

**BOARD FOR  
PROFESSIONAL ENGINEERS,  
LAND SURVEYORS, AND GEOLOGISTS**

***GEOLOGIST –  
CALIFORNIA SPECIFIC  
EXAMINATION OUTLINE  
August 2013***

## Professional Geologist Examination Outline

**I. GENERAL GEOLOGY PRACTICE (45%):** This content area assesses the candidate’s knowledge of geologic investigation techniques, field practice, feasibility studies, health and safety risk assessment, and ethical standards of practice.

### A. GENERAL GEOLOGY PRACTICES APPLIED TO CALIFORNIA (23%)

<i>Job Tasks</i>		<i>Associated Knowledge Statements</i>	
1.	Collect, analyze, and interpret available California geological and geophysical data, maps, sections, and reports.	1.	Knowledge of various sources (e.g., governmental, academic, commercial) for current and historical information (including maps) regarding California geology.
2.	Prepare, analyze, and interpret logs derived from California borings, trenches, and test pits.	2.	Knowledge of procedures for analyzing various types of available data and information related to California geology.
3.	Identify, map, and evaluate geologic, geomorphic, and seismic hazards.	3.	Knowledge of ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) related to geology.
4.	Develop feasibility studies of mitigation and remediation recommendations.	4.	Knowledge of ASTM D422 Standard Test Method for Particle-size Analysis of Soils related to geology.
		5.	Knowledge of Seismic Hazards Mapping Act related to geology.
		12.	Knowledge of California mineralogy and associated hazards.
		13.	Knowledge of California rocks and soils and their associated hazards (e.g., landslides, liquefaction, expansion).
		6.	Knowledge of procedures for geological feasibility studies (e.g., viability, cost-benefit, impact).

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<b>B. HEALTH, SAFETY, AND PROFESSIONAL ETHICS (22%)</b>	
<i>Job Tasks</i>	<i>Associated Knowledge Statements</i>
<p>5. Plan and design fieldwork programs for geological investigations, ensuring health and safety protection of workers, the public, and the environment.</p> <p>6. Assess risks to human health and safety, as well as to the environment, associated with geology projects.</p> <p>7. Conduct professional work in compliance with ethical standards and legal requirements.</p>	<p>7. Knowledge of Cal/OSHA regulations (e.g., trenching and shoring) related to field geology.</p> <p>8. Knowledge of procedures for assessing health and safety risks associated with geology projects.</p> <p>9. Knowledge of California Health and Safety Code, Division 20 Miscellaneous Health and Safety hazardous waste statutes related to the practice of geology.</p> <p>10. Knowledge of California Code of Regulations, Title 22, Division 4.5, Environmental Health Standards for the Management of Hazardous Waste related to geology.</p> <p>14. Knowledge of distribution of naturally occurring toxic substances (e.g., asbestos, mercury, radon) in California.</p> <p>11. Knowledge of Business and Professional Code Section 12.5 related to geologists.</p>

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<b>II. CALIFORNIA GEOLOGY (7%): This content area assesses the candidate's knowledge of the associations and distributions of rocks, faults, stratigraphic relations, tectonic features, and related hazards found in California.</b>	
<i>Job Tasks</i>	<i>Associated Knowledge Statements</i>
<p>9. Plan sedimentologic and stratigraphic investigations in California and evaluate results.</p> <p>10. Plan geomorphic investigations in California and evaluate results.</p> <p>11. Plan structural and tectonic investigations in California and evaluate results.</p> <p>12. Evaluate earthquake mechanisms, faulting, and paleoseismic history, as well as their related hazards.</p>	<p>15. Knowledge of basic California sedimentology, stratigraphy, and paleontology.</p> <p>16. Knowledge of California geomorphic provinces and their associated geological processes and hazards.</p> <p>17. Knowledge of California geological units and structural features.</p> <p>18. Knowledge of California tectonic framework.</p> <p>19. Knowledge of CGS Note 42, Fault Rupture Hazard Zones in California.</p> <p>20. Knowledge of fault systems in California and their associated hazards.</p> <p>21. Knowledge of California history of major earthquakes and probability of future occurrences.</p> <p>22. Knowledge of procedures for identifying surface and subsurface faults.</p> <p>23. Knowledge of Alquist-Priolo Zoning Act.</p> <p>24. Knowledge of CGS Note 31, Faults and Earthquakes in California.</p>

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<b>III. APPLIED GEOLOGY PRACTICE (48%): This content area assesses the candidate’s knowledge of hydrogeology, environmental geology, engineering geology, mining geology, and energy resource development applied to California. It focuses on the major State issues in each subarea of geologic practice as well as State laws, regulations, and guidelines related to geology.</b>			
<b>A. HYDROGEOLOGY (18%)</b>			
<b><i>Job Tasks</i></b>		<b><i>Associated Knowledge Statements</i></b>	
13.	Plan California hydrogeological investigations and evaluate results.	25.	Knowledge of procedures for planning and evaluating hydrogeological investigations.
		26.	Knowledge of California Statutory Water Rights Law related to geology.
		27.	Knowledge of California Water Code related to geology.
		28.	Knowledge of Porter-Cologne Water Quality Control Act (California Water Code, Division 7 Water Quality) related to geology.
14.	Evaluate California water resources, assess aquifer yield, and determine sustainability.	29.	Knowledge of major California groundwater basins, their characteristics (e.g., recharge), and issues related to their management.
15.	Design and develop California groundwater supply, monitoring, observation, extraction, production, injection, and cathodic protection wells.	30.	Knowledge of California Well Standards 74-90 and 74-81.
		31.	Knowledge of the scope of practice for California C-57 Well Driller licensees.
		32.	Knowledge of methods and procedures for preventing well cross-contamination.
16.	Manage and protect California groundwater resources.	33.	Knowledge of methods and procedures for managing and protecting groundwater resources in California.
		34.	Knowledge of seawater intrusion locations in California and related management issues.
17.	Plan and manage the decommissioning of various types of wells in California.	35.	Knowledge of various drilling methods and their application to California geologic conditions.

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<b>B. ENVIRONMENTAL GEOLOGY (18%)</b>	
<i>Job Tasks</i>	<i>Associated Knowledge Statements</i>
<p>18. Plan environmental geologic investigations and evaluate results.</p>	<p>36. Knowledge of procedures for planning and evaluating environmental geologic investigations.</p> <p>37. Knowledge of ASTM E2247 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property related to the practice of geology.</p> <p>38. Knowledge of ASTM E1527 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process related to the practice of geology.</p> <p>39. Knowledge of Preliminary Endangerment Assessment (PEA) Guidance Manual for hazardous waste sites related to geology.</p>
<p>19. Develop, manage, and protect surface water resources in California.</p>	<p>40. Knowledge of California State agencies that regulate water, their procedures, and their resources related to geology.</p> <p>41. Knowledge of geologic factors applied to the development, management, and protection of surface water resources in California.</p>
<p>20. Plan sampling programs for water, soil, and soil vapor to assess hazards and risks.</p>	<p>42. Knowledge of California Health and Safety Code Division 104, Part 12 Drinking Water related to geology.</p> <p>43. Knowledge of ASTM E1903 Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process related to geology.</p> <p>44. Knowledge of ASTM E2600 Standard Guide for Vapor Encroachment Screening on Property involved in Real Estate Transactions related to geology.</p> <p>45. Knowledge of the fate and transport of chemicals in the vadose and saturated zones.</p> <p>46. Knowledge of methods and procedures for conducting water, soil, and soil vapor tests.</p> <p>47. Knowledge of Leaking Underground Fuel Tank (LUFT) Manual guidelines related to geology.</p>

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<b>B. ENVIRONMENTAL GEOLOGY (18%)</b>			
<b><i>Job Tasks</i></b>		<b><i>Associated Knowledge Statements</i></b>	
21.	Remediate surface water and groundwater resources in California.	48.	Knowledge of methods and procedures for remediating surface water and groundwater resources.
		49.	Knowledge of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) process for cleaning up hazardous waste sites.

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<b>C. ENGINEERING GEOLOGY (9%)</b>	
<b><i>Job Tasks</i></b>	
<b><i>Associated Knowledge Statements</i></b>	
22.	Plan engineering geology investigations and evaluate results.
23.	Evaluate geologic factors concerning flood control and prevention in California.
24.	Provide geological recommendations for engineering design, site development, land use, and watershed management in California.
25.	Develop programs for geologic, geomorphic, and seismic hazard mitigation in California.
26.	Develop programs for land and watershed restoration in California.
50.	Knowledge of procedures for planning and evaluating engineering geology investigations.
51.	Knowledge of procedures for seismological investigations to identify earthquake hazards and fault creep.
52.	Knowledge of CGS Note 48, Engineering Checklist.
53.	Knowledge of California Building Code related to geology.
54.	Knowledge of procedures for identifying and characterizing mass wasting (e.g., landslides, rock fall, soil creep).
55.	Knowledge of geologic factors applicable to the design and construction of flood control systems and water resources infrastructure.
56.	Knowledge of forestry practices for watershed management in California.
57.	Knowledge of methods for ground improvement (e.g., grouting, lime treatment, geo-textiles).
58.	Knowledge of Department of Toxic Substances Control (DTSC) requirements for construction and monitoring of landfills related to geology.
59.	Knowledge of CCR Title 27, Division 2, Chapter 3 Standards for Construction of Waste Management Units related to geology.
60.	Knowledge of coastal processes (e.g., bluff erosion, sea level rise) and associated hazards.
61.	Knowledge of methods and procedures for mitigation of various geologic, geomorphologic, and seismic hazards.
62.	Knowledge of CGS Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards.
63.	Knowledge of methods and procedures for land and watershed restoration.



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<b>D. ENERGY RESOURCES AND MINING GEOLOGY (3%)</b>			
<b><i>Job Tasks</i></b>		<b><i>Associated Knowledge Statements</i></b>	
31.	Plan exploration, development, and production of energy resources in California.	68.	Knowledge of distribution of energy resources (e.g., oil, gas, geothermal) in California.
33.	Provide recommendations for the design of energy development operations in California.	70.	Knowledge of geologic design considerations for energy development operations.
34.	Provide recommendations for the closure, reclamation, and restoration of energy operations in California.	71.	Knowledge of procedures for geological evaluation of the closure, reclamation, and restoration of energy operations.
30.	Provide recommendations for the closure, reclamation, and restoration of mineral extraction operations in California.	67.	Knowledge of procedures for geological evaluation of the closure, reclamation, and restoration of mineral extraction operations in California.

