SB 4 WELL STIMULATION TREATMENT REGULATIONS

FINAL STATEMENT OF REASONS

The Department of Conservation (Department) is adding sections 1751, 1761, 1777.4, 1780, 1781, 1782, 1783, 1783.1, 1783.2, 1783.3, 1784, 1784.1, 1784.2, 1785, 1785.1, 1786, 1787, 1788, and 1789 to California Code of Regulations, title 14, division 2, chapter 4, subchapter 2. These changes to the regulations are each necessary to implement the provisions of Senate Bill 4 (Pavley, Chapter 313, Statutes of 2013) (SB 4), and Public Resources Code section 3106.

INTRODUCTION

On September 20, 2013, Governor Brown signed into law SB 4. SB 4 complements existing rules that require some of the strongest well construction and operation standards in the nation by enacting further safeguards to public health and safety and the environment regarding the practices known as well stimulation.

SB 4 requires a permit from the Department of Conservation (Department), Division of Oil, Gas and Geothermal Resources (Division) to conduct well stimulation. The permit application must include detailed information about the fluids to be used, a ground water monitoring plan, and a water management plan. Copies of an approved permit must be sent to neighboring property owners and tenants, and water well testing must be provided upon request. SB 4 requires the Division to prepare regulations to ensure that well stimulation is done safely and to require detailed public disclosure about the well stimulation. The Division must develop an internet website to facilitate public disclosure of well stimulation information, and the website must allow the public to easily search and aggregate the information.

SB 4 requires the Division to prepare an environmental impact report, consistent with the California Environmental Quality Act, addressing the practice of well stimulation in California. Additionally, the Act requires the Natural Resources Agency to complete an independent scientific study on well stimulation treatments, and the State Water Resources Control Board to develop groundwater modeling criteria and implement ground water monitor programs.

The adopted regulations are the result of consideration of extensive public input and consultation with other state regulatory agencies. The Department made the proposed regulations and revisions thereto available for public comment from November 15, 2013 until January 14, 2014; from June 13, 2014 until July 28, 2014; and from October 9, 2014 until October 24, 2014. During those public comment periods the Department conducted a total of ten public comment hearings around the state. In addition, as required under Public Resources Code section 3160, subdivision (b), the Division developed these regulations in consultation with various state regulatory agencies.

The adopted regulations are intended to supplement the Division's current oil and gas regulatory framework with regulations specific to well stimulation to meet the mandates of SB 4. The adopted regulations satisfy the goals and requirements of SB 4 by setting requirements to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments; and by requiring full disclosure of the composition and disposition of well stimulation fluids, including hydraulic fracturing fluids, acid well stimulation fluids, and flowback fluids. The adopted regulations satisfy the goals and requirements of SB 4 by implementing express statutory requirements regarding well stimulation permits, public disclosure, neighbor notification, and water well testing. The adopted regulations address the distinction between well stimulation treatment and other routine operations; the distinction between well stimulation and underground injection projects; and the acid concentration threshold at which an acid matrix stimulation treatment is subject to the requirements of SB 4.

DETAILED STATEMENT OF SPECIFIC PURPOSE AND RATIONALE

1751. Single-Project Authorization.

Public Resources Code section 3160, subdivision (d), requires operators to obtain a permit from the Division before performing a well stimulation treatment. Public Resources Code section 3203 requires operators to submit a notice of intention and obtain approval from the Division before drilling or reworking a well. Public Resources Code section 3160, subdivision (d)(2), provides that well stimulation permits and approvals of notices of intention to drill or rework wells may be approved under a single authorization if they are applied for concurrently.

The purpose of Section 1751 is to establish a procedure for requesting a single-project review and authorization for multiple well stimulation treatment permit applications or notices of intent to drill or rework a well. Operators commonly plan to conduct multiple drilling and well stimulation operations in short period of time. In those instances, consideration of each permit on an individual basis can be much less efficient than considering the group of operations as a single project.

When the Division issues a single-project authorization, it will specify what operations have been approved. If operations approved under a single-project authorization are not commenced within one year of approval then the operator must obtain a new approval for those operations. It is necessary to include this time limit because by statute both a well stimulation treatment permit and an approval of a notice of intention to drill or rework a well expire after one year.

In response to public comments expressing concerns that single-project authorization would result in diminished review of applications and notices, Section 1751(c) specifies that each application and notice submitted for single-project authorization will be reviewed in the same manner as it would had the application or notice been submitted individually.

It is necessary to establish a procedure for single-project authorization because the Division has a high volume of permits and notice of intention to evaluate. In some

instances, permit evaluation will be repetitive from one operation to the next. Grouping approvals with commonalities will create efficiency for the Division, the operator, and for interested members of the public. The efficiency achieved by establishing a procedure for single-project authorization will facilitate the Division's statutory mandates under Public Resources Code section 3160, subdivision (d), and 3203 to evaluate proposals to conduct well stimulation treatments and drill or rework wells. Section 1751 will also increase openness and transparency in business and government because it will allow for a more orderly and efficient review process. All of the public notification and other requirements of SB 4 will be required as part of these approvals.

1761. Well Stimulation and Underground Injection Projects.

Public Resources Code section 3160 requires the Division to establish regulations regarding well stimulation treatments and it requires a permitting process for well stimulation treatments. Public Resources Code section 3157 defines the term "well stimulation treatment," but further elaboration is necessary to make it clear whether specific types of operations do or do not meet the definition. Public Resources Code section 3157 distinguishes well stimulation treatment from routine well cleanout, well maintenance, removal of formation damage from drilling, bottom hole pressure surveys, and other routine operations that do not affect the integrity of the well or the formation.

Section 1761(a)(3) defines an Acid Volume Threshold, which is calculated on a case-by-case basis, factoring in the wellbore volume and the porosity of the formation. Calculation of the Acid Volume Threshold will return a number of gallons per treated foot of the wellbore, which will be used to help determine whether a treatment using acid is or is not a well stimulation treatment. The purpose of the Acid Volume Threshold is to identify a conservative volume threshold, under which it can safely be said that a treatment does not meet the definition of a well stimulation treatment.

As explained in the *DOGGR Discussion of Calculated Acid Volume Threshold* included in the rulemaking record, based on the Division's determination that wellbore damage generally extends 20 to 50 inches from the wellbore, the Acid Volume Threshold is designed to calculate the formation bulk volume per treated foot of the wellbore for a 36-inch radius from the wellbore. A distance of 36 inches was selected because it is a conservatively smaller area than the area where wellbore damage could typically occur. If a treatment is below the Acid Volume Threshold, then it is clearly within the range of wellbore cleanout, maintenance, and removal of formation damage. Well treatments using acid that exceed the Acid Volume Threshold are presumed to be well stimulation treatment, unless it is successfully demonstrated to the Division that the treatment will not increase the permeability of the formation.

The distinction in Public Resources Code section 3157 between well stimulation treatment and other routine operations that do not affect the integrity of the well or the formation will not always be clear cut and the Division anticipates case-by-case technical discussion with operators regarding whether certain treatments are or are not well stimulation treatment. The purpose of Section 1761 is to establish a basic framework for that analysis, and to dispense with discussion of certain treatments that clearly are not well stimulation treatment because of the low volume of fluid used.

Simplification is built into the Acid Volume Threshold to minimize complications added to an already complicated regulatory scheme. The Acid Volume Threshold has been set at a conservatively low level, in part to account for distortions caused by that simplification. Section 1761(a)(1)(A)(ii) specifies that for the purpose of determining whether a treatment is greater than the Acid Volume Threshold, the volume of fluid used in a treatment does not include the volume fluid used for a pre-flush that does not use acid or an overdisplacement that does not use acid. Section 1761(a)(3) specifies that the lowest calculated or measured porosity in the zone of treated formation is the treated formation porosity to be used for calculating the Acid Volume Threshold.

Section 1761(a)(1)(A)(ii) excludes the volume of fluid used in the pre-flush if it does not contain acid from the Acid Volume Threshold calculation because a non-acid pre-flush fluid pumped into the well below the formation parting pressure clearly does not meet the definition of well stimulation treatment. The fluid pumped during the displacement, if it does not include acid, is also properly excluded from the Acid Volume Threshold calculation. The concern that the displacement would push acid further into the formation does not take into account that the acid used in treatment becomes spent and diluted as it moves further into the formation. Therefore, a non-acid displacement does not increase the area of the acid treatment.

As explained in the *DOGGR Discussion of Calculated Acid Volume Threshold* included in the rulemaking record, the Division has determined that the quantitative assessment of risks contemplated in Public Resources Code section 3160, subdivision (b)(1)(C) is not feasible given the limited data presently available and the timeframe during which the Division must promulgate regulations regarding well stimulation treatment. For this reason, the proposed Acid Volume Threshold is not intended to be a basis for making the risk-based distinction called for under Public Resources Code section 3160, subdivision (b)(1)(C). That is, the proposed Acid Volume Threshold is not intended to be a basis for acid matrix stimulation treatments that will enhance the permeability formation to be excluded from regulation. Instead, the sole purpose of the proposed Acid Volume Threshold is to distinguish acid matrix stimulation treatment from the routine uses of acid that are already expressly excluded from the definition of well stimulation treatment under Public Resources Code section 3157. Public Resources Code section 3160, subdivision (b)(1)(C)(ii), requires the Division to reevaluate the acid volume threshold by 2020, taking into account newly available data, and making revisions to the regulations if appropriate.

Based on public comments, the Division identified a need to specify in regulation whether gravel pack operations meet the definition of well simulation treatment. A gravel pack is designed to provide a screen to the formation to limit the formation's fine material from entering the well. There are high-rate gravel pack operations that inject the gravel at such high pressure, that which exceeds the formation fracture gradient, that places the gravel deep into the formation and increase the permeability. These operations, although called a gravel pack, would be considered a well stimulation because the injection pressure exceeded the fracture pressure. A gravel pack done at lower pressure is only filling up the void space between the production liner and the wellbore with the gravel and is not increasing the permeability of the formation, and therefore it is not a well stimulation treatment. Section 1761(a)(1)(A)(i) specifies that a

treatment at pressure exceeding the formation fracture gradient is presumed to be a well stimulation treatment, and Section 1761(a)(1)(B) specifies that a gravel pack treatment that does not exceed the formation fracture gradient is not a well stimulation treatment.

There is a further need for clear definition of the term “well stimulation treatment” because there has been confusion about the distinction between underground injection projects and well stimulation treatments. Injection projects for enhanced oil recovery, injection disposal, and underground gas storage are covered by extensive, existing regulations, found in Sections 1724.6 through 1724.10 and Section 1748 through 1748.3. These requirements for a “subsurface injection or disposal project” do not apply to well stimulation treatments. The scope, duration, and purpose of injection projects and well stimulation treatments are substantially different, and therefore the regulatory approach to each practice is different. However, because both practices involve putting fluids into an oil or gas well, some have advocated that the Division should apply the underground injection project regulations to well stimulation treatments. Disagreement about the distinction between these two categories of operations has been the subject of litigation in state and federal courts.

The purpose of Section 1761 is to build upon the statutory definition of “well stimulation treatment” to make it as clear as possible what operations are subject to the proposed regulations and to the permitting requirements of Public Resources Code section 3160, subdivision (d). Section 1761 clearly defines the term “underground injection project” and is intended to resolve any confusion about the Division’s intention to regulate well stimulation treatments in a manner that is distinct from the way that underground injection projects are regulated. The definitions note that well stimulation treatment is a short term and non-continual process and that an underground injection project involves sustained or continual injection, as these are salient distinctions between the two types of operations.

Section 1761(b)(3) states that regulations regarding well stimulation treatment apply to well stimulation treatment operations and regulations regarding underground injection project operations apply to underground injection project operations. Wells that are part of an underground injection project are not exempt from these regulations. If well stimulation treatment is done on a well that is part of an underground injection project, then the well stimulation treatment operations are subject to the requirements for well stimulation treatment. However, the requirements for well stimulation treatment do not apply to the underground injection project operations, as there are separate requirements that apply to those.

Public Resources Code section 3157 specifically excludes underground injection projects such as steam flooding, water flooding, and cyclic steaming from the definition of well stimulation treatment. Therefore, even if these underground injection project operations fall within the parameters of the definition of a well stimulation treatment, they are not well stimulation treatment operations for purposes of these regulations. Underground injection projects are regulated under Sections 1724.6 through 1724.10 and Sections 1748 through 1748.3. If a well stimulation treatment, such as a hydraulic fracturing treatment or an acid matrix stimulation treatment, is performed on a well that

is part of an underground injection project, then that treatment would still be subject to these regulations.

Section 1761 is necessary to prevent confusion about which regulations apply to any given oil and gas operation. A clear definition of the term "well stimulation treatment" will facilitate the Division accomplishing its statutory mandate under Public Resources Code sections 3106 and 3160 to regulate those operations.

1777.4. Well Maintenance and Cleanout History.

Public Resources Code section 3157 distinguishes well stimulation treatment from routine well cleanout, well maintenance, removal of formation damage from drilling, bottom hole pressure surveys, and other routine operations that do not affect the integrity of the well or the formation. A treatment that is not a well stimulation treatment is not subject to the permitting and public disclosure requirements of Public Resources Code section 3160 and these regulations. The purpose of Section 1777.4 is to specify data that must be submitted for treatments that do not meet the definition of a well stimulation treatment. Section 1777.4 is necessary to create a record that the Division can use to verify that treatments are correctly identified as not being a well stimulation treatment, and because Public Resources Code section 3213 requires that acid treatment data is maintained in the well history.

Under Section 1777.4, operators are required to submit a brief description of the treatment and include the calculations that would demonstrate that the treatment is not a well stimulation treatment. Operators must provide the calculation of the Acid Volume Threshold for operations involving emplacement of acid in the well, and the bottom-hole pressure applied to the formation for operations involving pressures to the formation that exceed the formation pore pressure. Bottom-hole pressure can be measured or it can be calculated, but if it is calculated, then the calculation must be provided. Section 1777.4 provides that specific types operations that are already documented under other parts of the Division's regulatory scheme are not subject to Section 1777.4

Section 1777.4(d) provides for submission of acid treatment data on an aggregated basis, at the Division's discretion. Under Section 1777.4(d), an aggregation plan would specifically describe the treatment and identify the number of times it is performed on a given well, but the information would be submitted annually and fluid volume can be aggregated by oil field.

An aggregation plan would achieve efficiency by allowing operators to submit data at a lower frequency and by allowing operators to forego individual Acid Volume Threshold calculations for treatments that clearly would not meet the definition of a well stimulation treatment. However, use of an aggregation plan would still result in collection of specific acid treatment data for each treatment. An aggregation plan would cover a particular treatment, which would be defined with sufficient specificity to make it clear to the Division that the treatment would never meet the definition of a well stimulation treatment. The description of a treatment covered by an aggregation plan would necessarily include specific description of the nature and purpose of the treatment and narrow and specifically defined parameters for the range of volume and content of fluid used. Therefore, an aggregation plan would provide specific data about the treatment and the number of times that treatment was done on a given well. For

these reasons, the Division determined that the allowance for an aggregation plan under Section 1777.4 is equally effective and less burdensome to the regulated public.

Section 1777.4 furthers the Division's statutory mandate under Public Resources Code section 3160 to permit and regulate well stimulation treatments and the Division's statutory mandate under Public Resources Code section 3213 to collect acid treatment data in the well history. Section 1777.4 has the further benefit of providing the public with data about treatments that do not meet the definition of well stimulation treatment.

Proposed Article 4. Well Stimulation Treatments.

1780. Purpose, Scope, and Applicability.

The purpose of Section 1780 is to address issues regarding the purpose, scope, and applicability of requirements for well stimulation treatments. Specifically, Section 1780 addresses the points at which well stimulation treatment is considered to begin and end, and the distinction between well stimulation treatment requirements and underground injection project requirements.

Section 1780 defines the scope of the proposed regulations by establishing that the point at which a well stimulation treatment is considered to begin is when fluid is first pumped into the well, and that the treatment is assumed to end when the equipment is disconnected from the well. These points of clarification are necessary because the timeframes for certain requirements are triggered at the commencement or end of a well stimulation treatment.

Section 1780(c) identifies concrete activities that clearly indicate the time when the actual treatment is occurring, and therefore these activities are ideal for staging the pre-treatment and post-treatment requirements. If well stimulation treatment were said to begin and end long before or after the treatment was actually occurring, then the timing of public disclosures, neighbor notifications, and well evaluations would be disrupted and statutory purposes would be undermined.

Section 1780 explains that well stimulation treatments are to be governed by Article 4, and not by the requirements of existing Sections 1724.6 through 1724.10 or Sections 1748 through 1748.3. Likewise, Section 1780 explains that Article 4 does not apply to underground injection projects. Because of the commonalities between well stimulation treatments and underground injection projects, it is necessary to be as clear as possible in distinguishing the two types of operations.

To this end, Section 1780(b) states that regulations regarding well stimulation treatment apply to well stimulation treatment operations and regulations regarding underground injection project operations apply to underground injection project operations. Wells that are part of underground injection project are not exempt from these regulations. If well stimulation treatment is done on a well that is part of an underground injection project, then the well stimulation treatment operations are subject to the requirements for well stimulation treatment. However, the requirements for well stimulation treatment do not apply to the underground injection project operations, as there are separate requirements that apply to those.

The provisions of Section 1780 establish necessary parameters for the requirements of the proposed regulations, and these parameters facilitate the Division accomplishing its statutory mandate under Public Resources Code sections 3106 and 3160 to regulate well stimulation treatments. Section 1780, together with proposed Section 1761, will provide clarity as to what operations are or are not subject to the requirements of Article 4.

The Division considered and rejected the alternative of including an acid concentration threshold in Section 1780, whereby acid matrix stimulation treatments at or below a 7% acid concentration threshold are not subject to the requirements for well stimulation treatments. The acid concentration threshold that was initially proposed in Section 1780(a) was removed and the Acid Volume Threshold was added to the definition of "well stimulation treatment" at Section 1761(a)(3). Consistent with the statutory definition, the Acid Volume Threshold is intended to identify excluded operations based on the effect of the treatment, as designed, upon the formation.

1781. Definitions.

The purpose of Section 1781 is to define each of these key terms used in Article 4 that require definition because they are used to convey a specific meaning, are subject to more than one interpretation, or are technical terms that are not commonly known. Some of the terms defined in Section 1781 are already defined in statute, and the statutory definitions are usually included without modification to support consistent interpretation of the regulations.

The terms "acid well stimulation treatment," "acid matrix stimulation treatment," "additive," "base fluid," "flowback fluid," "hydraulic fracturing," "proppants," "surface property owner," and "well stimulation treatment fluid" are each defined by statute in Public Resources Code section 3150 through 3159. The definitions provided for these terms in proposed Section 1781 are essentially identical to the statutory definitions. It is necessary to add these definitions to make it clear that the statutory definitions are operative in Article 4. The term "acid fracturing" is defined because the term is part of the definition of "acid well stimulation treatment."

The terms "acid stimulation treatment fluid" and "hydraulic fracturing fluid" are both used in the statutory definition of "well stimulation treatment fluid." Although the two terms are not themselves used in Article 4, it is necessary to define them to make clear the meaning of "well stimulation treatment fluid."

The term "axial dimensional stimulation area" or "ADSA" is defined as a short-hand for the subsurface area of stimulation.

The term "Chemical Disclosure Registry" is defined to be short-hand reference to the internet website to be used for public disclosure of information relating to well stimulation treatments. This short-hand term is necessary because restating this explanation in each relevant part of the regulations would be confusing and inefficient. Section 1788(b) requires that, in addition to posting chemical information to the Chemical Disclosure Registry, operators must submit all required public disclosures directly to the Division and that the Division will make the information available to the public in a format that can easily searched and aggregated.

The terms “Designated Contractor for Water Sampling,” “independent third party,” “surface property owner,” and “tenant” are all defined for the purpose of implementing the neighbor notification and water testing requirements of Public Resources Code section 3160, subdivision (d)(6) and (7).

The terms “State Water Board” and “Regional Water Board” are defined to be short-hand references to the State Water Resources Control Board and the Regional Water Quality Control Board with jurisdiction over the location of a well that will have or has had a well stimulation treatment.

Section 1781 is necessary to avoid ambiguity and ensure that those who are subject to the requirements of Article 4 are able to understand and interpret the regulation correctly.

Section 1781 initially included a definition of the term “protected water,” but that definition was removed from the regulations. Public Resources Code section 3160, subdivision (b), calls for regulations that ensure well integrity and geologic and hydrologic isolation of the stimulated hydrocarbon formation, regardless of the quality of groundwater in the area. Accordingly, the requirements of these regulations apply regardless of the groundwater quality and therefore it is not necessary to define “protected water.”

1782. General Well Stimulation Treatment Requirements.

The purpose of Section 1782 is to establish a set of governing principles under which all well stimulation treatments must be conducted, and to make clear that the operator has the burden of operating in accordance with those principles. The remainder of Article 4 lays out the specific requirements adhering to these principles, but operators must adhere to these principles, even when adherence to all specific requirements might not be enough to do so. The stated principles are as follows:

- Casing is sufficiently cemented or otherwise anchored in the hole in order to effectively control the well at all times;
- Geologic and hydrologic isolation of the oil and gas formation are maintained during and following the well stimulation treatment;
- All potentially productive zones, zones capable of over-pressurizing the surface casing annulus, or corrosive zones be isolated and sealed off to the extent that such isolation is necessary to prevent vertical migration of fluids or gases behind the casing;
- All well stimulation treatment fluids are directed into the zone(s) of interest;
- The wellbore’s mechanical integrity is tested and maintained;
- The well stimulation treat fluids used are of known quantity and description for reporting and disclosure as required pursuant to this Article;
- The well stimulation treatment fluid will not damage the well casing, tubing, cement, or other well equipment, or would otherwise cause degradation of the well’s mechanical integrity during the treatment process;
- The operator shall follow the intent of all applicable well construction requirements, use good engineering practices, and employ best industry standards;

- If a well breach occurs during well stimulation treatment it will be reported in accordance with established procedures; and
- Well stimulation treatment operations will be conducted in compliance with all applicable requirements of the Regional Water Board, the Department of Toxic Substances Control, the Air Resources Board, the Air Quality Management District or Air Pollution Control District, the Certified Unified Program Agency, and any other local agencies with jurisdiction over the location of the well stimulation activities.

Section 1782(c) states that if the Division identifies compliance issues, then the well stimulation treatment will be terminated as soon as it is safe to do so.

Each of the principles stated in Section 1782 are in furtherance of the Division's statutory mandate under Public Resources Code section 3106 to supervise oil and gas production so as to prevent, as far as possible, damage to life, health, property, and natural resources. Each of the principles stated in Section 1782 are also in furtherance of the Division's statutory mandate under Public Resources Code section 3160, subdivision (b), to establish regulations ensuring integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments.

1783. Application for Permit to Perform Well Stimulation Treatment.

Public Resources Code section 3160, subdivision (d), requires operators to obtain a permit from the Division before performing a well stimulation treatment. The purpose of Section 1783 is to reiterate the statutory permit requirement and affirm that well stimulation treatments must be performed in accordance with the conditions of the permit. In addition, Section 1783 establishes certain procedures to facilitate the implementation of the statutory permitting requirement.

One of the procedures is that operators will submit the information supporting a permit application to the Division in a digital format. The Division will develop an interactive electronic form for submitting all of the permit application information to the Division by email. Eventually, the Division will streamline this process by developing an interactive website for submission of the information. Processing the applications for well stimulation treatment permits represents a significant workload for the Division and electronic submission are necessary to mitigate the fiscal impact of the statutory permitting requirement. Requiring submission in an electronic format will result in an increase in openness and transparency in business and government because it will be easier for the Division to make the submissions available to the public.

Section 1783(a) states that all approved permits will include a condition that well stimulation treatment will not commence unless there is written approval from the State Water Resources Control Board and the appropriate Regional Water Quality Control Board addressing the groundwater monitoring requirements under Water Code section 10783. Public Resources Code section 3160, subdivision (d)(3)(D), provides that the Division may approve a well stimulation treatment permit in advance of compliance with Water Code section 10783, provided that the permit is conditioned on the treatment not commencing until compliance is achieved. Whether and how the operator has complied

with Water Code section 10783 is within the regulatory purview of the State Water Resources Control Board and the appropriate Regional Water Quality Control Board. The required condition under Section 1783(a) is written in broad terms to allow for the fact that compliance with Water Code section 10783 may come in different forms. Pursuant to Public Resources Code section 3160, subdivision (c), the Division will enter into a formal agreement with the Water Boards, and that agreement will address the mechanics of these parallel processes to ensure that the agencies are coordinated with regard to these requirements.

Another procedure established in Section 1783 addresses the operator's notice to the Division immediately before performing a well stimulation treatment. Public Resources Code section 3160, subdivision (d)(9), requires operators to notify the Division at least 72 hours prior to the actual start of the well stimulation treatment so that Division staff can witness the treatment. In addition to this, Section 1783 requires operators to confirm with the Division between three and fifteen hours before it is to be done. This requirement is necessary to avoid Division staff driving to a well site to witness an operation that does not occur as scheduled.

Section 1783(c) and (d) reference information sharing with agencies listed in Public Resources Code section 3160, subdivision (c), but the specifics of the information sharing will be detailed in the formal agreements required under that statute. As a matter of course, complete well stimulation treatment applications and 72-hour notifications will be shared with specified state agencies, provided the mechanics of information sharing are addressed in a written agreement.

When 72-hour notice is provided to the Division, Section 1783(e) requires that the operator indicate if actual drilling, redrilling, or rework of a well differs significantly from what was contemplated at the time that the well stimulation treatment permit was approved. If the actual drilling, redrilling, or rework of a well does differ significantly from what was contemplated at the time that the well stimulation treatment permit was approved, then the approved permit may need to be reevaluated.

The provisions of Section 1783 are each necessary to implement the permitting requirements of Public Resources Code section 3160, subdivision (d). Section 1783 provides a framework for ensuring well stimulation treatments are only conducted in accordance with the conditions of an approved permit that reflects coordinated review by the specified agencies, and that the Division is advised and has an opportunity to witness when well stimulation treatment occurs.

1783.1. Contents of Application for Permit to Perform Well Stimulation Treatment.

Public Resources Code section 3160, subdivision (d), requires operators to obtain a permit from the Division in advance of performing a well stimulation treatment. The statute also specifies minimum contents of an application for a well stimulation treatment permit, which include:

- Identification and location of the well;
- The time period during which the well stimulation treatment is planned to occur;
- A water management plan;

- A list of the anticipated identity and concentration of the chemical constituents of the well stimulation treatment fluids the operator plans to use;
- Modeling of the well stimulation treatment and identification of plugged and abandoned wells within the modeled treatment area;
- Compliance with the groundwater monitoring requirements of Water Code section 10783; and
- An estimate of treatment-generated waste materials that are not addressed in the water management plan.

The purpose of Section 1783.1 is to implement the statutory permitting requirement of Public Resources Code section 3160, subdivision (d). The permit application contents specified in Section 1783.1 reflect the statutory requirements for a permit application under Public Resources Code section 3160, subdivision (d)(1); the Division's assessment of the information that it will need to effectively evaluate a permit application; and interagency consultation, as contemplated in Public Resources Code section 3160, subdivision (b)(1)(A).

As required under Public Resources Code section 3160, subdivision (d)(1)(C), Section 1783.1(a)(23) requires that an application for a well stimulation treatment permit include a water management plan that includes an estimate of the amount of water to be used in the treatment; the anticipated source of the water to be used in the treatment; and the disposal method identified for the recovered water in the flowback fluid from the treatment. Section 1783.1(a)(23) also specifies what information must be provided regarding the source of the water to be used. That specification is consistent with the definition of "source of water" added to Public Resources Code section 3227 by the recently chaptered Senate Bill 1281.

Public Resources Code section 3160, subdivision (d)(3)(D), provides that the Division may approve a well stimulation treatment permit in advance of compliance with Water Code section 10783, provided that the permit is conditioned on the treatment not commencing until compliance is achieved. Accordingly, Section 1783.1(a)(27) allows that is sufficient if a permit application includes indication that the operator is working with the appropriate Water Board to comply with Water Code section 10783.

In addition to the permit application requirements specified in Public Resources Code section 3160, subdivision (d), Section 1783.1 requires that the well stimulation treatment permit application includes:

- Identification and contact information of the operator;
- The operator's plan for compliance with the cement evaluation required under Section 1784.2;
- The results of the evaluation and modeling required under Section 1784; and
- Identification of any CEQA documents that relate to the proposed treatment.

In addition, Section 1783.1(a)(31) states the application shall include, "Other information as requested by the Division." It is likely that questions will arise during the course of the permitting process and the purpose of Section 1783.1(a)(31) is to specify

that the Division may request additional information on a case-by-case basis as it deems necessary in a particular circumstance.

All of the information required under Section 1783.1 will be considered in the Division's review of a well stimulation treatment permit application. Section 1783.1 is necessary to clarify the statutory permitting requirements of Public Resources Code section 3160, subdivision (d) and to ensure that the Division all has the information that it needs to evaluate the well stimulation treatment permit application, including the quantifiable risk of the well stimulation treatment.

Public Resources Code section 3160, subdivision (j), imposes strict limitations on the ability to claim trade secret protection as a basis for not making required public disclosures required under SB 4. In the event that a claim of trade secret protection is asserted, Public Resources Code section 3160, subdivision (j), provides detailed procedures for the Division's handling of that claim, and Section 1788(d) indicates where those procedures can be found.

Because the evaluations required under Section 1784 are included in the permit application requirements, Section 1783.1 furthers the Division's statutory mandate under Public Resources Code section 3160, subdivision (b), of ensuring integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. Effective implementation of the statutory permitting requirement will further the Division's statutory mandate under Public Resources Code section 3106 to supervise oil and gas production so as to prevent, as far as possible, damage to life, health, property, and natural resources because it will ensure that the Division has an opportunity to evaluate whether there are risks associated with a well stimulation treatment before it occurs.

1783.2. Copy of Well Stimulation Permit; Notice of Availability for Water Testing, Sampling.

Public Resources Code section 3160, subdivision (d)(6), requires operators to hire an independent entity to provide notification to every tenant and owner of neighboring property within 1500 feet of the wellhead or 500 feet of the surface representation of a well that will have a well stimulation treatment performed on it. The statute requires operators to provide neighbor notification at least 30 days prior to commencing the well stimulation treatment and notified property owners may request water quality testing at the operator's expense. Public Resources Code section 3160, subdivision (b)(1)(B) expressly requires the Division to adopt regulations implementing the statutory neighbor notification requirement. The purpose of Section 1783.2 is to establish procedures implementing the neighbor notification requirement of Public Resources Code section 3160, subdivision (d)(6).

The purpose of Section 1783.2 is to establish clear and specific procedures to implement the neighbor notification requirement of Public Resources Code section 3160, subdivision (d)(6). Section 1783.2 reiterates the statutory neighbor notification requirements, specifies the required content of the notice, specifies acceptable methods of providing notice, and specifies recordkeeping and reporting requirements for the independent entity that provides the notification.

Section 1783.2(a)(2)(B) requires that the neighbor notification include a completed Well Stimulation Treatment Neighbor Notification Form, which is incorporated by reference. The purpose of the template form is to ensure that notification is presented in a clear fashion and includes necessary information about requesting water testing. The required Well Stimulation Treatment Neighbor Notification Form is in both English and Spanish and it includes contact information for both the Division and the State Water Resources Control Board, either of which could provide information about the subject treatment.

The Well Stimulation Treatment Neighbor Notification Form is incorporated by reference because it would be cumbersome and otherwise impractical to publish the document in the California Code of Regulations. The purpose of the form is to provide information to neighbors about pending operations, and the 14-page form does not itself specify requirements that the regulated public will need to reference. The form will primarily be accessed by the independent third party hired to conduct neighbor notification, and it will be easier for the independent third party to download the form from the Department's public website, than it would be for them to extract the form from the California Code of Regulations. In addition, due to the length of the document, it would be cumbersome to include it in the California Code of Regulations.

The provisions of Section 1783.2 are each necessary to avoid confusion on the part of operators or the independent entities hired about how to comply with the neighbor notification requirements of Public Resources Code section 3160, subdivision (d). The statutory neighbor notification requirement will ensure that people living in the vicinity have an opportunity to raise questions and concerns with the Division and the operator before a well stimulation treatment occurs, and Section 1783.2 will accomplish the Division's goal under Public Resources Code section 3160, subdivision (b) to implement the requirement.

1783.3. Duty to Hire Independent Third Party to Provide Copy of Permit, Notice of Water Testing, Sampling.

Public Resources Code section 3160, subdivision (d)(7) requires operators to pay for testing of water wells or surface water suitable for drinking located on neighboring parcels within 1500 feet of the wellhead or 500 feet of the surface representation of a well, if the neighboring surface property owner requests the water testing. The statute specifies testing is to consist of baseline testing prior to well stimulation treatment and follow-up testing after well stimulation. Testing must be conducted in accordance with standards and protocols specified by the State Water Resources Control Board, and testing must be conducted by a qualified independent third-party contractor designated by the State Water Resources Control Board. The statute further specifies that results of the water testing must be reported to the Division, the appropriate Regional Water Quality Control Board, the surface property owner, and tenants, to the extent authorized by a tenant's lease. Public Resources Code section 3160, subdivision (b)(1)(B) expressly requires the Division to adopt regulations this statutory neighbor water requirement, and the purpose of Section 1783.3 is to establish procedures implementing the water testing requirement of Public Resources Code section 3160, subdivision (d)(7).

One of the purposes of Section 1783.3 is to prevent a late request for water testing from delaying well stimulation treatment beyond the required 30-day neighbor notification period, while protecting surface property owners' right to have water testing paid for by the operator. Section 1783.3(b)(4) specifies that if the request for water testing is made within 20 days of notice being provided, then the operator must ensure that baseline sampling occurs before well stimulation treatment commences. If the surface property owner does not make a timely request for testing, then the property owner is responsible for ensuring sampling gets done before the treatment commences, and the operator is not required to delay commencement of treatment beyond the required 30-day neighbor notification period. Regardless of the timing of the request or the sampling, the operator is responsible for cost of sampling and testing requested by surface property owner in accordance with Section 1783.3.

In accordance with Public Resources Code section 3160(d)(7)(B), Section 1783.3(b)(2) specifies that water quality testing must be done in accordance with standards and protocols specified by the State Water Resources Control Board. Water Code section 10783 requires the State Water Resources Control Board to develop model criteria for groundwater monitoring by July 1, 2015, and standards and protocols for water sampling and testing will be part of that criteria. Section 1783.3(b)(7) states that the Regional Water Quality Control Board must be given advance notice of water sampling so that it may have an opportunity to witness the sampling.

In accordance with Public Resources Code section 3160, subdivision (d)(7)(C), Section 1783.3(d) states that a tenant who has lawful access to a water well or surface water may independently contract with a designated contractor, but is not entitled to reimbursement from the operator. The Well Stimulation Treatment Neighbor Notification Form includes information about how to find a list of Designated Contractors for Water Sampling.

The provisions of Section 1783.3 are each necessary to avoid confusion on the part of operators, surface property owners, or tenants about operators' responsibility to pay for water testing under Public Resources Code section 3160, subdivision (d)(7). Sections 1783.3 will accomplish the Division's goal under Public Resources Code section 3160, subdivision (b) to implement the requirements of Public Resources Code section 3160, subdivision (d)(7).

1784. Well Stimulation Treatment Area Analysis and Design.

Public Resources Code section 3160, subdivision (b), requires the Division to adopt regulations to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. The purpose of Section 1784 is to require modeling and analysis to evaluate wells and geologic features within the area of a proposed well stimulation treatment in order to ensure geologic and hydrologic isolation of the treated hydrocarbon formation.

The requirements for identifying wells within the area of a proposed well stimulation treatment are specified in Section 1784(a)(2), which provides, "The well stimulation treatment analysis shall include identification and review of all well bores located completely or partially within two times the ADSA to ensure the geologic and

hydrologic isolation of the oil and gas formation during and following well stimulation." The "ADSA" is defined in Section 1781(f) as the "estimated axial dimensions, expressed as maximum length, width, height, and azimuth, of the area(s) stimulated by a well stimulation treatment." Section 1784(a)(1) requires the operator to submit for review the modeling and analysis supporting the ADSA. A safety factor of two is used for the analysis of potential conduits within the treatment area because it provides an ample margin of error without requiring a review that extends well beyond the area influenced by the well stimulation treatment.

Although Section 1784(a)(2) requires identification of all wells within two times the ADSA, Section 1784(a)(2) does not necessarily require detailed review of casing diagrams for each of those wells. Detailed casing diagrams are required for wells within the "review area," and Section 1784(a)(2) provides that the Division may allow modification of the review area based on modeling and analysis provided by the operator that demonstrates geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatment. If modeling and analysis effectively demonstrates geologic and hydrologic isolation, then it would be an unnecessary burden to require detailed evaluation of wellbores outside the confined area. Section 1784(a)(2)(A) details information that must be provided for each well within the approved review area.

Public Resources Code section 3160, subdivision (i), requires identification of geologic features within an area of at least five times the fracture zone that have the potential to either limit or facilitate the migration of fluids outside the fracture zone. Accordingly, Section 1784(a)(3) requires assessment of all geologic features within five times the ADSA to ensure geologic and hydrologic isolation of the hydrocarbon formation during and following well stimulation. That assessment must include an evaluation of whether the geologic feature may act as a migration pathway for injected fluids or displaced formation fluids, and an assessment of the risk that the well stimulation treatment will communicate with the geologic feature. In addition, Section 1784(a)(4) requires assessment of the confining capacity of adjacent formations that the well stimulation treatment might interact with.

Section 1784(b) states that the well stimulation treatment design must utilize the analysis done under Section 1784 to ensure that the well stimulation treatment fluids or hydrocarbons do not migrate and remain geologically and hydrologically isolated to the hydrocarbon formation. Section 1784 also states that the well stimulation treatment cannot be designed to employ pressure greater than 80% of the API rated minimum internal yield of the well casing. It is necessary to specify a pressure limit relative to the API rated minimum internal yield of the casing string to ensure that a well stimulation treatment, as designed, does not overpressure the well. The standards of Section 1784 must be met regardless of groundwater quality in the area.

Section 1784 is necessary to ensure that due precautions are taken to ensure the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. It is standard practice to thoroughly evaluate a well and to design well stimulation treatments so as to prevent damage to the well or escape of fluids from the hydrocarbon zone. However, these best practices are not specified in regulation.

The requirements of Section 1784 further the Division's statutory mandate under Public Resources Code section 3160, subdivision (b), of ensuring the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. They also further the Division's statutory mandate under Public Resources Code section 3106 to supervise oil and gas production so as to prevent, as far as possible, damage to life, health, property, and natural resources. Section 1784 will have the additional benefit of increasing openness and transparency in business and government because it will result in a record of pre-well stimulation treatment evaluations that can be reviewed by other public agencies and by interested members of the public.

1784.1. Pressure Testing Prior to Well Stimulation Treatment.

Public Resources Code section 3160, subdivision (b), requires the Division to adopt regulations to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. The purpose of Section 1784.1 is to require operators to pressure test the well, and the equipment to be used for hydraulic fracturing, prior to commencing a well stimulation treatment. Pressure testing is a basic and essential precaution to determine the integrity of a well or equipment during hydraulic fracturing. It is necessary to require pressure testing of the well because pressure testing is an effective way to establish that a well is competent to withstand the pressure used during the well stimulation treatment. Likewise, pressure testing of the surface equipment is an effective way to establish that the equipment will not fail under the pressures used in the well stimulation treatment.

Section 1784.1(a) requires that all cemented casing strings and all tubing strings to be utilized in the well stimulation treatment operations shall be pressure tested for at least 30 minutes at a pressure equal to at least 100% of the maximum surface pressure anticipated during the well stimulation treatment, but not greater than the API rated minimum internal yield of the tested casing. Section 1784.1 requires that the pump, and all equipment downstream from the pump, shall be pressure tested at a pressure equal to 125% of the maximum surface pressure anticipated during the well stimulation treatment, but not greater than the manufacturer's pressure rating for the equipment being tested.

Section 1784.1 allows for pressure testing to only 100% of the anticipated pressure because there is an additional safety factor in Section 1785(b), which requires termination of the treatment if, during treatment, pressure exceeds 80% of the API rated minimum internal yield on any casing strings in communication with the treatment. If the well has been successfully pressure tested to 100% of the API rated minimum internal yield, then the termination threshold for monitoring during treatment remains at 90% of the API rated minimum internal yield of the casing. Because there is no termination threshold applicable to surface equipment during treatment, pressure testing to 125% of the anticipated pressure provides an appropriate safety margin.

Although a well may have already been pressure tested upon completion of drilling, events may occur between that time and the time of well stimulation treatment that could affect the integrity of the well. For that reason, Section 1784.1(a) requires

pressure testing must be done not more than 30 days before well stimulation, and after everything has been done to the well that could affect integrity. The operator must give the Division at least 24-hours of notice before pressure testing so that the Division will have an opportunity to witness the testing, and all pressure testing must be charted.

If there is a pressure change of 10% or more during pressure testing, then the Division must be notified and provided the pressure test charting. The casing, tubing, or equipment cannot be used until the issue is addressed to the Division's satisfaction and a successful pressure test has been done. A 10% variance threshold is a conservative indicator of potential integrity issues that allows for typical pressure gauge variance. The Division is on call at all hours to answer questions and to provide guidance to operators, and remediation of minor problems should not cause a delay.

If pressure testing is successful, then Section 1784.1(b) states that the pressure test charting must be given to the Division not less than 12 hours before beginning the treatment. It is imperative that the well casing and tubing strings are tested and verified by the Division, and with adequate planning the operator will not need to idle the rig for 12 hours.

Although the Division believes that pressure testing in advance of well stimulation treatment is a best practice that is universally employed, it is necessary to expressly require pressure testing so that the Division can verify and enforce the practice. It is necessary that the Division is provided an opportunity to witness pressure testing because first-hand observation is the only way to verify that pressure testing is done properly.

The pressure testing requirements of Section 1784.1 further the Division's statutory mandate under Public Resources Code section 3160, subdivision (b), to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. They also further the Division's statutory mandate under Public Resources Code section 3106 to supervise oil and gas production so as to prevent, as far as possible, damage to life, health, property, and natural resources. Performing a well stimulation treatment on a well that is not competent to withstand the pressure involved could cause a breach in the well that could result in contamination of groundwater, health and safety risks for workers, or loss of hydrocarbon resources.

1784.2. Cement Evaluation Prior to Well Stimulation Treatment.

Public Resources Code section 3160, subdivision (b), mandates regulations that will ensure well integrity and geologic and hydrologic isolation of the treated hydrocarbon formation during and after well stimulation treatment. In order to ensure well integrity, the purpose of Section 1784.2 is to verify that a well subject to well stimulation treatment is constructed in accordance with well construction requirements, and that the quality of cement is sufficient to ensure geologic and hydrologic isolation.

The default cement evaluation method is a cement evaluation log, but Section 1784.2 is intended to be a performance-based requirement. Another cement evaluation method may be used if it is capable of demonstrating the adequacy of the cement. The cement evaluation may be waived under an alternate cement evaluation plan if the Division is satisfied that past experience with drilling and production in the area has

proven that the method of well construction and cementing employed will ensure that there will be no voids in the annular space of the well. An alternate cement evaluation plan will not be approved by the Division unless the operator can conclusively prove that the plan will ensure zonal isolation.

Consistent with industry-standard wait time for cement to cure, Section 1784.2(a) requires cement evaluation is done at least 48 hours after cement placement. Section 1784.2(b) requires that cement evaluation results be provided to the Division at least 72 hours before commencement of well stimulation treatment and that the treatment may not proceed if the Division identifies concerns with the cement evaluation. Seventy-two hours coincides with the amount of notice an operator must give the Division before commencing well stimulation treatment, and it is an appropriate amount of time to ensure that Division staff have an opportunity to review cement evaluation results before the treatment commences. Section 1783.1(a)(20) provides that a well stimulation treatment permit application need only include a plan for completion of the cement evaluation. However, if the operator is proposing an alternative cement evaluation method under Section 1784.2(c), then the proposal must be included in the application for a well stimulation treatment permit.

If the well has cement in place beyond what is required under the applicable well construction regulation, then the operator is not required to evaluate the additional cement. Requiring evaluation of cement that is not required under the Division's well construction requirements would create a disincentive for operator cement wells beyond the minimum requirements.

The requirements of Section 1784.2 further the Division's statutory mandate under Public Resources Code section 3160, subdivision (b), of ensuring integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. They also further the Division's statutory mandate under Public Resources Code section 3106 to supervise oil and gas production so as to prevent, as far as possible, damage to life, health, property, and natural resources. Performing a well stimulation treatment on a well without verifying adequate cement would present risks of contamination of groundwater and loss of hydrocarbon resources. Section 1784.2 will have the additional benefit of increasing openness and transparency in business and government because it will result in a record of pre-well stimulation treatment evaluations that can be reviewed by other public agencies and by interested members of the public.

1785. Monitoring During Well Stimulation Treatment.

Public Resources Code section 3160, subdivision (b), requires the Division to adopt regulations to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. The purpose of Section 1785 is to require the operator to monitor during well stimulation treatments for indications that a well breach may have occurred or that fluid is not confined to the intended zone, and to require appropriate diagnostics and response if there is such an indicator.

Section 1785(a) requires the operator to monitor and record the surface injection pressure, the slurry rate, the proppant concentration, the fluid rate, and the pressure of

each annuli of the well. Section 1785(a) requires operators to record monitoring parameters during well stimulation treatment, so if Division staff are unable to witness a treatment there will be a record of the treatment for the Division to review.

Section 1785(b) specifies thresholds at which the operator must terminate the well stimulation treatment, report the incident to the Division, and conduct diagnostics. The specific thresholds are an unexpected pressure change of 20% or greater or the occurrence of a pressure in excess of 80% of the API rated minimum internal yield of a casing string in communication with the hydraulic fracture treatment. However, if pressure testing in advance of treatment was done to 100% of the API rated minimum yield of the tested casing, then the termination threshold during well stimulation treatment is 90% of the API rated minimum yield of the tested casing. For wells that do not have the surface casing annulus open to atmospheric pressure, Section 1785 requires a gauge and pressure relief device, and specifies maximum pressure relief settings. Each of the thresholds specified in Section 1785 is based upon established best practices and precautionary principles of the industry.

Regardless of whether one of the specified monitoring thresholds is surpassed, if the operator has any indication of well breach or a breach of isolation of protected water, then the operator must terminate the well stimulation treatment, report the incident to the Division, and conduct diagnostics. Although circumstances with the well may prevent the operator from conducting diagnostics immediately, the diagnostics must be done as soon as possible. The Division must be notified when diagnostics are conducted so that Division staff have an opportunity to witness the diagnostics.

If diagnostics indicate that a well breach did occur during well stimulation treatment, then the operator must immediately shut-in the well and isolate the perforated interval. In addition, the operator must provide essential information about the event to the Division and the local Regional Water Quality Control Board to facilitate incident response. The information that the operator must provide includes a description of events leading up to the well breach, the depth interval of the well breach, and an exact description of the chemical composition of the fluids in the well at the time of the well breach. In the event of a well breach, the Regional Water Quality Control Board would take the lead in the groundwater investigation and would specify what water quality testing is necessary based on the specifics of the situation. Section 1785(e) specifies that an operator cannot resume operation of a well shut-in due to breach without approval from the Division.

The State Water Resources Control Board maintains a groundwater quality database and Section 1785(f) requires that groundwater quality data submitted under Section 1785 be included in that database. The State Water Resources Control Board groundwater quality database is a public database.

Section 1785 is necessary to ensure that due precautions are taken to protect groundwater. It is standard practice to carefully monitor the pressures, rates, and concentrations occurring during a well stimulation treatment, but these best practices are not specified in regulation and therefore are not expressly required. If a well breach does occur during hydraulic fracturing, then it is necessary for the Division and the Regional Water Quality Control Board to be involved and well-apprised of the situation so that so as to ensure that the situation is effectively addressed to prevent and mitigate

any contamination of groundwater or loss of hydrocarbon resources. The information required under Section 1785 is crucial to determining the most effective approach to evaluating, monitoring, and arresting the risk of contamination of groundwater when responding to a well breach during a well stimulation treatment.

Section 1785 furthers the Division's statutory mandate under Public Resources Code section 3160, subdivision (b), to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. It also furthers the Division's statutory mandate under Public Resources Code section 3106 to supervise oil and gas production so as to prevent, as far as possible, damage to life, health, property, and natural resources. The requirements of Section 1785 will trigger diagnostic testing and reporting on a well that has been breached during well stimulation treatment, and ensure that the Division and the Regional Water Quality Control Board have an opportunity to verify and direct response to well breach situations. The information that an operator is required to report under Section 1785 will increase openness and transparency in business and government because it will result in a detailed public record of each incident.

1785.1. Monitoring and Evaluation of Seismic Activity in the Vicinity of Hydraulic Fracturing.

Public Resources Code section 3160, subdivision (b), requires the Division to adopt regulations to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. The first purpose of Section 1785.1 is to make sure that well stimulation via hydraulic fracturing does not generate seismicity that causes the public concern or damage to structures. The second purpose of Section 1785.1 is to provide assurance that fractures created during hydraulic fracturing do not encounter, and then stimulate, a hidden fault such that the fracturing fluids might find a pathway out of the anticipated fracture stimulated volume.

Section 1785.1 requires monitoring of the California Integrated Seismic Network during and after hydraulic fracturing. If an earthquake of magnitude 2.7 or greater occurs within a specified area around the well, then further hydraulic fracturing in the area are suspended until the Division, in consultation with the California Geologic Survey, determines that there is no indication of a heightened risk of seismic activity from hydraulic fracturing.

Section 1785.1 addresses the need to assess the potential for felt seismic events to result from hydraulic fracturing and does so at low cost as the monitoring of the California Integrated Seismic Network (CISN) can be done via a free website in real time.

The threshold magnitude was selected by assessment of the capabilities of the CISN in the Central Valley and other locations around the State (areas in which hydraulic fracturing is being employed or might be) to locate M 2-3 seismicity with sufficient accuracy so that the event could be located within a volume that is germane to hydraulic fracturing. At the same time there was a desire to keep the threshold as low as practical, and hence as protective as possible. The accuracy of the location of size and depth of a seismic event is directly related to the number and types of seismic

instruments in a given area, hence in many areas of the Central Valley, network density is not sufficient to allow for a lower threshold. The magnitude threshold, M 2.7, was decided based on network capabilities and the desire for the provision to be as protective as practical and at the same time high enough so that background seismicity or poorly located seismic events outside of the volume of interest would not cause an unnecessary work stoppage that could impose an undue burden of cost and time on the industry.

The second reason, assuring that conduits for the escape of fracturing fluids are not created by exciting small hidden faults within the anticipated fracture volume, speaks to the need for a review of the pattern of seismicity in which an alignment of events would suggest that a fault has been intersected by a stimulated fracture. Both reasons for the provision require a review if the threshold of M 2.7 is exceeded, and because of the concern for the escape of fluids beyond the intended zone, a review must proceed prior to any resumption of activities. Hence a waiver of any cessation of activity would undermine the very reason for the provision.

Section 1785.1 is based on sound scientific principles of rock physics and rock mechanics. In fracture theory, the stresses that build up at the tip of an advancing fracture exist ahead of the fracture by several times the width dimension of the propagating fracture. Therefore from the perspective of a single fracture, the five times the maximum length portion of the provision provides an unreasonably large margin of safety. However, as one purpose of the seismic provision is to assess the potential for fluids to find and activate a hidden fault and therefore escape from the zone of interest, as well as allow for other geologic uncertainties that affect fluid migration, the five-times fracture length margin is based on the limit of the possible extent of fluid flow under typical pressures and fluid volumes of hydraulic fracturing activities. Hence the rock volume of five times the maximum fracture length provides a large margin of safety while at the same time not making the volume so large that background seismic events or geologic variability outside any feasible volume of rock influenced by hydraulic fracturing does not create unnecessary or irrelevant impediments for industry.

The focus of Section 1785.1 on hydraulic fracturing, as opposed to other or all stimulation techniques, is based on the fact that the volumes and pressures of fluids used in hydraulic fracturing impart the largest stresses into the rocks of any stimulation technique. In fact, some stimulation techniques reduce in situ stresses. Hence the provision is again based on sound scientific principles of rock physics and mechanics and is protective of the activities that conceivably create the greatest threat to public health and safety.

A seismic provision based on seismic hazard and risk would be a more refined approach to the one proposed. However, as the risk of even felt seismicity induced by hydraulic fracturing is very low, and approaching zero for damaging seismicity, the potential benefit of a full analysis of hazard and risk is far outweighed by the cost and time necessary for developing and implementing such a robust, and quite nuanced approach, which itself would have its own limitations and will greatly increase the costs of implementation.

1786. Storage and Handling of Well Stimulation Treatment Fluids.

The purpose of Section 1786 is to ensure proper storage and handling, including appropriate spill response, for fluids associated with well stimulation treatment. Section 1786 clarifies that for facilities associated with well stimulation treatment operators must adhere to existing production facilities maintenance requirements and that well stimulation treatment fluids must be accounted for in an operator's Spill Contingency Plan. The applicability of existing secondary containment requirements to well stimulation treatment facilities is specified. The operator must also comply with all applicable requirements of other state agencies, including evaluation of wastes fluids to determine if they meet the Department of Toxic Substance Control's definition of hazardous waste. In addition, Section 1786 expressly requires fluids associated with well stimulation treatment to be stored in containers and not in sumps or pits.

Because construction of effective secondary containment may not be cost effective for facilities that will only be on site for a short period of time, Section 1786(a)(1) provides that production facilities that are in place for less than 30 days are not required to have secondary containment, but a specific spill response plan for those facilities must be detailed in the operator's Spill Contingency Plan. Already existing regulation Sections 1722(a) and 1722.9 require a Spill Contingency Plan that is designed to prevent and respond to unauthorized releases and that contains specific information about facilities and fluids on-site. If fluids on-site are not accounted for in the operator's Spill Contingency Plan, then the plan is inadequate.

Section 1786(a)(2) clarifies that the operator must comply with all federal, state, and local requirements for spill reporting and remediation applicable to the fluids and chemicals associated with well stimulation treatment. There are numerous federal, state, and local requirements for reporting and responding to unauthorized releases. The exact requirements that apply depend on various factors including what substances are involved, the volume of the release, and the setting of the incident. It would be impractical and confusing to attempt to iterate all of those requirements in the Division's regulations and it is not the Division's intent to modify those requirements. The purpose of Section 1786(a)(2) is to make a general admonition that operators must be familiar with and comply with those requirements. In addition, if a spill occurs, Section 1786(b)(6) requires the operator to submit a corrective action plan to the Division explaining what went wrong and what steps have been taken to ensure that it does not happen again.

Section 1786(a)(8) makes a detailed admonition that all fluids associated with well stimulation treatment must be evaluated and managed in accordance with the existing waste management requirements of the Department of Toxic Substances Control.

Each of the provisions of Section 1786 is necessary to ensure proper storage and handling of fluids associated with well stimulation treatment. There is widespread public concern that environmental contamination and other health and safety impacts will result from improper handling of fluids associated with hydraulic fracturing. Expressly stating that existing laws and regulations regarding storage and handling of fluids apply in the context of well stimulation treatment will assure concerned members of the public of this fact and dispel any confusion that may exist for operators.

Expressly requiring compliance with other federal, state, and local laws and regulations also allows the Division to intervene and take independent enforcement action should an operator disregard requirements administered by other regulatory agencies. It is necessary to require the use of containers for storage of fluids associated with well stimulation treatment because that is the most effective way to prevent the fluids from contaminating air, soil, or water, or otherwise posing a health and safety risk.

Section 1786 furthers the Division's statutory mandate under Public Resources Code section 3106 to supervise oil and gas production so as to prevent, as far as possible, damage to life, health, property, and natural resources by ensuring that fluids are handled with all due care and that spills and incidents are responded to effectively and proactively. In doing so, these requirements will benefit public health and safety, worker safety, and the environment.

1787. Well Monitoring After Well Stimulation Treatment.

Public Resources Code section 3160, subdivision (b), requires the Division to adopt regulations to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. The purpose of Section 1787 is to require ongoing monitoring of a well that has had a well stimulation treatment and to specify minimum standards for that monitoring.

Once a well has had a well stimulation treatment, the operator has an ongoing obligation to monitor the well for any indication of a well breach and, if there is such indication, immediately inform the Division and conduct diagnostics. If diagnostics indicate that a well breach has occurred, then the operator must immediately shut-in the well and isolate the perforated interval. In addition, the operator must provide essential information about the event to the Division and the local Regional Water Quality Control Board to facilitate incident response. The information that the operator must provide includes a description of events leading up to the well breach, the depth interval of the well breach, and an exact description of the chemical composition of the fluids in the well at the time of the well breach. In the event of a well breach, the Regional Water Quality Control Board would take the lead in the groundwater investigation and would specify what water quality testing is necessary based on the specifics of the situation. Section 1787(c) specifies that an operator cannot resume operation of a well shut-in due to breach without approval from the Division.

Required monitoring for a well that has had a well stimulation treatment includes monitoring of production pressures and annular pressures. Production pressure must be monitored at least once every two days for the first thirty days and monthly after that. Annular pressure must be reported to the Division annually, but is not required if the operator can demonstrate to the Division's satisfaction that there are no voids in the annular space. This information is necessary because it provides possible indicators of a well failure, a lack of geologic confinement, or that the well stimulation treatment did not occur according to design, each of which could result in contamination of groundwater and loss of hydrocarbon resources.

Section 1787 establishes standards and thresholds for monitoring annular pressures of a well that has been hydraulically fractured. Operators must report annular

pressures to the Division on an annual basis, but must immediately inform the Division if annular pressure exceeds 70% of the API rated minimum internal yield or collapse strength of casing, or if surface casing pressures exceed a pressure equal to: 0.70 times 0.433 times the true vertical depth of the surface casing shoe (expressed in feet). These thresholds are consistent with established industry norms and precautionary principles. For monitoring purposes, the annular valve must be kept accessible at the surface, unless the Division is satisfied that there are no voids in the annular space of the well. A pressure release device is required for the annulus and the maximum set pressure is specified. The Division may waive the requirement of a pressure release device if satisfied that the need for one is alleviated by other forms of technical analysis or by operating experience in the area. Monitoring of annular pressures is necessary because breakdown of the annulus of a well is potentially an indication of a mechanical failure of the well, which could result in contamination of groundwater and loss of hydrocarbon resources.

Section 1787 furthers the Division's statutory mandate under Public Resources Code section 3160, subdivision (b), to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments. It also furthers the Division's statutory mandate under Public Resources Code section 3106 to supervise oil and gas production so as to prevent, as far as possible, damage to life, health, property, and natural resources. Careful monitoring of a well after a well stimulation treatment provides assurance that the well has not been compromised and that there is geologic and hydrologic isolation of the formation following the well stimulation.

1788. Required Public Disclosures.

Public Resources Code section 3160, subdivision (b)(2), requires the Division to adopt regulations requiring full disclosure of the composition and disposition of well stimulation fluids, including, but not limited to, hydraulic fracturing fluids, acid well stimulation fluids, and flowback fluids. The statute provides detailed specification of the disclosure that the regulations must, at a minimum, require. Public Resources Code section 3160, subdivision (g), requires operators to publicly disclose this information on a website to be developed by the Division for this purpose.

The purpose of Section 1788 is to implement the public disclosure requirements mandated by Public Resources Code section 3160, subdivision (b)(2). Section 1788 reiterates the disclosures specified in the statute, with specification added as needed to implement the disclosure requirements. These additional specifications include:

- Identity of the operator;
- Identity, location, and depth of the well;
- The description of the productive horizon where well stimulation treatment occurred;
- Information needed to identify the source of the water used;
- Required analytics to identify the composition of water used as base fluid;
- Information needed to identify the disposition of water recovered from the well after well stimulation treatment;

- Sampling and testing specifications to identify the composition of water recovered from the well after well stimulation treatment;
- Description of the equipment and method used to determine the radioactivity of recovered well stimulation fluids;
- Specification that the location and extent of well stimulation treatment must be described for each stage of the treatment; and
- Estimated volume of well stimulation treatment fluid recovered.

All of these additional specifications are necessary to meaningful and effective disclosure of the composition and disposition of well stimulation fluids.

Public Resources Code section 3160, subdivision (b)(2)(E), requires public disclosure of "the source, volume, and specific composition and disposition of all water," and Section 1788(a)(12) implements this statutory requirement. Section 1788(a)(12)(A) specifies that "source of water" means the well(s), water supplier, or point of diversion where the water was obtained. This language is consistent with the definition of "source of water" found in recently-chaptered Senate Bill 1281 (Pavley, Chapter 561, Statutes of 2014). Sampling and testing specifications in Section 1788(a)(12) were identified by the Division, in consultation with the State Water Resources Control Board, for the purpose of providing meaningful information about composition of water without unnecessary burden to the regulated public. Section 1788(f) reflects that the Division understands that in some cases it will not be feasible to complete all required sampling and testing within the 60-day timeframe.

Section 1788(b) requires operators to submit all of the required public disclosures directly to the Division on a spreadsheet developed by the Division for that purpose. Among the required public disclosures is the identity and concentration of each chemical constituent and additive in the well stimulation treatment fluid. As required by Public Resources Code section 3160, subdivision (b), the Division will organize the public disclosures submitted by the operators and make them publicly available in a format that is easily searched and aggregated, to the extent practicable. The Division is in the process of developing a website that will more effectively relay the required disclosures to the public, and will conduct further rulemaking as needed to ensure that Section 1788 is consistent with newly developed processes.

In addition to submitting the required public disclosures directly to the Division, operators are required to post the required public disclosures to the public internet website known as FracFocus.org maintained by the Ground Water Protection Council and Interstate Oil and Gas Compact Commission (the "Chemical Disclosure Registry"). The additional disclosure to the Chemical Disclosure Registry is necessary so that activities in California are accounted for in the national disclosure registry.

Section 1788(e) states that groundwater quality data reported under Section 1788 must also be submitted to the Regional Water Quality Control Board in an electronic format that is compatible with its water quality database. This is necessary to ensure that available groundwater data is included in that database.

Public Resources Code section 3160, subdivision (j), imposes strict limitations on the ability to claim trade secret protection as a basis for not making required public disclosures required under SB 4, and it is therefore unlikely that a claim of trade secret protection will be made in the context of these regulations. In the event that a claim of

trade secret protection is asserted, Public Resources Code section 3160, subdivision (j), provides detailed procedures for the Division's handling of that claim. Section 1788(d) indicates where those procedures can be found and it is not necessary to quote those statutory provisions in the regulations.

Public Resources Code section 3234 states that well records that are required to be filed with the Division are not public record and shall be maintained as confidential information if the well is an exploratory well or if other extenuating circumstances warrant confidential treatment. Public Resources Code section 3160, subdivision (k), specifies that a well granted confidential status pursuant to Public Resources Code section 3234 is not required to disclose well stimulation treatment fluid information until the confidential status of the well ceases. Public Resources Code section 3160, subdivision (k), also provides that, notwithstanding the confidential status of a well, it is public information that a well will be or has been subject to a well stimulation treatment, but does not otherwise expressly invalidate confidential treatment of well records under Public Resources Code section 3234. Accordingly, Section 1788(c) provides that an operator is not required to disclose information found in well records subject to confidential treatment under Public Resources Code section 3234.

Public Resources Code section 3160, subdivision (c), requires the Division to enter into formal agreements with other state regulatory agencies for the purposes of coordinating regulation of well stimulation treatment. Each of the required formal agreements will address confidential information sharing.

Section 1788 accomplishes the statutory goal of adopting regulations requiring full disclosure of the composition and disposition of well stimulation fluids, including, but not limited to, hydraulic fracturing fluids, acid well stimulation fluids, and flowback fluids. Section 1788 has the further benefit of increasing openness and transparency in business and government because the public will have easy access to comprehensive information regarding individual well stimulation treatments that have occurred statewide. The reporting required under Section 1788 is necessary for the health, safety, and welfare of the people of the state because the availability of complete information about well stimulation treatments will facilitate evaluation of the safety and efficacy of well stimulation treatment.

1789. Post-Well Stimulation Treatment Report.

The purpose of Section 1789 is to make sure that, in addition to the preliminary information required in other parts of the regulations, and the public disclosures required under Section 1788, the Division receives the information that it needs to verify and evaluate what happened during the well stimulation treatment.

Within sixty days after a well stimulation treatment, the operator is required to submit a report to the Division with key information about the results of the well stimulation treatment. The report must include the recording of pressure monitoring during treatment, production pressure monitoring from the first thirty days after treatment, the date and time each stage of the treatment occurred, and how the operations differed from what was anticipated in the treatment design. The 60-day timeframe is consistent with the timeframe for compliance with the public disclosure requirements after cessation of the well stimulation treatment.

The post-well stimulation treatment report required by Section 1789 is necessary to a complete record and understanding of well stimulation treatments. This report will assist the Division in verifying that operations were conducted in accordance with the laws and regulations governing the process and it will allow the Division to evaluate whether the approach to modeling and designing well stimulation treatment is proving accurate.

The post-well stimulation treatment report is necessary for the health, safety, and welfare of the people of the state because the Division must have complete information about the well stimulation treatments to effectively evaluate their safety and efficacy. For the same reason Section 1789 furthers the Division's statutory mandate under Public Resources Code section 3106 to supervise oil and gas production so as to prevent, as far as possible, damage to life, health, property, and natural resources. Because this information will also be available for public inspection, Section 1785 will increase openness and transparency in business and government by providing additional information about well stimulation treatment operations that have occurred.

NONSUBSTANTIAL CHANGES

The following nonsubstantial or grammatical changes have been made in the final text of the regulations that are not included in the originally proposed regulations or the modifications to the proposed regulations when they were made available for public comment:

- The modifying clause at the end of Section 1761(a)(1)(A) has been moved to the beginning of Section 1761(a)(1)(A)(i) and (ii). This grammatical correction makes clear that the clause modifies subparagraphs (i) and (ii), but not (iii). Subparagraph (iii) would be nonsensical if the modifying clause applied to it.

- The Acid Volume Threshold calculation in Section 1761(a)(3) was edited to correct an error in the grammar of the formula that would have resulted in porosity being factored incorrectly. As explained in the Division of Oil, Gas, and Geothermal Resources Discussion of Calculated Volume Threshold, page 4, "The Acid Volume Threshold is determined on a case-by-case basis by multiplying bulk volume by formation porosity (void space), and subtracting the wellbore volume which provides an estimated maximum volume of fluid/acid that may occupy the porosity in the formation if all indigenous fluid were to be displaced." In other words, the AVT is based on the volume of the donut-shaped area around the wellbore, but not the volume in the wellbore itself, with the volume being multiplied by the formation porosity.

Various stakeholders brought it to the Division's attention that, as written, the Acid Volume Threshold calculation made available for public comment on October 9, 2014 applies the porosity multiplier before subtracting the volume inside the wellbore from the total volume. The result of this error would be that porosity would be factored for the volume surrounding the wellbore and the volume within wellbore. This would mean that the impact of porosity would be inflated, inconsistent with the intent and

theory of the calculation, as explained in the Division of Oil, Gas, and Geothermal Resources Discussion of Calculated Volume Threshold, that the Acid Volume Threshold reflects the volume of acid that would extend 36 inches from the wellbore.

In addition to rearranging the formula so that porosity is correctly factored, the word “diameter” was added for clarity, US gallons was specified for clarity, and a missing parenthesis was added.

- An erroneous cross reference in Section 1761(a)(1)(ii). The cross reference to Section 1777.4(d) was corrected to be a cross reference to Section 1777.4(e).

- The clarification language in Section 1761(b)(3) has been copied to Section 1780(b). This change in no way alters any requirements but prevents any possible confusion that Section 1780(b) somehow differs from Section 1761(b)(3).

- A typo was corrected in Section 1781(a). “Definition” was replaced with “definitions.”

- A non-substantive change was made to Section 1782(b) for the sake of clarity. The words “the intent of” were deleted from the provision to avoid confusion where the intent of an applicable well construction requirement is not expressly stated.

- A grammatical change was made to Section 1782(a)(7). The statement, “The well stimulation treatment will not damage the well casing, tubing, cement, or other well equipment, or would otherwise cause degradation of the well’s mechanical integrity during the treatment process” is changed to, “The well stimulation treatment will not damage the well casing, tubing, cement, or other well equipment, or would <u>not</u> otherwise cause degradation of the well’s mechanical integrity during the treatment process.”

- The incorporation by reference in Section 1783.2(a)(2)(B) of the Well Simulation Treatment Neighbor Notification From (1/15 version) is changes to an incorporation by reference of the Well Simulation Treatment Neighbor Notification From (7/15 version). The differences between the 7/15 version of the form and the 1/15 version of the form are nonsubstantial and the requirement to use the form is not materially altered. The Well Simulation Treatment Neighbor Notification From provides information to the recipient about the mechanics of requesting water testing, and the 7/15 version of the form includes corrections to that information. In addition, the 7/15 version of the form includes a phone number for contacting the Division with questions. The additions and corrections of the information provided in the form does not materially alter any requirement or right.

- An incorrect cross reference on Section 1783.2(a)(3) was corrected. The reference to Section 1783.2(h) is corrected to be a reference to Section 1783.2(i).

- A non-substantive change was made to Section 1783.3(b)(4)(A) for the sake of clarity and to avoid duplication. The words “moves expeditiously and” were deleted because they are potentially confusing and are an unnecessary addition to the

statement that the property owner must make "necessary accommodations to enable the collection of baseline measurements without undue delay."

- "Division" was capitalized in section 1785.1(b)(1).
- The word "of" was inserted in Section 1787(b)(3) in order to make the statement grammatically correct.

ALTERNATIVES CONSIDERED

During the summer of 2012 the Department conducted a statewide listening tour to better understand public concerns about hydraulic fracturing. In December 2012, the Department released an initial set of draft regulations for discussion purposes and, during spring of 2013, the Department conducted a statewide series of day-long public workshops to solicit input on the draft regulations. Throughout this process, the Department has been meeting and discussing this area of regulation with the regulated industry, other public agencies, environmental groups, concerned members of the public, and members of the Legislature.

With the passage of SB 4, the Department has built upon this work to ensure that the proposed regulations accomplish each of the express rulemaking mandates of the new legislation. In particular, the scope of the Department's regulations has been expanded so that they address not only hydraulic fracturing, but other forms of well stimulation treatment as well.

In the course of developing the originally proposed regulations, the Department considered and rejected various alternative approaches, and the originally proposed regulations were revised twice in response to feedback received in ten public comments hearings held throughout the state, and tens of thousands of public comments submitted in written format.

No alternative considered by the Department to the final regulations would be more effective in carrying out the purpose for which the regulations are proposed; as effective and less burdensome to affected private persons than the adopted regulations; or more cost effective to affected private persons and equally effective in implementing the statutory policy or other provision of law. Following is supporting information for this determination and explanation setting forth reasons for rejecting proposed and considered alternatives, including alternative that might lessen the adverse economic impact on small businesses:

- The Department considered but rejected removing or limiting the availability of single-project authorization. The Department determined that removing or limiting the availability of single-project authorization would not be as effective in implementing the statutory policy and would not be more cost effective to the affected private persons, in this case, oil and gas operators. In either scenario, Division staff would review and scrutinize each permit application equally. By allowing the operators to combine permit applications and submit the package as a single-project, the operator will be able to potentially achieve economic savings associated with the costs of submitting permit applications separately.

- The Department considered but rejected employing an acid concentration threshold to identify acid treatment as exempt from regulation under SB 4. The Department determined that acid concentration is not an effective basis for distinguishing well stimulation treatment from other routine well operations. Instead, the Division adopted an acid volume threshold, to be calculated for each treatment, that will assist in determining which acid-related well activities are considered well stimulation treatment and need to be regulated as mandated by SB 4. The acid volume threshold will be more effective in carrying out the purposes of these regulations because volume of fluid is a better indicator of the effects of a treatment.

- The Department considered but rejected not specifying in regulation information to be submitted for well treatments that do not meet the definition of a well stimulation treatment. Public Resources Code section 3213 requires that acid treatment data be included in the well history. Section 1777.4 implements that statutory requirement by specifying certain information that must be included in the acid treatment data. The further purpose of Section 1777.4 are to create a record that the Division can use to verify that treatments are correctly identified as not being a well stimulation treatment. Operations involving pressure to the well are also included in Section 1777.4 for the purpose of generating a record for verification.

- The Department considered but rejected requiring the same documentation for well treatments that do not meet the definition of a well stimulation treatment as is required for a well stimulation treatment. The Department determined not requiring the same documentation for well treatments that do not meet the definition of a well stimulation treatment as is required for a well stimulation treatment to be more effective in carrying out the purpose for which the regulations are proposed. The documentation the Department is requesting of well treatments that do not meet the definition of a well stimulation treatment is sufficient in order to meet the statutory requirements in SB 4, as well as to better ensure there is no underreporting of well stimulation treatments in the state.

- The Department considered but rejected specifying a timeframe for the Division's review of an application for a well stimulation treatment permit. The Department determined not specifying a timeframe for the Division's review of an application for a well stimulation treatment permit to be more effective in carrying out the purpose for which the regulations are proposed. Senate Bill 4 explicitly outlines various requirements and seeks various assurances before a permit application is to be approved that are meant to protect public health and the environment. Senate Bill 4 does not consist of an explicit timeframe for the Department to review an application, and Public Resources Code section 3160, subdivision (d)(2)(B), expressly states that the timeframe for response in Public Resources Code section 3203 does not apply to review of an application for a well stimulation treatment permit. It is the Department's intent to perform a complete and thorough review of an application in a timely manner but without any arbitrary deadlines that would compromise the public health and environmental protections outlined in statute.

- The Department considered but rejected requiring more and different kinds of information in an application for a well stimulation treatment permit. The Department determined not requiring more and different kinds of information in an application for a well stimulation treatment permit to be more effective in carrying out the purpose for which the regulations are proposed. The minimum permit application contents specified in the final regulations reflect the statutory requirements for a permit application under Public Resources Code section 3160, subdivision (d)(1); the Division's assessment of the information that it will need to effectively evaluate a permit application; and interagency consultation, as contemplated in Public Resources Code section 3160, subdivision (b)(1)(A).

- The Department considered but rejected requiring notification of pending well stimulation treatment to neighbors in a wider area than what is specified in SB 4. The Department determined not requiring notification of pending well stimulation treatment to neighbors in a wider area than what is specified in SB 4 to be more effective in carrying out the purpose for which the regulations are proposed. Senate Bill 4 explicitly defines the area of neighbors that are to be notified of a pending well stimulation treatment operation. The Department has determined that the area defined in SB 4 is sufficient in order to meet the statute's goals of promoting transparency, as well as the protection of public health and the environment by way of providing water testing options.

- The Department considered but rejected requiring testing of neighbor's water wells and surface water, even if testing is not requested by the neighboring property owner. The Department determined not requiring testing of neighbor's water wells and surface water, even if testing is not requested by the neighboring property owner to be more effective in carrying out the purpose for which the regulations are proposed. Senate Bill 4 explicitly requires water testing only in instances when a property owner requests such testing.

- The Department considered but rejected requiring ongoing testing of neighbor's water wells and surface water. The Department determined not requiring ongoing testing of neighbor's water wells and surface water to be more effective in carrying out the purpose for which the regulations are proposed. Ongoing monitoring is explicitly considered under Water Code section 10783, which requires the State Water Resources Control Board to develop groundwater monitoring criteria to be followed by oil and gas operators for certain well stimulation treatment operations. Such criteria will determine the appropriate frequency and duration of the monitoring.

- The Department considered but rejected requiring secondary containment for all equipment associated with well stimulation treatment, regardless of how long it is on-site. The Department determined that construction of effective secondary containment may not be cost effective for facilities that will only be on site for a short period of time. The regulations provides that production facilities that are in place for less than 30 days are not required to have secondary containment, but a specific spill response plan for those facilities must be detailed in the operator's Spill Contingency Plan.

- The Department considered but rejected requiring that pressure testing be done not more than 24 hours before commencing well stimulation treatment. The Department determined that allowing pressure testing to be done more than 24 hours before treatment would be as effective in carrying out the purpose of the regulation, and less burdensome to affected private persons. The purpose of Section 1784.1 is to ensure the integrity of the well and equipment at the time that the well stimulation treatment is conducted. Although a well may be pressure tested upon completion of drilling, events may occur between that time and the time of well stimulation treatment that could affect the integrity of the well. Section 1784.1(a) has been revised to allow that the pressure testing may done as much as 30 days before well stimulation treatment, provided that no operation is subsequently performed that could affect well or equipment integrity.
- The Department considered but rejected requiring a radial cement evaluation log as part of the evaluation for every well stimulation treatment. The Department determined that the purposes of the regulation could be achieved without prescribing a specific technology. Although a radial cement evaluation log is an effective method for determining the adequacy of cement in the well, other equally effective technologies are available. In addition, where there is extensive geologic knowledge of area from past experience drilling and constructing wells, the adequacy of cement can be demonstrated through adherence to well construction techniques that have been proven to be successful in that area.

- The Department considered but rejected requiring cement evaluation to be included in an application for a well stimulation treatment permit. Requiring completion of cement evaluation prior to application for a permit for well stimulation treatment would not be as effective for implementing statutory policy and it would be more burdensome for affected private persons. Requiring completion of cement evaluation prior to application for a permit for well stimulation treatment would mean significant and unnecessary delays between completion of drilling operations and commencement of well stimulation treatment. It would also make it impossible to apply for well stimulation treatment permit concurrent with notice of intent to drill, which would be contrary to Public Resources Code section 3160, subdivision (d)(2). Section 1784.2 of the regulations requires that documentation of the cement evaluation shall be provided to the Department not less than 72 hours before commencement of a well stimulation treatment. If the Division identifies a concern with the cement evaluation, the well stimulation treatment shall not commence until the concern has been addressed to the Division's satisfaction.

- The Department considered but rejected various alternative approaches to well monitoring after well stimulation treatment, some requiring less monitoring and some requiring more. Well monitoring after a well stimulation is the most effective way to verify continuing well integrity and geologic and hydrologic isolation. At the same time, such monitoring requires an investment by operators in new equipment and additional staff time. The proposed regulations require a minimum level of well monitoring that will effectively verify well integrity and geologic and hydrologic isolation. In addition to the well monitoring required under the proposed regulations, Public

Resources Code section 3160, subdivision (d), requires operators to have a groundwater monitoring plan for a well subject to a well stimulation treatment.

- The Department considered but rejected requiring operators to employ micro-seismic monitoring equipment during hydraulic fracture treatments. Although micro-seismic monitoring equipment may be used in the course of doing the modeling required under the proposed regulations, prescribing the use of this technology is not necessary to achieve the purposes of these regulations. Especially in established fields where there is knowledge of the geology, micro-seismic monitoring equipment may have already been used, and other technologies and modeling techniques can be used instead of or in addition to micro-seismic monitoring to achieve the results. Micro-seismic monitoring technology may be employed by operators to achieve the performance standard under Section 1784 of demonstrating that wells and geologic features in the area of the treatment will not compromise geologic and hydrologic isolation.

- The Department considered but rejected using a uniform radius as the basis for determining the area of review for potential conduits in the area of a proposed well stimulation treatment. The Department determined the use of a customized area analysis, as opposed to a uniform radius analysis, as the basis for determining the area of review for potential conduits in the area of a proposed well stimulation treatment would be more effective in carrying out the purpose for which the regulations are proposed. Section 3160(b)(1)(A) of the Public Resources Code requires regulations that "…ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments…" The customized area analysis will provide incentive for operators to conduct and share high-quality geologic modeling and analysis and allow Division staff to focus its analysis on potential conduits within the treatment area that are of greater risk or concern.

- The Department considered but rejected both lesser and greater safety factors for the well stimulation treatment radius analysis. The Department determined rejecting both lesser and greater safety factors for the well stimulation treatment radius analysis would be more effective in carrying out the purpose for which the regulations are proposed. A safety factor of two is used for the analysis of potential conduits within the treatment area. This provides an ample margin of error without requiring a review that extends well beyond the area influenced by the well stimulation treatment. A safety factor of five that is used for review of geologic features in the area and for determining whether adjacent formations must be evaluated, consistent with Public Resources Code section 3160, subdivision (i).

- The Department considered but rejected allowing fluids associated with well stimulation treatment to be stored in lined pits or sumps. The Department determined not allowing fluids associated with well stimulation treatment to be stored in lined pits or sumps would be more effective in carrying out the purpose for which the regulations are proposed. This alternative would not have been as effective because it is difficult to verify the efficacy of the lining in a pit or sump, and because fluids stored in sumps or pits are more exposed to the environment.

- The Department considered but rejected including more and different kinds of information in the required public disclosures after well stimulation treatment. The Department determined including more and different kinds of information in the required public disclosures after well stimulation treatment would be equally effective in implementing the statutory policy but would not be more cost effective to the affected private persons, in this case, oil and gas operators. Senate Bill 4 specifically requires what kinds of information shall be disclosed. The Department has determined that these specified pieces of information are sufficient in order to meet the statute's goals of promoting transparency and collecting the information needed for the proper regulation of well stimulation activities.

LOCAL MANDATE

This adoption of this rulemaking action does not impose a mandate on local agencies or school districts.

CONSISTENCY WITH FEDERAL REGULATIONS

As explained in the initial rulemaking proposal, the Department considered related federal regulations to avoid unnecessary duplication or conflicts. To the extent that these regulations differ from federal regulations, the differing regulations are authorized by law and are justified by the benefit to human health, public safety, public welfare, or the environment.

The general exclusion of hydraulic fracturing from the U.S. Safe Drinking Water Act in no way precludes the state from regulating hydraulic fracturing or any other form of well stimulation treatment. To the extent that the SDWA does apply, the proposed regulations are consistent with the federal law and the proposed regulations will effectively prevent well stimulation treatment from endangering underground sources of drinking water.

ECONOMIC IMPACTS

The Department has made an initial determination that the adoption of these regulations may have a significant, statewide adverse economic impact directly affecting business, including the ability of California business to compete with businesses in other states. The Department's Economic Impact Analysis for the proposed regulations anticipates that there will be significant initial and ongoing costs associated with the requirements for cement evaluation; well stimulation treatment radius analysis; pressure testing prior to well stimulation treatment; storage and handling of well stimulation fluids, including storage of fluids in contained systems; and monitoring after well stimulation treatment. As discussed above, each of these requirements is necessary to accomplish the statutory goals of Public Resources Code sections 3106 and 3160. No alternative

considered by the Department would be more effective in carrying out the purposes of the proposed regulations or would be as effective but less burdensome to affected private persons than the proposed regulation.

Given the economic context of well stimulation treatments, the added economic impacts associated with complying with the proposed regulations will not deter operators from performing future well stimulation treatments. For these reasons, the Department has made the following determinations:

- The proposed regulations will not affect the creation or elimination of jobs within the State of California.
- The proposed regulations will not affect the creation of new businesses or the elimination of existing businesses with the State of California.
- The proposed regulations will not affect the expansion of businesses currently doing business in the State of California.
- The proposed regulations will not affect the ability of businesses within California to compete with businesses in other States.

The proposed regulations satisfy the Division's statutory mandate to prevent damage to life, health, property, and natural resources by ensuring that wells are properly drilled, operated, repaired, and plugged and abandoned; and to allow, with Division approval and oversight, the oil and gas industry to utilize all methods and practices known to the oil industry for the purpose of increasing the ultimate recovery of underground hydrocarbons. Also, the proposed regulations satisfy the statutory goals of SB 4 by addressing the well stimulation permit application process, acid concentration thresholds, construction of wells and well casings to ensure integrity of wells, well casings, and the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatments, and full disclosure of the composition and disposition of well stimulation fluids, including hydraulic fracturing fluids, acid well stimulation fluids, and flowback fluids, and the distinction between well stimulation and underground injection projects. Further, the Department has determined that the proposed regulations will result in nonmonetary benefits such as protection of public health and safety, worker safety, environmental safety, and transparency in business and government. Specifically, the benefits are as follows:

- Clarity for the Division, operators, and the public regarding which set of regulations oversee a specified oil and gas operation.
- A better-informed public that will know when and where well stimulation is occurring, and be able to obtain information specific to a completed well stimulation treatment.
- The Division will receive comprehensive information regarding the integrity of a well, information regarding the integrity of wells near a well stimulation treatment, and geologic information regarding the area around the well prior to a well stimulation treatment, which will result in assurances that well stimulation will be completed safely.

- Operators will be provided with clear directives regarding when to terminate a well stimulation treatment, how to respond in the case of a well failure, and what information must be collected to ensure that future well failures are preventable.
- Assurances that all well stimulation fluids will be handled safely and that spills and incidents will be responded to effectively and proactively.

DOCUMENTS RELIED UPON

The Department relied upon the following documents in proposing this rulemaking action:

- The Department's Economic Impact Analysis and STD 399 for the proposed regulations.
- *Division of Oil, Gas, and Geothermal Resources Discussion of Calculated Volume Threshold*
- API Technical Report 10TR1, Cement Sheath Evaluation, Second Edition, September 2008.
- Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids or Carbon Dioxide, API Recommended Practice 1110, 5th Ed., June 2007.
- Model Regulatory Framework for Hydraulic Fractured Hydrocarbon Production Wells, Environmental Defense Fund (EDF) and Southwestern Energy, Deliberative Draft of December 2, 2010.
- Economides, M.J., and K.G. Nolte, eds 2000. *Reservoir Stimulation*. 3rd ed. Houston: Schlumberger Educational Services.
- Grubb, W.E. and F.G. Martin, 1963. *A Guide to Chemical Well Treatments*. Petrol. Eng. Reprint Series.
- Guerard, B., 1984. *Evaluation and Surveillance of Water Injection Projects.* Pub. No. M13. California Department of Conservation Division of Oil and Gas.
- Harris, O.E., Hendrickson, A.R., and Coulter, A.W., 1966. *High-Concentration Hydrochloric Acid Aids Stimulation Results in Carbonate Formations*. J Petrol Technol, Vol. 18, No. 10. Pg 1291-1296.
- Kaabi, A.A., "Stimulate the Flow." 2003. *Middle East & Asia Review, Vol. 4*.
- King, G.E., 1986. *Acidizing Concepts – Matrix vs. Fracture Acidizing*. J Petrol Technol, Vol. 38, No. 5. Pg 507-508.

RESPONSE TO PUBLIC COMMENTS

Due to the volume of public comments received, summaries of and responses to the public comments received are compiled in three separate documents. Public comment summaries and responses for the 60-day public comment period held from November 15, 2013 to January 14, 2014 can be found under Tab "O" in the rulemaking file. Public comment summaries and responses for the 45-day public comment period

held from June 13, 2014 to July 28, 2014 can be found under Tab “P” in the rulemaking file. Public comment summaries and responses for the 15-day public comment period held from October 9, 2014 to October 24, 2014 can be found under Tab “Q” in the rulemaking file. These three separate documents are all hereby incorporated by reference into this document.