

## Senate Committee on Natural Resources and Water

### SB 4 (2013) Implementation: Well Stimulation in California Oversight Hearing

#### Background

##### Overview

Senate Bill 4 (Pavley/Leno, c. 313, Statutes of 2013) established the statutory framework for the specific regulation of well stimulation treatments, including hydraulic fracturing and acidization, in California's oil and gas wells. Prior to SB 4, well stimulation treatments appear to have been widely-practiced in California. However, the Division of Oil, Gas and Geothermal Resources (DOGGR) did not specifically regulate well stimulation treatments, did not require reporting of well stimulation treatments, and could not answer questions about their practice. SB 4 had numerous requirements, including, among others, that:

- an independent science study on well stimulation be conducted,
- DOGGR develop well stimulation treatment-specific regulations including a permit process,
- DOGGR consult with and reach formal agreements with other regulators with jurisdiction over various aspects of well stimulation treatments,
- the Water Boards develop model groundwater monitoring criteria, and conduct groundwater monitoring in the vicinity of the state's oil and gas fields, and
- an Environmental Impact Report applicable to well stimulation treatments state-wide be completed and certified.

SB 4 includes statutory deadlines for implementation of these items. The purpose of this hearing is to review the progress, particularly by DOGGR and the Water Boards, of their efforts to implement SB 4.

##### Well stimulation treatments

As defined in SB 4, a well stimulation treatment is "any treatment of a well designed to enhanced oil and gas production or recovery by increasing the permeability of the formation" (Public Resources Code (PRC) §3157). SB 4 excludes water flooding and other forms of enhanced oil recovery operations as these were already specifically regulated, if not very well<sup>1</sup>, by DOGGR. Hydraulic fracturing, or "fracking," is the form of well stimulation treatment that has received international attention as recent advances in fracking techniques have allowed for the recovery of oil and gas from many formations that had previously been uneconomic to produce. In fracking, fluids are pumped through the wellbore and into the hydrocarbon-containing formation at high pressure in order to fracture the rock and allow the hydrocarbons to then flow more easily to the wellbore for production. SB 4 also includes acid matrix stimulation and acid fracturing treatments as further examples of well stimulation treatments where acid is used to chemically react with the formation.

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<sup>1</sup> see, for example, "California Permitted Oilfield Discharge into Protected Water" by Ellen Knickmeyer, Associated Press, published February 5, 2015, or "State let oil companies taint drinkable water in Central Valley" by David R. Baker, San Francisco Chronicle, published February 1, 2015.

Fracking is highly controversial. The oil and gas production booms associated with advances in fracking have led to significant increases in hydrocarbon production in states such as Pennsylvania, Texas and North Dakota. However, at the same time there has been considerable public outcry over the attendant risks to public and environmental health and safety raised by fracking. These include, for example, degradation of air and water quality, among others. Throughout the world, efforts are underway to ban or strictly regulate hydraulic fracturing in many locations due to these concerns.

In the California legislature, there have been repeated efforts to ban or place a moratorium on fracking and/or well stimulation treatments (for example, AB 972 (Butler, 2012), AB 1323 (Mitchell, 2013), SB 1132 (Mitchell, 2014)). All have failed. In New York, Governor Cuomo, at the recommendation of the Public Health Director, affirmed the state's ban on high volume hydraulic fracturing (using more than 300,000 gallons per well) in December 2014. Other states have passed laws and/or regulations to regulate fracking (e.g. Pennsylvania, Texas, Illinois, among others).

In California in the November 2014 election, voters in San Benito and Mendocino Counties passed local bans on well stimulation treatments although a similar proposal was defeated in Santa Barbara County. The Santa Cruz County Board of Supervisors had earlier voted to ban well stimulation treatments, as had Beverly Hills. The Los Angeles City Council also has voted to have an ordinance written to ban well stimulation treatments, and Culver City City Council has voted to monitor developments in Los Angeles.

#### **SB 4 Implementation: Independent Science Study**

The Natural Resources Agency (CNRA) contracted with the California Council on Science and Technology (CCST) to meet the SB 4 requirement that an independent science study be completed on well stimulation treatments in California (see PRC §3160(a)). CCST drew upon the expertise of numerous scientists and a process was set-up to provide for extensive scientific peer-review of CCST's study.

In the August 1, 2014 progress report, the CNRA notified the Legislature that the study was going to be split into three parts<sup>2</sup>. Only Volume I – describing past and current well stimulation treatment practices, where they have occurred and are likely to occur in California<sup>3</sup> – would meet the statutory January 1, 2015 deadline. Volumes II – including air and water quality impacts, direct and indirect seismic impacts, traffic and other related information – and III – including case studies specific to California – would be completed by July 1, 2015. The breadth of the study and necessary scientific effort, as well as the time required for scientific peer-review of the study to be completed, were cited, in part, as the cause the delay.

Key findings from Volume I include:

- Fracking practices in California appear to be very different from current practices used to produce unconventional reservoirs in, for example, North Dakota and Texas. In

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<sup>2</sup> When the study is completed in its entirety, CCST will also produce an overall summary.

<sup>3</sup> Volume I is available at [http://ccst.us/projects/hydraulic\\_fracturing\\_public/SB4.php](http://ccst.us/projects/hydraulic_fracturing_public/SB4.php)

California, fracked wells tend to be shallower, vertical, fracked in one location in the well only, and use much smaller amounts of water on average (on the order of 200,000 gallons or less each).

- Future expanded production in California is likely to be predominantly in the San Joaquin basin where it is concentrated now. It remains highly uncertain how much oil can and is available to be produced directly from the Monterey Shale.
- Hydraulic fracturing, rather than acidizing, has been used much more frequently both onshore and offshore.
- Available data<sup>4</sup> indicate approximately 150 frack jobs per month onshore and about 1 offshore have occurred.
- Over the last decade, about 20% of California's oil production has been from fracked wells

#### **SB 4 Implementation: DOGGR's SB 4 regulations<sup>5</sup>**

Interim or emergency regulations governing well stimulation treatments have been in place since January 1, 2014. The emergency regulations will remain in effect until July 1, 2015. On July 1, 2015, DOGGR's permanent well stimulation treatment regulations will go into effect<sup>6</sup>. The permanent regulations were completed by the statutory deadline of January 1, 2015.

Before discussing the regulations, a summary of well stimulation treatment activity under SB 4 is compiled in Table 1. Over 1360 approved certification notices are posted on DOGGR's website. The index of the certification notices is searchable for information about each approved as complete well stimulation treatment. Of the complete well stimulation treatment notices, over 99% are in Kern County, principally in 3 large fields. Only ten notices are outside Kern County in Ventura (4), Kings (3) and Fresno (3) Counties. About 95% of the notices are for hydraulic fracturing, and only one of the 69 acid treatments is for acid fracturing. Seventeen groundwater monitoring plans were approved, and no trade secret claims for chemical additives have been made to date. Two operators (Aera Energy and Occidental of Elk Hills) account for over 90% of the notices filed.

DOGGR's interim well stimulation regulations include advance neighbor notification of well stimulation events, the opportunity for the neighbors to get their wells and surface waters tested before and after well stimulation treatment events, pre-and post-well stimulation public disclosure of chemicals and the amount of water used, groundwater monitoring plans for protected waters, where applicable, and other provisions. The requirements for groundwater monitoring plans were incorporated in the interim regulations and the Water Boards reviewed submitted plans.

DOGGR's permanent well stimulation regulations include much of the contents of the interim regulations<sup>7</sup>. In addition, the permanent regulations require seismic monitoring be conducted

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<sup>4</sup> 2012 - 2013

<sup>5</sup> DOGGR's well stimulation data can be reached through <http://www.conservation.ca.gov/dog/Pages/Index.aspx>

<sup>6</sup> The "permanent" regulations may be modified.

<sup>7</sup> As the State Water Resources Control Board is directed by SB 4 to develop model criteria for groundwater monitoring and regulations for groundwater monitoring, elements of the interim regulations that address this are not in DOGGR's permanent regulations.

**Table 1: Well Stimulation Notices (through February 1, 2015)**

Total approved certification notices	1363
- County breakdown	99+% Kern (1353) < 1% Ventura (4), Kings (3), Fresno (3)
Hydraulic fracturing notices (percentage of total & number)	95% (1294)
Acid Matrix (percentage of total & number)	5% (68)
- Field (County) breakdown	66 in Kern County, 2 in Kings
Acid fracturing (number)	1 (Kings County)
Horizontally-drilled wells (percentage of total & number)	2% (32)
- Field (County) breakdown	24 in Rose field (Kern), 5 in North Shafter (Kern). Also, 1 wildcat well in Kern and 2 in Lost Hills (Kern)
Oil/gas fields with certification notices (all are in Kern County except as indicated (* Ventura, ** Fresno, and *** Kings))	South Belridge (855), North Belridge (275), Elk Hills (134), Lost Hills (48), Rose (24, all horizontal wells), North Shafter (5, all horizontal wells), Ventura* (3), Kern Co wildcats (2), Coalinga** (2), North Coles Levee (4), Kettleman Middle Dome*** (3), Paloma (3), Asphaltto (1), Hopper Canyon* (1), Kettleman North Dome** (1), San Emidio Nose (1), Stockdale (1)
Approved groundwater monitoring plans	17 (not counting revisions & addenda)
Trade secret chemical claims	0

during well stimulation treatment events and appear to reflect input from other regulators, such as the Department of Toxic Substances Control (DTSC). The permanent regulations allow – consistent with the Governor’s signing message – for multiple well stimulation permit applications to be grouped together under a single authorization for the purposes of the California Environmental Quality Act.

**SB 4 Implementation: Water Boards’ activities<sup>8</sup>**

The Water Boards have been an integral part of the implementation of SB 4. The Water Boards have been tasked with the development of model groundwater monitoring criteria and the statutory deadline for implementing these regulations is July 1, 2015. Additionally, the Water Boards must start regional groundwater monitoring by January 1, 2016.

The State Water Resources Control Board (SWRCB) convened three workshops to receive public and stakeholder input on the development of the model groundwater monitoring criteria required by SB 4. Participants included the Lawrence Livermore National Laboratory (LLNL), the US Geological Survey (USGS), industry, environmental and environmental justice groups, agriculture and the oil and gas industry. Under contract to the SWRCB, LLNL has convened a group of experts to provide advice. The SWRCB has also contracted with the USGS to develop a conceptual model for regional monitoring. Meetings were held in Bakersfield and Los Angeles in August 2014 and in Sacramento in December 2014.

The USGS has released a white paper that discusses various considerations for the development of the monitoring criteria and groundwater monitoring. It recommends that the concept of vulnerability be incorporated into the criteria. Put practically, where the highest potential exists for oil and gas operations to impact a source of drinking water, more monitoring should be performed. Conversely where little potential for drinking water contamination exists, less monitoring is necessary. The white paper proposes a phased approach to regional monitoring – characterization, follow-up and on-going monitoring and the development of appropriate hydrologic models.

Of particular note, the white paper indicates that water districts are beginning to use/plan to use lower quality groundwater from deeper depths for drinking water after appropriate treatment. Further, the chemicals used in well stimulation are similar to those used in enhanced oil recovery operations in significantly larger quantities so signals specific to well stimulation treatments in groundwater are likely to be difficult to discern.

**SB 4 Implementation: DOGGR’s Memorandums of Agreement (MOAs)**

SB 4 requires that DOGGR consult with and reach formal agreements with several public entities who have jurisdiction and regulatory responsibility over different aspects of well stimulation treatments in order to promote regulatory accountability and public transparency (PRC § 3160(c)). The intent was to ensure that the regulators responsible for air quality, for example, regulated air quality associated with well stimulation treatments and that data handling, notification and reporting requirements were clearly delineated.

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<sup>8</sup> The Water Boards’ web-site containing describing its SB 4 activities is at [http://www.waterboards.ca.gov/water\\_issues/programs/groundwater/sb4/index.shtml](http://www.waterboards.ca.gov/water_issues/programs/groundwater/sb4/index.shtml)

On or by the statutory deadline of January 1, 2015, DOGGR executed the following MOAs:

- DOGGR and the Water Boards
- DOGGR and DTSC
- DOGGR and the California Coastal Commission
- DOGGR and CalRecycle
- DOGGR and the California Air Resources Board (ARB) and each of the following local air districts – San Joaquin Air Pollution Control District, the Ventura County Air Pollution Control District, the South Coast Air Quality Management District (SCAQMD), the Santa Barbara County Air Pollution Control District, the San Luis Obispo Air Pollution Control District and the Yolo-Solano Air Quality Management District.

Each MOA provides specific requirements for how and when DOGGR notifies the other regulators of well stimulation treatment permit applications, provides for interaction between the regulators and indicates that the respective MOAs will be revisited when the independent science study and the Environmental Impact Report are completed.

#### **SB 4 Implementation: Well stimulation treatment Draft Environmental Impact Report**

The Draft Environmental Impact Report (DEIR) for well stimulation treatment activities in California was released on January 14, 2015 by the Department of Conservation. The public comment period for the DEIR is from January 14 to March 16, 2015. The EIR is required by SB 4 to be certified by July 1, 2015 (PRC §3161). Six public hearings throughout the state are in the process of being held to receive comment.

The DEIR looks at the likely impacts of well stimulation treatments in California at a programmatic level state-wide. It evaluates several alternatives, including a ban on future well stimulation treatments. Three oil and gas fields – Wilmington, Inglewood and Sespe<sup>9</sup> are examined in detail.

As required, the DEIR addresses numerous potential impacts of well stimulation from air quality to biological resources to greenhouse gas emissions to environmental justice and cultural resources, among others. Impacts range from Class I (significant and unavoidable impact) to Classes III (less than significant impact), IV (no impact) and V (beneficial impact).

The DEIR identifies Class I impacts for aesthetics, air quality, biological resources, geological resources, greenhouse gas emissions, cultural resources, land use and planning, public and worker safety, and transportation and traffic. In some instances and locations, these impacts may be capable of mitigation to Class II, or may be of a lesser degree (Class III or IV). For example, well stimulation in an existing oil field is likely to have a lesser impact than well stimulation in a pristine forest. However, for example, the hazards associated with chemical transportation and to air quality cannot be entirely mitigated and remain Class I across the alternatives proposed.

The recommended alternative in the DEIR is to continue well stimulation treatment activities in California under the SB 4 regulations.

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<sup>9</sup> located in Los Angeles, Los Angeles and Ventura Counties. Kern County, where currently hydraulic fracturing is concentrated, is in the process of developing its own county-level EIR for oil and gas development.

#### **Additional state regulatory action to implement SB 4**

Significant action is also being undertaken by additional state regulators other than the Water Boards and DOGGR.

ARB received funding for 6 positions and \$300,000 in contract funding in the FY 2014/2015 budget to develop regulations to control and mitigate air emissions from well stimulation treatments. Initial measurements of air emissions from well stimulation treatments are underway and will be completed within the next few months. Additional measurements are being considered for FY 2015/2016. Currently, ARB is in the process of developing regulations to reduce methane emissions from oil and natural gas productions and well stimulation treatment-specific regulations may be included in that effort, if possible. ARB staff expect that methane controls will also reduce emissions of other pollutants. As noted previously, ARB signed MOAs with DOGGR and 6 local air districts regarding data sharing and other regulatory coordination related to well stimulation treatments.

DTSC has jurisdiction over hazardous waste, including those generated during oil and gas field activities, as defined and subject to certain statutory exemptions. DTSC also has jurisdiction over hazardous wastes that are transported over public roadways. To ensure that hazardous wastes are identified and managed legally, the SB 4 permanent well stimulation regulations require oil and gas operators to determine whether the wastes generated during well stimulation treatment activities are hazardous wastes. If the well stimulation wastes are determined to be hazardous waste, the oil and gas operators are required to handle those wastes in compliance with all applicable hazardous waste management requirements. Additionally, as noted above, DOGGR and DTSC signed a MOA which requires DOGGR to share well stimulation treatment permit applications with DTSC. DTSC is also planning to conduct a study of wastes that are generated by the oil and gas field operators to better understand the conditions, circumstances and types of stimulation chemicals through which well stimulation treatment and other oil and gas field activities are likely to result in the generation of hazardous waste. DTSC continues to work with local Certified Uniform Program Agencies (CUPAs) on SB 4 implementation and the regulation of hazardous wastes generated during oilfield operations and stimulation activities.

The Office of Environmental Health Hazard Assessment (OEHHA) is participating in the independent science study, as required by SB 4. OEHHA took the lead in organizing a public workshop earlier this month in Bakersfield to receive input on impacts from well stimulation activities, including, for example, health effects. Additionally OEHHA has been involved in reviewing drafts of the independent science study as well as developing toxicity values and exposure pathways for use in Volumes II and III of the study.

#### **SB 4 Implementation Concerns**

SCAQMD instituted Rule 1148.2 requiring reporting of various oil and gas well activities including drilling, hydraulic fracturing, matrix acidizing and other events in its service area of Los Angeles and Orange Counties. Rule 1148.2's effective date predates SB 4's by roughly 7 months<sup>10</sup> and the scope of Rule 1148.2 is broader. There have been several reports of

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<sup>10</sup> June 4, 2013

discrepancies between SB 4 and Rule 1148.2 since SB 4 went into effect<sup>11</sup>. A review of each set of records, and additional information provided by and discussions with both SCAQMD and DOGGR suggest that the apparent discrepancies stem largely from differences in the scope and effective dates of the respective regulations as well as late reporting by an operator.

The Center for Biological Diversity has also noted repeatedly delays in DOGGR's posting of post-stimulation information<sup>12</sup>. Operators were posting data on the Fracfocus.org web-site that was then not appearing on DOGGR's web-site until considerably later. DOGGR responded by indicating the delays were associated with quality control efforts and stated that efforts to improve the timeliness of posting the results would continue<sup>13</sup>.

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<sup>11</sup> see, for example, the March 26, 2014 letter to Governor Brown from the Center for Biological Diversity

<sup>12</sup> see, for example, the Center for Biological Diversity letter noted earlier. Under SB 4, the operator must provide DOGGR with post-stimulation information, as specified, within 60 days following the completion of the work.

<sup>13</sup> see October 6, 2014 letter to the Center for Biological Diversity from Dr. Steven Bohlen/DOGGR