

Narrative Description of Interim Well Stimulation Draft Regulations

On September 20, 2013, Governor Brown signed into law Senate Bill 4 (Pavley, Chapter 313, Statutes of 2013). SB 4 requires the Division of Oil, Gas, and Geothermal Resources (Division) to regulate well stimulation treatments.

To implement the legislation SB 4 permits the Department of Conservation (Department) to promulgate both emergency (interim) regulations and “permanent” regulations. The Department will use the emergency regulation process to set up interim rules that will go into effect on January 2, 2014 and remain in effect until November 2014 at which time the Department will adopt “permanent” regulations using the rulemaking process.

The interim regulations will require an operator to submit to the Division a signed Interim Well Stimulation Treatment Notice (WST Notice) prior to commencing a well stimulation treatment. The WST Notice must include detailed information about the fluids to be used, a ground water monitoring plan, and a water management plan. Copies of an approved WST Notice must be sent to neighboring property owners and tenants, and water well and surface testing must be provided upon request. SB 4 requires the Division to prepare regulations to ensure that well stimulation is done safely and to require detailed public disclosure about the well stimulation.

The interim regulations will address important operational requirements such as the WST Notice, well evaluation, neighbor notification, and storage and handling of fluids.

This narrative describes the current regulations governing well stimulation and the effect of the interim regulations. This document does not address the permanent well stimulation regulations or other requirements of SB 4, such as the EIR or independent scientific study.

Background

All oil and gas wells in California are constructed to meet specific standards. Well construction standards have a fundamental purpose – to ensure “zonal isolation.” Zonal isolation means that oil and gas coming up a well from the underground geologic production zone will not escape the well and migrate into other geologic zones, including zones that might contain fresh water. Zonal isolation also means that any fluids an oil and gas operator puts down a well for any purpose will either stay in that zone or be brought up to the surface, and are not allowed migrate to another zone. To achieve zonal isolation, current rules require that a cement barrier be placed between the well and the surrounding geologic strata or stratum. The cement bonds to the

surrounding rock and forms a barrier against fluid migration between the well and the surrounding rock. Cement barriers must meet certain standards for strength and integrity. If they do not meet the standards, they must be fixed or replaced. Metal casings – sometimes several layers of metal and cement, depending upon the well depth – also separate the fluids going up and down a well bore from the surrounding geology. If the integrity of a well is compromised by ground movement or other mechanisms, the operators must fix the well.

Once well operators drill into oil- and gas-bearing geologic formations, if there is recoverable oil or gas, they begin extraction of the resource. In some cases, the oil or natural gas will not flow freely to the well and the hydrocarbon formation must be stimulated (commonly referred to as either “production stimulation” or “well stimulation”). There are a variety of stimulation techniques intended to increase the permeability of the hydrocarbon formation and, thus, improve the flow of oil or natural gas from the geologic stratum to the well so hydrocarbon resources can be produced.

There are three broad types of well stimulation used in California that are the focus of SB 4 and the Department's interim regulations:

- Hydraulic fracturing (HF) involves the temporary application of fluids at very high pressures to the oil or gas producing stratum designed to create new fissures through which oil or gas can flow back to the well and be produced. Without these fissures, the geologic zone would not as easily release the oil or gas and the well would not flow. The pressures applied must be high enough to break the geologic formation (i.e., higher than the stratum's “fracture pressure”). In HF, a fluid with chemicals and additives intended to achieve certain ends is injected into the formation under pressure. A “proppant” (typically sand, or small resin or ceramic beads) is added so that the fractures created by the pressure do not collapse back on themselves under the weight of thousands of feet of overlying rock. If the fractures were to close after the stimulation treatment, no additional flow of oil or gas would occur. Some chemicals and additives in the fracturing fluid help make sure the proppant remains in a gel-like solution (instead of settling to the bottom of the fluid) for circulation into the fissures. Other additives dissolve the gel after the fractures are created to allow the “fracturing fluid” to come back to the surface and leave the proppants behind in the fissures. Still others are inserted to ensure that bacteria from the surface are not accidentally injected into the geologic stratum, where they might form biofilms or cultures that could clog the flow of the well.

- Acid fracturing is similar to HF in that the fluids are injected above the hydrocarbon-bearing formation's fracture pressure to create fractures in the hydrocarbon zone.

Unlike HF, however, sometimes a proppant is not used. In this case, the formation that is fractured is also etched by the acid, creating channels through which oil and natural gas can flow back to the well bore for production to the surface. When no proppant is used, gelling agents to hold proppant in suspension are not necessary. The acidity of the fluid may also remove the necessity of using other chemicals as biocides, although that is dependent upon the type and strength of the acid used.

- Acid matrix stimulation is the application of acid below a formation's fracture pressure to etch existing fissures, increase the hydrocarbon formation's permeability, and increase flow of oil or natural gas to the well bore. The pressures involved in this injection are lower than the fracture pressure of the surrounding rock, as the acid used is propagated into the hydrocarbon formation without need to fracture the formation. The need for gelling agents and agents that break the gel are not necessary, as no proppant needs to remain in suspension. Similarly, the use of other chemicals as a biocide may be reduced, dependent upon the concentration of acid used.

Some of the chemicals used in fracturing fluids are non-toxic, but others have potential health hazard properties. Once the fluids are injected, most of them are produced back to the surface through the same well into which they were injected.

California oil and natural gas is almost always associated with "produced water" – that is, brackish water that is sometimes as salty as the Earth's oceans has already been trapped in the oil or gas formation for millions of years. Generally, there is far more water in a reservoir formation than there is oil or natural gas; 80-90 percent water is not uncommon in California oil and gas fields. This means that, on average for all wells in the state, for every 100 barrels of fluid produced, more than 80 of the barrels of fluid are brackish water. One of three things can happen to this water: it can be re-injected through regulated injection wells for enhanced oil operations; it can be re-injected into regulated wastewater disposal wells; or it can be treated to meet standards that allow use for other purposes or discharge. When well stimulation occurs, most of the fluid used in the stimulation is pumped to the surface along with the produced water, making separation of the stimulation fluids from the produced water impossible. The stimulation fluid is then co-disposed with the produced water. Current regulations specify the disposal requirements for these fluids – for instance, existing regulations govern how fluids are disposed of in disposal wells, how they are used to enhance oil production from existing reservoirs, or how they are treated.

Current Well Approval Process

Operators apply to the Department before drilling an oil or gas well. If their well construction proposal meets the Department's standards, the Division of Oil, Gas, and

Geothermal Resources approves the proposal. Once the well is authorized, the operator is allowed to construct the well to the applicable standards and operate it in accordance with existing rules. If the well loses integrity – for example, damage to the well results in an inability to provide zonal isolation – the operator must remedy the situation. Also, if the well operator wants to change the well’s depth or change the well from a “producing well” to an “injection well” or to a “disposal well,” the Department/Division must review the proposed change. The Department’s existing regulations protect groundwater, public health and safety, and the environment through adherence to high construction standards and maintenance of the well’s integrity. These protections remain in effect, regardless of the well stimulation techniques applied to the geologic formation through the well.

Operator Requirements Under the Interim Regulations and SB 4

1. Integrity a Well.

The interim regulations will ensure that a well’s integrity is maintained by requiring an operator to certify: (1) a well’s casing is sufficiently cemented in order to effectively control the well at all times during well stimulation treatment; (2) all potentially productive zones, zones capable of over-pressurizing the surface casing annulus, or corrosive zones are isolated and sealed to prevent vertical migration of fluids or gases behind the casing; and (3) a wellbore’s mechanical integrity is tested and maintained and all cemented casing strings and all tubing strings to be utilized in the well stimulation treatment operations will be pressure tested.

2. Notice of Well Stimulation.

The interim regulations require that an operator submit to the Division, in advance of commencing a well stimulation treatment, a signed written Interim Well Stimulation Treatment Notice (WST Notice). Well stimulation treatment can commence once an operator has provided all of the required information and certifications to the Division and the Division has reviewed the WST Notice as complete.

The interim regulations require an operator to notify the Division at least 72 hours prior to commencing well stimulation that the treatment will take place so that Division staff may witness it.

3. Neighbor Notification and Water Testing.

SB 4 and the interim regulations require operators to hire an independent entity or person to provide notification to every tenant and owner of neighboring property within a specified distance from the wellhead and horizontal projection of a well that will have a well stimulation treatment performed on it. The statute and interim regulations requires

operators to provide neighbor notification at least 30 days prior to commencing the well stimulation treatment.

4. Pressure Testing of Equipment Prior to Well Stimulation Treatment.

The interim regulations require operators to pressure test equipment to be used for well stimulation, prior to commencing treatment.

5. Disclosure.

SB 4 requires an operator to post, within 60 days following the cessation of a well stimulation treatment, specified information regarding the composition and disposition of well stimulation fluids, including, but not limited to, hydraulic fracturing fluids, acid well stimulation fluids, and flowback fluids, to a Chemical Disclosure Registry that is accessible to the public. The interim regulations reiterate the disclosures specified in the statute, with some minor additions and non-substantive revisions for the sake of clarity.

6. Trade Secrets.

Some operators and contractors for operators claim that the chemical composition of the well stimulation fluids they use are subject to trade secret protections. Trade secret protections are specified primarily in the California Civil Code. SB 4 requires that, whether or not the information is claimed as trade secret, it must be disclosed to the Division. A supplier may designate that the information is a trade secret, and submit the information to the Division along with a specified justification. The Division is then required to make a determination of whether or not the information is a protected trade secret. After the determination, SB 4 sets forth a process by which the information can be obtained, how the trade secret information would be disclosed, and how the supplier may seek to obtain a preliminary injunction prohibiting disclosure of the information to the public if it disagrees with the trade secret determination of the Division. SB 4 also provides that even if the information is a protected trade secret, it must be disclosed to specified government entities, or for a health professional who reasonably believes that the information may be necessary in the diagnosis or treatment of a patient.

7. Storage and Handling of Well Stimulation Fluids.

Current law and regulations administered by the Department/Division contains provisions governing notification, response and clean-up of spills in the oil field environment. The interim regulations require that an operator's Spill Contingency Plan addresses handling of well stimulation fluid and additives.