Final Project Summary — PEER Lifelines Program

Project Title—**ID Number**	*NGA Data Sets*—**1L02**		
Start/End Dates	11/1/02 – 12/31/03	Budget/ Funding Source	$215,722/ PG&E-CEC
Project Leader (boldface) and Other Team Members	**Walter Silva (PEA)**		

1. Project goals and objectives

The project goal is to update the existing PEER strong motion dataset for use in developing the next generation of empirical attenuation relations for the PEER-NGA project. This project involves first updating and adding metadata (e.g. earthquake source, wave propagation path and recording and site parameters). Second, new earthquake/site metadata will be added. In addition, comparison of PEER strong motion dataset time histories and spectra were made to corresponding USGS and CGS values.

2. Benefits of the results of this project to develop technologies and protocols to mitigate the vulnerability of electric systems and other lifelines to damage directly and indirectly caused by earthquakes. Also, benefits to develop assessment techniques to evaluate damage to electric systems caused by earthquakes and to assess fiscal impacts due to the loss of electric service to the community.

Attenuation relationships are the backbone of modern earthquake hazard assessment. These relationships are used in all earthquake hazard assessment ranging from the U.S. national and California seismic hazards maps, (the latter produced jointly by the USGS and CGS), to site-specific assessments, both deterministic and probabilistic, used for specific facilities ranging from bridges to dams to power plants and other electrical systems. Hazard assessment results are used to establish design strategies and details of the build environment and to predict their performance.

3. Brief description of the accomplishments of the project

The PEER strong motion data set currently consists of over 10700 time histories (acceleration velocity, displacement) (Figure 1) and response spectra (Figure 2) from 175 earthquakes (magnitude **M** 4.37 to 7.9) at 1580 recording sites. All data were put into a common format for ease of use. A catalog and various spreadsheets provides the supporting metadata including V_S 30, fault mechanism (strike, dip, rake) and many other parameters.

4. Describe any instances where you are aware that your results have been used in industry

The database is currently being used in the PEER-NGA project to produce the next generation of attenuation relations for the western U.S.

5. Methodology employed

The methodology employed was to augment the PEER data set with strong motion recordings that were readily available from data providers (e.g. USGS, CGS, USC) on the www or other electronic media. Also, metadata (e.g. source, path and site information) were requested and received from leading attenuation modelers, seismologists and engineers. An extensive literature and web search for ground motion data and metadata was also performed.

6. Other related work conducted within and/or outside PEER

Substantial amounts of strong motion data and metadata collected during this project were provided by other organizations and individuals (e.g. PE&A, USGS, CGS).

7. Recommendations for the future work: what do you think should be done next?

Continue to expand and update the PEER strong motion data set with additional earthquakes and metadata.

8. Author(s), Title, and Date for the final report for this project

Not completed.

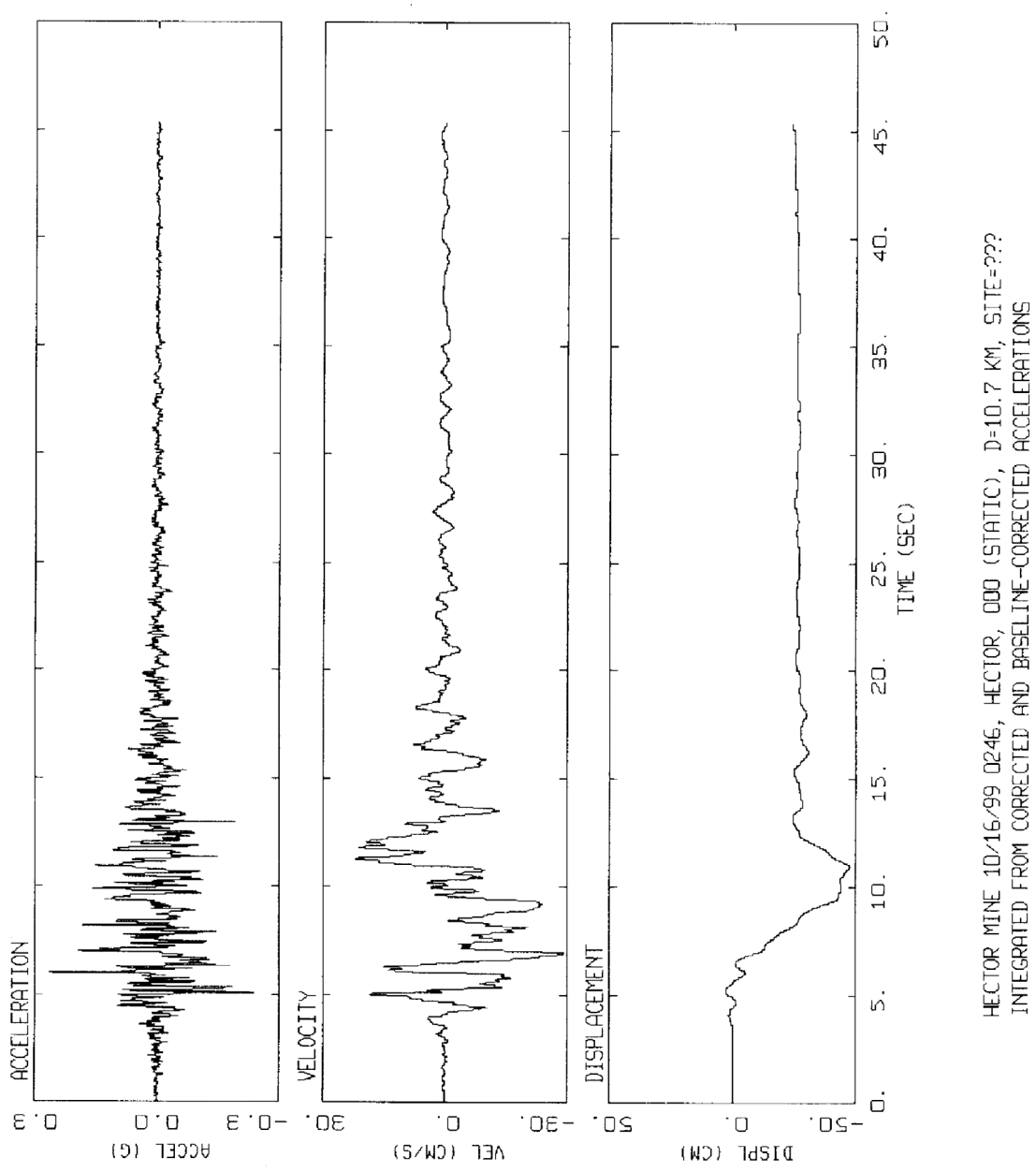

Figure 1. Acceleration, velocity and displacement time histories from the 1999 Hector Mine, CA earthquake at the closest station. The time history was processed at PE&A to retain static displacement offsets.

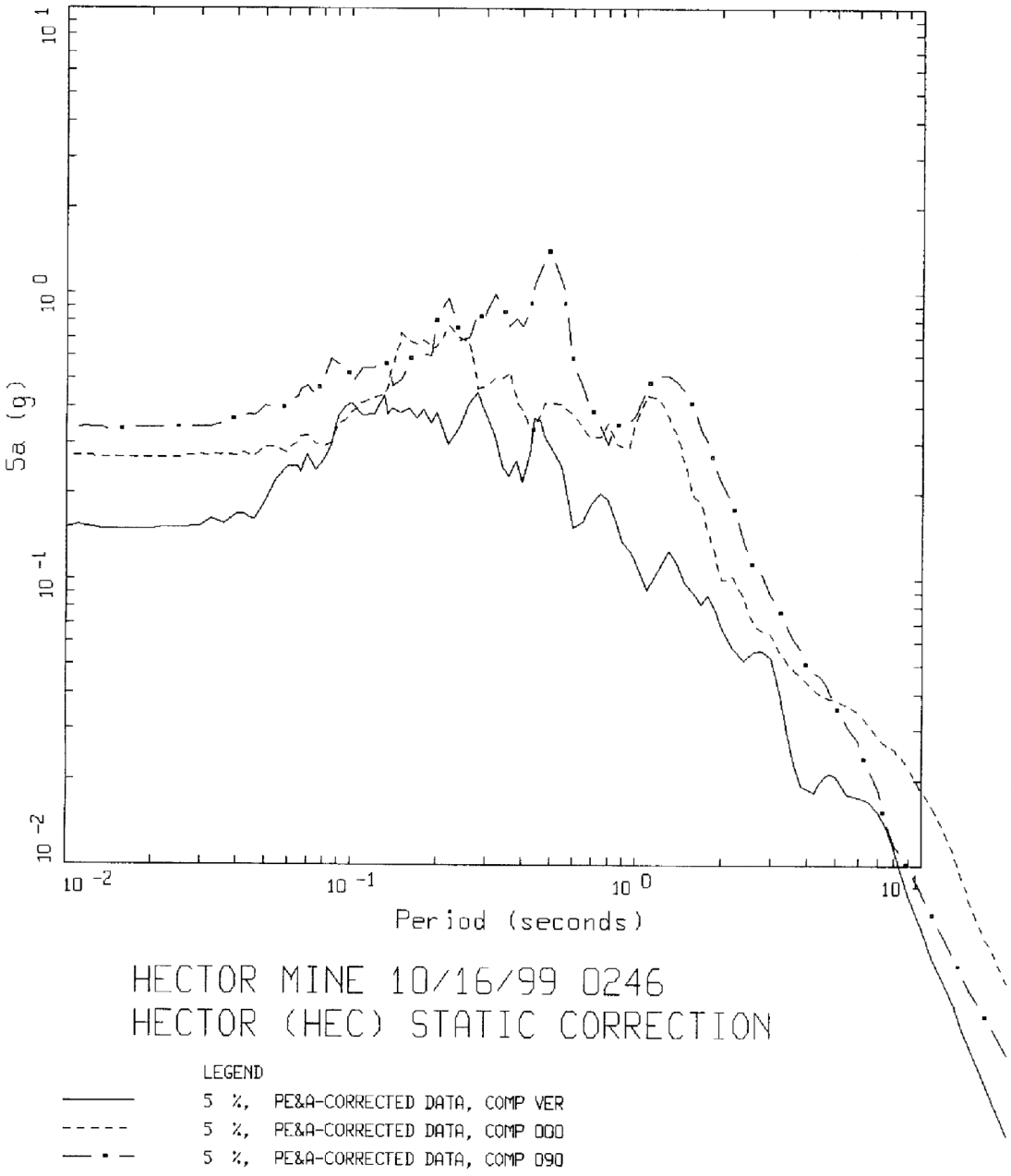

Figure 2. 5% damped response spectra at Hector. The Comp 000 spectrum is from the acceleration time history of Figure 1.