

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

2535 Capitol Oaks Drive, Suite 300, Sacramento, California, 95833-2944

Telephone: (916) 263-2222 – Toll Free: 1-866-780-5370

Facsimile: (916) 263-2246

www.bpelsg.ca.gov

**OFFICIAL NOTICE AND AGENDA****MEETING OF THE GEOLOGIST AND GEOPHYSICIST
TECHNICAL ADVISORY COMMITTEE
OF THE BOARD FOR PROFESSIONAL ENGINEERS,
LAND SURVEYORS, AND GEOLOGISTS**

**Housing and Community Development
Conference Room 402A
2020 West El Camino Avenue
Sacramento, CA 95833
916-263-6893**

September 28, 2016, beginning at 1pm

The meeting is open, and the public is invited to attend. The meeting facilities are barrier-free in accordance with the Americans with Disabilities Act. A person who needs disability-related accommodations or modifications in order to participate in the meeting shall make a request by contacting Celina Calderone at (916) 263-2230 or email celina.calderone@dca.ca.gov or by sending a written request to Ms. Calderone at the Board for Professional Engineers, Land Surveyors, and Geologists, 2535 Capitol Oaks Drive, Suite 300, Sacramento, California, 95833. Providing your request at least five (5) business days before the meeting will help to ensure availability of the requested accommodations.

Board Members are not members of the Technical Advisory Committees; however, Technical Advisory Committee meetings may be attended by Board Members.

For further information regarding this meeting, please contact Laurie Racca at (916) 263-2406. Electronic copies of this Official Notice and Agenda are available at <http://www.bpelsg.ca.gov>.

NOTE: All times indicated and the orders of business are approximate and subject to change. Items may be taken out of order. This meeting may be cancelled without prior notice.


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GEOLOGIST AND GEOPHYSICIST TECHNICAL ADVISORY COMMITTEE

Members:	William Owen, PGP, PG, CEG, (chair); Hugh Robertson, PG, CEG (Vice Chair); Mark Riches PGP; Gary Simpson, PG, CEG, CHG; June Oberdorfer, PG, CHG.
Board Liaisons:	Elizabeth Mathieson, PG, CEG, William "Jerry" Silva
Staff Liaison:	Laurie Racca, PG

- 1) Roll call to establish quorum, and introductions
- 2) Public Comment On Items Not on the Agenda
- 3) Approval of minutes from May 16, 2014 , Geologist and Geophysicist TAC meeting (Possible Action) 5
- 4) Committee liaison report (informational) 9
 - (a) Outreach efforts
 - (b) Fall 2016 Applications/Exams summary
 - (c) legislation/regulation summary
 - (d) ASBOG
- 5) Update of proposed changes to Business and Professions Code, §7841 Qualifications for registration as a geologist, and the Proposal to Amend Title 16, California Code of Regulations §3031; Presentation by Staff (Informational) 35
- 6) Update TAC workplan for 2016/2017 (Possible Recommendation) 45
- 7) Election of new Chair and Vice Chair
- 8) Date of next TAC meeting
- 9) Adjournment

**MEETING OF THE GEOLOGY AND GEOPHYSICS
TECHNICAL ADVISORY COMMITTEE OF THE BOARD FOR PROFESSIONAL
ENGINEERS AND LAND SURVEYORS**

**2535 Capitol Oaks Drive, Suite 300
Sacramento, CA 95833
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Friday, May 16, 2014

TAC Members Present:	William Owen, PGp, PG, CEG, Chair Hugh S. Robertson, PG, CEG, Vice Chair Gary Simpson, PG, CEG, Mark Riches, PGp, William Cole PG, CEG, CHG
TAC Members Absent:	
Board Staff Present:	Erik Zinn, PG, CEG (BPELSG Board Member) Larry Kereszt, Brooke Phayer, Patty Smith, Erin LaPerle, Lisa Chavez

I. Roll Call to Establish a Quorum

The meeting was called to order at 10:06 a.m. Roll was taken and a quorum was established.

II. Public Comment

Brooke Phayer (Information and Outreach Analyst) provided input that Geological and Geophysical information has been added to "The Building Officials Pamphlet" and "The Consumer Guide". The completed pamphlet and guide are currently ready for staff approval. Mr. Phayer is urging TAC members to motivate Board staff to approve the completion of the pamphlet and guide so that this can move forward.

III. Approve Minutes from January 14, 2014 Geologist and Geophysicist Technical Advisory Committee Meeting

MOTION: Hugh Robertson made a motion and Gary Simpson seconded to approve the minutes of the last TAC meeting with no corrections.

VOTES: 3-0; Motion carried

IV. Discuss Ideas to generate more interest from licensees for participation in examination development workshops.

- Evaluate different times of the year (summer time - no one available)
- Have workshops available at other localities (Bay Area and Southern California)
- Construct e-mail list from Applicant Tracking System (ATS) for all in "L" status
- Have more social media announcements sent out.
- Compile list of large companies/employers that hire Geologists and Geophysicists-Send request to disseminate the information to their employees. TAC Members and Mr. Zinn to submit contact information to Patty.
- Send e-mails to Association of Engineering Geologists (AEG) and also mail out through U.S. mail.

- Send information out in the renewal notices

V. Report by Erik Zinn, Board Liaison, on attendance at recent ASBOG Council of Examiners (COE) Meeting.

In April of this year Mr. Zinn attended the ASBOG Council of Examiners Meeting in Buffalo, New York. He explained that he attended a Task Analysis Survey Workshop and the COE Workshop where they were both creating questions for the next examination and grading the examinations that had been given. Most of what went on he was not able to divulge due to security issues.

He did state that one of the primary reasons for attending this meeting is to make sure that the examinations are appropriate for our Board's licensees. Also, that we are meeting our obligations. He also stated that based upon the questions he observed, he was seeing a very solid examination. The examinations leans slightly toward Petroleum and Mining which is very appropriate at the national level. California really doesn't factor in, in those particular areas too much.

Mr. Zinn stated that he was very impressed with the examination and the amount of discussion and debating among the workshop participants. The questions are reviewed over and over repeatedly. Questions that have been on the books for years are still argued about and sometimes taken off or revised; for that reason we are getting constantly updated questions and we are also getting really great input from an estimated 30 Geologists.

It really is a great success story for the Board in general. We were authorized for out-of-state travel for the first time in many years. For that specific reason Mr. Zinn was able to formally represent California and the Board at this meeting.

California is approximately 20% to 25% of the national examinees that take the ASBOG examinations. California is a major player and we are going to try to resurrect our presence at the National Level. We must, in order to make sure that the examination is applicable to our examinees.

VI. Review of SB 1270 Bill sponsored by the State Mining & Geology Board (SMGB)

Hugh Robertson gave an overview and his input regarding restructuring of The State Mining and Geology Board.

Hugh Robertson Motioned to oppose SB 1270 unless amended with specific modifications to Section 3 with regards to what appear to be unnecessary changes to the requirements of the State Geologist; and attention to Item B, the qualifications for the State Mine Inspector should be Geologist. Gary Simpson seconded motion.

VOTES: 5-0; Motion Carried

TAC to email Patty about concerns with different sections, who will then compile and send to Mr. Zinn for Board meeting.

Hugh Robertson amended motion to Oppose Unless Amended. William Cole seconded amended motion.

VOTES: 5-0; Motion Carried

VII. Update on Previous Items

a. New Occupational Analysis Status

Geophysicists Occupational Analysis came to us earlier this week. It is in the review process with staff.

b. Examination Statistics

Handouts of the available Examination Statistics were given out at meeting.

c. Enforcement Statistics

Handouts on Enforcement Statistics were given out at the meeting. Mr. Zinn requested the horizontal bar chart that shows the number of cases and total of times/thresholds; Mr. Kereszt agreed to add this to the next agenda packets.

VIII. Items for consideration at Future TAC Meetings

- 1) Continuing Education
- 2) State Mining & Geology Board notes – Update from Mr. Testa
- 3) Examination Development – OPES / Prometric – Workshops in Southern California
- 4) 2014/2015 Workplan
- 5) Update by staff on the Consumer Guide and the Building Officials Pamphlet
- 6) Overview of Outreach efforts and events the Board has participated in

IX. Set next meeting date

September 24, 2014

X. Adjournment

MOTION: Mark Riches made a motion and Hugh Robertson seconded to adjourn the meeting at 12:16 p.m.

VOTES: 3-0; Motion carried

PUBLIC PRESENT

Committee liaison report

a) Outreach efforts

- In accordance with the Board’s strategic plan goals, staff have focused outreach efforts toward educating university administrators and students about the importance of licensure. Fourteen (14) university geology departments have been visited since September 1, 2015. Staff also participated in the ASBOG booth at the GSA Cordilleran Section focusing on educating students about the Geologist in Training certificate.
- Professional outreach events have included Inland Geological Society, AEG Southern California, AEG San Francisco, AEG Fresno, AEG Sacramento, GRAC Sacramento, GRAC webinar, and the South Coast Geological Society.
- State agency outreach events included visits to the State Mining and Geology Board, California Geological Survey, Department of Water Resources, and the Regional Water Quality Control Board office in Redding.
- The Board hosted two workshops to gather input on education requirements for the Professional Geologist license. A video of the presentation was also uploaded to You Tube.

b) Applications/Exams Summary

Spring 2016 Geology and Geophysics Exam Results Summary

Note: The spring exam administration is limited to FG/PG/CSE. The geophysics exams, and specialty exams are administered once per year in the fall.

Geology	Pass	Fail	Total	Rate
ASBOG Fundamentals of Geology	86	40	126	68%
ASBOG Practice of Geology	46	14	60	77%
California Specific Examination	66	32	98	67%

Fall 2016 Geology and Geophysics Applications Summary

TOTALS—Fall 2016

Applicant Type	Approved	Denied	FG	Exam Type				
				PG	CSE	CEG	CHG	GP
GIT	99	4	99					
PG	130	1	63	90	113			
CEG	40	0				40		
CHG	30	0					30	
GP	9	0						9
Totals	308	5	162	90	113	40	30	9

TOTALS – Fall 2015 (for comparison)

Applicant Type	Approved	Denied	FG	Exam Type				
				PG	CSE	CEG	CHG	GP
GIT	53	2	53					
PG	107	3	47	59	97			
CEG	50	1				50		
CHG	22	0					22	
GP	8	0						8
Totals	240	6	100	59	97	50	22	8

TOTALS—Spring 2016 (for comparison)

Applicant Type	Approved	Denied	FG	PG	Exam Type				
					CSE	CEG	CHG	GP	Refile
GIT	101	0	101						16
PG	111	0	40	63	101				39
CEG									
CHG									
GP									
Totals	212	0	141	63	101	0	0	0	55

c) Legislation/regulation summary

Note: Additional details regarding legislation/regulation is included in the meeting materials for the BPELSG meeting August 18, 2016 posted on the Board's website at

http://www.bpelsg.ca.gov/about_us/meetings/materials/20160818_meeting_materials.pdf)

Legislation:

Staff Analysis: SB 1085

Bill Summary: Existing law makes the Board responsible for the certification, licensure, and regulation of the practice of professional engineering, the practice of professional geologists and geophysicists, and the practice of professional land surveyors. This bill would additionally require an applicant for renewal to complete a specified board-administered examination. The bill would make the failure to complete the examination a cause for disciplinary action.

Status: Governor's Desk

Staff Analysis: SB 1165

Bill Summary: Currently, the laws allow professional geologists and geophysicists to either sign or seal their documents. This bill would require professional geologists and geophysicists to both sign and seal (or stamp) their final work product documents to indicate their responsibility for them and to require professional geologists and geophysicists to obtain a seal (or stamp). This bill would extend the delinquent reinstatement rights to a licensee from 3-years to 5-years after expiration of their license. The bill would generally prohibit the renewal, restoration, reinstatement, or reissuance of these licensee after this time. This bill would additionally allow an applicant for licensure as a geologist, instead of the graduation requirement, to have completed a combination of at least 30 semester hours, or the equivalent, in courses that, in the opinion of the board, are relevant to geology and would require that at least 24 semester hours, or the equivalent, be in upper division or graduate courses. The bill would also make other technical and conforming changes.

Status: Approved by Governor.

Staff Analysis: SB 1479

Bill Summary: This bill would authorize the board to make arrangements with a public or private organization to conduct the examination. The bill would authorize the board to contract with such an organization the for materials or services related to the examination and would authorize the board to allow an organization specified by the board to receive, directly from applicants, payments of the examination fees charged by that organization for materials and services

Status: Governor's Desk.

Regulations:

The repeal of Board Rules Sections 3036.1, 3036.2, 3037.1, and 3037.2 regarding inspection and appeal of geophysicist, specialty geologist, and specialty geophysicist exam were noticed for a 45-day public comment period on May 27, 2016. The 45-day public comment period was extended and ended on July 22, 2016. No public hearing was scheduled on this rulemaking proposal, and none was requested. No comments were received during the 45-day comment period.

Status: The Board voted to adopt this at the August 2016 Board meeting, sent to final rulemaking process.

d) ASBOG Update

- Attended the Fall 2015 ASBOG annual meeting (Board Member + staff) and council of examiners (staff).
- Attended the Spring 2016 council of examiners (staff).
- Requesting out of state travel approval for Board Member, Executive Officer, and staff to attend the Fall 2016 ASBOG administrator's workshop, annual meeting, and council of examiners (staff only) in Lawrence, Kansas.



California Board for Professional Engineers, Land Surveyors, and Geologists (BPELSG)

**Defining the Minimum Curriculum
for a Qualifying Geological Sciences Degree for the
California Professional Geologist License**

**Geology and Geophysics
Technical Advisory Committee Meeting**

September 28, 2016

Laurie Racca, PG – Senior Registrar, Geology & Geophysics

Statement of the Issue

- Valid criteria to achieve professional licensure includes **equal** parts
 - education
 - work experience
 - passing the appropriate examinations



Statement of the Issue

The Board has long recognized that there is confusion regarding the geology education requirement due to:

- The flexibility and variety of geology curricula
- The lack of national accreditation for geology programs
- The proliferation of interdisciplinary degrees
- Applicants misinterpreting “*major in geological sciences*”
- Non-licensed professions (soil science, hydrology, environmental science) seeking a pathway to PG licensure, typically in the environmental field

PG Licensing in California

A sampling of PG applications 2012 to the present:

Applications Approved

- Geology
- Geological Sciences
- Earth Sciences
- Engineering Geology
- Hydrogeology
- Geoscience
- Geo-Environmental Science
- Geological Engineering
- Soil Science
- Geophysics
- Environmental Sciences and Policy
- Geology with Paleontology focus
- Natural Resources Management

Applications Not Approved

- Degrees with **the same or very similar** titles
- These degree titles appear most often in applications not approved:
 - Earth Science (general or non-geology focus)
 - Soil Science
 - Hydrology
 - Environmental Sciences
- The predominant practice area for denied applicants is the environmental cleanup industry.



Core Course Chronology

Former Board of Registration for Geologists and Geophysicists (BRGG)

Original Core Screening Courses	Tom Wright Study (1986-1987)	Donnoe Study & Report (1992)
1968-1969 four (4) courses	1987 recommended five (5) courses	1998 recommended six (6) courses
<ul style="list-style-type: none"> • Field Geology • Structural Geology • Historical Geology • Petrology 	<ul style="list-style-type: none"> • Physical Geology • Mineralogy • Petrology and/or Petrography • Structural Geology • Field Geology (or Field Methods) 	<ul style="list-style-type: none"> • Physical Geology • Historical Geology • Field Geology • Structural Geology • Stratigraphy • Earth Materials



BPESLG G&G TAC Activities

- 2012 Evaluation by Geologist and Geophysicist Technical Advisory Committee (G&G TAC)
 - May 1, 2012 meeting discussion:
 - TAC members' suggestions for core and elective courses
 - Review of university geology departments' requirements
 - Contact with Dr. David Bowman from CSU Fullerton
 - July 31, 2012 meeting recommendations/discussion:
 - Suggested list of core and elective courses
 - Provided recommended change to §7841 (in the law)
“Graduation with a major in geological sciences from a college or university, which includes at least 30 semester units in courses, which in the opinion of the Board are relevant to geology; of which 24 units must be upper-division or graduate courses.”

The Process

The Board intends to define the minimum curriculum for a qualifying geological sciences degree for licensure as a Professional Geologist in the regulations.

- 2012 G&G TAC discussions
- 2015/2016 conducted research (ongoing):
 - academic papers
 - contacted experts
 - university degree requirements
 - other license or certification models
 - Conducted public workshops in February 2016 to gather stakeholder input. <https://youtu.be/7IZ8PRXeG7w>
 - Ongoing informal outreach to stakeholders
- §7841 of the Geologist and Geophysicist Act has been amended to allow the Board to specify a list of core courses in the regulations (SB 1165, Cannella). Effective date 1/1/2017.
- Formal rulemaking to amend Title 16, Division 29, California Code of Regulations §3031 after the changes to the law go into effect.

Evolution of PG Education Requirements in §7841

California Geology License Qualifications Cross Reference

§7841 (b) 1968 to 2003	§7841 (b) 2004 to 2015	§7841 (b) 2016	§7841 (b) 2017
<p>(b) Meet one of the following educational requirements fulfilled at a school or university whose geological curricula meet criteria established by rules of the board:</p> <ul style="list-style-type: none"> (1) Graduation with a major in geology. (2) Completion of 30 semester units in geological science courses leading to a major in geology, of which at least 24 units are in the third or fourth year, or graduate courses. <p>(c) Have at least seven years of professional geological work....</p>	<p>(b) Graduation with a major in geological sciences from college or university.</p> <p>(c) Have a documented record of a minimum of five years of professional geological experience....</p>	<p>(b) Graduation from a college or university with a major in geological sciences or any other discipline that, in the opinion of the board, is relevant to geology.</p> <p>(c) Have a documented record of a minimum of five years of professional geological experience....</p>	<p>(b) Meet either of the following educational requirements fulfilled at a school or university whose curricula meet criteria established by rules of the board:</p> <ul style="list-style-type: none"> (1) Graduation from a college or university with a major in geological sciences or any other discipline that, in the opinion of the board, is relevant to geology. (2) Completion of a combination of at least 30 semester hours, or the equivalent, in courses that, in the opinion of the board, are relevant to geology. At least 24 semester hours, or the equivalent, shall be in upper division or graduate courses. <p>(c) Have a documented record of a minimum of five years of professional geological experience.....</p>

Major in Geological Sciences

- Updated informal review of California four-year university requirements in September, 2015
 - 35 geoscience departments (private, CSU, UC)
 - 16 on quarter system, 19 on semester system
 - 96 geoscience, earth science or other related majors
 - Both BA and BS degrees
 - Included 27 traditional BS Geology degrees
 - Based on departments' websites and online university catalogs

Major in Geological Sciences

- Difficulties encountered during the review of university requirements
 - Lack of standardized courses (content within similarly titled courses)
 - Varying course names
 - Large number of electives available
 - Multiple options or pathways to receive degree
 - Varying degree names and requirements
- A separate course for California Geology is not a requirement for most of the majors, despite the specific licensing test on the subject.

Major in Geological Sciences

- Results for all 96 majors (core + required electives)
 - Semester system: on average, degrees require 41 units of geology courses
 - Quarter system: on average, degrees require 47 to 49 units (equals 31-32 semester units) of geology courses
- Results for 27 traditional BS Geology degrees (core + required electives):
 - Semester system: 33-60 geology units
 - Quarter system: 47-132 units (equals 31-88 semester units)
 - Outlier schools on high end are CalTech (132 quarter units) and Stanford (75 quarter units)

Table 2
Comparison of College/University Courses to 2012 G&G TAC Recommended Coursework

G & G TAC Recommended Core Classes								
Course Name	All 96 Majors				27 BS Geology Majors			
	Number Required	Percent Required	Optional	Not Required	Number Required	Percent Required	Optional	Not Required
Physical Geology*	53	55%	30	13	21	77%	4	2
Historical Geology*	60	63%	18	18	20	74%	3	4
Mineralogy/Petrology ¹	76	79%	3	17	27	100%	0	0
Stratigraphy/Sedimentology	57	59%	3	36	24	88%	0	3
Structural Geology	58	60%	5	33	27	100%	0	0
Field Geology ²	52	54%	8	36	25	92%	1	1
G & G TAC Recommended Upper Division Electives								
Course Name	All 96 Majors			27 BS Geology Majors				
	Number Required	Optional	Optional	Number Required	Optional			
Paleontology	18		7	9	3			
Geophysical/Remote Sensing Methods ³	NA		NA	NA	NA			
Geomorphology-Land form interpretation	14		5	3	2			
Hydrogeology/Environmental Hydrogeology	13		6	5	1			
Tectonics	17		3	3	0			
Engineering/Economic Geology	2		2	1	1			
Geochemistry/Environmental Geochemistry	17		23	11	2			
Geophysics/Applied Geophysics	24		4	7	1			
Senior Thesis (<i>listed separately from summer field</i>)	37		6	11	0			

*lower division courses

"Optional" in this context means it is one of several choices to meet the major requirement.

1—For mineralogy/petrology 26 of 27 BS Geology programs require mineralogy or mineralogy/crystallography; 23 of 27 require igneous/metamorphic petrology. All 27 programs require at least one of these classes, most require both. One school appears to incorporate mineralogy into the petrology class.

2—This category includes both upper division field classes and the traditional summer field class. Of the 27 BS Geology programs, 15 require a summer field class and 1 program lists it as an option. Many schools appear to be incorporating upper division field work into the day to day coursework and/or an upper division field course instead of the traditional summer field camp.

3—It appears this skill is incorporated into other coursework. This is not typically listed as a separate class

Licensure Models Outside of California

- American Institute of Professional Geologists (AIPG)
Certified Professional Geologist (CPG)
- Association of State Boards of Geology (ASBOG)
- Reviewed licensure requirements of other US States (29 including Louisiana) & the territory of Puerto Rico (1)
- Geoscience Canada Education Requirements

Occupational Surveys and Competency Models

- ASBOG—2015 Task analysis survey used to update the content and scope of the national FG and PG exams
- Occupational Analysis—California Specific Examination (CSE)
- 2016 Undergraduate Geoscience Education Summit
- Geosciences Canada Knowledge Requirements

Workshop Comments Received

- Practicing geologists reporting a perceived lack of field skills with recent graduates
- Recent graduates indicating that traditional summer field courses are expensive
- Members of non-licensed professions seeking a pathway to geology licensure
- Frustration from some non-licensed professionals that they were not made aware of licensing requirements when choosing a college major
- Lists of specific courses that should be included in the requirements
- Positive feedback from college and university geology departments indicating a willingness to provide students with help documenting their educational qualifications for a license application

South Coast Geological Society Survey 2/1/2016

Conducted by Dr. Phil Armstrong CSU Fullerton, 32 responses

- Asked attendees to rate a series of classes as necessary, optional or unnecessary as a minimum qualification for a licensed geologist. Top ranked “necessary” classes.
 1. Field Geology (100%)
 2. Structural Geology (97%)
 3. Sedimentation/Stratigraphy (94%)
 4. Engineering Geology (81%)
 5. Geomorphology (78%), Earth History (78%)
 6. Earth Materials/Mineralogy (75%)

So what did we learn?

- The fundamental core skills required to be a competent geologist have remained remarkably unchanged over the last 50 years.
- Basic geologic skills ***apply across industries and through time***, even as specific job tasks have changed, and as technologies/tools have evolved.
- A lot of the confusion is due to thinking that “core skills” are the same as “industry job tasks” or “technology/tools”

Core Geology Skills \neq Industry Job Tasks

Core Geology Skills \neq Technology/Tools

So what did we learn?

- Coursework should demonstrate the ability
 - to use the scientific method
 - to measure, map, evaluate and communicate geologic data
 - to develop appropriate conclusions based on that data, including the evaluation of data quality
- Stakeholders have a dominant preference for a list of classes that includes an explanation or statement of the skills and competencies expected out of each course.
- Applicants want a specific objective standard that is easy to understand.

Major Elements of the Proposed Regulation

The following requirements are being considered for inclusion in the draft regulations language

- Institution accredited by a regional accrediting commission recognized by the US Department of Education
- No “Life Experience Degrees”
- Applicant’s burden to demonstrate that their coursework meets the Board’s requirements
- Update of the Independent Evaluation requirements (i.e. references) for all geology license types

Major Elements of the Proposed Regulation(cont.)

The following elements of the existing requirements will remain the same:

- No more than 3 years of education credit granted toward the 5 year experience requirement (in statute §7841).
 - 2 years of experience credit granted for an undergraduate degree meeting the Board's specifications
 - Up to 1 year of experience credit for graduate studies.
- Professional work experience credit is not counted until the educational requirements are fulfilled (in regulation §3031).

Proposed List of Courses

The draft regulations language was presented to the Board at the April 21/22 meeting. The list of classes **MAY CHANGE** based on the Board's input or via formal rulemaking. *This is still preliminary.*

Four (4) Required Core Classes	Two (2) Applied Upper Division Electives (From the list)	
<ul style="list-style-type: none">• Earth Materials• Structural Geology• Stratigraphy and Sedimentation• Upper Division Field Coursework	<ul style="list-style-type: none">• Geomorphology• Engineering Geology• Hydrogeology• California Geology• Paleontology• Resources Geology• Environmental Geology	<ul style="list-style-type: none">• Geophysics• Technology Applications in Geology• Applied Geoscience Courses From other Departments

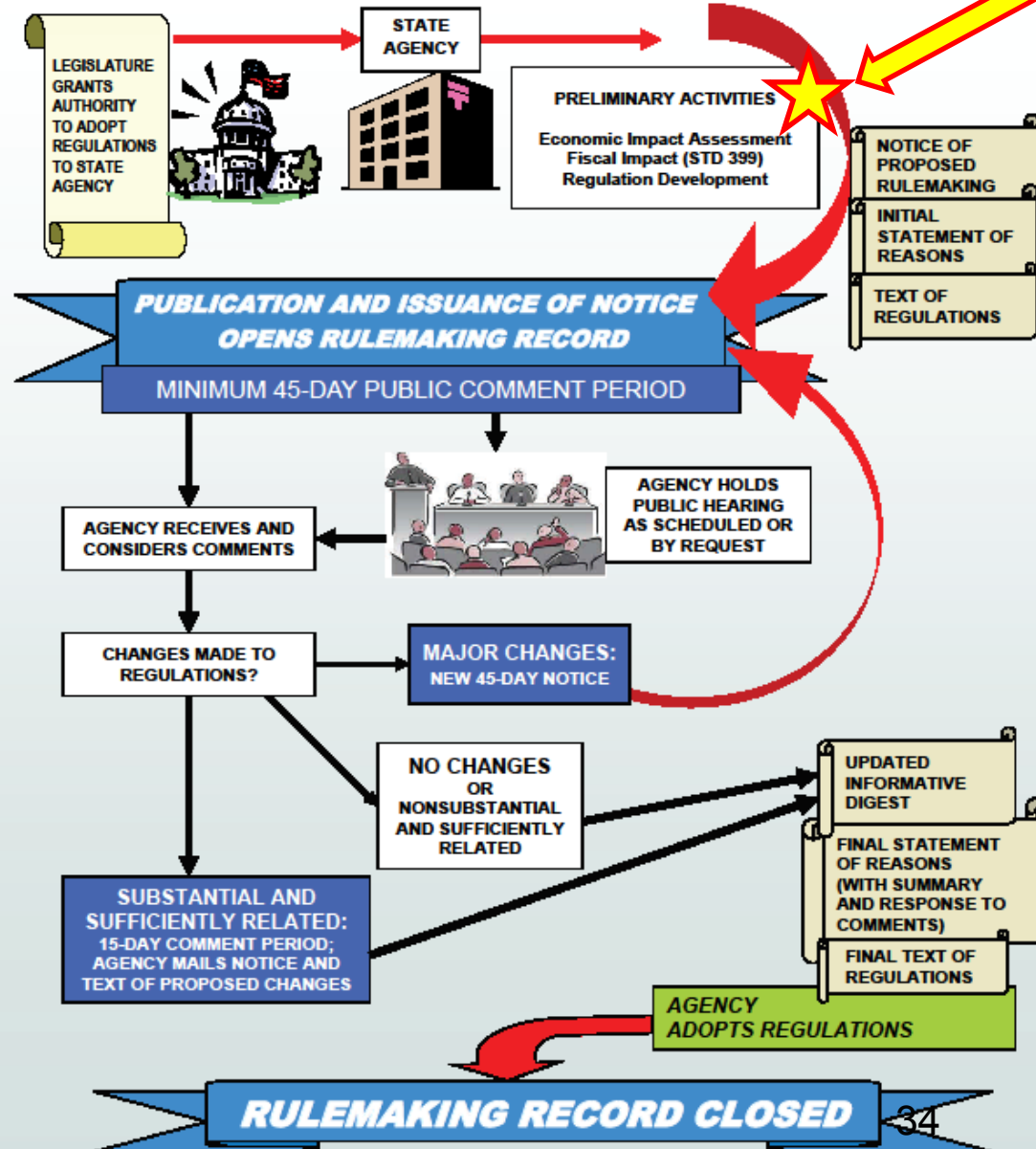
REGULAR RULEMAKING

You Are Here

The Process

We are in the Preliminary Activities phase.

- Draft language for the regulations will be submitted to the Board for approval this fall.
- After Board approval, a “Notice of Proposed Rulemaking” will start the process.
- There will be many more opportunities for public comment and input.



3031. Examination Required.

(a) Every applicant for ~~registration~~ licensure as a geologist shall be required to take and pass examinations as provided in Section 7841(d) of the Code or every applicant for ~~registration~~ licensure as a geophysicist, or every applicant for certification in any specialty, shall be required to take and pass an examination as prescribed by the Board ~~except as provided in Section 7847 of the Code.~~

(b) To be eligible for the ~~geological~~ Professional Geologist license ~~examination~~, an applicant shall have completed at least five years of educational and work experience in professional geological work, as set forth in subdivisions (b) and (c) of Section 7841 of the Code.

An applicant for licensure as a Professional Geologist will be granted credit towards the experience requirement for the following curriculum fulfilled at a school or university which, at the time the applicant was enrolled, was accredited by a regional accrediting commission recognized by the United States Department of Education. "Life Experience Degrees" are not acceptable.

(1) An applicant shall satisfy the education requirements describe in Section 7841(b) (1) or Section 7841 (b) (2) by successfully completing 30 semester hours, or the equivalent, in geological science courses, of which at least 24 semester hours, or the equivalent, are upper division or graduate courses as specified in (A) and (B) below. The 30 semester hours must include:

(A) Instruction sufficient to demonstrate an understanding of basic geologic concepts such as geologic time, earth history and origin, and plate tectonics; the scientific method and techniques used for geologic investigations; the training to think and visualize in spatial and temporal dimensions; the skills necessary to interpret the lateral or vertical subsurface conditions based on point geologic data; and the ability to understand reasonable variations in data and offer plausible explanations for anomalous values, including recognizing errors in measurement. This shall be accomplished by completing core coursework that includes at least one class in each of the following four subject areas:

(i) "Earth Materials" is that subject which deals with the identification, classification, and chemistry of minerals and rocks; their formation; the interpretation of their origins; as well as their uses and importance. Example

course names include Mineralogy, Optical Mineralogy, Igneous Petrology/Petrography, Metamorphic Petrology/Petrography, and Sedimentary Petrology/Petrography.

- (ii) “Structural Geology” is that branch of geology that describes and analyzes structural features of rocks to reconstruct the motions and processes involved in the build up and deformation of the Earth’s crust from small to large scales. It also includes the interpretation of brittle and ductile strain, the fundamentals of plate tectonics, and the analysis of local and regional geologic structure. Example course names include Structural Geology, Tectonics, Neotectonics, and Advanced Physical Geology.
- (iii) “Stratigraphy and Sedimentation” refers to the identification and interpretation of sedimentary rocks, sedimentary processes and structures, application of stratigraphic and dating methods, identifying the impact of climate and geologic processes on depositional patterns, and facies analysis. Course names may include Stratigraphy, Sedimentology, Sedimentary Petrology, and Sedimentary Basin Analysis.
- (iv) “Upper-Division Field Coursework” is a minimum of five semester hours of field training designed to demonstrate a progression of field investigation skills culminating in a final project or integrative field experience that is based on the knowledge and skills acquired in earlier geologic coursework. The coursework must demonstrate that the applicant has instruction in the methods needed to measure, map, evaluate and communicate geologic data; and the ability to plan and conduct geological investigations based upon existing sources of geologic information. This shall include preparing and interpreting geologic maps, cross-sections, stratigraphic columns, and written reports. Academic field training in skills such as logging trenches or borings, geophysical data acquisition, designing wells, and other common professional geologic tasks may serve as one component of, or as a supplement to, the field coursework requirement described in this section so long as it is part of the established college academic program for a geology degree. The field training can be obtained in one or more separate field classes over the course of the third and/or

fourth academic years, but must not be introductory in nature or be part of laboratory exercises for other coursework. Traditional course names may include Advanced Field, Applied Geologic Investigation Techniques, Spring Field, and Summer Field. Independent study, research projects, theses or dissertations may, at the Board's discretion, be used to satisfy the upper-division field coursework requirement if can be documented, to the Board's satisfaction, to be educationally equivalent.

(B) Applied upper-division coursework including at least two classes from the following subject areas. Courses that combine subjects or skill sets and are, in the opinion of the Board, educationally equivalent to those specified below will be considered, at the Board's discretion, to meet the requirements:

- (i) “Geomorphology” is that branch of geology dealing with the classification, origin, and analysis of landforms and watershed elements as well as the surface and tectonic processes that relate landforms to the underlying geologic materials. Skills learned include methods of geomorphic analysis and interpretation of different types of mapped data, including topographic, geologic, and remotely sensed data. Traditional course names may include Surface Processes, Landscape Analysis, and Quantitative Geomorphology.
- (ii) “Engineering Geology” refers to that branch of geology as defined in Section 3003 (b) of Title 16, California Code of Regulations. Skills learned should include application of geologic methods, principles, and information to engineering and related fields; the relationship between engineered structures and geology; the assessment and mitigation of geologic hazards including seismic hazards, flood potential and slope stability issues; and communication of hazard information. Typical course names may include Engineering Geology, Applied Geology and Geologic Hazards.
- (iii) “Hydrogeology” refers to that branch of geology as defined in Section 3003 (h) of Title 16, California Code of Regulations. Skills learned include the theory and analysis of groundwater flow, the relationship between geology and groundwater flow, the relationship of surface water and groundwater, fluid and vapor movement within the vadose zone, aquifer properties and mechanics,

development of groundwater as a resource, design of water wells and vapor wells, groundwater chemistry, and water quality issues. Typical course names may include Hydrogeology, Geohydrology, Contaminant Hydrogeology, and Water Resources.

- (iv) “California Geology” is the study of the geology, geologic history, tectonic evolution, geologic resources, and landforms of California. Course outcomes should include the knowledge required to pass the California Specific Examination required for professional licensure in this state as described in Section 7841 (d) of the Code. Topics may include specific California geologic formations known to present geologic hazards, earthquake hazards, and an analysis of case histories of major geologic/engineering failures specific to California. Typical course names may include California Geology, Engineering Geology, and Applied Geology.
- (v) “Paleontology” is the study of life throughout geologic time, exclusive of hominids. Coursework should address recognizing common fossils and fossil types, the geologic settings which would indicate the potential for paleontological resources, and the evolutionary history of fossil groups of traditional importance to geologists. Other topics may include basic modes of preservation, skeletal anatomy, systematics and taxonomy, biostratigraphy, paleoecology, and paleobiogeography. Example course names include, Paleontology, Invertebrate Paleontology, and Biostratigraphy.
- (vi) “Resources Geology” teaches the skills needed to identify the origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing materials; problems related to resource extraction; estimations and limitations of reserves; and reclaiming sites after extraction of resources. Typical course names include Economic Geology, Resources Geology, Petroleum Geology, Ore Deposits, Basin Analysis, Geothermal Processes and Applied Geochemistry.
- (vii) “Environmental Geology” includes an introduction to environmental site assessment and remediation, environmental geochemistry, and the mitigation of potentially negative effects of human activities such as exploration for

mineral and energy resources, or solid and hazardous waste disposal on geologic systems, as well as the protection of water resources, land and watershed restoration. Example course names include Environmental Geology or Applied Geology.

- (viii) “Geophysics” refers to that subject as defined in Section 7802.1 of the Code and Section 3003 (e) of Title 16, California Code of Regulations. This subject typically includes familiarization with geophysical exploration techniques, seismic wave propagation, attenuation physics of the earthquake source, magnitude, seismic moment and focal mechanism, seismic recording instruments, seismic reflection and refraction methods, gravity surveys, magnetic surveys; and geological interpretation of geophysical data. Typical course names would include Introduction to Geophysics, Applied Geophysics, Seismology, Engineering Geology, Applied Geology.
 - (ix) “Technology Applications in Geology” encompasses a wide range of technology skills with coursework that includes an emphasis on application to geologic investigations. These could include, but are not limited to, the use of Geographic Information Systems (GIS), computer modeling of groundwater or other processes, signal processing or numerical methods of data analysis. Coursework without a specific and demonstrable geologic application will not qualify.
 - (x) “Applied geoscience coursework taught by university departments other than geology” refers to coursework with a reasonable and rational application to the professional practice of geology as determined by the Board. A maximum of one course would be accepted at the discretion of the Board. Examples include Geologic or Geotechnical Engineering, Soil Mechanics, Rock Mechanics, Mining Engineering, Hydrology, or Soil Genesis and Morphology.
- (C) Independent study, research projects, theses or dissertations may, at the Board’s discretion, be used to satisfy the applied upper-division coursework requirement defined in (B) if can be documented, to the Board’s satisfaction, to be educationally equivalent to one or more of the courses specified.

(D) Workshops, professional development seminars, conferences, short courses, student internships, or reading courses may not be used to satisfy the 30 hour geological sciences coursework requirements, or equivalent.

(E) It shall be the applicant's responsibility to demonstrate that his/her academic coursework and training meet the requirements of the Board. To do so, the applicant must provide official sealed transcripts and any other supporting evidence requested by the Board to document that these educational requirements or equivalents have been met. Examples of acceptable supporting evidence to demonstrate educational equivalence includes, but is not limited to, copies of course descriptions from the school catalog in effect at the time the class was taken, course syllabi, copies of study materials, and the tables of contents of books required for the course, or any other reasonable and necessary information requested by the Board for this purpose.

(2) A bachelor of arts or bachelor of science degree in geology from a geology program accredited by an organization recognized by the Board may be substituted for the requirements described in Section 3031(b)(1) above at the discretion of the Board.

~~— (2) An applicant shall not be eligible to earn credit for professional geological work performed under the supervision of a pProfessional gGeologist or registered licensed eCivil or pPetroleum eEngineer until the applicant has completed the educational requirements set forth in subdivision (b) of Section 7841 of the Code.~~

~~— (1) (3)~~ (3) Graduate study or research in geological sciences at a school or university whose geological curricula meet criteria established by rules of the Board, shall be counted on a year-for-year basis in computing the experience requirements specified in Section 7841 of the Code. A year of graduate study or research is defined as being a 12 calendar month period during which the candidate is enrolled in a full-time program of graduate study or research. Full-time graduate study is defined as two semesters per year of eight semester units each, or as defined by the college or university whichever is less. Part-time graduate study ~~Shorter periods~~ will be prorated.

~~— (3) (4)~~ (4) In no case will credit be given for professional geological work experience performed during the same time period when full-time graduate study or research is being done for which educational experience credit is being allowed. Part-time graduate study or research and part-time professional geological work experience will be prorated and combined on a 12 calendar month basis.

(c) Qualifying experience for geologist licensure is that experience satisfactory to the Board which has been gained while performing professional geologic tasks under the responsible charge of a person legally qualified to practice geology.

(1) For the purposes of this section, “legally qualified” means having an appropriate license as a Professional Geologist; a licensed Civil Engineer with documented expertise in the area of geology in which the applicant’s experience is earned sufficient to qualify them as being in responsible charge of geologic work; or a reference legally practicing geology in a situation or locale where they are not required to be licensed, but with the training and experience to have responsible charge of geologic work as determined by the Board.

(2) Qualifying experience shall be computed on an actual time worked basis not to exceed forty hours per week.

(3) An applicant shall not be eligible to earn credit for professional geological work performed under the supervision of a legally qualified professional as defined in §3031(c)(1), until the applicant has completed the educational requirements set forth in subdivision (b) of Section 7841 of the Code.

~~(e) (d)~~ To be eligible for the geophysical examination licensure as a Professional Geophysicist, an applicant shall have completed at least seven years of educational and work experience in professional geophysical work, as set forth in subdivisions (b) and (c) of Section 7841.1 of the Code.

(1) An applicant for licensure as a Professional Geophysicist will be granted credit towards the experience requirement for education, as specified in Section 7841.1 of the Code, fulfilled at a school or university which, at the time the applicant was enrolled, was accredited by a regional accrediting commission recognized by the United States Department of Education. “Life Experience Degrees” are not acceptable.

~~(4)~~ (2) Graduate study or research in geophysical related sciences at a school or university whose geophysical curricula meet criteria established by rules of the Board, shall be counted on a year-for-year basis in computing the experience requirements specified in Section 7841.1 of the Code. A year of graduate study or research is defined as being a 12 calendar month period during which the candidate is enrolled in a full-time program of graduate study or research. Full-time graduate study is defined as two semesters per year of eight semester units each, or as defined by

the college or university whichever is less. Part-time graduate study ~~Shorter periods~~ will be prorated.

~~(2) An applicant shall not be eligible to earn credit for professional geophysical work performed under the supervision of a pProfessional gGeophysicist until the applicant has completed the educational requirements set forth in subdivision (b) of Section 7841.1 of the Code.~~

~~(3) In no case will credit be given for professional geophysical work experience performed during the same time period when full-time graduate study or research is being done for which educational experience credit is being allowed. Part-time graduate study or research and part-time professional geophysical work experience will be prorated and combined on a 12 calendar month basis.~~

(e) Qualifying experience for geophysics licensure is that experience satisfactory to the Board which has been gained while performing professional geophysics tasks under the responsible charge of a person legally qualified to practice geophysics.

(1) For the purposes of this section, "legally qualified" means having an appropriate license as a Professional Geologist; a Professional Geophysicist; a licensed Civil Engineer with documented expertise in the area of geophysics in which the applicant's experience is earned sufficient to qualify them as being in responsible charge of geophysical work; or a reference legally practicing geophysics in a situation or locale where they are not required to be licensed, but with the training and experience to have responsible charge of geophysical work as determined by the Board.

(2) Qualifying experience shall be computed on an actual time worked basis not to exceed forty hours per week.

(3) An applicant shall not be eligible to earn credit for professional geophysical work performed under the supervision of a legally qualified professional as defined in §3031(e)(1) until the applicant has completed the educational requirements set forth in subdivision (b) of Section 7841.1 of the Code.

(f) To assist the Board in evaluating qualifications, each applicant for licensure as a Professional Geologist, a Professional Geophysicist, or any specialty certification, shall submit completed reference forms from as many references as may be consistent with the length and scope of the professional experience, but no fewer than three.

(1) None of the references can be related to the applicant by birth or marriage.

(2) Reference forms must either be stamped by the licensee giving the reference, or must be notarized and, and must clearly indicate areas of personal knowledge of the applicant's qualifying experience.

(3) Information submitted by references is confidential.

(4) Nothing contained in this section shall limit the authority of the Board to require that an applicant submit additional references, employment verifications and other information pertinent to the applicant's education and/or experience to verify that the applicant meets the minimum qualifications for a Professional Geologist license as defined in Section 7841 of the Code; the minimum qualifications for a Professional Geophysicist license as defined in Section 7841.1 of the Code; or for a specialty in either geology or geophysics as defined in Sections 7842 and 7842.1 of the Code.

~~(d)~~ (g) Each applicant for ~~registration~~ licensure as a geologist who obtains a passing score on the Fundamentals of Geology and Practice of Geology examinations created by the National Association of State Boards of Geology on or after November 1, 1996 and obtains a passing score as determined by a recognized criterion-referenced method of establishing the pass point in the California specific examination pursuant to Section 7841(d) shall be deemed to have passed the required examinations for licensure as a professional geologist in California. This subsection shall become effective on January 1, 2000.

(1) Candidates shall receive credit for obtaining a passing score on the Fundamentals of Geology examination, the Practice of Geology examination and the California specific examination and shall be required to submit an application to retake and pass only those examinations previously failed.

~~(f)~~ (h) Every applicant for ~~registration~~ licensure as a geophysicist or for certification in any specialty, who obtains a passing score determined by a recognized criterion-reference method of establishing the pass point in the California examination shall be deemed to have passed the California examination. Such a passing score may vary moderately with changes in test composition.

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

2535 Capitol Oaks Drive, Suite 300, Sacramento, California, 95833-2944

Telephone: (916) 263-2222 – Toll Free: 1-866-780-5370

Facsimile: (916) 263-2246

www.bpelsg.ca.gov

**PROPOSED
WORK PLAN
TECHNICAL ADVISORY COMMITTEE (GEOLOGY AND GEOPHYSICS)****INTRODUCTION**

The Geology and Geophysics Technical Advisory Committee recognizes its position as an advisory committee to the Board, providing input to the liaison Board members on matters requested by the Board for Professional Engineers, Land Surveyors and Geologists. The input may take the form of assistance to Board staff, direct assistance to the liaison Board members, or recommendations made directly to the Board in the form of proposed motions or recommendations. In all cases, the focus of the activities of the TAC (G&G) will be in the interest of safeguarding property and public welfare.

YEAR PLAN 2016-2017

1. To help clarify "gray" areas in the existing laws, rules, and regulations regarding the practices of Geology and Geophysics, and make recommendations for handling and/or revising the laws, rules, and regulations, where appropriate.
2. To review proposed legislation or regulations that would affect the practice of geology or geophysics.
3. To assist the Board with information regarding the practices of geology and geophysics proposed to be included in information prepared and disseminated by the Board.
4. To aid in formulating suggested procedures, information required, and questions to be asked with regard to enforcement issues relating to the practice of geology and/or geophysics, and to advise the Board staff upon review of such enforcement cases as requested.
5. To meet in closed session to address specific consumer and inter-professional complaints, and make recommendations to the Board regarding their solutions.
6. To assist staff in advising, guidance, and identification of expert consultants.
7. To assist staff with reviewing minimum qualifications for Geologists and Geophysicists applying for examinations, as necessary

- 8.** Review licensing issues affecting other states to determine if the same issues may be relevant to California.
- 9.** Assist Board staff with outreach to students, professionals, and the general public with subjects of interest for licensees as necessary.
- 10.** To assist with any National Association of State Boards of Geology (ASBOG) matters regarding geology when referred by the Board.
- 11.** To coordinate with the Board's other Technical Advisory Committees as required by the Board.
- 12.** To assist the Board as directed.

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