCT 1936	15:36:00.0	34.833N	120.583W		3.00N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
39	17 OCT 1936	01:17:00.0	34.833N	120.583W		3.00N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
40	19 OCT 1936	14:01:00.0	34.833N	120.583W		3.00N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
41	18 NOV 1936	18:02:18.5	34.450N	120.516W	IV	4.50N'	10		F	N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.50 SCALE =ML AUTHORITY= PAS
42	28 JAN 1937	17:36:00.0	34.433N	119.866W		2.50N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
													ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
43	22 NOV 1937	04:12:53.7	34.366N	120.616W		V	4.50N'		10		P	N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.50 SCALE =ML AUTHORITY= PAS
44	1 JAN 1939	00:53:00.0	34.583N	120.333W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
45	12 FEB 1939	03:12:00.0	34.416N	119.833W			3.00N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
46	30 MAR 1939	10:11:00.0	34.500N	119.800W			2.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
47	6 SEP 1939	01:53:43.0	34.583N	120.416W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
48	12 SEP 1939	00:00:47.0	34.250N	119.750W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
49	25 DEC 1939	15:36:23.0	34.283N	119.833W			3.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
50	10 NOV 1940	10:25:10.0	34.350N	119.766W			4.00N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.00 SCALE =ML AUTHORITY= PAS

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
51	29 AUG 1941	08:43:24.0	34.600N	120.300W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
52	28 NOV 1941	06:33:00.0	35.000N	120.000W			3.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
53	6 JUN 1942	06:42:11.0	34.350N	119.850W			3.00N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
54	27 AUG 1943	08:16:53.0	34.433N	119.866W		IV	3.50N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
55	13 JUN 1944	08:27:32.0	34.666N	120.500W		VI	4.60N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.60 SCALE =ML AUTHORITY= PAS
56	13 JUN 1944	08:46:43.0	34.666N	120.500W			4.00N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.00 SCALE =ML AUTHORITY= PAS
57	13 JUN 1944	11:07:24.0	34.666N	120.500W			4.40N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.40 SCALE =ML AUTHORITY= PAS
58	4 SEP 1944	02:47:46.0	35.000N	120.000W			3.40N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL INTEN (MM)	MAG SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
											ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.40 SCALE =ML AUTHORITY= PAS
59	15 SEP 1944	14:12:42.0	34.700N	120.200W		2.60N'	16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.60 SCALE =ML AUTHORITY= PAS
60	30 NOV 1944	18:53:15.0	34.716N	120.416W		4.10N'	16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.10 SCALE =ML AUTHORITY= PAS
61	27 JAN 1945	17:50:31.0	34.750N	120.666W		3.90N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.90 SCALE =ML AUTHORITY= PAS
62	28 JUL 1945	02:33:48.0	34.700N	120.100W		4.20N'	16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.20 SCALE =ML AUTHORITY= PAS
63	9 FEB 1946	02:55:28.0	34.333N	119.916W		2.50N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
64	8 JUL 1946	19:59:44.0	34.833N	120.533W		3.20N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.20 SCALE =ML AUTHORITY= PAS
65	6 AUG 1946	04:55:07.0	34.950N	120.183W		2.80N'	16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.80 SCALE =ML AUTHORITY= PAS
66	22 NOV 1946	09:47:59.0	34.833N	120.683W		3.00N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
													ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
67	1 FEB 1948	17:00:54.0	34.416N	119.916W			3.00N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
68	9 MAY 1948	11:10:00.0	34.750N	120.250W			2.70N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.70 SCALE =ML AUTHORITY= PAS
69	17 JUL 1948	05:26:31.0	34.550N	120.050W			3.40N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.40 SCALE =ML AUTHORITY= PAS
70	25 JAN 1949	04:29:00.0	34.916N	120.416W			3.00N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
71	6 APR 1949	14:07:00.0	35.000N	120.000W			2.60N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.60 SCALE =ML AUTHORITY= PAS
72	8 APR 1949	13:17:07.0	34.600N	120.350W			3.20N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.20 SCALE =ML AUTHORITY= PAS
73	27 JUL 1949	18:21:35.0	34.533N	120.366W			3.60N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.60 SCALE =ML AUTHORITY= PAS
74	26 AUG 1949	16:52:32.0	34.500N	120.500W		VI	4.20N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
													ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.20 SCALE =ML AUTHORITY= PAS
75	27 AUG 1949	14:51:46.0	34.500N	120.500W		VI	4.90N'		16		P	N	REPORTED DAMAGE HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.90 SCALE =ML AUTHORITY= PAS
76	17 NOV 1949	05:06:06.0	34.800N	120.700W			2.80N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.80 SCALE =ML AUTHORITY= PAS
77	19 FEB 1950	08:29:44.0	34.500N	120.700W			3.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
78	2 AUG 1950	06:50:48.0	34.666N	120.633W			3.30N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.30 SCALE =ML AUTHORITY= PAS
79	10 MAR 1951	05:35:00.0	34.583N	120.666W		IV	2.70N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.70 SCALE =ML AUTHORITY= PAS
80	16 JUN 1951	19:01:17.0	34.400N	120.083W			3.30N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.30 SCALE =ML AUTHORITY= PAS
81	7 JUL 1951	05:53:33.0	34.750N	120.750W			3.50N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
82	17 NOV 1951	03:19:48.0	34.700N	120.500W		III	2.50N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
													ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
83	1 JUL 1952	16:29:24.0	34.300N	119.800W			3.10N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.10 SCALE =ML AUTHORITY= PAS
84	7 AUG 1952	19:15:12.0	34.333N	120.683W		IV	3.60N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.60 SCALE =ML AUTHORITY= PAS
85	8 APR 1953	00:59:20.0	34.800N	120.600W		IV	3.60N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.60 SCALE =ML AUTHORITY= PAS
86	26 JAN 1954	09:43:22.0	34.500N	120.333W		III	3.80N'		16		P	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.80 SCALE =ML AUTHORITY= PAS
87	13 MAR 1954	22:43:30.0	35.000N	120.700W			3.40N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.40 SCALE =ML AUTHORITY= PAS
88	13 AUG 1954	13:36:44.0	34.250N	120.500W			3.20N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.20 SCALE =ML AUTHORITY= PAS
89	13 AUG 1954	13:44:28.0	34.250N	120.500W			3.20N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.20 SCALE =ML AUTHORITY= PAS
90	19 AUG 1954	11:45:08.0	34.250N	120.500W			3.20N'		16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL INTEN (MM)	MAG SM	H (KM)	DIS (KM)	Q S	L O C A T I O N A N D C O M M E N T S
										LOCAL MAGNITUDE = 3.20 SCALE =ML AUTHORITY= PAS
91	22 AUG 1954	08:34:40.0	34.333N	120.666W		3.80N'	16		P N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.80 SCALE =ML AUTHORITY= PAS
92	22 AUG 1954	12:36:07.0	34.333N	120.666W		3.80N'	16		P N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.80 SCALE =ML AUTHORITY= PAS
93	9 AUG 1956	00:08:49.2	34.316N	119.750W	IV	4.00N'	4		P N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITA ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.00 SCALE =ML AUTHORITY= PAS
94	20 NOV 1956	03:42:44.0	34.700N	120.500W	IV	3.60N'	16		P N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.60 SCALE =ML AUTHORITY= PAS
95	2 JUL 1957	09:18:22.0	34.366N	119.883W		3.40N'	16		P N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.40 SCALE =ML AUTHORITY= PAS
96	2 JUL 1957	12:59:05.0	34.366N	119.883W		3.30N'	16		P N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.30 SCALE =ML AUTHORITY= PAS
97	2 JUL 1957	13:58:28.0	34.366N	119.883W		3.20N'	16		P N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.20 SCALE =ML AUTHORITY= PAS
98	18 AUG 1957	03:05:25.0	34.466N	120.133W		3.40N'	16		P N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.40 SCALE =ML AUTHORITY= PAS

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL INTEN (MM)	MAG SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
99	28 OCT 1957	11:41:02.0	34.333N	120.000W		2.80N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.80 SCALE =ML AUTHORITY= PAS
100	5 NOV 1957	23:50:52.0	34.716N	120.333W	IV	3.40N'	16		F	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.40 SCALE =ML AUTHORITY= PAS
101	16 NOV 1958	09:34:06.1	34.466N	119.750W	V	4.00N'	15		F	N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.00 SCALE =ML AUTHORITY= PAS
102	1 OCT 1959	04:35:35.0	34.450N	120.516W	VI	4.50N'	14		F	N	REPORTED DAMAGE HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.50 SCALE =ML AUTHORITY= PAS
103	28 FEB 1960	02:55:32.0	34.333N	119.950W		3.10N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.10 SCALE =ML AUTHORITY= PAS
104	1 DEC 1960	14:23:49.0	34.333N	119.850W		3.20N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.20 SCALE =ML AUTHORITY= PAS
105	31 JAN 1962	08:33:15.0	34.883N	120.683W		3.60N'	16		F	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.60 SCALE =ML AUTHORITY= PAS
106	1 FEB 1962	06:37:57.0	34.883N	120.683W	V	4.50N'	16		F	N	REPORTED FELT INFORMATION HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.50 SCALE =ML AUTHORITY= PAS

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL INTEN (MM)	MAG SM	H (KM)	DIS (KM)	Q	S	LOCATION AND COMMENTS
107	1 FEB 1962	07:58:12.0	34.883N	120.683W		3.70N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.70 SCALE =ML AUTHORITY= PAS
108	23 MAR 1962	22:10:17.9	34.266N	120.200W		2.90N'	19		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.90 SCALE =ML AUTHORITY= PAS
109	16 SEP 1962	18:31:16.6	34.500N	119.750W	IV	2.90N'	12		P	N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.90 SCALE =ML AUTHORITY= PAS
110	4 JUL 1963	03:20:40.9	34.766N	120.016W		3.20N'	20		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.20 SCALE =ML AUTHORITY= PAS
111	6 JUL 1963	23:32:30.4	34.783N	120.616W		3.30N'	2		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.30 SCALE =ML AUTHORITY= PAS
112	20 JUN 1964	09:21:51.4	34.666N	120.133W		3.10N'	23		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.10 SCALE =ML AUTHORITY= PAS
113	24 APR 1965	07:29:47.1	34.900N	120.133W		4.10MB	15		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.60 SCALE =ML AUTHORITY= PAS
114	21 JUN 1966	09:46:25.8	34.850N	120.466W	IV	3.90MB	2		P	N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 4.10 SCALE =ML AUTHORITY= PAS
115	28 JUN 1966	04:32:51.6	34.700N	120.300W		4.00N'	16			N	REPORTED FELT INFORMATION ORIGINAL DATA SOURCE = CGS LOCAL MAGNITUDE = 4.00 SCALE =ML AUTHORITY= BRK
116	28 SEP 1966	05:30:04.2	34.766N	120.483W		2.80N'	10		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.80 SCALE =ML AUTHORITY= PAS

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	LOCATION AND COMMENTS
117	8 JUL 1967	06:16:51.4	34.833N	120.300W			3.20N'		12		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.20 SCALE =ML AUTHORITY= PAS
118	13 AUG 1967	12:52:11.2	34.433N	119.983W		V	3.80N'		19		P	N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.80 SCALE =ML AUTHORITY= PAS
119	18 DEC 1967	14:10:47.4	34.800N	120.583W			2.90N'		10		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.90 SCALE =ML AUTHORITY= PAS
120	4 FEB 1968	09:46:37.7	34.650N	120.750W			2.60N'		1		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.60 SCALE =ML AUTHORITY= PAS
121	9 APR 1968	05:30:20.6	34.316N	119.833W			2.80N'		12		P	N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.80 SCALE =ML AUTHORITY= PAS
122	28 MAY 1968	06:23:22.2	34.850N	120.550W			3.00N'		10		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
123	12 JUN 1968	03:16:11.3	34.400N	119.833W			2.50N'		10		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
124	13 JUN 1968	14:15:31.5	34.350N	119.850W			2.50N'		15		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
125	16 AUG 1968	12:12:17.0	34.766N	120.350W		V	4.00MB		22		P	N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.30 SCALE =ML AUTHORITY= PAS
126	31 DEC 1968	22:10:19.6	34.283N	119.866W			3.00N'		26		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL INTEN (MM)	MAG SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
											ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
127	30 MAY 1969	14:08:09.3	34.616N	120.700W		3.10N'	10		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.10 SCALE =ML AUTHORITY= PAS
128	12 JUN 1969	13:26:45.5	34.900N	120.700W		2.70N'	10		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.70 SCALE =ML AUTHORITY= PAS
129	21 JUN 1970	18:48:50.8	34.783N	119.933W		2.60N'	8		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.60 SCALE =ML AUTHORITY= PAS
130	29 JUL 1970	21:13:18.5	34.666N	119.850W		2.50N'	8		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITA ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
131	7 SEP 1970	09:35:56.7	34.300N	119.850W		3.00N'	8		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.00 SCALE =ML AUTHORITY= PAS
132	17 OCT 1970	20:17:06.1	34.583N	119.833W		2.50N'	8		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
133	11 JAN 1971	15:21:41.0	34.900N	120.033W		3.50N'	16		P	N	HYPOCENTER DEPTH ASSIGNED HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITD ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
134	16 FEB 1972	23:50:38.6	34.766N	120.600W		3.30N'	8		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITC ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.30 SCALE =ML AUTHORITY= PAS
135	14 APR 1972	08:05:03.1	34.283N	119.866W		3.40N'	8		P	N	REPORTED FELT INFORMATION HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.40 SCALE =ML AUTHORITY= PAS
136	17 APR 1972	00:28:37.4	34.250N	119.833W		2.90N'	8		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	L O C A T I O N A N D C O M M E N T S
													ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 2.90 SCALE =ML AUTHORITY= PAS
137	23 SEP 1972	03:43:45.3	34.666N	120.516W			3.30N'		8		P	N	HYPOCENTER/EPICENTER DETERMINED BY PASADENA QUALITB ORIGINAL DATA SOURCE = PAS LOCAL MAGNITUDE = 3.30 SCALE =ML AUTHORITY= PAS
138	6 OCT 1977	11:50:58.1	34.883N	120.317W			2.90N'		4		P	N	REPORTED FELT INFORMATION 8 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 2.90 SCALE =ML AUTHORITY= PAS
139	6 OCT 1977	11:52:04.7	34.883N	120.300W			2.50N'		4		P	N	REPORTED FELT INFORMATION 4 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
140	6 OCT 1977	11:56:50.2	34.867N	120.367W			2.80N'		3		P	N	REPORTED FELT INFORMATION 5 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 2.80 SCALE =ML AUTHORITY= PAS
141	1 MAY 1978	08:02:54.4	34.367N	119.966W	V		3.70N'		5		P	N	POSSIBLE TSUNAMI GENERATED BY EARTHQUAKE POSSIBLE SEICHE ASSOCIATED WITH EARTHQUAKE REPORTED FELT INFORMATION 9 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 3.70 SCALE =ML AUTHORITY= PAS
142	13 AUG 1978	23:11:02.7	34.367N	119.750W			3.40N'		4		P	N	POSSIBLE TSUNAMI GENERATED BY EARTHQUAKE POSSIBLE SEICHE ASSOCIATED WITH EARTHQUAKE REPORTED FELT INFORMATION 11 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 3.40 SCALE =ML AUTHORITY= PAS
143	13 AUG 1978	23:15:03.6	34.384N	119.766W			3.10N'		5		P	N	POSSIBLE TSUNAMI GENERATED BY EARTHQUAKE POSSIBLE SEICHE ASSOCIATED WITH EARTHQUAKE REPORTED FELT INFORMATION 7 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 3.10 SCALE =ML AUTHORITY= PAS
144	16 AUG 1978	13:35:12.7	34.384N	119.783W	V		3.50N'		5		P	N	POSSIBLE TSUNAMI GENERATED BY EARTHQUAKE POSSIBLE SEICHE ASSOCIATED WITH EARTHQUAKE

CAT. NO.	DATE DAY-MO-YEAR	TIME(GMT) HR-MIN-SEC	LAT	LONG	SL	INTEN (MM)	MAG	SM	H (KM)	DIS (KM)	Q	S	LOCATION AND COMMENTS
													REPORTED FELT INFORMATION 19 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 3.50 SCALE =ML AUTHORITY= PAS
145	29 AUG 1978	06:04:49.8	34.384N	119.766W			2.80N'	5			P	N	POSSIBLE TSUNAMI GENERATED BY EARTHQUAKE POSSIBLE SEICHE ASSOCIATED WITH EARTHQUAKE REPORTED FELT INFORMATION 5 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 2.80 SCALE =ML AUTHORITY= PAS
146	29 AUG 1978	10:51:46.0	34.384N	119.800W			2.50N'	5			P	N	POSSIBLE TSUNAMI GENERATED BY EARTHQUAKE POSSIBLE SEICHE ASSOCIATED WITH EARTHQUAKE REPORTED FELT INFORMATION 3 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 2.50 SCALE =ML AUTHORITY= PAS
147	12 SEP 1978	11:57:55.4	34.384N	119.766W	V		3.60N'	6			P	N	POSSIBLE TSUNAMI GENERATED BY EARTHQUAKE POSSIBLE SEICHE ASSOCIATED WITH EARTHQUAKE REPORTED FELT INFORMATION 7 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 3.60 SCALE =ML AUTHORITY= PAS
148	6 DEC 1978	10:03:49.3	34.384N	119.750W			3.20N'	5			P	N	POSSIBLE TSUNAMI GENERATED BY EARTHQUAKE POSSIBLE SEICHE ASSOCIATED WITH EARTHQUAKE REPORTED FELT INFORMATION 6 P AND/OR P' ARRIVALS USED IN HYPOCENTER SOLUTION HYPOCENTER/EPICENTER DETERMINED BY PASADENA ORIGINAL DATA SOURCE = GS LOCAL MAGNITUDE = 3.20 SCALE =ML AUTHORITY= PAS

APPENDIX B

SOURCES OF HISTORICAL DATA

Historical Societies

Santa Maria Historical Society Museum
616 South Broadway
Santa Maria, California

Santa Ynez Valley Historical Society
P. O. Box 181
Santa Ynez, California
Jeannette Lyons

Lompoc Valley Historical Society
805/736-5044
Ann Calvert

Santa Barbara Historical Society Museum
136 East De La Guerra
Santa Barbara, California

Libraries

City of Santa Maria Library (Main Branch)
420 South Broadway
Santa Maria, California

City of Santa Maria Library (Los Alamos Branch)
405 Helena
Los Alamos, California

City of Lompoc Library
501 East North Avenue
Lompoc, California

ABSTRACT

Regional fault analyses of the Santa Maria district covered a northwest-trending 325-square-mile strip centered approximately at Los Alamos. Fault traces and lineaments were identified on low-sun-angle aerial photographs and during subsequent field reconnaissance studies. Strong geomorphic evidence of faulting was found along the Baseline and Los Alamos faults including topographic scarps, offset older geomorphic surfaces, and sag depressions; however, geomorphic evidence of recent surface faulting, such as youthful scarps or offset of young geomorphic features, is lacking along the faults. Geomorphic evidence of faulting along the Northern Baseline lineament suggests it is a fault similar to the Los Alamos fault.

Two trenches excavated about 0.5 mile apart along the Los Alamos fault exposed very low angle (10°-40°) shear surfaces with reverse slip. The shears attain their shallowest dips as they near the ground surface. The offsets of lithologic units observed in the two trenches decrease from the west toward the east between the trenches, as does the height of the scarp associated with the fault. Westward of the trench sites, the fault appears to follow the south margin of the Los Alamos Valley along the north flank of an overturned anticline.

The style of faulting found in the trenches and the geomorphic expression of faults in the study area indicate that north-northeast regional compression has been dominant here during the Quaternary Period. Down-dip slickensides on sheared surfaces and the general absence of lateral offsets of geomorphic features lead to the conclusion that the style of faulting is pure reverse slip.

1.0 INTRODUCTION

The Los Alamos Valley is situated in a transitional area between the Coast Ranges and Transverse Ranges Provinces. The Los Alamos Valley experienced local earthquakes in 1902 and 1915 that produced surface fissures, cracks, mounds, and landslides. The lengths of known faults, such as the Los Alamos fault near Los Alamos Valley, are sufficient to have generated the 1902 or 1915 earthquakes, estimated by Real and Toppozada (1978) to have been about magnitude 5.5. Recent geologic publications suggest that the Los Alamos fault may be part of a series of faults extending southeast to the Baseline fault and perhaps to the northwest from Los Alamos Valley (Sylvester and Darrow, 1979) (Fig. 1). If individual fault segments are structurally interconnected, collectively they could be a significant potential seismic source.

The major goal of this investigation is to define the location and the activity level of faults in the Los Alamos area and to evaluate possible sources of the 1902 and 1915 earthquakes. The limit of this study area, approximately 325 square miles in size, is shown on Figure 1. The area includes several possible fault traces and lineaments that trend across the central part of the Santa Maria basin (Fig. 1). Investigative methods have included literature review, aerial photographic interpretation, field mapping, and trench excavations.

Aerial photographic analyses and interpretation of geomorphic features were used to identify fault traces in the Santa Maria district and to locate potential trench sites along the Los Alamos and Baseline faults. Initially, sites along the Los Alamos fault appeared to have promise for

recovery of datable materials and thus for yielding information regarding recency of surface faulting, but they were later found to be barren of datable material. Detailed geologic mapping along the fault trace provided the basis for selection of two trench sites on the Barham Ranch that were subsequently excavated. This final technical report presents the findings and interpretations of this work.

2.0 BACKGROUND INFORMATION

2.1 Location and Setting of Study Area

The Santa Maria basin is located between the Transverse Ranges and Coast Ranges Provinces. Rocks exposed within the Santa Maria basin are Miocene and Pliocene marine sediments prograding to Pliocene and Pleistocene continental deposits. The Miocene marine sedimentary rocks rest unconformably on the Franciscan Formation. The folding and reverse faulting within the basin that includes Los Alamos Valley are indicative of compression across the area since late Pliocene time.

The Los Alamos Valley lies within the central part of the Santa Maria basin, which is bounded on the south and northeast by branches of the Santa Ynez fault zone (C. Hall, UCLA, personal communication, 1979). Another branch of the Santa Ynez fault strikes across the central part of the Santa Maria basin and includes the mapped Baseline fault and the Los Alamos fault (Woodring and Bramlette, 1950; Sylvester and Darrow, 1979). The Bradley Canyon, Santa Maria, Pezzoni, and Casmalia faults (Fig. 1) have all been proposed as possible northwest connections or splays of the Los Alamos fault (Dames and Moore, 1977). The Baseline fault and the Los Alamos fault have displacements

in the Plio-Pleistocene Paso Robles Formation and Pleistocene terrace deposits along their entire lengths. The Santa Maria and Bradley Canyon faults cut the Paso Robles Formation, whereas the Pezzoni and Casmalia faults are known to offset Pliocene sedimentary rocks.

2.2 Seismicity

The seismic activity of the Santa Maria district since 1925 is shown as an epicenter plot in Figure 2. The plot uses the NOAA catalog data presented in Appendix A. The plot shows a fairly low level of seismic activity in the Santa Maria district.

2.3 Previous Work

The Baseline fault was mapped by Sylvester and Darrow (1979) along the northeast edge of Lake Cachuma and inferred to extend westward to the fault (here called the Los Alamos fault) mapped by Woodring and Bramlette (1950) in Los Alamos Valley. Further extension of this fault trend was inferred in the subsurface by Sylvester and Darrow (1979) to continue across the Orcutt oil field, to connect with the Pezzoni fault, and then to extend offshore at Point Sal. Although Quaternary faulting has been mapped along this trend, confirmation of connections between these faults is not offered in the literature.

Dames and Moore (1977) excavated and examined three trenches across the central portion of the Baseline fault in Happy Canyon with inconclusive results. They found no fault offsets in the alluvium, which was Holocene and they did not expose the fault zone in the trenches.

-120.75 -120.50 -120.25 -120.00 -119.75

35.00 35.00

Santa Maria

Point Sal

Purisima Point

34.75 34.75

Los Alamos

Los Olivos

Lompoc

Point Arguello

34.50 34.50

Point Conception

Goleta

Santa Barbara Channel

34.25 34.25

120.5 119.75

REPORTED MAGNITUDE

8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
NO REPORTED MAGNITUDE

MAGNITUDE SYMBOL SIZES ARE SHOWN ON A CONTINUOUS NONLINEAR SCALE

INTENSITY

AMBIGUOUS LOCATION

XII
XI
X
IX
VIII
VII
VI
V
IV
III
II
NO REPORTED INTENSITY

0 5
Scale in Miles

WOODWARD-CLYDE CONSULTANTS

SEISMICITY MAP
1925 THROUGH DECEMBER 1978

Project No. **411731**
USGS CONTRACT 14-08-0001-18255

Fig. **2**

3.0 METHODS OF STUDY

The methods of study used in this investigation began with research of existing literature and analysis of aerial photographs in the office. The field phase of investigation subsequently commenced with reconnaissance field mapping, followed by detailed field mapping and subsurface investigations at selected sites. The methods are reviewed here.

Research of Historical Records

Research of historical records included contacting local newspapers, archives of local libraries, and historical societies. One of the main goals of this search was to discover detailed descriptions that would help evaluate the geologic effects of the 1902 and 1915 earthquakes. We found that historical records of these earthquakes are well summarized by Townley and Allen (1939) and by Beal (1915). Newspaper clippings add to the detail of damage reports; no reports, outside of newspapers, were found in libraries and historical societies. Henry Gewe, a long-time resident of Los Alamos could remember both the 1902 and 1915 earthquakes but could add little detail to published reports. Other long-time residents questioned could not remember the earthquakes. Lists of historical societies, libraries, and newspaper clippings that were consulted for the historical data are appended (Appendices B and C).

Low-Sun-Angle Aerial Photographic Analysis

The low-sun-angle photographic technique is used to enhance commonly subtle topographic features by shadow or illu-

mination effects produced by the sun at low angles with the horizon. For this study, the Santa Ynez Valley area was flown during the morning when there was about a 10° sun angle to the horizon. Other areas with more topographic relief were flown during a time of about a 15° sun angle.

The low-sun-angle aerial photographs were viewed by two or more geologists. Potential fault-related lineaments were marked on acetate overlays on the photos. The possibly fault-related lineaments were transferred to a 1:24,000-scale work map to allow interpretation of structural trends and continuity. The significant lineaments identified in the aerial-photo analysis coincide generally with mapped fault traces and with major structural, geomorphic, and topographic trends. Evidence of faulting or surface ground disturbance due to the 1902 and 1915 earthquakes was not identified.

The same low-sun-angle aerial photographs were used to interpret and map the various alluvial terraces associated with the Los Alamos and Baseline faults. This analysis of aerial photographs provided the basis for differentiation of the terraces and establishment of a relative chronology of their development.

Field Mapping

Field mapping included both reconnaissance and detailed levels of coverage. The major lineaments identified on aerial photographs were examined on a reconnaissance level with special attention to areas where geomorphic evidence of faulting was suspected. Also, the area between the Los Alamos fault and the Baseline fault was studied to evaluate

surface evidence of a connection between the two fault traces. Detailed field mapping centered on the Barham Ranch property along the Los Alamos fault scarp. The detailed mapping provided the basis for trench site selection and for characterization of the geomorphic features along the fault east and west of the Barham Ranch.

Topographic Profiling

A topographic profile across the Baseline fault scarp was measured using a tape measure, Brunton compass, and hand level. The profile measured the thalweg of a stream for 4,275 feet and documented displacement of the stream across the fault trace. Other topographic profiles were measured across the North Baseline lineament utilizing elevations and distances on 7-1/2-minute quadrangle sheets.

Trenches and Test Pits

Three trenches were excavated across the Los Alamos fault trace to depths of from 8 to 15 feet by a backhoe; this allowed detailed analysis of the nature of faulting and the effects of faulting on young sediments. Analysis of the trench walls provided structural and stratigraphic information. Datable materials were not found in the trenches. Of the 350 feet of trench excavated, about 325 feet were logged at a scale of 1:24 (1 inch = 2 feet).

Four test pits were excavated by backhoe in conjunction with the trenches. The purpose of the test pits was to provide stratigraphic information, datable material, and aid in determining the optimum lengths of the trenches. The test pits mainly provided stratigraphic information; they were barren of datable materials. The locations of trenches and test pits are shown in Figure 3.

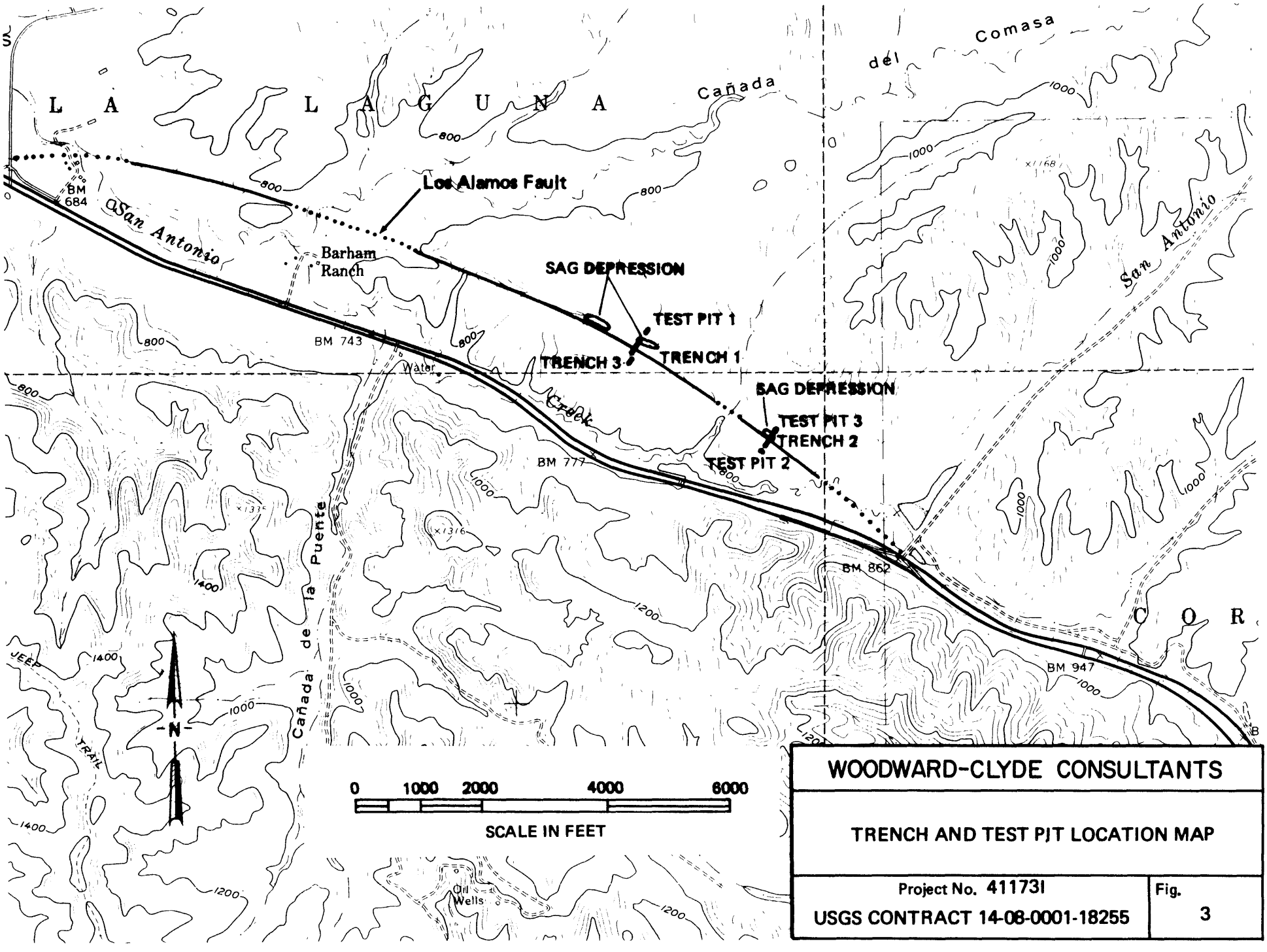
4.0 RESULTS OF INVESTIGATION

4.1 Historical Data, 1902 and 1915 Earthquakes

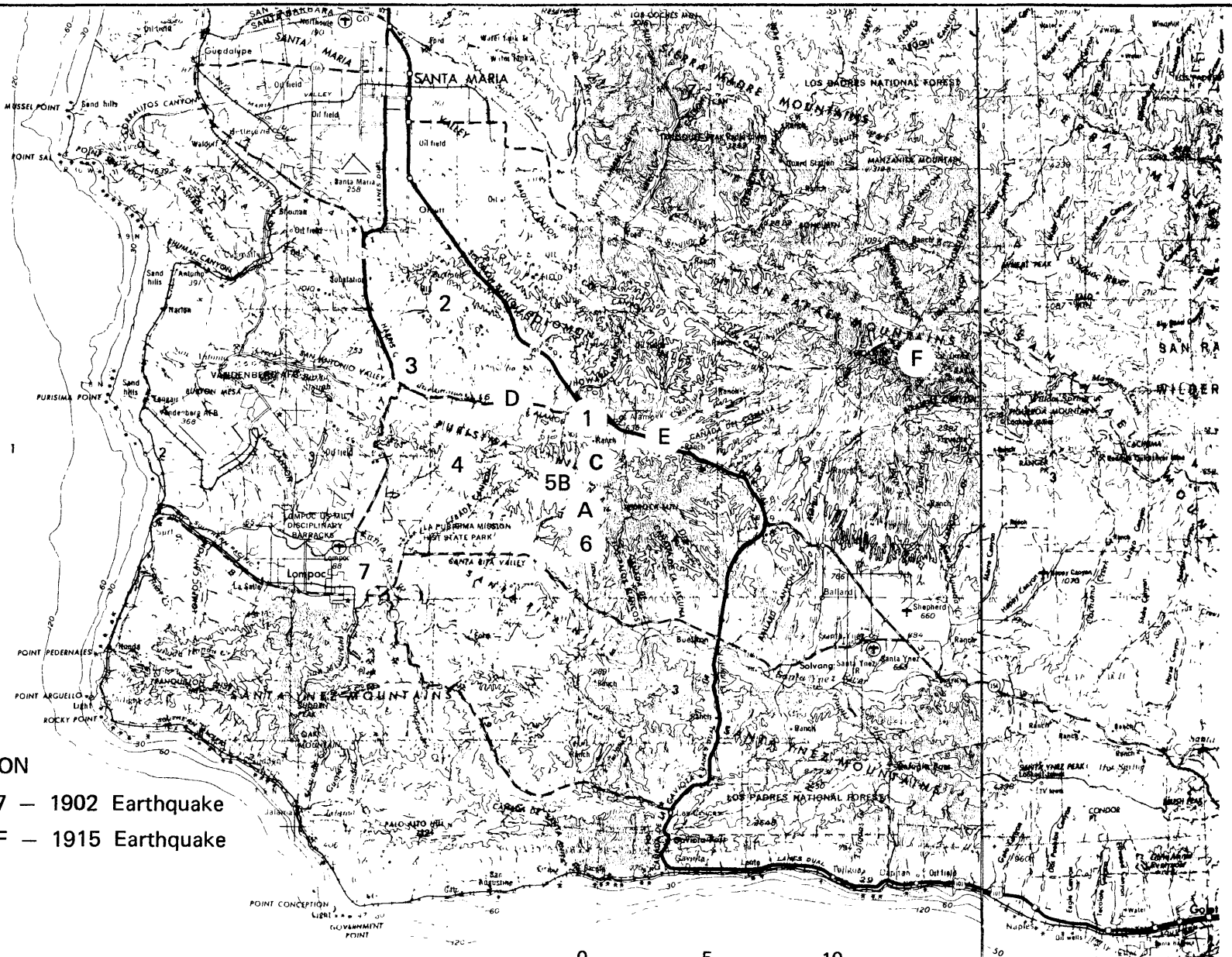
Historical data of the 1902 and 1915 earthquakes are summarized here; the back-up data for this summary from newspaper accounts and from Townley and Allen's catalog (1939) are presented in Appendices C and D, respectively. The geologic effects of the 1902 and 1915 earthquakes are summarized in Tables 1 and 2 and Figure 4. The preponderance of descriptive data is from the 1902 earthquake swarm that apparently caused the greatest damage and the most widespread geologic effects; however, the 1915 earthquake was felt over a larger area of California. Both the 1902 and 1915 earthquakes were centered near Los Alamos, where the greatest damage occurred during both of the events. The 1902 earthquakes were centered approximately 4 miles west of Los Alamos, and the 1915 earthquakes centered 2-3 miles east of the town (Townley and Allen, 1939). No surface faulting is documented for either of the earthquakes.

4.1.1 1902 Los Alamos Earthquakes

A series of locally felt earthquakes strongly shook the Los Alamos Valley in 1902 beginning with a destructive shock Sunday, 27 July at 10:57 p.m. A shock, reported as the heaviest (although not the most destructive), occurred at 7:30 p.m. on 31 July and was described as completing the damage begun on the 27th. Another very strong earthquake that occurred at 1:20 a.m. on 31 July was assigned



WOODWARD-CLYDE CONSULTANTS	
TRENCH AND TEST PIT LOCATION MAP	
Project No. 411731 USGS CONTRACT 14-08-0001-18255	Fig. 3



EXPLANATION

1 through 7 — 1902 Earthquake

A through F — 1915 Earthquake

Note: See Tables 1 and 2 for descriptions of effects

Project: USGS CONTRACT 14-08-0001-18255 Project No. 41173t	LOCATIONS OF GEOLOGIC EFFECTS FROM 1902 AND 1915 EARTHQUAKES	Fig. 4

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TABLE 1

GEOLOGIC EFFECTS REPORTED FROM THE JULY 1902 EARTHQUAKES IN LOS ALAMOS AND VICINITY
(Locations Referenced To Figure 4)

Location	Name	Description
1	Los Alamos	Ground cracked in thousands of places, some as wide as 4 feet. The cracks extended in a 15 mile strip 4 miles wide.
2	Careaga Oil Field	Large fissures in the earth; Two 3,000 barrel oil tanks smashed, one thrown 26 feet uphill.
3	Harris Station	Old creek bed began flowing 2 feet deep and 18 feet wide on 27th and was still flowing on the 31st.
4	Purisima Hills	North and northeast of Lompoc were landslides in hills. As far as the eye could see the hills had white spots where rocks were dislodged and rolled down hill.
5	Santa Rita Grade	Full of rocks and loose dirt.
6	Drum Canyon	Landslides destroyed the road.
7	Lompoc	Broken water mains. Santa Ynez River began flowing as in a freshet. The bed of the river was partly composed of quicksand and the sand shifted during shaking. At certain places, water appeared and then a short time afterward, the area would be perfectly dry. By the 31st the river was dry again.

TABLE 2

GEOLOGIC EFFECTS REPORTED FROM THE JAN. 1915 EARTHQUAKES IN LOS ALAMOS AND VICINITY
(Locations Referenced To Figure 4)

Location	Name	Description
A	Avery Ranch	Cracks in soil due to lurching, some 4 feet wide and six feet deep. Area affected was 175 feet long and 125 feet wide. An area 100 feet long and 25 feet wide subsided from 1 to 3 feet. Small landslides on hillsides. A spring increased its flow.
B	Santa Rita Grade	Ten tons of rock and soil slid and rolled onto the road.
C	Calaveras Canyon	Rock and soil on road.
D	Orania Ranch	Some springs ceased flowing while others flowed greater volumes.
E	Confaglia Ranch	Epicenter of earthquake assigned by Beal (1915).
F	Zaca Lake	The water washed onto the bank a distance of 6 feet.

magnitude 5.5 by Toppozada and others (1978) based on interpretation of intensity data. Newspapers reported that at least 70 earthquakes were felt in Los Alamos, although no complete records exist of the entire earthquake sequence. Newspaper accounts of the earthquakes and the reconstruction of the sequence of events by Townley and Allen (1939) are presented in Appendices C and D.

The first reports of damage were apparently exaggerated, having precipitated from sensationalism of the panic and damage reported in the newspapers. For example, the Sacramento Record Union (1 August) reported that "Great fissures were run in the earth, hills and knolls appeared in level valleys, springs of water opened up in places that had been dry, and the general topography of the valley was greatly changed in many respects." Such reports were commonly quoted in many different newspapers but were later rebutted as exaggerations. For example, on 2 August, the Sacramento Union reported ". . . as to the reports of great fissures in the earth, upheavals of the earth and similar stories of havoc wrought by the temblors, it is only charitable to say that they are untrue." Even with such strong counter-statements, as by the Sacramento Union, many geologic effects of the earthquake are sufficiently well documented to allow confirmation of high local intensities in Los Alamos and west of Los Alamos. Some of these geologic phenomena are summarized in the paragraphs below and in Tables 1 and 2.

The geologic effects observed include ground cracks apparently due to lurching, landslides, and changes in streams. Some accounts of the 1902 earthquakes give statements such as ". . . an area 15 miles long and 4 miles

wide was rent with gaping fissures and hills and knolls," and ". . . some cracks were as wide as 4 feet." Without doubt, some aspects of these statements are true, but little evidence exists to support the widespread effects and the nature of the ground cracks. One photographer was said to have searched for 8 hours trying to find the 4-foot-wide fissures and could not. Apparently, some fissures did appear in the Los Alamos Valley and at the Careaga oil fields but the extent of these was nowhere described.

Landslides and rock falls were quite common in the hills around Los Alamos and between Los Alamos and Lompoc. Several landslides closed the two roads between Los Alamos and Lompoc, and some landslides were said to be visible from Lompoc. Another account states that as far as the eye could see there were white spots on the mountainside where boulders had been dislodged and rolled downhill.

The initial earthquake caused the dry Santa Ynez river bed near Lompoc to begin flowing ". . . as in a freshet." Some areas of the river bed probably liquefied as they were partly composed of "quicksand" and the sand would "shift" during shaking. By 31 July, the river had stopped flowing again. In Los Alamos Valley, the Los Alamos Creek (San Antonio Creek), which had been dry for years, began flowing. At Harris, about 8 miles down-valley from Los Alamos (Fig. 4), the water was reported to be 18 feet wide and 2 feet deep on the 27th and was still flowing on the 31st.

4.1.2 1915 Los Alamos Earthquakes

On 11 January 1915, a single strong shock occurred Monday night at 8:31. The main shock was followed by as many as

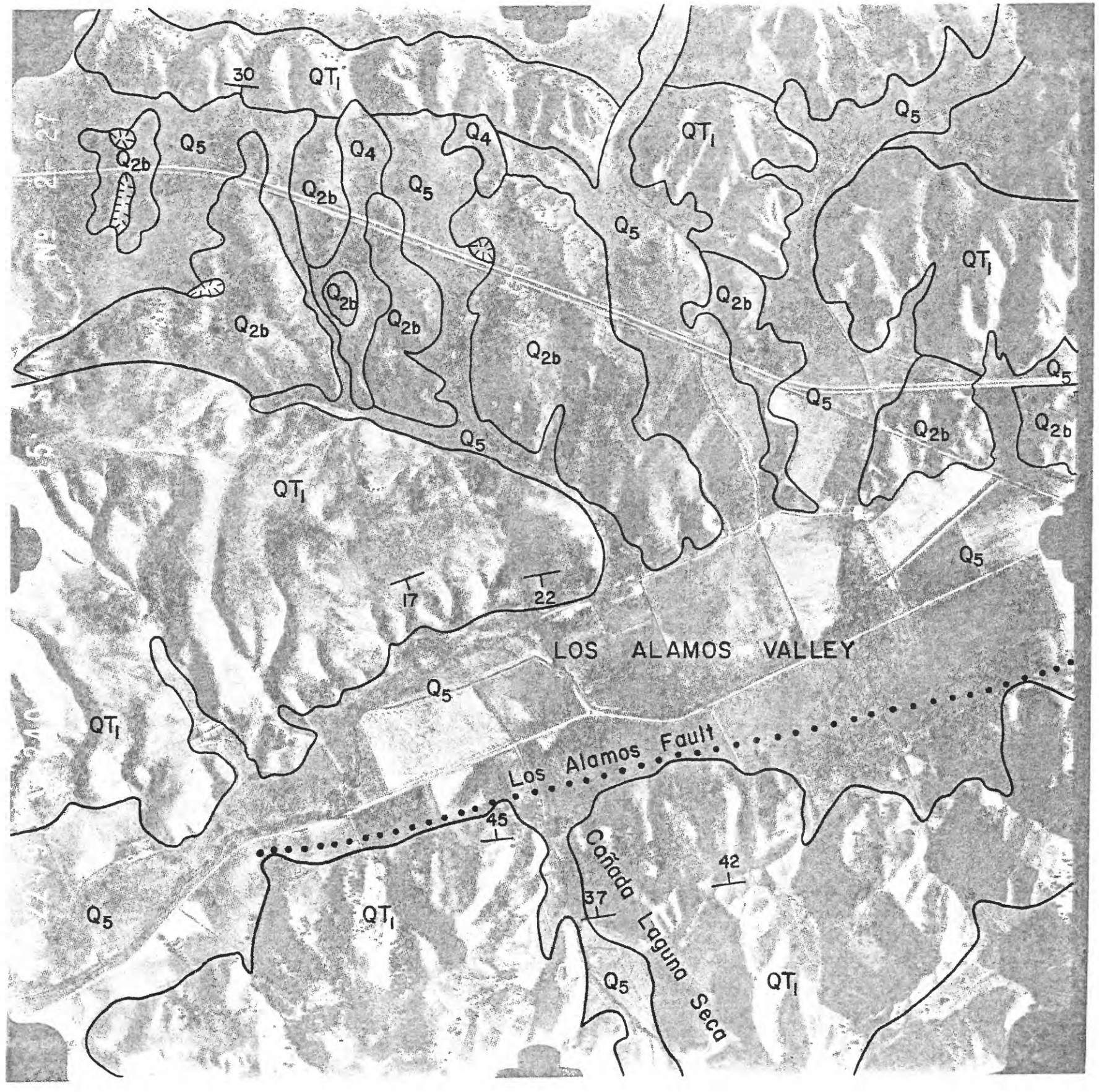
eight aftershocks before dawn of the next day, and it was followed by one to three aftershocks per day for about 30 days. The main shock lasted about 1 minute and was strongest in the vicinity of the Confaglia and Robbins ranches east of Los Alamos. The earthquake magnitude is estimated to be about 5.5 by Toppozada and others (1978). Newspaper accounts and the compilation by Townley and Allen (1939) are presented in Appendices C and D.

The geologic effects of the earthquakes are summarized by Beal (1915), who made a 9-day field reconnaissance of the affected area. Beal found no evidence of surface faulting in or around Los Alamos. He did find ground cracks due to lurching in some canyons, landslides, and changes in flow volumes in some streams. Those geologic phenomena are described in Table 2 and their locations shown in Figure 4.

4.2. Stratigraphy

The major continental stratigraphic units mapped in Los Alamos and Santa Ynez Valleys are the Paso Robles Formation, the Orcutt Sand, terrace deposits, and recent alluvium. The Orcutt sand and younger deposits have generally been considered as terrace deposits in published literature, but mapping of these units is often vague. This has resulted in much of the older terrace deposits being included in with the Paso Robles Formation and some younger terraces being included in with the Orcutt Sand.

For this study, the various strath terraces are differentiated and presented according to their relative ages and stratigraphic positions to help interpret the history of faulting along the Los Alamos-Baseline fault trend (Fig. 5). The strath terraces are identified on 1:24,000-scale



EXPLANATION

Q_5 Latest strath terrace, which forms valley floors with only modern drainage incision; also includes alluvial fans from side canyons developing on valley floor.

Q_4 Strath terrace with minor dissection, 90% of terrace surface remaining.

Q_{3b} Dissected strath terrace with 50% to 80% of terrace surface remaining.

Q_{3a} Dissected strath terrace with 30% to 50% of terrace surface remaining. The slopes from terrace surfaces to incised streams are gentle and rounded.

Q_{2b} / Q_{2a} Orcutt Sands and Gravels: Highly dissected strath terrace with 0% to 10% of terrace surface remaining; typically forms ridge-ravine topography with V-shaped stream bottoms.

QT_1 Paso Robles Formation: Continental deposits involved in regional folding without terrace surface remnants.

Topographic depression or basin

20 Strike and dip of bedding

80 Overturned bedding

D / U 30 Fault trace with dip of fault plane indicated, dotted where concealed; D - down, U-- up

Inferred, possible fault trace

(2) Note

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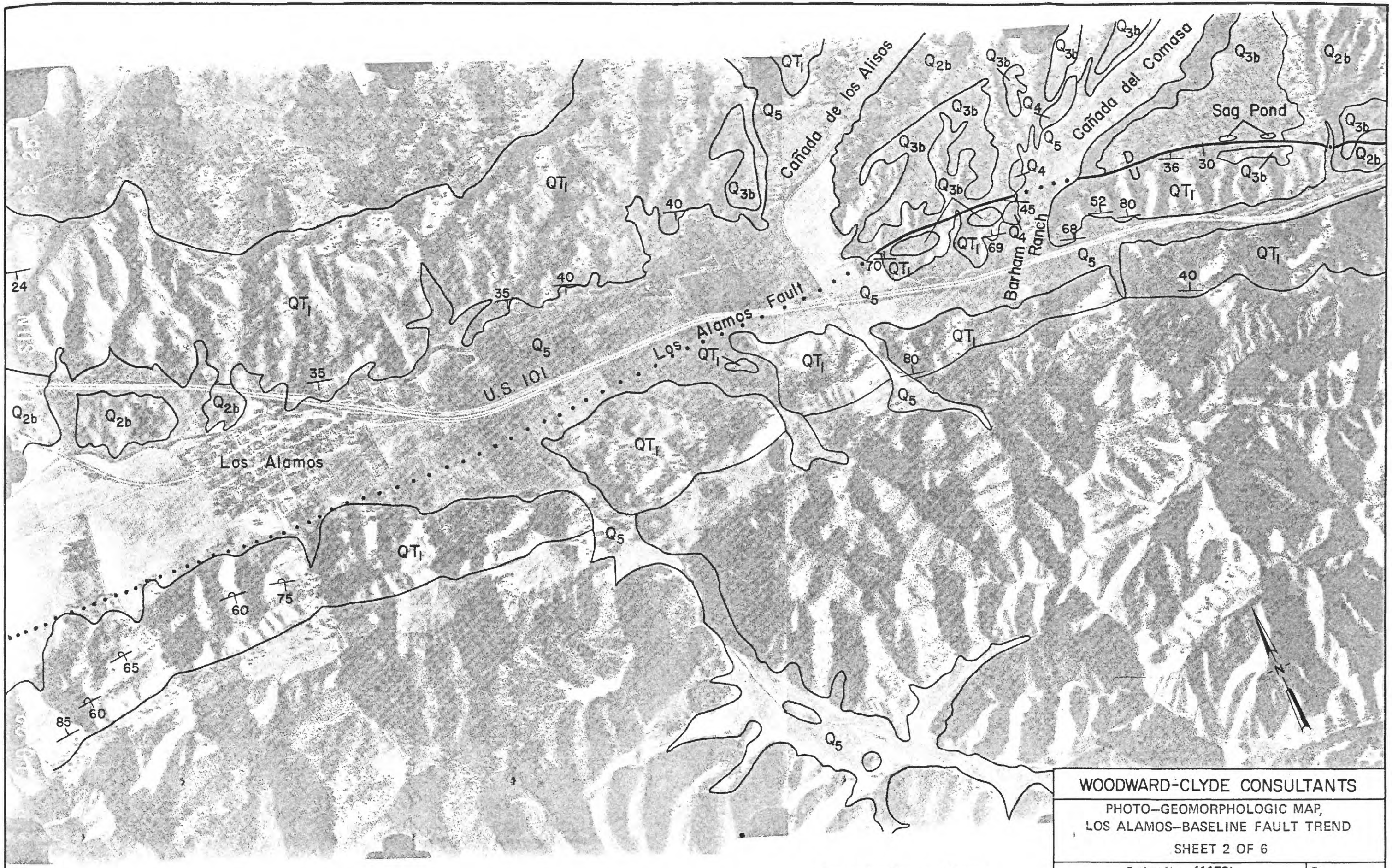
PHOTO–GEOMORPHOLOGIC MAP, LOS ALAMOS–BASELINE FAULT TREND SHEET 1 OF 6	
Project No. 41173I USGS CONTRACT 14-08-0001-18255	Fig. 5



For explanation, see Sheet 1.

WOODWARD-CLYDE CONSULTANTS

PHOTO–GEOMORPHOLOGIC MAP,
LOS ALAMOS–BASELINE FAULT TREND
SHEET 2 OF 6

Project No. 411731
USGS CONTRACT 14-08-0001-18255

Fig. 5

(1) Fault inferred at base of hill by Woodring and Bramlette, 1950.

(2) Fault suggested by Sylvester and Darrow (1979), location inferred for this study.

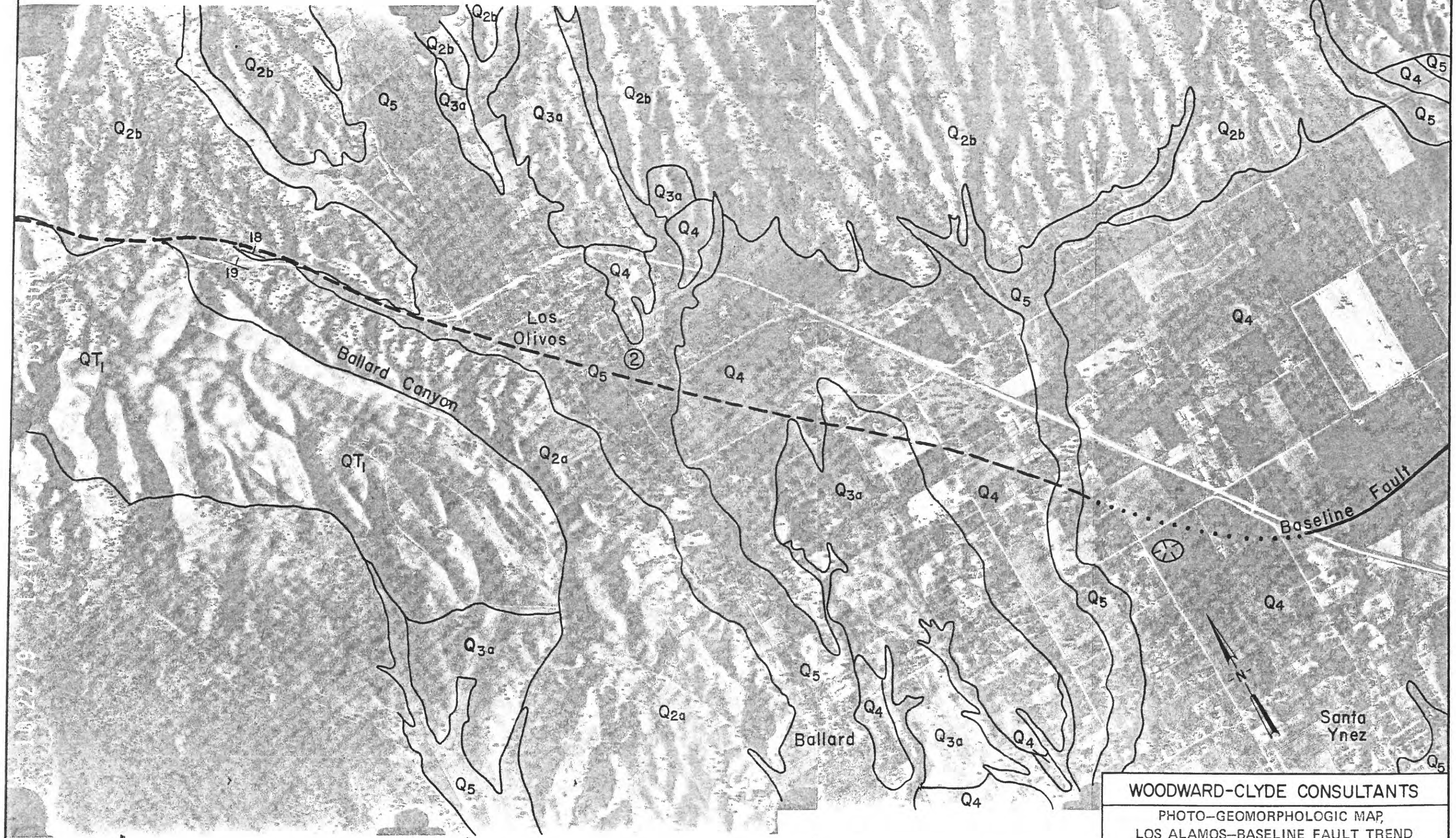
For explanation, see Sheet 1.

WOODWARD-CLYDE CONSULTANTS

PHOTO–GEOMORPHOLOGIC MAP,
LOS ALAMOS–BASELINE FAULT TREND
SHEET 3 OF 6

Project No. 411731
USGS CONTRACT 14-08-0001-18255

Fig. 5



② Fault suggested by Sylvester and Darrow (1979), location inferred for this study.

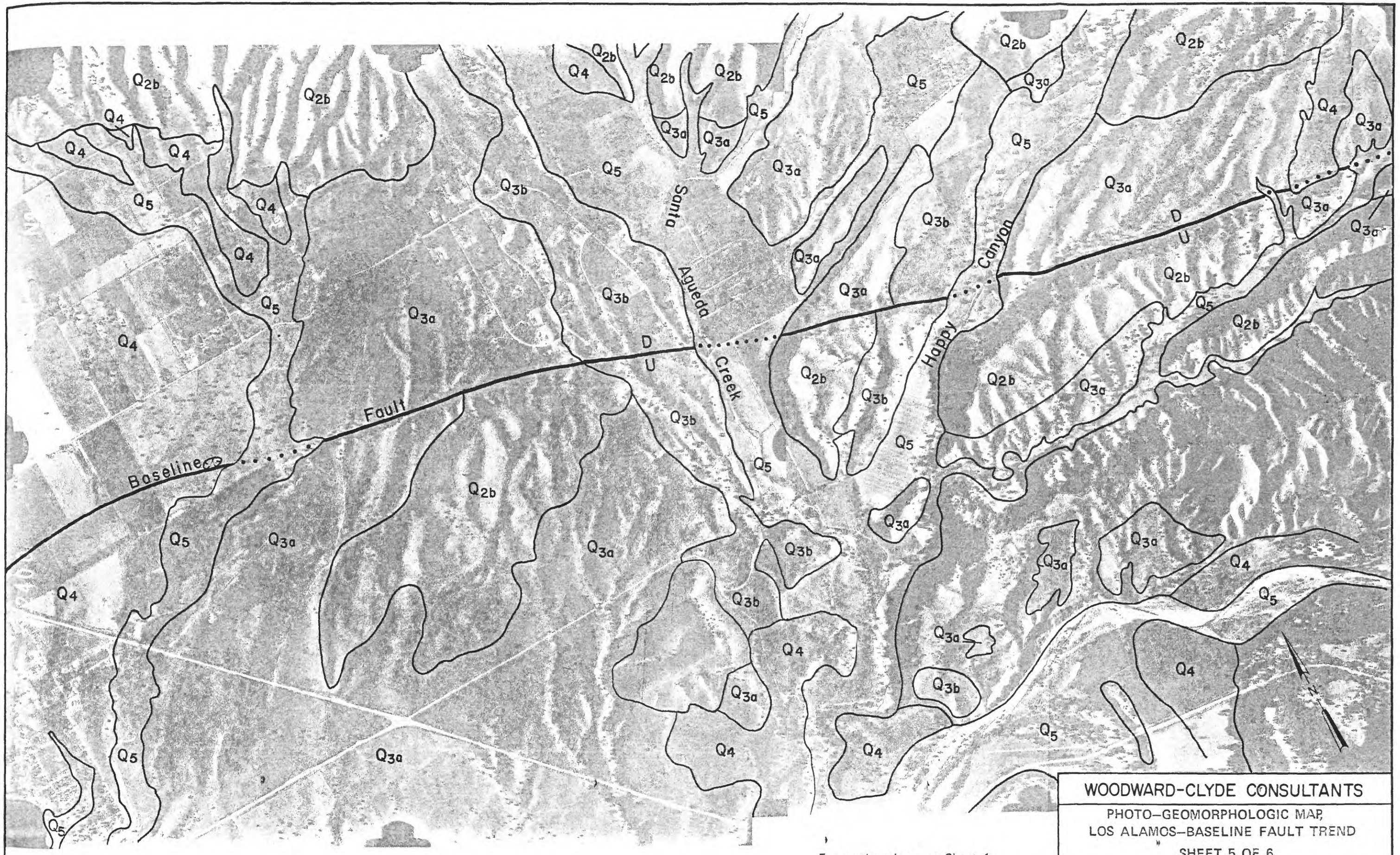
For explanation, see Sheet 1.

WOODWARD-CLYDE CONSULTANTS

PHOTO–GEOMORPHOLOGIC MAP,
LOS ALAMOS–BASELINE FAULT TREND
SHEET 4 OF 6

Project No. 411731
USGS CONTRACT 14-08-0001-18255

Fig. 5

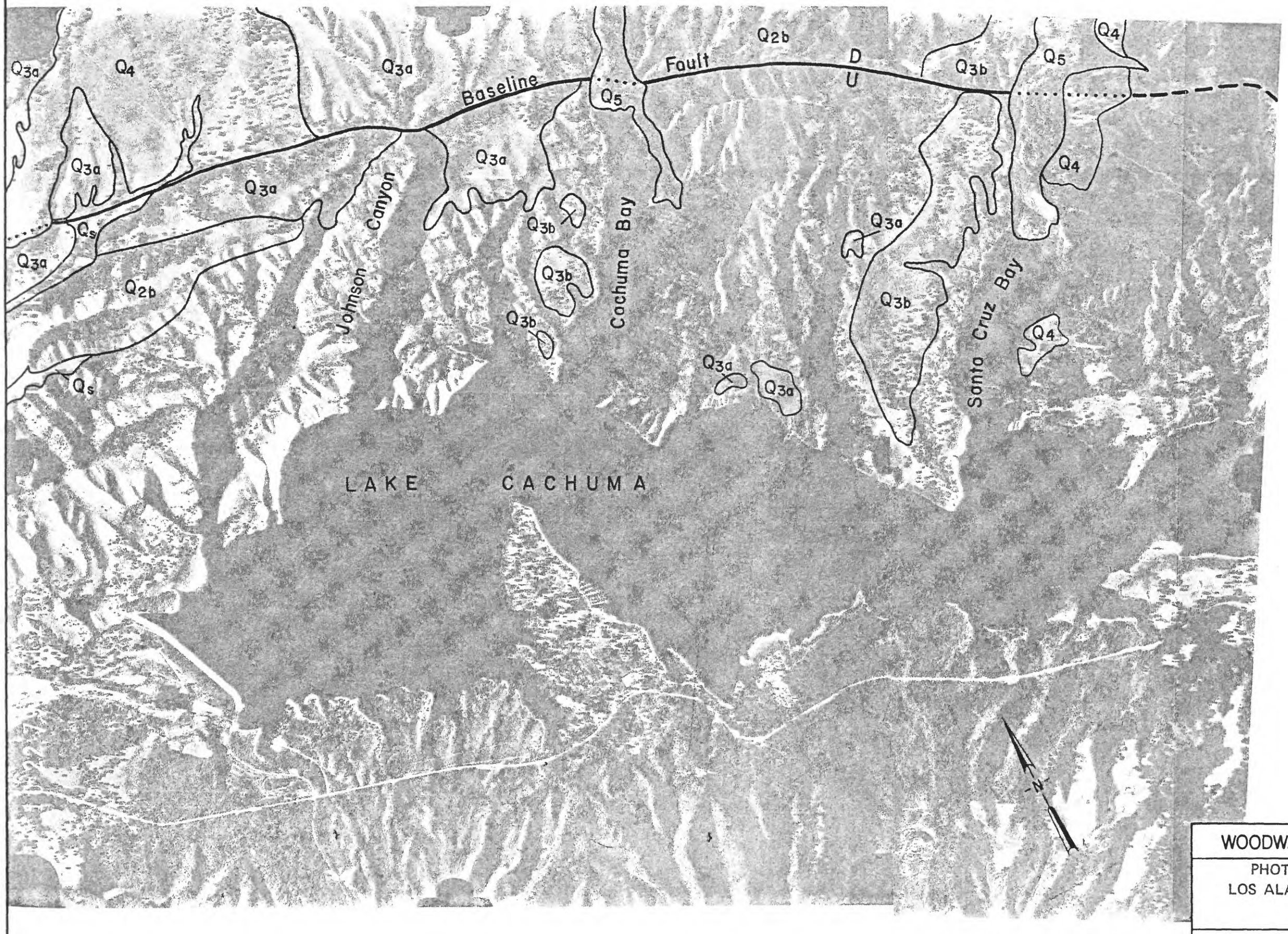


For explanation, see Sheet 1.

WOODWARD-CLYDE CONSULTANTS

PHOTO–GEOMORPHOLOGIC MAP,
LOS ALAMOS–BASELINE FAULT TREND
SHEET 5 OF 6

Project No. 411731	Fig.
USGS CONTRACT 14-08-0001-18255	5



For explanation, see sheet 1.

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PHOTO–GEOMORPHOLOGIC MAP,
LOS ALAMOS–BASELINE FAULT TREND
SHEET 6 OF 6

Project No. 411731
USGS CONTRACT 14-08-0001-18255

Fig. 5

aerial photographs and are correlated according to their relative elevations above the grade of the active streams and according to their relative degree of dissection. The distribution of the various terrace deposits is shown in Figure 5, Sheets 1 through 6. The strath terrace deposits are mapped as lithologic units, some of which have limited preservation of the actual terrace surfaces while others have terrace surfaces that are still quite well preserved. Ground-truth studies of the strath terraces were limited to geomorphologic reconnaissance along the trace of the Los Alamos-Baseline fault trend and did not include analyses of soils or lithology. Future studies should address the soil stratigraphy. Additional studies would probably discover a more detailed chronology of minor strath terraces not differentiated here. The interpretation of the strath terrace sequence as used in this report is presented in the following paragraphs. The terrace deposits are mapped numerically from 1 through 5, oldest to youngest respectively, and have "a" and "b" designations for subunits when they occur.

4.2.1 Paso Robles Formation

The continental Paso Robles Formation (Plio-Pleistocene) is the most widely distributed lithologic unit in the study area according to most published maps. In Figure 5, the Paso Robles Formation is designated as QT_1. It conformably overlies the Miocene and Pliocene marine sedimentary rocks of the Santa Maria district. The Paso Robles Formation and older marine sedimentary rocks are complexly folded and faulted to form the Solomon and Purisima Hills and the Los Alamos Valley synclinal structure. Sand and gravel are the principal constitutents of the Paso Robles. The gravels found in the study area consist mostly of pebbles of chert and cherty shale derived from the

porcelaneous Monterey Shale. Clay beds are also known in the Paso Robles. At the Barham Ranch north of U.S. Highway 101, the Paso Robles Formation consists mostly of fine-grained sand, silt, silty clay, and associated gravel lenses, with thick beds of gravels and sands increasing southward, down section.

4.2.2 Orcutt Sand

The Orcutt Sand (Pleistocene) lies unconformably on the Paso Robles Formation as well as on older formations locally. The Orcutt is composed of apparently very extensive alluvial fans and terraces that at one time sloped gently from the foot of the mountains on the east toward the ocean (Woodring and Bramlette, 1950). Unlike the Paso Robles Formation, the Orcutt Sand is only moderately folded. The Orcutt is very similar in composition to the Paso Robles, consisting of sands and gravels derived from the same source materials. Woodring and Bramlette (1950) state that wherever the Paso Robles is strongly deformed, the Orcutt can be distinguished easily from the Paso Robles by the unconformity and differing degrees of deformation. However, if the unconformity is not identified locally, the two are difficult to differentiate.

For this study, the Orcutt Sand is stratigraphically equated with the Q_{2a} and Q_{2b} strath terraces mapped in Figure 5. The term "strath terraces" used here refers to remnants of broad alluvial fans and alluvial valley floors that were graded to a common base level but are now dissected due to a change in the base level. The Q_{2a} and Q_{2b} terrace remnants define a gently sloping surface from the San Rafael Mountains toward the sea. They are the most highly dissected terraces within the study area and occupy

the highest elevations above the active stream systems. The present topography of the modern Q_{2a} and Q_{2b} terrain is characterized by V-shaped ridges and ravines roughly radiating from the source areas of Q_{2a} and Q_{2b} in the San Rafael Mountains. Less than 10% of the original terrace surface is preserved on the ridges.

The Q_{2a} and Q_{2b} terraces are differentiated from the Paso Robles Formation based on their affiliation with the ancient strath terrace surface and their stratigraphic position with respect to the Paso Robles. The Q_{2a} is essentially identical to the Q_{2b} except that the Q_{2a} is higher in elevation (approximately 40-80 feet higher) and it is found forming only the northeast side of Ballard Canyon. Assuming that the Q_{2a} and Q_{2b} are actually the same age, this anomalously limited extent of the Q_{2a} can be explained by faulting along an inferred fault shown in Figure 5 (Sheets 3 and 4). Uplift on the south side of the inferred fault consistent with the uplift found along the Baseline and Los Alamos faults would result in the Q_{2a} terrace surface being separated from the Q_{2b}, as is seen in the existing topography. This possible offset is supportive evidence for a connection between the Los Alamos and Baseline faults.

The Orcutt Sand consists mainly of sand interbedded with gravel. The gravel clasts are largely derived from the Monterey Shale, Sisquoc Shale, and some Cretaceous sandstone units (Woodring and Bramlette, 1950). Other materials forming clasts include chert, vein quartz, aplite, and volcanic rocks.

4.2.3 Younger Strath Terrace Deposits

Terrace deposits younger than the Orcutt Sand also consist of sands and gravels. Woodring and Bramlette (1950)

differentiate the stream terrace deposits, such as those abutting the Los Alamos fault scarp, from the Orcutt Sand on the basis of physiographic development. On that basis some of the Orcutt Sand may be mapped as younger terrace deposits according to Woodring and Bramlette (1950). For this report, these terraces have been differentiated according to their relative elevations and relative degrees of original terrace surface preservation. The characteristics of each terrace are described in the following paragraphs.

Q_{3a}

The areas shown in Figure 5 that are marked as Q_{3a} have approximately 30% to 50% of the original terrace surface preserved as remnants. These remnants are perched well above the active stream systems but are much lower than the highly dissected Q_{2b} surface. The terrace surfaces lying between incised streams are flat-topped and clearly represent a once-continuous surface, sloping about 1° to 2° downstream. The side slopes, from the terrace surface to the incised streams, are gentle and rounded.

Q_{3b}

The Q_{3b} surface is almont as high above the active streams as the Q_{3a} surface, and the two are often difficult to differentiate unless they are next to one another. The greatest difference between the two surfaces is that the Q3b surface is often better preserved, having 50% to 80% of the terrace surface remaining. The terrace at Barham Ranch is mapped as Q_{3b}.

Q_4

The Q_4 strath terrace is almost intact, having about 90% of the terrace surface preserved. It forms broad plains

that are undulating or incised only where locally uplifted. The terrace surface usually lies only 15 to 30 feet above the active streams.

Q_5

The Q_5 terrace forms the valley floors and is the first terrace above the active streams. The only incision in the Q_5 terrace is at the modern streams where gullies with vertical sides have been formed. The trenches excavated by Sylvester and Darrow (1979) provided a radiocarbon date of 1800 $\pm$ 130 years from the Q_5 mapped in Happy Canyon (Fig. 5, Sheet 5). As mapped, the Q_5 terrace also includes the active streams and the alluvial fans issuing from side canyons that are developing on valley floors.

4.3 Aerial Photographic Fault and Lineament Interpretation

4.3.1 Baseline Fault

The low-sun-angle aerial photographs show coverage of the Baseline fault from east of Lake Cachuma through the Santa Ynez Valley (Figs. 1 and 5). Lineament trends along the fault are described below from east to west; included are interpretations of the geomorphology and significance to surface faulting.

From east of Santa Cruz Bay on Lake Cachuma to Windsor Canyon (Figs. 1 and 5) several lineaments align along the probable fault trace suggested by Sylvester and Darrow (1979). The lineament is generally expressed by uplifted topography on the southwest side with respect to the northeast side. Several Quaternary terrace remnants on the northeast side butt against the lineament, having been down-dropped relative to the southwest side. For the most part, the topography on both sides of the fault is

highly dissected, causing the lineament to be discontinuous and somewhat vague along this stetch of the trend.

From Santa Cruz Bay westward to Santa Aqueda Creek (Figs. 1 and 5, Sheets 5 and 6), a distance of six miles, the lineament is very prominent and offsets several alluvial terraces of varying ages northeast and southwest across the Baseline fault. Along the northeast side of the fault there are at least four dissected terraces of different ages down-dropped relative to their counterparts on the southwest side. On the southern side of the fault there is a highly dissected terrain with scattered remnants of terrace surfaces 50 to 120 feet higher than on the northeast side. The lineament between the two geomorphic terrains forms a prominent north-facing scarp. Several small streams flowing southward are deflected along the scarp, but the larger streams are antecedent and cut through the scarp. The degree of dissection and the presence of antecedent streams are evidence that the remnants of the terrace surfaces on either side of the scarp were continuous prior to faulting.

Three to six miles northwest of Lake Cachuma the lineament trends across the Santa Ynez Valley to about one mile north of Santa Ynez (Fig. 5, Sheets 3 and 4). The lineament consists of a fault scarp that gradually diminishes in height westward and is lost in the alluvial plain of the valley. Geomorphic features along the scarp include deflected drainages, common antecedent streams, and at least one wind-gap stream channel perched on the south side of the scarp. Several wet spots are present in alluvium along the projected fault trace in Santa Ynez Valley; these may mark a continuation of the fault in the alluvium northwestward toward Los Olivos. Several weakly expressed lineaments project from the northwestern end of the

Baseline fault scarp toward Los Olivos and the upper Ballard Canyon area (Figs. 1 and 5, Sheet 4). South of the inferred fault some of the streams are incised and may be antecedent across a gentle uplift or fold in Q4 alluvium there (Fig. 5, Sheet 4). This relationship could also be interpreted as headward erosion of streams draining into the Santa Ynez River.

4.3.2 Los Alamos Fault

Weak lineament trends through Los Olivos and extending to the northwest may connect the Baseline fault to the Los Alamos fault (Figs. 1 and 5, Sheets 3 and 4). Evidence from aerial photographs supporting this interpretation is not compelling, but differences in topographic relief and geologic units in the area does support a connection. A similarity in style of surface faulting also indicates a common structural origin for the two faults. The Los Alamos fault has the same sense of displacement as the Baseline fault, with the northeast block down relative to the southwest block.

The Los Alamos fault was mapped in upper Los Alamos Valley by Woodring and Bramlette (1950) from along the northern edge of the Purisima Hills, across Highway 101, along the north edge of the Los Alamos valley for about 3 miles, and to the mouth of Canada de los Alisos (Fig. 5, Sheets 2 and 3). The lineament trend along the eastern part of this mapped trace is expressed by north-facing scarps and patches of alluvium butted against the base of the scarps. This geomorphic relationship is similar to that found along the Baseline fault, but the Los Alamos scarp is neither as extensive nor as prominent. Wet spots or sag ponds align at the base of the Los Alamos fault scarp.

Lineaments along the Los Alamos fault extend from Canada de los Alisos westward along two possible extensions of the fault, one following the south side of Los Alamos Valley and the other on the north side of Highway 101 and nearly parallel to it (Fig. 1). A series of low knolls along the south side of Los Alamos Valley align with the surface projection of the Los Alamos fault and represent the proper sense of displacement for the fault. The lineament on the north side of Los Alamos Valley is not particularly linear but does trend parallel to bedding and projects to a structural sag through the Solomon Hills and Solomon Canyon.

4.3.3 Solomon Canyon Fault

The lineaments in Solomon Canyon trend northwest along the bedrock-alluvium contact parallel to Highway 101 (Figs. 1 and 5, Sheet 1). The lineaments extend discontinuously from Los Alamos to near Orcutt. Lineaments northwest of Los Alamos are along sharp bedrock contacts and vegetation contrasts. The lineaments are parallel to the bedrock structure and may be controlled by both rock type changes and bedding planes, especially where bedding plane slopes are abutted by alluvium. No evidence of fault control is apparent near Los Alamos, although near Orcutt, Woodring and Bramlette (1950) infer a fault in the subsurface at Solomon Canyon (Fig. 1). The sense of movement on that inferred fault is down to the northeast. Field examinations revealed no surface evidence for a fault there.

4.3.4 Northern Baseline Fault

A lineament 2 miles north of Lake Cachuma and subparallel to the Baseline fault (Fig. 1) forms a definite break in the topography and is clearly marked by faceted ridges and numerous breaks in slope within Plio-Pleistocene

sedimentary rocks. No fault has been mapped along the lineament, but the geomorphic expression strongly suggests dip-slip faulting with the south side down relative to the north side. The lineament can be clearly seen for approximately 6 miles from Cachuma Creek to Santa Aqueda Creek (Fig. 1). East and west of that segment, the lineament can be inferred through saddles in ridges, but the vertical component of separation is not as clearly apparent. The lineament is interpreted to be fault controlled and is referred to as the Northern Baseline fault for this report.

The Northern Baseline fault appears to form the northern side of a structural graben that is wedged between the Northern Baseline and Baseline faults. This graben configuration would be consistent with a left-lateral component of wrench faulting and/or with north-northeast compression and resultant reverse faulting along the graben boundaries. A field reconnaissance along the western portion of the lineament revealed no exposures of a fault but discovered a persistent topographic drop of the dissected fan surface on the south side of the lineament.

4.4 Field Mapping and Geomorphic Interpretation

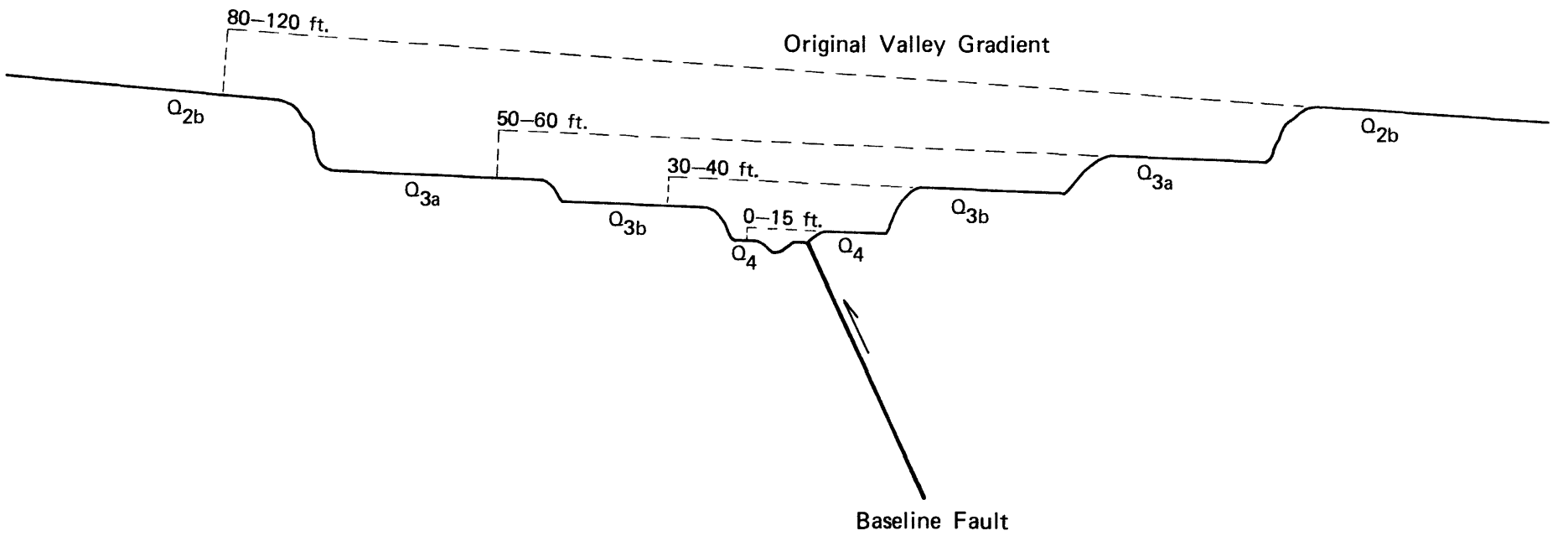
4.4.1 Baseline Fault

The Baseline fault forms a prominent scarp in the topography along which it vertically offsets the Q_{2b}, Q_{3a}, Q_{3b}, and Q_4 terraces and deflects many streams at the base of the scarp. Study of those streams and their morphology with respect to the fault scarp has provided insight into the style of faulting and history of the Baseline fault.

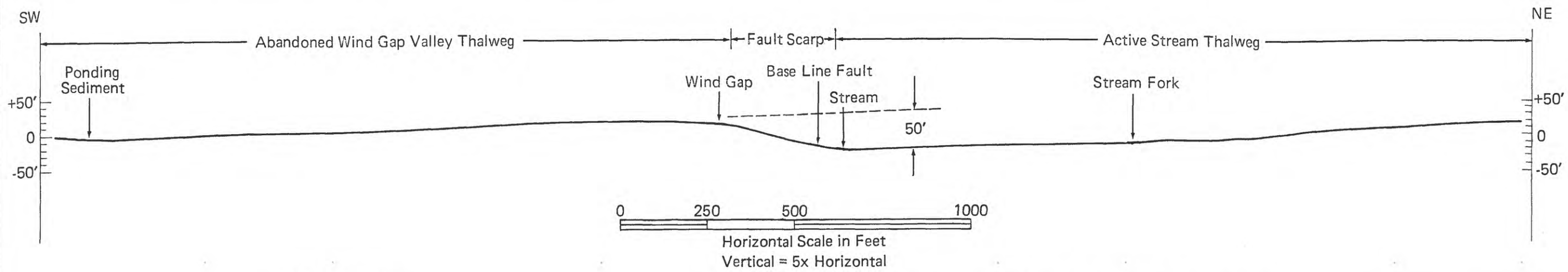
The Baseline fault has been active at least since the time of formation of the Q_{2b} terrace because the amount of offset on the younger strath terraces across the fault is

progressively less from the Q_{2b} through the Q_4 terrace. No evidence of offset on the Q_5 terrace is visible in the aerial photographs. Approximate amounts of offset of terrace surfaces just west of Santa Agueda Creek are: Q_{2b}, 80 to 120 feet; Q_{3a}, 50 to 60 feet; Q_{3b}, 30 to 40 feet; and Q_4 0 to as much as 15 feet. A schematic diagram of these offset terraces is shown in Figure 6. These approximate offsets are based on estimates from the 7-1/2-minute topographic sheets and brief inspection in the field. It is also interesting to note that the larger streams are antecedent to the scarp. This indicates that those streams were effective in cutting through the scarp as it developed and implies that the rate of faulting and the amount of individual displacements across the larger streams were not sufficient to deflect or pond the streams. Thus the terrace development occurred on both sides of the fault trace contemporaneous with the faulting.

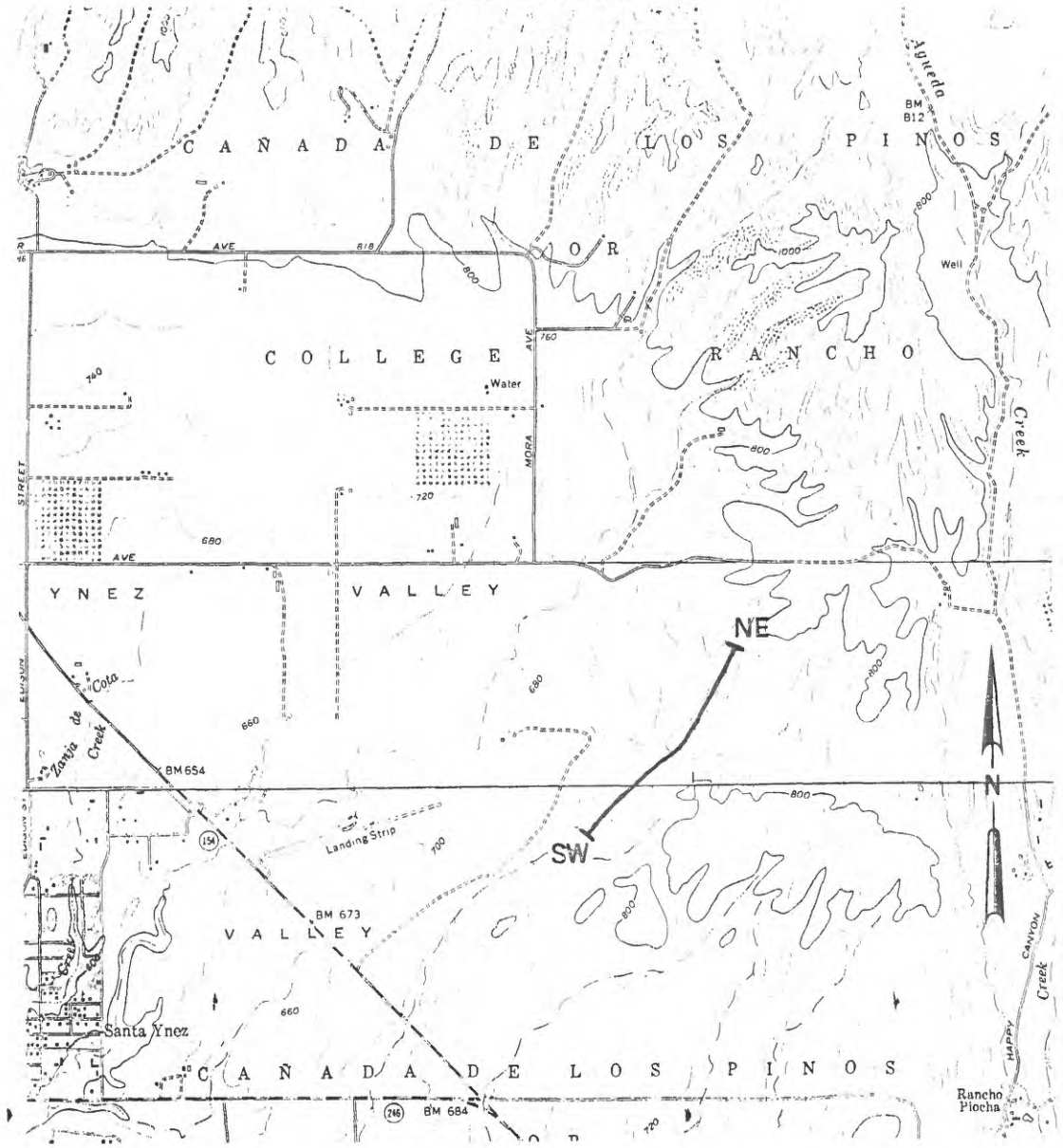
Most of the smaller streams are deflected and have no abandoned or ancestral channel on the south side of the scarp, which indicates that they developed after the scarp began forming. One stream, however, does appear to have been antecedent and then was abandoned when the stream was finally deflected by the growing scarp. The abandoned stream channel now remains as a wind-gap stream that opens through the scarp and has a down-dropped and deflected head water source. The thalweg profile of that abandoned stream channel and its deflected headwaters are shown in Figure 7. The thalweg profile exhibits the approximate amount of offset (50 feet) across the fault since the stream changed course. It is important to note that we could observe only slight to no right-lateral offset of the stream from aerial photograph analysis and field examination



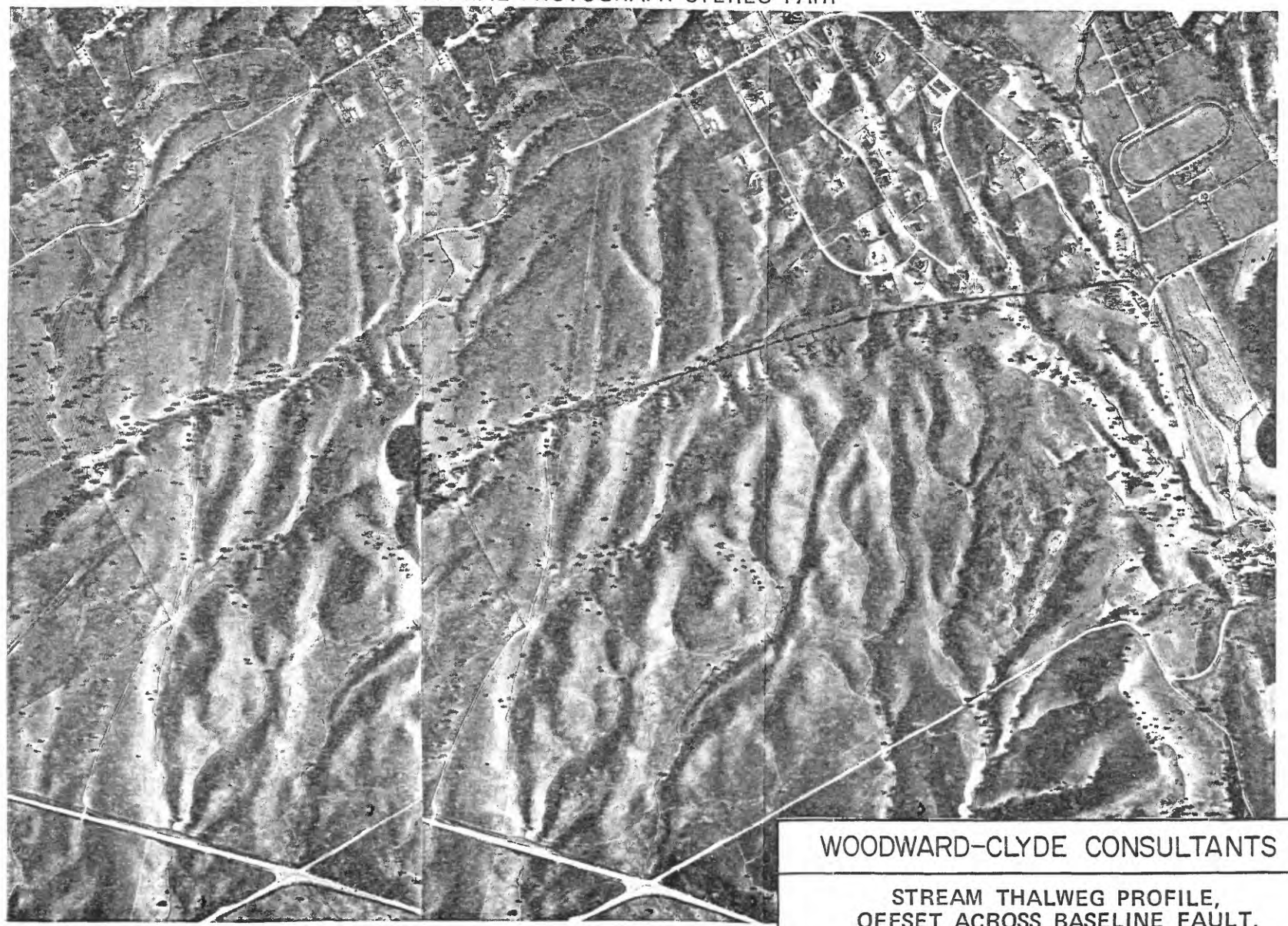
Project: 411731 Project No. USGS CONTRACT 14-08-0001-18255	SCHEMATIC DIAGRAM OF TERRACE SEQUENCE WITH RESPECT TO BASELINE FAULT	Fig. 6



LOCATION MAP



AERIAL PHOTOGRAPH STEREO PAIR



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STREAM THALWEG PROFILE, OFFSET ACROSS BASELINE FAULT, CRAWFORD RANCH

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Fig. 7

(Fig. 7). Other antecedent streams along the Baseline fault have no indication of lateral offset. These data are in contrast to the expected left-lateral component of slip accompanying the thrust faulting of the Transverse Ranges.

Examination of the abandoned stream channel in the field indicates its southern end is cut off and partly filled by sedimentation from an active stream system that it intersects. Thus, the downstream portion of the abandoned stream is shallowly ponded, as shown on the thalweg profile of Figure 7. This morphology is supportive evidence for the stream having been formed during a time of different stream processes and then having been beheaded by the fault.

4.4.2 Los Alamos Fault

The Paso Robles Formation is steeply tilted 40°-70° northward into the Los Alamos fault along its scarp. Woodring and Bramlette (1950) mapped the Paso Robles bedding as steepening toward the fault, presumably from the effect of drag folding on the uplifted block. The fault itself is mapped coincident with a synclinal fold axis trending into Los Alamos Valley. The areas both east and west of the mapped Los Alamos fault were examined during field mapping in order to detect similar structural trends that may represent extensions of the fault. West of Barham Ranch the fault probably follows the south side of Los Alamos Valley and dies out, whereas, east of the ranch the fault seems to connect with the Baseline fault.

Barham Ranch

The Barham Ranch is located 2.5-4 miles southeast from the town of Los Alamos at the head of the Los Alamos valley (Figs. 3 and 5, Sheet 2). A rather prominent north-facing

fault scarp traverses west-northwest across the ranch property north of Highway 101 (Fig. 5, Sheets 2 and 3). Along the fault scarp, a high ridge on the south side is butted against an isolated, flat-topped Q_{3b} terrace remnant, which slopes southward into the scarp. The scarp is approximately 70 feet in height at its highest point and decreases in height both to the east and to the west. The total length of the scarp is 2 miles. At the west end of the scarp, the fault enters the Los Alamos valley floor where younger Q_5 alluvium obscures it. The east end of the scarp seems to die out within the Q_{2b} terrace deposits before entering the Los Alamos Valley floor.

Three enclosed depressions occur along the base of the fault scarp. Those depressions are generally dry but fill with water during the rainy season. The depressions lie within a topographic trough that was formed from either warping or erosion by a possible deflected stream similar to streams found along the Baseline fault. The view of the photo in Figure 8 is toward the west along the base of the fault scarp, with the westernmost and largest sag pond shown in the background. Trenches and test pits were excavated in and across two of the sag depressions. Locations of these are shown in Figure 3. Unfortunately, the trenching program discovered that the intermittent nature of the sag ponds creates an unfavorable environment for deposition and accumulation of carbonaceous material, thus age dating was not possible.

At the east end of the scarp, the geomorphic extension of the fault should intersect a stream-cut slope (Fig. 5, Sheet 3). At that site, a stream meander undercuts the slope and produces a 10-15-foot-high exposure of Q_{2b} terrace deposits (Orcutt); however, no evidence of faulting

View looking west toward largest sag pond at base of scarp.

Project: 41173I Project No. USGS CONTRACT 14-08-0001-18255	LOS ALAMOS FAULT SCARP	Fig. 8

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was found in the outcrop and field evidence of the fault was not found east of that location.

West of Barham Ranch

South of Los Alamos, adjacent to the synclinal valley, the first anticline encountered is a rather tight fold overturned to the north (Fig. 5, Sheet 2). The overturned fold is parallel to the Los Alamos Valley and to the Los Alamos fault mapped to the east. The youngest overturned rocks belong to the Plio-Pleistocene Paso Robles Formation. In adjacent hills to the north and south of Los Alamos Valley, bedding typically has much more gentle dips, which range from nearly horizontal to 30° on the flanks of folds. By comparison, the overturned anticline seems to be rather severe local deformation similar to that adjacent to the Los Alamos fault. Although the overturned fold is not faulted, according to Woodring and Bramlette (1950), the north flank is a likely place for a possible thrust fault.

Given the structural trend of the Los Alamos fault and the results of the lineament analysis, it seems most probable that the Los Alamos fault extends west from the Barham Ranch along the south side of Los Alamos Valley. The lineament analysis of the area west of Barham Ranch revealed the alignment of several low knolls on the south side of the Los Alamos fault projection. This trend also aligns with the south side of Los Alamos Valley adjacent to the overturned anticline. Because the severity of local deformation along the fault and along the overturned fold are comparable, and because the structural style is consistent with reverse faulting, we prefer to interpret the continuation of the Los Alamos fault along the south edge of the valley rather than the extension northward from Los Alamos, as suggested by Sylvester and Darrow (1979). Our

interpretation is supported by the location of some small southward-dipping shear surfaces found during the field reconnaissance south of Los Alamos in the Paso Robles Formation. Although the small shear surfaces may only be local features, they are consistent with reverse faulting. Also, Arnold and Anderson (1907) discuss reverse faulting accompanied by several hundred feet of down-to-the-north offset located at the mouth of Canada Laguna Seca along the north flank of the overturned fold west of Los Alamos.

East of Barham Ranch

East of Barham Ranch, the fault projection may exist between the Orcutt Sand and Paso Robles Formation contact shown in Figure 5, Sheets 2 and 3. Although the steeply dipping bedding in the Paso Robles (QT_1) diminishes to dips between 20° and 35° in the Orcutt Sand Q_{2b} deposits, a synclinal fold structure does extend eastward. The syncline has rather gentle flanks and can be traced as far east as midway between Highway 101 and Los Olivos (Fig. 5, Sheet 3). The syncline parallels the trend of the postulated connection between the Los Alamos and Baseline faults but is slightly north of it. If the syncline has associated faulting, as at the Barham Ranch, it could almost fill the structural gap between the Los Alamos and Baseline faults.

East of Highway 101, the synclinal fold axis aligns with several saddles in ridges, but exposures of the synclinal axis and faulting are not present. Between Highway 101 and Los Olivos, the bedding in Q_{2b} deposits gently dips 10° to 20° to the north where it is exposed in road cuts and abandoned railroad cuts. These dips indicate that the synclinal axis is north of the road (Fig. 5, Sheet 4). Although the structural evidence observed in the

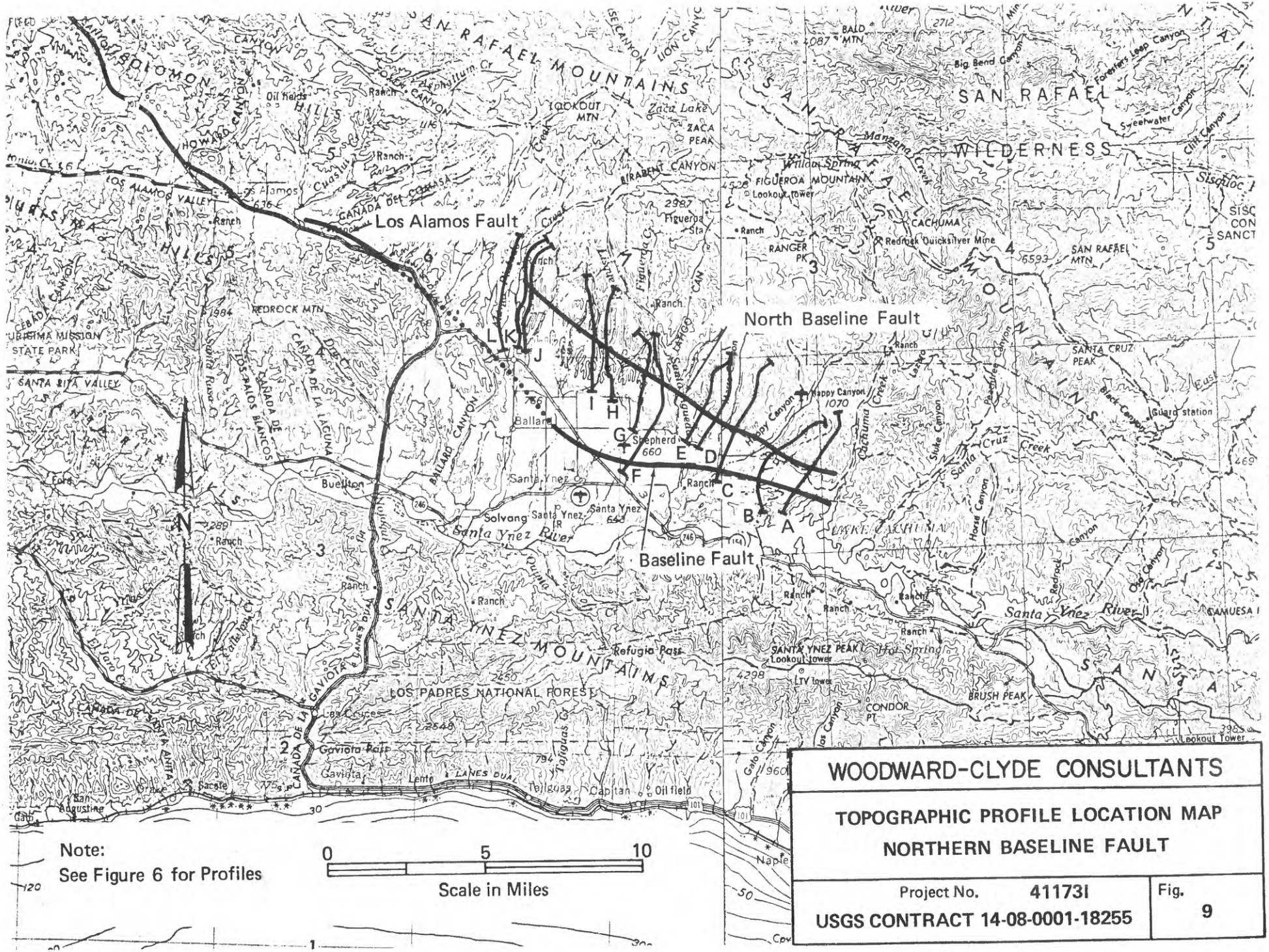
field cannot confirm a connection between the Los Alamos and Baseline faults, generally high topography and some high perched terrace deposits south of the projected synclinal axis are supportive geologic evidence of faulting.

As stated in the discussion of stratigraphy, Section 4.3.2, the differentiation of the Q_{2a} and Q_{2b} strath terraces is based on an elevation difference of about 40 to 80 feet. Otherwise the two terrace remnants appear identical on aerial photographs and are composed of the same sediments. If the two terraces are the same age and origin, the difference in elevation would confirm the presence of a fault probably connecting the Baseline and Los Alamos faults.

4.4.3 Northern Baseline Fault

A prominent lineament, the Northern Baseline lineament, is roughly parallel to the Baseline fault and from 1 to 3 miles north of it (Fig. 1). The lineament is easily recognized on aerial photographs and from the air as a series of faceted ridges along a linear mountain front trending northwest and bounding the north side of Santa Ynez Valley (Fig. 9). At the lineament's west end, west of Santa Agueda Creek, it traverses a highly dissected older alluvial fan of the Q_{2b} strath terrace that emerges from the San Rafael Mountains. Field examination of the lineament there reveals an apparent vertical offset of the Q_{2b} surface, with the southwest side down. No exposures of faulting could be found in the vicinity along the lineament.

In order to evaluate the apparent offset of the Q_{2b} surface and to compare the morphology of the lineament along its trend, a series of topographic profiles were



WOODWARD-CLYDE CONSULTANTS	
TOPOGRAPHIC PROFILE LOCATION MAP NORTHERN BASELINE FAULT	
Project No. 411731 USGS CONTRACT 14-08-0001-18255	Fig. 9

constructed across the lineament (Fig. 9). The profiles were measured from existing 7-1/2 minute U.S. Geological Survey topographic maps. The profile locations were selected along topographic highs such as ridge lines and remnants of the Q_{2b} fan surface. Therefore, the profiles should approximate the highly dissected Q_{2b} surface prior to the deep dissection. The profiles are shown from east to west in Plate 1; their locations are shown in Figure 9.

The rather prominent south-facing scarp of the Northern Baseline lineament clearly appears on profiles A through E and is evidence for a fault along the trend. (For purposes of discussion it will be called the Northern Baseline fault). Profiles A and B illustrate the graben-like structure between the Northern Baseline fault and the Baseline fault. Profiles F through L are located west of Santa Agueda Creek in the dissected Q_{2b} terrain. Those profiles are interpreted as having an amount of offset of the dissected Q_{2b} surface that decreases across the Northern Baseline fault from east to west. Profile L indicates no relative difference in elevation of the Q_{2b} surface across the North Baseline fault. Those topographic data are evidence of a fault that probably has a decreasing amount of surface faulting westward along its trace until it dies out in the vicinity of Figueroa Mountain Road due north of Los Olivos.

4.5 Trench Excavations

Three trenches were excavated along the Los Alamos fault trace (Figs. 3, 10, 11, and 12). The first two trenches exposed the Los Alamos fault and were logged at a scale of 1:24 (1 inch = 2 feet). The trench logs are presented as Plates 2 and 3 (in pocket). The third trench was excavated near trench No. 1, but higher on the scarp, across a subtle

Trench No. 3

Color Change

Los Alamos Fault Trace

Fig. 10
Overlay

Change in color tone of spoils pile marks fault trace. (Photo taken facing south toward fault scarp).

Project: 411731 Project No. USGS CONTRACT 14-08-0001-18255	TRENCH NO. 1	Fig. 10

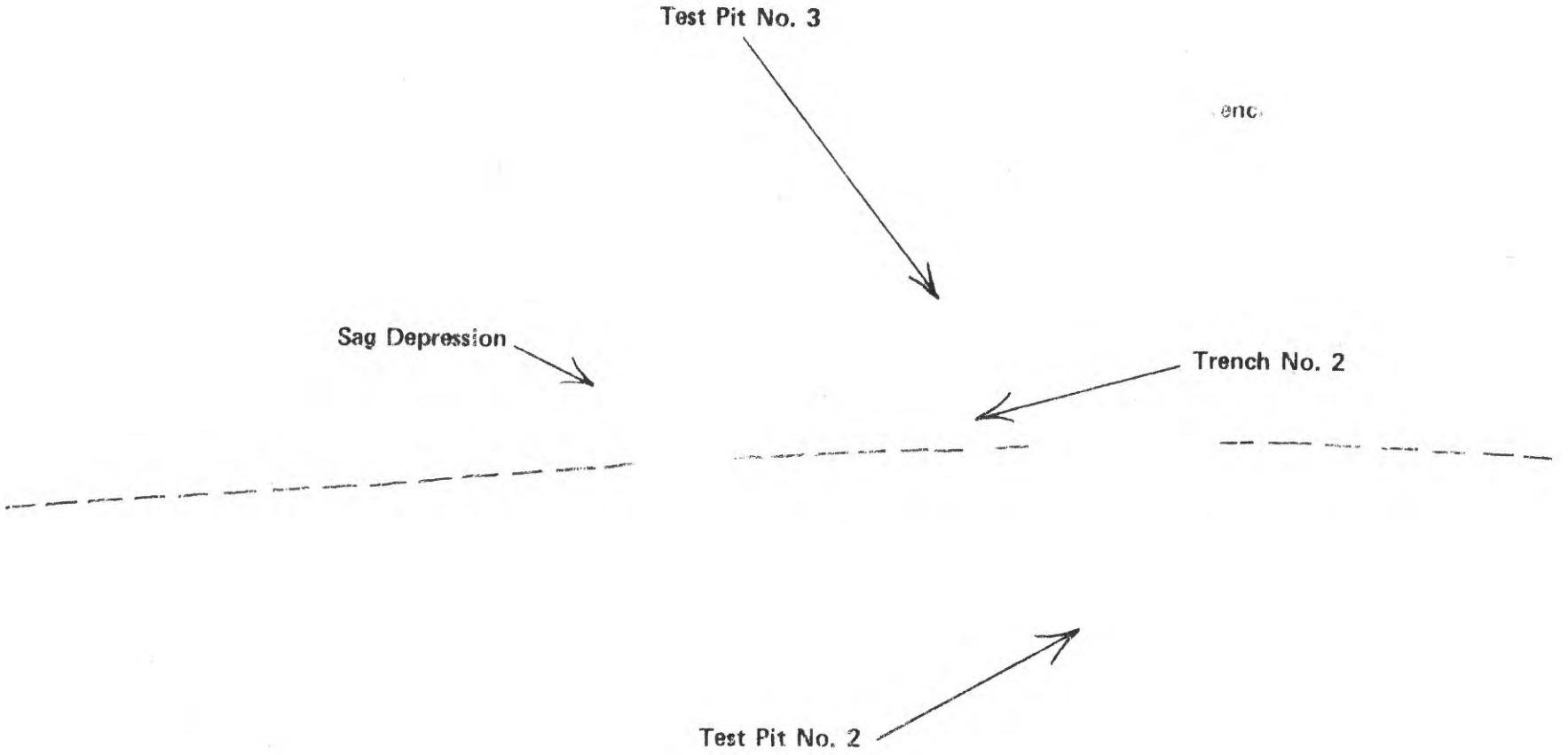
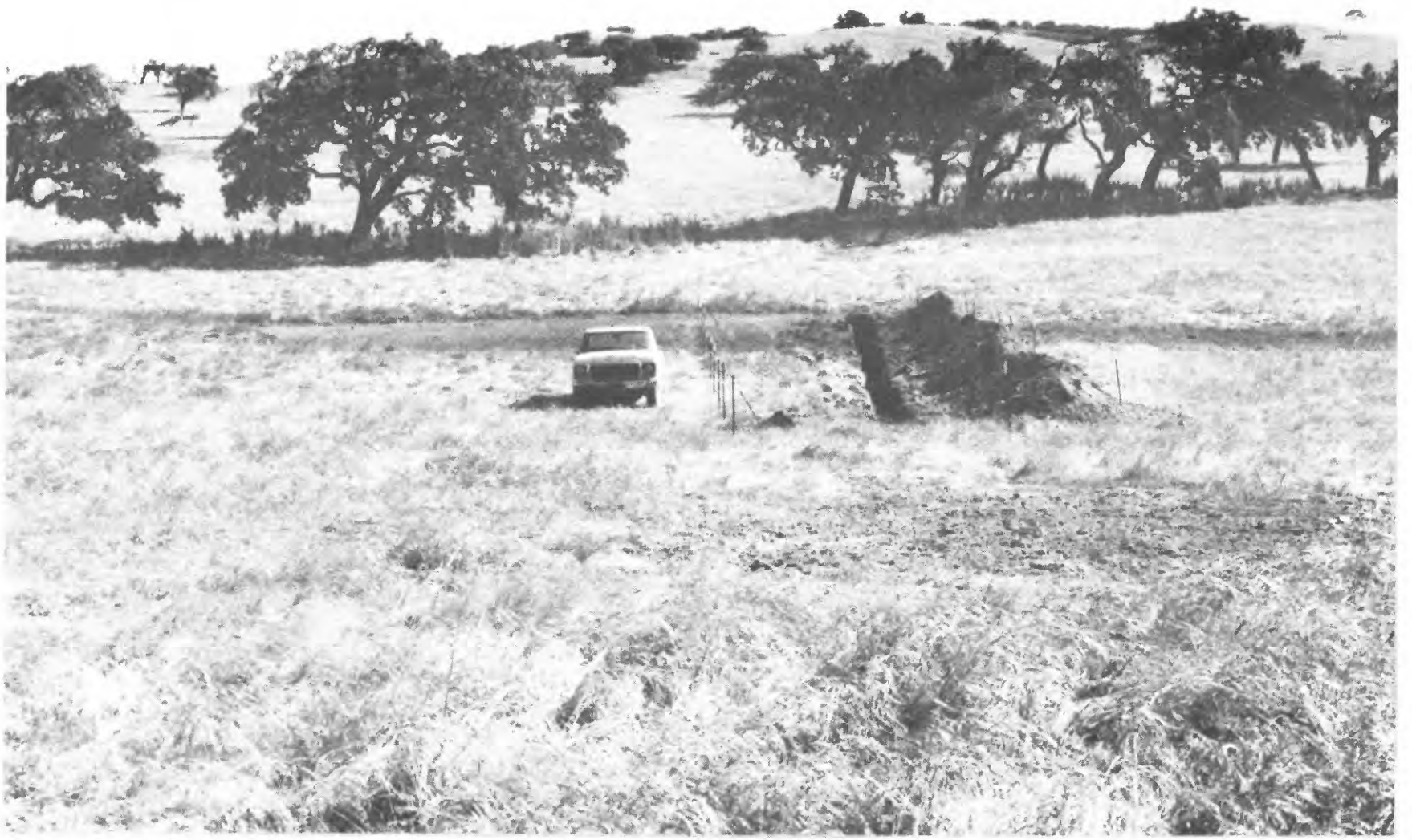


Fig 11
Overlay



Location of trench and test pits relative to sag depression and fault scarp. (Photo taken facing north from top of fault scarp).

Project: 41173I Project No. USGS CONTRACT 14-08-0001-18255	TRENCH NO. 2	Fig. 11

Backhoe is excavating Trench No. 3 uphill from Trench No. 2.

Project: 411731 Project No. USGS CONTRACT 14-08-0001-18255	TRENCH NO. 3	Fig. 12

break in slope (Fig. 11). The trench exposed only the depositional contact between coarse-grained Q_{3b} terrace deposits and the underlying Paso Robles Formation, so it was not logged.

The fault zone exposed in both trenches No. 1 and 2 consists of a series of low-angle (10°-40°) south-dipping sheared surfaces with a reverse sense of slip. Observed slickensides on the shear planes are consistently down-dip with no indication of a horizontal component of slip. The shears in each trench dip very shallowly to the south but typically steepen to about 30° or 40° at the bottom of the trench.

In trench No. 1 the Paso Robles Formation is thrust from the south over Q_{2b} terrace deposits to the north along the main shear plane in the trench (Plate 2). Near the ground surface, the main shear surface intersects and offsets the base of the "A" soil horizon by about 30 inches (75 cm) of reverse slip (Fig. 13 and Plate 2, Sheet 1). The dip on this main shear surface averages about 10° in most of the trench except at the base where it steepens to 30°. The main shear surface indicated on Plate 2 is coincident with a slight steepening of the slope of the fault scarp; this supports youthful movement on the fault and uplift of the south side.

The very low angle of the fault plane with respect to the ground surface leads us to believe that a sharp fault scarp may not accompany surface faulting, but rather that a gentle bulge in the ground surface may be typical for this fault during events of surface faulting. Thus, the fault should not be readily recognizable at the ground surface,

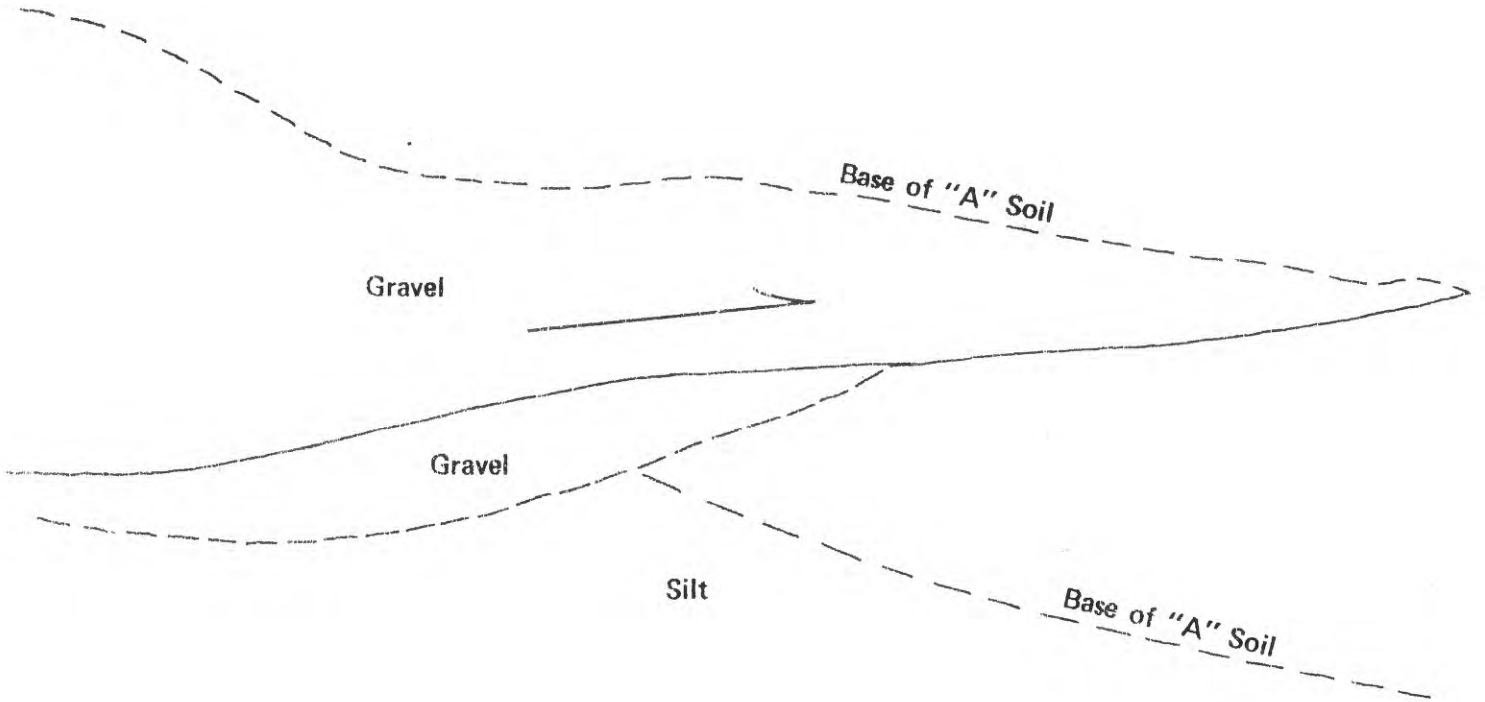


Fig 13
Overlay

Reverse faulting in colluvial soil is accentuated by high moisture content.

Project: 41173I Project No. USGS CONTRACT 14-08-0001-18255	TRENCH NO. 1 OFFSET SOIL	Fig. 13

WOODWARD–CLYDE CONSULTANTS

except perhaps as a break in slope; such is the case where trench No. 1 was excavated.

Trench No. 2 was excavated in Orcutt Sand (Q_{2b}) deposits through the edge of a sag pond beginning at the upper part of the fault scarp (Fig. 11). Although the terrace deposits at the trench site appear similar to the Paso Robles Formation mapped to the west, the nearly flat-lying bedding is suggestive of the Q_{2b} strath terrace. The trench exposed several small shear surfaces upslope from the sag pond. Contrary to the large shear plane found in trench No. 1, the shear surfaces in trench No. 2 do not juxtapose sediments with great differences in lithology. In fact, the most youthful shear, which offsets the base of the "B" soil horizon by about 10 inches (25 cm), appears to offset the terrace deposits by only 18 inches (45 cm) (Figs. 14 and 15). Overall, the shear surfaces are much less prominent in trench No. 2 and are interpreted as evidence for the recent offsets dying out in an eastward direction.

5.0 CONCLUSIONS AND OBSERVATIONS

The Los Alamos fault is a low-angle reverse fault associated with an asymmetric synclinal fold axis trending into Los Alamos Valley. Evidence from trenching indicates that the style of faulting is pure thrust. The fault is quite youthful, having offset the base of a "B" soil horizon in one location and the base of an "A" soil horizon in another location. Although age dating of offset lithologic units could not be accomplished because of the absence of datable materials, it is probable that the offset "A" soil is Holocene or latest Pleistocene in age. Based on the proximity of the fault to Los Alamos and the youthfulness in offsets, the Los Alamos fault is the most

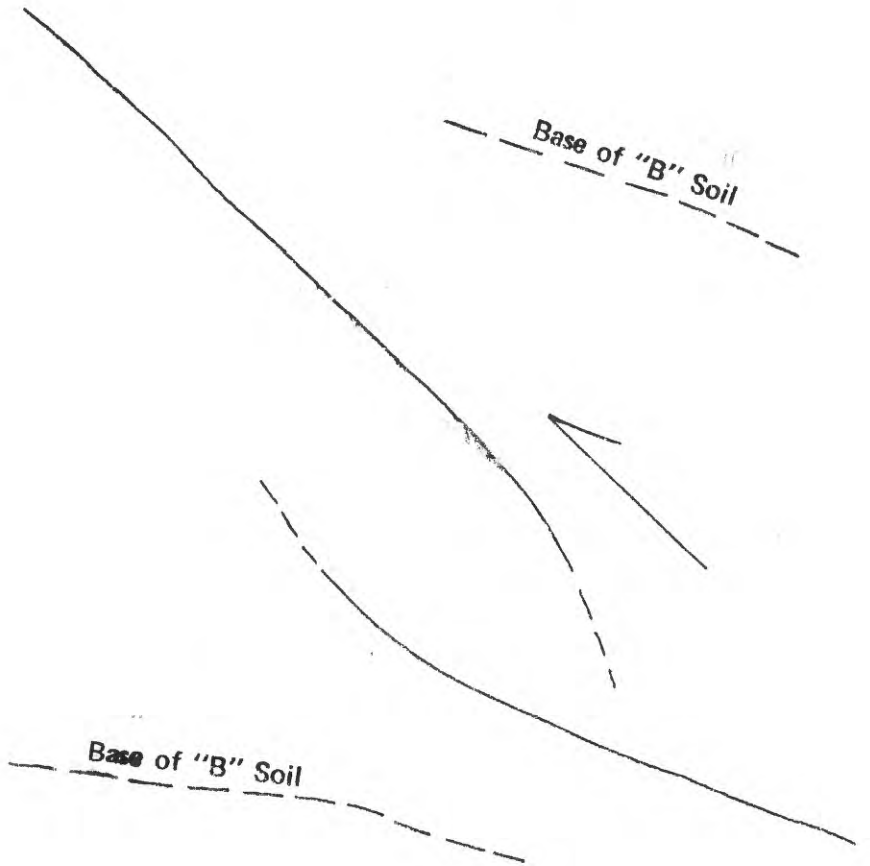


Fig 14
Overlay

Geologist is pointing to the base of an offset "B" soil horizon.

Project: 41173I Project No. USGS CONTRACT 14-08-0001-18255	TRENCH NO. 2 OFFSET SOIL	Fig. 14

49a

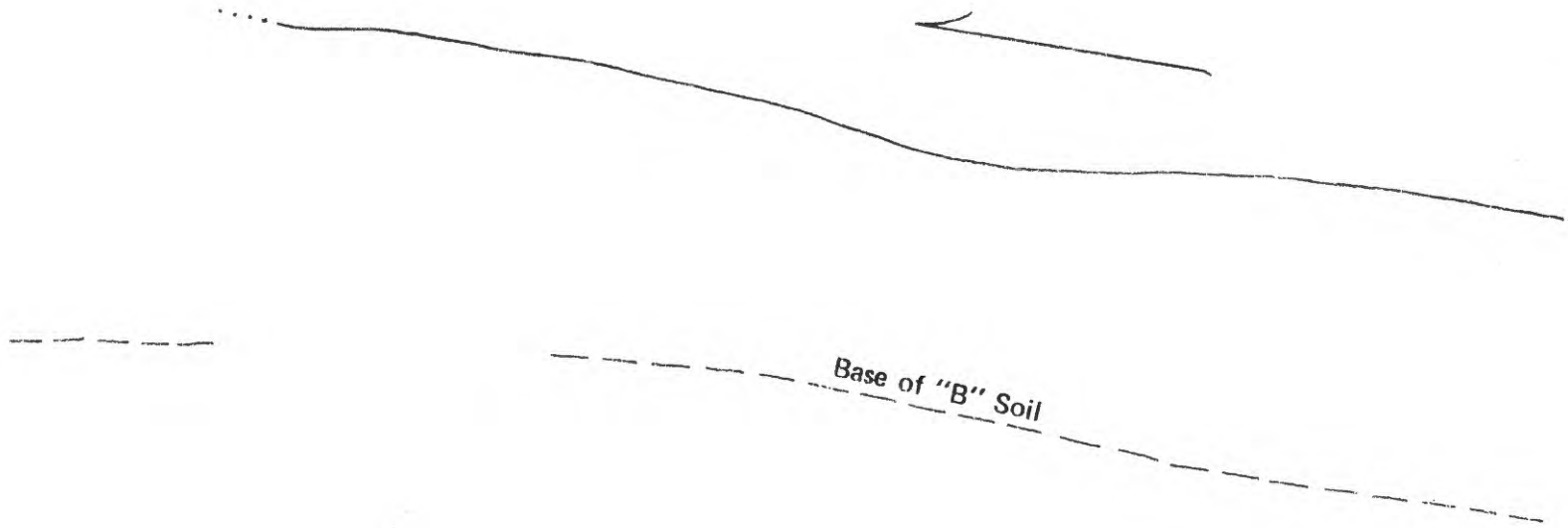


Fig 15
Overlay

The pencil is pointing to a low–angle shear through the "B" soil horizon. Darker clay lining accentuates the shear.

Project: 411731 Project No. USGS CONTRACT 14-08-0001-18255	TRENCH NO. 2 LOW–ANGLE SHEAR	Fig. 15

WOODWARD–CLYDE CONSULTANTS

likely source of the 1902 and 1915 earthquakes in the study area.

Westward from the mapped Los Alamos fault, an overturned anticline and a series of low knolls along the projection of the fault are indications that the Los Alamos fault follows the southern edge of Los Alamos Valley. Continuation of the fault farther west than the overturned anticline is not supported by the known structure or geomorphology of the valley and surrounding foothills. A fault branching to the north side of Los Alamos Valley is not supported by either the structure there or the geomorphology of the valley.

The Los Alamos fault appears to die out at the surface eastward along the mapped trace of the fault. The scarp height diminishes and the observed total offset of the terrace deposits diminish before the fault projection intersects Highway 101. The structural deformation (tilting and folding of bedding) associated with the fault rapidly becomes less intense eastward as the terrace changes from Paso Robles to Orcutt (Q_{2b}) terrace deposits. The Los Alamos fault appears to be a local fault associated with folding along the south side of Los Alamos Valley. However, topographic trends and distribution of Quaternary strath terraces support continuation of the fault into the vicinity of Los Olivos; thus an association of the Los Alamos fault with the Baseline fault cannot be precluded.

The Baseline fault scarp morphology is strikingly similar to the Los Alamos fault, with the south side uplifted to form a scarp facing upstream. A stream, which was once

antecedent across the scarp and now is diverted along its base, is either not laterally offset or may have minor right-lateral offset, suggesting that the Baseline fault is a dip-slip fault or, more specifically, a thrust fault like the Los Alamos fault.

The Northern Baseline lineament follows the offset in an ancient Q_{2b} fan surface (south side down). The lineament is probably a reverse fault and, like the Baseline and Los Alamos faults, is responding to the regional compression across the Santa Maria district.

6.0 FUTURE WORK AND RECOMMENDATIONS

The faulting that manifests itself in the Santa Maria district appears to be quite youthful but is often difficult to recognize because of the extensive late Pliocene and Pleistocene age continental sediments. However, these young sediments also provide a clear opportunity for defining the age of faulting and for understanding the history of faulting within the district. Future work in the area should focus on the evaluation of Quaternary sediments and their tectonic geomorphology. This should include classification and correlation of all strath terraces within the district, in conjunction with interpretations of soil-profile development associated with each terrace surface. The information would aid in defining other fault trends in the district, such as the postulated Santa Ynez River fault south of the present study area.

In the Los Alamos Valley, future work should center on confirming the location of the Los Alamos fault on the south side of the valley. The fault may die out or extend

farther west than the overturned anticline. To confirm the presence of the fault would require additional detailed field mapping and more trench excavations.

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APPENDIX C

NEWSPAPER CLIPPINGS

Los Alamos Earthquakes

1902 and 1915

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 27, 1902

Time: Sunday night and Monday morning

Location: Los Alamos, Lompoc

Source Name: Santa Maria Times

Date: August 2, 1902

Published at: Santa Maria

Text: ALARM CAUSED BY EARTHQUAKES

LOS ALAMOS THE CENTER OF DISTURBANCE. REPEATED SHOCKS WARN CITIZENS OF DANGER--MANY FAMILIES FLEEING FOR SAFETY, MUCH DAMAGE TO PROPERTY. OIL TANKS DESTROYED

This has been a week of earthquakes and while our immediate vicinity has been dealt with somewhat more leniently than our neighboring towns, yet the feeling of apprehension was none the less great. The shocks of Sunday night and Monday morning were the greatest ever felt in the valley, both in violence and length of duration, but still they did comparatively little damage here.

In Lompoc, however, the shocks were of a more serious nature, and caused widespread damage and consternation. Chimneys toppled over, stoves were overturned, water pipes broken and tops and sides of mountains shaken off, while the Santa Ynez river changed its course partly with every quake. Some fifteen shocks were felt up to this time.

But the worst sufferer is Los Alamos, and it is a miracle that no one was killed. As it is, business is at a standstill, while nearly every one that can is leaving the place. The north-bound passenger train on Thursday evening brought many families, including those of Messrs. Wickenden, Kahn and Leslie. Many families have driven away and are now seeking refuge either in this valley or in San Luis Obispo. Miss Mamie Nance, who was in Los Alamos at the time, narrowly escaped being struck in the head by a slab of marble from a large table, which was shaken loose by a shock while she was asleep. The old Catholic church has been completely destroyed, while numerous adobe houses have suffered a similar fate. In Harris' drug store every bottle was broken, so that it was utterly impossible to compound a prescription. Water tanks were shaken loose and in nearly every instance thrown to the ground and smashed. Wickenden's store, as well as others, has suffered considerable loss of stock, the goods being scattered in all

directions, while the buildings are so badly cracked in some instances as to be unsafe. In one room of Mr. Leslie's residence the contents were piled ten feet high. Not a brick chimney remains in the town. The roof of the Presbyterian church was entirely demolished, and numerous small buildings were removed from their foundations. Those now residing in the town camp in the streets.

On the Harris ranch damage to the extent of several hundred dollars was suffered. Some valuable furniture being smashed almost to kindling wood. The residence itself was badly injured. No one was hurt, although the family was badly shaken up, one of the boys being thrown out of his bed and clear across the room.

A singluar circumstance in connection with the earthquake is that the Los Alamos creek, which has for some time contained no water whatever, has suddenly burst into quite a respectable torrent, the depth of water being reported at two feet.

At the oil wells two oil tanks were smashed to pieces, one being thrown fifteen feet up hill, causing a loss of 2,800 barrels of oil. The pipe line is said to be cracked, but to what extent cannot be learned now. The wells themselves are not damaged, at least that is the report as now given out. The company's loss ranges from ten to fifteen thousand dollars.

The shock seemed to have centered itself around Los Alamos and was not felt any further south than Santa Barbara, and on the north no further than San Luis Obispo. At Garey, Santa Ynez, Guadalupe and the sugar factory the shock, while slightly felt, caused little or no damage.

Scientific men from all the leading universities of the coast are now in this section, as well as a number of prominent writers, and are endeavoring to locate the cause of this unusual disturbance in these parts.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 27 and July 28, 1902

Time: 10:57 PM and 5:08 AM

Location: Los Alamos

Source Name: San Luis Obispo Tribune

Date: August 1, 1902

Published at: San Luis Obispo

Text: DAMAGE BY EARTHQUAKE

GOODS THROWN FROM SHELVES IN LOS ALAMOS STORES

TWO BIG OIL TANKS NEAR LOS ALAMOS WERE SHATTERED

M. King of Los Alamos was in this city last evening. He stated that the earthquake shock did considerable damage at Los Alamos Sunday night. Goods were thrown from shelves of the stores and considerable glass were and crockery was broken.

The Orena house a few miles south of the place was damaged. The shock cracked the main walls.

Two big tanks of the Union Oil Company were broken and 2800 barrels of oil were lost.

There were two distinct shocks in this city. One at 10:57 p.m. and the other at 5:08 a.m. The direction of each was east and west.

EARTHQUAKE SHOCK

At 10:45 Sunday night there were two distinct and heavy earthquake trembles. The first one made houses rattle some.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 31, 1902

Time: 1:00 AM

Location: Los Alamos, Cal.

Source Name: San Luis Obispo County Telegram Tribune

Date: December 18, 1972

Published at: San Luis Obispo

Text: 1902: WHEN LOS ALAMOS RUMBLED AND TUMBLED

"San Luis Obispo, Cal., July 31--A strip of country 15 miles long by four miles wide rent with gaping fissures and dotted with hills and knolls that sprung up during the night as if by magic; a village in ruins and hundreds of people fleeing for their lives, are the results of last night's earthquakes in the valley of Los Alamos in the northern part of Santa Barbara County. For four days that section has been shaken by a series of earthquakes without precedent in the history of the Pacific Coast. The most severe shock occurred at 1:30 this morning. Hills were shaken and twisted to their foundations, and the valleys trembled and rolled like the surface of the ocean. Springs of water appeared in places that had been dry and the topography of the valley was greatly changed in many respects. The disturbance was preceded by a rumbling like distant thunder, which increased until the earth began to rise."

The story, still frighteningly vivid after the passage of 70 years, is from the brown, sere pages of the Pittsburg (Pa.) Times of Aug. 1, 1902 (in those days, Pittsburgh apparently was spelled by at least one newpaper with the final "h").

The newspaper, folded and torn in half, was discovered this week by Pismo Beach second-hand furniture dealer Bay Fultz in the back of a mirror on an antique dresser he was refinishing.

Fultz, owner of the R & M Second Hand Store at 555 Cypress, said he obtained the dresser in a consignment of furniture from a Fresno auction.

"I believe it came from somewhere in Pennsylvania," Fultz said. "Someone must have tried to repair the mirror around the turn of the century and used the newspaper as padding."

The San Luis Obispo datelined earthquake story, which appears on the front page of the old paper, caught Fultz' eye immediately.

No wonder. Even in the conservative type of the day, the headlines are shockers:

"Wreck by earthquake".

"California town depopulated by frightened citizens".

"Shocks that have been felt for four days culminiated in an earth tremor that threw down buildings--Face of the country changed by the seismic convulsions".

The story bears out the headlines, though there is no indication of its source.

"With the first warning the terror-stricken people sought places of safety in vacant lots and roads, while many fled toward the neighboring hills. The first vibrations were followed by the most terrific shock ever experienced in this section of the state. The earth trembled and rolled and twisted until it was impossible for people to stand erect, and the inhabitants crouched together in the darkness, fearful that the earth might open and swallow them. The terror inspired by the rumbling and trembling of the earth was increased by the sound of falling buildings, which gave some idea of the destruction being wrought. A church was leveled to the ground and not one brick building was left standing.

"Chimneys had toppled over, frame buildings had been wrenched apart and thrown from their foundations, and there was not a building in town that had not been damaged. In store buildings the merchandise was thrown from shelves, and everything breakable was destroyed; not a pane of glass was left in any window in town, and in those frame houses left standing stoves were overturned and crockery and glassware destroyed. A conservative estimate of the loss to property is $30,000 and this amount will probably be greatly increased by the damage in the surrounding country.

"The extent of the most severe portion of the disturbance is 11 miles long by four miles wide, but the shock was felt throughout Santa Barbara and San Luis Obispo counties. At the Western Union oil wells two tanks were wrecked and much other damage was done. The people have deserted the village, every conveyance has been taken and the passenger and freight trains have been loaded with people fleeing for safety. Since the first disturbances on Sunday night there have been over 70 shocks".

The newspaper accounts are substantiated in the records of the Seismological Laboratory at the California Institute of Technology, whose John Nordquist told the Telegram-Tribune that the 1902 Los Alamos quake had an intensity of between 8 and 9 on the modified Mercalli scale" or nearly the intensity of the devasting San Francisco temblor of four years later.

There was no loss of life in the Aug. 30, 1902 earthquake in northern Santa Barbara County, nor in the series of noisy tremors which continued, sometimes at the rate of five a day, until December of that year.

And the cause--or at least the relation of the Los Alamos quakes to any known fault system--remains obscure.

"The locale is many miles to the west of the San Andreas fault," explained Nordquist. "And there are only two east-west trending lesser faults mapped anywhere in the vicinity; one which extends about 15 miles inland from Pedernales near Point Arguello and a second small fault near Point Sal.

"That simply may indicate", the Pasadena seismologist added, "that the geologists haven't done very extensive mapping in the Los Alamos region."

At least one old-time scientist had some reassuring words for Central Coast residents in 1902. A Prof. Hilgard of Berkeley was quoted in the Aug. 7 issue of the San Luis Obispo Tribune as saying:

"It appears that for some days past there have been tremors in your region--efforts at (earth) readjustment, but apparently not quiet effective. So there came a severe shock arising, let us hope from the fault-blocks sliding or dropping into a permanent position, in which they are likely to remain peacefully for some time to come..."

A day earlier, the Telegram-Tribune's predecessor had noted that the quakes had been felt as far north as Creston. The earthy story read, in part:

"The people in this section had the pleasure of being aware that something was the trouble with the bowels of the earth and the old mother was trying to relieve herself by some vigorous exertions. There were two shocks the past week, one the first, a slight one on July 27th, the second occurred Thursday at 1 a.m. July 31st. No damage done, but it caused an awful creaking in the buildings and the houses seemed to abor like unto an old wooden ship in the trough of a heavy sea."

And there seemed to be some sharp differences between editors in San Luis Obispo and points as distant as say, Pittsburgh, Pa., over how the Los Alamos shock should be reported.

Wrote the editor of the Tribune in an editorial on Aug. 8, 1902:

"The epidemic of earthquakes which appear to have struck our neighbor at Los Alamos subsides with difficulty. Spasmodic shudders still serve to make newspaper excitment. The epidemic of lurid space matter which for a few days filled even the metropotian journals with references to it has however been snuffed out. Even the inhabitants of the little town who for a time were evidently happy at the amount of free advertising they were getting, suddenly took a sharp turn and betrayed profound indignation at the scandalous and unfounded manner in which their climate was being maligned and severally and collectively were prepared to swear that it was no great shakes after all, merely a little playful wrinkling of the skin of the earth, in which any, even the best regulated community, might be subject in unguarded moments".

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 27, 1902 and July 28, 1902

Time: 10:57 (27th) and 5:08 AM (28th)

Location: San Luis Obispo

Source Name: San Luis Obispo Semi-Weekly Breeze

Date: August 1, 1902

Published at: San Luis Obispo

Text: EARTHQUAKE SHOCKS

San Luis Obispo experienced two distinct earthquake shocks last night, one at 10:57 p.m., the other at 5:08 a.m. The first was quite severe and lasted for five seconds. The second was less severe and had a duration of three seconds. The direction of each was east and west. The reports made by the local weather bureau are:

Earthquake--10:57 p.m. Direction east and west. Duration 0'5" Heavy.

Earthquake--5:08 a.m. Direction east and west. Duration 0'3" Light.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 31, 1902

Time: Thursday morning

Location:

Source Name: San Luis Obispo Semi-Weekly Breeze

Date: August 5, 1902

Published at: San Luis Obispo

Text: SHOOK OUT OF BED

Fireman Nick Sinnet, who rooms at the Park View Hotel, was treated rather roughly by the earthquake Thursday morning. He awoke to find himself lying on the floor with his head bruised and it is the supposition that the earthquake rolled him out of bed. At the same time, a large portion of the plastering over the kitchen, the room immediately underneath, was knocked off.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: 28 July 1902

Time: 1:20 AM

Location: Los Alamos

Source Name: Santa Barbara Weekly Press

Date: 31 July 1902

Published at: Santa Barbara

Text: CONSTERNATION AT LOS ALAMOS

People Panic-Stricken and Fear to Enter Homes

ANOTHER VIOLENT EARTHQUAKE

Advised to Abandone their Homes--Lompoc Suffers-In this City

Los Alamos, July 31, 3:40 a.m.--(Special to the Press), The most severe earthquake shock in the history of Santa Barbara county occurred here tonight, far greater than the one of last Sunday night July 27. It occurred at 1:20 o'clock this morning, and was preceded by loud rumbling sounds. The people of the town rushed from their homes, clad only in their night clothes, panic-stricken, into the streets. The seismic movement seemed to be rotary, the furnature of the various homes and offices being thrown into a pile in the center of the rooms. In one room of Mr. Leslie's residence to contents were piled ten feet high. Not a brick chimney remains in the town; the roof of the Presbyterian Church was entirely demolished, and numerous small buildings were removed from their foundations. The shock lasted from twelve to fifteen seconds.

The only place that could be reached by telephone was the state university of Berkeley, and the president of that institution, Prof. Benjamin Ide Wheeler, advised those who could do so to leave that place at once, or to shelter themselves in caves, as he believed there would be a repetition of the present seismic disturbances.

SHOCK AT LOMPOC

A very severe shock was felt at Lompoc. In a telephone message to The Press early this morning it was announced that the tremor was more violent than the one last Sunday night, but no damage was reported. The shock occurred at 1:20 o'clock this morning.

AT SANTA BARBARA

One of the most severe earthquake shocks ever felt in Santa Barbara occurred at 1:20 o'clock this morning. The vibrations lasted about 10 seconds. Owing to the lateness of the hour it was impossible to learn whether or not any damage was done.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 27, 1902

Time:

Location: Los Alamos

Source Name: Santa Barbara Morning Press

Date: July 18, 1976

Published at: Santa Barbara

Text: OLDEN DAYS: The Big Los Alamos quake of '02

A series of "swarm of earthquakes which began with a shake at Los Alamos Sunday, July 27, 1902, were felt as tremors in Santa Barbara.

"It did queer and unreasonable things" during the repeated tremors that first night.

The old Orena Adobe was "a mass of ruins;" The Careaga oil fields suffered a huge loss from damageed storage tanks; fissures were opened in the ground, and household furnishings thrown about.

Then early in the morning of July 31, Los Alamos residents "felt the most severe shock in the history of Santa Barbara County.

"The people of the town rushed panic-stricken from their homes, clad only in their nighclothes into the streets.

"The seismic movement seemed to be rotary, the furniture of the various homes and offices being thrown into a pile in the center of the room . . .

"Not a brick chimney remains in the town. The roof of the Presbyterian Church was demolished, and numerous buildings were removed from their foundations . . .

"The only place that could be reach by telephone was the State University at Berkeley, and the president of that institute, Benjamin Ide Wheeler, advised those who could do so to leave the place at once, or to shelter themselves in caves, as he believed there would be a repetion of the present seismic disturbances."

On Aug. 1, the Morning Press said that the earthquake in the Los Alamos Valley has not spent its strength and the people of that section are disposed to take the advice of President Wheeler. May are leaving for places outside of the tremblor belt . . .

"Up to the present time no one has been injured. There were no brick buildings in the little village to fall about the heads of the occupants, and the damage has been limited to the ruin of plaster, the collapse of chimneys, the breaking of crockery and glassware, the falling of the front wall of the Presbyterian Church and two stores, and demolishing of the old Orena adobe . . ."

"Earthquake Country," a Sunset Book, states that "a special train of 14 cars had been sent from San Luis Obispo to facilitate evaculation."

After a local earthquake in December, 1920, the Daily News recounted that during the Los Alamos quakes of 1902 the San Francisco newspapers sent reporters to describe the tremors.

"The men of the town decided to give the correspondents a real treat, so rigged an apparatus with which they could not only create perfect bedlam, but also shake the hotel . . ."

After anxiously and vainly awaiting an upheaval all day, they "had hardly fallen into a doze the jokers got busy.

"The first outbreak took each San Francisco man from his bed with a bound. The second and third sent them pell mell down the stairs, their clothes in a tangle under their arms, and they bolted into the street . . ."

After quiet seemed to return, they again went to bed, and more "quakes" having given them a restless night, they departed the next day to find details of the hoax in a rival northern newspaper.

A San Francisco publication's statement that it was glad that "Santa Barbara (and its upheavals) is so far away," brought a blasting editorial in the Morning Press on Aug. 3, 1902, that Santa Barbara was quite a distance from Los Alamos, and had not been "shaken by a terrific earthquake," as reported.

The Santa Barbara editor also criticized the San Francisco Bulletin for printing pictures of the Lompoc High School and the Betteravia Sugar Beet Factory, which were not damaged.

Then the editorial stated optimistically:

"So far as history records, there has never been a life lost in Santa Barbara County through earthquakes.

"Nor was anyone ever injured. No buildings of any stability were ever detroyed or serously damaged.

"Until this quake in the Los Alamos Valley there has been no serious disturbance of this nature in the county since 1857, and at that date no damage resulted.

"Even with the assurance that there would be an earthquake such as that at Los Alamos every year, Santa Barbara County, would have more to offer as a place of residence than any point in the eastern states.

"But earthquakes are not yearly occurrences; if they happen once in half a century it is notable, so notable, if fact, that the newspapers go into hysterics in their effort to chronicle the event.

"Compared with sunstrokes, and heat in summer, blizzards and cold in winter, cyclones and tornados, thunderstorms and floods and the other things of the eastern climate, Californians are quite willing to take the occasional earthquake in exchange . . ."

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 31, 1902

Time: 7:20 PM

Location: Los Alamos

Source Name: Los Angeles Times

Date: August 1, 1902

Published at: Los Angeles

Text: TWISTING QUAKES TEAR UP VILLAGE

People of Los Alamos Driven in Terror from their Homes and Destruction Wrought

Los Alamos, July 31--(Exclusive Dispatch) As if the shocks of Sunday night and last night were not enough to drive into a state of terror the people of this little town, there was another earthquake tonight at 7:20 o'clock, even more severe than any of the previous disturbances. It completed what destruction had been left unfinished by the twisting of the earth at 1:20 o'clock this morning when houses were thrown off their foundations, walls toppled and buildings demolished.

Throughout the day there have been tremblings of the earth almost without intervals. Little tremors would come every few minutes, with now and then a heavier one. The people were therefore prepared for the worst tonight, when there was a repetition of the terrifying dizzying motion of the earth, which before had wrought such ruin. Not a house in the twon was occupied at the time this shock came. The people had taken the counsel of the scientists at the State University, who had advised them not to enter their houses to sleep, for the reason that other and perhaps heavier shocks might be expected.

The people prepared their meals in the streets, moved their beds to vacant lots and large open spaces, building such shelters as they could with the means at hand. From time to time the noise of falling plaster in the houses could be heard as a slight tremor caused the loosened pieces to come down. On the whole the town is in an alarming condition.

Tonight's shock was like those which preceded it. It could be heard approaching. In the distance was what seemed like the rumbling of thunder which increased in volume until with a deep roar, the earth began twisting. It continued for less than four seconds and then cracked suddenly. A few minutes later there were two distinct shocks, but not nearly so severe.

At 11 o'clock tonight the twon people are living in the open air. They dare not enter their houses; wrapped in blankets and coverlets, they are sleeping under almost every tree, or are trying to sleep there.

There is no such truth in the report sent out this afternoon that fire was seen issuing from one of the mountains thus indicating volcanic disturbances.

How the people escaped last night, no one can tell. That there were not several killed seems almost miraculous since the shocks of last Sunday there had been a few little quakes, but no one thought there would be another of equal force.

This morning at 1:20 o'clock there was a crash of windows, a cracking of plastering, the creaking of frame structures, and above all, the terrifying rumble of another earthquake even more severe than that of Sunday.

People rushed from their homes panic-stricken. It was no time to think of clothing, and none stopped to dress. The shock was over quickly and before most of them could leave their rooms. Not a person was injured. After such an experience sleep was impossible. Men went tremblingly into their houses for the clothing of their wives and children, and all spent the early morning on the streets. Many families left today some going to Santa Barbara, but the greater number went north. Many are preparing to leave tomorrow, tonight's severe shock having convinced them that there is danger here.

No reports have been received tonight of damage at other points by the latest shock but it was felt from San Luis Obispo to below Santa Barbara.

WORST EVER FELT

Santa Barbara Report, Special Correspondence of the Times.

Santa Barbara, July 31--The earthquake this morning at 1:30 o'clock with Los Alamos as the center, was the worst ever felt in this country and one of the worst ever experienced in the State. The town of Los Alamos is a scene of desolation today. The first shock that occurred on Sunday night sadly demoralized the people, and did a great deal of damage, especially at the oil wells of the Western Union Oil Company, located a few miles east of the town, but this morning's shock ruined the town, and many of the ranch houses outlying, and consternation prevails among the inhabitants. The shock was preceded by loud rumbling sounds, so terrifying the people that they rushed from their homes in their nightclothes, into the street.

The seismic movement was rotary piling into the center of rooms furniture of every description, of the various homes and offices. In one room of Mr. Leslie's residence the household effects were piled up ten feet high.

Not a brick chimney remains in the town, and a number of buildings are totally wrecked, among these is the Pyresbyterian Church. This building of brick was entirely demolished. The rear portion is moved four inches from its foundation, the front wall fell and the whole roof fell in upon the pews. Numerous small buildings are removed from their foundations and are much damaged.

The overturning and explosion of an oil lamp in the home of Mrs. Whitney an elderly lady, set fire to her house which however, was extinguished by neighbors.

The only place of scientific advice reached by telephone from Los Alamos this morning was the State University at Berkeley. President Benjamin Ide Wheeler of the Institution advised that the people leave Los Alamos at once or shelter themselves away from their homes as the seismic disturbances likely would continue. President Wheeler was asked to send a scientist to the scene.

The Wickenden, Leslie, Littleton, Show and Perkins families have already left town and others are preparing to leave.

Los Alamos is a village of 700 inhabitants in the beautiful Los Alamos Valley on the Pacific Coast narrow-gauge railroad in Santa Barbara county about seventy-five miles north of this city, close to the newly-developed oil district of the Western Union company.

At Lompoc, twenty-five miles west the shock was reported very severe but resulting in no material damage.

At Los Olivos, eighteen miles south grave fears are entertained, though no damage is reported.

Santa Maria, sixteen miles north was severely shaken but no property was damaged.

The shock was distinctly felt in Santa Barbara, stopping clocks, swaying lamps and alarming the people. The shock reached as far north as San Luis Obispo, and south as Los Angeles.

NO PERSONS INJURED

Statement of Losses

Santa Barbara, July 31--The earthquake in the Los Alamos Valley has not yet spent its strength, and the people of the

section are disposed to take the advice of President Wheeler of the State University. Many are leaving for places outside of the trembler belt, only those having businesses, they cannot well abandon being content to face the mysterious future.

Up to the present time no person has been injured. There are no brick buildings in the little village to fall about the heads of occupants and the damage has been limited to the ruin of plaster the collapse of chimneys, the breaking of crockery and glassware, the falling of the walls of the Presbyterian Church and two store buildings, and the demolishing of the old adobe building on the Orena ranch seriously damaged by the first quake on Sunday night. The damage in the town of Los Alamos will not exceed $10,000, in the opinion of conservative residents of the place, who have made a careful survey of the conditions. Those who have suffered the greatest losses are the following named:

F. Wickenden, general merchandise, walls of store building fell in, loss $800, damage to stock $1000.

Max King, general merchanise, falling plaster and loss of stock $350.

L. Kahn, general merchandise and saloon, saloon wrecked; loss $209, damage to store, $100.

Presbyterian Church, part of the front wall collapsed and other damage, $800.

C. H. Pierson, general merchanise, store moved off of its foundation, loss, $350; damage to stock $1000.

Dr. Graham Block, walls fell in, loss, $600.

H. H. Harris, drug store, loss $1200, mostly to stock.

The tankhouse of David Greenlee collapsed and his residence was also damaged.

The hotel building suffered less than any other reporting but a few dollars damage to glassware.

There is not a chimney left standing in town. The Nick Foxen residence, occupied by F. Ybarra, was moved four inches and split in opposite corners.

Not a building escaped some injury, and it is considered miraculous that no one was hurt. The local telephone line is down, and several trees have been uprooted.

The Los Alamos Creek is still flowing a large stream, which started with the first shock Sunday night.

There was a series of lighter vibrations during the day; in fact, disturbance was continuous with intermissions sometimes of a few minutes, and sometimes an hour. A report was started that smoke was seen issuing from the mountains near Zaca Lake, but this proved unfounded.

People traveling the roads in the outskirts of Los Alamos discovered several landslides attributed to the earthquake. On the grade between Lompoc and Los Alamos the road was in one place full of rocks and loos dirt. J. R. Drum of Drum Canon reports the same condition in that neighborhood.

The expectancy of further quakes is not preventing a stream of visitors to the town, attracted by their curiosity.

At the Carreaga oil wells, where the greatest damage was done Sunday night. Today's shocks were scarcely felt. The heaviest shock during the day occurred shortly before 4 o'clock. It was very severe but added nothing to the destruction and losses. In Santa Barbara no shocks have been noted since early this morning, the disturbance being confined to the immediate district of Los Alamos.

WHAT SCIENTISTS SAY

Not Surprised by Shocks

Berkeley, July 31--Regarding the unprecedented severity of the earthquakes in Santa Barbara county, Prof. Samuel B. Christy of the University of California said:

"While Southern California earthquakes were unusually severe, it was nothing more than could be expected. The western coast of this continent is liable to have such shocks at any time. Any great contraction of the earth on the Pacific Coast may be accompanied by damage to property. It is a well-known scientific fact that as the earth cools in the interior, the earth crust on which we live is bound to give, producing a jarring effect of varing intensity."

James Maddrill who has charge of the observatory of the University of California this summer said:

"From unofficial sources we have learned that the southern earthquakes were practically localized. This is strange since the shocks were so severe. In quakes sufficient vibrations to raze a building, the shock is generally plainly felt for a radius of hundreds of miles. The disturbance however was scarecely felt here, the seismograph of the university showing but a faint record."

T. I. Heaton of the Univesity of California said:

"While scientists are working on the theory of the probable cause of the earthquakes in Santa Barbara county, the exact reason will probably never be known. There was evidently a slip in the strata of the earth. In such cases a slight displacement sometimes produces a fearful shock. The theory has been advanced that the removal of great quantities of oil from the earth in southern California is responsible for the seismic disturbance. I hardly think this possible, as the oil wells do not penetrate the earth deep enough into the hot region".

WELLS NOT DAMAGED

Santa Maria, July 31--Investigation at the oil wells proves that previous reports were greatly exaggerated. Five thousand dollars at most will cover the entire loss which was inflicted at the tank reservoirs on Careago ranch. The shocks were heavy but slow and steady, thus lessening damage. Guadeloupe still reports no damage but continuous light shocks. Lompoc reports but little damage with occasional slight tremors.

The Santa Ynez River which turned from a dry bed to a running stream at the first shock has again run dry. At Betteravia, the Union Sugar Company's night shift walked out, refusing to continue work until the shocks ceased. The building, a six-story brick suffered no damage. Each shock was accompanied by distinct roaring dying in the distance.

Another quite severe earthquake shock was felt here at 7:25 p.m. No damage was done. Two families arrived this afternoon from Los Alamos fleeing from the terrifying shocks almost tontinually felt there. It is reported a reign of terror holds away there and that more families are preparing to leave.

RAILROAD NOT AFFECTED

San Francisco, July 31--Master of Transportation Richardson of the Southern Pacific Company stated to the Associated Press today that the seismic disturbance in Santa Barbara county had not destroyed any railroad property and that the tracks of his company were intact all trains running on schedule time.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 31, 1902, August 1, 1902

Time: after 7:00 PM (31st)

Location: Lompoc, Santa Barbara

Source Name: Bakersfield Daily Sun

Date: August 1, 1902

Published at: Bakersfield

Text: EARTHQUAKE DOES DAMAGE

Chimneys Razed, Houses Were Cracked and Other Destruction Reported

Lompoc, Cal., August 1--The most severe earthquake shock experienced here since the tembler of Sunday last occurred shortly after 7 o'clock last night, when two lessor shocks followed closely upon the first, none of the disturbances, however, doing any material damage. While it is true that the populace is in a state of anxiety and the considerable damage has been done in various localities, it is the impression of the Associated Press correspondent at the scene that the reports from Los Alamos have been overdrawn. A great many chimneys have been takendown because of their weak conditions, and a deal of the damage actually done must be attributed to faulty masonry and the unfitness of various structures to withstand even the slightest earthquake. Since the initial shock of Sunday last, which was quite severe, vibrations have continued with unabeted vigor and at close intervals, threatening many of the chimneys. Window glass is shattered from time to time, but the vibrations have deminished in force and there is no panic here among the people as yet. The rear section of the Hotel Arthur was cracked on Wednesday and the same vibration broke two windows in the hotel. A few miles north of the town, two immense water tanks have been demolished, releasing 10,000 gallons of water which escaped by way of a neighboring ravine and did little damage. Heavy landslides are reported from the mountains north of here with no damage done beyond the closing of the two roads. Gangs of men were at once put to work clearing up the obstruction.

Santa Barbara, Cal., August 1--Shortly before 9 o'clock this morning two very severe shocks of earthquake were felt in Los Alamos. They were not as severe as the shock which caused such wide-spread wrecking of property at an early hour yesterday morning. As it was, several buildings not

already destroyed were badly cracked, one immense structure belonging to Juan Careaga, a short distance from Los Alamos, being turned partly around on its foundation. Not a house was inhabited last night. The people are building up huge fires in the street and sprending the night huddled about in groups. Others slept in straw stacks in the open fields.

A few minutes past 11 o'clock today two more shocks visited Los Alamos. The grammar school building was partly damaged.

Latest advices received at noon state that the earth continues to tremble and give forth heavy rumbling sounds. For several hours past shocks have come at intervals of about an hour and a half, each shock being followed closely by a second in each instance.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: 28 July 1902

Time: Midnight

Location: Santa Barbara

Source Name: Bakersfield Californian

Date: 29 July 1902

Published at: Bakersfield

Text: EARTH STILL TREMBLING

Santa Barbara Experiences Seven Additional Shocks Today

Santa Barbara, Cal., July 29--Seven additional distinct shocks of earthquake were felt in the upper portion of Santa Barbara county last night. They were most severe at Los Alamos and Lompoc. The heaviest shock occurred about midnight, followed by lighter ones more or less regularly until 4 o'clock. Telephone communication with the Careaga ranch is interrupted this morning and it is not known if further damage was done in the oil fields. From records kept during the severe shocks of Saturdy and Monday morning it appeared that the first shock was of nearly a minute duration. In twenty minutes three others followed, the third quake being accompanied by a terrific report. The shocks were of varying violence and in every case the vibrations were from east to west. Some of the lesser shocks amounted to not more than violent lurches of the earth with not more than two movements, one forward and the other backward.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 27, 1902

Time: Few minutes after 11:00 PM (27th)

Location: Santa Barbara

Source Name: Hanford Weekly Sentinel

Date: July 31, 1902

Published at: Kings County

Text: "QUAKE IN SOUTHLAND"

BUILDINGS PROSTRATED AND WINDOWS SHATTERED

Oil and Water Pipes Bent and Twisted as if by Fire. Lompoc is left Practically Without Water Supply--The Damage Very Heavy

Santa Barbara, July 29--The most severe earthquake ever experienced in Southern California did a great amount of damage in the northern part of Santa Barbara County Sunday night. The district affected extends from Lompoc to Santa Maria, the center of activity evidently having been near the latter place.

The first shock was felt a few minutes past 11 o'clock, vibrations continuing for several minutes. Shortly after there were fourteen distinct shocks, but none of them was as severe as the first. Nearly fifteen minutes elapsed between the first and final shocks. In the Careaga oil fields, which are operated by the Western Union Oil company, large fissures were cut in the earth. Two tanks containing 3000 barrels of oil each were dashed into splinters, the oil flooding the section. Nearly all of the surface pipe lines used for conveying oil and water several miles were twisted or broken in such a manner that renewal will be necessary. Strangely, none of the wells, which are down a distance of over 2000 feet, were affected. At Los Alamos adobe buildings were razed to the ground, while in the business places windows were broken and goods on the shelves thrown to the floor. Lompoc, several miles to the southwest, shared badly. The city is practically without a water supply, as the mains were badly broken and the water has been flooding certain portions of the city.

The Santa Ynez river, which in the summer is usually a small stream, but in winter a torrent, was comparatively dry Sunday. Today water is rushing over the river bed as in a

freshet. No one will attempt to explain this remarkable phenomenon, and the presence of such a large volume of water at this time of the year is considered part compensation for the great damage that has resulted in other ways.

Over 100 years ago the Franciscan fathers undertook to establish a mission at Lompoc. The large building was nearly completed after several years of hard work when an earthquake visited the district and utterly destroyed the edifice. Further attempts to build a structure at that point were abandoned. From several of the sparcely settled districts reports are received in this city that the damage done was very great to buildings of every description. Only a slight shock was felt in Santa Barbara. The Western Union telegraph wires between Santa Barbara and Los Angeles are down.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 29, 1902 (Tuesday)

Time: 2:00 AM

Location: Santa Barbara

Source Name: Hanford Sentinel

Date: July 31, 1902

Published at: Kings County

Text: SANTA BARBARA STILL SHAKING

SEVEN DISTINCT SHOCKS FELT DURING TUESDAY

Santa Barbara, July 30--Seven distinct earthquake shocks were felt about Los Alamos and Lompoc in the northern part of the county, Tuesday. The first one, which came about 2 o'clock in the morning was quite severe. The others came at intervals of about an hour each. As far as known no great damage was done at any point. A report from Los Alamos says a heavy shock was felt at 11 o'clock.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 29, 1902

Time: 2:00 AM

Location: Santa Barbara and surrounding area

Source Name: Hanford Sentinel

Date: July 31, 1902

Published at: Kings County

Text: Santa Barbara Still Shaking - Seven Distinct Shocks Felt During Tuesday

Seven distinct earthquake shocks were felt about Los Alamos and Lompoc in the northern part of the County, Tuesday. The first one, which came about 2 o'clock in the morning, was quite severe. The others came at intervals of about an hour each. As far as is known, no great damage was done at any point. A report from Los Alamos says a heavy shock was felt at 11 o'clock."

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 27, 1902

Time:

Location: Lompoc

Source Name: Sacramento Union

Date: July 30, 1902

Published at: Sacramento

Text: LOMPOC VALLEY EARTHQUAKE TURNS OUT QUITE SERIOUS

Heavy Loss to Oil Company--Hilltops Shaken Off and Bed of Santa Ynez River Disturbed--Many People Spent the Night in Tents or on the Streets

Lompoc, July 30--The earthquake which occurred the night of the 27th was of a more serious nature than at first thought, although the reports sent out to some of the papers have been greatly exaggerated, especially as to the damage in the town of Lompoc and Lompoc Valley.

It was more serious on the northern side of the of the Santa Ynez River, and did considerable damage there. Most of the chimneys on the houses on that side of the river were shaken down, stoves knocked over, and a greater portion of the dishes were broken. Several water tanks were thrown over, the tops of several hills, or small mountains, were shaken off and the sides of the hills gave way.

These strange sights can be plainly seen from the town of Lompoc. The Santa Ynez River still continues its freakish changes. The bed of the river is partly composed of quicksand, and the severe shaking up that it got causing the sand to shift often, and at times the water will appear at certain places in the river, and a short time afterward it will be perfectly dry.

Among the more nervy class of residents the simple shocks of earthquake did not worry them much, but the incessant bellowing of the cattle, cackling of chickens and barking of dogs, which continued for a full hour after the severe shock gave them good reason for fear, as this is considered an indication of danger.

Los Alamos and vicinity suffered more than any other portion that the temblor struck. From the first shock, which

occurred near 11 o'clock on the night of the 27th until the following morning, they had twelve distinct shocks, and up to 8 o'clock this morning they had seven more. A great many of their homes were slightly damaged, chimneys broken down and walls cracked, while the Orena adobe, which has been a landmark near Los Alamos for years past, is completely demolished and can never be occupied again.

The land is cracked open in thousands of places, some of the cracks being as wide as four feet, and running almost unmeasurable distances.

Most of the residents would not occupy their homes last night, but instead slept in tents and under trees.

The damage to the Western Union Oil Company, in the Carreaga district, cannot yet be definitely estimated. While they lost the two great tanks of oil, some of the wells appear to be flowing much heavier today, and it is hoped the company will yet come out ahead.

SANTA MARIA, July 29--Reports of further damage by the earthquake indicate that the center of disturbance was at the Western Union oil wells, about sixteen miles from here. At the wells a 1500-barrel tank was thrown twenty-six feet uphill, and another was crushed with a total loss of 2800 barrels of oil. The ground was marked by many fissures, from which in places water flows.

There were fifteen distinct shocks at the wells, and the Los Alamos people were panic-sticken. Many remained in the streets all night in their night clothes. Merchants and saloonkeepers suffered heavily, bottles, glasses and dishes being thrown down and broken. Chimneys in many houses crumbled and windows were broken.

Every rancher near here suffered some loss of water. Oil pipes between Carreaga and the oil wells were broken in many places, and much oil and water lost. Manager Logan estimates the loss to the oil company at about $150,000.

Captain Harris reports a $200 loss at his home. A wardrobe in the rear chamber was thrown ten feet across a bed. The temblors occurred almost continuously from 10:55 p.m. till 5:30 a.m. Scarcely a building at Lompoc escaped. The water main was broken, entailing heavy repairing costs.

All clocks stopped, chimneys were knocked down, and two water tanks on the Wise ranch were demolished. Stores suffered damage from broken dishes, windows, bottles, etc. Houses were damaged by falling chimneys. Saunders' drug-store was a heavy loser.

The Santa Ynez River developed from a small creek to a considerable stream.

Little damage was done at Santa Maria, except by broken crockery, glass, etc., but many people were badly frightened by the severity of the shock. Several chimneys fell, frightening people into the streets, where they remained till morning.

At Garry no great damage was done, yet it reports the heaviest shock ever felt there, with several slighter ones toward morning. The shock extended no farther south than Santa Barbara, which reports no damage. Late reports state light disturbances occurred again at Los Alamos and vicinity.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 31, 1902

Time:

Location: San Luis Obispo

Source Name: Sacramento Record Union

Date: August 1, 1902

Published at: Sacramento

Text: TEMBLORS CONFINED TO SMALL AREA

Los Alamos, Santa Barbara County, the Center of Seismic Disturbance--Town Shaken Almost to Ruin--People Fly to Other Parts of County--Yesterday's Shock Was Scarcely Felt a Few Miles Away

San Luis Obispo, July 31--The most severe shock of the entire and recent series of temblors in this section occurred at 1:20 o'clock this morning in Los Alamos, when the hills were shaken and twisted to their foundations and the valleys trembled and rolled like the unstable surface of the ocean. Great fissures were run in the earth, hills and knolls appeared in level valleys, springs of water opened up in places that had been dry, and the general topography of the valley was greatly changed in many respects.

The disturbance had no general direction, but was what is known as a twister. It was preceded by a rumbling like that of distant thunder, which increased until the earth began to rock and twist and the hills began to tremble.

With the first warning sound of the approaching disaster the terror-stricken people rushed into the streets and sought places of safety in vacant lots and fields, while many hastened toward the neighboring hills. The first vibrations were similar to the preceding disturbances in direction and effect, but they were immediately followed by the most terrific shock ever experienced in this section of the State. The earth trembled and rolled and twisted until it was impossible to stand erect, and the terror-stricken people crouched together in the darkness, fearful that the earth beneath them might open and swallow them up.

The terror inspired by the rumbling and trembling of the earth was increased by the sound of falling buildings, which gave some idea of the terrible destruction that was being wrought.

When the most severe shock had passed and the rumbling sounds had died away, the people gathered in groups about the ruins of their homes and places of business, and when they saw the extent of damage done many of them, fearful of a repetition of this terrible experience, immediately started by foot, or by such conveyances as could be had, for places where the pre-dawn shocks had been less severe.

In the darkness of the night it was impossible to determine the full extent of destruction wrought, but with the dawn of day the stricken village presented the appearance of the ruins of a city long deserted. A church had been leveled to the ground, and not one brick building was left standing. Chimneys had toppled over, frame buildings had been wrenched apart and thrown from their foundations, telegraph and telephone wires had been broken, and there was not a building in town that had not been damaged more or less seriously.

In store buildings that were not totally destroyed the merchandise was thrown from shelves and everything breakable was destroyed. Not a pane of glass was left in any window of any house in town, and in the frame cottages and dwelling-houses that were left standing, stoves were overturned and crockery and glassware was destroyed.

The extent of the most severe portion of the disturbance is fifteen miles long by four miles wide, but the shock was lightly felt throughout Santa Barbara and San Luis Obispo counties.

At the Western Union oil wells on the Carrega (Careaga) ranch two tanks have been thrown over and much other damage was done. The disturbances continued throughout the day at intervals of two hours, but none of the shocks were severe.

The people have deserted the village. Every conveyance has been taken, and the passenger and freight trains that have left there since the severe shock last night have been loaded with people who are fleeing to Santa Maria and the northern part of the county for safety.

Since the first disturbance on Sunday night there have been over seventy distinct shocks, and those who have been keeping records have now given up the count, as the disturbance has become almost continuous.

PROPERTY DAMAGES

Santa Barbara, July 31--The earthqauke in the Los Alamos Valley has not yet spent its strength, and the people of the section are disposed to take the advice of President Wheeler

of the State University, who suggests that they leave the town. Many are leaving for places outside of the temblor belt, only those having business, they cannot well abandon being content to face the mysterious future. Up to the present time no one has been injured. There are no brick buildings in the little village to fall about the heads of occupants, and the damage has been confined to the ruin of plaster, the collapse of chimneys, the breaking of crockery and glassware, the falling of the walls of the Presbyterian Church and two store buildings, and the demolishing of the old adobe building on the Orena ranch, seriously damaged by the first quake on the memorable Sunday night.

The damage in the town of Los Alamos will not exceed $10,000, in the opinion of conservative residents of the place, who have made a careful survey of the conditions. Those who have suffered the greatest loss are:

F. Wickenden, general merchandise; walls of store buiding fell in; loss, $800; damage to stock, $1000.

Max King, general merchandise; falling plaster and loss of stock, $350.

L. Kahn, general merchandise and saloon; loss, $200; damage to store $100.

Presbyterian Church; part of the front wall collapsed; damage $800.

C. H. Pierson, general merchandise; store moved off its foundation; loss, $350; damage to stock $1000.

Dr. Graham; building walls fell in; loss, $600.

H. H. Harris drug store; loss $1200; mostly to stock.

The tank-house of David Greenlee collapsed and his residence was also damaged.

The hotel building suffered less than any other, reporting but a few dollars damage is glassware.

There is not a chimney left standing in town.

The Nicfoxen residence, occupied by F. Barra, was moved four inches and split in opposite corners.

Not a building escaped some injury, and it is considered miraculous that no one was hurt.

The local telephone line is down, and several trees have been uprooted.

The Los Alamos Creek is still flowing a large stream started with the first shock on Sunday night. During the afternoon the weather was hot and sultry, and the inhabitants were anticipating another heavy shock, following the ideal "earthquake weather". The same condition of the atmosphere has been noted at various times during the progress of the disturbances and there was good ground for the fear.

There was a series of lighter vibrations during the day. In fact, the disturbance was continuous, with intermissions sometimes of a few minutes and at others of an hour.

A report was started that smoke was seen issuing from the mountains near Zacata Lake, but this proved unfounded.

People traveling the roads in the outskirts of Los Alamos discovered several landslides, attributed to the earthquake. On the grade between Lompoc and Los Alamos the road was in one place full of rocks and loose dirt.

J. H. Drum of Drum Canyon reports the same conditions in that neighborhood.

The expectation of further quakes is not preventing a stream of visitors to the town, attracted by curiosity.

L. E. Blockman, at Santa Maria, reports but one shock in that town, at 1:20 this morning, and that no damage was done.

At the Carreaga oil wells, where the greatest damage was done Sunday night, today's shocks were scarcely felt.

The heaviest shock during the day occurred shortly before 4 o'clock. It was very severe, but added nothing to the destruction and losses. In Santa Barbara no shocks have been noted since early this morning, the disturbance being confined to the immediate district of Los Alamos.

The damage was confined to the immediate vicinity of Los Alamos. The northern end of the Los Alamos Valley, in which the oil wells are located, felt the shock, but there was no loss of property. The same may be said of Santa Maria, Lompoc, Los Olivos and other towns in the district.

The last quake during the morning was at 10:20. Between 7 and 7:30 there were seven distinct shocks, and they were followed by others at intervals during the morning. The town of Los Alamos is about seventy-five miles northwest of Santa Barbara.

A pecularity of the disturbance is the limited area affected. Only two of the more severe quakes have been felt in Santa Barbara, and did absolutely no damage in this city. On this account there is no alarm here.

Today's shocks were felt at Santa Maria, Cayucos, Lompoc and other points within a radius of a few miles, but no serious damage was done except at Los Alamos.

The Southern Pacific Railroad tracks were not disturbed.

REPORTS EXAGGERATED

Santa Maria, July 31--Investigation at the oil wells proves that previous reports were greatly exaggerated. Five thousand dollars at most will cover the entire loss which was inflicted at the tank reservoirs on Carreaga ranch. The shocks were heavy, but slow and steady, thus lessening damage. Gaudaloupe still reports no damage but continuous light shocks.

Lompoc reports but little damage with occasional slight tremors. The Santa Ynez River, which turned from a dry bed to a running stream at the first shock, has again run dry.

At Betteravia the Union Sugar Company's night shift walked out, refusing to continue work until the shocks ceased. The building, a six-story brick, suffered no damage. Each shock was accompanied by distinct roaring, dying in the distance.

Santa Maria, July 31--Another quite severe shock of earthquake was felt here at 7:25 p.m. No damage was done. Two families arrived here this afternoon from Los Alamos, fleeing from the terrifying shocks amost continually felt there. It is reported a reign of terror holds sway there, and that more families are preparing to leave.

Santa Barbara, July 31--Another severe earthquake was felt at Los Alamos at 7:30 tonight. It was almost as severe as that of early this morning. A slight shock was felt in this city at the same time.

At a late hour tonight all those who are left in Los Alamos are huddled around a large bonfire, awaiting the break of day. No one is so brave as to enter his home and remain there during the night. No damage is announced from the 7:30 quake, but developments are expected tomorrow.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 31, 1902

Time:

Location: Los Alamos

Source Name: Sacramento Union.

Date: August 2, 1902

Published at: Sacramento

Text: THE STORIES OF LOS ALAMOS EARTHQUAKE WERE OVERDRAWN

Loss Will Amount to but a Few Thousand Dollars--Associated Press Correspondent Describes What He Saw and Learned on a Tour of Locality Where Quakes Occurred

Santa Barbara, August 1--Throughout the day, until 3:30 p.m., occasional slight earthquake shocks were felt in Los Alamos Valley. A report from Los Alamos at 9 o'clock tonight stated that no shocks occurred since 3:10.

The wagon road over what is known as the Los Alamos grade, extending over the mountain into the valley, is in bad condition. Boulders and dirt were thrown from higher elevations by tons, and persons arriving at Los Alamos from Lompoc this evening report having great difficulty in making their way over dangerous places.

Professor Larkin of Mount Lowe Observatory arrived in Los Alamos this evening. Over the telephone he stated the disturbances are of a nature known as oscillatory earthquakes, and are of a common nature. He says it is quite probable they are due to the sudden displacement of immense bodies of gases, seven or eight miles beneath the surface of the earth.

While the country about Los Alamos gives evidence of once having been the scene of great volcanic action, he observes nothing to indicate that another calamity of that nature is likely to occur.

Professor Hilgard, head of the Agricultural Department of the University of California, who telephoned Attorney Leslie advising him and the people of Los Alamos to desert their homes for places of safety, and whose statements have been attributed to President Wheeler, under a missapprehension,

has written Leslie stating the advice was given as a precautionary measure and not in anticipation of further earthquakes.

RETURNING CONFIDENCE

Santa Barbara, August 1--As the people of the Los Alamos section are recovering from their fright, another view of the earthquake situation is taken. Reports are coming in to the effect that the actual condition has been greatly exaggerated in many cases. This, coupled with the denial from Berkeley that the President of the University has given the advice to desert the town, should aid in the restoration of confidence in the prospects of the village.

E. S. Cordero, a prominent rancher of the Los Alamos Valley, arrived here today. He states that the reports are wild, that no buildings of any stability have been seriously injured, those suffering the greatest damages being shacks.

Another report comes from Los Alamos that a photographer named Sturtevant, who was sent to secure views for a newspaper, drove for eight hours one day searching for the four-foot fissures in the earth's crust, reported to have been caused by the quake but failed to locate it.

David Greenlee, who lost a water tank and windmill in the shakup, admits that the things were in poor condition, and that he was about to take them down when the earthquake saved him the trouble.

The report sent out from San Francisco and credited to a reported discoverer of the Los Alamos oil fields, to the effect that a volcano had been active in the vicinity of Los Alamos for several years, has also detracted the minds of the people from the serious side of the week's events. The alleged volcano is many miles from the scene of the disturbance, and partakes more of the nature of a hot spring than a volcano. There are no evidences of volcanic formations in the vicinity.

The university professors are unable to agree as to the cause of the earthquakes; the people who have experienced them do not attempt an explanation. The fact that the area of the affected district is limited has prevented any fears of disaster in adjacent territory.

LONG BOW STORIES

San Francisco, August 1--A trained Associated Press reporter who was sent to Los Alamos, the scene of the recent earthquake disturbances, writes the following from there:

The reports telegraphed from this place and other sections of Santa Barbara and San Luis Obispo counties telling of the enormous damage done here by the series of earthquakes which have visited this county and this vicinity in particular, at frequent intervals since July 27th, have been exaggerated to the great detriment of the county and State, and can only be attributed to hysteria or diseased imaginations.

It is an undeniable fact that there has been an unprecedented number of earthquakes, some of them more or less severe, but as to the reports of great fissures in the earth, upheavals of the earth, and smiliar stories of the havoc wrought by the temblors, it is only charitable to say that they are untrue.

Several landslides are reported, and one of them, about nine miles northeast of Lompoc, really displaced an enormous body of earth, which slid harmlessly into an isolated canyon miles from the nearest habitation. The very nature of the earth in this section is conductive to just such phenomena, being of a shale formation and very soft.

It only requires a shake of the slightest nature to cause similar slides and a severe frost in this section has been known to displace large bodies of earth.

The "twister" of yesterday morning dismantled one or two old oaks in this vicinity and one or two large rocks were loosened from their anchorages on the mountain sides and sent crashing into the valleys below. These little disturbances doubtless lent support to the stories of great rents in the earth and similar reports.

Within the town limits some damage certainly did result from the quakes; but most of the damage resulted from falling brick and chimneys.

The brick walls of Wickenden's general store are partially demolished and will have to be built, and but one chimney in town remains intact. A careful and minute investigation discloses the undeniable fact that little or no mortar was used in setting the bricks. They were merely pasted together with adobe mud, and that of poor quality. That the little brick church did not collapse long ago of its own weight is little short of a miracle.

Dozens of element-decayed chimneys were shaken to pieces, some of them falling through paper-like roofs into rooms below, doing more or less damage and badly frightening the occupants of the houses.

The greatest loss was sustained by the Western Union Oil Company, two of their 14,000-gallon tanks being destroyed,

releasing the oil, which rushed down the hill on which the tanks stood, into a little ravine and out into the Santa Ynez River. The loss to the oil company amounts to $4000.

The inhabitants of this section of Santa Barbara County have certainly been greatly frightened, and not without reason, but the investigation of the Associated Press representative fails to show any genuine reason for the exodus of certain of Los Alamos' citzens during the past day or so.

CAUSE OF THE QUAKE

San Francisco, August 1--John H. Conway, who was one of the first men to discover the mineral possibilities of the Los Alamos district, believes that the disturbances are in no way due to volcanic activity, but occasioned by subsidences caused by the action of the subterranean gases and oils in which the region is known to abound.

It has been known for years that gas was being generated beneath the earth's surface in the vicinity of Los Alamos. Professor Silliman of Yale, in 1866 put forward that theory and added that he had nowhere seen such evidences of the presence of hydrocarbons. This was substantiated lately by F. McMillan, a San Francisco mining engineer.

For many years there has been a small, active volcano on Alamos side of the mountain which lies between that place and Santa Barbara. Smoke and steam constantly issue from various fissures along the summit of a plateau or shelf near the northern slope of the mountain.

Viewed from the distance of the old stage road, these manifestations appear like small camp fires. They have never developed any alarming tendencies and have attracted very little direct investigation.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: 28 July 1902

Time: Midnight

Location: Santa Barbara

Source Name: Sacramento Bee

Date: July 29, 1902

Published at: Sacramento

Text: ADDITIONAL SHOCKS OF EARTHQUAKE

Santa Barbara, July 29--Several additional distinct shocks of earthquake were felt in the upper portion of Santa Barbara County last night. They were most severe at Los Alamos and Lompoc. The heaviest shock occurred about midnight, followed by lighter ones more or less regularly until 4 o'clock. Telephone communication with the Careaga Ranch is interrupted this morning, and it is not known if further damage was done in the oil fields.

From records kept during the severe shocks of Sunday night and Monday morning, it appears that the first shock was nearly of one minutes' duration. In twenty minutes three others followed, the third quake being accompanied by a terrific report. The shocks were of varying violence, and in every case the vibrations were from est to west.

Some of the lesser shocks amounted to not more than violent lurches of the earth, without more than two movements, one forward and the other back.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 28, 1902

Time: 11:03 p.m.

Location: Santa Barbara County

Source Name: Sacramento Bee

Date: July 29, 1902

Published at: Sacramento

Text:

Santa Barbara, July 29--At 11:03 o'clock Sunday night Santa Barbara County was visited by the most severe earthquake experienced in years. Only a slight tremor was felt here, but other places report destruction of property of great value.

The center of the disturbance appears to have been at the Carreaga oil fields near Los Alamos. Two 1500 barrel tanks containing 175,000 gallons of oil were completely wrecked and the contents became a total loss. Buildings were cracked and some minor damage suffered. The total loss sustained by the oil company will be about $20,000.

The report that the wells ceased to flow proved to be untrue.

At Harris Station an old creek bed which had been dry for years began flowing with a stream two feet deep and eighteen feet wide. At Los Alamos furniture and dishes were broken but no lives lost. Some narrow escapes are reported. Reports from Lompoc and Santa Maria state that several severe quakes were felt there at the same hour but little damage was done. A slight shock was felt here at 3:30 p.m. last evening.

Lompoc, July 29--Lompoc Valley experience a severe earthquake at 10:55 Sunday night. At this time a violent shock was felt which lasted fully thirty sconds and was so severe that dishes, clocks, house plants, etc., were thrown from shelves upsetting furniture and other articles. The people were stricken with terror and ran from their houses some fearing to return as other lighter shocks continued for several hours afterward.

Another heavy shock was felt at 5 a.m. and one at 11 a.m. A large water tank was knocked over. The earth cracked open at many different places and the Santa Ynez River bed slightly changed at places.

The shock seemed to be of a local nature as it was but slightly felt north as far as San Luis Obispo and south as far as Gaviota.

San Luis Obispo, July 29--Two distinct earthquake shocks were experienced in this place Sunday night. The first and heaviest of the two occurred at 10:57 p.m. and had a duration of five seconds. The second occurred at 5:04 o'clock this morning and lasted three seconds. The general direction of both disturbances was east and west.

At the Western Union Oil Company's wells on the Carreaga ranch two tanks containing 2000 barrels of oil were destroyed by the first disturbance.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 27, 1902

Time: Sunday night

Location: Santa Barbara

Source Name: Colusa Sun

Date: July 29, 1902

Published at: Colusa County

Text: SANTA BARBARA VISITED BY EARTHQUAKE

The severest earthquake ever known in Southern California, is said to have occurred at Santa Barbara on Sunday night. It threw down oil tanks, houses, broke up lines of oil piping, and damaged things generally.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 31, 1902

Time: 1:20 AM

Location: Los Alamos

Source Name: Colusa Sun, July 31, 1902

Date: July 31, 1902

Published at: Colusa County

Text: SERIOUS EARTHQUAKES IN SANTA BARBARA

Los Alamos, July 31--A series of heavy earthquakes that have continued for three days culminated at 1:20 this morning by a heavy shock doing great damage. Many buildings were destroyed, including the Presbyterian church, which was entirely demolished. People are panic-stricken and are leaving town by vehicle and by train.

Lompoc, July 31--Three heavy shocks of earthquake occurred here last night, followed by several more this morning. People were badly scared, but no serious damage was done. The disturbance is general throughout San Luis Obispo and Santa Barbara counties.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 28, 1902 (actually July 27, 1902)

Time: few minutes past 11:00 PM

Location: Santa Barbara

Source Name: Santa Rosa Press Democrat

Date: July 30, 1902

Published at: Santa Rose, Cal.

Text: SEVERE EARTHQUAKE

EXTENSIVE DAMAGE DONE IN SEVERAL SECTIONS OF SANTA BARBARA

Buildings Demolished, Oil Tanks are Wrecked and Considerable Depredation by Forces of Nature is Done There

Santa Barbara, July 28--A very severe earthquake did a great amount of damage in the northern part of Santa Barbara County last night. The district affected extends from Lompoc to Santa Maria, the center of activity evidently having been near the latter place.

The first shock was felt a few minutes past 11 o'clock, vibrations continuing for several minutes. There were fourteen distinct shocks, but none of them was as severe as the first.

In the Careaga oil fields, which are operated by the Western Union Oil Company, large fissures were cut in the earth. Two tanks containing 3,000 barrels of oil each were dashed into splinters, the oil flooding the section. Nearly all of the surface pipe lines used for conveying oil and water several miles were twisted or broken.

Strangely none of the wells was affected. At Los Alamos adobe buildings were razed to the ground, while in the business places windows were broken and goods on the shelves thrown on the floor. Lompoc, several miles to the southwest shared badly. The city is practically without a water supply, as the mains were badly broken and the water has been flooding certain portions of the city.

The Santa Ynez river which in the summer is usually a small stream but in winter a torrent, was comparatively dry yesterday. Today water is rushing over the river bed as in

a freshet. No one will attempt to explain this remarkable phenomenon and the presence of such a large volume of water at this time of the year is considered part compensation for the great damage that has resulted in other ways.

Reports received tonight from outlying districts confirm the reports as to the severity of the shock and the amount of damage done.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 30, 1902

Time: 7:30 PM

Location: Santa Barbara

Source Name: Santa Rosa Press Democrat

Date: July 31, 1902

Published at: Santa Rose

Text: GREAT EARTHQUAKE

LOS ALAMOS IS VISITED BY THE HEAVIEST SHOCK OF ALL LAST NIGHT

People of the Town Rush Panic-Stricken to the Suburbs of the Place--and Camp for the Night Around a Fire

Santa Barbara, July 31--The earthquakes in the Los Alamos Valley have not yet subsided, and tonight all the people have left the town and are camped about a large bonfire on the outskirts.

A series of minor shocks were felt during the day, but at 7:30 o'clock tonight the worst earthquake felt yet occurred. Terror stricken people rushed from their homes and left the town. The wrecking of buildings was completed, and it was stated that one brick chimney is still standing in the town.

The damage in the stores could not have been greater had it been purposly accomplished. A disorganized heap of articles of every description occupies the floor in every building and shelves are empty. In the drugstores and saloons every bottle was smashed. More than half of the inhabitants of Los Alamos will never return to reside in the town.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 28, 1902 (actually July 27, 1902)

Time: 10:55 PM, 5:00 AM, 11:00 AM

Location: Lompere (Lompoc), Santa Barbara, etc.

Source Name: The Morning Oregonian

Date: July 29, 1902

Published at: Portland, Oregon

Text: SHAKEN BY EARTHQUAKES

CALIFORNIA TOWNS EXPERIENCE VIOLENT SHOCKS

Dishes Are Thrown From Shelves In Lompere Valley, and People Become Terror-Stricken

Lompere, Cal., July 28--Lompere Valley experienced a severe earthquake shock at 10:55 last night. At that time a violent shock was felt which lasted fully 30 seconds, and was so severe that dishes, clocks, house plants, etc. were thrown from shelves and furniture and other articles upset. The people were stricken with terror and ran from their houses, some fearing to return, as other light shocks continued for several hours afterward. Another heavy shock was felt at 5 a.m. and one at 11 a.m. A large water tank was knocked over, the earth cracked at many different places and the Santa Yenz River bed slightly changed at places. The direct disturbance seemed to be of a local nature.

IN SANTA BARBARA COUNTY

Oil Company Alone Loses $20,000-
Several Narrow Escapes

Santa Barbara, Cal. July 28--At 11:03 o'clock last night Santa Barbara County was visited by the most severe earthquake experienced in years. Only a slight tremor was felt here, but in other places considerable property was destroyed. The center of the disturbance appears to have been at the Carreaga oil-fields near Los Alamos. Two 1500-barrel tanks containing 175,000 gallons of oil were completely wrecked and the contents became a total loss. Buildings were cracked and some minor damage suffered. The total loss sustained by the oil company will be about $20,000. A report that the wells had ceased to flow proved to be untrue.

At Harris Station an old creek which had been dry for years began flowing a stream two feet deep and 18 feet wide. At Los Alamos furniture and dishes were broken but no lives lost. Some narrow escapes are reported.

Reports from Lompoc and Santa Maria state that several severe shakes were felt there at the same hour, but little damage was done.

A slight shock was felt here at half-past five o'clock this evening.

Tanks of Oil Destroyed

San Luis Obispo, Cal., July 28--Two distinct earthquake shocks were experienced in this place last night. The first and heaviest of the two occurred at 10:57 p.m. and had a duration of five seconds. The second occurred at 5:19 this morning and lasted three seconds. The general direction of the disturbances was east and west. At the Western Union Oil Company's wells on the Careaga ranch, two tanks containing 2800 barrels of oil were destroyed by the first disturbance.

Heaviest Shock Ever Felt

Santa Maria, Cal., July 18--A heavy shock of earthquake was felt here at 10:50 last night. The vibrations were from east to west and lasted 45 seconds. The waves were a steady sway. Old timers say it was the heaviest shock ever felt here. Near Los Alamos, a few miles from here a formerly dry creek bed was a rushing stream this afternoon.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 30, 1902

Time:

Location: Los Alamos

Source Name: The Morning Oregonian,

Date: August 2, 1902

Published at: Oregon

Text: STILL MORE QUAKES

Shocks at Los Alamos, Cal., Continue--Disturbances Less Severe

Reports of Damage Greatly Exaggerated--Many People Have Narrow Escape From Death--Cause of the Shocks

Los Alamos, Cal., Aug. 1--The reports telegraphed from this place and other sections of Santa Barbara and San Luis Obispo Counties, telling of the enormous damage done here by the series of earthquakes which have visited this country and this vicinity in particular, at frequent intervals since July 27, have been greatly exaggerated. It is an undeniable fact that the number of earthquakes has been unprecedented, and some of them more or less severe, but as to the reports of great fissures in the earth, upheavals of the earth and similar stores of havoc wrought, it is only chartiable to say that they are untrue. Within the limits of Los Alamos the property damage will not exceed $4000.

Several slight shocks were experienced today, but no damage beyond further dismaying the inhabitants of this little town resulted. Shortly after 9 o'clock this morning there were two. Several buildings not already destroyed were badly cracked, one immense structure belonging to Juan Careaga, a short distance from Los Alamos being turned partly around on its foundation. A few minutes past 11 o'clock today two more shocks occurred. The grammar school building was badly damaged. Plastering was knocked from the walls and the interior filled with debris, desks, chairs, blackboards, the furniture being thrown to the center of the room in a great heap.

Newspaper correspondents from all sections of the state have flocked to Los Alamos, and the town has about as many newspaper and scientific people as resident inhabitants.

People from Lompoc and outlying districts have reached Los Alamos with stories of havoc in the hills. A great landslide, carrying down hundreds of tons of earth, occurred near the Hoover rancho. The road from Lompoc was buried for 50 feet. As far as the eye can reach from this grade there are white spots on the mountainsides, indicating where huge boulders were sent thundering down to the valleys.

John R. Drum, a mountain farmer; reports a road-destroying landslide in Drum Canyon. The faces of the hills are charged with noises which Drum describes as the most terrifying sounds he ever heard.

The oil wells around the town of Los Alamos seem not to have suffered. The Careaga wells owned by Los Angeles capitalists are located five miles from here and fears for them filled te minds of all as the seismic disturbances increased. The casing of the wells, 10 in number, are almost 2000 feet into the earth, yet not a well has yet been injured.

Since the beginning of the earthquake shocks the temperature here has been most oppressive, as much heat apparently coming from the earth as from the sun, which for the most part of the time has been shinning brightly.

Miss Mamie Leslie, in charge of the telephone office here, has remained at her post, although her family has sought a place of greater safety. She is the daughter of a prominent attorney.

Professor Larkin, of Mount Low Observatory, arrived at Los Alamos this evening. Over the telephone he stated the disturbances are of a nature known as oscillatory earthquakes, and are of a common nature. He says it is quite probable they are due to the sudden displacement of immense beds of gases, seven or eight miles beneath the surface of the earth. While the country about Los Alamos gives evidence of once having been the scene of great volcanic action, he observes nothing to indicate that another calamity of that nature is likely to occur.

Professor Hilgard, of the agricultural depatment of the University of California, who telephoned Attorney Leslie advising him and the people of Los Alamos to desert their homes for places of safety, and whose statements have been attributed to President Benjamin Ide Wheeler, under a misapprehension, has written Leslie stating the advice was given as a precautionary measure and not in anticipation of other earthquakes.

NARROW ESCAPE FROM DEATH

Experiences of People in Buildings Which Went Down

Los Alamos, Cal., Aug. 1--Several narrow escapes from death are reported as a result of the seismic disturbances in this section. Arthur Foxen, a young man, was asleep in a room at the rear of Wickenden's store when the terrifying shock came last night. The fall of the big safe blocked his exit through the door. He turned to the window, but could not for a moment raise it. That deley saved his life, for an instant afterward the top of the rear wall crashed down past the window, freeing its fastening and giving him exit.

Dr. H. C. Bagby, of Santa Maria, was sleeping in the home of Mrs. D. P. Whitney, an aged woman, when the earthquake and the crash from the Wickenden wall aroused him. His eyes saw an unusual light, and with quick wit he decided that Mrs. Whitney had been reading by a lamp and that the lamp had been overturned. Without a thought for his own safety he rushed upstairs and found Mrs. Whitney vainly fighting the flames and seemingly surrounded by them. Drawing her from her place of peril he beat out the fire with the bedclothes and thus saved a life and a large part of the business section.

In the destruction of the abode home of Casper Orena, a boy laying sleeping just where a great V-shaped section of the heavy adobe wall was twisted out and cast aside, but he escaped unscathed. All the family of Dr. Graham was away when their house crumbled down. They had gone north to bury one of their little ones and so escaped death.

SMALL ACTIVE VOLCANO IN REGION

For many years there has been a small, active volcano on the Los Alamos side of the mountainss, which lies between that place and Santa Barbara. Smoke and steam constantly issue from various fissures along the summit of a plateau or shed near the northern slope of the mountain. Viewed from the distance of the old stage road, these manifestations appear like small campfires. They have never developed any alarming tendencies, and have attracted very little direct investigation.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: July 27 1902, July 31, 1902

Time: 11:00 PM (27), 7:30 PM (28), 1:20 AM (31)

Location: Santa Barbara

Source Name: The Portland Oregonian

Date: August 1, 1902

Published at: Portland

Text: EARTH IS SHAKEN

Violet Seismic Shocks in California

PEOPLE WARNED TO MOVE

Santa Barbara County Section is Panic-Stricken

MANY BUILDINGS TOPPLE OVER

Disturbance Are of the "Twister" Order and Face of the Earth Is Changed--No Loss of Life Yet Reported

Santa Barbara, Cal., July 31--The inhabitants of the little town of Los Alamos which has been the center of seismic disturbances since last Sunday are tonight huddled around a huge bonfire, waiting for daylight to come. Many of the residents have left for places outside of the tremblor belt. Those who have remained could not well abandon their business. The town of Los Alamos is situated on the Pacific Coast Railway, midway betwen Santa Ynez and Santa Maria in the long narrow Valley of the Los Alamos 16 miles from the coast. It has about 800 population. The Los Alamos Valley is from one-half mile to one mile wide. Its population is about 800. There are no brick buildings in the little village and the damage thus far is limited to the ruin of plaster, the collapse of chimneys, the breaking of crockery and glassware, the falling of the walls of the Presbyterian Church and two store buildings, and the demolishing of an old adobe building which was seriously damaged with the first quake on Sunday night. The damage will not exceed $10,000 in the opinion of conservative residents of the place. Those who have suffered the greatest loss are the following: F. Wickenden, general merchandise, walls of store buiding fell in, loss $800; damage to stock, $1000. Max King, general merchandise, falling plaster and loss of

stock, $350. Presbyterian Church, part of the front wall collapsed damge $800. C. H. Plerson, general merchandise, store moved off its foundation, loss $350; damage to stock $1000. Dr. Graham, building walls fell in; loss $600. H. H. Harris, drug store; loss, $1200, mostly to stock. The tankhouse of David Greenlee collapsed and his residence was also damaged.

The hotel building suffered less than any other, reporting but a few dollars damage to glassware.

There is not a chimney left standing in town. The Nick Foxen residence was moved four inches and spit in opposite corners. Not a building escaped some injury, and it is considered miraculous that no one was hurt.

There was a series of light vibrations during the day, which culminated in quite a severe shock at 7:30 p.m. Further shocks are anticipated.

FACE OF COUNTY CHANGED

San Luis Obispo, July 31-A strip of country 15 miles long by four miles wide, rent with gaping fissures and dotted with hills and knolls that sprung up during the night, as if by magic; a village in ruins, and hundreds of people fleeing for the lives, are the results of last night's seismic disturbance in the prosperous and fruitful valley of Los Alamos, in the northern part of Santa Barbara County. During the last four days that section of the county has been shaken by a series of earthquakes that is without precedent in the history or tradition of the Pacific Coast, and the continuance of the disturbances and increasing severity of the shocks have so terrorized the inhabitants that they are leaving for other parts as rapidly as possible.

The disturbance began Sunday evening with a shock which caused several hundred thousand dollars of damage to property in the village and the surrounding country. This shock was followed by a number of disturbances less severe and less disastrous, continuing through the remainder of Sunday night and Monday forenoon.

FACE OF COUNTRY CHANGED

On Tuesday night, beginning at 12:10 o'clock, there was another series of seven shocks, all of which were light. The most severe shock of the entire series occurred at 1:20 o'clock this morning, when the hills were shaken and twisted to their foundations and the valleys trembled and rolled like the unstable surface of the ocean. Great fissures were

run in the earth, hills appeared in level valleys, springs of water opened up in places that had been dry, and the general topography of the valley was greatly changed in many respects.

The disturbance had no general direction but was what is known as a "twister". It was preceded by a rumbling like that of distant thunder, which increased until the earth began to rock and twist and the hills began to tremble. With the first warning of the sound of the approaching disaster, the terror stricken people rushed into the streets and sought places of safety in vacant lots and fields, while many hastened toward the neighboring hills. The first vibrations were similar to the preceding disturbances in direction and effect but they were immediately followed by the most terrific shock ever experienced in this section of the state. The earth trembled and rolled and twisted until it was impossible to stand erect, and the terror-stricken people crouched together in the darkness, fearful that the earth beneath them might open and swallow them up.

Buildings Shaken Down

The terror inspired by the rumbling and trembling of the earth was increased by the sound of fallings buildings, which affords some idea of the terrible destuction that was being wrought. When the more severe shock had passed and the rumbling sounds had died away in distant hills, the people gathered in groups about the ruins of their homes and places of business and when they saw the extent of damage done, many of them fearful of a repetition of this terrible experience immediately started on foot or by such conveyances as could be had for places of safety.

In the darkness of the night, it was impossible to determine the full extent of the destruction brought, but with the dawn of day the village presented an appearance of ruins of a city long deserted. A church had been leveled to the ground, and not one brick building was left standing. Chimneys had toppled over, frame buildings had been wrenched apart and thrown from their foundations, the telegraph and telephone wires had been broken, and there was not a building in town that had not been damaged more or less seriously. In store buildings that were not totally destroyed, the merchandise was thrown from shelves and everything breakable was destroyed. Not a pane of glass was left in any window of any house in town, and in the frame cottages and dwelling-houses that were left standing stoves were turned over and crockery and glassware was destroyed.

The people have deserted the village; every conveyance has been taken and the passenger and freight trains that have

left here since the severe shock last night have been loaded with people who are fleeing to Santa Maria and the northern part of the country for safety. Since the first disturbances on Sunday night, there have been over 70 distinct shocks, and those who have been keeping records have now abandoned the effort, the disturbance has become almost continuous .

In the drug store of H. H. Harris, the bottled goods and glassware were thrown down, and the place completely wrecked. Kahn's saloon shared a like fate. The stores of Fred Wickendeh and C. Pierson were badly shaken up. In some places the walls have caved in and merchandise smashed. A large safe in Wickendens saloon was overturned and went crashing through the floor. The home of Attorney Alex Desile was completely wrecked. The Presbyterian Church, the only edifice of its kind in the town was destroyed. Other reports of damage are coming in but thus far there is no loss of life or serious injury to anyone. Telephone communication with the district is interrupted.

President Benjamin Wheeler of the University of California, was communicated with by telephone and advised that the people be ready to leave at a moments notice. _____ for other of residences and placed of _____ left open so those indoors might escape in the event of further disturbances. The advise of President Wheeler was communicated to the people and was immediately acted upon.

CAUSE OF THE EARTHQUAKE

EVIDENTLY A SLIP IN THE STRATA OF THE EARTH

Berkeley, Cal, July 31--Regarding the unprecedented severity of the earthquakes in Santa Barbara County, Prefessor Samuel B. Christy of the University of California said:

" While the Southern California earthquakes were unusually severe, it was nothing more than could be expected. The western coast of this continent is liable to have such shocks at any time. Any great contraction of the earth on the Pacific Coast may be accompanied by damage to property. It is a well-known scienitic fact that as the earth cools in the interior the earth crust, on which we live, is bound to give, producing jarring effects of varying intensity."

James Maddrill, who has charge of the charge of the observatory of the University of California this summer, said:

"From official sources we have learned that the southern earthquakes were practically localized. This is strange, since the shocks were so severe. In quakes with sufficient vibration to raze a building, the shock is generally plainly felt for a radius of hundreds of miles. The disturbance, however, was scarcely felt here, the seismograph at the University of California showing but a faint record."

T. L. Heaton of the University of California said:

"While scientists are working on the theory of probable cause of the earthquake in Santa Barbara County the exact reason will probably never be known. There was evidently a slip in the strata of the earth. In such cases a slight displacement sometimes produces a fearful shock. The theory has been advanced that the removal of great quantities of oil from the earth in Southern California is responsible for the seismic disturbance. I hardly think this possible, as oil wells do not penetrate deep enough into the hot region."

NO ALARM AT SANTA BARBARA

Santa Barbara, Cal., July 31--A message from John S. Bell, owner of the Los Alamos ranch, stated that the ranchhouse was seriously damaged by falling plaster, loss of china, etc. The oil wells at Caregar (i.e., Careaga) are believed to be uninjured. There have been no further shocks at Santa Barbara. The latest reports indicate that the damage was confined to the immediate vicinity of Los Alamos. One extimate, that of Captain Harris, places the loss to be at $10,000 or $11,000.

The last shock during the morning was at 10:28. Between 7 and 7:30 there were seven distinct shocks, and they were followed by othes at intervals during the morning. A peculiarity of the disturbances is the limited area affected. Only two of the more severe disturbances have been felt in Santa Barbara, and did absolutely no damage in this city. On this account there is no alarm here.

People Leave Homes in Night Robes

Tempere, Cal., July 31--A terrific shock of earthquake occurred at 1:20 o'clock this morning, followed at 1:40 o'clock by a lighter shock. Buildings rocked violently, and people rushed from their homes in their night robes. The first shock lasted several seconds, and a number of buildings damaged by Sundays night's shock are on the verge of collapse. People remained on the streets all night, fearing to return to their homes.

Another Heavy Shock at Santa Maria

Santa Maria, Cal., July 31--Another quite severe earthquake shock was felt here at 7:25 p.m. No damgae was done. Two families arrived this afternoon from Los Alamos, fleeing from the terrifying shocks almost continuously felt there. It is reported a reign of terror holds sway there, and that more families are preparing to leave.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: January 11, 1915

Time: 8:27 (when clock stopped)

Location: Lompoc

Source Name: Lompoc Record

Date: January 12, 1915

Published at: Lompoc

Text: EARTHQUAKE SHOCK MONDAY NIGHT QUITE SEVERE

One of the hardest earthquake shocks experienced by present residents of Lompoc came Monday evening at about 8:27 o'clock, at least that was the time our clock stopped. The shock was from the northwest to southeast and the disturbance lasted about fifteen seconds. This was followed by another shock in about fifteen minutes and there were shocks felt distinctly at 10 p..m. and 3 a.m. Tuesday morning. Some parties counted eight distinct shocks during the night.

The big shock appeared to come in two installments. The first part was quite hard and when it began to subside those of our citizens who have experienced numbers of like occurences began to smile but the second and harder shock caused serious countenances and anxius looks in every home.

The Royal Arch Masons were holding their meeting in the I. O. O. F. hall when the earthquake came and we are told that there was a hurried exit from the building. A few of the audience at the Movie House made their exits and some occupants of the Hotel Arthur who had retired early beat it for the street below clad in their night clothes.

The damage in this immediate vicinity was trifling and no one was hurt. In the Santa Rita section the quake was harder as was also the case several years ago when several chimneys were tumbled down there. Stoves were thrown several inches this time and at the Geo. Pyster ranch house the chimney was cracked. Dishes were thrown helter skelter and considerable loss is reported on that score.

At Los Alamos the loss was very small but on the General Petroleum lease at Careaga the temblor appeared the worst. Plaster was shook from the fine residence of Captain Batcheldor and the china and dishes were wrecked. At the Batkin & McClendon ranch at Careaga a great deal of china and dishes were destroyed.

The local telephone exchanges were unable to answer the calls that came in by the hundreds for the hour that followed although two girls were soon serving at each board.

The old grade landing from Santa Rita to Los Alamos is reported to have suffered considerably on this side. Tons upon tons of the embankment were thrown upon the grade. Long seams an inch and one-half in width were opened in the roadbed.

At Los Alamos the quake was especially severe from all reports. Almost every chimney was tumbled down or shifted out of position so we are told. The chimney at the grammar school crashed through the roof tearing an immense hole, and the school has been closed temporarily for repairs. Several of the houses were also badly shattered, the new home of Peter Consalio being among the worst damaged.

The Associated Oil Company's pipeline to Gaviota was broken at Bicknell, at Santa Rita and in Gaviota Canyon.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: January 11, 1915

Time: 8:45 p.m.

Location: Los Alamos

Source Name: Santa Maria Times

Date: Janauary 16, 1915

Published at: Santa Maria

Text: SEVERE EARTHQUAKE FELT IN THIS COUNTY

An earthquake of unusual violence took place on Monday evening at a quarter to nine, which shook the community and the territory between Salinas and Los Anagles more or less severely.

According to one of our local high school teachers the shock lasted 35 seconds and the vibrations seemed to travel north and south.

There was no damage done to any of our buildings here, so far as is known, but in Los Alamos several chimneys were thrown down, dishes knocked off the shelves, etc. At Lompoc, it is reported that the Odd Fellows Hall had suffered a crack in the wall and other buildings, including one of the banks, were also damaged.

The Union Oil Company's pipe line and also the Associated Oil Company's lines suffered breaks. The Associated's line was broken in two places, one being at Bicknell and the other near Santa Rita. Considerable oil managed to escape, but as the break in Santa Rita occurred in a gulch, the company will save about 95 per cent of it. A crew of men are now at work making the necessary repairs.

The Pacific Telephone Company had some difficulty with its long distance wires, but the trouble was soon remedied. The Western Union had no damage, the lines being slightly weakened. The Home Phone was not disturbed.

At Santa Barbara the shock was slight and from there south was still lighter.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: January 11, 1915

Time: 8:30 PM

Location:

Source Name: Oxnard Daily Courier

Date: January 12, 1915

Published at:

Text: HEAVIEST QUAKE OF YEARS SHAKES THIS COAST SECTION

"Did you feel it?" referring to last night's earthquake was the common form of greeting this morning. A temblor of several seconds' duration shook Oxnard and the coast from north of Santa Barbara to the Malibu range at 8:30 last night.

The phenomenon here was divided into two periods. The first was slight and caused doors and windows to rattle without decided shake of the earth. This was followed immediately by several rocking movements so that no one could be mistaken about what had taken place.

Santa Barbara reports nine distinct shocks, and the quake was more severe there than here. The telephone girls at the central office there were . . . . . (incomplete)

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: January11, 1915

Time: 8:30 PM

Location: San Luis Obispo

Source Name: San Luis Obispo Tribune

Date: January 15, 1915

Published at: San Luis Obispo

Text: THERE WAS A SHAKE UP
THREE DISTINCT SHOCKS OF EARTHQUAKE CAUSE WINDOWS TO RATTLE

(From Tuesday's Daily)

At half past 8 o'clock last evening there were distinct shocks of earthquake felt in this city and throughout the surrounding country. The shocks caused a rattling of dishes in homes and the windows quivered while the force of the quake was sufficient to create a movement among the buildings. Inquiry in different parts of the city proved no harm done, although many persons were frightened within their homes.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: January 11, 1915

Time: 8:30 p.m.

Location: Santa Barbara

Source Name: Santa Monica Outlook

Date: January 12, 1915

Published at: Santa Monica

Text: EARTHQUAKE SHOCKS

Santa Barbara, January 12--Nine distinct earthquake shocks were felt here at intervals of a second at 8:30 o'clock. The only damage reported in this vicinity is the settling of a brick building at Lompoc, resulting in a long crack in the outer wall. The shocks are reported to have been felt for some distance north and south of here. They were said to be the heaviest in several years.

EARTHQUAKE NEWSPAPER REPORT

Earthquake Date: January 11, 1915

Time: 8:30 PM

Location: Santa Barbara

Source Name: Los Angeles Times

Date: January 12, 1915

Published at: Los Angeles

Text: NINE TEMBLORS RATTLE DISHES

SANTA BARBARA SHAKEN BY EARTHQUAKE HEAVIEST IN SEVERAL YEARS

Santa Barbara, January 11--Nine distinct earthquake shocks were felt here tonight at intervals of a second at 8:30 o'clock.

The only damage reported in this vicinity is the settling of a brick building at Lompoc, resulting in a long crack in the outer wall. The shocks are reported to have been felt for some distance north and south of here. They were said to be the heaviest in several years.

APPENDIX D

HISTORICAL ACCOUNTS OF LOS ALAMOS EARTHQUAKES

From

Descriptive Catalog of Earthquakes of the Pacific Coast of the United States[1]

[1] Townley and Allen, 1939

1902 Earthquakes

1902 July 27, 10:57 p.m. Los Alamos. VIII to IX. The shock of July 27 was quite local, being confined to the northern part of Santa Barbara County. Store buildings were damaged and goods thrown about. On the property of the Western Union Oil Co. two tanks containing 3000 barrels of oil each were destroyed. Pipes for conducting oil and water were twisted and broken. The adobe house on teh Orena ranch, which had been a landmark for years, was a mass of ruins. At Lompoc buildings were damaged and pipes broken. One account says the greatest damage occurred four miles west of Los Alamos. There was no damage in Santa Barbara.--Reid's Scrapbook, 2, 20, 21, 22.

"A month before the earthquake distinct rumblings were heard in the yard and the ground heaved at the Rancho Los Alamos".--Letter from Walter Nordhoff.

1902 July 28, [5:08 a.m.] San Luis Obispo. Many aftershocks followed the heavy shock at 10:57 p.m. on July 27. One of the most distinct of these aftershocks was that felt at 5:08 a.m., July 28. This was felt in San Luis Obispo as well as other places. The shock at Berkeley on July 28 was probably of some other origin.

1902 July 30. Severe shocks occurred from the 27th to the 31st at Lompoc, Los Alamos, San Luis Obispo, Santa Maria, and other places in Santa Barbara and San Luis Obispo counties. A few buildings were thrown down, but the property loss was not great and no lives were lost.

It is misleading to place this note under date July 30, as there is no record of any shock on that date, although there may have been some minor ones. One account states that a total of seventy-five shocks occurred in the five day interval between July 27 and 31. No one seems to have kept a complete record.

1902 July 31, 1:20 a.m., 7:30 p.m. VIII to IX. Los Alamos. Two more severe earthquakes occurred in Los Alamos and surrounding country on July 31, and many minor shocks were felt during the day. The shocks of July 31 completed the ruin started on July 27. Not a chimney was left standing in Los Alamos, and not a house escaped damage. During the five days of terror the people became so nervous that when the severe shocks of the 31st came, nearly the whole population left by whatever means of transportation was available. A special train of fourteen cars was sent from San Luis Obispo to take the terrified inhabitants away. The effects were worst in a strip about fifteen miles long and four miles wide. There were fissures and cracks in the ground, landslides, and a stream which was dry

flowed a large volume of water. Some of these effects occurred on July 27 and others on the 31st, but as newspaper accounts are all the evidence available, it is not easy to segregate the happenings in a chronological order. That there was no loss of life was due probably to the fact that there were no brick buildings in the area most badly shaken.

1902 August 1 to 3. Los Alamos. Several shocks.

1902 August 4. Los Alamos. There were six shocks on August 4, 15 2:05 a.m., 3:18 a.m., 4:15 a.m., 1:29 p.m., and 3:40 p.m., 4:55 p.m. The third and the sixth were the most severe. There was no damage, but then there was nothing much left that could be damaged.--Reid's Scrapbook, 2, 25.

1902 August 9. 4:00 p.m. Los Alamos. Distinct earthquake detonation and tremor.--S. F. Call, August 10, 1902.

1902 August 10. 2:40 a.m. Los Alamos. Heavy detonation followed by trembling.--S. F. Call, August 10, 1902.

1902 August 10. 2:40 p.m. Santa Barbara. Very severe but did no damage. Another shock during the afternoon and two at night. These were much lighter than the one at 2:40 p.m.

Shocks at both 2:40 a.m. and 2:40 p.m. on the same day would ordinarily arouse suspicion of error, but there were so many shocks near Los Alamos at this time that this seems not unreasonable.--Reid's Scrapbook, 2, 25.

1902 August 14. 2:15 a.m., 3:05 a.m., 3:20 a.m, 1:50 p.m., 3:50 p.m. Los Alamos. All slight except the one at 3:20 a.m. This one was said to have shaken the ground violently.--Reid's Scrapbook, 2, 26. A and R.

1902 September 10. 9:30 p.m., 11 p.m. Los Alamos. Severe. Reid estimates intensity at VI to V. Several light shocks during the past few days. A and R.

1902 October 21. Between 1:45 p.m. and 2:15 p.m. Los Alamos. Three shocks the first quite severe; duration forty seconds; no damage. Felt also in Lompoc--Reid's Scrapbook, 2, 26. A and R.

1902 October 22. 2 a.m. Los Alamos. Light shock.--Reid's Scrapbook, 2, 26.

1902 December 12. Los Alamos VII to VIII. All the northern part of Santa Barbara County was again shaken by severe earthquakes in the afternoon of December 12. At Los Alamos there were three shocks in five minutes, but the time was not stated. At Los Alamos dishes and glassware were thrown from shelves and at Santa Maria the walls of a brick school were cracked and plaster fell in many houses, indicating an epicentral intensity of VII to VIII.--San Francisco Call, December 12 or 13, 1902.

1915 Earthquakes

1915 January 11. 8:31 p.m. VIII. Los Alamos, Santa Barbara Co. After a field investigation Carl H. Beal concluded that the epicenter of this earthquake was two or three miles east of Los Alamos. In its epicentral region the shock was a series of hard jerks in different directions, ending with a vertical jolt. It lasted about a minute in the vicinity of the origin. Practically every chimney in Los Alamos was damaged, and some were thrown many feet. The intensities at some of the principal places in the disturbed area were: Los Alamos VIII; Lompoc VII; Santa Maria VI to VII; Santa Barbara V; San Luis Obispo V; Paso Robles, San Luis Obispo Co., IV; Los Angeles II. There were from one to three aftershocks daily for about thirty days after the main shocks, but most of them do not seem to have been recorded.--BSSA, 5, 14.

The Weather Bureau observers reported intensities as follows: Santa Barbara V, nine shocks felt (report of Geo. W. Russell), or VI, a single shock lasting five seconds (report of C. E. Rachford); Ozena V and Nordhoff (Ojai), III, Ventura Co.,; San Luis Obispo V, duration thirty seconds, and Paso Robes IV; Priest Valley II, Monterey Co.; Bakersfield, Kern Co., rapid rocking, felt by several.--ERWB.

The shock was recorded on the University of California instruments at Berkeley and Mount Hamilton, but with considerably less energy than was the equally distant Cape Mendocino earthquake of May 6, which caused no damage.--BSSUC 1, 174, 179.

The most northerly point reporting this disturbance was San Jose, about 200 miles, and the most southerly was Los Angeles, 125 miles to the southeast. The shaken area was in excess of 50,000 square miles.--Reid's Scrapbook, 3, 249, 252.

1915 January 12. Betteravia, Santa Barbara Co.--WB Form 1009.

1915 January 14. Betteravia, Santa Barbara Co.--WB Form 1009.

1915 January 15. Los Alamos, Santa Barbara Co.--WB Form 1009.

1915 January 20. Los Alamos, Santa Barbara Co.--WB Form 1009.

1915 January 26. Los Alamos, Santa Barbara Co.--WB Form 1009.

1915 January 27. Los Alamos.--WB Form 1009.