The Florida Senate

BILL ANALYSIS AND FISCAL IMPACT STATEMENT

(This document is based on the provisions contained in the legislation as of the latest date listed below.)

Prepared By: The Professional Staff of the Committee on Environmental Preservation and Conservation

BILL:	SB 462
INTRODUCER:	Senator Young and others
SUBJECT:	Advanced Well Stimulation Treatment
DATE:	February 2, 2018
REVISED:	

	ANALYST	STAFF DIRECTOR	REFERENCE	ACTION
1.	Istler	Rogers	EP	**Favorable**
2.			AEN	
3.			AP	

I. Summary:

SB 462 prohibits the performance of advanced well stimulation treatments on oil or gas wells in the state. The bill defines the term "advanced well stimulation treatment" to include all stages of well intervention performed by injecting fluids into a rock formation:

- At pressure that is at or exceeds the fracture gradient of the rock formation and the purpose or effect is to fracture the formation to increase production or recovery from an oil or gas well, such as hydraulic fracturing or acid fracturing; or
- At pressure below the fracture gradient of the rock formation and the purpose or effect is to dissolve the formation to increase production or recovery from an oil or gas well, such as matrix acidizing.

The definition explicitly excludes techniques used for routine well cleanout work, well maintenance, or removal of formation damage due to drilling or production; or acidizing techniques used to maintain or restore the natural permeability of the formation near the wellbore.

II. Present Situation:

Production of conventional versus unconventional oil and gas resources: the use of well stimulation techniques

Conventional oil and gas resources are found in permeable sandstone and carbonate reservoirs.[1] Wells have historically been drilled vertically, straight down into a rock formation to extract conventional resources. Whereas conventional resources are found in concentrated underground locations, unconventional resources are highly dispersed through impermeable or "tight" rock

[1] Michael Ratner & Mary Tiemann, Cong. Research Serv., R 43148, *An Overview of Unconventional Oil and Natural Gas: Resources and Federal Actions*, 2 (Apr. 22, 2015), *available at* https://www.fas.org/sgp/crs/misc/R43148.pdf (last visited Jan. 29, 2018).

formations, such as shales and tight sands. To extract unconventional resources, drilling has shifted from vertical to horizontal or directional away from the reservoir and toward the source rock.

Well stimulation techniques are used in the production of both conventional and unconventional resources. The techniques can be focused solely on the wellbore for maintenance and remedial purposes or can be used to increase production from the reservoir.[2] The relatively recent development of horizontal or directional drilling in conjunction with the expanded use of well stimulation techniques has increased the production at oil or gas wells and has led to the profitable extraction of unconventional resources.[3] The three main well stimulation techniques are hydraulic fracturing, acid fracturing, and matrix acidizing.[4]

Hydraulic Fracturing

Hydraulic fracturing was developed in the 1940s to increase the production of conventional oil and gas resources. While the technique is not new, the composition of the fracturing fluids used in the process has evolved over time. Initially the fracturing fluids were oil-based and relied on a mixture of petroleum compounds, such as napalm and diesel fuels.[5] Modern hydraulic fracturing involves a fracturing fluid that is composed of a base fluid, in most cases water; additives, each designed to serve a particular function; and a proppant, such as sand. The composition of the fracturing fluid varies depending on the permeability and brittleness of the reservoir rock.[6] A hydraulic fracturing operation at a horizontal well involves four stages. The first is the "stage," during which a portion of the well is isolated to focus the fracture fluid pressure. The second is the "pad," during which fracture fluid is injected without proppant to initiate and propagate the fracture. The proppant is then added to keep the fractures open. The third stage is the "flush," during which fluid is injected without proppant to push any remaining proppant into the fractures. The fourth state is the "flowback," during which the hydraulic fracturing fluids are removed and the fluid pressure dissipates.[7]

The Environmental Protection Agency (EPA) estimates that 25,000-30,000 new wells were drilled and hydraulically fractured annually in the United States between 2011 and 2014.[8] In 2016, hydraulically fractured horizontal wells accounted for 69 percent of all oil and natural gas

[2] California Council on Science and Technology Lawrence Berkeley National Laboratory, *An Independent Assessment of Well Stimulation in California, vol. 1, Well stimulation technologies and their past, present, and potential future use in California*, 14 (January 2015) [hereinafter *CA Study*], *available at* http://ccst.us/publications/2015/2015SB4-v1.php (last visited Jan. 29, 2018).
[3] *Id*. at 2.
[4] *Id*. at 28.
[5] Gallegos, T.J., and Varela, B.A., United States Geological Survey, *Trends in Hydraulic Fracturing Distributions and Treatment Fluids, Additives, Proppants, and Water Volumes Applied to Wells Drilled in the United States from 1947 through 2010—Data Analysis and Comparison to the Literature*, Scientific Investigations Report 2014–5131, 7 (2015), *available at* http://pubs.usgs.gov/sir/2014/5131/pdf/sir2014-5131.pdf (last visited Jan. 29, 2018).
[6] *CA Study* at 48.
[7] *Id*. at 42.
[8] U.S. Environmental Protection Agency (EPA), *Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States*, 3-1 (Dec. 2016) [hereinafter *EPA Study*], *available at* https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990 (last visited Jan. 29, 2018).

wells drilled in the U.S.[9] Hydraulic fracturing in conjunction with horizontal or directional drilling techniques has led to a surge in domestic production of oil and gas resources in the last decade and, in 2012, the United States became the world's top producer of petroleum and natural gas hydrocarbons.[10] The combination of horizontal drilling and hydraulic fracturing has contributed to increase in oil and natural gas production in the U.S., which are both expected to reach record levels in 2018.[11]

Acid Fracturing

Well stimulation techniques that use acid-based formulas are sometimes preferred in carbonate reservoirs.[12] Acid fracturing is a well stimulation technique that uses acidic fluids. Well operators pump the acidic fluids into a well at a pressure that exceeds the fracture gradient and, thus, fractures the rock. The acid etches the walls of the fracture and eliminates the need to use a proppant because the fractures remain open after pressure is released.[13] The produced fluids have a much lower acid content than the injected fluids because most of the acid that is injected is neutralized through a reaction with the rock.[14] As compared to hydraulic fracturing, acid fracturing is generally more successful in carbonate reservoirs because of the relatively high degree of natural fractures present.[15]

The purpose of an acid fracturing treatment is to create new or open existing fractures and dissolve formation material to create an irregular fracture surface that opens up new flow paths or enhances existing flow paths into the wellbore.[16] As compared to hydraulic fracturing, acid fracturing results in fractures that are relatively short in length.[17] One of the main factors that adversely affects acid fracture growth is fluid loss or acid leakoff. Acid leakoff can result in the enlargement of wormholes and natural fractures and can greatly increase the area from which fluid loss occurs, making fluid-loss control difficult and preventing acid from reaching untreated parts of the fracture.[18]

Matrix Acidizing

Dating back to 1895, well operators have been using matrix acidizing for over 100 years.[19] Drilling and production operations lead to formation damage.[20] Formation damage can include the plugging of perforations or the plugging of the rock matrix by debris from the well and well

[9] U.S. Energy Information Administration (EIA), *Hydraulically fractured horizontal wells account for most new oil and natural gas wells* (Jan. 30, 2018) https://www.eia.gov/todayinenergy/detail.php?id=34732 (last visited Jan. 30, 2018).
[10] EIA, *Today in Energy, U.S. remained the world's largest producer of petroleum and natural gas hydrocarbons in 2014*, (Apr. 7, 2015) http://www.eia.gov/todayinenergy/detail.cfm?id=20692 (last visited Jan. 29, 2018).
[11] EIA, *Hydraulically fractured horizontal wells account for most new oil and natural gas wells* (Jan. 30, 2018).
[12] *CA Study* at 56.
[13] *Id*. at 28.
[14] *Id*. at 14.
[15] *Id*. at 56.
[16] American Petroleum Institute, *Acidizing: Treatment in Oil and Gas Operations*, 3 (2014), *available at* http://www.api.org/~/media/files/oil-and-natural-gas/hydraulic-fracturing/acidizing-oil-natural-gas-briefing-paper-v2.pdf (last visited Jan. 29, 2018).
[17] *CA Study* at 56.
[18] Middle East & Asia Reservoir Review, vol. 4, *Stimulate the Flow*, 46 (Jan. 2003), *available at* https://www.slb.com/resources/publications/industry_articles/mearr/num4_stimulate_flow.aspx (last visited Jan. 29, 2018).
[19] *CA Study* at 69.
[20] Middle East & Asia Reservoir Review, vol. 4, *Stimulate the Flow*, 42 (Jan. 2003).

operations which restricts the flow of hydrocarbons into the wellbore.[21] Matrix acidizing is performed by pumping acidic fluids into a well at a pressure that does not exceed the fracture gradient.[22] Acidizing is often used for well maintenance and to remediate damage caused by well operation and drilling.[23] Operators use acid, which is very effective at dissolving carbonate minerals, to bypass formation damage around the well.[24] The acid is mostly neutralized because it reacts quickly with the limestone. Additionally, various acids are used to clean residential water wells to loosen or dissolve debris so that it can be pumped out of the well.[25]

If large volumes of acid are injected into carbonate formations, matrix acidizing can be used to increase the permeability of the formation beyond the zone impacted by drilling or production activities.[26] Matrix acidizing can result in limited stimulation of carbonate reservoir permeability beyond the near-wellbore region.[27] This technique is not commonly used for stimulation in unconventional reservoirs because it does not increase recovery enough in low permeability reservoirs to make production viable.[28] The penetration into the formation caused by matrix acidizing is less extensive than after use of a fracturing technique. However, in carbonate reservoirs matrix acidizing can create deeply penetrating channels, known as wormholes, and lead to deeper acid penetration into more permeable fractures of a naturally fractured reservoir.[29] To minimize the probability of acid entering into highly permeable sections of the formation, which could create channels into water-producing zones, careful treatment, design, and execution is required when performing a matrix acidizing treatment.[30]

Production of oil and gas resources in Florida

Northwest and South Florida are the major oil and gas producing areas in the state. The first producing oil well was discovered in 1943 at a wellsite located in the Big Cypress Preserve in South Florida.[31] Oil and gas resources were first discovered in Northwest Florida in 1970. There are two active oil and gas fields in Northwest Florida in Escambia and Santa Rosa counties, and five active oil and gas fields in South Florida in Lee, Hendry, Collier, and Miami-Dade counties.[32] While geologists believe that there may be large oil and natural gas deposits off Florida's western coast, the state enacted a drilling ban for state waters in 1990 and, in 2006, Congress banned the leasing of federal offshore blocks within 125 miles of Florida's western

[21] *Id*.
[22] *CA Study* at 69.
[23] *Id*. at 14.
[24] *Id*. at 69.
[25] National Groundwater Association, *Residential Well Cleaning* (2016), *available at* http://www.ngwa.org/Documents/ClipCopy/Res-Well-Cleaning.pdf (last visited Jan. 30, 2018).
[26] *CA Study* at 14.
[27] *Id*. at 28.
[28] *Id*. at 14.
[29] *Id*. at 30.
[30] Middle East & Asia Reservoir Review, vol. 4, *Stimulate the Flow*, 44 (Jan. 2003).
[31] American Oil & Gas Historical Society, *First Florida Oil Well*, http://aoghs.org/states/first-florida-oil-well/ (last visited Jan. 29, 2018).
[32] Florida Department of Environmental Protection (FDEP), *State Production Data* (2017), *available at* https://floridadep.gov/water/oil-gas/documents/state-production-data (last visited Jan. 29, 2018).

coast until at least 2022.[33] Additionally, federal law gives priority use of much of the area to the military for training.[34]

As of 2017, there were approximately 64 active producer wells in Florida.[35] The Florida Department of Environmental Protection's (FDEP) 2017 Annual Production Report totaled natural gas production at 773,864 million cubic feet and oil production at 618,891 thousand barrels in the state.[36] Proven oil and gas reserves both in Northwest and South Florida are composed of carbonate formations and reservoirs that have relatively high permeability.[37] Rather than hydraulic fracturing, well operators in the state prefer washing or flushing the formations to open carbonate pathways to enhance recovery of oil and gas resources.[38]

Regulation of Well Stimulation Techniques

Federal

There is limited direct federal regulation over oil and gas activities. In 2005, Congress passed the Energy Policy Act amending, in part, the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA).[39] The SDWA was amended to revise the definition of the term "underground injection" to specifically exclude the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations. The CWA was amended to characterize oil and gas exploration and production as "construction activities," thereby removing these operations from the scope of the CWA.[40] Thus, the Energy Policy Act effectively exempted non-diesel hydraulic fracturing from federal regulation.[41]

In an attempt to regulate hydraulic fracturing on federal and tribal lands, the Bureau of Land Management (BLM) in March of 2015, published final rules governing hydraulic fracturing.[42] The rules were to take effect on June 24, 2015; however, the United States District Court for the

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[33] EIA, Florida, *Profile Analysis: Petroleum*, http://www.eia.gov/state/analysis.php?sid=FL (last visited Jan. 29, 2018); *see* s. 377.242(1), F.S.
[34] EIA, Florida, *Profile Analysis: Petroleum*, http://www.eia.gov/state/analysis.php?sid=FL (last visited Jan. 29, 2018).
[35] FDEP, *State Production Data* (2017), *available at* https://floridadep.gov/water/oil-gas/documents/state-production-data (last visited Jan. 29, 2018).
[36] *Id*.
[37] FDEP, *Hydraulic Fracturing Background and Recommendations* (Sept. 29, 2015) *available at* http://news.caloosahatchee.org/docs/Dep_Fracturing_Response_130118.pdf (last visited Jan. 29, 2018).
[38] *Id*.
[39] Energy Policy Act of 2005, H.R. 6, 109th Cong. (2005-2006).
[40] The EPA rule implementing the CWA amendment was challenged and the Ninth Circuit Court of Appeals vacated the rule. Oil and gas construction facilities remain subject to stormwater permitting requirements, as well as, NPDES permit requirements; *see* William J. Brady, *Hydraulic Fracturing Regulation in the United States: The Laissez-faire approach of the Federal government and varying state regulations*, 8 (Unv. of Denver Sturm College of Law), *available at* http://www.law.du.edu/documents/faculty-highlights/Intersol-2012-HydroFracking.pdf (last visited Jan. 29, 2018).
[41] Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 FORDHAM ENVTL. L. REV. 115 (2009), *available at* http://law.uh.edu/faculty/thester/courses/Emerging%20Tech%202011/Wiseman%20on%20Fracking.pdf (last visited Jan. 29, 2018).
[42] Under the final BLM regulations, the term "hydraulic fracturing" is defined as "those operations conducted in an individual wellbore designed to increase the flow of hydrocarbons from the rock formation to the wellbore through modifying the permeability of reservoir rock by applying fluids under pressure to fracture it. Hydraulic fracturing does not include enhanced secondary recovery such as water flooding, tertiary recovery, recovery through steam injection, or other types of well stimulation operations such as acidizing."

District of Wyoming granted a preliminary injunction and the rule was stayed.[43] In June of 2016, the court held that the BLM lacked authority to regulate hydraulic fracturing and set aside the final rules.[44] The court's ruling was appealed to the United States Court of Appeals Tenth Circuit which dismissed the appeal and remanded with directions to vacate the district court's opinion and dismiss the action without prejudice in light of the Bureau of Land Management's decision to rescind the final rules.[45]

While direct regulation over well stimulation techniques at the federal level is limited, there are several federal statutes that regulate the indirect impacts of oil and gas extraction. The EPA's Oil and Gas Extraction Effluent Guidelines and Standards regulate wastewater discharges from field exploration, drilling, production, well treatment, and well completion activities.[46] The regulations apply to conventional and unconventional extraction with the exception of extractions of coalbed methane.[47] These standards are incorporated into the National Pollutant Discharge Elimination System (NPDES) regulatory framework.[48]

Because oil and gas activities may result in the release of hazardous substances into the environment at or under the surface in a manner that may endanger public health or the environment, these activities are regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).[49] While recovered petroleum or natural gas is exempt from the act, other hazardous substances that result from oil or gas production, such as fracturing fluids, fall under the act. If a release of such fluids occurs, the facility owner and operator could face liability under CERCLA.[50]

To ensure that employees who may be exposed to hazardous chemicals in the workplace are aware of the chemicals' potential dangers, manufacturers and importers must obtain or develop Material Safety Data Sheets (MSDS) for hydraulic fracturing chemicals that are hazardous according to the Occupational Safety and Health Administration (OSHA) standards. MSDS sheets must be maintained for hazardous chemicals at each job site and must, at a minimum, include the chemical names of substances that are considered hazardous under OSHA regulations.[51]

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[43] *State of Wyo. vs. U.S. Dept. of the Int.*, No. 2: 15-CB-043-SWS (D. Wyo. Sept. 30, 2015) (order granting preliminary injunction), *available at* http://www.wyd.uscourts.gov/pdfforms/orders/15-cv-043%20130%20order.pdf (last visited Jan. 29, 2018).
[44] *State of Wyo. vs. U.S. Dept. of the Int.*, No. 2: 15-CV-043-SWS (D. Wyo. June 21, 2016) (order on petitions for review of final agency action), *available at* http://www.wyd.uscourts.gov/pdfforms/orders/15-cv-043-S%20Order.pdf (last visited Jan. 29, 2018).
[45] *State of Wyo. vs. U.S. Dept. of the Int.*, No. 16-8068 (10th Cir. Sept. 21, 2017), *available at* https://www.ca10.uscourts.gov/opinions/16/16-8068.pdf (last visited Jan. 30, 2018).
[46] EPA, *Oil and Gas Extraction Effluent Guidelines, Rule Summary*, http://www.epa.gov/eg/oil-and-gas-extraction-effluent-guidelines (last visited Jan. 29, 2018).
[47] *Id*.
[48] *Id*.
[49] Adam Vann, Brandon J. Murrill, & Mary Tiemann, Cong. Research Serv., R 43152, *Hydraulic Fracturing: Selected Legal Issues*, 12 (Sept. 26, 2014), *available at* https://www.fas.org/sgp/crs/misc/R43152.pdf (last visited Jan. 29, 2018).
[50] *Id*. at 13.
[51] *Id*. at 22.

State

States have primary jurisdiction and authority over the regulation of oil and gas activities. Almost all states with economically viable production wells have extensive regulatory programs in place for permitting and monitoring oil and gas activities. Recent advances in technology and the widespread use of well stimulation techniques, particularly hydraulic fracturing, have motivated some states to update and revise their oil and gas regulations to specifically address such techniques or to ban certain techniques altogether.[52] In 2012, Vermont became the first state to ban hydraulic fracturing.[53]

The Governor of New York in December of 2010 issued an executive order directing the New York State Department of Environmental Conservation (NDEC) to publish a revised Generic Environmental Impact Statement to consider if and under what conditions high-volume hydraulic fracturing should be allowed in the state of New York and which prohibited the issuance of permits to drill wells using such method until the statement was completed.[54] The NDEC published its final findings statement in 2015, which concluded that there were "no feasible or prudent alternatives [other than a ban which] would adequately avoid or minimize adverse environmental impacts and that address the scientific uncertainties and risks to public health from [high-volume hydraulic fracturing.]" The NDEC's Findings Statement effectively banned high-volume hydraulic fracturing in the state of New York.[55]

In 2015, Maryland passed a two-year moratorium on hydraulic fracturing, which included a requirement that the Maryland Department of the Environment (MDE) adopt regulations for the hydraulic fracturing of a well for the exploration or production of natural gas.[56] MDE proposed rules, including a suite of best practices to be followed for oil and gas exploration and production in Maryland, which were intended to protect public health, safety, natural resources, and the environment. The MDE published rules in November of 2016, and the rules were reviewed by the Maryland General Assembly's Joint Committee on Administrative, Executive, and

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[52] Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 FORDHAM ENVTL. L. REV. 115 (2009); see *State of Wyo. vs. U.S. Dept. of the Int.*, No. 2: 15-CB-043-SWS at 40 (D. Wyo. Sept. 30, 2015), for a list of states with regulations that address hydraulic fracturing.

[53] 29 V.S.A. § 571; 29 V.S.A. § 503, defines the "hydraulic fracturing" as "the process of pumping a fluid into or under the surface of the ground in order to create fractures in rock for the purpose of the production or recovery of oil or gas."

[54] Governor Paterson, *Executive Order No. 41: Requiring Further Environmental Review of High-Volume Hydraulic Fracturing in the Marcellus Shale*, 9 CRR-NY 7.41 (Dec. 13, 2010), *available at* https://govt.westlaw.com/nycrr/Document/Ib2187f04646111e09f330000845b8d3e?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)&bhcp=1 (last visited Jan. 29, 2018).

[55] NY Department of Environmental Conservation, *Final Supplemental Generic Environmental Impact Statement on the Oil, Gas, and Solution Mining Regulatory Program: Regulatory Program for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and other Low-Permeability Gas Reservoirs*, 42 (June 2015), *available at* http://www.dec.ny.gov/energy/75370.html (last visited Jan. 29, 2018); under New York law, the term "high-volume hydraulic fracturing" is defined as "the stimulation of a well using 300,000 or more gallons of water as the base fluid for hydraulic fracturing for all stages in a well completion, regardless of whether the well is vertical or directional, including horizontal."

[56] Maryland Code § 14-107.1 (2015).

Legislative Review.[57] In 2017, Maryland passed a ban on hydraulic fracturing[58] for the exploration or production of oil or natural gas in the state and became the third state to ban the well stimulation technique.[59]

In the state of Florida, the FDEP has regulatory authority over oil and gas resources. The Division of Water Resource Management (division) within the FDEP oversees the permitting process for drilling production and exploration. The FDEP adopted Chapters 62C-25 through 62C-30 of the Florida Administrative Code to implement and enforce the regulation of oil and gas resources. The division has jurisdiction and authority over all persons and property necessary to administer and enforce all laws relating to the conservation of oil and gas.[60] Drilling and exploration is not authorized or is subject to local governmental approval in tidal waters, near improved beaches, and within municipal boundaries.[61]

When issuing permits for oil and gas exploration or extraction, the division is required to consider the nature, character, and location of the lands involved; the nature, type, and extent of ownership of the applicant; and the proven or indicated likelihood of the presence of oil, gas, or related minerals on a commercially viable basis.[62] The FDEP is required to ensure that all precautions are taken to prevent the spillage of oil or other pollutants in all phases of drilling for and extracting oil, gas, or other petroleum products.[63] Additionally, the FDEP is authorized to issue rules requiring the drilling, casing, and plugging of wells in such a manner as to prevent the escape of oil or other petroleum products from one stratum to another.[64]

Before any person begins work other than environmental assessments or surveying at the site of a proposed drilling operation, a permit to drill is required and a preliminary site inspection must be conducted by the FDEP.[65] An application for a permit to drill must include a proposed casing and cementing program and a location plat survey.[66] Each drilling permit is valid for one year and may be extended for an additional year.[67] Before a permit is granted, the owner or operator is required to post a bond or other form of security for each well. The bond or security amounts vary depending upon well depth.[68] In lieu of posting a bond or security for each well, the owner or operator may file a blanket bond for the coverage of multiple operations, up to ten wells, in the amount of $1 million.[69]

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[57] Letter from Joint Cmte. to Secretary of the Department of the Environment (Dec. 29, 2016), *available at* http://mde.maryland.gov/programs/Land/mining/marcellus/Documents/16-232P_to_Sec.pdf (last visited Jan. 29, 2018).
[58] Under Maryland law, the term "hydraulic fracturing" is defined as a stimulation treatment performed on oil and natural gas wells in low–permeability oil or natural gas reservoirs through which specially engineered fluids are pumped at high pressure and rate into the reservoir interval to be treated, causing fractures to open.
[59] Maryland Code § 14-107.1.
[60] Section 377.21(1), F.S.
[61] Section 377.24, F.S.
[62] Section 377.241, F.S.
[63] Section 377.22, F.S.
[64] *Id*.
[65] Fla. Admin. Code R. 62C-26.003.
[66] *Id*.
[67] *Id*.
[68] Fla. Admin. Code R. 62C-26.002.
[69] *Id*.

Before a well is used for its intended purpose, a permit to operate the well must be obtained.[70] Operating permits are valid for the life of the well; however, every five years the FDEP is required to perform a comprehensive field inspection and the permit must be re-certified.[71] Each application and subsequent re-certification must include the appropriate fee; bond or security coverage; a spill prevention and cleanup plan; flowline specifications and an installation plan; containment facility certification; and additional reporting and data submissions, such as driller's logs and monthly well reports.[72]

A separate permit is not required for the performance of well stimulation techniques. Such techniques are regulated as workovers.[73] Rule 62C-25.002(61) of the Florida Administrative Code defines the term "workover" as "an operation involving a deepening, plug back, repair, cement squeeze, perforation, hydraulic fracturing, acidizing, or other chemical treatment which is performed in a production, disposal, or injection well in order to restore, sustain, or increase production, disposal, or injection rates." An operator is required to notify the FDEP before commencing a workover procedure and must submit a revised Well Record[74] to the FDEP within 30 days after the workover.[75] In December of 2013, the FDEP received a workover notice proposing use of an enhanced extraction procedure and requested that the company that submitted the notice not complete the procedure until the FDEP could review the procedure.[76] The company ignored the FDEP's request and commenced with the procedure. Consequently, the FDEP issued a cease and desist order.[77] The FDEP fined the company $25,000 for violating the cease and desist order.[78]

A person that violates any statute, rule, regulation, order, or permit of the division relating to the regulation of oil or gas resources or who refuses inspection by the division is liable for damages caused to the air, waters, or property of the state; for the reasonable costs of tracing the source of the discharge and for controlling and abating the source and the pollutants; and for the costs of restoring the air, waters, and property.[79] Such persons are also subject to judicial imposition of a civil penalty of up to $10,000 for each offense.[80] Each day during any portion of which a violation occurs constitutes a separate offense.[81]

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[70] Fla. Admin. Code R. 62C-26.008.
[71] Fla. Admin. Code R. 62C-25.006 and R. 62C-26.008.
[72] Fla. Admin. Code R. 62C-26.008.
[73] *See, e.g.*, s. 377.22, F.S., requiring the division to adopt rules to "regulate the shooting, perforating, and chemical treatment of wells" and to "regulate secondary recovery methods, in the introduction of gas, air, water, or other substance in producing formations;" and s. 377.26, F.S., requiring the division to "take into account technological advances in drilling and production technology, including, but not limited to, horizontal well completions in the producing formation using directional drilling methods."
[74] Fla. Admin. Code R. 62C-26.008.
[75] Fla. Admin. Code R. 62C-29.006.
[76] *State of Florida Department of Environmental Protection vs. Dan A. Hughes Company, L.P.* OGC File No. 14-0012 (April 8, 2014), *available at* https://www.doah.state.fl.us/FLAID/DEP/2014/DEP_14-0012_05162014_014716.pdf (last visited Jan. 30, 2018).
[77] *Id*.
[78] *Id*.
[79] Section 377.37(1)(a), F.S.
[80] *Id*.
[81] *Id*.

Local

As most states with oil and gas resources have extensive regulatory programs governing oil and gas activities, the issue as to what extent the local governments within those states may regulate oil and gas activities within their boundaries has arisen. In some states, local governments have banned or limited the use of certain well stimulation techniques with varying degrees of success. In Colorado a number of municipalities passed bans on hydraulic fracturing within their city limits, but the Colorado Supreme Court, finding that the cities' regulations were preempted by state law, overturned the city of Longmont's ban and the city of Fort Collin's 5-year moratorium on fracking and the storage and disposal of fracking wastes within city limits.[82] In Pennsylvania similar bans were passed, and Pennsylvania state courts held that municipalities retain their authority to limit oil and gas development within their borders, effectively authorizing local governments to regulate the "where, but not the how, of hydrocarbon recovery."[83]

While cities and counties do not operate oil and gas permitting programs in Florida, some through their land use regulations or zoning ordinances require special exceptions for oil and gas activities or limit oil and gas activities to certain zoning classifications.[84] When authorizing oil and gas activities, local governments consider factors such as consistency with their comprehensive plan, injuries to communities or the public welfare, and compliance with zoning ordinances.[85] Section 377.24(5), F.S., restricts the FDEP from issuing a permit for drilling within the corporate limits of a municipality unless the municipality adopts a resolution approving the permit. Six municipalities, Estero, Bonita Springs, Coconut Creek, Cape Coral, Dade, and Zephyrhills, and thirteen counties, Alachua, Bay, Brevard, Broward, Citrus, Indian River, Martin, Miami-Dade, Osceola, Pinellas, St. Lucie, Volusia, Wakulla, and Walton, have banned one or more forms of well stimulation techniques by ordinance.[86] Additionally, many other

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[82] *See City of Longmont, et. al v. Colo. Oil and Gas Ass'n*, No. 15SC667 (May 2, 2016); *see City of Fort Collins v. Colo. Oil and Gas Ass'n*, No. 15SC668 (May 2, 1016), *available at* https://www.courts.state.co.us/Courts/Supreme_Court/Case_Announcements/ (last visited Jan. 29, 2018).

[83] David L. Schwan, *Preemption Update: Local Attempts to Preempt State Regulation of Hydraulic Fracturing*, 6 (Jan. 2015), *available at* http://www.americanbar.org/content/dam/aba/administrative/litigation/materials/2015-joint-cle/written_materials/01_fracked_up_preemption_update.authcheckdam.pdf (last visited Jan. 29, 2018).

[84] *See, e.g.*, Lee County's Land Development Code §§ 34-1651 and 34-145(c).

[85] *Id*.

[86] Ordinance No. 2015-19 bans well stimulation within and below the corporate boundaries of the Village of Estero; Chapter 4, Article VI, Division 15, Section 4-1380 of Bonita Spring's Land Development Code bans well stimulation; Article IV, Section 13-1000 of Coconut Creek's Land Development Code bans well stimulation; Ordinance §3.23 prohibits well stimulations within the City of Cape Coral's corporate limits; Ordinance No. 2016-08 prohibits extreme well stimulation within the City of Dade; Ordinance No. 1310-16 prohibits the use of land for hydraulic fracturing within the City of Zephyrhills; §77.13.5 of Alachua County's Code of Ordinances prohibits extraction of oil and natural gas; §311 of Bay County's Land Development Regulation prohibits hydraulic fracturing in all zone districts in unincorporated Bay County; §46-375 of Brevard County's Code of Ordinances prohibits well stimulations; §66-133 of Citrus County's Code of Ordinances bans any form of well stimulation; §317.03 of Indian River County's Code of Ordinances prohibits well stimulations; §4.12.3 of Osceola County's Land Development Code prohibits oil and gas exploration that uses well stimulation; §27-193 of Broward County's Code of Ordinances prohibits extreme well stimulation; §67.441 of Martin County's Code of Ordinances prohibits high-pressure well stimulation; §33-437 of Miami-Dade County's Code of Ordinances prohibits well stimulations; §58-489 of Pinellas County's Code of Ordinances prohibits well stimulation; Policy 6.1.5.7 of St. Lucie County's Code of Ordinances prohibits high-intensity petroleum operations; §50-42 of Volusia County's Code of Ordinances prohibits high-pressure well stimulation; §6-34 of Wakulla County's Code of Ordinances prohibits high intensity petroleum operations; §9-156 of Walton County's Code of Ordinances prohibits extreme well stimulation.

counties and cities have passed resolutions supporting various types of bans and moratoriums relating to well stimulation techniques.[87]

Environmental Concerns

There are a variety of environmental concerns relating to well stimulation techniques. Potential impacts and concerns include: groundwater or surface water contamination; stress on water supplies; inadequate wastewater management and disposal; and air quality degradation.[88] Because well stimulation techniques are applied to so many types of underground formations using a variety of methods and fluids, environmental impacts vary depending on factors such as the toxicity of the fluid used; the closeness of the fracture zone to underground drinking water; the existence of a barrier between the fracture formation and other formations; and how wastewater is disposed.[89]

Water Quality

The EPA estimated that of the approximately 275,000 wells that have been hydraulically fractured in 25 states between 2000 and 2013, an estimated 21,900 or eight percent were within one mile of at least one public water system groundwater well or surface water intake.[90] As a result of fracturing, sources of drinking water may be contaminated through the release of gas-phase hydrocarbons, in what is known as stray gas migration, as a result of the movement of liquid or gases out of the well if the well casing or cementing is too weak or if it fails.[91] The EPA concluded that "the injection of hydraulic fracturing fluids into wells with inadequate mechanical integrity [allowed for] gases or liquids to move to groundwater sources."[92] While concerns related to inadequate well casing or cementing, are not unique to hydraulic fracturing, horizontally drilled, hydraulically fractured wells pose more production challenges because the well casing is subject to greater pressures.[93] The National Ground Water Association recommends water well owners test their water wells prior to the operation of oil and gas well installations to provide a baseline for comparison after oil and gas production.[94]

Mitigating measures, such as extending the casing farther below groundwater resources and pressure testing the well casing before the injection of fluids, may work to prevent well casing failures. Blowout preventers also help control and prevent pressure build-ups. Furthermore,

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[87] See Food & Water Watch, *Local Regulations Against Fracking*, http://www.foodandwaterwatch.org/insight/local-resolutions-against-fracking#florida, for a list of local governments that passed resolutions against fracking.
[88] EPA, *Natural Gas Extraction-Hydraulic Fracturing, Providing Regulatory Clarity and Protections Against Known Risks*, http://www.epa.gov/hydraulicfracturing (last visited Jan. 29, 2018).
[89] Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 FORDHAM ENVTL. L. REV. 115 (2009).
[90] *EPA Study* at 2-14.
[91] Avner Vengosh, Robert B. Jackson, Nathaniel Warner, Thomas Darrah, & Andrew Kondash, *A Critical Review of the Risks to Water Resources from Unconventional Shale Gas Development and Hydraulic Fracturing in the United States*, American Chemical Society, 48 Env. Sci. & Technol. 8334-8348, 8336 (Mar. 2014), *available at* http://pubs.acs.org/doi/abs/10.1021/es405118y (last visited Jan. 29, 2018).
[92] *EPA Study* at 10-3.
[93] Michael Ratner & Mary Tiemann, Cong. Research Serv., R 43148, *An Overview of Unconventional Oil and Natural Gas: Resources and Federal Actions*, 8 (Apr. 22, 2015).
[94] National Ground Water Association, *Water Wells in Proximity to Natural Gas or Oil Development* (2016), *available at* http://www.ngwa.org/Documents/ClipCopy/Water-Wells-Proximity.pdf (last visited Jan. 30, 2018).

hydraulically fractured wells in shale formations are usually drilled deeper than vertical wells and, therefore, the vertical separation between the formation and the drinking water resource is usually greater.[95] Thousands of feet of rock layers typically overlay the produced portion of shale and serve as a barrier to contamination.[96] The vast majority of Florida's public water supply is obtained from groundwater sources, specifically from the Floridan aquifer system that underlies the state of Florida.[97] Areas in which oil and gas have been extracted have an upper confining unit that is generally greater than 100 feet, which may serve as a barrier to contamination.[98]

Fractures created during hydraulic fracturing can intersect nearby wells or their fracture networks, resulting in the flow of fluids into those wells and to underground drinking water resources. These "frac-hits" are more likely to occur if wells are close to each other or are on the same well pad.[99] The likelihood of a frac-hit is less than 10 percent in hydraulically fractured wells more than 4,000 feet apart, while likelihood is nearly 50 percent in wells that are less than 1,000 feet apart.[100] In Florida, horizontal wells and associated drilling units that are deeper than 7,000 feet have more stringent spacing requirements.[101]

Surface water contamination may occur because of the inadequate storage and disposal of produced water. Produced water is the water that comes to the surface naturally as part of the oil and gas production process. For a hydraulically fractured well the produced water includes the fracturing fluids or flowback. Approximately 10-40 percent of the volume of injected fracturing fluids returns to the surface after hydraulic fracturing.[102] In most produced waters, the concentrations of toxic elements, such as radioactive radium, are positively correlated with salinity, which suggests that many of the potential water quality issues associated with produced waters may be attributable to the geochemistry of the brines within the shale formations.[103]

As the use of hydraulic fracturing has increased, so has the volume of wastewater generated. Spills of produced water do occur and can result in large volumes or high concentrations of chemicals reaching groundwater sources.[104] The EPA concluded that spills generally occur at 1 to 10 percent of hydraulically fractured or active wells, with about 7 percent of such spills reaching surface water or groundwater.[105] In Florida, any spill of waste material must be immediately reported to the division and the appropriate federal agencies, and the owner or operator is responsible for the costs of cleanup or other damage incurred.[106]

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[95] Michael Ratner & Mary Tiemann, Cong. Research Serv., R 43148, *An Overview of Unconventional Oil and Natural Gas: Resources and Federal Actions*, 7 (Apr. 22, 2015).
[96] *Id*.
[97] DEP, *Aquifers*, https://fldep.dep.state.fl.us/swapp/Aquifer.asp (last visited Jan. 29, 2018).
[98] U.S. Geological Survey (USGS), *Conceptual Model of the Floridan*, http://fl.water.usgs.gov/floridan/conceptual-model.html (last visited Jan. 29, 2018).
[99] *EPA Study* 6-71.
[100] *Id*. 10-18.
[101] Fla. Admin. Code R. 62C-26.004(5).
[102] Avner Vengosh, Robert B. Jackson, Nathaniel Warner, Thomas Darrah, & Andrew Kondash, *A Critical Review of the Risks to Water Resources from Unconventional Shale Gas Development and Hydraulic Fracturing in the United States*, American Chemical Society, 48 Env. Sci. & Techol. 8334-8348, 8340 (2014).
[103] *Id*.
[104] *EPA Study* at 10-3.
[105] *Id*. at 10-9.
[106] Section 377.371, F.S.

Water Supply

The amount of water used during the performance of a hydraulic fracturing treatment depends on the well depth, formation geology, and the composition of the fluids injected. In some cases, over 90 percent of the fracturing fluid is water and each hydraulically fractured well can require thousands to millions of gallons of water.[107] While the total water use for hydraulic fracturing is relatively low compared to other water users,[108] wells that are good candidates for such techniques are usually located near the same water source and, as a result, the collective impact of water withdrawals may result in increased competition among users.[109] To decrease the competition among users, some states have implemented pilot projects evaluating the feasibility of reusing produced waters or other brackish or wastewaters.[110] The reuse of wastewater, however, is often limited by the amount of wastewater that is available.[111] The volume of produced water from a single well is relatively small compared to the volume of water needed to fracture a well.[112]

Wastewater Management and Disposal

The vast majority of produced water is disposed of using injection wells. Injection wells are permitted under the Underground Injection Control (UIC) program.[113] The goal of the UIC program is the effective isolation of injected fluids from underground sources of drinking water.[114] Class II injection wells are designed to inject fluids associated with the production of oil and natural gas or fluids used to enhance hydrocarbon recovery. While the injection of fracturing fluids, unless the fluid contains diesel, is exempt from the UIC program, the wastewater from oil and gas operations is not exempt.[115] As unconventional oil and gas wells are being drilled at rapid rates, space for underground injection wells is becoming limited in some areas. In Florida there are 14 active Class II disposal wells, with an average disposal rate per well of 246,000 gallons per day.[116]

Another issue that is developing with the increase in the number of injection wells is the concern that the deep-well disposal of oil and gas production wastewater is responsible for seismic activity in certain areas.[117] The Oklahoma Geological Survey determined that the primary

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[107] *EPA Study* at ES-6.
[108] Avner Vengosh, Robert B. Jackson, Nathaniel Warner, Thomas Darrah, & Andrew Kondash, *A Critical Review of the Risks to Water Resources from Unconventional Shale Gas Development and Hydraulic Fracturing in the United States*, American Chemical Society, 48 Env. Sci. & Techol. 8334-8348, 8343 (2014).
[109] Hannah Wiseman, *Risk and Response in Fracturing Policy*, 84 Unv. of Col. L. Rev. 729-817, 776 (2009), *available at* http://lawreview.colorado.edu/wp-content/uploads/2013/11/11.-Wiseman_For-Printer_s.pdf (last visited Jan. 29, 2018).
[110] *Id*. at 770.
[111] *EPA Study* at 10-6.
[112] *Id*.
[113] EPA, Underground Injection Control Program, http://water.epa.gov/type/groundwater/uic/ (last visited Jan. 29, 2018).
[114] *Id*.
[115] EPA, *Natural Gas Extraction-Hydraulic Fracturing, Underground injection of waste disposal fluids from oil and gas wells (Class II wells)*, http://www.epa.gov/hydraulicfracturing (last visited Jan. 29, 2018).
[116] *EPA Study* at 8-24.
[117] *See* Peter Folger & Mary Tiemann, Cong. Research Serv., R 43836, *Human-Induced Earthquakes from Deep-Well Injection: A Brief Overview*, (Sept. 30, 2016), *available at* https://www.fas.org/sgp/crs/misc/R43836.pdf (last visited Jan. 29, 2018).

suspected source of triggered seismicity is from the injection of produced water associated with oil and gas production in disposal wells.[118]

Additionally, in some states the produced water is being sent to treatment facilities that are not equipped to treat wastewater from hydraulically fractured wells.[119] In June of 2016, the EPA, under the authority of the Clean Water Act, published final rules for the oil and gas extraction category. The rules establish pretreatment standards that prevent the discharge of pollutants in wastewater from onshore unconventional oil and gas facilities to publicly owned treatment works.[120]

Air Quality

The key emissions associated with unconventional oil and natural gas production include methane, volatile organic compounds (VOCs), nitrogen oxides, sulfur dioxide, particulate matter, and various hazardous air pollutants.[121] In 2012, the EPA issued the first federal air standards for hydraulically fractured natural gas wells.[122] The New Source Performance Standards required reductions in VOC emissions from hydraulically fractured natural gas wells.[123]

In May of 2016, the EPA issued three rules which together seek to curb emissions of methane, VOCs, toxins, and air pollutants, such as benzene, from new, reconstructed, and modified oil and gas sources.[124] The final rule requires compressor stations to monitor leaks, also known as "fugitive emissions," four times a year and requires owners or operators to find and repair such leaks, which can be a significant source of both methane and VOC pollution.[125] The rule phases in requirements for a process known as "green completion" to capture emissions from hydraulically fractured wells. The EPA expects that implementation of the rule will reduce air pollutants and toxins, as well as, provide health benefits related to reductions in fine particle pollution and ozone toxics, along with improvements in visibility.[126] In June of 2017, the EPA proposed to stay the requirements relating to fugitive emissions, well site pneumatic pump standards, and certification of closed vent systems by a professional engineer for two years.[127]

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[118] Oklahoma Geological Survey, *Statement on Oklahoma Seismicity* (Apr. 21, 2015), http://wichita.ogs.ou.edu/documents/OGS_Statement-Earthquakes-4-21-15.pdf (last visited Jan. 29, 2018).
[119] Hannah Wiseman, *Risk and Response in Fracturing Policy*, 84 Unv. of Col. L. Rev. 729-817, 768-769 (2009).
[120] EPA, *Unconventional Extraction in the Oil and Gas Industry*, http://www2.epa.gov/eg/unconventional-extraction-oil-and-gas-industry (last visited Jan. 29, 2018).
[121] Michael Ratner & Mary Tiemann, Cong. Research Serv., R 43148, *An Overview of Unconventional Oil and Natural Gas: Resources and Federal Actions*, 9 (Apr. 22, 2015).
[122] *Id*.
[123] EPA, *Controlling Air Pollution from the Oil and Natural Gas Industry*, https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-industry (last visited Jan. 29, 2018).
[124] EPA, *EPA's Actions to Reduce Methane Emissions from the Oil and Gas Industry: Final Rules and Draft Information Collection Request*, https://www.epa.gov/sites/production/files/2016-09/documents/nsps-overview-fs.pdf (last visited Jan. 29, 2018).
[125] *Id*.
[126] *Id*.
[127] Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources: Stay of Certain Requirements, 82 Fed. Reg. 27,645 (June 16, 2017), *available at* https://www.gpo.gov/fdsys/pkg/FR-2017-06-16/pdf/2017-12698.pdf (last visited Jan. 30, 2018).

III. Effect of Proposed Changes:

SB 462 bans the performance of advanced well stimulation treatments in the state and clarifies that a permit for drilling or operating a well does not authorize the performance of advanced well stimulation treatments.

The bill defines the term "advanced well stimulation treatment" to include all stages of well intervention performed by injecting fluids into a rock formation:

- At pressure that is at or exceeds the fracture gradient of the rock formation and the purpose or effect is to fracture the formation to increase production or recovery from an oil or gas well, such as hydraulic fracturing or acid fracturing; or
- At pressure below the fracture gradient of the rock formation and the purpose or effect is to dissolve the formation to increase production or recovery from an oil or gas well, such as matrix acidizing.

The definition explicitly excludes techniques used for routine well cleanout work, well maintenance, or the removal of formation damage due to drilling or production, or acidizing techniques used to maintain or restore the natural permeability of the formation near the wellbore.

The bill clarifies that the ban only applies to oil and gas wells.

The bill takes effect upon becoming a law.

IV. Constitutional Issues:

A. Municipality/County Mandates Restrictions:

None.

B. Public Records/Open Meetings Issues:

None.

C. Trust Funds Restrictions:

None.

V. Fiscal Impact Statement:

A. Tax/Fee Issues:

None.

B. Private Sector Impact:

The bill bans certain techniques used to increase production or recovery from an oil or gas well. The fiscal impact of the ban is indeterminate at this time.

C. Government Sector Impact:

The Department of Environmental Protection (FDEP) may incur additional costs related to amending Rules 62C-25 through 30 of the Florida Administrative Code to implement the ban provided in the bill. Such costs most likely can be absorbed within FDEP's existing budget.

VI. Technical Deficiencies:

None.

VII. Related Issues:

None.

VIII. Statutes Affected:

This bill substantially amends section 377.19 of the Florida Statutes.

This bill creates section 377.2405 of the Florida Statutes.

IX. Additional Information:

A. Committee Substitute – Statement of Changes:
(Summarizing differences between the Committee Substitute and the prior version of the bill.)

None.

B. Amendments:

None.