Bridge
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Canadian firm plans fracking campaign that could require 4 billion gallons of Michigan water

Featured Quality of Life — 25 June 2013

By Jeff Alexander/Bridge Magazine contributor

THIRSTY WORK: The Encana Corp.'s Westerman well in Kalkaska County recently used 8.5 million gallons of water to complete a hydraulic fracturing process. (courtesy photo)

KALKASKA — A Canadian firm has laid out plans to drill 500 new natural gas wells in Northern Michigan, using a technique that could consume more than 4 billion gallons of groundwater — or about as much water as Traverse City uses in two years.

The firm, Encana Corp., will rely on hydraulic fracturing or "fracking," a technique cloaked in controversy that requires large amounts of water, mixed with chemicals and other elements, to break down rock formations and release natural gas. Encana, for example, used 8.5 million gallons of groundwater earlier this month to frack a single gas well, the Westerman in Kalkaska County, east of Traverse City.

Because most of the water used in fracking becomes contaminated and is left in geologic formations deep underground, a recent surge in drilling by Encana and other companies has raised concerns that fracking could drain water from some of the state's best rivers.

Encana recently drilled several new wells into the Collingwood shale formation, which lies about two miles underground. That's the first step in a plan to drill 500 more deep shale wells in the region using fracking, according to company records.

STATE MAP OF FRACKING PERMIT SITES

The company's plan to drill several new gas wells near Kalkaska will entail pumping about 300 million gallons of water out of the ground, injecting that water into several gas well bores and then leaving nearly all of the contaminated water in the ground when the fracking is completed, according to state records.

The result: A net loss of up to 300 million gallons of groundwater to the North Branch of the Manistee River, a blue-ribbon trout stream fed almost entirely by groundwater. One of Encana's drilling sites is a half-mile from the Manistee River's North Branch,

according to company records.

"If the citizens of Michigan knew corporations were destroying hundreds of millions of gallons of Michigan water – water that is supposedly protected by government for use by all of us – they would be opposing this new kind of completion (fracking) technique," said Paul Brady, a fracking watchdog who lives near Kalkaska. "These deep shale, unconventional wells are using massive amounts of water without adequate testing and solid data on aquifer capacity."

Encana spokesman Doug Hock, however, is optimistic: "Can we access the (deep shale gas) and still protect the environment? Absolutely."

State's monitoring questioned, defended

Michigan's Water Withdrawal Assessment Tool, a computer-based program launched in 2006, was supposed to prevent water withdrawals that could harm streams and rivers. The tool is Michigan's first line of defense against excessive water withdrawals, but it was developed before drillers began using large quantities of water when fracking deep shale gas wells here.

Scientists, lawyers and Michigan courts have said the tool and other state estimates of stream flows are deeply flawed. If true, such a problem could result in the state inadvertently approving large water withdrawals that hurt rivers and streams.

Researchers at Michigan State University recently found several sites where the state's water tool over-estimated the volume of water in small headwater streams that feed the Manistee River.

"In some watersheds, we are seeing that the assumed flows (calculated by the state's water tool) are much higher than we measured. In one case the tool was off by a factor of three," said David Hyndman, a hydrogeologist, professor and chairman of MSU's Department of Geological Sciences.

Those findings were significant for three reasons, Hyndman said: Many of the Collingwood shale gas wells are being drilled in the ecologically fragile headwater areas of rivers; headwater streams are critically important to the health of entire river systems; and the state does little monitoring in headwater streams, where rivers originate.

Government and industry officials defended the state's water assessment tool.

State officials who developed the tool "did error analysis to make sure it was working and everywhere they tested, it worked," said Jill VanDyke, a senior geologist with the Michigan Department of Environmental Quality.

The Water Withdrawal Assessment Tool estimates flows in Michigan's 7,000 streams and river segments using data from river gauges and other information, including geology, soil characteristics, drainage area and precipitation. But only 2 percent of all river and stream segments in Michigan, 147 sites, have gauges that measure actual stream flows. That lack of in-stream data forced the DEQ to base much of the water assessment tool on general environmental conditions and mathematical models.

Dave Hamilton, a former DEQ official who helped develop the water assessment tool, said it takes a "very conservative" approach to ensure that large water withdrawals don't cause adverse impacts.

"Ninety percent of the time there is more water in a stream than what the tool is saying," said Hamilton, who is now a senior policy adviser for The Nature Conservancy's Michigan chapter.

Well uses 3 million gallons from village supplies

State law requires using the tool to screen water withdrawals that exceed 100,000 gallons daily. If the tool raises a red flag, state officials conduct a site visit. Those site visits usually lead to permit approvals, according to DEQ officials.

Since 2008, the DEQ has issued 52 permits for large, fracking-related water withdrawals. Another 17 permits are pending, according to state data.

Fracking critics said recent problems at the Westerman gas well in Kalkaska County — where water wells didn't produce as predicted and drillers had to truck in 3 million of gallons of water from Kalkaska and Mancelona to complete the fracking process — highlighted flaws in the water assessment tool.

Tanker trucks were used to ship millions of gallons of water from the nearby villages of Kalkaska and Mancelona to a gas and oil well. (courtesy photo)

Encana's Hock and DEQ officials blamed the problem on "geologic conditions" unrelated to the water assessment tool.

"Everyone wanted to jump to the conclusion that the (water assessment) tool didn't work and there wasn't adequate water," Hock said. "The tool worked well ... it was a matter of really tougher rock than we anticipated."

Industry watchdog Brady said the DEQ is trying to gloss over problems with the water assessment tool.

"Obviously the tool declared that the area had ample water and as we unfortunately found out the tool was inaccurate," said Brady, who has written extensively about fracking on the respectmyplanet.org website.

Concerns about Michigan's ability to accurately predict stream flows aren't new.

In 2005, the DEQ planned to issue a permit allowing an oil company to discharge 1.15 million gallons of slightly contaminated groundwater daily into Kolke Creek, the headwaters of the Au Sable River. The DEQ claimed that the index (or average) flow in Kolke Creek was about 6,000 gallons per minute, enough to dilute the oil company's contaminated water without harming the creek.

As part of a lawsuit challenging the DEQ permit, independent scientists proved that the state's estimate of Kolke Creek's index flow was up to 100 times greater than the actual flow.

A state circuit court concluded that the state's estimate of the flow in Kolke Creek was inaccurate and blocked the proposed discharge of polluted water into creek. The DEQ appealed but the state Court of Appeals upheld the lower court's ruling.

The prospects for natural gas drilling – and the subsequent need for water supplies for fracking – have waxed and waned in Michigan in recent years.

First came a boom of investment in drilling rights on state property as petroleum firms looked **to extend natural gas exploration from Pennsylvania and Ohio into Michigan**.

By late 2012, though, the pace of exploration in Michigan was still far below drilling rates seen in other Great Lakes states and low natural gas prices were seen **as a potential brake on activity**.

That may soon change.

Encana officials said the oil and gas industry wants to export natural gas extracted from shale formations in Michigan and other states to consumers in Asia. Demand for natural gas in China is strong and prices are double the cost of natural gas in the U.S., industry, watchdogs said.

China's government-controlled energy company, Sinopec, has already invested $2.5 billion in a joint venture with Oklahoma-based Devon Energy. Devon has permits to drill several Collingwood shale wells in Northern Michigan, according to state records.

And late last week, Michigan Congressman Fred Upton, R-St. Joseph and chairman of the House's energy panel, touted fracking as an aid in making the **U.S. "energy independent" in natural gas**:

"We're the largest natural gas producer now in the world because of the advances that we've done on hydraulic fracking. … We are so rich in that resource."

Jeff Alexander is owner of J. Alexander Communications LLC and the author of "Pandora's Locks: The Opening of the Great Lakes – St. Lawrence Seaway." A former staff writer for the Muskegon Chronicle, Alexander writes ***a blog on the Great Lakes****.*

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Bruce McFee

JUNE 25, 2013 AT 9:37 AM

4 billion gallons is equivalent to about 6 hours of water flowing over Niagara Falls.

While that might seem like a lot of water, it would probably occur over several years. It is not the same impact as in Los Angeles where they have diverted the entire Colorado River for their water use.

The dilemma in all this is that we could continue to import energy from countries that have much less interest in protecting the environment. But this means we need a

strong military presence to keep that energy supply safe. Or we just bite the bullet and become energy independent.

One piece of good news is that a break through is right around the corner making desalination of sea water more practical.

Reply

Jim Olson

JUNE 25, 2013 AT 10:42 AM

Ten million gallons over 21 days will most likely harm creeks and wetlands in headwaters areas of our lakes and streams or interfere with adjacent farmer who is irrigating crops or nearby landowners who rely on water wells. What the state and industry have to do is do what every other heavy water user does — conduct a pump yield test and monitor groundwater, wetlands, streams, creeks nearby during the test. Industry will know up front whether there is enough water and DEQ and DNR and citizens will know if there is enough water, that there will be no harm or interference.

Reply

Karen Dill-Wilson

JUNE 25, 2013 AT 12:53 PM

this example is ridiculous. fracking PERMANENTLY removes that water from the consumable water table and makes it toxic. in MI the flow back water that comes up must be disposed of in class II deep injection wells and the rest stays down hole. it's an industry spin tactic: they want to say they use less water than hydro-electric or agriculture but what they DON'T tell you is that it's PERMANENTLY lost and poisoned, unlike other uses. farmers out west are now competing with gas and oil for water usage...who would you rather have water? someone who grows your food or somebody that will poison your water and leave your well dry?

Reply

Mark Knowles

JUNE 25, 2013 AT 9:57 AM

Come on local...and state officials...protect the environment...Don't sell it some Oklahoma based.company and the Chinese. Stop selling your sole and protect your people...the streams and lakes of Michigan are far more important than selling natural gas.

Reply

Jim Olson

JUNE 25, 2013 AT 10:37 AM

Jeff and Center for Michigan. Thanks for publishing and distributing this widely. Citizen organizations, and policy organizations like FLOW http://www.flowforwater.org have been calling on MDNR and Natural Resources Commission to investigate and require baseline estimates of water withdrawals, diversions, transfers, and losses from the water cycle for over a year. DNR rejected any talks when approached last year to reform its leasing procedures and lease so that right to use necessary water would not transfer until development plan is submitted to MDNR for approval for areas of the state and state land, with estimates and consideration of water loss and community, farmers, landowners, and environmental impacts. It is the only legal and sensible way to address this issue, and must be done immediately before it is too late. MDEQ must not issue permits until all of this has been done, and effects and alternatives fully considered. The state lands and waters under them and running through them, are held by Michigan through DEQ

and DNR as trustees for benefit of citizens, not the oil and gas industry. If fracking is allowed at such a large scale, and the jury is still out on this, it should and can only be done after careful pump tests, hydrogeological monitoring of actual flows and levels of streams, wetlands, lakes, groundwater. There is no other way to know what will happen. And if it is not done, it is plainly reckless.

Reply

Caroline B Smith

JUNE 25, 2013 AT 12:17 PM

What's another 3 or 4 million gallons? Nestle's is also taking a LOT of ground water out of Michigan and selling it back to us from WalMart and many other outlets. Just remember, "THE ONE WITH THE MOST FRESH WATER WINS."

Reply

Jeff Alexander

JUNE 25, 2013 AT 2:59 PM

Here's a little perspective: According to state data, Nestle's Ice Mountain water bottling plant near Big Rapids pumped 226 million gallons of groundwater last year. At that rate, it would take Nestle roughly 17 years to withdraw the 4 billion gallons of groundwater that Encana Corp. could withdraw and use at 500 natural gas wells that are hydraulically fractured.

State officials also point out that agricultural operations in Berrien County withdraw 10 million gallons of groundwater daily (averaged over the course of a year). At that rate, all of those farms could pump that amount of water (350 million gallons annually) for 11 years before equaling the amount of groundwater that Encana may use at its hydraulically fractured natural gas wells.

There is one other important point to consider, regardless of whether you think the 4 billion gallons of water that Encana might use is a drop in the bucket or a small lake: The vast majority of water used in fracking is left underground or discarded in deep injection wells because it is contaminated with chemicals. So while Traverse City uses 4 billion gallons of water annually, most of that water remains in the water cycle. It goes back into the ground, surface waters or the air after people use it.

Unless recycled, the water that fracking operations pump out of the ground and use to fracture deep shale is taken out of the local, regional or global water cycle. it's gone forever. Just saying.

Reply

Tom Matych

JUNE 30, 2013 AT 6:03 AM

Good job Jeff. The part where there's enough water in the creek to dilute. Isn't this the same reasoning they used way back when for dumping waste from factories in our lakes and rivers? I don't see anything good from fracking. My well is 166 feet deep, I have good water, they want to drill around here, I refused to sign the contract, my neighbor did sign. I'm 2 miles from the Muskegon river.

Reply

LuAnne Kozma

JUNE 25, 2013 AT 12:39 PM

The Committee to Ban Fracking in Michigan is conducting a ballot initiative petition drive to ban horizontal hydraulic fracturing to end this practice in Michigan, and to

prevent frack wastes from being dumped here. Donate to the campaign and volunteer to collect signatures at: http://www.letsbanfracking.org.

We must protect our state from this threat. The water used in fracking is transformed into industrial waste, which is then "disposed of" in injection wells–back into our ground and eventually contaminating our aquifers.

–LuAnne Kozma, campaign director, Committee to Ban Fracking in Michigan

Reply

Neil

JUNE 25, 2013 AT 1:02 PM

Is it conceivable and feasible to have a water purification plant to process fracking water back to potable drinking water?

Reply

Bill

JUNE 25, 2013 AT 1:18 PM

Yes. Frack water could be brought back to an acceptable quality but there must be a disposal method for
remaining concentrated effluent. Although the fact does not serve naysayer's purposes, water is an almost
endlessly renewable resource if we make reasonable efforts.

Reply

Jeff Alexander

JUNE 25, 2013 AT 3:02 PM

Not likely. However, the water could be recycled and re-used, thereby reducing use. Encana officials said that fracking operations in the water-starved west and southwest recycle the water used to fracture deep shale deposits.

Reply

spudnik

JUNE 25, 2013 AT 3:19 PM

No. The process is built around exploiting a ton of water and walking away. This water is nothing you'd want to drink after processing. And once these wells start leaking massive amounts of pollutants into our groundwater, guessing these corporations will go out of business. We as a culture will need to wake up before it's too late, but the greed seems to have the upper hand now.

Reply

Nancy Shiffler

JUNE 25, 2013 AT 3:21 PM

When you run into problems you didn't "anticipate," it's a pretty good sign that it's time to step back and take a longer, more careful look at what you are doing before you start issuing more permits and drilling more wells. The DEQ isn't doing it's job.

Reply

Charles Richards

JUNE 25, 2013 AT 3:27 PM

"Encana officials said the oil and gas industry wants to export natural gas extracted from shale formations in Michigan and other states to consumers in Asia. Demand for natural gas in China is strong and prices are double the cost of natural gas in the U.S., industry, watchdogs said" This smacks of autarky, a policy that has been proven

throughout history to be inimical to human welfare. If the rest of the article is of similar quality, and I suspect it is, then I don't place much value on it.

Reply

Mark L

JUNE 25, 2013 AT 5:56 PM

Interesting. A little geometry and one can visualize that the water it took to produce this well is about 1 acre (209 feet square) by 25 feet deep. At around 2.5 feet of precipitation per year in Michigan (NOAA), that would be the entire annual precipitation on 10 acres of land for a year to produce that well. 500 wells then would be 5000 acres or 7.8 square miles worth of annual precipitation out of a watershed to produce? It's not going to dry out the Great lakes, but its a lot of dirty water. The stuff is already toxic after well # 1, and the wells are usually clustered. Why can't it be filtered, reprocessed and re-used in the next hole? "because it's cheaper to inject it" doesn't seem like a very good answer...

Reply

Kerry Thompson

JUNE 25, 2013 AT 8:08 PM

For a publication that attempts to remain neutral you seem to be in "fear mongering overdrive". We are fracking in several places in Michigan without damage to the environment, We are helping the damaged economy and providing a product for a cost effective price. Benefactors are those land owners that receive dividends every month from the oil companies. Public agencies and charitable organizations are all receiving big dividends from fracking in Michigan. My good friend has a well drilled next to him and the horizontal fracking under him for over a year has not upset his ground water the level of his ponds his fish or his faucet (no gas fumes). The Boy Scout camp down the road has received more revenues from this well than from all of the donors public and private in the last two years combined.
Where are the articles that show the positive benefits of fracking in the state?

Reply

David Waymire

JUNE 26, 2013 AT 11:46 AM

Kerry, the point here isn't that fracking is always bad...it's that it isn't always good, and can have major implications.That is indeed the very definition of neutral reporting, and is far, far from fear mongering.

The massive use of water detailed in this story is a huge change from the "old fracking" that used to consume maybe 100,000 gallons per well. Now we are talking hundreds of millions of gallons from one site, with potential implications for aquifers and small streams and rivers critical to the headwaters of our trout-friendly state. If that kind of withdrawal can be managed, that's one thing. If it is drying up wells, then it needs to be regulated much more strongly. And if it is affecting our blue ribbon trout streams, that needs to stop.

Reply

Jim Peters

JUNE 26, 2013 AT 2:44 PM

I think it is important to put a few things into perspective. First, it will take EnCana in my estimation 5 – 10 years or longer to drill the 500 wells and mcuh longer to get them completed and producing. More than likely a disposal well will be drilled on each pad or 1 disposal well located to handle several well pads and connected by pipelines eliminating the need to truck the water. Second, this moves EnCana from the explority phase

into developement phase where economics of scale become very important. Third, these wells will likely be drilled over a fairly large geographical area (several different counties) on well pads that may contain 6 – 12 wells per pad. If water withdrawal becomes an issue then water recycling I'm sure will be used. EnCana is saying that they are seeing around 25% of the fracturing fluid returned to the surface so even if they recycle 100% of the returned fluid they will still need new water to continue. In Pennsylvania they are currently recycling 90% of the returned fluid. Pennsylvania has drilled now over 6,000 shale wells. Keep in mind that Pennsylvania has a very limited water supply and it's geology does not support deep disposal wells.

Reply

Jim Peters

JUNE 26, 2013 AT 3:40 PM

Nobody seems to want to discuss the economic impact of drilling 500 shale wells in the somewhat poor, rural areas of northern Michigan. Roughly, 500 wells at around $10 million per well works out to $5 billion dollars invested. Current unemployment rates in these counties range between 10 and 12%. Those rates would drop considerably not just for those counties but for all surrounding counties as well. It won't turn us into North Dakota where some McDonalds pay up to a $1,500.00 sign on bonus if you will stay for at least 2 weeks but the impact will be felt state wide. Local business will florish, families will move in including children for schools, local tax revenues will surge. The economic impact will last for at least a generation. But the water? We are blessed with a significant amount of fresh, clean water. More regulation needed? Possibly, but I believe it can be done in an environmentally safe matter as it is being done every day in Pennsylvania, North Dakota, Texas, Ohio, Colorado, Oklahoma, Arkansas, Louisiana, West Virginia and soon to be California and Illinois.

Reply

Brian W

JUNE 30, 2013 AT 11:21 PM

I agree with you Jim, There is a very negative spin here. None of the good that comes from this is being pointed out. I know I make a good living.... Most of the people working on these locations are local, EnCana is very conscious about the enviroment and the impact of its operations. Each person has "stop work authority" and are empowered to use it in the event of a safety or environmental concern. EnCana takes this VERY serious. There are wellbore integrity checks at regular intervals to ensure there will not be migration of fluids into the aquifer.

I also feel the protests are necessary... without them the industry would not be evolving to use safer fluids (Halliburton is a pioneer in fluids derived from the food industry). But big oil needs to know they are being watched.

Reply

Brian W

JUNE 30, 2013 AT 11:25 PM

This weekend was cherry festival too. I feel the tourism has a very profound effect on the environment. I know the garbage on 131 is up this weekend, is an airshow necessary or a waste of fuel? All the idiots on Torch lake, they dont care about the condition they leave the lakes in....

Reply

Tracy Davis

JULY 10, 2013 AT 7:50 PM

Jim,
Nobody seems to want to discuss that while they think Fracking is such a horrible thing for our environment, they still keep driving their SUV's, ATV's, Snowmobiles, Boats etc.

Reply

acapoz

JUNE 27, 2013 AT 8:44 PM

once the drinking water is depleted, then what?

Fracking isn't about energy independence for Americans, its about profits for oil & gas. They will control the supply & demand to maximize profits. The cost Americans will have to pay in the end is the dependence on bottled water. Fracking will take the bottled water industry to the level of oil & gas profits. Once municipal water supply is depleted from fracking then Americans have no other source than bottled water. And you will pay more for water than for energy.

Reply

Kris Olsson

JULY 1, 2013 AT 10:01 AM

What is the timeline for a fracked well? Do they use the 8 million gallons or so all at once, or is it over the course of several fracking events? So, for a given well, over what period of time is the water consumed. Also, another question – in the state online records for oil and gas, is there a way to distinguish the newer hydro fracking type of drilling from the "regular" oil and gas well permitting/plays?

Reply

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