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California State Grange - Camp Nast Assocs. (CNA), LLC - Carpinteria Valley Association
Citizens Coalition for a Safe Community Citizens for Responsible Oil & Gas - Clean Water Action
Earthworks - Environmental Defense Center - Environmental Working Group
Fracking, Oil and Gas Committee, Angeles Chapter, Sierra Club - Los Padres Forest Watch
Mainstreet Moms - Medicine Lake Citizens for Quality Environment
Mount Shasta Bioregional Ecology Center - Natural Resources Defense Council - SanDiego350.org
Santa Barbara County Action Network - Sierra Club California - Sierra Club Los Padres Chapter
The Wildlands Conservancy - Wholly H2O

January 14, 2014

Department of Conservation
801 K Street, MS 24-02
Sacramento, CA 95814
DOGGRregulations@conservation.ca.gov
ATTN: Well Stimulation Regulations

Re: Public Comments: SB 4 Well Stimulation Treatment Regulations

On behalf of our hundreds of thousands of members and supporters, we submit these comments on the Senate Bill 4 (SB 4) Well Stimulation Treatment Regulations. This comment letter is signed by and represents the combined input of numerous organizations (hereafter referred to as the "Coalition"). Over the last two years, many of our organizations have provided numerous public and informal comments, recommendations, and suggestions in attempts to strengthen the regulatory framework for hydraulic fracturing, acidizing, and all forms of well stimulation. We appreciate the continued opportunity to engage in this process and provide feedback.

We strongly urge the adoption of the most stringent protections possible, to go beyond the minimum standards of SB 4. While the Legislature, through the passage of SB 4, has compelled the state to adopt regulations with some basic, minimal guidelines specified, state law requires DOGGR to "prevent, as far as possible, damage to life, health, property, and natural resources."¹ This mandate must be reflected in all state policies related to well stimulation including the Division's proposed regulations.

Our organizations are united in the belief that DOGGR can only meet the legal mandate by imposing a moratorium on well stimulation. Industry is poised to rapidly expand its use of highly controversial well stimulation techniques to extract oil and gas throughout the state, yet there is not a comprehensive science and knowledge base to assess the expected impacts to our state's

¹ California Public Resources Code, Section 3106

health, water, air, climate, natural resources, environmental quality, seismically sensitive lands and communities, and the related social and environmental justice issues. The absence of science and reporting occurs in a context of a currently inadequate regulatory environment, including documentation and reporting, and thereby enforceable safeguards. Under SB 4 and the emergency regulatory power granted for the interim period by that statute, and the existing power under Pub. Res. Code § 3106, the Division clearly has the authority to implement the precautionary principle, and put an immediate halt to well stimulation projects. We strongly urge a moratorium on all well stimulation and the immediate implementation and completion of an independent scientific review.

Although we view these regulations as inadequate in many regards, we acknowledge progress made since the release of the "discussion draft" regulations on hydraulic fracturing in December 2012. We note progress made in the following areas:

- Regulations now address most forms of well stimulation and completion techniques, such as acid matrix stimulation, in addition to hydraulic fracturing.
- The Division must affirmatively approve permits prior to well stimulation.
- Advanced notice to neighbors, including tenants, will be required prior to well stimulation.
- Disclosure and approval of sources and volumes of water used in well stimulation and disposition, and composition of wastewater, including flowback and produced water associated with well stimulation operations.
- Groundwater testing performed prior to well stimulation operations to establish baseline water quality, and subsequent to well stimulation, with monitoring plans requiring certification from the appropriate Regional Water Board.
- Elimination of secrecy of the identities of chemicals used in well stimulation, and a process for requiring the Division to verify all trade secret claims.
- Public disclosures must be posted on a state-run website, instead of a nationwide, non-government and unverified site such as FracFocus.

While the draft regulations display a number of improvements over the existing and previously proposed regulations, they fall short of providing adequate and enforceable safeguards for the risks of well stimulation treatments and the potential increase in drilling and associated activities.

In addition to enacting a moratorium pending the completion of environmental studies and the evaluation of risks regarding well stimulation techniques, a number of issues related to the proposed regulations, and some not addressed by the proposed regulations, are necessary to

make the regulations more protective of health, safety, environmental quality, and natural resources. The proposed regulations must:

- Specify that full compliance with the California Environmental Quality Act (CEQA) be met through the completion of field-by-field and well-by-well environmental reviews, and affirm the statement in Pub. Res. Code § 3161(4)(C) that nothing in these provisions “prohibits a local lead agency from conducting its own EIR”;
- Specify delineation and connection of regulatory authority among all state, regional, and local agencies, as mandated under SB 4. Regulations must formalize agencies’ jurisdictions and duties and thereby facilitate more complete and coordinated regulatory coverage for all aspects of well stimulation. Responsible agencies must have formal agreements with other agencies before implementation;
- Expand the scope of the regulations to cover all forms of well stimulation regardless of penetration distance from the well-bore or acid concentration. The intent of SB 4 was to regulate all forms of well stimulation; as proposed, the regulations may leave some forms of well stimulation unregulated;
- Broaden and redefine the definition of “protected water” to include waters of all current and potential beneficial uses, consistent with the Clean Water Act, the Safe Drinking Water Act, and the Porter-Cologne Water Quality Control Act;
- Provide air quality protections, including closed-loop gas control systems, monitoring, containment, and restrictions, on volatile organic compounds (VOCs), air toxics, and greenhouse gas emissions;
- Because of potential increased volumes of wastewater due to unconventional drilling methods, the Division should examine the current methods of produced water and flowback disposal, and strengthen all related regulatory programs to ensure protection of surface and groundwater resources and reduce the risk of induced seismicity;
- Eliminate injection of dangerous chemicals, and promote the use of food-grade and other benign additives, including a prohibition on the injection of any distillate hydrocarbon, BTEX, and other hydrocarbons;
- Require microseismic monitoring to establish baseline ground movement, and monitor seismic activity and post-stimulation seismicity in the surrounding area;
- Require complete compliance with all notification, disclosure, and monitoring for confidential wells that receive well stimulation treatments;
- Prohibit stimulation in, under, or around sensitive areas, including but not limited to, the Pacific Ocean (offshore oil platforms), coastal bays and estuaries, coastal zones draining to the ocean, bays, or estuaries, near residential areas, sensitive receptors (hospitals, schools, daycare facilities, elderly housing and convalescent facilities),

sensitive ecosystems, wetlands, critical watersheds, groundwater recharge areas, national forest lands, national monuments, national wildlife refuges, state ecological reserves, areas classified as “environmentally sensitive” pursuant to 14 C.C.R. §1760, and known fault zones;

- Require operators to prepare Injury Illness Prevention Programs prior to well stimulation to protect workers’ health and safety.

As California continues to move forward with developing regulations on well stimulation, certain policies and regulations in other other states and local jurisdictions should be examined for examples of how the Division can provide greater protections. The Governor has stated that California will have the most stringent regulations in the U.S., so we include the following list of other states and local justisdictions which have implemented specific policies that are more protective than the proposed regulations.

- New York and Maryland have implemented moratoria on hydraulic fracturing while risks to health and the environment are examined;
- Vermont has banned the practice outright;
- Pennsylvania assumes water contamination is the presumed fault of any stimulations unless an operator has conducted sampling and analysis;
- Wyoming regulations require ground and surface water monitoring within one-half mile of wells at various intervals before, during, and after spudding and casing, and monitoring for air pollutants near oil and gas production sites;
- Alaska regulations require water monitoring within one-half mile from the well head and the well path before and after treatments, shorter notice/reporting periods, cement-evaluation logging, envelope rather than radius models, and detailed characterization of each treatment stage along the well; and
- Many state and local jurisdictions have implemented setbacks from sensitive receptors. In Dallas, for example, no drilling is allowed within 1,500 feet of homes, schools, churches, or other protected sites.

In addition to these general comments, we respectfully submit the following specific comments on each section of the regulations. These comments use the following format: Coalition narrative comment text in regular font; text of the Division proposed regulations in normal indented font; ~~recommended deletions in strikethrough~~; Recommended additions underlined.

1751. Single-Project Authorization.

The “single-project authorization” element destroys the current regulatory and permitting structure. Stimulation treatment “applications” are isolated from other permits to drill, rework, and abandon, even though stimulation was previously included in the Notices of Intent (NOI). A single project authorization must include the linkage of the Application for treatment and the Notice of Intent to drill or rework, along with a separate public notice as to when the treatment activities will commence.

All existing and new well construction and reconstruction are processed based on single-well NOI's, with sometimes up to 20 wells and NOIs submitted at one time, a ten-day review period, and default approval of the permit unless supplements are required and requested within the review period.

Grouping is not currently required for the entire process of drilling, redrilling, or other works and completion for the entire well. Requiring grouping for only one phase in a well construction is neither reasonable nor efficient.

We recommend the following amendments:

- (a) For the purposes of this section, “single-project authorization” shall mean a single Division approval for multiple applications for permits to perform up to a total of ten (10) well stimulation treatments as part of and/or notices of intent to drill or rework wells within a single calendar year and a single lease, reservoir/pool, or field of up to 640 acres total area of surface or subsurface operations which has been reviewed and assessed in appropriate local certified CEQA compliance documents. CEQA Compliance shall require Programmatic EIR for Division delineated Fields under current Unit/Field Rules practice.
- (b) A request for a single-project authorization shall include:
 - (1) Identification of each of the applications and notices that are part of the request;
 - (2) The applications and notices that comprise the request for a single-project authorization;
 - (3) Division approved permits and histories of wells for all grouped wells for stimulation treatments;
 - (4) Certifications of CEQA compliance for all related drilling, reworking, and/or stimulation.
- (c) The Division will specify what operations are approved by a single-project authorization and the conditions under which the operations are approved.

(d) Operations approved by a single-project authorization that have not commenced within one calendar year shall not be commenced without first obtaining a new approval for those operations and new conditions as required or appropriate from the Division.

(e) The Division may incorporate the provisions for stimulation treatment within the notice and permitting for each well construction (Permit to Drill) and reconstruction (Permit to Rework).

(f) For the purposes of this section, “single unit authorization” may be considered through a single Division annual approval for multiple applications, notices, and permits to perform well stimulation treatments, drilling, or reworking of wells for a single calendar year in a single field or other designated unit of less than 640 acres total area of surface or subsurface operations which has been reviewed and assessed in appropriate local certified CEQA compliance documents and which shall replace any previous Field/Unit Rule for the same field/unit.

1761. Well Stimulation and Underground Injection Projects.

The term "well stimulation treatment," combined with the “applicability” definition in Section 1780, is too narrowly defined in the draft regulations and must be amended in the final regulations. In particular, the definition should not limit the regulations to treatments that penetrate a formation more than 36 inches from the well-bore, or that use acid concentrations of more than 7% (see Section 1780). These thresholds are arbitrary and have no basis in the enabling legislation.

SB 4 and Section 3157(a) define “well stimulation treatment” as follows: “For the purposes of this article, ‘well stimulation treatment’ means any treatment of a well designed to enhance oil and gas production or recovery by increasing the permeability of the formation. Well stimulation treatments include but are not limited to, hydraulic fracturing treatments and acid well stimulation treatments.” We support an amended definition of “well stimulation treatment,” as follows below, and we request that the draft regulations use this definition for this Section 1761 and/or in 1781, Definitions.

In addition, excluding underground injection projects from the regulations is problematic because many injection projects have both injection and production wells that undergo well stimulation treatments. If underground injection wells are stimulated as part of a Drilling or Reworking Permit, they must be subject to these treatment rules. No exemption can be allowed for wells in underground injection projects from regulations regarding well stimulation.

The definition of injection for disposal, and/or production/recovery must be expanded to include gas injection and recovery.

Detailed comments and required amendments are as follows and may be repeated in Section 1781:

(a) The following definitions are applicable to this chapter:

(1) “Well stimulation treatment” means a treatment of a well designed to enhance oil and gas production or recovery by ~~increasing~~ modifying the permeability of the formation. ~~Well stimulation is a short term and non-continual process for the purposes of opening and stimulating channels for the flow of hydrocarbons.~~ Examples of well stimulation treatments include hydraulic fracturing, acid fracturing, ~~and acid matrix stimulation, and gravel packing.~~ Well stimulation treatment does not include ~~routine well cleanout work; routine well maintenance; routine treatment for the purpose of removal of formation damage due to drilling; bottom hole pressure surveys; routine well cleanout or maintenance activities that do not affect the integrity of the well or the formation; the removal of scale or precipitate from the perforations, casing, or tubing; or a treatment that does not penetrate into the formation more than 36 inches from the wellbore.~~

(2) ~~“Underground injection project” or “subsurface injection or disposal project” means sustained or continual injection into one or more wells over an extended period in order to add fluid to a zone for the purpose of enhanced oil recovery, disposal, or storage. Examples of underground injection projects~~ Well stimulation treatment does not include the enhanced oil recovery methods of ~~include~~ waterflood injection, steamflood injection, cyclic steam injection, injection disposal, and gas storage projects, unless those processes or projects employ stimulation. Any enhanced oil recovery or wastewater disposal process that employs stimulation (pressures exceeding 0.6psi/foot depth) is a well stimulation treatment and subject to these regulations.

~~(b) Well stimulation treatments and underground injection projects are two distinct kinds of oil and gas production processes. Unless a regulation expressly addresses both well stimulation and underground injection projects,~~

~~(1) Regulations regarding well stimulation treatments do not apply to underground injection projects; and~~

~~(2) Regulations regarding underground injection projects do not apply to well stimulation.~~

1780. Purpose, Scope, and Applicability.

The purpose, scope, and applicability of Article 4 (Well Stimulation Treatments) is too narrowly defined in the draft regulations, and must be amended in the final regulations. In addition, an acid concentration threshold is in contravention of the plain text of SB 4. SB 4 mandates that the Division establish a threshold *volume* for acid not a threshold concentration. Section 3160, subsection (b)(1)(C)(i) states that “the rules and regulations *shall* establish threshold values for acid *volume* applied per treated foot of any individual stage of the well, or for total acid *volume* of the treatment.”

We object to the use of arbitrary thresholds to create distinct classes of well stimulation. Volumetric and other thresholds create different regulatory regimes not just for the actual act of well stimulation, but also for many other steps in the production process, such as: public notice, well construction, chemical disclosure, and waste water handling. In practice, this means that oil and gas production performed below the threshold is not subject to the more stringent rules that apply to production above the threshold. As such, they create a system in which regulations to protect environmental and human health are not consistently applied across all oil and gas operations.

SB 4 directs the Division to set the volumetric threshold “based upon a quantitative assessment of the risks posed by acid matrix stimulation treatments that exceed the specified threshold value or values in order to prevent, as far as possible, damage to life, health, property, and natural resources pursuant to Section 3106.” The Department does not provide any assessment or basis to support the proposed concentration threshold. In the absence of such an assessment, the Department must set the volumetric threshold at zero; any volume of acid should be subject to the proposed rules.

In sum, Section 1780 should be amended as follows:

- (a) The purpose of this article is to set forth regulations governing well stimulation treatments, as defined in Section 1761, subdivision (a)(1), ~~except that~~ The requirements of this article do not apply to acid matrix stimulation treatments that use an acid *volume of more than 0 gallons per treated foot, or total acid volume of the treatment of more than 0 gallons concentration of 7% or less.* Nor is an operator is required to obtain a permit under Public Resources Code Section 3160, subdivision (d), prior to performing an acid matrix stimulation treatment that uses an acid *volume of more than 0 gallons per treated foot, or total acid volume of the treatment of more than 0 gallons concentration of 7% or less.*

~~(b) Well stimulation treatments are not subsurface injection or disposal projects and are not subject to Section 1724.6 through 1724.10. This article does not apply to underground injection projects.~~

(c) For purposes of this article, a well stimulation treatment commences when well stimulation fluids and equipment are delivered to the pad ~~is pumped into the well~~, and ends when well stimulation treatment equipment and all fluids and additives are ~~is~~ disconnected from the well and removed from the site.

1781. Definitions

This section appears to be incomplete. We note the absence of needed definitions for, at a minimum: "operations," "productive and non productive horizons," and "repeat stimulation."

This section should be amended as follows:

The following definitions shall govern this article:

(uu) "Acid Fracking or Fracturing" means an acid treatment conducted at pressures greater than the pressure necessary to fracture the target formation, which may both dissolve existing natural fracture cements and exceed the altered rock fracture pressures, and for the purposed of increasing formation permeability.

(a) "~~Acid matrix stimulation treatment~~" means an acid treatment conducted at pressures lower than the applied pressure necessary to fracture by dissolution any parts of the native/original underground geologic formation (including cemented native fractures)

~~(b) "Acid well stimulation treatment" and may also means a well-stimulation treatment that~~ uses, in whole or in part, the application of one or more acids to the well or underground geologic formation for the purposes of enhancing or increasing permeability and flows from the formation. The acid well stimulation treatment may be at any applied pressure and may be used in combination with hydraulic fracturing treatments or other well stimulation treatments. Acid well stimulation treatments include acid matrix stimulation treatments and acid fracturing treatments.

(c) "~~Acid stimulation treatment fluid~~" means one or more ~~base~~ fluids mixed with physical and chemical additives for the purpose of performing an acid well stimulation treatment and has a pH of less than 7.

(yy) "Acid Fracturing" (or AcidFracs) means the injection of acids at pressures exceeding the unaltered natural formation's rock fracture pressures.

(zz) "Fracture" means naturally or induced breaks in the formation which may or may not be cemented by precipitates before the stimulation.

(uu) "Formation permeability" means the summation of the rock permeability and natural or induced fracture permeability (e.g., flow through naturally occurring fractures).

- (d) **"Additive"** means a substance or combination of physical and chemical substances added to a base or carrier fluid for purposes of preparing well stimulation treatment fluid, including, but not limited to, acid stimulation treatment fluid and hydraulic fracturing fluid. An additive may serve additional purposes beyond the transmission of hydraulic pressure to the geologic formation. An additive may be of any phase (gaseous, liquids, or solids) and may include proppants.
- (xx) **"Annulus (or annular space)"** means any void between a casing or tubing and another casing or the borewall of the drilled well. If not specified the annular space shall be between the production casing and either the intermediate or the surface casing.
- (e) **"Base fluid"** means the continuous phase fluid used in the makeup of a well stimulation treatment fluid. The continuous phase fluid may include, but is not limited to, water, and may be a liquid or a hydrocarbon or non-hydrocarbon gas. A well stimulation treatment may use more than one base fluid.
- (xx) **"Carrier fluids"** means a fluid that is used to transport materials into or out of the wellbore, typically developed with 1) ability to efficiently transport the necessary material (such as pack sand during a gravel pack), 2) ability to separate or release materials at correct times or places, and 3) compatibility with other wellbore fluids while being nondamaging to exposed formations.
- (uu) **"Breaches, leaks, seeps, or failures"** mean any imperfections in the casings, cementing, or borehole wall integrity which may allow fluids or gases to move between the casing annular space, through the cement layers, and/or from/into the surrounding formations and can be replaced with a simple use of a single term, "leak."
- (zz) **"Cement bonds"** means bondings that adherence between cement annular layers, well casings, and drilled bore walls of geological units and can be interpretatively measured by cement (bond) evaluation logs and indirectly by well pressure tests.
- (f) **"Chemical Disclosure Registry"** means the Internet Web site developed by the Division for the purpose of reporting the information required under Section 1788. [Until the Division has completed development of the reporting website, "Chemical Disclosure Registry" shall mean the chemical registry Internet Web site known as fracfocus.org developed by the Ground Water Protection Council and the Interstate Oil and Gas Compact Commission, or another publicly accessible information Internet Web site that is designated by the Division. Any submissions in compliance with these regulations to other designated agents or organization shall be considered as if to the Division and all such submissions shall carry all the same requirements for validity and correctness in compliance to State laws and regulations.]
- (yy) **"Closed Loop System"** means any combination of piping, pumping, and storage facilities for containing fluids and gases without any exposure to or releases to the environment.

- (xx) “Fault” means any break, discontinuity, or planar surface in brittle rock across which observable displacement occurs.
- (x) “Formation permeability” means the summation of the rock permeability and natural or induced fracture permeability (e.g., flow through naturally occurring fractures).
- (g) “Flowback or flowback fluid” means the fluid recovered from the treated well before the commencement of oil and gas production from that well following a well stimulation treatment. The flowback fluid may include materials of any phase.
- (yy) “Production” means the drawing of fluids and gases including groundwater from the surrounding formations and arising from the wellhead and eventually transported offsite for commercial purposes or returned to the production zone. Produced water only comes from the later testing phases of well completion and during production for commercial purposes.
- (xx) “Flowback period” means the time period that begins as soon as any injected stimulation fluid begins to resurface, and ends when either the well is shut in or is producing continuously, whichever occurs first.
- (xx) “Stimulation Envelope or Envelope” means the total volume of altered formation and its measurements of the intended and actual volume of all fractures and pathways created by stimulation operations and as confirmed by microseismicity monitoring of the stimulation results.
- (vv) “Fresh Water” means waters with existing or potential beneficial uses as defined under the Porter-Cologne Water Quality Control Act.
- (vv) “Horizontal projections” means the projected surface representation of the horizontal path of the wellbore.
- (h) “Hydraulic fracturing” means a well stimulation treatment that, in whole or in part, includes the pressurized injection of hydraulic fracturing fluid into an underground geologic formation in order to fracture the formation (exceeds rock fracture pressures of the native or amended formation or unit), thereby causing or enhancing the permeability of the formation and the production of oil or gas from a formation and a well.
- (i) “Hydraulic fracturing fluid” means one or more base fluids mixed with physical and chemical additives for the purpose of hydraulic fracturing.
- (xx) “Leasee” means a person to whom a lease is granted; a tenant under a lease.
- (aa) “Lease” means a contract granting use or occupation of property during a specified period in exchange for a specified rent.
- (yy) “Microseismicity” means natural and induced ground movement events which generally may not be perceptible to most people and would be measured within the Richter Scale range of -3 to +2 magnitudes.
- (zz) “Notice” for treatments means the announcements of treatment activities 30 day after the date of the “notices” and does not mean the notices of intent generally submitted by

- operators to the Division in order to receive a permit to drill, rework, or abandon a well which herein would be equivalent to the Application for permit to conduct treatment.
- (uu) **“Occupant”** means any individuals or entities, which have the legal right to reside or operate in or on such properties even though they may not have a recorded or notarized lease or contract to reside therein.
- (vv) **“Planned modifications”** means those changes of the usual permitted or typical designs, practices, or activities or those required by the Field/Pool/Unit Rules which are anticipated prior to initiation of the construction or reconstruction and associated stimulation treatments of a well.
- (ww) **“Each POINT of treatment” (or “a Point”)** means all outermost points of stimulation including the furthest point of fracture or dissolution from the perforation of the casing/tubing/borewall and shall not mean the perforation of the casing or cement.
- (xx) **“Pressures”** means those planned and measured actual pressures generated during the stimulation programs for enhancing formation permeability as measured/estimated at or in the stimulation envelope (depth times psi/foot of depth, or psi), as measured at the surface in equipment used for the stimulation (psiG), and as estimated for the target formation as “rock fracture pressure” of native rock and acidized rock.
- (xx) **“Produced or Formation Water”** means water produced from a wellbore during production that is not a treatment fluid and is originally found in those formations in or beneath the “Uppermost Hydrocarbon Zone.”
- (xx) **“Operator”** means any organization which has the Division-designated responsibilities and authorities to control the development of an oil field and its wells and which has authority to contract or sub-contract any activities related thereto to other organizations and/or individuals.
- (vv) **“Property”** means any delineated lands and formations which have been formally recognized by a governmental agency and have been assigned to (are owned by) a specific individual(s) or other entity(ies) who have rights and obligations for all activities on and/or within such properties.
- (j) **“Proppants”** means physical materials carried by stimulation fluids and inserted or injected into the underground geologic formation that are intended to prevent or slow fractures from closing after stimulation.
- (k) **“-Protected wWater with beneficial use(s)”** means water outside of a Hydrocarbon Zone that has existing or potential for beneficial uses as defined by the Porter-Cologne Water Quality Control Act. ~~contains no more than 10,000-mg/l total dissolved solids.~~
- (l) **“Regional Water Board”** means the Regional Water Quality Control Board with jurisdiction over the location of a well subject to well stimulation treatment.
- (xx) **“Rock Fracture Pressure”** means the pressures required to be exerted on the natural or altered state of the formation (psi/foot vertical depth or X times and hydrostatic pressure

of 0.433/foot depth) to achieve or promote fracturing and increasing the fracture permeability of the formation.

(xy) **“Subsurface property owner”** owners and/or lessors of subsurface property rights for the production of mineral resources by the operator and/or the leasee.

(m) **“Surface property owner”** means the owner of real surface property as shown on the latest equalized assessment roll or, if more recent information than the information contained on the assessment roll is available, the owner of record according to the county assessor or tax collector.

(xx) **“Stimulation Envelope” (or “envelope”)** means the length (radius), height, and width of the stimulation in a stratigraphic unit produced by the stimulation treatment.

(n) **“Well Stimulation treatment fluid”** means a base fluid mixed with physical and chemical additives, ~~which may include acid,~~ for the purpose of a well or formation stimulation treatment. A well stimulation treatment may include more than one well stimulation treatment fluid. Well stimulation treatment fluids include, but are not limited to, hydraulic fracturing fluids and acid stimulation treatment fluids.

(vv) **“Tenant”** means a person or entity possessing the right to occupy a legally recognized parcel, or portion thereof.

(xx) **“Uppermost Hydrocarbon Zone”** means the shallowest true vertical depths of any stratigraphic unit containing hydrocarbon contents of greater than 100 mg/L of total petroleum hydrocarbon or any other hydrocarbon liquid or gas, whether of commercial value or not.

1782. General Well Stimulation Treatment Requirements.

Current regulations lack formal relationships between information submitted by the operator(s) as part of an application to drill for consideration by the Division. Studies and analyses may be performed by the operator, but are not required to be submitted nor reviewed by the Division and not made available to the public.

We request this section be amended as follows:

(a) When a well stimulation treatment is performed, the operator shall ensure that all of the following have been documented, reported, and included in notices, permits, and reports (history of well):

(1) Casing description and demonstration that the casings are ~~is~~ sufficiently cemented or otherwise anchored in the hole in order to effectively control the well at all times;

- (2) Geologic, hydrologic, hydraulic, and gaseous isolation of the oil and gas formation are maintained during and following the well stimulation treatment through production and until abandonment;
 - (3) 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 before, during, and following stimulation treatment;
 - (4) The wellbore's mechanical and bond integrity is tested, logged, ~~and~~ maintained and reported;
 - (5) All well stimulation treatment fluids are directed into the zone(s) of interest and would not and have not penetrated beyond the planned stimulation envelope;
 - (6) The well stimulation treatment fluids used are of known quantity and description for reporting and disclosure as required pursuant to this Article; and
 - (7) The well stimulation treatment fluids is not of a concentration level that shall not will damage the well casing, tubing, cement, or other well equipment, or would otherwise cause degradation of the well's mechanical and bonding integrity during and/or after the treatment process.
 - (8) A history of all stimulation of the well and for all wells within five-times the maximum stimulation envelope dimensions.
- (b) In addition to specific methods set forth in these regulations, to achieve the objectives of this section, the operator shall follow the intent of all applicable well construction requirements, use good engineering practices, and employ best industry standards, shall compile and submit all such requirements, practices, and standards for related activities in other states for mitigation, and shall include those required by local jurisdictions where they may be demonstrated to be equal or more stringent than those included in these Sections, 1780-1799.

1783. Application for Permit to Perform Well Stimulation Treatment.

We support the requirement that operators must apply for and receive a discretionary approval of a conditioned permit prior to any announcement of any well stimulation treatment.

We request the following amendments to strengthen this section:

- (a) A well stimulation treatment or repeat well stimulation treatment shall not commence without a valid permit approved by the Division and shall be done in accordance with the conditions of the Division's approval.

- (b) An application for a permit to conduct well stimulation operations shall include all of the information listed in Sections 1782 and 1783.1 and shall be submitted electronically to the Division on a digital form specified by the Division and available on the Division's public internet Web site at <http://www.conservation.ca.gov/DOG/Pages/Index.aspx>.
- (x) An application shall be included as part of any well operator's notice of intent to drill, rework, or abandonment of a well in which stimulation treatment shall be used and shall be reviewed in conjunction with the other Division's approval of well activities. Stimulation treatment notices shall be for actual implementation of activities approved as part of a Permit to Drill, or to Rework (including redrilling), or to Abandon.
- (c) The operator shall notify the Division and all related agencies with jurisdiction over the operation (e.g., Water Board and Air Resources Boards/Districts, federal land management agencies) at least 72 hours prior to commencing well stimulation so that Division staff and other agencies may witness. Three hours prior to commencing, the operator shall confirm with the Division and other agencies that the well stimulation treatment is proceeding.

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

The contents of the permit application must be publicly available and readily accessible on the Division's website within 24 hours of submittal.

All applications for permits must be submitted electronically in a format that is searchable by public users of the Division's website. The Division must also provide for list serve subscribers for applications for particular Districts, Counties, Zip Codes, Fields/Units/Pools/Leases, and wells.

Items must be reorganized so that related items are grouped with like items.

The water management plan attachment must be standardized to ensure that all required information is disclosed on every well stimulation permit application. The well stimulation treatment notices for the interim period have displayed a lack of clarity and uniformity that needs addressing.

Water source disclosure must provide more specific information so as to accurately describe the precise source of all water to be used in a stimulation treatment. Pursuant to SB 4, PRC 3160(b)(2)(E), operators must disclose the "source, [and] volume... of all water to be used as base fluid during the well stimulation treatment." If an operator discloses more than one water source, estimated volume from each source must be specified.

Although the appropriate Regional Water Board must certify groundwater monitoring plans, the Division must nevertheless collect information regarding groundwater monitoring in the permit application to ensure adequate public access to this information. The Division must require in the permit application, mapping requirements similar to those outlined in Section 1783.4(b)(3) through (5) in the interim SB 4 well stimulation treatment regulations. The radius of review, however, must be extended. The interim language requires evaluation of water wells and geology within the same radius as that specified for notification to neighbors, 1500 feet of the oil/gas well-head and 500 feet of the surface projection of an oil/gas well path. Potential impacts on water contamination could have a much larger reach. The Division must increase the radius for water testing to at least one mile (5280 feet) or twice the anticipated stimulation radius, whichever is greater. Mapping and analysis must include any existing active and abandoned oil/gas wells, water wells and surface water sources with beneficial uses, aquifer recharge zones, discernible faults, and other potential geologic features that could transport fluids or gases into waters with beneficial uses or to the ground surface.

Section 1783.4(b)(3) of the interim regulations applies to “information that is publicly available.” Since the exact location of public supply wells may not be publicly available – exact locations are obfuscated to one mile – it may be impossible for an operator to know whether or not any public supply wells lie within the 1500 foot radius of the well head, or 500 feet of the surface projection of a well path. Mapping requirements must include all wells whose obfuscated location intersects with the required area of review.

Mapping and review requirements must apply to all well stimulation permit applications and must demonstrate exemption from monitoring requirements due to the absence of nearby waters that may have beneficial uses. Regulations must clearly state that the mapping requirements be included in all permit applications regardless of whether or not any actual groundwater monitoring will occur.

We strongly support 1783.1(a)(25) requiring that the appropriate Regional Water Board certify compliance with the appropriate type of groundwater monitoring plan. The Regional Boards are the most appropriate entity to ensure that proper compliance with groundwater monitoring requirements is met.

For any well stimulation activities occurring on state or federal lands, the application should contain certification from the appropriate land management authority stating that the activity complies with any relevant land management plans.

Because the provisions of PRC 3160 (j) (2) prohibit certain information from being claimed as a trade secret, and neither operators nor regulators may be familiar with these provisions, they should be quoted in the chemical disclosure requirement in this section. See 1783.1(a)(26).

We request this section to be amended as follows:

- (a) All applications for permits to perform a well stimulation or restimulation treatments shall include the following:

Operator

- (1) Operator's name;
- (2) Name and telephone number of person filing the form;
- (3) Name(s) of person to contact with technical questions regarding the treatment operations;
- (4) Telephone number(s) and email address(es) of person(s) to contact with technical questions regarding treatment and related operations e.g., perforations, production testing, etc., and an on-site representative for the public and/or Division to contact in case of an emergency or complaint.

Well

- (5) API number assigned to the well by the Division;
- (6) Lease name and number of the well;
- (7) Location of the well, submitted as a non-projected, Latitude/Longitude, in the General Coordinate System (GCS) NAD83 with at least six digits to the right of the decimal point.
- (8) County, City, and USPS-Zip Codes in which the well is located;
- (9) Name and Division number of the oil field, unit, area, lease, pool, or other identified production designation;
- (10) Type, activity (active, idled, etc.), and date of original completion of well;
- (11) For directionally drilled wells, ~~the proposed~~ coordinates (from surface location), the true vertical depth at total depth, and the wellbore path for the entire well at 100-foot intervals and any stages of perforations and stimulation;
- (12) Measured and eEstimated true vertical depth of the well included in (12);

Resources and Environmental Contexts

- (13) Depth of the base of ~~protected~~ water(s) with beneficial uses and uppermost hydrocarbon-bearing zone as shown on an iso-surface diagram/map;
- (14) Name(s) and vertical depth(s) of the productive formation(s), member(s), and horizon(s) where well stimulation treatment(s) will occur;

- (00) Names and descriptions of all faults penetrating the to-be-stimulated horizon within 2640 ft or twice the anticipated stimulation radius of the proposed location of stimulation, whichever is greater;
- (00) All other previously stimulated and fractured wells within 2640ft of the wellhead and path or twice the anticipated stimulation envelop, whichever is greater;
- (00) Any relevant Spill Contingency Plans or Pipeline Management Plans, in accordance with 14 C.C.R. §§ 1722 and 1774.2, respectively.
- (00) Whether any of the facilities associated with the well stimulation are classified as “environmentally sensitive” as defined in 14 C.C.R. §1760(e).

Notice activities

- ~~(11) The~~ Time period during which the well stimulation treatment is planned to occur;
- ~~(15) The~~ Planned location(s) of the well stimulation treatment(s) on the well bore, the estimated length, height, width, and directions of the induced (Stim Envelope) fractures or other planned stimulation effects modification(s), if any, and the location of existing wells, including plugged and abandoned wells, measureable faults, and any UIC Program areas (Areas of Reference) that may be impacted by these fractures and modifications or within five times the greatest dimension of the Stim Envelope;
- (17) Anticipated volume, rate, and pressures of fluid to be injected;
- (18) Identification of all wells that have previously been ~~stimulated hydraulically fractured~~ in ~~all the same~~ production horizons within the area of twice the anticipated maximum fracture radius stimulation envelope and heights;
- (19) Identification of where in the operator’s Spill Contingency Plan ~~handling~~ as to where the Water Management Plan of well stimulation fluid and additives and flowbacks has been addressed is found;
- ~~(20) The~~ Cement and bond evaluation required under Section 1784(a)(1);

Planned and Limits

- ~~(21) The~~ Well stimulation treatment envelope (Stim Envelope) radius analysis required under Section 1784(a)(2), including identification of all water within the area of the well stimulation treatment envelope radius analysis, and the names and API numbers of all wells, identifiable faults, and UIC project areas within the area of 1500 feet or five times the maximum dimension of the Stim Envelope (whichever greater) of the well stimulation treatment envelope radius analysis;
- ~~(22) The~~ Well stimulation treatment design required under Section 1784(a)(3);

Fluids and Management

- (23) ~~A w~~Water management plan that includes an estimate of the amount of water to be used in the treatment, an estimate of water to be recycled following the well stimulation treatment, the anticipated source of the water to be used in the treatment (provided in latitude/longitude coordinates), the estimated volume from each source (where multiple sources of water will be used), and the anticipated disposal method that will be used for the recovered water in the flowback fluid from the treatment that is not produced water that would be reported pursuant to Section 3227;
- (24) ~~The e~~ Estimated amount of treatment-generated waste materials that are not addressed by the water management plan, and the anticipated disposal method for the waste materials;
- (00) The operator shall design, and provide process flow diagrams and piping-instrumentation-diagrams, and provide monitoring/reporting system for both Closed Loop Water and Gases Systems. The design and other supporting documents shall identify and include activities for delivery, storage, mixing, injection, flowback recovery, flowback storage/treatment, and transfers for transport.
- (25) Certification from the Regional Water Board that the well subject to the well stimulation treatment is covered by a well-specific, field-wide, or regional ground water monitoring plan developed in accordance with Water Code section 10783; and
- (26) ~~A e~~ Complete list of the names, Chemical Abstract Service numbers, volumes, and estimated concentrations, in percent by mass, of each and every chemical constituent of the well stimulation fluids anticipated to be used in the treatment. If a Chemical Abstract Service number does not exist for a chemical constituent, another unique identifier may be used, if available. A claim of trade secret protection for the information required under this section shall be handled in the manner specified under Public Resources Code section 3160, subdivision (j), which specifies that the identities of the chemical constituents shall not be considered trade secrets: PRC 3160 (j)(2) Notwithstanding any other law or regulation, none of the following information shall be protected as a trade secret:
- (A) Identities of the chemical constituents of additives, including CAS identification numbers;
 - (B) Concentrations of the additives in the well stimulation treatment fluids;
 - (C) Any air or other pollution monitoring data;
 - (D) Health and safety data associated with well stimulation treatment fluids; and
 - (E) Chemical composition of the flowback fluid (averaged and maxima values).
- (XX) All other information regarding past stimulation treatments on the same well and comparisons with those of the current application along with justifications as to differences.

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

The Division, in consultation with the State Water Resources Control Board (“Board”) must develop and implement formats and systems to disseminate information to neighbors regarding the availability of water testing. A template for neighbor notification is needed to ensure that landowners and tenants within the specified radius receive all required information in an easy to read format, in English and other appropriate languages, and have a standardized method to request monitoring, such as a pre-paid and addressed postcard with a check box. Such a template should also ask neighbors to provide information about active or abandoned wells and surface water located on their property, in order to provide information to operators that is required in the water management plan.

We request the Division develop such a template in consultation with the State Water Resources Control Board and make the template publicly available for review prior to approval of the permit.

A system is also needed that will allow the Division to verify that all required information and notification has been properly distributed to the appropriate recipients. This verification process needs to be part of the permit approval process and must include communication with the Board. This will allow the Board to track requests for monitoring and ensure that appropriate follow-up and all requested monitoring has occurred.

We request this section be amended as follows:

- (a) Within three (3) days of an operator's submission of a permit application to conduct stimulation treatment, the operator shall notify and provide copies of the notice(s) to those persons and entities to be notified for the stimulation treatment.
- (b) At least three (3) days in advance of submission of notice to conduct stimulation treatment, the operator of any oil or gas well who may receive a well stimulation treatment permit from the Division shall provide all notices of pending submissions to the Division for all surface and subsurface property owners, occupants, lessees, and tenants of legally recognized properties situated within a 2640-foot radius of the wellhead of any such well, or within 2640 feet of the horizontal projection(s) of the subsurface parts of any such well and shall identify sources of the official notices and supplements through the Division. The operator shall authorize the Division to make accessible via the internet all submissions regarding the notice and its considerations.

We note that other states (e.g. Alaska) require notice for 0.5 miles (2640 feet) from the wellhead and trajectory/path of the well.

- (c) At least 30 days in advance of commencing well stimulation treatment, the operator of any oil or gas well receiving a well stimulation treatment permit from the Division ~~is required to~~ shall provide to surface and subsurface property owners, occupants, lessees, and tenants of legally recognized ~~properties~~ parcels of land situated within a ~~152,640-foot~~ radius of the wellhead of any such well, or within 52,640 feet of the horizontal projection of the subsurface parts of any such well, the following:
 - (1) ~~A copy~~ Copies of the well stimulation treatment notice(s) and permit(s);
 - (2) Notice of the availability for water sampling and testing of any water well suitable for drinking, other beneficial uses, or agricultural irrigation purposes; and
 - (3) Notice of the availability for water sampling and testing of any surface water suitable for drinking, other beneficial uses, or agricultural irrigation purposes.
- (d) For the purposes of this section, “occupants,” “lessees” and “tenant” means a person or entity possessing the right to occupy, use, or produce from a legally recognized parcel, or portion thereof, ~~by way of a valid agreement.~~
- (e) If the surface and subsurface property owner, occupant, lessee, or tenant receiving the notice is a state or federal government agency, then the notice shall be delivered to that agency’s office located closest to the proposed well stimulation activity.

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

Proper implementation by the third party is very important. We request the following amendments to increase accountability and ensure proper notification:

- (a) ~~It is the operator’s responsibility to~~ shall identify the surface and subsurface property owners, lessees, occupants, and tenants to whom a copy of the approved well stimulation treatment permit and information on the available water sampling and testing must be provided ~~and notification is required~~ under Section 1783.2. To fulfill this responsibility, the operator or owner must hire an independent person or entity to provide a copy of the permit and the notification required.
- (b) Any person or entity hired by the owner/operator of a well to provide a copy of the permit and notice in accordance with this regulation shall, ~~after~~ within 30 days of providing such notice, deliver to the Division, in writing, the following:
 - (1) The names of the property owners, lessees, occupants, or tenants identified;
 - (2) The methods and procedures by which the copy of the permit was provided, and the date on which the copy of the permit was provided; and
 - (3) The methods by which the notice of the availability of water sampling and testing was provided, and the date on which the notice was provided.

(c) Information about the availability of water quality testing may be included in the notification ~~or the notification may reference a website with further information about testing options.~~

(d) Whether or not water testing was requested by each recipient of the notice.

(e) The performance of the independent entity or persons under this section shall be subject to independent review and audit by the Division.

1784. Evaluation Prior to Well Stimulation Treatment.

1784(a)(1). We support the Division's proposed requirement that operators must evaluate cement integrity prior to well stimulation, but suggest the following changes to the proposed requirements.

In order to ensure reliable measurements, the cement must be sufficiently hard before running a cement evaluation tool (CET), among other factors.ⁱ In practice the amount of time needed to ensure an accurate reading varies by site, and depends on many factors including the cement formulation and the characteristics of the CET used.ⁱⁱ A general rule of thumb is to allow the cement to harden for 72 hours, however, so we recommend revising the minimum wait time from 48 to 72 hours.

We request the Division's proposal to allow the requirement to do a cement evaluation to be waived be deleted. Verifying the integrity of the cement job is crucial to ensure mechanical integrity and isolation of fluids and should be performed on every well.

We request a requirement to run cement bond evaluation logs (CELs) on production, intermediate, and surface casings. CELs must be obtained for all strings of cemented casing that isolate waters of beneficial uses, potential flow zones, or through which stimulation will be performed.

We support the Division's proposed requirement that the cement evaluation must be submitted with the well stimulation application. This information is necessary to help the Division determine if the casing was cemented properly, so that any additional analysis or remedial operations that may be necessary to protect groundwater can be identified and implemented prior to stimulation.

- (1) Allowing at least ~~48~~ 72 hours to elapse after cement placement, the operator shall run a radial cement evaluation log or other cement evaluation method that is approved by the Division and capable of demonstrating adequate cementing. Cement evaluation logging must be performed on all strings of cemented casing that isolate protected water.

potential flow zones, or through which stimulation will be performed. If the quality of the cement outside ~~of the production~~ any string of casing is not sufficient to ensure the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation treatment, then the operator must develop a plan to remediate the cement and obtain approval from the Division for the remediation plan prior to proceeding. The operator is only required to evaluate the cement that is required to be in place under Section 1722.4. ~~The Division may waive the requirement of doing a cement evaluation if the supervisor is satisfied that, based on geologic and engineering information available from previous drilling or producing operations in the area where the well stimulation treatment will occur, well construction and cementing methods have been established that ensure that there will be no voids in the annular space of the well.~~

1784(a)(2). We support the Division’s proposed requirement to perform a well stimulation radius analysis. This analysis is crucial to ensure that any potential pathways by which injected or displaced fluids could reach groundwater are identified and remediated, if necessary. However, the proposed regulations are not sufficient and we believe the following revisions and additions are necessary to reduce the risks to groundwater.

1784(a)(2)(i). We support the requirement to perform appropriate modeling to determine the well stimulation treatment area of influence (AOI), but request additional clarifications about what constitutes an “appropriate model.” Regulations must specify that operators are required to model the lengths, heights, widths, and orientations of fractures (in the case of fracture stimulation), horizontal and vertical penetration of stimulation fluids and additives, and the horizontal and vertical extent of any displaced formation fluids.

Operators should also model the volume of rock in which chemical reactions between the formation, hydrocarbons, formation fluids, or injected fluids may occur and should consider and account for potential migration of fluids and chemical reaction byproducts over time.

The model must take into account all relevant geologic and engineering information including but not limited to:

- (1) Rock mechanical properties, geochemistry of the producing and confining zone, and anticipated stimulation pressures, rates, and volumes;
- (2) Geologic and engineering heterogeneities;
- (3) Potential for migration of injected and formation fluids through faults, fractures, and manmade penetrations; and
- (4) Cumulative impacts over the life of the project.

These requirements are achievable with current technology and methods. Petroleum engineers routinely employ advanced computer modeling to simulate stimulation treatments.ⁱⁱⁱ

1784(a)(2)(ii). We support the requirement to identify potential migration pathways within the well stimulation treatment radius, plus a safety factor. However, the safety factor should be twice the largest dimension anticipated by the AOI modeling, rather than twice the well stimulation treatment length. Depending on the specifics of the stimulation treatment, depth of the well, and other geologic and engineering factors, the length may not always be the greatest dimension of the AOI.

We support the proposed requirement to review all offset wells and faults within the well stimulation treatment radius, plus a safety factor. However, the rules should require the operator to provide the Division with additional information about any such features identified and take additional steps to prevent communication with such features, including:

1. A list of all such wells, including but not limited to wells permitted but not yet drilled, drilling, awaiting completion, active, inactive, shut-in, temporarily abandoned, plugged, and orphaned.
2. A description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Division may require.
3. An assessment of the integrity of each well identified.
4. A plan for performing corrective action if any of the wells identified are improperly plugged, completed, or abandoned.
5. An assessment to determine the risk that the stimulation treatment will communicate with each well identified.
6. For each well identified as at-risk for communication, a plan for well control, including but not limited to:
 - a. A method to monitor for communication.
 - b. A determination of the maximum pressure which the at-risk well can withstand.
 - c. Actions to maintain well control.
 - d. If the at-risk well is not owned or operated by the owner/operator of the well to be stimulated, a plan for coordinating with the offset well operator to prevent loss of well control.
7. The location, orientation, and properties of known or suspected faults, fractures, and joint sets.
8. An evaluation of whether such features may act as migration pathways for injected fluids or displaced formation fluids to reach protected water or the surface.

9. An assessment to determine the risk that the stimulation treatment will communicate with such features.
10. If such features may act as migration pathways and are at-risk for communication, the stimulation design must be revised to ensure that the treatment will not communicate with such features or the well must be re-sited.

Communication between offset wells during stimulation is a serious problem, risking blowouts in adjacent wells and/or aquifer contamination during well stimulation. A New Mexico oil well recently experienced a blowout, resulting in a spill of more than 8,400 gallons of fracturing fluid, oil, and water. The blowout occurred when a nearby well was being hydraulically fractured and the fracturing fluids intersected this offset well.^{iv} The incident led the New Mexico Oil Conservation Division to request information about other instances of communication between wells during drilling, completion, stimulation or production operations.^v Incidents of communication between wells during stimulation have been documented in British Columbia^{vi}, Pennsylvania^{vii}, Texas, and other states across the country.^{viii}

The oil and gas regulator in Alberta, Canada recognized that communication between wells during fracturing is a serious risk to well integrity and groundwater, and created requirements to reduce the likelihood of occurrence.^{ix} Similarly, Enform, a Canadian oil and gas industry safety association, published recommended practices to manage the risk of communication.^x

1784(a)(2)(iii). We object to the proposed requirement to exempt operators from reviewing the properties of geological formations adjacent to the productive horizon unless a radius of five times the anticipated well stimulation treatment length from a point of treatment extends beyond the productive horizon. This proposed rule appears to be a misinterpretation of the requirements of SB 4 at 3160(i)(1)-(2). This section requires the operator to define a radius at least five times the fracture radius (for fracture stimulation treatments), and identify geologic features within that radius that may act as pathways or barriers for fluids to migrate outside the fractured zone. In other words, SB 4 requires *all wells* that are fracture stimulated to have such an analysis performed.

It is important to assess the characteristics of rocks adjacent to the formation targeted for stimulation for all wells. Most crucial is to evaluate what can be termed the “confining zone,” defined as a geological formation, group of formations, or part of a formation above a zone that will be stimulated that is capable of limiting fluid movement above the stimulated zone. Operators should be required to demonstrate the presence of a suitable confining zone for all wells that will be stimulated, not only for fracture stimulated wells and not only for those wells where a radius of five times the anticipated well stimulation treatment length extends beyond the productive horizon.

We recommend the following revisions:

(iii) ~~If a radius of five times the anticipated well stimulation treatment length from a point of treatment extends beyond the productive horizon being evaluated for possible well stimulation treatment, then the well stimulation treatment radius analysis shall include a review of the geological formations adjacent to the productive horizon. Wells that will be stimulated must be sited such that a suitable confining zone is present. The owner or operator shall demonstrate to the Division that the confining zone:~~

1. Is of sufficient areal extent to prevent the movement of injected or displaced fluids above the stimulated zone;
2. Is sufficiently impermeable to prevent the vertical migration of injected or displaced fluids;
3. Is free of transmissive faults or fractures that could allow the movement of injected or displaced fluids above the stimulated zone; and
4. Contains at least one formation of sufficient thickness and with geomechanical characteristics capable of preventing or arresting vertical propagation of fractures.
5. The Division may require the operator to identify and characterize additional zones that will impede or contain vertical fluid movement.

The operator shall assess the mechanical rock properties, including permeability, relative hardness (using Young's Modulus), relative elasticity (using Poisson's Ratio), and other relevant characteristics of the geological formations to determine whether the geological formations will ensure the geologic and hydrologic isolation of the oil and gas formation during and following well stimulation. The results of this analysis should be submitted with the well stimulation application.

1784(a)(3). We recommend the following amendments:

(3) Utilizing the well stimulation treatment radius analysis conducted pursuant to subsection (a)(24), the operator shall design the well stimulation treatment so as to ensure that the well stimulation treatment fluids or hydrocarbons do not migrate and remain geologically and hydrologically isolated to the hydrocarbon formation. Elements of the well stimulation treatment design must include:

- (i) The type (e.g. fresh water, brine, nitrogen, etc.) and source (e.g. stream, well, recycled flowback, etc.) of base fluid(s) to be used;
- (ii) The estimated total volume of fluid and, if applicable, proppant to be used;
- (iii) The anticipated surface treating pressure range;
- (iv) The maximum anticipated pumping pressure;

(v) The operating procedure; and

(vi) The estimated or calculated fracture gradient of the producing and confining zone(s).

1784.1. Pressure Testing Prior to Well Stimulation Treatment.

Pressure testing prior to well stimulation is critically important, and we support the intent of the proposed requirements but request the amendments below.

(a)(1) We support the proposed test pressure for new wells, including the incorporation of a safety factor – the test time and acceptable pressure loss. However, stimulation treatment will be applied to all existing wells up to maybe ten times in the life of the well. The proposed rules fail to include testing and bond logging standards for uncemented and deeper completions of existing wells subject to rework during the expected 25+ years of production.

(b) The proposed regulations do not include a requirement to report the results of the pressure test.

We request the following amendments:

(a) The operator shall do and report all of the following not more than 24 hours prior to commencing or recommencing well stimulation treatment:

(1) All cemented ~~and uncemented~~ 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 125% of the maximum ~~surface~~ pressure anticipated during the well stimulation treatment. If during testing there is a pressure drop of 10% or more from the original test pressure, then the tested casing or tubing shall not be used until the cause of the pressure drop is identified and corrected. No casing or tubing shall be used unless it has been successfully tested pursuant to this section.

Non-cemented production completions shall be tested to a minimum of (i) 70% of the lowest activating pressure for pressure actuated sleeve completions or (ii) 70% of formation integrity for open-hole completions, as determined by a formation integrity test.

(2) All surface equipment to be utilized for well stimulation treatment shall be rigged up as designed and the design must be submitted with the permit application. The pump(s), 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 or 2000psiG whichever greater.

(b) The operator shall notify the Division at least ~~24~~72 hours prior to conducting the pressure testing or logging required under this section, 1784.1 so that Division staff may witness.

(c) In the event of a failed test, the operator shall orally notify the authorized officer as soon as practicable but no later than 12 hours following the failed test. The operator shall conduct a cement evaluation or other appropriate tests to determine the source of failure. Stimulation operations may not begin until a successful pressure test is performed, and the results are submitted to the Division. If mechanical integrity cannot be restored, the well must be cement-plugged 100% and abandoned.

1785. Monitoring During Well Stimulation Treatment Operations.

Monitoring during well stimulation is crucial and we support the intent of proposed requirements but request the following amendments:

(a) The operator shall continuously monitor, record/document, and report/submit within five business days reports for all of the following parameters during the well stimulation treatment, if applicable:

- (1) Surface injection pressure;
- (2) Slurry rate;
- (3) Proppant concentration;
- (4) Fluid rate; ~~and~~
- (5) All annuli pressures; and
- (6) Identities, rates and concentrations of additives used.

(b) The operator shall terminate the well stimulation treatment and immediately notify and provide the collected data to the Division if any of the following occur:

- (1) Production-surface or intermediate-surface casing annulus pressure change of 20% or greater than the calculated pressure increase due to pressure and/or temperature expansion;
- (2) Pressure exceeding ~~90%~~ 80% of the API rated minimum internal yield on any casing string in communication with the well stimulation treatment;
- (3) The operator ~~suspects~~ has reason to suspect any potential leak breach in the production or intermediate casing strings, production casing cement or plugs, or isolation of any sources of ~~protected~~ waters with beneficial uses, pressurized zones, and hydrocarbon zones;

- (4) Any monitored parameters indicate a loss or potential loss of mechanical and bond integrity;
- (5) Injection pressure exceeds the fracture pressure of the confining zone(s);
- (6) Any indications that injected fluids or displaced formation fluids have contacted any fault or fracture or constructed or plugged well;
- (7) Communication occurs with an offset well.

(c) If any of the events listed in subdivision (b) occur, then the operator shall perform diagnostic testing and logging on the well to determine whether a leak breach has occurred. Diagnostic testing shall be done as soon as is reasonably practical but no longer than 24 hours following any of the above events or others. The Division shall be notified before ~~when~~ diagnostic testing is performed ~~being done~~ so that Division staff may witness the testing. All documentation regarding any leak and diagnostic testing and logging results shall be submitted ~~provided~~ to the Division as it becomes available or within 24 hours, whichever comes first. Prior to any further operations, mechanical integrity must be restored and demonstrated to the satisfaction of the Division, and the operator must demonstrate that the ability of the confining zone(s) to prevent the movement of fluids above or beyond the stimulated zone has not been compromised.

(d) If diagnostic testing reveals that a leak breach has occurred, then the operator shall immediately shut-in the well, isolate the leaking perforated interval, and notify/report to the Division and the Regional Water Board by electronic formats and hard copy follow-ups with all of the following information:

- (1) ~~DA~~ descriptions of the activities leading up to the well failure.
- (2) Depth interval(s) of the well leaks ~~failure~~ and methods used to determine the depth interval.
- (3) ~~EA~~ an exact description of the chemical constituents of the well stimulation treatment fluid, or of the fluid that is most representative of the fluid composition in the well at the time of the well failure, including:
 - (A) Total dissolved solids, hydrogen sulfide, and volatile organic compounds;
 - (B) Chloride, sodium, barium, boron and bromine, and all organic or inorganic chemicals listed in the tables in California Code of Regulations, title 14, sections 64431 and 64444; and
 - (C) Gross alpha, gross beta, uranium, tritium, radium 226+228, and all other radionuclides.
- (4) ~~An estimates~~ Estimates of the volume of fluid lost during well leak ~~failure~~.
- (5) If available, groundwater quality data for the beneficial ~~protected~~ water closest to the well leak ~~failure~~. If a loss of mechanical and/or bond integrity is discovered, if the

integrity of the confining zone has been compromised, or if fluids have reached any fault or communicated with any other well, operators shall take all necessary steps to evaluate whether injected fluids or formation fluids may have contaminated or have the potential to contaminate any unauthorized zones. If such an assessment indicates that fluids may have been released, or pose any risk of release into a source of protected water or any unauthorized zone, the operator shall notify the Division immediately, take all necessary steps to characterize the nature and extent of the release, and comply with and implement a remediation plan approved by the Division. If such contamination occurs in a source of water with a beneficial use, a notification shall be placed in a newspaper available to the potentially affected population and on a publicly accessible website and all known users of the water supply shall be individually notified immediately by mail and by phone.

(e) We support these proposed electronic reporting requirements although these could be incorporated into (f).

(e) Groundwater quality data submitted to the Division shall be copied to the Regional Water Boards under subsection (d) shall be in an electronic format that follows the guidelines detailed in California Code of Regulations, title 23, chapter 30.

(f) We support these proposed requirements, but we request the following addition following to 1785 (f):

(g) Microseismicity (tremors of -3 to +2 Richter Magnitude) shall be monitored from at least three days prior to the stimulation treatment, throughout the treatment phases and for at least seven days after the last pressurized injection or until tremor events return to levels experienced prior to the treatment for the area and depths of five times the greatest dimension of the stimulation envelope.

1786. Storage and Handling of Well Stimulation Treatment Fluids.

We request this section to be amended as follows:

(a) Operators shall adhere to and report documentation of such adherence to and/or compliance with the following requirements for the storage and handling of well stimulation treatment fluid, additives, and produced water from a well that has had a well stimulation treatment:

(1) Fluids shall be stored in compliance with the secondary containment requirements of Section 1773.1 and the Spill Contingency Plan, including ~~except~~ that secondary

containment is ~~not~~ required for portable or temporary production facilities when used or onsite for more than three-hours.

- (2) Operators shall be in compliance with all applicable testing, inspection, and maintenance requirements for onsite production facilities containing well stimulation treatment and waste fluids.
- (3) Fluids shall be accounted for in the operator's previously approved Spill Contingency Plan.
- (4) Fluids shall be stored in containers, tankers, and tanks and shall not be stored in ground sumps or pits.
- (5) In the event of an unauthorized release, the operator shall immediately implement the approved Spill Contingency Plan and notify the appropriate response entities for the location, quantities, and the types of fluids involved, as required by all applicable federal, state, and local laws and regulations; and the operator shall perform clean up and remediation of the area, as required by the approved Spill Contingency Plan and all applicable federal, state, and local laws and regulations.
- (6) Within 5 days of the initial occurrence of an unauthorized release, the operator shall provide the Division a written report and weekly updates as needed or requested that includes:
 - (A) ~~A~~ Description of the activities leading up to the release;
 - (B) ~~The~~ types and volumes of fluid released;
 - (C) ~~The~~ Cause(s) of release;
 - (D) Actions taken to stop, control, and respond to the release; and
 - (E) Steps taken and any changes in operational procedures implemented and related changes to the Spill Contingency Plan by the operator to prevent future releases.
- (7) Operators shall document quarterly to the Division ~~be in~~ compliance with all applicable requirements of the Regional Water Board, the Department of Toxic Substances Control, and the Air Quality Management District with jurisdiction over the location of the well.
- (8) If fluids will be transported offsite, fluids shall be chemically characterized as if it is an industrial wastewater and not injected into a well regulated by the Division under Sections 1724.6 through 1724.10, and then the fluids shall be evaluated to determine if they are hazardous waste, as defined by Department of Toxic Substances Control in its regulations.

1787. Well Monitoring After Well Stimulation Treatment.

As indicated for pre-treatment and during treatment activities, the Division's requirements for an approved oil spill/leak plan must be used for all levels of actions for breaches, leakage, or other

failures for the well and related facilities and piping above and below ground. Similarly, all activities must be documented and reported/reports submitted to the Division and to the Water Board and such should be done in a matter of hours, not days, or as practical or reasonable.

Continued confusion of leaks, breaches, and failures must be simplified down to leaks and included in definition.

We request this section be amended as follows:

- (a) Operators shall monitor each ~~producing~~ well that has had a well stimulation treatment to identify any potential problems with a well that could endanger any underground source of ~~protected~~ beneficial water or hydrocarbon zone. If there is any indication or suspicion of a well leakage failure, the operator shall immediately notify the Division and the Regional Water Board, implement the approved Spill Contingency Plan, and perform diagnostic testing on the well to determine whether a well ~~leakage failure~~ has actually occurred. If the testing indicates that a well ~~leakage failure~~ has occurred, then the operator shall immediately take all appropriate measures to stop or reduce leakage, contain leaked materials within the well bore, and prevent contamination of all underground sources of protected beneficial water, hydrocarbon zones, and all surface waters in the area of the well and shall provide the Division and the Regional Water Board with the information described in section 1785(d).
- (b) Operators shall adhere to and report and document such adherence/compliance with the following requirements for a well that has had a well stimulation treatment:
 - (1) ~~The p~~Production pressure(s) of the well shall be monitored at least once every two (2) days for the first thirty (30) days after the well stimulation treatment and on a monthly basis thereafter. Information regarding production pressures shall be reported to the Division on a monthly basis.
 - (2) Well flows~~The well~~ shall be monitored at least once every two days for the first thirty days after the well stimulation treatment and on a monthly basis thereafter to determine ~~the~~ amounts of gas, oil, and water produced, including ~~the~~ volumes of ~~readily~~ identifiable well stimulation treatment fluid flowback. The operator shall report the information to the Division on a monthly basis for 5 years or until there has been an elimination of detectible 95% reduction in well stimulation treatment fluid contained in the produced fluid(s), whichever comes first.
 - (3) ~~All~~ The annular pressures of the well shall be reported to the Division annually. Any unusual events ~~#~~ shall be immediately reported to the Division, such as 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).
- (4) The annular valve shall be kept accessible from the surface or left open and plumbed to the surface with a working pressure gauge unless it has been demonstrated to the Division's satisfaction that there are no voids in the annular space.
 - (5) A properly functioning pressure relief device shall be installed on the annulus between the surface casing and the production casing, or, if intermediate casing is set, on the annuli between the surface casing and the intermediate casing and the production casing. This requirement may be waived by the Division, if the operator demonstrates to the Division's satisfaction that the installation of a pressure relief device is unnecessary based on technical analysis and/or operating experience in the area and submitted to the Division before the waiver is granted.
 - (6) If a pressure relief device is installed, then all pressure releases from the device shall be reported to the Division within 24 hours of detection. The maximum set pressure of a surface casing pressure relief device shall be the lowest of the following:
 - (A) A pressure equal to: 0.70 times 0.433 times the true vertical depth of the surface casing shoe (expressed in feet);
 - (B) 70% of the API rated minimum internal yield for the surface casing; or
 - (C) A pressure change that is 20% or greater than the calculated pressure increase due to pressure and/or temperature expansion.
 - (7) As indicated for both pre-treatment and during treatment, microseismicity monitoring shall be continued after the cessation of pressurized injection for each stage and for the duration of all stage, until the monitoring demonstrates statistically the return to pre-treatment conditions. If during the post-treatment monitoring period, any tremor of greater than 2 Richter magnitude occurs the monitoring shall be continued for an additional 30 days.

1788. Required Public Disclosures.

This section must ensure that all information is easily accessible to the public in a timely manner. All data submitted to the chemical disclosure registry must be verified by the Division and in a sortable/searchable and easy to use electronic format. In the period prior to the Division developing its own website as the chemical disclosure registry, all information must be submitted to the Division as well as an independent site such as FracFocus.org as compliance with any state-required submissions. All information submitted during this period must also be added to the state-run registry upon its operation. All submissions to any non-state organization must include

provisions to assure accuracy, correctness, and lack of purposeful errors as if the submission were directly to a state agency with implied penalties for errors and omissions.

Additionally, the Division must publish public disclosure indexes, similar to the well stimulation applications and notices indexes currently published on a weekly basis. The Division should also post to the chemical disclosure registry and to a suitable Division webpage, additional data and map layers, including groundwater basins, exempt aquifers, surface waterways and non-attainment air quality areas, and boundaries of state- and federally-owned lands (including but not limited to national forests, national wildlife refuges, national monuments, and state ecological reserves) in order for the public and other agencies to identify surrounding conditions and contexts and risks and threats to health and the environment.

(a)(19) correctly states that the names and CAS numbers of all chemical constituents must be disclosed on the Chemical Disclosure registry, or to the Division, if the registry is unavailable. All disclosures must be required even if the registry is unavailable, and DOGGR must make this information available to the public

1788(c) must be amended to clearly require that all information for confidential wells be disclosed to the public, the Division and other applicable agencies, including the Water Boards and CUPAs, and health professionals.

We request that the Division include the following amendments and re-ordering in Section 1788:

- (a) Except as provided in subdivision (c), within 60 days after the cessation of a well stimulation treatment, the operator shall post to the Chemical Disclosure Registry all of the following information:
 - (1) Operator's name;
 - (2) API number assigned to the well by the Division;
 - (3) Lease name and number of the well;
 - (4) Location of the well, submitted as a non-projected, Latitude/Longitude, in the General Coordinate System (GCS) NAD83.
 - (5) County and Zip Code in which the well is located;
 - (6) Date(s) that the well stimulation treatment occurred;
 - (7) True vertical and measured depths of the well and all stimulation treatment zones;
 - (8) Name(s) and vertical depth(s) of the productive horizon(s) where well stimulation treatment occurred;
 - (9) ~~The~~ Trade name(s), supplier, concentration(s), quantities, and a brief description of the intended purpose(s) of each additive contained in the well stimulation fluids used;
 - (10) ~~The~~ Total volume(s) of base fluid used during the well stimulation treatment;

(11) Identification of whether the base fluid is water suitable for irrigation or domestic purposes, water not suitable for irrigation or domestic purposes, or a fluid other than water;

(12) ~~The s~~Source(s), volume(s), and specific composition(s) and disposition(s) of all water associated with the well stimulation treatment, including, but not limited to, water used as base fluid and water recovered from the well following the well stimulation treatment that is not otherwise reported as produced water pursuant to Section 3227;

(13) Identification of any reuse of treated or untreated water for well stimulation treatments and well stimulation treatment-related activities;

(14) ~~The s~~Specific composition(s) and disposition(s) of all well stimulation treatment fluids, including waste fluids, other than water;

(15) Any radiological components or tracers injected into the well as part of the well stimulation treatment, a description of the recovery method, if any, for those components or tracers, the recovery rate, the residual or remaining percentages, and specific disposal information for recovered components or tracers;

(16) ~~The r~~Radioactivity of the recovered well stimulation fluids;

(17) ~~The l~~Location of the portion of the well (including measured and true vertical depths) subject to the well stimulation treatment and the extent of the stimulation envelope ~~fracturing or other modification~~, if any, surrounding the well induced by the treatment;

(18) ~~The e~~Estimated volume(s) of well stimulation treatment fluid that has been recovered; and

(19) ~~A c~~Complete list of the names, Chemical Abstract Service numbers, and maximum concentration, in percent by mass, of each and every chemical constituent of the well stimulation treatment fluids used. If a Chemical Abstract Service number does not exist for a chemical constituent, the operator may provide another unique identifier, if available.

(20) All prior stimulation treatments of the well.

(b) If the Chemical Disclosure Registry is unable to receive information required to be reported under this section, then the operator shall provide the information directly to the Division in digital formats as directed by the Division.

~~(c) Except for items (1) through (6) of subsection (a), operators are not required to post information to the Chemical Disclosure Registry if the information is found in a well record that the Division has determined is not public record, pursuant to Public Resources Code section 3234.~~

(d) A claim of trade secret protection for the information required to be disclosed under this section shall be handled in the manner specified under Public Resources

Code section 3160, subdivision (j). PRC 3160 (j)(2) Notwithstanding any other law or regulation, none of the following information shall be protected as a trade secret:

- (1) The identities of the chemical constituents of additives, including CAS identification numbers.
- (2) The concentrations of the additives in the well stimulation treatment fluids.
- (3) Any air or other pollution monitoring data.
- (4) Health and safety data associated with well stimulation treatment fluids.
- (5) The chemical composition of the flowback fluid.

(e) Groundwater quality data reported under this section shall also be submitted to the Regional Water Board in an electronic format that follows the guidelines detailed in California Code of Regulations, title 23, chapter 30.

1789. Post-Well Stimulation Treatment Report.

We note an apparent error in this section. The reference to 1784(a)(4) appears to be incorrect, as there is no such section and must be replaced with 1784(a)(2).

All information eventually must be submitted to and integrated with the other records for any specific well, e.g., History of Well. Historic hardcopy files are being replaced with online and digital files and archives. Hardcopy submittal must be replaced with near-real time reporting to the Division and simple copying (cc/bcc) of the same to other agencies and subscribers.

The post-event reporting must be linked to all other records related to the same well, usually through the American Petroleum Institute's numbering system – the API No. – including all records and histories of the same well resulting from the Notices of Intent and Permits processed through a currently separate system. Such isolation will lead to errors and required revisions of these and other regulations.

We request the following amendments to this section:

(a) Within 60 days after the cessation of a well stimulation treatment, the operator shall submit a report to the Division describing:

- (1) The History, all conditions, and results of and during the well stimulation treatment and all previous stimulation treatments;
- (2) The pressures and flows encountered before, during, and following the well stimulation treatment; and previous such treatments; and
- (3) Difference between How the actual and planned/designed well stimulation treatments and all related conditions differs from what was anticipated in the well stimulation treatment design that was prepared under (Section 1784(a)(5)); and
- (4) Records of all microseismicity tremors during the monitoring period for the subject treatment and any prior treatments and comparisons and differences for subject and prior envelopes.

(b) If data maintained by the U.S. Geological Survey indicates that, since the commencement of well stimulation treatment, an earthquake of magnitude 2.0 or greater has occurred within 5280 feet area of the well stimulation treatment envelope radius analysis required under Section 1784(a)(4), then the occurrence of that earthquake shall be noted analyzed with regard and related to the field, any UIC projects, and the envelope in the report prepared under subsection (a).

Thank you for your attention to this letter. We look forward to the Division's response to our comments.

Sincerely,

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cc:

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Notes:

ⁱ Boyd, D., Al-Kubti, S. Khedr, O.H., Khan, N., Al-Nayadi, K., Degouy, D., Elkadi, A., and Al Kindi, Z., “Reliability of Cement Bond Log Interpretations Compared to Physical Communication Tests Between Formations.” *Abu Dhabi International Petroleum Exhibition and Conference, 5-8 November 2006, Abu Dhabi, UAE*. Society of Petroleum Engineers, 2006. 11 pp.

ⁱⁱ Jordan, M.E., and Shepherd, R.A., “Cement Bond Log: Determining Waiting-on-Cement Time.” *SPE Annual Technical Conference and Exhibition, 22-26 September 1985, Las Vegas, Nevada*. Society of Petroleum Engineers, 1985. 8 pp.

ⁱⁱⁱ See, e.g. Jones, J. R., & Britt, L. K. (2009). *Design and Appraisal of Hydraulic Fractures*. Society of Petroleum Engineers.; Adachi, J., Siebrits, E., Peirce, A., & Desroches, J. (2007). Computer simulation of hydraulic fractures. *International Journal of Rock Mechanics and Mining Sciences*, 44(5), 739-757.

^{iv} Jensen, Tina. “Fracking fluid blows out nearby well; Cleanup costs, competing technologies at issue”. Kasa.com. 18 Oct. 2013: LIN Television Corporation. Web. 2 Jan. 2014.

^v “Aztec District III-Request for information.” State of New Mexico, Energy, Minerals and Natural Resources Department., n.p., 22 Oct. 2013. Web. 2 Jan. 2014.

^{vi} “Safety Advisory 2010-03, May 20, 2010: Communication During Fracture Stimulation.” BC Oil and Gas Commission. n.p. 20 May 2010. Web. 3 Jan. 2014.

^{vii} See, e.g. Detrow, Scott. (2012) “Perilous Pathways: How Drilling Near An Abandoned Well Produced a Methane Geyser.” StateImpact Pennsylvania 9 October 2012: NPR. Web. 3 Jan. 2014.; Pennsylvania Department of Environmental Protection, Bureau of Oil and Gas Management. (2009, October 28). Draft Report - Stray Natural Gas Migration Associated with Oil and Gas Wells.

^{viii} Vaidyanathan, Gayathri. “When 2 wells meet, spills can often follow.” EnergyWire. 5 Aug. 2013: E&E News. Web. 3 Jan. 2014.

^{ix} Alberta Energy Board. (2013 May). Directive 083: Hydraulic Fracturing – Subsurface Integrity. 15p. available at <http://www.aer.ca/documents/directives/Directive083.pdf>

^x Enform Canada. 27 Mar. 2013. “Interim IRP 24: Fracture Stimulation: Interwellbore Communication; An Industry Recommended Practice For The Canadian Oil And Gas Industry” Interim Volume 24. 1st Edition.