

Affidavit of Ellis Boal

1. I know the facts below by personal knowledge.

2. I have been an active member of Ban Michigan Fracking (“BMF”), almost since its formation in November 2011. BMF is a Michigan nonprofit which seeks to ban horizontal hydraulic fracturing for gas or oil in Michigan.

3. The term “hydraulic fracturing” is interchangeable with the term “fracking.” The DEQ uses both. http://www.michigan.gov/documents/deq/Hydrofrac-2010-08-13_331787_7.pdf .

4. We see several problems with it, including threats to air (smog and global warming), water (contamination by undisclosed carcinogens and endocrine disrupters in frack chemicals), ground (human-caused earthquakes), forests (fragmentation), and humans (indigenous radioactive material transported from the depths to the surface). Media reports say that nationwide, thousands of wells are fracked each year. We fear the trend will come in force to Michigan, where only a few have been horizontally fracked so far.

5. Though vertical wells here have been completed by the fracking process for decades, the volume of water and chemicals associated with them is a hundredth of what is used in horizontal deep-shale wells, where it can sum to over five million gallons. http://www.michigan.gov/documents/deq/Hydrofrac-2010-08-13_331787_7.pdf .

6. On March 27-28, 2012, I had email communication with Susanne Biteman, a geologist in the DEQ Cadillac office. She is assigned to processing permit

applications by Encana Oil and Gas USA for permits in the Utica-Collingwood shale under Sunset Trail in Oliver and Excelsior Townships in Kalkaska County. My email noted for these and other fracked Utica-Collingwood wells that the DEQ had not been treating them as injection wells or requiring applicants to submit data customarily required for injection well permits. The failure seemed to contradict the DEQ definition for injection wells, at R 324.102(x). I noted the definition includes "... a well used to inject water, gas, air, brine, or other fluids for the purpose of increasing the ultimate recovery of hydrocarbons from a reservoir...." Therefore it seemed injection well data, including the specific gravity, and maximum rates and pressures of the injection, and chemical analysis of representative samples of the injected fluid, should be included with frack applications. See attached exhibits 1 and 2. See also R 324.201(2)(j)(vi). I asked why the DEQ has not been requiring this.

7. She wrote back the next day saying the definition refers only to one type of injection well, wells drilled for "secondary recovery." The correspondence is attached as exhibit 3. Note it was copied to her boss Rick Henderson, chief of the DEQ field operations section.

8. On April 4, 2012, Encana applied for several more permits, including two new horizontal wells at the surface location of the existing south well on Sunset Trail, two miles south of M-72. These are the deepest oil or gas wells BMF knows of in Michigan. The combined depths of the three wells together (vertical + horizontal) would sum to over 10

miles. The new wellheads would be 50 feet apart. This, in the middle of pristine Mackinaw State Forest, near the North Branch of the Manistee River, with a public boat launch, a snowmobile trailhead, and 1200-acre year-round Boy Scout Camp Tapico nearby, and where on Saturday, October 8, 2011, Encana left a 60-foot drilling rig unfenced and unguarded. (I considered it an attractive nuisance.) In violation of MCL 324.61525(1), no permit was displayed. See pictures attached as exhibits 4a-h.

9. Encana is not a member of American Petroleum Institute (API).

<http://api.org/GlobalItems/GlobalHeaderPages/Membership/API-Member-Companies.aspx> .

10. DEQ announced the new Encana applications on April 9. See attached exhibit 5. BMF immediately requested copies, which at this date are not yet received.

11. DEQ requires that applicants attach an environmental impact assessment to an application, in which the applicant states whether the method of well completion includes hydraulic fracturing. See attached exhibit 6. By email correspondence of April 15-16, 2012, Susanne Biteman stated that Encana did intend to frack the two new wells. See attached exhibit 7. It was again copied to Henderson.

12. On April 11, 2012, I emailed Hal Fitch, for many years and today the head geologist in the DEQ's office of oil, gas, and minerals. I noted the new Encana applications, and questioned him about Biteman's interpretation of R 324.102(x), noting the definition does not in terms single out secondary recovery wells as she claimed. I asked whether DEQ would now begin to enforce R 324.102(x). I asked particularly whether he would reject the

applications without further processing should Encana decline to provide injection well data and "information showing that injection into the proposed geological strata will not initiate fractures through the overlying strata" as required by R 324.201(2)(j)(v).

13. He wrote back the same day, claiming that completion by fracking does not make a well an "injection well" under R 324.102(x):

A key phrase in the definition in Rule 102(x) is "*ultimate* recovery of hydrocarbons." That phrase is used again in the definition of secondary recovery in Rule 103(j). While it could be argued that hydraulic fracturing is intended to increase the recovery of hydrocarbons, its objective is the *initial* recovery. Conversely, Rule 103 (s) clearly considers hydraulic fracturing to be a well completion operation—which is defined to include "artificial stimulation"—and not injection. These rules were intended to apply in this manner when they were promulgated and have always been interpreted that way by our agency. I can speak to this from personal experience because I had a lead role in the 1996 promulgation of the rules as well as in subsequent amendments. [emphasis in original]

I wrote back on April 12, 2012, noting:

the rules nowhere define "ultimate recovery" of hydrocarbons, and nowhere define or even make reference to "initial recovery." Much less does rule R 324.102(x) or any other rule make a distinction between the two, as you do in excluding frack injection from the definition of "injection well."

I added:

Finally, you rely on the longstanding tenure of the DEQ interpretation, dating back to 1996, 2001, and 2002, when the rules were promulgated and amended. The EPA made a similar argument to the eleventh circuit in *LEAF v EPA*, 118 F3d 1467 (CA11, 1997). The court rejected it as "spurious," equated fracking operations to underground injection, and enforced the literal terms of the then-[Safe Drinking Water Act]. I would add that the DEQ's factual assumptions 10+ years ago are of little relevance today, when the volumes of injected frackwater are a hundred times what they were then.

14. The correspondence is attached as exhibit 8. It was again copied to Rick Henderson.

15. On April 12, 2012, I attended a public meeting hosted by State Rep Joel Johnson in Gladwin with several speakers from the DEQ and DNR including Henderson. About 200 people were there.

16. Devon Energy had a literature table at the back. I went to the table. I identified myself and fell into conversation with its senior production engineering adviser in Michigan, Alan James about Devon's plans. Devon is an important operator in Michigan, active in Gladwin County in the A-1 Carbonate layer, with about a dozen horizontal wells either permitted, applied-for, or contemplated. Devon is an API member. <http://api.org/GlobalItems/GlobalHeaderPages/Membership/API-Member-Companies.aspx>. Later I approached James with handwritten questions on a card and asked that he write answers, which he did. They are attached as exhibit 9. They show the following:

Question: "What is the purpose of the hydraulic fracturing you expect to conduct on your wells?"

Answer: "Improve the conductivity of the reservoir to the wellbore."

Question: "In particular, is one of the purposes to increase the ultimate recovery of hydrocarbons?"

Answer: "Yes."

17. I framed my question specifically using the phrase "increase the ultimate

recovery of hydrocarbons” because I knew that was the part of the DEQ's definition of an injection well at R 324.102(x), on which Fitch relied.

18. On April 18, 2012, I attended an afternoon seminar at a meeting at the Grand Traverse Resort in Acme, of API and the Michigan Oil and Gas Association (“MOGA”). The speaker was David Miller. He is the standards director for API. Recently he testified to Congress that API was "the leader for nearly nine decades in developing voluntary industry standards that promote reliability and safety through proven engineering practices." See <http://naturalresources.house.gov/UploadedFiles/MillerTestimony07.08.11.pdf> .

19. Before the talk Michigan API director John Griffin introduced himself , gave me a copy of a thick API handout, and invited me in. Griffin and I talked for a few minutes first, in which I asked him if the purpose of hydraulic fracturing was to “increase the ultimate recovery of hydrocarbons,” again using the key phrase. He said yes.

20. For Miller's talk I didn't count, but I would say over 100 industry people were there, along with Rick Henderson, who had addressed the seminar earlier in the afternoon.

21. In his talk Miller said Michigan regulations cite API standards 38 times. He added that hydraulic fracturing is a priority issue for API and it is developing a campaign on the subject.

22. He called on me during Q&A. I had no recorder but made notes later, and recall it as follows. I thanked MOGA for permitting me into the meeting. I asked what I termed was a very basic question: What is the purpose of hydraulic fracturing? Is the main purpose, or the only purpose, to “increase the ultimate recovery of hydrocarbons” (again using the phrase). Miller explained generally to the effect that horizontal drilling allows the operator to drill one hole instead of several vertical holes, so it's more efficient. I followed up: "So the answer to my question is yes, the purpose of hydraulic fracturing is to increase the ultimate recovery of hydrocarbons?" Miller answered "Yes."

23. Materials in the thick API handout corroborated that answer. The full handout is here: <http://www.api.org/policy-and-issues/hf.aspx> . Overall it is a collection of five recently-developed API documents addressing best practices and risk management issues of hydraulic fracturing.

24. Section 9 of the first one (“HF1”, attached as exhibit 10) compares a fracked to a non-fracked well. A diagram shows that:

by creating an artificial fracture, individual molecules that are a long distance from the well can find their way to the fracture, and once there, can travel quickly through the fracture to the well. ... The process of hydraulic fracturing *increases* the exposed area of the producing formation, creating a high conductivity path ... so that hydrocarbons and other fluids can flow more easily from the formation rock, into the fracture, and *ultimately* to the wellbore. [emphasis added]

Nowhere in HF1 is there a reference to increase of “initial” recovery, or anything similar, as a goal of hydraulic fracturing. Nowhere are “secondary recovery” wells distinguished. The words “initial” and “secondary” are found three times each, but in

different contexts.

25. Section 3 of the second one (“HF2”, attached as exhibit 11) asserts:

In addition, advances in hydraulic fracturing have played a key role in the development of domestic oil reserves, such as those found the Bakken shale in Montana and North Dakota. In fact, very few unconventional gas formations in the US and throughout the world would be economically viable without the application of hydraulic fracturing. These very low permeability formations tend to have fine grains with few interconnected pores. Permeability is the measurement of a rock or formation's ability to transmit fluids. In order for natural gas to be produced from low permeability *reservoirs*, individual gas molecules must find their way through a tortuous path to the well. Single hydraulic fracture stimulation can *increase* the pathways for gas flow in a formation by several orders of magnitude. [emphasis added, footnotes omitted]

Nowhere in HF2 is there a reference to increase of “initial” recovery, or anything similar, as a goal of hydraulic fracturing. Nowhere are “secondary recovery” wells distinguished. The word “initial” is found four times, but in different contexts. The word “secondary” is not found.

26. API defines “injection well” in language very similar to R 324.102(x). In section 2 of HF2, an injection well is said to be: “A well used to *inject fluids* into an underground formation either *for enhanced recovery* or disposal.” [emphasis added] Secondary recovery, initial recovery, and ultimate recovery – highlighted by Biteman and Fitch – are not distinguished in the definition.

27. API's definition uses the word “enhanced” instead of the DEQ's word “increase,” but the connotations are identical. In the definitions section HF2 does not define “enhance” so readers must assume it is not a term of art, and has its ordinary

English meaning. The word is found nine times in the document, sometimes in connection with fracking and sometimes not. In none of the instances is there any implication that “enhancement” is associated or disassociated with either initial or secondary recovery of hydrocarbons.

28. API's definition of “hydraulic fracturing” in section 2 of HF2 confirms such a well is a species of injection well: “*Injecting* fracturing fluids into the target formation at a force exceeding the parting pressure of the rock thus *inducing fractures* through which oil or natural gas can flow to the wellbore.” [emphasis added]

29. In addition to the thick handout in the presentation was an API video “Hydraulic Fracturing: safe oil and natural gas extraction,” which is also on its website at <http://www.energyfromshale.org/shale-extraction-process> . The video begins:

Hydraulic fracturing has provided safe extraction of oil and natural gas from from underground shale formations for more than sixty years. The technology continues to improve, *increasing* access to abundant energy sources while limiting environmental impact. [emphasis added]

30. API speaks for the industry nationally. The bottom line is everyone agrees that a frack well is an injection well, and so do the literal words of R 324.102(x).

Indeed, in the DEQ's white paper on fracking, in effect it does too:

The purpose of [fracking and horizontal drilling] is the same: to increase exposure of more reservoir rock formation to the well bore to *maximize* gas production.... [The process] involves *pumping water* at high pressure.... [emphasis added]

http://www.michigan.gov/documents/deq/Hydrofrac-2010-08-13_331787_7.pdf.

31. As mentioned, DEQ field operations chief Rick Henderson was present

during Miller's talk. Like all participants he received the thick API handout and saw the video. In follow-up Q&A he took no exception to Miller's remarks, the handout, or the video, all of which were telling the leaders of Michigan's frack industry that the purpose of fracking is to increase the ultimate recovery of hydrocarbons. Nor did anyone else.



Ellis Boal

Subscribed and sworn to before me this
26 day of April, 2012.



Notary public Charlevoix County

My commission expires: October 1, 2012
Charlevoix County, Michigan
My commission expires October 1, 2012
Acting in Charlevoix County