

**Elizabeth Lincoln Mathieson, P.G., C.E.G.**  
**Senior Managing Scientist**

**Professional Profile**

Ms. Elizabeth (Betsy) Mathieson is an Engineering Geologist in Exponent's Civil Engineering practice. Ms. Mathieson specializes in site characterization, landslide and debris flow investigations, erosion investigations, fault investigations, sinkhole investigations, hazard mapping, site history analysis, subsurface differing site conditions claims, third party reviews for public agencies, and management of multidisciplinary project teams.

Before joining Exponent, Ms. Mathieson spent more than 17 years in engineering and environmental geologic consulting. She currently serves as a Subject Matter Expert for the Examination Development Unit of the California Board for Professional Engineers, Land Surveyors, and Geologists and a member of the Roy J. Shlemon Scholarship Award committee of the Engineering Geology Division of the Geological Society of America. She also served three terms as chairperson of the Enforcement Oversight Committee of the California Board for Geologists and Geophysicists and as a member of California's Alfred E. Alquist Seismic Safety Commission. She is a past director of the Association of Environmental and Engineering Geologists and a past president of the California Council of Geoscience Organizations.

**Academic Credentials and Professional Honors**

M.S., Engineering Geology, Stanford University, 1983

A.B., Geological Sciences, Harvard University (*magna cum laude*), 1978

California Board for Professional Engineers, Land Surveyors, and Geologists Subject Matter Expert for geologist and engineering geologist license exams; California Council of Geoscience Organizations (past president); Association of Environmental and Engineering Geologists (past director); National Association of Geology Teachers—U.S. Geological Survey Distinguished Student Field Program (1978); Geological Society of America Research Grant with Outstanding Honors (1982)

**Licenses and Registrations**

Professional Geologist, California, #PG 4025; Certified Engineering Geologist, California, #CEG 1249; Registered Geologist, Missouri, #2008027339; Engineering Geologist, Oregon, #E1589; Registered Professional Geologist, Tennessee, #4576; Professional Geologist, Utah, #7207723-2250; Engineering Geologist, Washington, #2123

## **Languages**

Spanish

## **Presentations and Publications**

Mathieson, EL, Sykora DW. Geologic and geotechnical challenges of Trans-Andean natural gas pipelines: A case history – Peru’s Camisea pipelines. Annual Meeting, Association of Environmental and Engineering Geologists, Anchorage, AK, September 22, 2011.

Mathieson, EL, Stenner, H, Okubo, S, Rodriguez, MA. Liquefaction and lateral spreading in the epicentral area of the April 4, 2010, M7.2 El Mayor – Cucapah Earthquake. Annual Meeting, Association of Environmental and Engineering Geologists, Charleston, SC, September 24, 2010.

Pettinger A, Montgomery R, Mathieson E. Design, construction and operation of South American pipelines crossing the Andes. Touch Briefings – Hydrocarbon World 2010; 5(1).

Mathieson E, Sykora D (co-presenters). Ground failures and other ground water-related property damage. Lorman Education Services national teleconference, Oakland, CA, November 10, 2009.

Mathieson E. The importance of common sense in failure investigations. Women in AEG Breakfast, Annual Meeting, Association of Environmental and Engineering Geologists, Lake Tahoe, CA, September 24, 2009.

Shaller, PJ (presenter), Mathieson, EL, Okubo, S. The Travertine Rock Avalanche, Southern Santa Rosa Mountains, Southeastern California. Annual Meeting, Association of Environmental and Engineering Geologists, Lake Tahoe, CA, September 23, 2009.

Stenner, H (presenter), Cydzik, K, Hamilton, D, Cattarossi, A, Mathieson, E. Massive landslides from the M7.9 Wenchuan, China Earthquake. Annual Meeting, Association of Environmental and Engineering Geologists, Lake Tahoe, CA, September 23, 2009.

Turner F, Mathieson E (presenter). Independent technical and policy-level seismic reviews of major lifelines and critical facilities in California by the Seismic Safety Commission. TCLEE 2009 (Technical Conference on Lifeline Earthquake Engineering), American Society of Civil Engineers, Oakland, CA, June 29, 2009.

Turner F, Mathieson E. Independent technical and policy-level seismic reviews of major lifelines and critical facilities in California by the Seismic Safety Commission. Proceedings, Lifeline Earthquake Engineering in a Multihazard Environment, TCLEE 2009, American Society of Civil Engineers Technical Conference on Lifeline Earthquake Engineering, Oakland, CA, June 29–July 1, 2009, 12 p.

Mathieson EL. The importance of common sense in failure investigations. American Society of Civil Engineers Redwood Empire Branch, Santa Rosa, CA, June 10, 2009.

Mathieson EL, Shaller PJ. Geological aspects of slope stability. In: Slope Stability and Landslides. Short course, University of Wisconsin–Madison Department of Engineering Professional Development, University of California Extension, March 11-13, 2009; March 17–19, 2008; March 28–30, 2007; February 8–10, 2006; February 16–18, 2005; and February 18–20, 2004; and University of California Los Angeles, February 19–21, 2003; February 20–22, 2002; and February 21–23, 2001.

Stenner H, Cydzik K, Hamilton D, Cattarossi A, Mathieson E. Landslides and earthquake lakes from the Wenchuan, China earthquake: Can it happen in the U.S.? American Geophysical Union Fall Meeting, San Francisco, California, December 15–19, 2008.

Stenner H, Hamilton D, Cydzik K, Cattarossi A, Mathieson E. Landslides and quake lakes from the M7.9 China Earthquake: Are Californians in the same boat? 3<sup>rd</sup> Conference on Earthquake Hazards in the Eastern San Francisco Bay Area, California State University East Bay, Hayward, California, October 22–24, 2008.

Mathieson EL. The importance of common sense in failure investigations. American Society of Civil Engineers Joint Younger Member Forum – Geotechnical Group Dinner Meeting, Berkeley, CA, September 25, 2008.

Mathieson EL. Are we damaging our credibility? — Detangling geologic issues from the evolution debate. Annual Meeting, Association of Environmental and Engineering Geologists, New Orleans, LA, September 20, 2008.

Mathieson EL. Hazards posed by earthquake-induced landslides and landslide dams in China following May 12, M7.9 Wenchuan earthquake. CCTV-9, Beijing, China, May 17, 2008. (Live television interview).

Mathieson EL. Hazards posed by earthquake-induced landslides and landslide dams in China following May 12, M7.9 Wenchuan earthquake. CCTV-9, Beijing, China, May 15, 2008. (Recorded television interview).

Medley EW, Mathieson EL, Tankikawa S. The benefits of ground-based stereo photography in engineering geology: Part 1—Two geopictures are better than one. Annual Meeting, Association of Environmental and Engineering Geologists, Los Angeles, CA, September 27, 2007.

Medley EW, Mathieson EL, Tankikawa S. The benefits of ground-based stereo photography in engineering geology: Part 2—A brief introduction to processing your two geopictures. Annual Meeting, Association of Environmental and Engineering Geologists, Los Angeles, CA, September 27, 2007.

Mathieson EL. “Forensic geology” revisited. Annual Meeting, Association of Environmental and Engineering Geologists, Boston, MA, November 3, 2006.

Meldrum J, Mathieson E, Harrison H. Role of trees in debris flow initiation. Annual Meeting, Association of Environmental and Engineering Geologists, Boston, MA, November 3, 2006.

Mathieson E, Mesard PM. Engineering geologic and hydrogeologic aspects of climate change in California. Lorman Education Services seminar paper, San Francisco, CA, June 23, 2006.

Mathieson EL. Whose “fault” is it?—Engineering geologic support for litigation. American Association of Petroleum Geologists Annual Meeting, Houston, TX, April 11, 2006.

Mathieson E. Landslide mitigation through improved grading practices. Association of Bay Area Governments 2004 Fall General Assembly, Oakland, CA, October 6, 2004; on behalf of California Grading Officials Association.

Mathieson EL. Tomato juice-induced sinkholes—Construction defects not “out of sight, out of mind.” Annual Meeting, Association of Engineering Geologists, Dearborn, MI, September 30, 2004; additional presentation to San Francisco Section, Association of Engineering Geologists, September 14, 2004.

Mathieson E. Water, water everywhere...and mostly it causes trouble: The role of water in ground failures. Continuing Legal Education Short Courses, Dickenson, Peatman, and Fogarty, Napa, CA, April 2004; Office of the County Counsel, San Mateo County, CA, December 1999; Office of the City Attorney, City and County of San Francisco, May 2000; Office of the City Attorney, Oakland, CA, November 2000 (with Exponent Civil Engineering practice staff).

Shaller P, Medley E, Hamilton D, Lyle J, Mathieson E, Weirich F. Hydrologic impacts and watershed recovery following the 1999 Lowden Ranch fire, Lewiston Area, Trinity County, California. Poster presentation at Geological Society of America Conference, Wildland Fire Impacts on Watersheds: Understanding, Planning, and Response, Englewood, CO, October 21–23, 2003.

Mathieson EL. New Hampshire’s old man killed by rockfall—The demise of a state symbol. Annual Meeting, Association of Engineering Geologists, Vail, CO, September 19, 2003.

Mathieson EL. The present is the key to the past is the key to the future. Coast Geological Society, Ventura, CA, November 19, 2002; Cordilleran Section Geological Society of America, Annual Meeting, Corvallis, OR, May 13, 2002.

Mathieson EL. Can building codes limit your right to practice? Annual Meeting, Geological Society of America, Denver, CO, October 27, 2002.

Mathieson EL. Putting geology back into the Building Code. Joint Annual Meeting, Association of Engineering Geologists and American Institute of Professional Geologists, Reno, NV, September 26, 2002.

Mathieson EL. Putting geology back into the building code. Symposium Proceedings, Visioning the Future of Engineering Geology: Sustainability and Stewardship, Joint Annual Meeting, Association of Engineering Geologists and American Institute of Professional Geologists, Reno, NV, September 26, 2002, 17 p.

Cato K, Belitz K, Haneberg B, Larson R, Mathieson B, Shakoor S, Sharp J. The history and future of *Environmental and Engineering Geoscience*. Joint Annual Meeting, Association of Engineering Geologists and American Institute of Professional Geologists, Reno, NV, September 26, 2002.

Warmerdam JM, Medley EW, Mathieson EL. Using binomial probability statistics to evaluate proportion of debris in a soil stockpile. Joint Annual Meeting, Association of Engineering Geologists and American Institute of Professional Geologists, Reno, NV, September 26, 2002.

Mathieson EL. Helping policymakers with geo-issues—Professional activities outside the technical realm. Women in AEG Breakfast, Joint Annual Meeting, Association of Engineering Geologists and American Institute of Professional Geologists, Reno, NV, September 26, 2002.

Mathieson B, De Guzman R. Water, water everywhere...and mostly it causes trouble: The role of water in civil engineering failures. East Bay Claims Association, Concord, CA, July 2002 (with Exponent Civil Engineering Practice staff).

Mathieson EL (editor). Tunnels through fault rocks and tectonic melanges: A short course for engineering geologists and geotechnical engineers—field trip guidebook—May 31, 2002. San Francisco Section Association of Engineering Geologists.

Mathieson EL. Geologists slowly regaining ground in building code. Annual Meeting, Association of Engineering Geologists, St. Louis, MO, October 4, 2001.

Mathieson EL, Kurka M, McDonald B. Earthquake awareness. Presentation to security staff of worldwide corporation at San Francisco headquarters, June 22, 2001.

Mathieson B. Testimony on selected proposed changes to 2000, 2001, and 2002 International Building Code on behalf of California Council of Geoscience Organizations, International Code Council Structural Committee Hearings, Costa Mesa, CA, March 19 and 20, 1999; St. Louis, MO, September 15, 1999; Birmingham, AL, April 14 and 15, 2000, and Portland, OR, March 26, 2001.

Mathieson B. Silicon Valley groundwater cleanup. MC for Outstanding Environmental and Engineering Geologic Project Award Presentation and Opening Session, Annual Meeting, Association of Engineering Geologists, San Jose, CA, September 22, 2000.

Mathieson EL. Melange and minerals—Characterizing economic Calera limestone blocks in the Franciscan complex. Annual Meeting, Association of Engineering Geologists, San Jose, CA, September 22, 2000.

Mathieson B. Impact of Governmental Action on the Engineering Profession and Industry. Panel discussion, Northern California Section, American Institute of Chemical Engineers, Oakland, CA, March 23, 1999.

Mathieson EL. Milestones, mentors, anecdotes, and advice. Presentation to San Francisco Bay Area Chapter, Association for Women Geoscientists, April 16, 1998.

Mathieson EL, Cleary JM. Residential strain gauge on an active fault. Presentation to Great Basin Section, Association of Engineering Geologists, January 15, 1998.

Mathieson EL, Cleary JM. Residential strain gauge on an active fault. Annual Meeting, Association of Engineering Geologists, Portland, OR, October 3, 1997.

Mathieson EL. Late Quaternary activity of the Madison Range fault along its 1959 rupture trace, Madison County, Montana. Annual Meeting, Association of Engineering Geologists, San Diego, CA, October 5, 1983.

Mathieson EL. Activity of a portion of the Madison Range fault, Madison County, Montana. M.S. thesis, Stanford University, 1983.

Mathieson EL. Post-Pinedale displacement rate on the Madison Range fault along its 1959 rupture trace, Madison County, Montana. Annual Meeting, Rocky Mountain and Cordilleran Sections Geological Society of America, Salt Lake City, UT, May 3, 1983.

Mathieson EL. Holocene activity of the Madison Range fault along its 1959 rupture trace, Madison County, Montana. Presentation to San Francisco Section, Association of Engineering Geologists, Berkeley, CA, March 1, 1983.

Lincoln EH. Influence of geologic conditions on building foundation engineering in Boston, Massachusetts. Senior honors thesis, Harvard University, 1978.

### **Selected Project Experience**

Evaluated causes of landslides and storm damage including bridge collapses and culvert failures.

Served as project geologist for integrity analysis of recently constructed parallel pipelines carrying natural gas and liquid natural gas (LNG) from the Amazon jungle over the Andes mountain range to the Pacific coast of Peru. Reviewed pre- and post-construction geologic and geotechnical reports (primarily in Spanish); performed site inspections at 49 remote locations at which repairs of landslides, rockslides, debris flows, and eroded river banks were planned or in progress; evaluated factors that contributed to the occurrence of six LNG pipeline spill incidents, evaluated geotechnical-related risks to the pipelines; evaluated the pipeline operator's progress toward reducing the risks; and prepared geologic and geotechnical portions of several reports and presentations.

Evaluated reported sinkhole-related damage to a large condominium complex in Tennessee. Coordinated work of Exponent staff, geophysical subconsultant, and construction cost estimator, and served as liaison with local geotechnical consultant.

Evaluated causes of sinkholes that formed above newly constructed storm drain on State highway project in California's Central Valley. Investigation included extensive review of contractor's and inspector's daily logs prepared during construction.

Performed down-hole logging of large-diameter drill holes in landslides and beneath distressed houses to examine soil and bedrock for evidence of landsliding, to determine depths and physical characteristics of slide planes, and to collect samples of slide-plane material for laboratory testing and subsequent stability analysis. During construction of foundation underpinning, examined sidewalls of pier holes to determine whether embedment was adequate.

Investigated stability of a large landslide beneath a proposed rocket-fuel mixing facility. Work included literature research, air-photo interpretation, geologic field mapping, and logging and sampling of continuous-core drill holes.

Evaluated causes of earthquake-induced ground failures at private residences and government facilities after the 1989 Loma Prieta Earthquake in the San Francisco Bay area. Ground failures investigated included landslides, ridge-top shattering, deformation of fill, and lateral spread due to liquefaction. Investigated earthquake damage claims after the 1994 Northridge Earthquake in southern California. Evaluated claim of earthquake damage to a water main in a high-rise building after a minor earthquake in Los Angeles. Analyzed extent of damage to a government facility due to liquefaction and lateral spread caused by the 2006 Hawaii earthquake.

Evaluated the merits of subsurface differing site conditions claims on public highway and sewer projects in California's Central Valley and the Sierra Nevada foothills.

Performed numerous investigations, including: Distressed houses, hillside ranch roads, landslide and debris-flow causation, erosion damage causation, diversion of drainage, over-excavation in quarries, archaeological sites, billing disputes, differing site conditions claims, and a fatal car crash. Work included review of available geologic and engineering information, air photo interpretation, geologic mapping, crawl-space inspections, observation during remedial construction, document review, and presentation of findings.

Performed detailed interpretation of historic aerial photographs of two former oil fields to determine site use history, topographic (development) history including drainage routes, sources and geometry of fill material, and sources and distribution of debris. Correlated air photo findings with historic site plans and descriptions from deposition transcripts.

Provided technical and project management support to assist a Southern California client in identifying, prioritizing, and evaluating potential sources of perchlorate to a municipal well field.

Provided technical and project management support for an environmental cost recovery claim related to discovery of lead impact to soil at a former military base in southern California.

Provided technical support for evaluation of alleged damages to a Central Valley (California) municipality's sole water-supply aquifer from releases of PCE.

Provided technical support for evaluation of allegations of releases of PCE at more than 30 separate locations in a northern California municipality.

Performed numerous Phase I Environmental Site Assessments, including determination of site history from air photos, historic documents, and interviews; site inspections and chemical storage inventories; assessment of nearby facilities; and analysis of potential for existing and future soil and ground water contamination.

Designed and installed monitoring wells at numerous fuel and solvent storage facilities. Conducted soil and ground water sampling and evaluated lateral and vertical extent of various chemicals of interest.

Prepared geologic and ground movement potential maps for the City of Saratoga, California, and geotechnical hazards maps for the City of Milpitas, California.

Supervised fault-rupture hazard investigations, including logging of exploratory trenches to investigate fault locations and activity. Projects ranged from school sites on faults in Alquist-Priolo Earthquake Fault Zones to single-family houses adjacent to newly mapped faults.

Performed development-feasibility mapping of large ranches proposed for residential development. Prepared geologic maps and cross sections; evaluated fault, landslide, debris flow, and liquefaction hazards; and constructed development feasibility maps. Served as liaison between clients and agency planning departments.

Performed office and field review of landslide investigation on behalf of subdivision developer's geologic consultant. Objective was to develop an independent interpretation of unexpected subsurface conditions before consultant submitted report to reviewing agency.

## **Prior Experience**

Staff (1983) to Principal (1997) Geologist, Manager of Geology and Environmental Departments, Terratech, Inc. (became D&M Consulting Engineers in 1999), 1983–1999

Staff Geologist, Cleary Consultants, 1983

Associate Geologist, Kaiser Cement Corporation, 1981–1982

Geologist, William Cotton Associates, Summer 1980

Staff Geologist, Jo Crosby & Associates, Summer 1979

Geologist, U.S. Geological Survey, Summer 1978

## **Professional Affiliations**

- Association of Environmental and Engineering Geologists (member)
- Association for Women Geoscientists (member)
- Geological Society of America (member)
- Groundwater Resources Association of California (member)