

**TITLE 16. BOARD FOR PROFESSIONAL ENGINEERS,
LAND SURVEYORS AND GEOLOGISTS
DEPARTMENT OF CONSUMER AFFAIRS**

INITIAL STATEMENT OF REASONS

Hearing Date: January 22, 2019

Subject Matter of Proposed Regulations: Professional Geologist License Qualification Requirements, and Professional Geophysicist License Qualification Requirements.

Authority cited Business and Professions Code (BPC) §7818.

Reference cited BPC §7841, §7841.1, §7841.2, §7842, and §7842.1.

Section(s) Affected: Adopt California Code of Regulations Title 16, §3022, §3022.1 and §3022.2; Amend California Code of Regulations §3031.

PROBLEM BEING ADDRESSED

Business and Professions Code Sections 7841, 7841.1, 7841.2, 7842 and 7842.1 describe the qualifications required for licensure as a geologist, licensure as a geophysicist, and for certification as a geologist in training or as a specialty geologist or geophysicist. These requirements include completing specified education requirements, work experience requirements, and passing the required examination(s). Additional explanation of these requirements is included in Title 16, California Code of Regulations (CCR) §3031.

As it is currently written 16 CCR §3031 lacks important detail, is inconsistent with other sections of the regulations, and should be amended to address three significant flaws which make it difficult to understand for potential licensees and the public:

1. problems with the way this section of the regulations is organized,
2. lack of detail regarding specific licensure qualification requirements,
3. lack of consistency both within the regulations relating to the practices of geology and geophysics, and to improve consistency between the regulations for the various professional disciplines (engineering, land surveying, and geology) regulated by the Board.

The confusion resulting from the flaws in 16 CCR §3031 has resulted in two significant adverse effects.

1. Submittal of license applications by unqualified persons. The Board has received applications from persons with only a two-year community college degree, and has received applications from persons with degrees not related to the practice of

geology. In some cases, unqualified applicants have appealed the denial of their license application. A license appeal is heard before an administrative law judge. A hearing forces both the unqualified applicant and the Board to incur costs in both time and money. These costs include expenses for legal counsel, travel to the hearing, and staff time.

2. The erroneous perception by the public, and other regulatory agencies that Professional Geologists are not held to the same standards as Professional Engineers or Professional Land Surveyors. This perception appears to be directly related to the lack of clarity provided in the regulations, and seriously undermines the Board's credibility to implement its mission of public protection.

The Board is proposing to update the education and experience requirements for licensure as a geologist or geophysicist currently described in 16 CCR §3031 and move these topics into new sections §3022, §3022.1 and §3022.2 proposed for adoption as part of this rulemaking. In doing so, the Board is amending the standards that are considered when a person applies for certification as a Geologist-In-Training (GIT), licensure as a Professional Geologist (PG), and licensure as a Professional Geophysicist (PGP).

Additionally, the Board is deleting unnecessary text within §3031 that describes the examination requirements for the Professional Geologist License, the Professional Geophysicist License and for certification as a specialty geologist as well as renumbering the remaining sections.

With the revisions being proposed here, the Board is seeking to clarify the requirements for applicants and the public, improve the readability of the regulation, and make the regulation easier to understand.

NECESSITY

The Board has determined that to effectively address the problems identified above, it is necessary to move the sections of §3031 that describe the education and experience requirements for geologists and geophysicists to California Code of Regulations, Title 16, Article 2, §3022, §3022.1, and §3022.2. The existing language regarding the education and experience requirements will be deleted from §3031, and the language will be updated in the newly adopted §3022, §3022.1, and §3022.2. The proposed amendments include:

Changes proposed to address clarity and readability:

- Adopting §3022, §3022.1, and §3022.2 to describe the geologist and geophysicist education and experience requirements. This allows the grouping of qualification requirements into regulation sections with common topics. It also allows for separation of the requirements for the Professional Geologist license and the Professional Geophysicist license.

- Deleting the outdated and misplaced language in the existing §3031 that describes education and experience requirements for geologists and geophysicists.
- Revising outdated language in §3031 that describes examination requirements for licensure, and updating the numbering of the remaining language.
- Deleting language in §3031 that is no longer relevant.

Changes proposed to add missing detail:

- Adds specific standards for the educational qualifications required to obtain a Professional Geologist license or certification as a Geologist-in-Training. These include specifying an ABET accredited baccalaureate degree, or alternatively, successfully completing coursework at an accredited institution to obtain the knowledge and skills expected for geology licensure.
- Requires that the educational requirements for a Professional Geophysicist license be fulfilled at a college or university accredited by a national or regional accrediting agency recognized the United States Office of Education.
- Clarifies in regulation who can serve as a valid responsible charge reference to document work experience for the Professional Geologist license, and Professional Geophysicist license.
- Clarifies in regulation the specific number of references required to document work experience for the Professional Geologist license and the Professional Geophysicist license.
- Clarifies in regulation how undergraduate or graduate education is credited toward work experience for the Professional Geologist license and Professional Geophysicist license.

Changes intended to improve consistency:

Whenever possible and appropriate, the proposed language suggested for adoption as part of this rulemaking was modeled on existing text within the Board rules and regulations relating to the practices of professional engineering and professional land surveying, and existing text within the regulations relating to the practices of geology and geophysics. This will improve consistency between the regulations for the various professional disciplines regulated by the Board, and further demonstrate the Board's commitment to applying the statutes, regulations, policies and procedures for each of the regulated disciplines (engineering, land surveying and geology) in a clearly defined, consistently applied, and fair manner.

SPECIFIC PURPOSE OF EACH ADOPTION, AMENDMENT, OR REPEAL:

Adopt 16 CCR §3022(a)

This introductory paragraph replaces text within 16 CCR §3031(b) which is being repealed as part of this rulemaking. This replacement language has been rewritten to better align with the underlying statutes. A direct reference to the Professional Geologist qualification requirements of BPC §7841, and to the Geologist-In-Training qualification requirements of BPC §7841.2 has been added for clarity and to consolidate related licensure requirements in one place. The educational requirements for the

Professional Geologist license and the Geologist-In-Training certificate described in the law are identical.

Adopting this section will provide language that is more consistent with the statute and will make this section of the regulations easier to understand.

Adopt 16 CCR §3022(a)(1):

BPC §7841(b)(1) and BPC §7841.2(c)(1) state that one option for qualifying for the Professional Geologist license or Geologist-In-Training certificate is “*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*”. Existing regulation (16 CCR §3031) does not include a definition of “*graduation....with a major in geological sciences*”. Adoption of this section in regulation will define an acceptable degree as being a baccalaureate degree or higher in geology or a related geological science from a program that is ABET accredited.

A baccalaureate degree is specified because BPC §7841(b)(1) and §7841.2(c)(2) require “graduation from a college or university with a major in geological sciences”. A major is a group of courses required by a college or university in order to receive a degree. In the United States, the first post-secondary degree commonly available at a college or university is the baccalaureate or bachelor’s degree. The bachelor degree has requirements for breadth as well as depth of study, and meets or exceeds the minimum semester hours specified in the alternative qualification pathway described in §7841(b)(2). This ensures that all applicants are being held to equivalent minimum standards.

Program level accreditation is an established and appropriate standard to ensure a minimum level of educational quality for licensure to protect the public. Additionally, ABET accreditation will promote consistency with the approved curriculum requirements that the Board imposes on engineers and land surveyors.

Adopt 16 CCR §3022(a)(2):

Sections 7841 and 7841.2 allow an applicant for licensure as a geologist, or for certification as a geologist-in-training, instead of the graduation requirement, to have completed a combination of at least 30 semester hours (45 quarter hours), or the equivalent, in courses that, in the opinion of the Board, are relevant to geology. It also requires that at least 24 semester hours (36 quarter hours), or the equivalent, be in upper division or graduate courses.

Additionally, this section of the regulation specifies that coursework must be completed at a college or university accredited by a national or regional accrediting agency recognized by the United States Office of Education, and that “*life experience course credit*” is not acceptable. This regulatory language is consistent with the Board rules for engineers [16 CCR §424(b)].

As with program level accreditation (aka ABET), institutional accreditation is an established and appropriate standard to ensure a minimum level of educational quality for licensure to protect the public.

“Life experience course credit” is a method used to assess a person’s resume and issue college or university credit based upon life experience. While some accredited institutions will allow life experience course credit for general education requirements if a student passes a competency exam, it is generally not accepted by accredited institutions for requirements of the major. Since the *30 semester hours/24 upper division* must be obtained in relevant geology courses (not general education requirements), life experience credit is not an appropriate or acceptable standard to meet the education requirements for geology licensure.

Defining educational criteria in the form of a list of specific coursework promotes appropriate educational standards for the Professional Geologist license to protect the public. Based on input provided by stakeholders during the preliminary activities conducted as part of this rulemaking effort, the list of coursework presented in the regulation includes definitions of the major knowledge and skills expected out of each subject so that applicants can map the content of their coursework to the Board’s requirements.

The ability of an applicant and/or the Board to “map” courses with knowledge and skills is necessary for the following reasons:

- Lack of standardized courses between institutions: Depending on the institution, what were once separate courses such as “mineralogy”, and “igneous/metamorphic petrology” may now be combined into one class, while at other institutions, these two classes may be three separate classes.
- Lack of standardized course names for equivalent classes: For example, a class that fits the description of a traditional “geologic hazards” class may be renamed “natural disasters” to make it more appealing to students.

16 CCR §3022(a)(2) subdivisions (A) and (B) described below provide a list of core geologic concepts and applied upper division courses required for licensure as an alternative to the ABET accredited degree specified above in the proposed 16 CCR §3022(a)(1). This list was developed based upon extensive research, and public outreach (including targeted outreach to colleges and universities, as well as industry professionals) that was conducted as preliminary activities for this rulemaking. Additionally, the knowledge and skills defined by 16 CCR §3022(a)(2) is consistent with the ABET process ensuring that all applicants are held to equivalent standards.

Adopt 16 CCR §3022(a)(2)(A) and 16 CCR §3022(a)(2)(B):

To define a list of courses for the education component of the Professional Geologist license qualifications standard, the Board reviewed the following information to identify the education needed to provide knowledge and skills necessary for minimum competency in the profession. In addition to the summary presented below, a complete

list of the materials relied upon by the Board in developing this regulation is included in the “Underlying Data” section presented later in this document.

- Current and historical occupational surveys of the geology profession commissioned by the Board for Professional Engineers, Land Surveyors and Geologists, as well as the former Board of Registration for Geologists and Geophysicists.
- Available duty statements/job descriptions for geology jobs with the State of California.
- Current and previous task analysis surveys conducted by the National Association of State Boards of Geology.
- The United States Office of Personnel Management qualifications for geologists.
- Information provided through the geoscience community survey and geoscience employers workshop conducted as part of the *Heads/Chairs on the Future of Undergraduate Geoscience Education Workshop* hosted by the University of Texas at Austin.
- Published papers on the role of education in geologic practice and/or licensure.
- College and university geologic science or related educational programs offered at 35 institutions in California. This review was conducted in September 2015 and duplicated previous educational surveys conducted by the former Board of Registration for Geologists and Geophysicists (BRGG).
- Other state geologic license qualification requirements, and a review of the geologic license qualification requirements for Canada.
- Recommended geology coursework for professional practice compiled by geologic professional societies.
- Outreach conducted as part of pre-rulemaking activities for this regulation. The pre-rulemaking workshops were conducted to solicit input from professionals working in the field, college/university geology departments, and the public.

The Board review of the available information concluded that minimum competency for the Professional Geologist license should include instruction sufficient to demonstrate an understanding of core geologic concepts as described in §3022(a)(2)(A), and instruction in how to apply these basic geologic concepts to tasks common to the profession as described in §3022(a)(2)(B). Additional geologic coursework necessary to meet the total 30 semester hours or 45 quarter hours requirement specified in §7841(b)(2) and §7841.2(c)(2) of the Code may be selected at the applicant’s discretion but must be relevant to the definition of geology in §7802 of the Code.

The classes included in the proposed regulation are summarized below. The proposed classes are a balance between the tasks of the profession with the courses most commonly available at colleges and universities.

The subject descriptions included in the proposed regulation are based on the knowledge and skills identified as important by the geologic profession, course subject descriptions from college and university geology departments, and published definitions.

A specific minimum credit value defined in semester hours was included to ensure consistency and fairness when evaluating an applicant's education (i.e. the same standard applies to everyone). The specific minimum credit values for each course were established by comparing the content and credit values of existing college and university curricula, to the knowledge and skills required for professional licensure as identified by occupational surveys of the geology profession, both nationally and within California.

Core Geologic Concepts §3022(a)(2)(A)

The Board considers the following four subject areas necessary components of a geologic education for the reasons specified. Of the 30 semester hours or 45 quarter hours required by the Code, an applicant must successfully complete a minimum of 15 semester hours of core geological science courses in the subject areas as specified.

- i. *“Earth Materials”*—understanding the composition of earth materials is key to making reasonable conclusions regarding how these materials behave and can benefit or harm the activities or health of humankind.
- ii. *“Structural Geology”*—trains geologists to think and visualize in spatial and temporal dimensions to understand the origin of existing geologic conditions and how those conditions may change through time.
- iii. *“Stratigraphy and Sedimentation”*—develops skills necessary to interpret lateral or vertical subsurface conditions based on point geologic data, including the origin of the identified earth materials and their geologic history.
- iv. *“Upper-Division Field Geology”*—integrates the knowledge and skills learned in the controlled environment of academic instruction through application to existing “real world” situations. This “learning by doing” develops the ability to understand reasonable variations in data and offer plausible explanations for anomalous information, including recognizing errors in measurement.

Applied Upper-Division Geology Coursework §3022(a)(2)(B)

The practice of geology is very broad and encompasses many different sub-disciplines. The proposed regulation would require that an applicant successfully complete a minimum of 6 semester hours or 9 quarter hours of upper division coursework from a combination of at least 2 of these subject areas. Each of these topics has a direct relationship to specific professional geologic tasks or important practice areas which justifies their inclusion in the regulation.

- i. *“Geomorphology”*—this subject is important to field geology skills in any of the subdivisions of professional geologic work. It is also important in multidisciplinary fields such as watershed evaluation and habitat preservation.
- ii. *“Engineering Geology”*—this subject is defined in 16 CCR §3003(b) and focuses on geologic factors and processes that affect civil engineering works (e.g. bridges, dams, buildings, roads etc.). A specialty title authority

- license is available in California for this sub-discipline (16 CCR §3041).
- iii. “Hydrogeology”—this subject is defined in 16 CCR §3003(h) and is important to water supply and water quality issues. A specialty title authority license is available in California for this sub-discipline (16 CCR §3042).
 - iv. “California Geology”—the geology of California is variable and complex. Knowledge of the geology and seismicity of California is required to obtain the California Professional Geologist license [BPC §7841(d)].
 - v. “Paleontology”—paleontological resources are protected under the California Environmental Quality Act as a non-renewable scientific resource and evaluation of these resources is an important professional task. Knowledge of paleontology is also important for interpretation of geological setting and history.
 - vi. “Resources Geology”—this subject includes both the responsible development of geologic resources for the benefit of mankind (e.g. oil and gas, commercial mineral production, construction aggregates etc.), and the mitigation of the negative effects of such development.
 - vii. “Environmental Geology”—this subject focuses on evaluating and mitigating adverse human impacts to the geologic environment especially contamination of soil, soil vapor, surface water and groundwater.
 - viii. “Geophysics”—this is an important branch of geology that uses natural and induced fields of force to study the earth. Geophysics is a generally non-destructive technique that can provide detailed information in situations where other geologic techniques are inadequate. A separate practice authority license is available in California for this sub-discipline of geology (BPC §7803.1).
 - ix. “Technology Applications in Geology”—the application of newer tools and technologies to the professional practice of geology is widespread and can increase the efficiency and accuracy of geologic investigations. Including this subject in the regulation provides guidance on the types of technology related coursework that the Board considers applicable to geology licensure. Since, however, technology instruction is peripherally related to geology instruction, the Board would limit the maximum possible credit for these courses to ensure that they do not comprise a significant part of the applicant’s qualifying credit.
 - x. “Applied Geoscience Topics taught by a college or university department other than a geology or related geological sciences department”—this subject area was included due to the multidisciplinary nature of many professional fields. Additionally, due to budget cutbacks at public higher education institutions, many smaller geology departments team with other college or university departments to increase the variety of courses available to their students. Including this subject area in the regulation allows for more flexibility in meeting the educational requirements for licensure. But because these courses are peripherally related to core geology instruction, the Board proposes to limit the maximum possible credit for the courses to ensure they do not comprise a significant part of

an applicant's qualifying credit.

The requirement for coursework from a minimum of 2 of the applied upper division subject areas was included to ensure a minimum breadth of qualifications for licensure in order to protect the public based upon occupational surveys of the profession and other research conducted for this rulemaking. Requiring more than this minimum standard would not greatly increase public protection while unnecessarily limiting educational choices.

Adopt 16 CCR §3022(a)(3):

To allow for maximum educational flexibility, the Board has included an option that would allow independent study courses, research projects, or theses/dissertations to satisfy the upper division or graduate coursework requirements defined as part of this regulation. These types of educational activities generally involve a structured agreement or plan between the student and the college or university to allow the Board to evaluate the content in the context of the educational requirements of this regulation. The Board will require official documentation from the college or university to substantiate an applicant's claim that these non-traditional course offerings include instruction in the knowledge and skills specified in this regulation.

The proposed regulation would empower the Board to exercise discretion in granting credits for these non-traditional methods of instruction. Consistent with the underlying statute, the Board would determine whether, "in the opinion of the Board", such instruction is relevant to geology.

Adopt 16 CCR §3022(a)(4):

This section specifies that the Board will not accept informal learning opportunities such as professional workshops, seminars, conferences, or non-credit certificate programs, as well as student internships or reading courses. A reading course is defined as a course not normally offered as part of the curriculum that is run as a tutorial or remedial course. While the Board recognizes that these types of instruction have value, the less structured nature of these types of courses make it difficult for the Board to evaluate their content in a consistent and fair manner. Therefore, it is not appropriate for the Board to accept these types of courses.

Adopt 16 CCR §3022(a)(5):

16 CCR §3022(a)(4) provides clarifying language for applicants noting that the Board requires official sealed transcripts as documentation for the education component of the licensure requirements. Requiring official transcripts from the college or university is a reasonable and achievable method of formally documenting completed coursework. Requiring that the transcripts be sealed provides assurance to the Board that the transcripts have not been tampered with prior to being submitted.

This section also provides clarifying language noting that the Board may request any reasonable and necessary documentation to verify that the specified educational requirements have been met. This language is consistent with and modeled after the

Board rules for engineers [16 CCR §427.10(b)(2) and §427.20(d)], and is necessary to ensure that the Board may adequately evaluate applications.

Adopt 16 CCR §3022(b):

The Board proposes to adopt this new section 16 CCR §3022(b) to clarify the experience requirements by explaining who “*in the opinion of the Board has the training and experience*” to serve as a reference.

Adopt 16 CCR §3022(b)(1)(A), 16 CCR §3022(b)(1)(B), 16 CCR §3022(b)(1)(C), 16 CCR §3022(b)(1)(D):

The Board proposes to adopt these new sections 16 CCR §3022(b)(1)(A), 16 CCR §3022(b)(1)(B), 16 CCR §3022(b)(1)(C), and 16 CCR §3022(b)(1)(D) to clarify the experience requirements by explaining the phrase in BPC §7841(c) that refers to who “*in the opinion of the Board, have the training and experience to have responsible charge of geologic work*”. The current regulations do not provide sufficient explanation of this phrase which causes confusion among potential applicants for a geologist license regarding who can serve as a valid responsible charge reference to document their work experience. Only persons with appropriate geologic training and experience, and legally practicing geology by license, under an exemption authorized by the Geologist and Geophysicist Act, or in a situation or location where a license is not required are acceptable to serve as a responsible charge reference. The concepts defined in this section are similar to the standards applied in 16 CCR §424(c)(1) relating to the practice of professional engineering.

Adopt 16 CCR §3022(b)(2):

BPC §7841(c) states that a candidate applying for a Professional Geologist license must have a documented record of a minimum of 5 years of experience “*of a character satisfactory to the board*”. The current regulations do not provide sufficient explanation of this phrase which causes confusion among potential applicants for a geologist license regarding how the minimum requirement is calculated. The Board proposes to adopt this section of the regulation to clarify the experience requirements by providing a measurable standard for full time work experience. This “40-hour workweek” will ensure that the minimum standard is enforced consistently. This standard is consistent with the standard applied to other Board professions and mimics language in 16 CCR §424(c)(2) relating to the practices of professional engineering.

Adopt new 16 CCR §3022(b)(3):

This section is being adopted to explain the requirements of BPC §7841(c) as they relate to education credit.

Adopt 16 CCR §3022(b)(3)(A):

This section clarifies the requirements for granting professional geologic experience for undergraduate coursework as described in BPC §7841(c). This section will make the requirements for the professional geologist license more complete, easier to understand and will ensure that they are consistently applied.

Adopt 16 CCR §3022(b)(3)(B), 16 CCR §3022(b)(3)(C)

These sections describe the requirements for granting professional geologic experience for graduate level study at a college or university as described in BPC §7841(c). This section will make the requirements for the professional geologist license more complete, easier to understand and will ensure that they are consistently applied.

Adopt 16 CCR §3022(b)(4)

The content in existing regulation section 16 CCR §3031(b)(2) states that an applicant is not eligible to earn credit for professional geologic experience until they have completed the education requirements in BPC §7841. This regulatory language is being repealed and replaced by the revised language in this section to increase the readability of this regulation, and to ensure that the requirements are consistently applied.

Adopt 16 CCR §3022.1(a):

This introductory paragraph replaces text within existing 16 CCR §3031(c) which is being repealed as part of this rulemaking. This replacement language has been rewritten to better align with the underlying statutes. A direct reference to the Professional Geophysicist qualification requirements of BPC §7841.1 has been added for clarity and to consolidate related licensure requirements in one place.

Adopting this section will provide language that is more consistent with the statute and will make this section of the regulations easier to understand.

Adopt 16 CCR §3022.1(a)(1):

The education requirements for a Professional Geophysicist license are specified in BPC §7841.1(b). The education requirement for the Professional Geophysicist license includes the phrase *“fulfilled at a school or university whose curricula meet criteria established by rules of the board”*. This phrase is not defined in existing regulation. Adoption of 16 CCR §3022.1(a)(1) would require that the educational requirements for a Professional Geophysicist license be fulfilled at a college or university accredited by a national or regional accrediting agency recognized by the United States Department of Education. Additionally, this section would specify that *“life experience course credit”* is not acceptable. This regulatory language is consistent with the Board rules for engineers [16 CCR §424(b)].

As with program level accreditation (aka ABET), institutional accreditation is an established and appropriate standard to ensure a minimum level of educational quality for licensure to protect the public.

“Life experience course credit” is a method used to assess a person’s resume and issue college or university credit based upon life experience. While some accredited institutions will allow life experience course credit for general education requirements if a student passes a competency exam, it is generally not accepted by accredited institutions for requirements of the major. BPC §7841.1(b)(2) requires the completion of *30 semester hours/24 upper division* in courses relevant to geophysics. Since these

courses must be obtained in courses relevant to geophysics (not general education requirements), life experience credit is not an appropriate or acceptable standard to meet the education requirements for licensure as a geophysicist.

Adopt 16 CCR §3022.1(b):

BPC §7841.1(c) states that a candidate applying for a Professional Geophysicist license must have a demonstrated record of geophysical work, and that “*The adequacy of required supervision and experience shall be determined by the board in accordance with standards set forth in regulations adopted by it.*” The current regulations do not provide sufficient explanation regarding the Board’s standards. This new section will alleviate confusion, ensure consistency in how the standards are applied, and consolidate licensure requirements in one place.

Adopt 16 CCR §3022.1(b)(1):

BPC §7841.1(c) states that a candidate applying for a Professional Geophysicist license must have a demonstrated record of at least 7 years of professional geophysical work. The current regulations do not provide sufficient explanation of what this means which causes confusion among potential applicants for a geophysicist license regarding how the requirements are calculated. The Board proposes to adopt this section of the regulation to clarify the experience requirements by providing a measurable standard for calculating the work requirements using a full time work standard. This “40-hour workweek” is consistent with the standard applied to other Board professions and mimics language in 16 CCR §424(c)(2) relating to the practices of professional engineering. It will also ensure that the statutory standards are applied consistently.

Adopt 16 CCR §3022(b)(2):

This section is being adopted to explain the requirements of BPC §7841.1(c) as they pertain to undergraduate and graduate credit.

Adopt 16 CCR §3022.1(b)(2)(A):

The requirements for granting professional geophysical work credit for undergraduate education as described in BPC §7841.1(c) were not included in the regulations. To improve clarity and consistency, the Board is adding 16 CCR §3022.1(b)(2)(A) to address this oversight in the original regulatory language. This will make the requirements for the Professional Geophysicist license more complete, easier to understand, and will ensure that they are consistently applied.

Adopt 16 CCR §3022.1(b)(2)(B), 16 CCR §3022.1(b)(2)(C):

These sections describe the requirements for granting credit for professional geophysical work for graduate level study at a college or university as described in BPC §7841(c). This section will make the requirements for the professional geophysicist license more complete, easier to understand and will ensure that they are consistently applied.

Adopt 16 CCR §3022.1(b)(3):

The current language in existing 16 CCR §3031(c)(2) states that an applicant is not eligible to earn credit for professional geophysical work until they have completed the education requirements in BPC §7841.1. This regulatory language is being repealed and replaced by the revised language in this new section to increase the readability of this regulation, and to ensure that the requirements are consistently applied.

Adopt 16 CCR §3022.2(a):

BPC §7841 requires candidates for the Professional Geologist license to document professional geological experience as part of the application process. BPC §7841.1 requires candidates for the Professional Geophysicist license to demonstrate professional geophysical work as part of the application process. Neither the current law nor the existing regulations provide any guidance on how this is to be accomplished. However, both 16 CCR §3041 and 16 CCR §3042 specify that to document geologic experience for the title authority specialties of engineering geology or hydrogeology an applicant “*shall submit three references*”.

Adding §3022.2(a) will address this oversight in the original regulatory language by establishing the number of references required to demonstrate professional work experience at three to be consistent with the requirements specified in 16 CCR §3041 and 16 CCR §3042. Requiring three references also makes this requirement consistent with the National Association of State Boards of Geology Model Rules and Regulations.

Adopt 16 CCR §3022.2(a)(1).

Adopting this section adds language mimicking 16 CCR §427.10(b)(1) which specifies that references cannot be related to the applicant (an inherent conflict of interest that undermines the reference’s credibility).

Adopt 16 CCR §3022.2(a)(2).

Adopting this section adds language specifying that reference documentation submitted to the Board must be the original copy with signature and seal on every page of the documentation submitted. This requirement is intended to verify the identity of the reference provider submitting the documentation and that the documentation has not been subject to tampering. Professional Geologists and Professional Geophysicists are required to have a seal bearing their name, license number and title (BPC§§7852, 7852.1)

Adopt 16 CCR §3022.2(a)(3)

The content of these sections specifies the information to be provided to the Board in order to document the required professional geological experience or professional geophysical work in support of a license candidate’s application. This will make the requirements for applying for both a Professional Geologist license and the Professional Geophysicist license easier to understand by clearly explaining the reference requirements and ensure that these standards are consistently applied. It will also improve consistency with the reference requirements imposed by the Board on the professions of engineering and land surveying.

Adopt 16 CCR §3022.2(a)(3)(A)

BPC §7841(c) requires that an applicant for a geology license has a documented record of *“professional geologic experience demonstrating that the applicant is qualified to assume responsible charge of the work upon licensure as a geologist”*. BPC §7841(c) also states that this experience *“shall be gained”* under the supervision of someone qualified to *“have responsible charge of geologic work”*.

BPC §7841.1(c) requires that an applicant for a geophysicist license has *“at least seven years of professional geophysical work”* that shall include *“a minimum of three yearsunder the supervision of a professional geophysicist....or a minimum of five years’ experience in responsible charge professional geophysical work”*.

The purpose of this section is to provide documentation from the reference to demonstrate that requirements of BPC §7841(c) or BPC §7841.1(c) have been met. This section mimics language from 16 CCR §427.10 and 16 CCR §427.20 requiring that the reference must clearly indicate areas of personal knowledge of the applicant’s qualifying work or experience.

Adopt 16 CCR §3022.2(a)(3)(B) and 16 CCR §3022.2(a)(3)(C)

BPC §7841(c) requires that an applicant *“Have a documented record of a minimum of five years of professional geologic experience...”*. BPC §7841.1(c) requires that an applicant for a geophysicist license has *“at least seven years of professional geophysical work”*.

The purpose of this section is to require that the reference include information regarding the length of time they can document as professional geologic experience or professional geophysical work for the applicant. This will give the Board the documentation required in BPC §7841(c) and BPC §7841.1(c) to evaluate whether the applicant has satisfied this requirement for licensure.

Adopt 16 CCR §3022.2(a)(3)(D)

BPC §7841(c) requires that an applicant for a geology license has a documented record of *“professional geologic experience demonstrating that the applicant is qualified to assume responsible charge of the work upon licensure as a geologist”*.

BPC §7841.1(c) requires that an applicant for a geophysicist license has *“at least seven years of professional geophysical work”*.

The definitions in 16 CCR §3003(d) and §3003(e) describe what is meant by *“professional geologic experience”* or *“professional geophysical work”*. Requiring that a reference provide a detailed, complete and accurate description of the professional geologic experience or professional geophysical work completed by the applicant gives the Board the information required to determine if the applicant has met this requirement for licensure.

Adopt 16 CCR §3022.2(a)(3)(E)

BPC §7841(c) and BPC §7841.1(c) both require that an applicant complete a certain minimum length of professional geologic experience or professional geophysical work to qualify for licensure.

This section clarifies that the description of the professional geologic experience or professional geophysical work must be sufficient to substantiate the amount of geologic experience or geophysical work being documented by the reference for the applicant. This will allow the Board to determine if the applicant has satisfied the minimum experience or work requirements specified in the statute.

Adopt 16 CCR §3022.2(a)(3)(F)

This section requires the reference to use appropriate scientific terms while avoiding colloquialisms, jargon or slang.

A colloquialism is a saying that expresses something other than the literal meaning of the words it contains. Jargon is a type of language that is used in a particular context and may not be well understood outside that context. Slang is an informal nonstandard vocabulary composed typically of coinages, arbitrarily changed words, and extravagant, forced, or facetious figures of speech.

These types of descriptions (colloquialism, jargon, slang) typically have meanings that are unclear, mean different things to different people, or may change over time. Requiring the use of well-defined scientific terms allows the Board to ensure that the documentation supporting the geological experience or geophysical work requirements for licensure is clear and unambiguous.

Adopt 16 CCR §3022.2(a)(3)(G)

The proposal includes a certification under penalty of perjury that will help ensure that the reference documentation contains truthful, factual representations made in good faith (see, eg. *In re Marriage of Reese & Guy* (1999) 73 Cal. App. 4th 1214, 1223 [judicial explanation for the use of certifications]). The Board will be better able to protect consumers since only an applicant who meets the experience requirements as demonstrated by their application materials will be eligible for licensure. The certification requirement protects the public by ensuring that only qualified applicants receive licenses. The certification requirement also enables the Board to enforce its Professional Standards and Code of Professional Conduct for licensees (16 CCR §3065) in the event false information is reported by licensed references.

Adopt 16 CCR §3022.2(a)(4):

This section adds language mimicking 16 CCR §427.10(b)(2) which reserves the rights of the Board to seek reasonable information necessary to evaluate an applicant's qualifications. This is necessary to ensure that the Board has the ability to obtain the documentation necessary to substantiate that an applicant has met the requirements for licensure.

Repeal old title and adopt new title for 16 CCR §3031:

The title of this section is being changed to reflect the content as amended by this rulemaking. The title will be changed to “*Examination Credit: Professional Geologist, Professional Geophysicist and Specialty Certification*”. Existing content not consistent with the amended title will be moved to new sections §3022, §3022.1, and §3022.2 as described earlier in this document. Adopting a new title as described will improve readability and reflect the actual content of this section.

Repeal 16 CCR §3031(a):

The repeal of this entire section will eliminate confusion caused by the duplication of requirements clearly specified in the BPC and by reference to a section of the law that is no longer applicable. The current language in this section duplicates examination requirements specified in BPC §7841(d), §7841.1(d), and §7842(b), and is therefore not necessary. Additionally, the current language contains an outdated reference to a previously amended section of the law that formerly allowed for approval of a license application without an exam (BPC §7847.5 and 7847.6 repealed January 1, 1984). Currently BPC §7847 requires that all applicants meet the requirements of the BPC and the Regulations Relating to the Practices of Geology and Geophysics, including the examination requirements.

Repeal 16 CCR §3031(b), 16 CCR §3031(b)(1), 16 CCR §3031(b)(2), and §16 CCR §3031(b)(3):

The text within 16 CCR §3031(b) will be repealed in its entirety. The professional geologist education and experience requirements previously described in this section have been updated and relocated to Article 2 Applications as §3022 Professional Geologist Educational and Experience Requirements. This will group topics covered by the regulation into sections with common purposes, and make the regulation easier to understand.

Repeal 16 CCR §3031(c), 16 CCR §3031(c)(1), 16 CCR §3031(c)(2), and 16 CCR §3031(c)(3):

The text within 16 CCR §3031(c) will be repealed in its entirety. The professional geophysicist education and experience requirements previously described in this section have been updated and relocated to Article 2 Applications as §3022.1 Professional Geophysicist Educational and Experience Requirements. This will group topics covered by the regulation into sections with common purposes, and make the regulation easier to understand.

Repeal 16 CCR §3031(d):

By its own terms, 16 CCR §3031(d) was repealed and became inoperative as of December 31, 1999. However, the language has remained in the California Code of Regulations. This proposal is simply eliminating the language from Title 16 CCR.

Renumber and amend 16 CCR §3031(e).

The existing text in 16 CCR §3031(e) will be renumbered as 16 CCR §3031(a). The last sentence of this section, which refers to the date this section became effective, will

be deleted. The transition to the National Association of State Boards of Geology examinations has been completed and referencing the effective date of the transition is no longer necessary. Additionally, the word “*registration*” will be deleted and replaced with “*licensure*” to be consistent with the grammar and phrasing used in the Board’s existing laws and regulations.

These changes will increase the readability of the regulation and make the regulation easier to understand.

Renumber 16 CCR §3031(e)(1):

The existing text in 16 CCR §3031(e)(1) will be renumbered as 16 CCR §3031(a)(1) to be consistent with the other changes to §3031. Renumbering this section will increase the readability of the regulation and make the regulation easier to understand.

Renumber 16 CCR §3031(f):

The existing text in 16 CCR §3031(f) will be renumbered as 16 CCR §3031(b) to be consistent with the other changes to §3031. The word “*registration*” will be deleted and replaced with “*licensure*” to be consistent with the grammar and phrasing used in the Board’s existing laws and regulations.

These changes will increase the readability of the regulation and make the regulation easier to understand.

ANTICIPATED BENEFITS OF THIS REGULATORY ACTION

The Board anticipates that the proposed regulatory action will benefit consumers, the geologic profession, as well as the Board itself. The clarification of the requirements for licensure as described in this proposed regulation promotes fairness, consistency in applying the requirements as stated in the Geologist and Geophysicist Act, and increases transparency in government. Providing consistent and clear requirements ensures that minimum competency is met by licensed professionals in order to protect the public health and safety, property and the environment.

UNDERLYING DATA

AB 600, 1968 Reg. Sess. Ketchum. Chapter 942 1968 Cal. Stat.

AB 20, 2009 4th Ex. Sess. Strickland. Chapter 18 2009 Cal. Stat.

AB 1431, 2010 Reg. Sess. Hill. Chapter 696 2010 Cal. Stat.

Abbott, David M. Jr. CPG. Consulting Geologist. 2015. *Email Communication*. October 22 and 23.

- Abbott, D., Wallace, R., Nutter, K., Jarvis, S., and Austin, L. 2015. *The Certification Experience Requirement*. American Institute of Professional Geologists, The Professional Geologist. July/August/September.
- ABET, 2016-2017. *Criteria for Accrediting Applied Science Programs*.
<http://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-applied-science-programs-2016-2017/>
- American Association of Petroleum Geologists (AAPG). 2015. *State Registration and Licensing*. http://dpa.aapg.org/state_registration.cfm Accessed August 18, 2015.
- American Geological Institute. 1984. Bates, Robert L., and Julia A. Jackson, editors. *Dictionary of Geological Terms, Third Edition*. New York: Anchor Books.
- American Geosciences Institute. 2013. *Final Report of the American Geosciences Institute ad hoc Committee on Academic Geoscience Program Classification*.
<http://www.americangeosciences.org/sites/default/files/AGIClassificationCommitteeReport.pdf>.
- American Geosciences Institute. 2015. Wilson, Carolyn, editor. *Directory of Geoscience Departments and Other Geoscience Organizations, 50th Edition*. pp. 7-26.
- American Institute of Hydrology. 2012. *Educational Criteria*. November 6.
- American Institute of Professional Geologists (AIPG). 2007. *Education for Professional Practice*. Report with Recommendations of the Ad Hoc Committee on Curriculum.
- American Institute of Professional Geologists (AIPG). 2015. *What is AIPG?*
<http://www.aipg.org/about/index.htm>.
- American Institute of Professional Geologists (AIPG). 2015a. *AIPG Membership: Guidelines*. <http://www.aipg.org/Membership/guidelines.htm>
- American Water Resources Association. 1989. *Professional Certification and Registration for Water-Resources and Related Disciplines*. AWRA Special Publication no. 89-4. (A. Ivan Johnson, Editor.) pp. 23-27, 65-68.
- Association of Engineering Geologists (AEG). 1973. *Geology, Seismicity, and Environmental Impact*. Special Publication. (Moran, D.E., Slosson, J.E., Stone, R.O., and Yelverton, C.A., Editors). October.
- Association of Engineering Geologists (AEG). 1990. *Proceedings, National Colloquium on Professional Registration for Geologists*. Pittsburgh, Pennsylvania, October 1-5, 1990. (Robert E. Tepel, Editor).

- Association of Engineering Geologists (AEG). 1991. *Academic Preparation for Careers in Engineering Geology and Geological Engineering*. AEG Special Publication No. 2. (Jerry D. Higgins, and John W. Williams, Editors).
- Association of Engineering Geologists (AEG). 1996. *Issue Analysis: How California Citizens Benefit From a Geology Practice Licensure Act*.
- Blair, Jane W. PE, Executive Secretary, New York State Board for Engineering, Land Surveying and Geology. 2016. *Personal Communication*. January 21.
- Board of Registration for Geologists and Geophysicists (BRGG). 1969. *Minutes of the Public Meeting of the State Board of Registration for Geologists*. May 19.
- Board of Registration for Geologists and Geophysicists (BRGG). 1969a. *Minutes of the Public Meeting of the State Board of Registration for Geologists*. June 9.
- Board of Registration for Geologists and Geophysicists (BRGG). 1969b. *Minutes of the Public Meeting of the State Board of Registration for Geologists*. July 1.
- Board of Registration for Geologists and Geophysicists (BRGG). 2003. *Request for Approval of Proposed Legislation, Licensure Requirements for Registered Geologists*.
- Board of Registration for Geologists and Geophysicists (BRGG). 2006. *Interpretation of Geological Sciences Degrees*. Issue Summary. November 28.
- Board of Registration for Geologists and Geophysicists (BRGG). N.D. *Board Discussions/Actions Regarding SB 1984 and National Association of State Boards of Geology (ASBOG)*. Chronology and Summary.
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2012. *Minutes of the May 1, 2012 Geologist and Geophysicist Technical Advisory Committee*.
http://www.bpelsg.ca.gov/about_us/meetings/minutes/20120501_ggtac.pdf.
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2012a. *Minutes of the July 31, 2012 Geologist and Geophysicist Technical Advisory Committee*.
http://www.bpelsg.ca.gov/about_us/meetings/minutes/20120731_ggtacmn.pdf.
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2014. *2015-2018 Strategic Plan*. http://www.bpelsg.ca.gov/pubs/2015-2018_bpelsg_strategic_plan.pdf.

- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2016. *Minutes of the Public Meeting of the Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). January 14.*
http://www.bpelsg.ca.gov/about_us/meetings/minutes/20160114_bdmn.pdf
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2016. *Geosciences Degree Workshop Agenda and Announcement.* February 19 and February 26.
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2016. *YouTube Video, Geosciences Degree Workshop.* March 3.
<https://www.youtube.com/watch?v=7IZ8PRXeG7w&feature=youtu.be>
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2016. *Letter from Robert Stockton Board President to Gina McCarthy EPA Administrator, RE: EPA Comments on Professional Licensing in 40 CFR Parts 257 and 261.* May 6.
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2016. *Minutes of the Public Meeting of the Board for Professional Engineers, Land Surveyors and Geologists (BPELSG).* April 21-22.
http://www.bpelsg.ca.gov/about_us/meetings/minutes/20160421_bdmn.pdf
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2016. *Minutes of the Public Meeting of the Board for Professional Engineers, Land Surveyors and Geologists (BPELSG).* June 9-10.
http://www.bpelsg.ca.gov/about_us/meetings/minutes/20160609_bdmn.pdf
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2016. *Minutes of the Public Meeting of the Board for Professional Engineers, Land Surveyors and Geologists (BPELSG).* August 18.
http://www.bpelsg.ca.gov/about_us/meetings/minutes/20160818_bdmn.pdf
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2016. *Meeting Materials for the September 28, 2016 Geologist and Geophysicist Technical Advisory Committee.*
http://www.bpelsg.ca.gov/about_us/meetings/materials/20160928_gg_tac_meeting_materials.pdf
- Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2016. *Minutes of the Public Meeting of the Board for Professional Engineers, Land Surveyors and Geologists (BPELSG).* October 13.
http://www.bpelsg.ca.gov/about_us/meetings/minutes/20161013_bdmn.pdf

Board for Professional Engineers, Land Surveyors and Geologists (BPELSG) vs. Elliot Russell Haro Professional Geologist Applicant. Case No. 1768-S. OAH No. 2015120264. Decision effective November 10, 2016.

Board for Professional Engineers, Land Surveyors and Geologists (BPELSG). 2017. *Meeting Materials for the Public Meeting of the Board for Professional Engineers, Land Surveyors and Geologists (BPELSG)*. February 8-9. http://www.bpelsg.ca.gov/about_us/meetings/materials/20170208_meeting_materials.pdf

Board for Professional Engineers, Land Surveyors, and Geologists (BPELSG), 2018. *Meeting Materials for the Public Meeting of the Board for Professional Engineers, Land Surveyors, and Geologists (BPELSG)*. November 1, 2018. https://www.bpelsg.ca.gov/about_us/meetings/materials/20181101_meeting_materials.pdf

Brady, Roland H. III, PhD, PG 5721. Professor Emeritus of Earth and Environmental Sciences, California State University Fresno. 2016. *Personal Communication*. January 28.

Brady, Roland H. III, PhD, PG 5721. Professor Emeritus of Earth and Environmental Sciences, California State University Fresno. 2016. *Academic Preparation for PG Licensure*. Memorandum to Laurie Racca, Senior Registrar Geology and Geophysics, Board for Professional Engineers, Land Surveyors, and Geologists (BPELSG). February 7.

Bralower, T., Easterling, W, Geissman, J., Savina, M., Tewksbury, B., Feiss, G., Macdonald, H., and Rhodes, D. 2008. *Accreditation: Wrong Path for the Geosciences*. GSA Today, v. 18, no. 10. p. 52-53. <http://www.geosociety.org/gsatoday/archive/18/10/pdf/i1052-5173-18-10-52.pdf>.

California Business and Professions Code §§6700-6799. (includes amendments made during the 2015 legislative session). Effective January 1, 2016. *Professional Engineers Act*.

California Business and Professions Code §§6700-6799. (includes amendments made during the 2016 legislative session). Effective January 1, 2017. *Professional Engineers Act*. http://www.bpelsg.ca.gov/laws/pe_act.pdf.

California Business and Professions Code §§7800-7887. (includes amendments made during the 2015 legislative session). Effective January 1, 2016. *Geologist and Geophysicist Act*.

California Business and Professions Code §§7800-7887. (includes amendments made during the 2016 legislative session). Effective January 1, 2017. *Geologist and Geophysicist Act*. http://www.bpelsg.ca.gov/laws/gg_act.pdf.

California Business and Professions Code §§8700-8805. (includes amendments made during the 2015 legislative session). Effective January 1, 2016. *Professional Land Surveyors' Act*.

California Business and Professions Code §§8700-8805. (includes amendments made during the 2016 legislative session). Effective January 1, 2017. *Professional Land Surveyors' Act*. http://www.bpelsq.ca.gov/laws/pls_act.pdf.

California Code of Regulations. Title 16, Division 5 §§400-476. *Board Rules and Regulations Relating to the Practices of Professional Engineering and Professional Land Surveying*. <http://www.bpelsq.ca.gov/laws/boardrules.pdf>.

California Code of Regulations. Title 16, Division 29 §§3000-3067. *Regulations Relating to the Practices of Geology and Geophysics*. http://www.bpelsq.ca.gov/laws/gg_regs.pdf.

California Courts Webpage. Accessed September 25, 2015. <http://www.courts.ca.gov/1098.htm>

California Department of Conservation, Division of Oil, Gas and Geothermal Resources. 2015. *Position Duty Statement. Associate Oil and Gas Engineer*. Position Number 538-201-3783-197.

California Department of Conservation, Division of Oil, Gas and Geothermal Resources. 2015. *Position Duty Statement. Associate Oil and Gas Engineer*. Position Number 538-205-3783-xxx.

California Department of Conservation. 2016. *Engineering Geologist, Training and Experience Evaluation*.

California Department of Conservation, Division of Oil, Gas and Geothermal Resources. 2015. *Position Duty Statement. Engineering Geologist*. Position Number 538-201-3756-094.

California Department of Conservation, Division of Oil, Gas and Geothermal Resources. 2015. *Position Duty Statement. Engineering Geologist*. Position Number 538-205-3756-xxx.

California Department of Fish and Wildlife. 2014. *Duty Statement. Senior Engineering Geologist*. Position Number. 565-021-3751-003.

California Department of Toxic Substances Control. 2016. *Engineering Geologist, Training and Experience Evaluation*.

California Department of Toxic Substances Control. 2016. *Position Duty Statement. Engineering Geologist.* Position Number 810-551-3756-031.

California Department of Toxic Substances Control. 2016. *Position Duty Statement. Senior Engineering Geologist.* Position Number 810-551-3751-001.

California Department of Toxic Substances Control. 2016. *Position Duty Statement. Senior Engineering Geologist (Supervisory).* Position Number 810-551-3751-006.

California Department of Transportation. 2015. *Duty Statement. Engineering Geologist.* Position Number 559-323-3756-xxx.

California Department of Transportation. 2015. *Position Duty Statement. Senior Engineering Geologist (Specialist).* Position Number 913-140-3751-911.

California Department of Water Resources. 2010. *Job Description and Position Classification. Engineering Geologist.* Position Number 1890-3756-xxx.

California Department of Water Resources. 2015. *Job Description and Position Classification. Engineering Geologist.* Position Number 6200-3756-xxx.

California Department of Water Resources. 2016. *Job Description and Position Classification. Engineering Geologist.* Position Number 1461-3756-xxx.

California Department of Water Resources. 2016. *Job Description and Position Classification. Engineering Geologist.* Position Number 4400-3756-009.

California Department of Water Resources. 2016. *Job Description and Position Classification. Engineering Geologist.* Position Number 4400-3756-010.

California Department of Water Resources. 2016. *Job Description and Position Classification. Senior Engineering Geologist.* Position Number 4400-3751-501.

California Department of Water Resources. 2016. *Job Description and Position Classification. Senior Engineering Geologist.* Position Number 1481-3751-001.

California Department of Water Resources. 2016. *Job Description and Position Classification. Supervising Engineering Geologist.* Position Number 1710-3748-590.

California Department of Water Resources. 2016. *Job Description and Position Classification. Supervising Engineering Geologist.* Position Number 3485-3748-590.

California Energy Resources Conservation and Development Commission. 2016. *Job Announcement. Engineering Geologist.* Position Number 535-770-3756-001.

California Environmental Protection Agency, Central Valley Regional Water Quality Control Board (R5). 2015. *Duty Statement. Engineering Geologist*. Position Number 150-3756-901.

California Environmental Protection Agency, Central Valley Regional Water Quality Control Board (R7). 2015. *Duty Statement. Engineering Geologist*. Position Number 880-165-3756-001.

California Environmental Protection Agency, State Water Resources Control Board. 2012. *Duty Statement. Engineering Geologist*. Position Number 880-250-3756-086.

California Environmental Protection Agency, State Water Resources Control Board. 2014. *Duty Statement. Engineering Geologist*. Position Number 880-250-3756-095.

California Environmental Protection Agency, State Water Resources Control Board. 2016. *Engineering Geologist. Training and Experience Examination*.

California Environmental Protection Agency, State Water Resources Control Board. 2014. *Job Posting. Engineering Geologist*. July.

California Environmental Protection Agency, State Water Resources Control Board. 2015. *Duty Statement. Engineering Geologist*. Position Number 880-250-3756-104.

California Environmental Protection Agency, State Water Resources Control Board. 2015. *Duty Statement. Engineering Geologist*. Position Number 550-3756-xxx.

California State Water Resources Control Board. 2015. *Proposed Duty Statement. Engineering Geologist*. Position Number 300-3756-006.

California Environmental Protection Agency, State Water Resources Control Board. 2016. *Duty Statement. Engineering Geologist*. Position No. 260-3756-xxx.

California Environmental Protection Agency, State Water Resources Control Board. 2016. *Senior Engineering Geologist. Promotional Exam Announcement*.

California Legislative Information. 2015. Cross-Reference Chaptered Bills.
<http://leginfo.legislature.ca.gov/faces/displayCodeAndBill.xhtml?sectionNum=7841.&billVersionSectionId=3349090&lawCode=BPC>

California Legislative Information. 2016. Cross-Reference Chaptered Bills.
<http://leginfo.legislature.ca.gov/faces/displayCodeAndBill.xhtml?sectionNum=7841.&billVersionSectionId=3171646&lawCode=BPC>

- California Legislative Information. 2016. Cross-Reference Chaptered Bills.
<http://leginfo.legislature.ca.gov/faces/displayCodeAndBill.xhtml?sectionNum=7841.&billVersionSectionId=3942489&lawCode=BPC>
- California State University Departments of Geology Chairs Annual Meeting. 1999.
Geological Registration and Curriculum Background Materials. CSU Fullerton, November 5, 1999. Compiled by John W. Williams, Department of Geology, San Jose State University.
- California State University. Search CSU Degrees.
http://www.bpelsg.ca.gov/about_us/meetings/minutes/20120731_ggtacmn.pdf.
Accessed August 12, 2015.
- California State University, San Bernardino, Department of Geological Sciences. 1997.
Goals and Objectives for Geology Majors. February 14.
- Code of Federal Regulations. Title 34, Part 600 Institutional Eligibility Under the Higher Education Act of 1965 as amended. §600.2 *Definitions*.
<https://www.gpo.gov/fdsys/pkg/CFR-2011-title34-vol3/pdf/CFR-2011-title34-vol3-sec600-2.pdf>
- Corbett, Robert G. and Corbett, Erica A. 2001. *Geology Programs and Disciplinary Accreditation*. *Journal of Geoscience Education*. v. 49, no. 2, p. 130-134.
- Council of Professional Geological Organizations. 1993. *Suggested Geology Practice Act of 1993*.
- Council on Licensure, Enforcement, and Regulation (CLEAR), and National Organization for Competency Assurance (NOCA). 1993. *Principles of Fairness: An Examining Guide for Credentialing Boards*. February.
- Davidson, Wendy J. AIPG Assistant Director. 2015. *Email Communication*. October 15.
- De Paor, Declan G. 2016. *Virtual Rocks*. *GSA Today*. v. 26, no.8. p 4-11.
- Department of Consumer Affairs. 2013. *Occupational Analysis of the Geology Profession for the California Specific Examination (CSE)*. Office of Professional Examination Services. Lincer-Hill, H., and Riedel, L. July.
- Dictionary.com. Accessed on September 25, 2015.
<http://dictionary.reference.com/browse/license?s=t>
- Dictionary.com. Accessed on September 25, 2015a.
<http://dictionary.reference.com/browse/licensure?s=t>

- Donnoe, William E., Ed.D. 1992. *Final Report: Occupational Analysis and Test Specification for Registered Geologist*. Prepared for the California Board for Geologists and Geophysicists by Donnoe & Associates. December.
- Drummond, Carl N. and Markin, Jane M. 2008. *An Analysis of the Bachelor of Science in Geology Degree as Offered in the United States*. *Journal of Geoscience Education*. v. 56, no. 2, p. 113-119.
- Duke, Gary. Senior Staff Counsel, Department of Consumer Affairs. 2015. *Personal Communication*. November 5.
- Durley, Cynthia C., M.Ed. MBA. 2005. *The NOCA Guide to Understanding Credentialing Concepts*. National Organization for Competency Assurance.
- Elifritis, C. Dale. PhD. Professor Emeritus, Geological Engineering, Missouri University of Science and Technology. 2016. *Email Communication*. January 22 and 23, August 24 and 29, October 31.
- Elifritis, C. Dale. PhD. Professor Emeritus, Geological Engineering, Missouri University of Science and Technology. 2017. *Email Communication*. January 3.
- Elifritis, C. Dale. PhD. Professor Emeritus, Geological Engineering, Missouri University of Science and Technology. 2017. *Personal Communication*. February 7.
- Elkins, Joe T., and Elkins, Nichole M.L. 2007. *Teaching Geology in the Field: Significant Geoscience Concept Gains in Entirely Field-based Introductory Geology Courses*. *Journal of Geoscience Education*. v. 55, no. 2, p. 126-132.
- Ericksen, Rick L., RPG, CPG. Executive Director, Mississippi Board of Registered Professional Geologists. 2015. *Email Communication*. October 26.
- Ericksen, Rick L., RPG, CPG. Executive Director, Mississippi Board of Registered Professional Geologists. 2017. *Personal Communication*. February 7.
- Fieg, Anthony D. 2010. *Technology, Accuracy and Scientific Thought in Field Camp: An Ethnographic Study*. *Journal of Geoscience Education*. v. 58, no. 4, p.241-251.
- Franks, Alvin L. PhD, PG 152, CEG 88, CHG 1. 2016. *Personal Communication*. January 13.
- Geological Society of America. 1957. *Teaching Aids and Allied Material in Engineering Geology*. Special Report. Committee on Teaching Aids. Mann, J. F., McGill, J.T. and Kiersch, G.A., Chairman. http://www.geoscilibrary.org/wp-content/uploads/2014/08/kiersch_g-teaching_aids_engineering_geology-4-academic_preparation-ocr.pdf

- Geological Society of America. 2009. *Field Geology Education: Historical Perspectives and Modern Approaches*. Special Paper 461. Edited by Steven J. Whitmeyer, David W. Mogk, and Eric J. Pyle.
- Geoscientists Canada. 2014. *Geoscience Knowledge and Experience Requirements for Professional Registration in Canada*. <http://geoscientistscanada.ca/wp-content/uploads/2014/11/GC-Knowledge-Requ.BKLT-.REV-.EN-.web-.final-.pdf>
- Gonzales, Leila M., and Keane, Christopher K. 2010. *Who Will Fill the Geoscience Workforce Supply Gap?* *Environmental Science & Technology*. v. 44, no. 2, p. 550-555.
- Hammer, Sigmund. 1971. *Whither geology?* American Geological Institute, *Geotimes*. February.
- Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule, 80 Fed. Reg. p. 21337 (April 17, 2015) (to be codified at 40 CFR Parts 257 and 261).
<https://www.gpo.gov/fdsys/pkg/FR-2015-04-17/pdf/2015-00257.pdf>
- Head, William D., Alexander, Susan. E., Moore, Steven W., and Melton, Forrest S. 2006. *From the Ground Up: Building and Undergraduate Earth Systems Curriculum*. *Journal of Geoscience Education*. v. 54, no. 3, p. 240-248.
- Joint Legislative Sunset Review Committee (JLSRC), Senator Ruben S. Ayala, Chairman. 1996. *Review and Evaluation of the Board for Geologists and Geophysicists*. Report to the Department of Consumer Affairs.
- Kirchner, James Gary. 1994. *Results of an Alumni Survey on Professional and Personal Growth at Field Camp*. *Journal of Geological Education*. v. 42., p. 125-128.
- Legal-dictionary.thefreedictionary.com. Accessed on September 25, 2015. <http://legal-dictionary.thefreedictionary.com/code>
- Legal-dictionary.thefreedictionary.com. Accessed on September 25, 2015a. <http://legal-dictionary.thefreedictionary.com/statute>
- Lindberg, David N., PG 5581, CEG 1895. 2015. *Email Communication*. November 19.
- Livingston, Chris. Research Librarian, California State University Bakersfield Walter Stiern Library. 2015. *Personal Communication*. September 24.
- Manner, Barbara Marras. 1995. *Field Studies Benefit Students and Teachers*. *Journal of Geological Education*. v. 43., p. 128-131.

- McEachrin, Shelly. Evaluator. Arizona State Board of Technical Registration. 2015. *Personal Communication*. September 22.
- Moore, Ric PLS, Executive Officer BPELSG. 2015. *Personal Communication*. September 10.
- National Association of State Boards of Geology (ASBOG). 2005. *The Professional Geologist Model Licensure Law*.
<http://asbog.org/documents/Model%20Law%2012-2-05.pdf>.
- National Association of State Boards of Geology (ASBOG). 2005. Task Analysis Survey 2005: A Study of the Practice of Geology in the United States and Canada. TEST, Inc. Warner, J.L., May.
- National Association of State Boards of Geology (ASBOG). 2010. Task Analysis Survey 2010: A Study of the Practice of Geology in the United States and Canada, Extended Summary. TEST, Inc. Warner, J.L., Warner, S.P., June.
- National Association of State Boards of Geology (ASBOG). 2011. *Model Rules and Regulations*. <http://asbog.org/documents/ASBOG%20Rules-Regs%202011.pdf>.
- National Association of State Boards of Geology (ASBOG). 2014. *Geology Registration Standards Matrix*. November.
- National Association of State Boards of Geology (ASBOG). 2015. *Home Page*.
- National Association of State Boards of Geology (ASBOG). 2015. Task Analysis Survey 2015: A Study of the Practice of Geology in the United States and Canada. TEST, Inc. Warner, J.L., April.
- National Association of State Boards of Geology (ASBOG). 2016. *Professional Geologists Candidate Handbook*. January.
- National Association of State Boards of Geology (ASBOG). 2016. *Geology Registration Standards Matrix*. November.
- Neel, Henry H. 1979. *The History of the Registration of Geologists in California*. Newsletter, California Section, Association of Professional Geological Scientists (formerly American Institute of Professional Geologists). May.
- Nicholas, Georgina. Louisiana Board of Professional Geoscientists. 2015. *Personal Communication*. September 28.
- Oxforddictionaries.com. Accessed on September 25, 2015.
http://www.oxforddictionaries.com/us/definition/american_english/law

- Petrovic, H.L. and Stokes, A. 2014. *Geoscientists' perceptions of the value of undergraduate field education*. GSA Today, v.24, no. 7, p. 4-10.
- Proctor, Richard J. 2004. *A History of AIPG 1963-2003*. American Institute of Professional Geologists.
- Proctor, Richard J., PG 247, CEG 134 (Emeritus). 2015. *Personal Communication*. December 17.
- Racca, Laurie. 2016. *Evolution of Geology Licensing requirements in California: Defining a Geological Sciences Degree*. Hydrovisions, v.25, no. 2, Groundwater Resources Association of California.
- Renshaw, Carl E. 2014. *Design and Assessment of a Skills-based Geoscience Curriculum*. Journal of Geoscience Education. v. 62, p. 668-678.
- Rogers, David J. PhD., 2015. *Threadlines of Geotechnical and Engineering Geology Firms in the Greater Los Angeles Metro-Southern California Area: 113-114*. Evolution of Geotechnical Practice Blog. September 2.
<http://web.mst.edu/~rogersda/Geotechnical-Practice/>
- Rogers, David J. PhD., 2015a. Karl F. Hasselmann Chair in Geological Engineering, Missouri University of Science & Technology. *Email Communication*. September 17.
- Santi, Paul M. PhD., 2015. Professor and Department Head, Department of Geology and Geological Engineering, Colorado School of Mines. *Personal Communication*. October 15.
- Santi, Paul M., and Higgins, Jerry D. 2005. *Preparing Geologists for Careers in Engineering Geology and Hydrogeology*. Journal of Geoscience Education. v. 53, no. 5, p. 512-521.
http://inside.mines.edu/~psanti/paper_pdfs/Preparing%20Geologists%20for%20EG%20and%20Hydro.pdf
- Santi, Paul M., and Kowalski, Ryan J. 2004. *The Role of Education and Experience in Developing Site Investigation Skills*. Environmental & Engineering Geoscience. v. 10, no. 1, p. 45-55.
- SB 1165, 2016 Reg. Sess. Cannella. Chapter 236 2016 Cal. Stat.
- Schmidt, P.L. and Conrad, J.M. 2012. *Capstone 101: A Framework for Implementation of an ABET-compliant Capstone Sequence*. Paper presented at 2012 ASEE Annual Conference, San Antonio, Texas. June.

- Schmitz, Darrel. American Association of Petroleum Geologists (AAPG). *Curriculum Accreditation Needed*. Commentary.
<http://www.aapg.org/Publications/News/Explorer/Details/ArticleID/672/Curriculum%ADAccreditation%ADNeeded1/3>. Accessed August 5, 2015.
- Shapiro, Russell S. PhD., Chair Geological and Environmental Sciences Department, CSU Chico. 2015. *Personal Communication*. September 1.
- Shimberg, Benjamin, and Roederer, Doug. 1994. *Questions a Legislator Should Ask, 2nd Edition*. Council on Licensure, Enforcement and Regulation (CLEAR).
- Snyed, Deana, PG, Executive Director ASBOG. 2015. *Email Communication*. October 23.
- Soil Science Society of America. *Glossary of Soil Science Terms*.
<https://www.soils.org/publications/soils-glossary/#>. Accessed February 8, 2016
- Soil Science Society of America. *State Soil Science Licensing and Legislation*.
<https://www.soils.org/certifications/already-certified/licensing> . Accessed March 7, 2016
- Sweeny, Paul, Executive Officer, Board of Registration for Geologists and Geophysicists. 2000. *Legislative Proposal Concept Paper*. Memorandum to Sailaja Cherukuri, Deputy Director, Division of Legislative and Regulatory Review, Department of Consumer Affairs. August 4.
- Sydnor, Robert H., PG 3267, CHG 6, CEG 968, 2016. *Email Communication*. January 29.
- Tepel, Robert E., PG 1706, CEG 547, 2015. *Email Communications*. October 8 and 16.
- Troxel, Bennie W., PG 937, CEG 370 (Emeritus). 2015. *Personal Communication*. October 22.
- Turner, A.K., 2008. *Education and Professional Recognition of Engineering Geologists and Geological Engineers in Canada and the United States*, in: Proceedings, 1st International Conference on Education and Training in Geo-Engineering Sciences, Constantza, Romania, 2-4 June 2008, (I. Manoliu & N. Radulescu, Eds), CRC Press, Taylor & Francis Group, London, p. 111-118.
- Turner, A.K., 2011. *The Role of Competency-Oriented Descriptions in Geo-Engineering*. Paper presented at the Pan-Am CGS Geotechnical Conference – Geo-Innovation Addressing Global Challenges, Toronto, Canada.

United States Department of Education. 2011. *Guidance to Institutions and Accrediting Agencies Regarding a Credit Hour as Defined in the Final Regulations Published on October 29, 2010*. GEN-11-06.

United States Office of Personnel Management. 2016. *Classification and Qualifications General Schedule Qualifications Standards, Geology Series, 1350*.

United States Office of Personnel Management. 2016. *Classification and Qualifications General Schedule Qualifications Standards, All Professional Engineering Positions, 0800*.

University of California. Campus Majors.

http://admission.universityofcalifornia.edu/counselors/files/undergraduate_majors_list.pdf. Accessed on August 12, 2015.

University of Texas at Austin. 2016 *Heads/Chairs on the Future of Undergraduate Geoscience Education Summit*. <http://www.jsg.utexas.edu/events/future-of-geoscience-undergraduate-education/>. Accessed September 24, 2015 and February 2, 2016.

Warner, Jack. 2017. Test, Inc. *Email Communication*. February 8.

Western Association of Schools and Colleges Accrediting Commission for Senior Colleges and Universities. 2011. *Policy on Credit Hour*. http://2015.wascarc.org/sites/default/files/Heyman_W8_Credit_Hour_Policy_WA_SC.pdf September.

Wigginton, William B., PG 2975, CHG 10, CEG 855 (emeritus). 2015. *Personal Communication*. November 17.

Williams, John. PhD., PG 3219, CHG 3, CEG 937, Professor Emeritus of Geology, San Jose State University. *Personal Communication*. December 4.

Williams, John. PhD., PG 3219, CHG 3, CEG 937, Professor Emeritus of Geology, San Jose State University. *Email Communication*. December 17.

Wisconsin Statutes. 2015. Chapter 470. *Examining Board of Professional Geologists, Hydrologists and Soil Scientists*. <https://docs.legis.wisconsin.gov/statutes/statutes/470.pdf>.

Wuebbles, Donald J., Asplen, Lisa, and Brewer, Joseph, 2006. *Earth Systems, Environment and Society: A New Interdisciplinary Undergraduate Major at the University of Illinois*. *Journal of Geoscience Education*. v. 54, no. 3, p. 230-239.

List of States with Geology Licensure: individual state requirements reviewed.

Alabama
Arizona
Arkansas
Delaware
Florida
Georgia
Idaho
Illinois
Indiana
Kansas
Kentucky
Louisiana
Maine
Minnesota
Mississippi
Missouri
Nebraska
New Hampshire
New York
North Carolina
Oregon
Pennsylvania
Puerto Rico
South Carolina
Tennessee
Texas
Utah
Virginia
Washington
Wisconsin
Wyoming

California Universities and Degrees Reviewed (September 2015)

Bachelor Degrees	Degree Type	Subject Area
California Institute of Technology, Division of Geological & Planetary Sciences	BS	Geobiology
	BS	Geochemistry
	BS	Geology
	BS	Geophysics
	BS	Planetary Science
California Luthern University, Department of Geology	BS	Geology
California Polytechnic State University, San Luis Obispo, Earth & Soil Sciences Department	BS	Environmental Earth and Soil Sciences w/Geology concentration
California Polytechnic State University, Pomona, Department of Geological Sciences	BS	Geology
CSU Bakersfield, Department of Geological Sciences	BA	Geology
	BS	Geology
CSU Chico, Dept of Geological & Environmental Sciences	BS	Geology
	BS	Geosciences
	BS	Environmental Science-Energy and Earth Resources
	BS	Environmental Science-Hydrology concentration
CSU Dominguez Hills, Dept of Earth Science & Geography	BS	Earth Science
CSU East Bay, Dept of Earth & Environmental Sciences	BA	Geology
	BS	Geology
CSU Fresno, Dept of Earth & Environmental Sciences	BS	Geology
CSU Fullerton, Department of Geological Sciences	BA	Earth Science
	BS	Geological Sciences
CSU Long Beach, Department of Geological Sciences	BA	Earth Science
	BS	Geology

CSU Los Angeles Department of Geosciences and the Environment	BS	Environmental Geoscience Option
	BS	Geology Option
CSU Northridge, Department of Geological Sciences	BS	Geology Option
	BS	Geophysics Option
CSU Sacramento, Department of Geology	BA	Earth Science
	BA	Geology
	BS	Geology
CSU San Bernardino, Department of Geological Sciences	BA	Geology
	BS	Geology
	BS	Environmental Geology Option
CSU Stanislaus, Dept of Physics and Geology	BA	Earth Science-Liberal Studies
	BS	Geology
Humbolt State University, Dept of Geology	BA	Geosciences
	BA	Geology
	BS	Geology
Loma Linda University, Dept of Earth and Biological Sciences	BS	Environmental Science/Geology Concentration
	BS	Geology
Occidental College, Dept of Geology	BS	Environmental Science/Geology Concentration
	BS	Geology
Pomona College, Geology Department	BS	General Geology
	BS	Environmental Earth Science
	BS	Earth, Planetary & Space Science
	BS	Geochemistry
San Diego State University, Dept of Geological Sciences	BA	General Geology
	BS	General Geology
	BS	emphasis in Engineering Geology
	BS	emphasis in Geochemistry
	BS	emphasis in Geophysics
	BS	emphasis in Hydrogeology
	BS	emphais in Marine Geology
BS	emphasis in Paleontology	
San Francisco State University, Department of Earth & Climate Sciences	BA	Earth Sciences
	BS	Earth Sciences w/Hydrology Emphasis
	BS	Earth Sciences w/Geology Emphasis
San Jose State University, Dept of Geology	BA	Earth Science
	BS	Geology

Sonoma State University, Department of Geology	BA	Earth Science
	BS	Geology
Stanford University, Dept of Geological and Environmental Sciences	BS	Geological Sciences
	BS	Geological Sciences (options for concentration in engineering geology or hydrogeology)
UC Berkeley, Dept of Earth & Planetary Science	BA	Environmental Earth Science
	BA	Geology
UC Davis, Department of Earth and Planetary Sciences	BA	Geology
	BS	Geology
UC Irvine, Department of Earth System Science	BS	Earth System Science (options for specialization in hydrology & ecosystems)
UC Los Angeles, Dept of Earth, Planetary and Space Sciences	BA	Earth and Environmental Science
	BS	Geology
	BS	Engineering Geology
	BS	Geology/Paleobiology
UC Riverside, Dept of Earth Sciences	BS	General Geology
	BS	Geology w/Global Climate Change Option
	BS	Geology w/Geobiology Option
	BS	Geology w/Geophysics Option
UC San Diego, Scripps Institution of Oceanography	BS	Earth Science - Geology
	BS	Earth Science - Geophysics
	BS	Earth Science - Environmental Geochemistry
	BS	Earth Science-Solid Earth Geochemistry
UC Santa Barbara, Dept of Earth Science	BA	Earth Science
	BS	Earth Science - geology, or Engineering ES based on electives
	BS	Earth Science - climate & environment
	BS	Earth Science - geohydrology
	BS	Earth Science - Geophysics
	BS	Earth Science - Paleobiology
UC Santa Cruz, Earth & Planetary Sciences	BA	Earth Sciences/Anthropology BA
	BS	Earth Sciences
	BS	Earth Sciences w/Environmental Geology
	BS	Earth Sciences w/Ocean Sciences
	BS	Earth Sciences w/Planetary Sciences
	BS	Earth Sciences w/Science Education

University of Southern California, Dept of Earth Sciences	BS	Geological Sciences
	BA	Earth Sciences
University of the Pacific, Dept of Earth & Environmental Sciences	BA	Geology
	BS	Geology
	new BS	Geological & Environmental Science w/Geology Concentration

List of outreach activities conducted to advertise the proposed regulation changes and solicit input for the content of this regulation.

July 31, 2014:

Adoption of BPELSG 2015-2018 Strategic Plan which included “Goal 1.1 Identify the minimum curriculum required for a qualifying geological sciences degree.”

September 2015-January 2016:

General verbal notifications of the Board’s intent to develop regulations to implement Strategic Plan Goal 1.1 in presentations/outreach events at the following groups:

- CSU Chico, September 1, 2015.
- Redding area geology brownbag presentation, September 9, 2015.
- University of the Pacific, October 20, 2015.
- CSU San Bernardino, November 4, 2015.
- Inland Geological Society, November 5, 2015.
- UC Riverside, November 6, 2015.
- Association of Engineering Geologists, December 10, 2015.
- CSU Fresno, December 10, 2015.
- CSU Bakersfield: January 19, 2016.
- UC Davis: January 22, 2016.
- Sonoma State: January 28, 2016.

Jan 14-15, 2016 BPELSG meeting:

Board authorized staff to conduct public workshops to solicit input on identifying the minimum curriculum required for a qualifying geological sciences degree.

January 26, 2016:

Announcement of the Geosciences Degree Workshop and posting of the agenda on the Board’s webpage.

January 27, 2016:

Email to 35 college and university geoscience departments inviting their participation in the Board workshops soliciting input on identifying the minimum curriculum required for a qualifying geological sciences degree.

February 8, 2016:

Posted meeting materials (presentation and bibliography) for the Geosciences Degree Workshops to Board website

February 19, 2016:

Geosciences Degree public workshop, Riverside, California.

February 26, 2016:

Geosciences Degree public workshop, Sacramento, California.

March 3, 2016:

Posted YouTube video presentation of Geosciences Degree Workshop to Department of Consumer Affairs YouTube site.

February 2016-April 2016:

Specific discussion (included in PowerPoint presentation slides) regarding the content and progress of the Board's draft regulations regarding the education requirements for geology licensure.

- Association of Engineering Geologists, San Francisco Section: February 9, 2016
- Stanislaus State: February 16, 2016
- San Jose State: February 22, 2016
- Association of Engineering Geologists, Southern California: March 23, 2016
- CSU Fullerton: April 20, 2016
- Association of Engineering Geologists, Sacramento: April 26, 2016
- CSU Sacramento: April 27, 2016

April 21-22, 2016:

First preliminary draft regulation presented at the April 2016 Board meeting.

Summer 2016:

Article published in the Groundwater Resources Association of California newsletter "Hydrovisions" regarding the Board's efforts to define a geological sciences degree.

Spring 2016 to present:

All Geologist-In-Training certificate applicants are notified with their application approval email that the Board is in the process of updating the geology licensure regulations.

May 2016-December 2016:

Specific discussion (included in PowerPoint presentation slides) regarding the content and progress of the Board's draft regulations regarding the education requirements for geology licensure.

- South Coast Geological Society: May 5, 2016.
- Loma Linda University: May 11, 2016.
- Association of Engineering Geologists, Sacramento: August 23, 2016
- CSU Long Beach: September 8, 2016
- Humboldt State: September 26, 2016.

- National Association of State Boards of Geology Administrator Workshop: November 1, 2016
- UC Berkeley: November 9, 2016
- CalPoly Pomona: November 17, 2016
- CSU East Bay: December 1, 2016

September 28, 2016:

Geologist and Geophysicist Technical Advisory Committee public meeting, Sacramento, California.

The outreach efforts conducted from February 2016 to January 2017 generated comments and suggestions. Feedback was received via email, U.S. Mail, by completing comment forms, or by providing verbal comments. Comments included the following general topics or themes:

- 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
- Suggestions that the Board initiate an “environmental license”
- Frustration from some non-licensed professionals that they were not made aware of licensing requirements when choosing a college major
- Suggested lists of specific courses that should be included in the requirements
- Suggestions to include newer technologies and techniques in the list of courses
- General support for defining a qualifying degree
- Requests that the requirements be specific and clear so applicants can understand them
- A request that all applicants be held to the same standard, and that the requirements not be reduced to accommodate non-geology professionals
- Positive feedback from college and university geology departments indicating a willingness to provide students with help documenting their educational qualifications for a license application
- A dominant preference for a list of classes that includes an explanation or statement describing the skills and competencies expected out of each course

Draft regulatory language was developed and revised several times based upon the comments received during the Preliminary Activities phase of regulation development. The draft regulatory language was included in the February 2017 Board meeting materials, and additional comments were requested as described below.

February 3, 2017:

Email to 35 college and university geoscience departments providing link to the February 2017 Board meeting materials and requesting input on the draft regulation.

February 7, 2017:

Meeting with UC Davis geology department faculty regarding draft regulation.

February 8, 2017:

Board meeting that included the Board's approval to move forward with rulemaking to amend 16 CCR §3031. Public comments were received at the meeting from UC Davis faculty requesting specific changes to the regulatory language. These changes were accepted by the Board and are reflected in the draft regulations submitted as part of this rulemaking.

Comments received as result of the February 2017 Board meeting and associated outreach focused entirely on the geology education requirements. Comments included:

- Disagreement with program level accreditation (ABET) described in the proposed §3022 (a)(1).
- Interest and inquiries on how to obtain program level accreditation (ABET) for an individual school as described in the proposed §3022 (a)(1).
- Misunderstanding and concerns about how to convert non-standard private school credit hours to semester hours [applies to §3022 (a)(2)].
- A specific question on whether the Field Geology requirement described in §3022 (a)(2)(A)(iv) could be met with laboratory exercises for other coursework.
- Questions about how the knowledge and skills described in the subject areas will be mapped to college and university courses [applies to §3022 (a)(2)].
- A suggestion to change the number of credit hours required for specific courses so that schools operating on the quarter system are not at a disadvantage [applies to §30 (a)(2)].
- A suggestion to require a combined number of units as electives [applies to §3022 (a)(2)(B)] in order to make it easier for schools operating on the quarter system to ensure their students meet this requirement.
- Concerns that the Board is "watering down" geology license requirements (general comment).
- Concern that the Board is developing a list of required courses when the Governor has mandated that students graduate with a specific number of units and in a specific amount of time (general comment).
- Feedback from college and university geology departments indicating that working professionals could supplement their education through "open university" if they are deficient in meeting the requirements described in the draft regulation language.

Based on the specific feedback received on the draft language presented at the February 2017 Board meeting, the following specific changes were made to the draft regulations language.

- The number of semester hours required for core coursework described in §3022 (a)(2)(A)(ii) "Structural Geology", and §3022 (a)(2)(A)(iii) "Stratigraphy and Sedimentation" was reduced from 4 semester hours (6 quarter hours) for each class, to 3 semester hours (4.5 quarter hours) for each class.
- For the Applied Upper Division electives described in §3022 (a)(2)(B), instead of requiring a specific number of semester hours for each course (3 semester or 4.5 quarter), the requirement was revised to an aggregate of 6 semester hours (or 9

quarter hours) as a combined total from two subject areas. This allows for more flexibility in meeting the requirement.

February 9, 2017-May 2, 2018

General verbal updates regarding the Board's progress in developing regulations to implement Strategic Plan Goal 1.1 in presentations/outreach events at the following groups:

- UC Santa Cruz, February 27, 2017.
- San Diego Association of Geologists, March 22, 2017.
- San Francisco State University, March 28, 2017.
- San Diego State University, April 12, 2017.
- California Department of Water Resources, April 24, 2017.
- UC Davis Geology Club, January 24, 2018.
- South Coast Geological Society, February 12, 2018.
- Inland Geological Society, March 6, 2018.
- San Diego State University March 14, 2018.
- CSU Bakersfield, March 16, 2018.
- CSU Fresno, March 22, 2018.
- Association of Engineering Geologists, Fresno, March 22, 2018.
- CSU Stanislaus, April 10, 2018.
- CSU Northridge, April 17, 2018.

May 3, 2018

The May 2018 Board meeting included a discussion of this proposed rulemaking and a vote of approval to revise the rulemaking language presented at the February 2017 Board meeting. At the suggestion of the Board, portions of the proposed regulation language were moved from Article 3 Examinations into Article 2 Applications. The suggested change moved the education and experience requirements for licensure as a geologist or geophysicist currently described in 16 CCR §3031 into new sections §3022, §3022.1 and §3022.2 proposed for adoption as part of this rulemaking. This reorganization grouped similar topics into the most appropriate article in the regulations. The Board also suggested minor wording changes that helped to make the language in the regulation more readable. No public comments regarding this rulemaking were received either before or during the May 2018 Board meeting.

BUSINESS IMPACT

These proposed amendments are not anticipated to have an adverse economic impact on businesses since this rulemaking is specifically related to the application process for individuals. The Board does not license businesses.

These proposed amendments may result in a minor cost savings to the Board, and a cost savings to unqualified applicants, by ensuring that the requirements for geology and geophysics licensure are clear and unambiguous. This will likely reduce or eliminate costs associated with unqualified candidates applying for licensure, and the costs of court proceedings associated with the appeal of denied applications.

ECONOMIC IMPACT ASSESSMENT

The Board anticipates this regulatory proposal will not create or eliminate jobs within the State of California because it is merely clarifying the existing requirements of the license applications and does not add any new requirements that would affect jobs.

The Board anticipates this regulatory proposal will not create new business or eliminate existing businesses within the State of California because the Board does not license nor regulate businesses, only individuals.

The Board anticipates this regulatory proposal will not affect the expansion of businesses currently doing business within the State of California because this regulatory proposal simply clarifies the existing requirements for licensure. Additionally, the Board does not license nor regulate businesses, only individuals.

This regulatory proposal may benefit the health and welfare of California residents because it will clarify for the consumers of California, and our Board's applicants, licensees and certificate holders, the laws and regulations pertaining to geologic and geophysics licensure. By reviewing this regulation, the Board's patrons will better comprehend licensure requirements. Thus, avoiding misinterpretations associated with licensure requirements that may occur because of ambiguous language.

The Board anticipates this regulatory proposal to have no effect on the state's environment as it is clarifying requirements for individuals applying for geologic and geophysics licensure.

This regulatory proposal is not anticipated to affect worker safety because this proposal pertains to consumer protection not to work-related protection.

ECONOMIC IMPACT FOR "MAJOR REGULATIONS" (IF APPLICABLE)

Not applicable.

SPECIFIC TECHNOLOGIES OR EQUIPMENT

This regulation does not mandate the use of specific technologies or equipment.

CONSIDERATION OF ALTERNATIVES

No reasonable alternative to the regulatory proposal would be either more effective in carrying out the purpose for which the action is proposed or would be as effective or less burdensome to affected private persons and equally effective in achieving the purposes of the regulation in a manner that ensures full compliance with the law being implemented or made specific.

Set forth below are the alternatives which were considered and the reasons each alternative was rejected:

Alternative 1: Leave 16 CCR §3031 unchanged

Rejected: This section of the regulations as currently written has been found to be lacking in several respects. In order to fully implement the licensure qualification requirements as described in the Geologist and Geophysicist Act, the Board has determined that it is necessary to update and clarify the regulations as described.