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December 29, 1994

CSMIP STRONG-MOTION DATA FROM THE OFFSHORE EUREKA EARTHQUAKE OF 26 DECEMBER 1994

Report OSMS 94-25
California Strong Motion Instrumentation Program (CSMIP)

A magnitude 5.3 (M_L BRK; moment magnitude 5.4 BRK) earthquake occurred on December 26, 1994 at 6:10 am (PST), approximately 20 km west (offshore) of Eureka. The preliminary hypocenter is located at 40.76°N, 124.37°W at a depth of approximately 20 km (BRK, USGS).

The recorded peak horizontal accelerations from this earthquake are relatively high (over 0.5 g maximum), but the duration is short (1-2 seconds) and the ground response records show a single pulse. In contrast to the horizontal, the vertical accelerations were relatively low at the near-in stations.

Table 1 summarizes the strong-motion data at 9 CSMIP stations, ranging in epicentral distances from 19 to 48 km. The locations of these stations and other CSMIP stations in the Eureka area are shown on the attached map. The largest horizontal acceleration was 0.56 g, recorded at a ground response station in Eureka about 20 km from the epicenter. The vertical acceleration at this station was only 0.06 g.

The records from two structures are included in this report, a 5-story building and a lightly-instrumented bridge. The 5-story building, a reinforced masonry residential building, was strongly shaken, with recorded horizontal accelerations of approximately 0.5 g at the first floor and 0.9 g at the roof level.

Processed acceleration, velocity and displacement and response spectra (preliminary) are included in this release for the abutment channels of a Caltrans bridge over the Samoa Channel in Humboldt Bay near Eureka.

Table 1. Data Recovered from CSMIP Stations from the Eureka Earthquake of 26 December 1994.

CSMIP No.	Station Name	Coordinates	Epicentral Distance	Az*	Site Geology	Maximum Acceleration Ground	Maximum Acceleration Structure
89327	Eureka — 5th & H 3-story masonry bldg.	40.802°N 124.163°W	19 km	74°	Alluvium	0.41g H 0.10g V	
89686	Eureka — Humboldt Bay Bridge	40.822°N 124.169°W	19 km	67°	Marine bay mud	— —	0.64g H 0.18g V
89509	Eureka — Myrtle & West Avenue	40.801°N 124.148°W	20 km	75°	Alluvium	0.56g H 0.06g V	
89494	Eureka — 5-story Residential Bldg.	40.802°N 124.146°W	20 km	75°	Alluvium	0.49g H 0.11g V	0.88g H

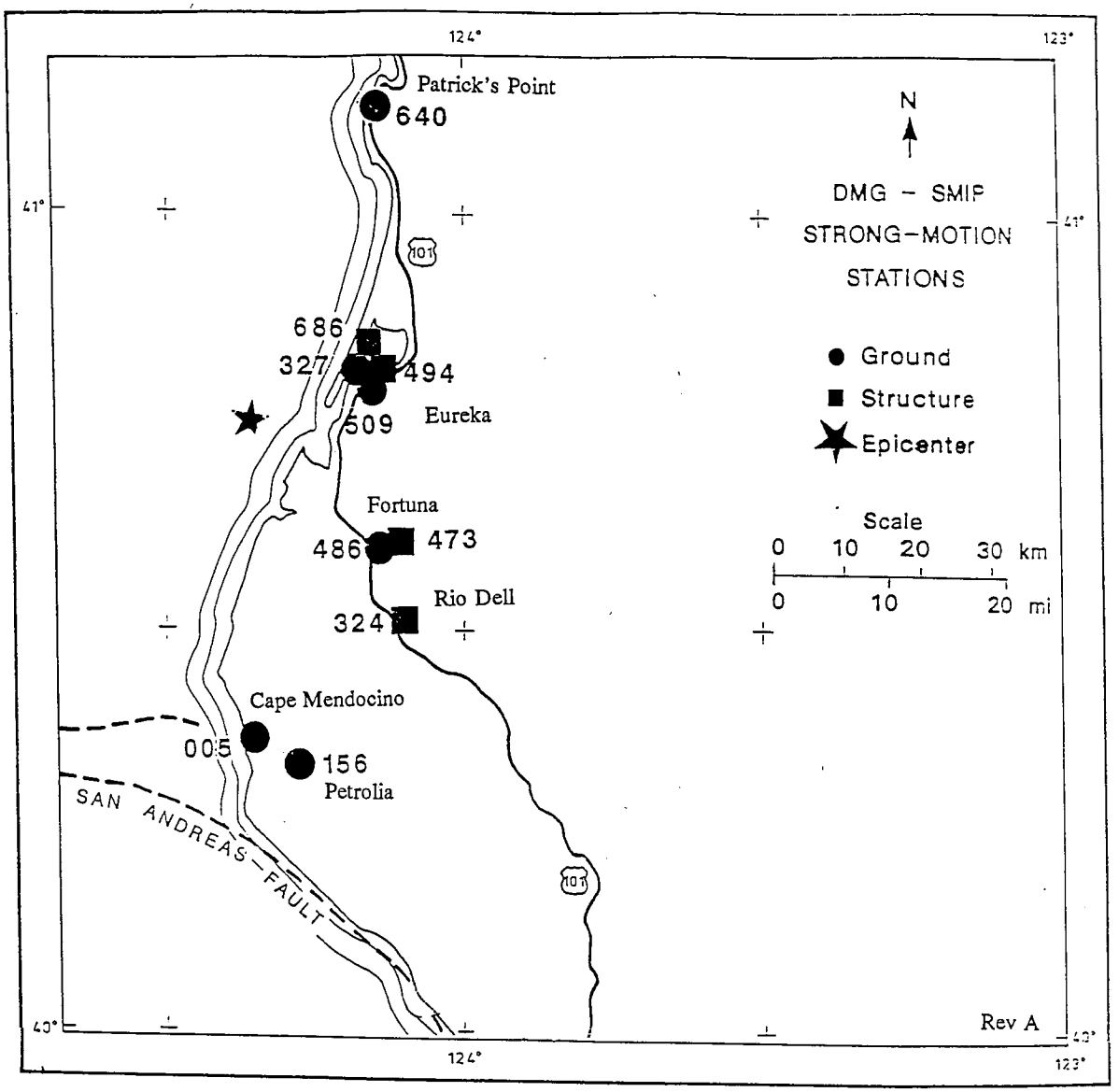


Figure 1. CSMIP strong-motion stations in the vicinity of the Eureka earthquake of December 26, 1994.

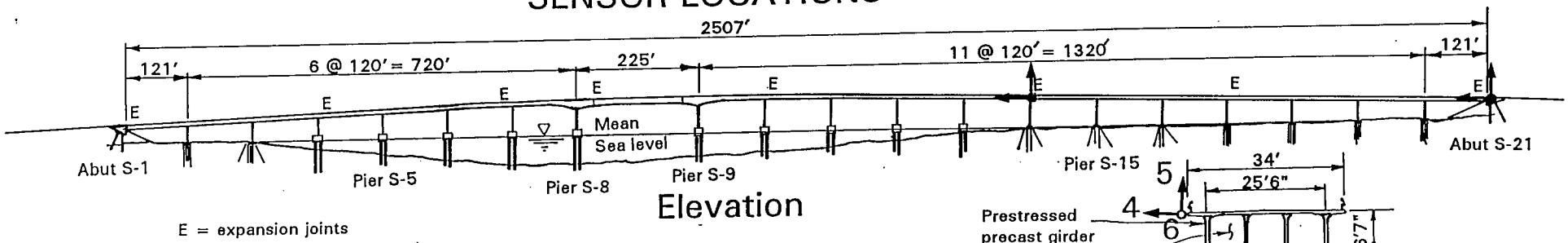
Table 1 *(continued)*. Data Recovered from CSMIP Stations from the Eureka Earthquake of 26 Dec 1994.

CSMIP No.	Station Name	Coordinates	Epicentral Distance	Az*	Site Geology	Maximum Acceleration Ground	Maximum Acceleration Structure
89486	Fortuna	40.584°N 124.145°W	27 km	134°	Alluvium	0.14g H 0.02g V	
89324	Rio Dell — Hwy. 101/ Painter St. Overpass	40.503°N 124.100°W	36 km	140°	Alluvium	0.12g H 0.02g V	0.24g H 0.20g V
89005	Cape Mendocino	40.348°N 124.352°W	45 km	178°	Hard sandstone	(not triggered)	
99640	Patrick's Point — State Park	41.137°N 124.150°W	46 km	42°	Alluvial marine terrace	(not triggered)	
89156	Petrolia	40.325°N 124.287°W	48 km	171°	Alluvium	0.016g H 0.005g V	

* Azimuth from epicenter

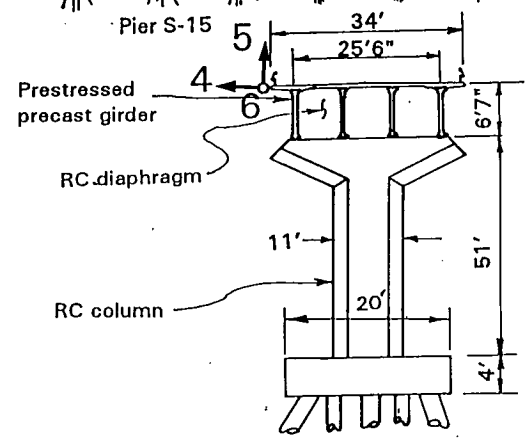
Eureka - Humboldt Bay Bridge
(CSMIP Station No. 89686)

SENSOR LOCATIONS



Elevation

E = expansion joints

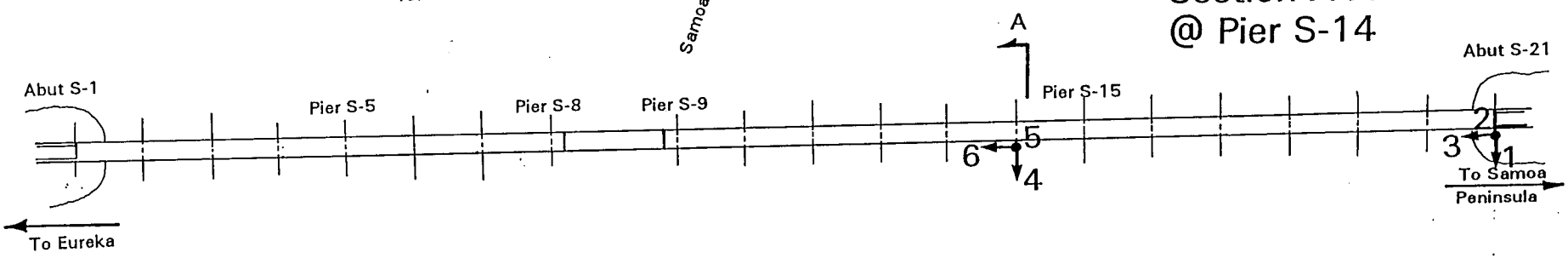


Section A-A
@ Pier S-14

Structure Reference
Orientation: N = 42°

N_{ref}

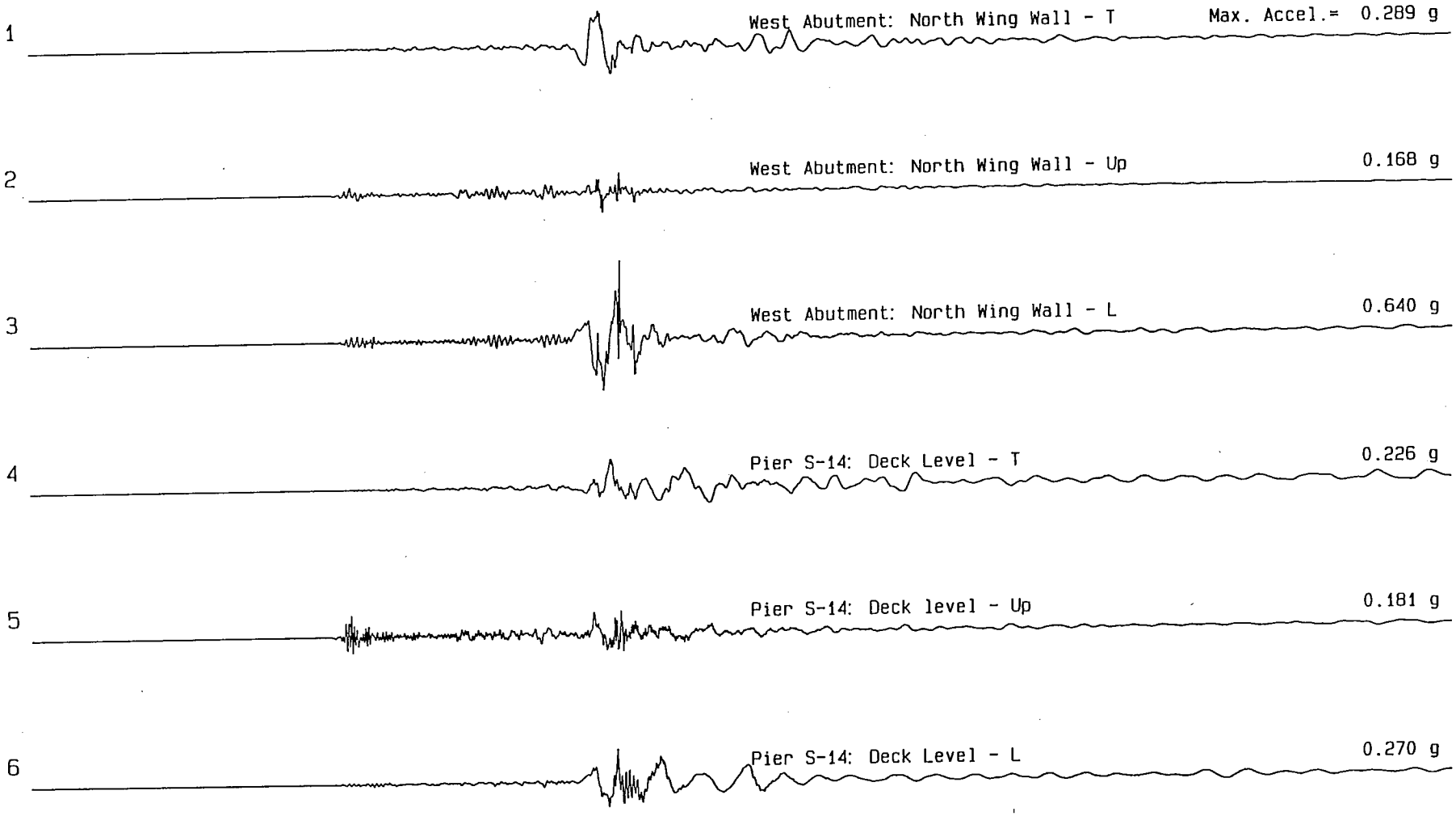
Samoa Channel



EUREKA - HUMBOLDT BAY BRIDGE

(CSMIP Station 89686)

RECORD 89686-C3119-94360.02



T = Transverse (42°), L = Longitudinal (132°)

Structure Reference Orientation: N=42°

0 1 2 3 4 5 10 15 20 Sec.

Eureka-Humboldt Bay Bridge: CSMIP S/N 686

Earthquake of Dec 26, 1994 06:09 PST
CSMIP PRELIMINARY PROCESSING

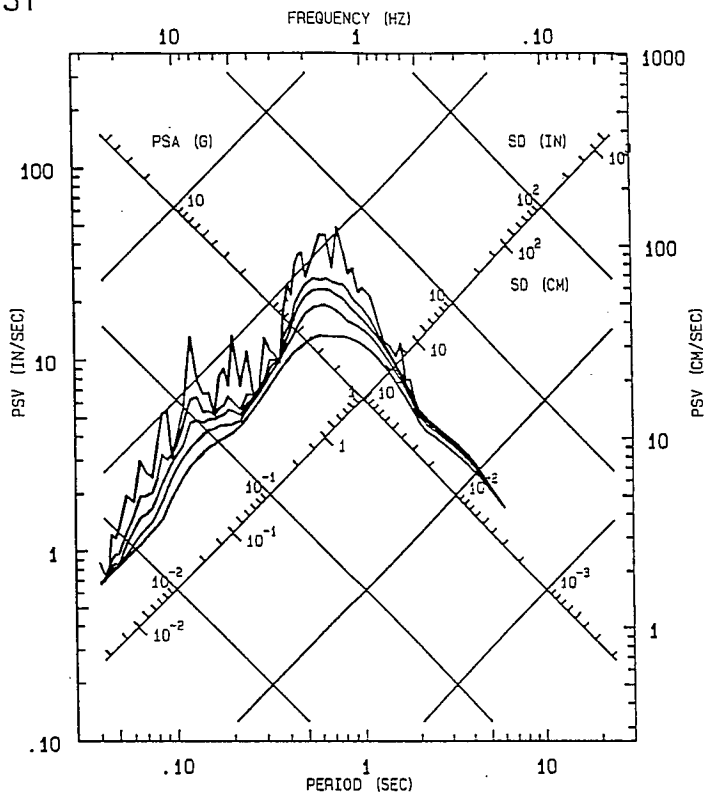
ABUTMENT CHANNELS

PHASE 3 DATA: RESPONSE SPECTRA
USABLE DATA BANDWIDTH: 0.20 TO 47.2 HZ
(0.02 TO 4.90 SEC)

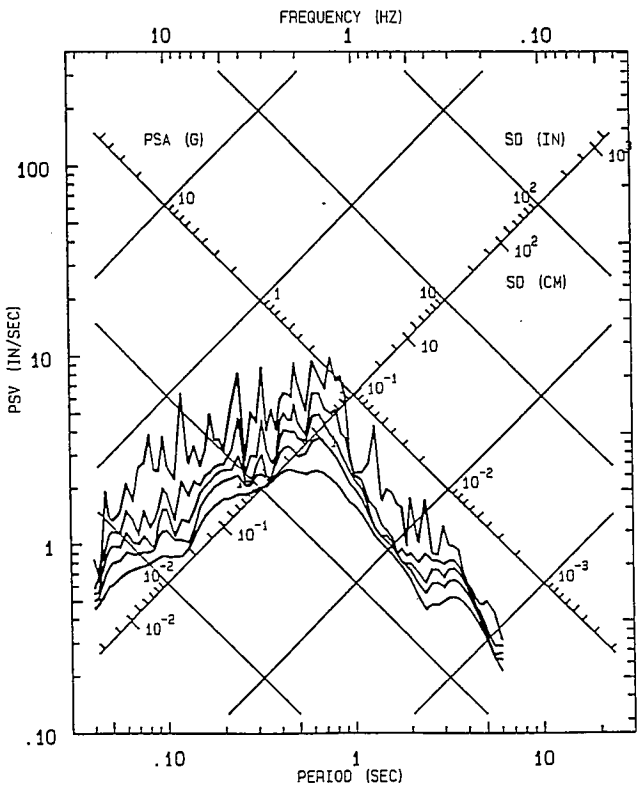
RECORD ID: 89686-F0851-94360.02

—— RESPONSE SPECTRA: PSV, PSA & SD
DAMPING VALUES: 0, 2, 5, 10, 20%

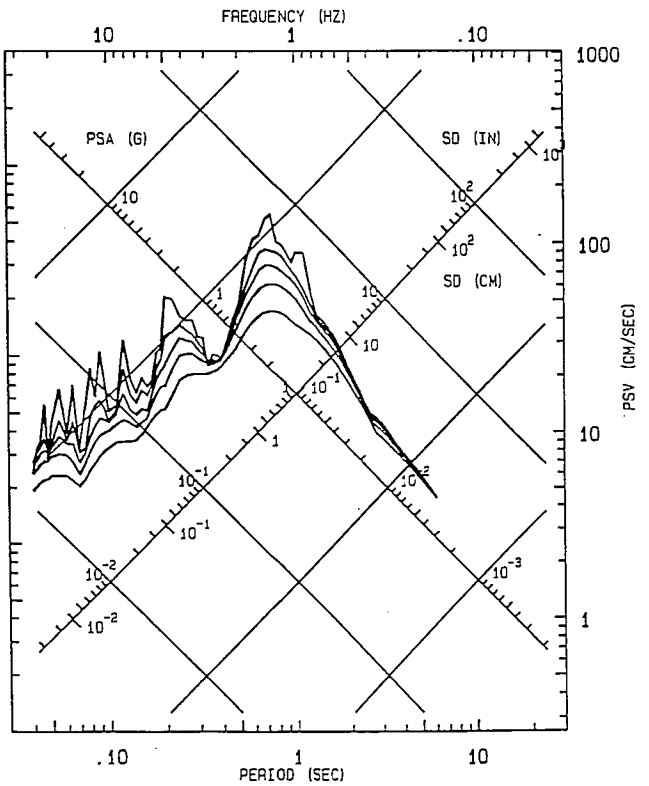
Transverse (42°)
CHN 1



Up
CHN 2

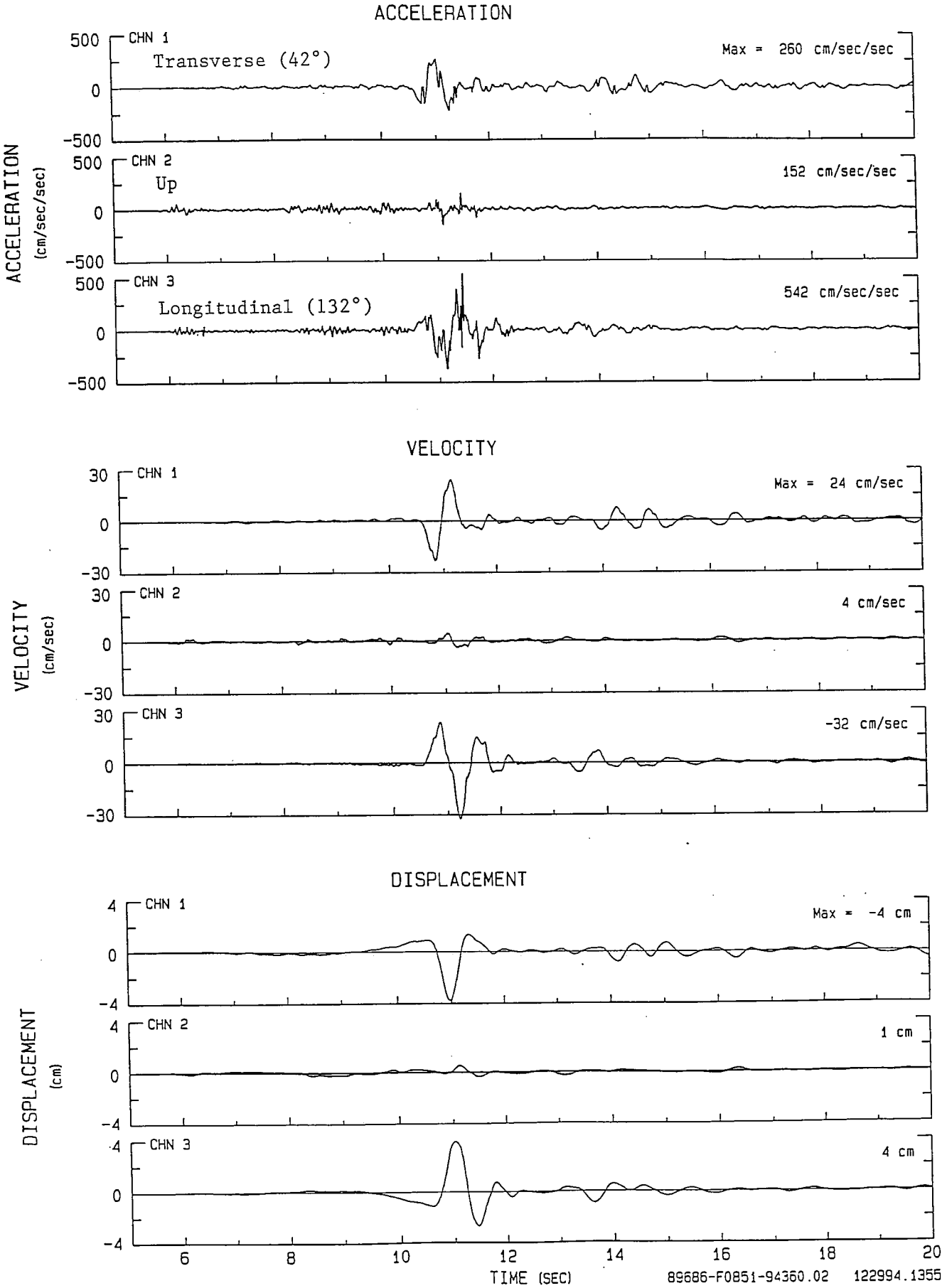


Longitudinal (132°)
CHN 3



Earthquake of Dec 26, 1994 06:09 PST CSMIP PRELIMINARY PROCESSING

Eureka-Humboldt Bay Bridge CSMIP Sta Num 89686

Usable Data Bandwidth: .20 to 47.2 Hz (.02 to 5.0 Sec)

ABUTMENT CHANNELS