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Oil and Gas Collection: Hydraulic Fracturing, Toxic Chemicals and the Surge of Earthquake Activity in Arkansas

Fracking the life out of Arkansas and beyond

by **Rady Ananda**



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The last four months of 2010, nearly 500 earthquakes rattled Guy, Arkansas. [1] The entire state experienced 38 quakes in 2009. [2] The spike in quake frequency precedes and coincides with the 100,000 dead fish on a 20-mile stretch of the Arkansas River that included Roseville Township on December 30. The next night, 5,000 red-winged blackbirds and starlings dropped dead out of the sky in Beebe. [3] Hydraulic fracturing is the most likely culprit for all three events, as it causes earthquakes with a resultant release of toxins into the environment. [4]

A close look at Arkansas' history of earthquakes and drilling reveals a shocking surge in quake frequency following advanced drilling. The number of quakes in 2010 nearly equals all of Arkansas' quakes for the entire 20th century. The oil and gas industry denies any correlation, but the advent of hydrofracking followed by earthquakes is a story repeated across the nation. It isn't going to stop any time soon, either. Fracking has gone global.

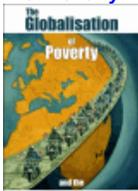


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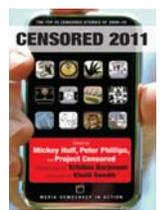
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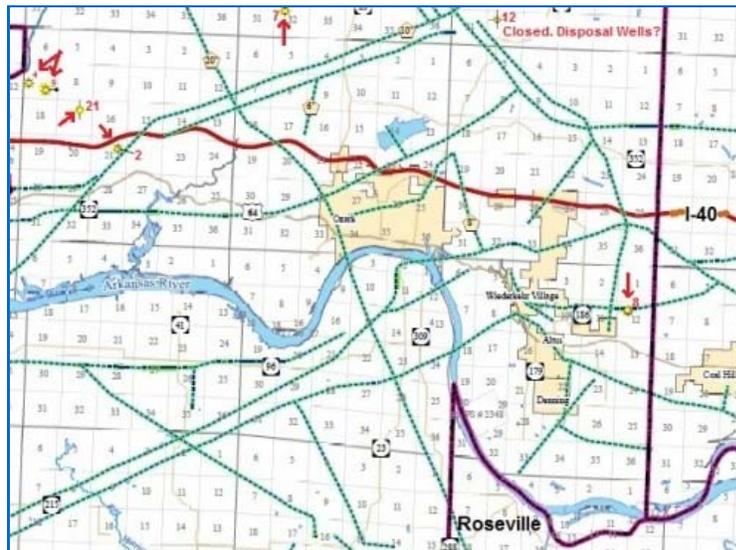
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Hydraulic fracturing (fracking) pumps water and chemicals into the ground at a pressurized rate exceeding what the bedrock can withstand, resulting in a microquake that produces rock fractures. Though initiated in 1947, technological advances now allow horizontal fracturing, vastly increasing oil and gas collection. [5] In 1996, shale-gas production in the U.S. accounted for 2 percent of all domestic natural gas production, reports Christopher Bateman in Vanity Fair. "Some industry analysts predict shale gas will represent a full half of total domestic gas production within 10 years." [6] In 2000, U.S. gas reserve estimates stood at 177 trillion cubic feet, but ramped up to 245 tcf in 2008. These new technologies prompt experts to increase global gas reserve estimates ninefold. [7]

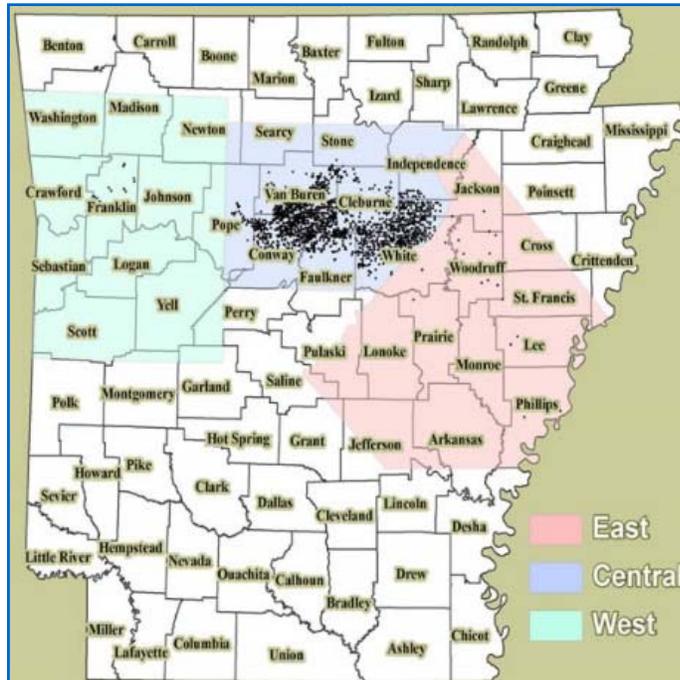
The grid below shows a section of the Arkansas River, with Roseville Township at bottom, where the first reports of the fish kill originated. The green lines surrounding and crossing the river indicate gas pipes, ranging from 8-20" in diameter. Any number of leaks in the pipes can explain the fish kill. Gas wells are shown by yellow 'suns' (see red arrows) and range from 1,500 to 6,500 feet deep. (Disposal wells, where drilling waste products are injected at high pressures, go as deep as 12,000 feet.) The red numbers next to the 'suns' give the number of gas wells in that spot, numbering close to 50 in this small area. [8]



(The gray numbers relate to the Township Numbering System. Each square equals one square mile. Click map for larger image.)

In December alone, over 150 earthquakes rocked Arkansas. [1] The swarm of quakes in Guy likely results from six years of intense drilling. Guy sits within the Fayetteville Shale Formation which, according to the Arkansas Geological Survey (AGS), is "the current focus of a regional shale-gas exploration and development program." A billion cubic feet of gas has been produced from this area since 2004. [9]

Thousands of wells are in operation in North-Central Arkansas (blue section of the following map). [10] Beebe, where the bird kill occurred, is in White County and Guy is at the northern end of Faulkner Co., where the anomalous earthquakes continue.

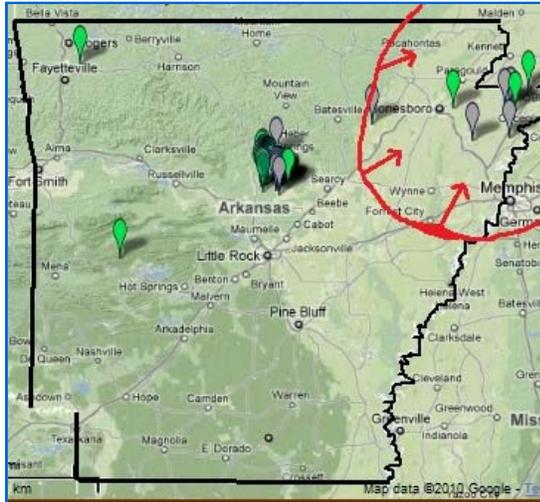


Red-winged blackbirds roost in clusters up to a million or more birds, often with other species like starlings and cowbirds. (In the 1950s and '60s, roosts could number 20 million birds.) Blackbirds prefer low, dense vegetative cover in wetlands or near streams. Though some may perch 30 feet above the water, most perch within one to two feet of it, and some will roost with their feet resting in water. Blackbirds can range up to 50 miles a day from roost to feeding sites, but they all settle in for the night before sunset. [11]

An earthquake of whatever scale can release a stream or cloud of gas and fracking chemicals which could easily explain why sleeping birds would suddenly take flight, and then quickly die as they succumbed to the toxic fumes. Of note, eight measured quakes within 40 miles of Beebe, and within 75 miles of Roseville, hit the area on December 30 thru several minutes past midnight on January 1st. [12] This excludes any micro- or miniquakes which can have the same effect. Significantly, the area is known for its prolific microquakes — numbering 40,000 since 1982. [1]

Canadian Geologist Jack Century crusades against induced seismicity from irresponsible drilling. In a 2009 speech before the Peace River Environmental Society, he provided a brief explanation of how fracking induces earthquakes, completely refuting industry denial that fracking causes quakes. Fracking induces not only micro- and mini-seismic actions that can compromise the integrity of well casings, but also large earthquakes registering on the order of 5 to 7 on the Richter Scale, resulting in human deaths. [13]

Scott Ausbrooks, geohazards supervisor for AGS, told CNN in December that while earthquakes aren't unusual in Arkansas, the frequency is. [14] Indeed, they've had a **1,200 percent increase in earthquakes** over 2009 data just in the last four months of 2010. All of the quakes registered less than 3 on the Richter Scale; over 98% of them occurred near Guy, where we find the largest concentration of gas wells; and 99% occurred outside the New Madrid Fault zone (circled in red below) where seismic activity is expected, implying they are human induced [1]:



Though AGS publicly claims no earthquake relation to drilling, in early December, Arkansas banned new drilling permits until further notice.

CNN reported that "According to the Arkansas Oil and Gas Commission, there are at least a half dozen 'disposal wells' within a 500-square-mile zone around Guy." Ausbrooks noted similar "incidents in Colorado in the 1960s at Rocky Mountain Arsenal, where deep water injection was tied to earthquakes." [14]

Arkansas Earthquake and Drilling History

When comparing Arkansas' earthquake history with its drilling history, a causative correlation becomes obvious.

The entire 19th century saw 15 recorded earthquakes and none in the first decade of the new century. A total of 694 quakes rocked Arkansas in the 20th century. That number was surpassed in 2009-2010, with the bulk (483) occurring the last three months of 2010. Table 1 was prepared using complete quake data thru 2009 [15], complete data from August thru December, 2010 [1], and just North Central Arkansas quake data from January thru July, 2010. [16]

Decade Ending	No. Quakes
1909	0
1919	6
1929	9
1939	14
1949	1
1959	10
1969	14
1979	143
1989	389
1999	107
2009	179
2010	622+

Arkla, Inc., through its many morphs, mergers and acquisitions, is and has been a key gas driller in Arkansas. Between 1975 and the early 1980s, the company found more gas than it produced. By 1982, Arkla was able to sell Central Louisiana Electric Company more than 100 million cubic feet of gas daily. By the early 1990s, it operated the sixth-largest pipeline system in the United States and was among the ten largest operators of natural gas reserves. [17] Its production timeline coincides with the massive jump in earthquakes in the 1970s and 1980s. Today, 37 companies drill for gas and

oil in Arkansas. [18]

Unregulated Fracking on a Global March

The U.S. and Canada are not alone in exploiting this highly destructive technology. Poland also embraces fracking. Several energy companies are currently exploring Poland's reserves, including Conoco-Phillips, ExxonMobil, Marathon, Chevron, Talisman, Lane Energy, BNK Petroleum, Emfesz, EurEnergy Resources, RAG, San Leon Energy and Sorgenia E&P. [19] These new technologies will significantly impact the global trade in natural gas, according to Forbes [20]:

"Poland consumes 14 billion cubic meters of gas a year and imports more than 70% of it from Russia. It is easy to see how the country could benefit from starting shale gas drilling as soon as possible. Not only could it decrease its dependency on Russia, it might even turn into a gas exporter."

Bateman noted that Western and Central Europe have leased their lands to frackers. Australians are suffering from the same frack contaminations as Americans, and China is also exploiting the new technology. [6]

Josh Fox's 2010 film, *Gasland*, documents a multitude of harmful consequences on animal and human life, as well as property values. The most infamous scene shows people able to ignite their contaminated tap water [21]: http://www.youtube.com/watch?v=UrnnQ17SH_A

Fox makes the point that Dick Cheney's former company, Halliburton, lobbied for and won exemptions from the Clean Air Act, the Clean Water Act, Superfund, and the Safe Drinking Water Act, thanks to our corporate-owned Congress. Though it did not hesitate to pass on Wall Street's gambling debts to the public (twice), Congress has not found the will to pass the Fracturing Responsibility and Awareness of Chemicals (FRAC) Act.

Nor do drillers have to disclose the toxic chemicals used, contrary to the 1986 Emergency Planning and Community Right-to-Know Act. [22]

In 2004, the Environmental Protection Agency determined that fracking poses no threat to water supplies and that no further studies were needed. [23] From some Orwellian nightmare, however, at least 65 of the chemicals used in fracking are considered hazardous by the EPA. They have been linked to "cancer; liver, kidney, brain, respiratory and skin disorders; birth defects; and other health problems," according to a 2005 report by the Oil and Gas Accountability Project. Of primary concern to citizens, OGAP notes that "Approximately half of the water that Americans rely on for drinking comes from underground sources." [24]

Wyoming took a proactive stance on full disclosure of fracking chemicals when it passed new rules in September. Loopholes, however, still allow companies to claim proprietary ownership of such information, restricting the information from public view. [25]

Given the EPA's position that fracking is safe, it's not likely that Arkansas citizens will get much help from the federal government. Nor will they find a friend at the state level. The Arkansas Department of Environmental Quality has so far been unwilling or unable to stop UMETCO Minerals Corporation from illegally dumping toxic chemicals into streams. [26]

The same situation applies across the nation where state governments protect industry over environmental and human health. Recently, outgoing Governor David Paterson vetoed legislation that would have put a moratorium on vertical and horizontal hydraulic drilling. [27] Already, Pennsylvania leases a third of its public lands to private energy drillers. [21]

Given government bias toward energy giants, and BP's destruction of the Gulf of Mexico is a case in point, more direct action may be required by citizens, if environmental and human health are to be saved from the fossil fuel industry.

Rady Ananda holds a B.S. in Natural Resources from The Ohio State University's School of Agriculture.

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