

## Technical and Scientific Resources Regarding Matrix Acidizing



Well stimulation is an umbrella term that captures any operation at an oil or gas well whereby fluids are injected into the rock formation in order to increase the production or recovery of oil or gas. Matrix acidizing is a form of advanced well stimulation which uses methods similar to “fracking.” This technique involves a lower pressure than acid or hydraulic fracturing. It dissolves the rock, rather than fractures it. Matrix acidizing treatments can have the same effect on geology as small hydraulic fracturing treatments – creating wormholes up to 20 feet in carbonate formations.

Although the idea of using acids for oil well stimulation is an old concept, “the chemicals, volumes, and techniques used in acidizing have evolved”<sup>1</sup> and pose unacceptable risks to Florida.

### **CONTAMINATION RISK TO WATER SUPPLIES**

- A UCLA study found that the chemicals used in matrix acidizing are similar to those used in hydraulic fracturing and that use of this treatment comes with similar pathways for contamination.<sup>2</sup>
- The chemical concentrations used in matrix acidizing are higher than found in hydraulic fracturing. Injected fluids for matrix acidizing are typically between 6 to 18% chemicals.<sup>3</sup>

<sup>1</sup> Abdullah, 2016. Toxicity of Acidizing Fluids Used in California Oil Exploration. Toxicological and Environmental Chemistry, 2016. <http://dx.doi.org/10.1080/02772248.2016.1160285>. University of California, Los Angeles.

<sup>2</sup> Abdullah, 2016. Acidizing Oil Wells, a Sister Technology to Hydraulic Fracturing: Risks, Chemicals, and Regulations.

- During Construction: For well stimulation processes, the well bore is typically drilled through the Underground Source of Drinking Water (USDW) in order to access the oil and gas deposits. Vibrations and pressure pulses associated with drilling can cause short-term impacts to groundwater quality, including changes in color, turbidity, and odor.<sup>4</sup> While there are state standards set by the Florida Administrative Code for casing and integrity of wells, if the well bore is not properly sealed and cased, chemicals and other compounds can escape the well bore and into groundwater resources.

- Additional Conduits to Contamination:

Old, abandoned wells can also potentially serve as migration pathways for contaminants to enter groundwater systems.<sup>5</sup> States have estimated that there are roughly 150,000 undocumented and abandoned oil and gas wells in the United States.<sup>6</sup> (For example, there are 2 abandoned wells very close to the Collier-Hogan well in Collier County).

Additionally, it has been noted that natural underground fractures as well as those that are created during well stimulation treatments could also serve as conduits for migration of contaminants into groundwater.<sup>7</sup>

## **WASTE OF DRINKING WATER SUPPLY**

- In Collier County, the Collier Hogan well was permitted to use 280.32 millions of gallons of fresh water each year for 5 years from the lower Tamiami aquifer, which is easily accessible potable water through shallow wells.<sup>8</sup> This water is cheaper to access and treat than water located in the brackish or salty aquifers found deeper underground.<sup>9</sup> Yet Collier County obtains 59% of its drinking water from deeper, more expensive, and harder to access saltier/brackish aquifers to meet its needs.<sup>10</sup>
- When this fresh water is used in well stimulation projects, it is injected below ground and only a small percentage is returned. This water cannot be recycled back into drinking water due to use of toxic chemicals, presence of naturally-occurring radioactive materials from deep underground, and the resulting saltiness of the wastewater.

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<sup>3</sup> Abdullah, 2016. Toxicity of Acidizing Fluids Used in California Oil Exploration. Toxicological and Environmental Chemistry, 2016. <http://dx.doi.org/10.1080/02772248.2016.1160285>. University of California, Los Angeles.

<sup>4</sup> Groat & Grimshaw, 2012. Fact-Based Regulation for Environmental Protection in Shale Gas Development, Summary of Findings. Energy Institute, The University of Texas at Austin.

<sup>5</sup> US Environmental Protection Agency, 2016. Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resource in the United States. Executive Summary. P. 28.

<sup>6</sup> Interstate Oil and Gas Compact Commission, 2008. Protecting Our Country's Resources: The States' Case. Orphaned Well Plugging Initiative. Department of Energy National Energy Technology Laboratory.

<sup>7</sup> Myers, 2012. Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers. Ground Water.

<sup>8</sup> South Florida Water Management District, 2017. Water Use Permit NO. 11-03415-W. Collier County.

<sup>9</sup> South Florida Water Management District, 2007. Water Supply Cost Estimation Study.

<sup>10</sup> South Florida Water Management District, 2012. Lower West Coast Water Supply Plan Update

- Waste water returns can be highly acidic, in the range of pH 0-3.<sup>11</sup> Thus, the limestone and sandstone geologies do not completely neutralize the acids being applied.

### **PUBLIC HEALTH ISSUES**

- There are about 200 specific chemicals used in matrix acidizing treatment, “with at least 28 of them being F-graded hazardous chemicals, which are known carcinogens, mutagens, reproductive toxins, developmental toxins, endocrine disruptors, or high acute toxicity chemicals.”<sup>12</sup> Most of the chemicals used in acidizing are similar to hydraulic fracking.<sup>13</sup>

### **ECONOMIC IMPACTS**

- **Tourism:** Environmental disasters have an enormous impact on Florida’s tourism-based economy. There are a total of 1.4 million jobs in Florida that depend on the tourism industry.<sup>14</sup> This is easy to see from the most recent algal bloom in the Caloosahatchee - the entire state is impacted economically, not just in the local or regional area of the ecological disaster. In the 4 counties that were placed under a state of emergency in 2016 due to this algal bloom, there was four billion dollars of economic impact to marine industries and 37,000 individual employees were directly impacted.<sup>15</sup>
- **Energy Reserves:** The oil obtained from Florida accounts for less than 1/10<sup>th</sup> of 1% of all of the United States oil reserves.<sup>16</sup> Given the potential environmental impacts that could impact our tourism- and real estate-based economy, well stimulation is not worth the risk to public resources for such little return.
- **Mineral Rights:** Banning well stimulation treatments (including fracking and matrix acidizing) does not preclude regular cleaning of wells, nor does it preclude conventional oil drilling to obtain oil and gas deposits.

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<sup>11</sup> Abdullah, 2016. Toxicity of Acidizing Fluids Used in California Oil Exploration. Toxicological and Environmental Chemistry, 2016. <http://dx.doi.org/10.1080/02772248.2016.1160285>. University of California, Los Angeles. Citing Schuchart, 1995; Gdanski and Peavy, 1986; and Taylor et al, 1999.

<sup>12</sup> *Ibid.*

<sup>13</sup> Abdullah, 2016. Acidizing Oil Wells, a Sister Technology to Hydraulic Fracturing: Risks, Chemicals, and Regulations.

<sup>14</sup> Employment data from the Florida Department of Economic Opportunity (as reported by Visit Florida.org) <http://www.visitflorida.org/about-us/what-we-do/>

<sup>15</sup> These are Florida’s Waters. This is Their Destruction. Everglades Coalition Fact Sheet. 23 February 2017.

<sup>16</sup> Hernandez, 2015. "Energy Pro: Florida Is Not A Big Oil State. So Why Drill?" Wlrn.org, 17 Aug 2015.