MARK R. LEGG, Ph.D.
Earth Scientist

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Education

Ph.D., Geological Sciences, University of California, Santa Barbara (1985)
M.S., Oceanography, Scripps Institution of Oceanography, U. C., San Diego (1980)
B.S., Space Sciences & Mechanical Engineering, *Magna Cum Laude*,
Florida Institute of Technology, Melbourne (1973)

Registrations

Registered Geologist, California #6463
Registered Geophysicist, California #948
Engineer-In-Training, California #3951

Professional Responsibilities

As President and Chief Consultant for Legg Geophysical, Inc., Dr. Legg:

- Directs subsurface geophysical investigations and data processing.
- Manages all geology and geophysical studies.
- Manages all seismicity studies.
- Manages projects in deterministic and probabilistic seismic hazard assessment and risk characterization.
- Directs Geographic Information System (GIS) projects.

Professional History

1992-Present	*President*, Legg Geophysical, Inc., Huntington Beach, California.
1989-1998	*Senior Scientist*, ACTA, Inc., Torrance, California.
1988-1989	*Project Manager*, NTS Engineering, Long Beach, California.
1985-1988	*Research Scientist*, Amoco Production Company, Tulsa Research Center, Tulsa, Oklahoma.
1979-1985	*Member of Professional Staff*, J. H. Wiggins Company, Redondo Beach, California.
1979-1982	*Research Assistant*, California Division of Mines and Geology, La Jolla, California.

Project Experience

Dr. Legg has worked on numerous projects, including:

- Surface and subsurface geologic and geophysical investigations.
- Acquisition, processing, and interpretation of seismic reflection/refraction profiles to model crustal structure.
- Borehole geophysical studies.
- Development, testing, and technology transfer of state-of-the-art seismic methods for hydrocarbon exploration in the marine environment.
- Geologic reconnaissance of proposed development.
- Seismic hazard assessment component of due-diligence site assessments for commercial properties.
- Development of user-friendly GIS-based hazard/risk assessment software.
- Development, maintenance and upgrade of large-scale computer programs for risk assessments of both natural and man-induced hazards.
- Liquefaction, landslide, and slope stability dynamic studies.
- Tsunami hazard assessment using geologically realistic source models

Honors and Awards

FEMA/EERI NEHRP Professional Fellowship, 2002, Civil Engineering, Univ. of Southern California, Los Angeles (tsunami studies with Professor Costas Synolakis)
Expert Advisory Panel, Tsunami Hazard Mitigation Guidelines Project, 1999-2000, California Office of Emergency Services
Southern California Earthquake Center Outstanding Education Award, 1998, 2000
National Science Foundation Graduate Fellowship, 1973-1976

Associations

San Diego State University (Geological Sciences) *Adjunct Professor, Lecturer*
Southern California Earthquake Center (SCEC) *Participating Scientist*
American Association of Petroleum Geologists
American Geophysical Union
Earthquake Engineering Research Institute
Geological Society of America
Seismological Society of America
Society of Exploration Geophysicists
Los Angeles Basin Geological Society (*President* 1996-97; *Treasurer* 1994-2001)
South Coast Geological Society (*Vice President 2003; President 2004*)
Sigma Xi

Selected Publications

Dr. Legg has published numerous technical papers on a wide range of topics, including the following:

Ph.D. Dissertation: Geologic Structure and Tectonics of the Inner Continental Borderland Offshore Northern Baja California, Mexico (1985)

M.S. Thesis: Seismicity and Tectonics of the Inner Continental Borderland of Southern California and Northern Baja California, Mexico (1980)

Barberopoulou, A., **Legg, M.R.,** Gica, E., and Legg, G., 2013, Multiple wave arrivals contribute to damage and tsunami duration on the US West Coast: Springer, (in press)

Wilson, R., Admire, A., Borrero, J., Dengler, L., **Legg, M.,** Lynett, P., Miller, K., Ritchie, A., Sterling, K., and Whitmore, P., 2012, Observations and impacts from the 2010 Chilean and 2011 Japanese tsunamis in California (USA): Pageoph, Topical Volume Tsunamis 2011

Barberopoulou, A., J.C. Borrero, B., Uslu, **M.R. Legg**, and C.E. Synolakis, 2011, A second generation of tsunami inundation maps for the State of California: Pure and Applied Geophysics, 168 (2011), p. 2133-2146.

Barberopoulou, A., **M.R. Legg**, B. Uslu, and C.E. Synolakis, 2010, Reassessing the tsunami risk to major ports and harbors of California I: San Diego: *Natural Hazards*, Springer, published online, 18 p. DOI 10.1007/s11069-010-9681-8

Wilson, R.I., L.A. Dengler, J.D. Goltz, **M.R. Legg**, K.M. Miller, A. Ritchie, and P.M. Whitmore, 2011a, Emergency response and field observation activities of geoscientists in California (USA) during the September 29, 2009, Samoa tsunami: Earth-Science Reviews 107 (2011), p. 193-200.

Wilson, R.I., L.A. Dengler, **M.R. Legg**, K. Long, and K.M. Miller, 2010, The 2010 Chilean Tsunami on the California Coastline: Seismological Research Letters, Volume 81, Number 3, p. 545-546.

Ryan, H.F., **M.R. Legg**, J.E. Conrad, and R.W. Sliter, 2009, Recent faulting in the Gulf of Santa Catalina: San Diego to Dana Point: *in* Lee, H.J., and Normark, W.R., eds. Earth Science in the Urban Ocean: The Southern California Continental Borderland: *Geological Society of America Special Paper 454*, p. 291-316.

Selected Publications (Cont'd)

Chaytor, J.D., C. Goldfinger, M.A. Meiner, G.J. Huftile, C.G. Romsos, and **M.R. Legg**, 2008, Measuring vertical tectonic motion at the intersection of the Santa Cruz-Catalina Ridge and Northern Channel Islands platform, California Continental Borderland, using submerged paleoshorelines: *Geological Society of America Bulletin*, v. 120, p. 1053-1071.

Legg, M.R., C. Goldfinger, M.J. Kamerling, J.D. Chaytor, and D.E. Einstein, 2007, bends: Cunningham, W.D. & Mann, P. (eds), *Tectonics of strike-slip restraining & releasing bends in continental and oceanic settings*, Geological Society of London Special Publications, v. 290, p. 143-168.

Francis, R.D., and **M.R. Legg**, 2007, Late Quaternary uplift of the Palos Verdes tectonic block: Evidence from high resolution seismic imaging of the Palos Verdes Fault on the San Pedro Shelf: *Society of Economic Mineralogists and Paleontologists* Guidebook 103, p. 189-222.

Borrero, J. C., **M.R. Legg**, and C.E. Synolakis, 2004, Tsunami sources in the southern California bight: *Geophysical Research Letters*, v. 31, p. L13211.

Legg, M.R., J.C. Borrero, and C.E. Synolakis, 2004, Tsunami hazards associated with the Catalina fault in southern California: *Earthquake Spectra*, vol. 20, p. 917-950.

Kuhn, G.G., **M.R. Legg**, and J.P. Franklin, 2004, Paleoseismology of blind and offshore faults, North Coast San Diego County, California, USA: *in* Proceedings, 11th International Conf on Soil Dynamics & Earthquake Engineering, 3rd International Conf on Earthquake Geotechnical Engineering, Berkeley, California, p. 597-604.

Legg, M.R., M.J. Kamerling, and R.D. Francis, 2004, Termination of strike-slip faults at convergence zones within continental transform boundaries: Examples from the California Continental Borderland: *in* Grocott, J., K. McCaffrey, G. Taylor, and B. Tikoff, eds., *Vertical Coupling and Decoupling in the Lithosphere*: Geological Society of London Special Publication, vol. 227, p. 65-82.

Legg, M.R., Nicholson, C., Goldfinger, C., Milstein, R., and Kamerling, M., 2004, Large enigmatic crater structures offshore southern California: *Geophysical Journal International*, vol. 158, p. 803-815.

Legg, M.R., and M.J. Kamerling, 2003, Large-scale basement-involved landslides, California Continental Borderland: in Bardet, J.-P., Synolakis, C.E., Davies, H.L., Imamura, F., and Okal, E. A., eds., *Landslide Tsunamis: Recent Findings and Research Directions, Pageoph Topical Volume*, v. 160, p. 2033-2051.

Chrostowski, J.D., and **M.R. Legg**, 2002, Public transportation risk: Proceedings 30th Explosives Safety Seminar, August 13-15, 2002, Atlanta, Georgia, 20 p.

Legg, M.R., and J.C. Borrero, 2001, Tsunami potential of major restraining bends along submarine strike-slip faults: *in* Proceedings of the International Tsunami Symposium 2001, NOAA/PMEL, Seattle, WA, p. 331-342.

Kuhn, G.G., **M.R. Legg**, R.J. Shlemon, and J.L. Bauer, 2000, Neotectonics in the North Coastal Area, San Diego County, California: in Legg, M.R., G.G. Kuhn, and R.J. Shlemon, eds., Neotectonics and Coastal Instability: Orange and Northern San Diego Counties, California: Joint Field Conference, guidebook (2 volumes), AAPG Pacific Section, SPE Western Section, Long Beach, p. I-88-I-103.

Francis, R.D., D.R. Sigurdson, **M.R. Legg**, R.B. Grannell, and E.L. Ambos, 1999, Student participation in an offshore seismic reflection study of the Palos Verdes fault, California Continental Borderland: J. Geo-Science Education, v. 47, p. 22-30.

Selected Publications (Cont'd)

Francis, R.D., R.G. Bohannon, and **M.R. Legg**, 1998, Geology and marine geophysics of Catalina Island and the California Borderland: Field trip guidebook, Cordilleran Sect., Geol. Soc. Am., Long Beach, CA, 16 p. 1 plate.

Francis, R.D., R.G. Bohannon, and **M.R. Legg**, 1998, Geology and marine geophysics of Catalina Island and the California Borderland: Field trip guidebook, Cordilleran Sect., Geol. Soc. Am., Long Beach, CA, 16 p. 1 plate.

Legg, M.R., 1995, Earthquake Related Coastal Inundation—Tsunami and Seiche: Section 3.3.4 *in* G. Johnson, ed., "Guidance for the Seismic Evaluation and Design of Petrochemical Facilities", ASCE Publication.

Kuhn, G., **M.R. Legg**, and E. Frost, 1994, Large pre-historic earthquake(s) in coastal San Diego County, California: *in* Paleoseismology Workshop Proc., Marshall, CA, U.S. Geol. Survey Open-File Report 94-568, p. 100-103.

McCarthy, R.J., E.N. Bernard, and **M.R. Legg**, 1993, The Cape Mendocino earthquake: A local tsunami wakeup call? *in* Proc. Eighth Symposium on Coastal and Ocean Management, New Orleans, Louisiana, p. 2812-2828.

Legg, M.R., 1992, Faulting and seismotectonics in the inner borderland offshore of the Los Angeles Basin. *in* Proceedings of the Association of Engineering Geologists Annual Meeting, Long Beach, California, p. 569-578.

Legg, M.R., 1992, Faulting and seismotectonics in the inner borderland offshore of southern California: *in* Engineering Geology field trips: Orange County, Santa Monica Mountains, and Malibu, 35th Annual Meeting, Assoc. Engr. Geologists, South Coast Geological Society guidebook, p. A11-A17.

Legg, M.R., 1991, Sea Beam evidence of recent tectonic activity in the California Continental Borderland. *in* Dauphin, P., and G. Ness, editors, The Gulf and Peninsular province of the Californias. American Association of Petroleum Geologists Memoir #47, p. 179-196.

Legg, M.R., and M.P. Kennedy, 1991, Oblique divergence and convergence in the California Continental Borderland. *in* Abbott, P.L., and W.J. Elliott, eds., Environmental Perils of the San Diego Region. San Diego Association of Geologists Guidebook, p. 1-16.

Legg, M.R., V. Wong O., and F. Suarez V., 1991, Geologic structure and tectonics of the inner continental borderland of northern Baja California. *in* Dauphin, P., and G. Ness, editors, The Gulf and Peninsular province of the Californias. Amer. Assoc. Petroleum Geologists Memoir #47, p. 145-177.

Legg, M.R., 1991, Developments in understanding the tectonic evolution of the California Continental Borderland: *in* Osborne, R.H., ed., SEPM Shepard Commemorative Volume, p. 291-312.

Legg, M.R., and J.M. Haber, 1990, Seismic response of sonic boom-coupled Rayleigh waves: Final Report, U. S. Air Force Systems Command, Noise and Sonic Boom Impact Technology, OL-ACHSD/YAH(NSBIT), 246 pp.

Haber, J.M., and **M.R. Legg**, 1990, Sonic boom damage to conventional structures. *in* Proceedings, 61st Shock and Vibration Symposium, Pasadena, CA. p. 241-250.

Legg, M.R., and J.M. Haber, 1990, Sonic boom coupled Rayleigh waves: *in* Proc. of the 61st Shock and Vibration Symposium, Pasadena, CA, p. 251-260.

Legg, M.R., B.P. Luyendyk, J. Mammerickx, C. de Moustier, and R.C. Tyce, 1989, Sea Beam survey of an active strike-slip fault: The San Clemente fault in the California Continental Borderland: *Jour Geophysical Research*, v. 94, p. 1727-1744.

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Legg, M.R., 1987, Earthquake epicenters and selected fault plane solutions of the inner-southern California continental margin. Map No. 1B *in* Greene, H.G.,and M.P. Kennedy, eds., Geologic Map Series of the California Continental Margin, Calif. Div. Mines & Geology, Area 1 of 7, (NOS 1206N-16), Scale 1:250,000. (also 3B)

Legg, M.R., 1986, Earthquake epicenters and selected fault plane solutions of the mid-southern California continental margin. Map No. 2B *in* Greene, H.G., and M.P. Kennedy, eds., Geologic Map Series of the California Continental Margin, Calif. Div. Mines & Geology, Area 2 of 7, (NOS 1206N-15), Scale 1:250,000.

Legg, M.R., and J.E. Slosson, 1984, Probabilistic approach to earthquake-induced landslide hazard mapping. *in* Proceedings, Eighth World Conference on Earthquake Engineering, San Francisco, CA, p. 445-452.

Taylor, C.E., **M.R. Legg**, J.M. Haber, and J.H. Wiggins, 1985, New lifeline multi-scenario seismic risk techniques with a model application: *Civil Engineering Systems*, v. 2, p. 77-83.

Eguchi, R.T., C.E. Taylor, and **M.R. Legg**, 1983, Earthquake performance of water supply systems. **in** Earthquake behavior and safety of oil and gas storage facilities,buried pipelines and equipment, ASME, New York City, PVP, vol. 77, p. 406-416.

Legg, M.R., and J.E. Slosson, 1982, Seismic hazard mapping for lifeline vulnerability analyses. *in* Proceedings, 3rd International Earthquake Microzonation Conference, Seattle, WA, p. 1641-1652.

Eguchi, R.T., J.M. Hudson, L.L. Philipson, **M.R. Legg**, C. Taylor, and J.H. Wiggins, 1981, Earthquake performance of natural gas distribution systems. *in* Proc. 1981 International Gas Research Conference, Los Angeles, California.

Kennedy, M.P., S.H. Clarke, H.G. Greene, and **M.R. Legg**, 1980, Recency and character of faulting offshore from metropolitan San Diego, California. California Division of Mines & Geology *Map Sheet #42*. Scale 1:50,000.

Legg, M.R., R.T. Eguchi, and J.H. Wiggins, 1980, National earthquake loss assessment: Sensitivity to alternative risk mapping procedures. U. S. G. S. *Open-File Report #80-1170*. (Contract Report).

Legg, M.R., and M.P. Kennedy, 1979, Faulting offshore San Diego and northern Baja California. *in* Abbott, P.L., and W.J. Elliott, eds., Earthquakes and other perils - San Diego region. San Diego Assoc. of Geologists, p. 29-46.

Legg, M.R., D.C. Agnew, and R.S. Simons, 1977, Earthquake history and recent seismicity of coastal San Diego County, California, 1800-1976. *in* Kuhn, G., Coastal Zone Geology and Related Sea-Cliff Erosion: San Dieguito River to San Elijo Lagoon, San Diego County, California. San Diego County Board of Supervisors Study *#11596-0800E-KUHN*.