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The Unholy Alliance of Big Energy, Big University, Big State: My Exchange with Terry Engelder

By Wendy Lee

February 15, 2012

Perhaps the most incredible thing about my recent public listserv and consequent email exchange with Penn State geologist [Terry Engelder](#) is his explicit insistence that I "do not have permission to put this material on the web." Why, I can only hazard to guess, but the substance of our last exchange may have something to do with it: I think he's a tad bit embarrassed, and let his desire to be the "Jonas Salk" of natural gas extraction get away with him. Engelder plainly does not like me, and he does not want to have to deal with a critic.

Here's how that cashed out in our very last exchange—and Engelder got the last word: he claims to teach a class called "Resource Wars" for which, he says, he needed material showing the behavior of "intolerant fundamentalists" in the face of "scientific evidence." He says that he knew he could "shake" some of these folks "out of the bushes" by chatting up the [Youngstown Ohio earthquakes](#) in order to show why we shouldn't worry about this sort of seismic activity. He claimed that I had cooperated "very nicely" in his shaking venture by taking his character to task in our correspondence, and that this was especially true in my response to the public listserv post that I have included here since it was not email (as if email were private correspondence, but whatever.). His main aim, he said, was to use me to illustrate the distinction between open and close-minded people. By "close-minded," I gather he means "critical" or "querying" since that's what I did. My bet is that Professor Engelder wished he could take back that last post because both in substance and in tone it vindicates my observations about his motives, namely, that they're not entirely consistent with the academic values he claims to espouse—and that serving the mission of the natural gas industry is more important than serving that of the university. But then again—Penn State is clearly more interested in the money generated through the promotion of [slickwater hydraulic fracturing](#) than it is in the academic integrity of its institution. Professor Engelder is, I think, simply the poster child for that corporatized institution we used to call a university.

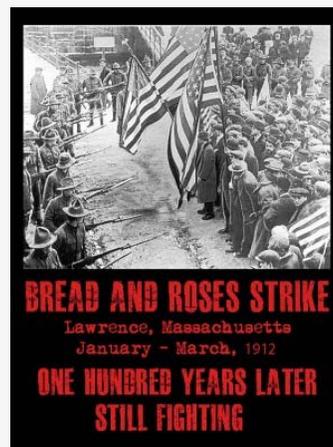


In his original post to "colleagues" Professor Engelder argues that while the earthquakes in Youngstown, Ohio and elsewhere are indeed connected to the destabilizing presence of deep injection wells, that they are of too little concern to worry about whether we should revisit the decision that requires them, namely hydraulic fracturing—fracking—a gas extraction process that produces waste-water so toxic that it cannot ever be returned to the water table and hence must be permanently (or, at least until it leaks) deposited in wells drilled deep under the earth's surface. He draws an analogy comparing the earthquakes to the temporary ice melt caused by ice skate blades sheering across ice:

Most of you understand that ice skates work because the pressure under the thin blade of steel causes a very small amount of ice to melt momentarily. We scientists call this a pressure-induced phase change from a solid (ice) to a liquid (water). It is this film of water between the steel blade and solid ice that allows the skate to glide without effort... The water along the fault zone acted just like a water film between the steel blade of a hockey skate and solid ice. The fault in question was already subject to a push from earth stress. It is just that the push was not quite enough to get the fault to slip (trigger an earthquake).



Perhaps this seems a sound argument; I think not. Indeed, I think it's open to some fairly critical analysis, and that was what I set out to offer in my response. That is called "being a critic" and it does not constitute libel because it is not an attack on the person, but rather the argument. If I wanted to attack Professor Engelder personally, I could have just called him "stinky." In the follow-up correspondence—initiated by Engelder—I



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continued the critique of this analogy as well as of other aspects of his original post. And he continued to respond—mostly by repeating the analogy—but of course, he's refused to allow any more public inspection of those claims despite the fact that he explicitly reserves the right for himself to use them to teach his course. In other words, Professor Engelder reserves to himself the prerogative of engaging in an exchange on the disguised intention of baiting an alleged intolerant fundamentalist into saying something stupid—and he reserves the right to use it as a pedagogical tool—all the while refusing to allow she who has said the stupid to post the exchange (or presumably use it as a pedagogical tool). If this feels hypocritical it's because it is.

I did question Professor Engelder's motives given his unvarnished (and undenied) use of his position as a professor at a big-name School—Penn State—to promote an industry whose extraction processes pose a serious hazard to the environment, and to human and nonhuman animal health. Calling Professor Engelder out on his professional responsibilities is also not libel—he is a university professor and a public figure. He has a professional responsibility to represent facts honestly and without bias—even where this does not jibe with what he may want to be the case. And Engelder is committed to the continuation of fracking—even if what's required for the storage of its waste produces earthquakes. So why doesn't he just go to the mat on this one? If Engelder is certain of his arguments, certain that he is acting in accord with his professional responsibility, certain that I am wrong on my facts, my analyses, my daring to call him out, why deny me permission to post the whole exchange? What's he got to lose if only I look the stupid? I argued that these earthquakes have to be taken seriously, they were earthquakes that on the evidence were likely to increase in both magnitude and frequency, and that this was the sort of collateral damage caused by hydraulic fracturing we can ill-afford. I quoted his sources, and demonstrated that he quoted them out of context. I took to task his comparison of earthquakes to the ice-melt caused by skating blades arguing that this underrepresented the actual damage caused by the quakes (especially where there were large human populations like Youngstown), and I pointed out that the fluids that will inevitably leak from these wells were massively toxic (which he papers over by calling the fluids "mostly water").

Professor Engelder was not happy—hence the contentious email exchange followed by his admission that the whole thing was a set-up to lure "intolerant fundamentalists" into becoming fodder for his course. Perhaps he thinks that because I'm "just" a state university professor I am easily intimidated by the "big gun's" attempt to silence me. I did ask permission; he did refuse it. Well and good. I've not posted the exchange anywhere on the web—not because doing so is libelous, but because I honor my promises. The last time I checked, however, the first amendment still applies. I can still talk about the exchange, and I can still post his original "letter to colleagues." To intimate he might sue me for libel shows only that Professor Engelder cares little for freedom of expression when it's not his own, and that he cares little for the academic freedom of inquiry and exchange that defines the very mission of a university. But then again, this is Penn State.

Why bother?

Because Terry Engelder epitomizes a relationship between a university, an industry, and ultimately the state that should give us all pause—especially when that relationship underwrites an industry whose history is demonstrably rife with subterfuge, mendacity and camouflage of fact in the interest of profiteering. The original exchange was not only public—it was so public that it could serve to shake environmental fundamentalists like myself out of the bushes. Why "obviously"? Because both in strategy—a letter addressed to "colleagues"—and in content—the defense of an industrial process, fracking, against the criticism that the deep injection wells cause earthquakes, Professor Engelder not only explicitly pitches for the industry, but seeks to undermine the opposition in the minds of those who would be its future employees—hence the use of language like "intolerant fundamentalists." There is no mystery about where he stands. In a recent interview with Ira Glass of *This American Life*, Sarah Koenig describes him this way:

People critical of gas drilling have called Terry Engelder an industry shill. And while it is true that his Marcellus talking points line up exactly with those of industry, I got the impression that Engelder sincerely believes these talking points. He believes industry wants to do shale drilling right, that it's figuring out how to minimize the environmental and health hazards. And his job, his responsibility, in fact, is to help. He believes he's had an opportunity only a handful of scientists get, to influence the course of history. He compared himself to Louis Pasteur and Jonas Salk.

Another way to put this is that Terry Engelder is manifestly not an industry shill. As my own correspondence with him bears out, this is just too simple. Indeed, I think the case may be a bit more pathological. Engelder's investment is revealed in his comparison of himself to Louis Pasteur and Jonas Salk, two of history's great humanitarian scientists. Consider the series *This American Life* where Ira Glass offers an insightful glimpse into the relationship between an academic, in this case, Terry Engelder, a university, Penn State, and an industry poised to strike natural gas gold. Professor Engelder is rightly credited with the discovery—though not undisputed—of fifty trillion cubic feet of natural gas potentially extractable from the Marcellus Shale deposits under Pennsylvania and New York. His response: "Merry Christmas America. You're in for a real treat." The irony could not be more poignant or more sad: he appears to truly believe that an industry poised to rape the environment upon which we all depend for the sake of demonstrable profiteering is actually interested in human welfare.

Professor Engelder apparently believes he owes it to the industry to be its Jonas Salk: "In a very real sense, this was my one



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opportunity to repay the faith that the federal government has had in me and the industry has had in me." Far, however, from the image of the humanitarian scientist, Engelder takes his purported historical significance to justify mercenary subterfuge for the sake of converting a university course into an opportunity to recruit industry apostles, and to contribute to the demonizing of its critics. But his teaching moment is also mine—though my aims are radically different: understanding Terry Engelder offers a window into an industry willing to say and do virtually anything to advance its objectives—including using one of its own true believers to espouse its "transitional energy, national security, America, cheap and abundant" worldview—and to run interference against folks like me. It would be, I have come to realize, irrational for Professor Engelder to worry the loss of revenue from any fracking investments he may have—but he does have his place in history to consider, and that, it turns out, is a far more fragile thing.

What if his colleagues—the ones to whom he pretends to address his original missive—discovered an exchange that effectively interrogates the legitimacy of this place? What would they think? Professor Engelder addresses me as if I would suffer embarrassment should my own colleagues at Bloomsburg University read it. But I would suffer no such thing. I'm not, as Professor Engelder implies, made daft by "intolerant fundamentalism," but I am acting in the capacity of a public intellectual devoted to the public good. I have no responsibility other than to tell the truth in my public and my scholarly life as a writer and a philosopher. I have neither monetary investment nor the weight of posterity to worry, and hence my responsibility is fully consistent with the academic mission of my university—and his (at least as is ought to be). It is a very different story, I think, with Penn State as [This American Life helps demonstrate](#):

Engelder doesn't just talk up the Marcellus Shale. "I have to make a bit of a sales pitch for Penn State," he says. He repeatedly points out the quote, "symbiosis between the gas industry and Penn State," and asked them to invest in research at Penn State, quote, "The type of research that's necessary to answer some of these questions that are going to be so critical to the future of Marcellus development," the type of research that he, himself, will be doing... Engelder has started a research project. 10 oil and gas companies are paying about \$40,000 each so students can map the Appalachian Basin, showing companies where best to drill. Engelder also has a multimillion dollar project to help engineers figure out, among other things, how much pressure they need to frack wells. Penn State depends hugely on industry money, and not just on the oil and gas industry, on pharmaceutical companies, and on weapons manufacturers, and on the government. All major research universities do, not just Penn State. But Penn State's got one of the oldest and best gas and petroleum engineering schools in the country. Without industry money, the school might not survive. Flip through this year's awards banquet program for the Energy and Mineral Engineering students, and it's an industry roster. They're getting money from Chesapeake Energy, Consol Energy, Chevron, BP, ConocoPhillips, Marathon Oil. Some of these students will go on to work for these companies, and make lots of money, and give it back to Penn State, which is great for the university. But if you take a close look at how some of these donations work, you can see how entwined the university is, not just with the gas industry, but also with state government, and how all three of them are united on the topic of drilling. [my emphasis]

This is not the story of a university; it's the story of a university beholden to an industry that has come to dictate key aspects of the university's mission. Penn State has effectively forfeited its responsibility to act as an independent agent for the public good, and uses the professorial status of one of its celebrity own—Terry Engelder—to legitimate it. Engelder's "letter to Colleagues" makes marketing look like education—great for Penn State, Inc. Professor Engelder is beholden not to Penn State (other than to legitimate his status), but to those corporations who fund his research into the Marcellus Shale, who fund his graduate student's future careers, who donate enormous sums to his university—and to his place in history. Engelder's own claim was that "the discovery [of natural gas] could be worth \$1 trillion." To be clear: I am not claiming that Professor Engelder profits monetarily through his association with the Natural Gas Industry. He may; he may not. I don't know. What I am claiming is that Engelder epitomizes the forfeiture of academic integrity consequent on the corporatization of the university—and that in the end this impugns Penn State as a public trust. This could not be better represented than in Engelder's own words concerning the abuse of the state's eminent domain, takings, and mineral rights laws to appropriate private property through forced pooling: "I suspect that if the commission were to word their recommendations for pooling in a clever enough way, this would provide political cover for the governor himself. Now, the reason this is important that it come from me, for example, is that it has no credibility if someone from industry proposes this. In fact, as the commission has been criticized a great deal anyway for being top-heavy with industry types" ([This American Life](#)). In other words, Engelder knows that his appeal as a university academic offers the best possible propaganda to the industry and, as a bonus, offers cover to a state government—the Corbett administration—that's as deeply compromised by fracking dollars as are its appointments to key agencies and positions hail from Big Energy.

At one level, my story comes down to this: I dismantled Terry Engelder's argument for the continuation of deep injection wells, and he doesn't like it. I offer documented evidence of the dangers of these wells, and he doesn't like that either. I cite my sources. I deconstruct his ice-skating analogy. I question whether his motives are pedagogical or propagandist. I make out the argument against the process—fracking—that generates the need for the wells. I debunk the claims made for economic growth by showing that this growth is undermined by the price we will all pay for the destruction of our environment. Mine are not the rants of a straw man—an intolerant fundamentalist—but of a citizen and fellow member of the academy who takes her responsibility to act for the public good seriously. Professor Engelder is insulted. But that is not the issue. The issue is whether I have spoken the truth. I have, and I am happy to let others judge this claim for themselves—Professor Engelder is not. The fact is that he impugns himself by demanding that an exchange he admits was intended for unstated and arguably nefarious purposes not be made public. To silence me insures against embarrassment. But once an academic resorts to this strategy, we must conclude their interests lay not in scholarship, but in the preservation of their own celebrity.

Celebrity is, however, not integrity.

And this story, a story not in the end about professors but about the relationship of a university to an industry, must be read as a cautionary tale about the dereliction of a university's mission, [the corporatization of education](#), and the wholesale forfeiture of the trust between the academy and the public good. My exchange with Terry Engelder, in other words, is naught but a taste of things to come when a trusted institution—the academy—becomes compromised in both its teaching and research missions by the smell of money. The sad part—and I think the ultimate explanation for his refusal to allow me to

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post our exchange on the web—is that Engelder’s investment in fracking isn’t about money—but it is about getting to be right—even when you’re wrong. For this concession to self-aggrandizing ego, he should be embarrassed. Penn State, however, should be ashamed.

My original exchange with Terry Engelder who addresses “colleagues.”

[Engelder]: Dear fellow citizens:

The magnitude 4.0 earthquake on New Year’s Eve outside Youngstown, Ohio, was the flavor of the week for reporters calling to ask about the most recent developments in the Marcellus gas shale industry.

[Lee]: Professor Engelder begins his address in the flippant tone that folks in my neck of the woods (academic philosophy) call the setting up of a straw—that is, by referring to reports of an earthquake in Youngstown as a reporter’s “flavor of the week,” Professor Engelder clearly seeks to create prejudice against the argument that hydraulic fracturing causes earthquakes even before evidence has been offered one way or the other. This is unbecoming a professional academic who addresses “colleagues” and who markets himself as a scholar. That Professor Engelder uses his professional credentials to market himself does not make him less a scholar necessarily—but it is an abuse of his credentials. More of this later.

[Engelder]: I hope I can add some clarity to the media hype by providing a physical explanation for what is happening in Youngstown.

[Lee]: More sensible translation given the now well-established facts: “Let me use my title as a professor to the ends of my paid employers in the natural gas industry to tamp down the ugly truths pouring out of this Pandora’s Box.”

Here are the facts:

From the *Statist*, the *Associated Press*, and the *Christian Science Monitor*: “The area around Youngstown, in the state’s northeast corner, has seen 11 minor quakes in recent months, the *Associated Press* reports. The last was a 4.0 on New Year’s Eve that reportedly was felt as far away as Buffalo. The AP cites a seismologist who says the quakes were almost certainly caused by operations at an injection well used for the disposal of wastewater from hydraulic fracturing operations. The state has temporarily closed that well and others nearby. The theory is that when the wastewater is shot back into the ground, it can slip into cracks along a fault line and “act like a hydraulic jack” to trigger quakes, the *Christian Science Monitor* explains. The quakes could continue for up to a year even after the well is closed, the AP’s expert warns.”

From the USGS [[United States Geological Survey](#)] and Columbia University: “Recent earthquakes in Ohio and Oklahoma have been directly linked to deep wells used to dispose of liquid wastes for hydraulic fracturing or “fracking” of natural gas, according to geological experts. And they expect more earthquakes to come as the industry continues to expand across the eastern United States. A boom in gas production using hydraulic fracturing or “fracking” of natural gas has played a role in decreasing US dependence on foreign oil and coal and helped cut energy prices, but evidence is mounting that the process may come at a price. “To the extent that our nation wants to become independent of meeting its energy needs in the coming years, the increased earthquakes are going to go along with that,” said Art McGarr, a geophysicist with the U.S. Geological Survey in Menlo Park, Calif. “The problems are only going to grow in the future.” State officials shut down all drilling around a brine-injection well after a magnitude 4.0 quake rumbled through the Youngstown, Ohio, on New Year’s Eve day. That was the 11th earthquake in 2011 in the region, which is not considered seismically active. Experts are also investigating a 5.6 magnitude earthquake east of Oklahoma City that has been linked to gas drilling there, McGarr said....A team of investigators from Columbia University’s Lamont-Doherty Earth Observatory has been trying to figure out the connection between the earthquakes and the injection well, which takes waste fluids from nearby fracking operations, for the past few months. John Armbruster, a seismologist on the team, said the wells trigger quakes that are already poised to occur.”

From *Scientific American*: “Residents of Youngstown, Ohio, received an extra surprise on Christmas Eve and again on New Year’s Eve—earthquakes, measuring 2.7 and 4.0 on the Richter scale, respectively. No one was injured and only a few cases of minor damage were reported after the Dec. 31 event. Scientists have quickly determined that the likely cause was **fracking**—although not from drilling into deep shale or cracking it with pressured **water** and chemicals to retrieve natural gas. Rather, they suspect the disposal of wastewater from those operations, done by pumping it back down into equally deep sandstone....Nine small earthquakes had already occurred between March and November 2011 within an eight-kilometer radius of a wastewater injection well run by Northstar Disposal Services. Because quakes are otherwise rare in the Youngstown area, the Ohio Department of Natural Resources in November asked Columbia University’s **Lamont–Doherty Earth Observatory** (LDEO) to place mobile seismographs in the vicinity to better determine what was going on. John Armbruster from LDEO installed four seismographs on November 30. By triangulating the arrival time of shock waves at the four stations, Armbruster and his colleagues needed only a day or two to determine with 95 percent certainty that the epicenters of the two holiday quakes were within 100 meters of each other, and within 0.8 kilometer of the injection well. The team also determined that the quakes were caused by slippage along a fault at about the same depth as the injection site, almost three kilometers down. Although LDEO scientists are not saying that the pumping caused the quakes, injection fluids have been implicated in other strike-slip earthquakes close to **deep-injection wells**. In essence, the fluids can act as lubricants between two abutting rock faces, helping them to suddenly slip along the boundary. The scientists did say that subsequent quakes from the Youngstown injections, which had been underway for a year, could continue to occur for up to another year, even if no more fluids are added. Ohio lawmakers have asked Northstar to stop operations until a full investigation is complete; the company has agreed but is not talking publicly about the events.”

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In other words, the clear evidence points directly to the deep injection wells—repository for frack fluids arriving from particularly Pennsylvania—as the causal culprit of the earthquakes. The question is not whether deep injection is implicated in seismic activity but simply whether the magnitude of that activity will become greater and its incidents more frequent. Even IF (as is unlikely) it is not yet clear enough that deep injection is responsible for the earthquakes, it is certainly clear enough that a moratorium must be instituted on the process until the evidence is established one way or the other—and this includes precisely all those activities for which the deep injection wells are necessary, namely, hydraulic fracturing—or fracking.

Now to address Professor Engelder's logic:

[Engelder]: Most of you understand that ice skates work because the pressure under the thin blade of steel causes a very small amount of ice to melt momentarily. We scientists

[Lee]: The reference to "we scientists" is insulting and dismissive—it seeks to elevate one class of educated person above others. Moreover, Professor Engelder is not acting here in his role as a scientist. He is acting as an industry representative who uses his title "scientist" to establish credibility and to make claims that are not those of science appear as if they were.

[Engelder]: call this a pressure-induced phase change from a solid (ice) to a liquid (water). It is this film of water between the steel blade and solid ice that allows the skate to glide without effort. The reason that the skate glides without effort is that this thin film of water literally lifts the steel blade off the ice by at carrying part of the load of the steel blade. You would be correct in concluding that the load of the blade is transferred from a solid-solid (steel-ice) contact to a solid-liquid-solid (steel-water-ice) contact.

Friction between the solid steel blade and the solid ice is another part of this ice skate analogy. Friction is the ratio of the push necessary to make the steel blade glide on ice relative to the weight of the hockey player. To make their skates glide heavy hockey players must generate more push than light hockey players. What if physics can turn heavy hockey players into light hockey players? In fact, the water film under the steel blade does just exactly that by 'carrying' some of the load of the heavy hockey player. With the addition of water between the blade and the ice, less push is necessary.

Earlier this week, the *USA Today* paraphrased a colleague of mine at the US Geological Survey, Art McGarr, by writing, "Since an incident outside Denver in the 1960s, geologists have known that deep injections of wastewater, placed in the ground to avoid cleanup costs, can trigger earthquakes". Dr. McGarr was referring to the Rocky Mountain Arsenal outside of Denver where operators had some low level liquid waste that the Arsenal wanted to dump. The solution was to inject this underground. However, injection underground 'triggered' some earthquakes, largely because the liquid waste (probably mostly water) found its way to a fault zone.

[Lee]: Professor Engelder misrepresents the claims of USGS Art McGarr. He was not referring to the Rocky Mountain Arsenal incident. Here's what McGarr in fact claims: "It's reasonably clear that these Youngstown earthquakes are being caused by the disposal well activities." "To the extent that our nation wants to become independent of meeting its energy needs in the coming years, the increased earthquakes are going to go along with that...The problems are only going to grow in the future." Moreover, the incident at the Rocky Mountain Arsenal is instructive: deep injection of wastewater can trigger earthquakes. Perhaps Professor Engelder thinks that because "causes" does mean something quite different from "trigger" that the potential damaging consequences will be less from the latter than from the former. But this faulty logic involves something rather like assuming that just because, say, the consumption of caffeine may only be the trigger of a migraine headache and not the cause that the headache itself will not be as severe. And that, of course, is ridiculous.

[Engelder]: The water along the fault zone acted just like a water film between the steel blade of a hockey skate and solid ice. The fault in question was already subject to a push from earth stress. It is just that the push was not quite enough to get the fault to slip (trigger an earthquake). When water from the Rocky Mountain Arsenal was injected along the fault, the water picked up some of the load from rock stress across (normal to) the fault. By our understanding of friction, if water carries some of the load, then the push parallel to the fault (which did not changed during injection) becomes capable of triggering earthquakes.

[Lee]: Indeed. And if even this much is true, it is compelling reason enough to halt deep injection. But in fact even industry representatives like the Ohio Oil and Gas Association worry about far more: "We support the state's action" on closing down this well, says Tom Stewart, head of the Ohio Oil and Gas Association."

[Engelder]: The government (i.e., the USGS) in collaboration with industry (i.e., Chevron) wanted to understand the effect of injection on triggered earthquakes.

[Lee]: Let's take a moment to examine Chevron's credibility on all things fracking: In a recent and very well documented study conducted by the Sisters of St. Francis of Philadelphia, the Sisters showed that Chevron failed "to transparently disclose risks associated with hydraulic fracturing operations to investors," and that when shareholders—including the disposal of waster water—were apprised of these risks their response was that the risks were so great that the industry must do everything possible to resist environmental and safety regulation since that regulation—from inception to disposal—would be so costly that the industry would not be profitable. In other words, the mission of Chevron—even according to its own shareholders—is to turn a profit at any cost.

[Engelder]: Consequently, a very famous experiment took place in the early 1970s at Chevron's Rangely oil field in western Colorado in which earthquakes were systematically triggered by a plan of periodic water injection under high pressure. This work was reported in a 1976 Science paper which I attach. Shortly after the Rangely experiment in the 1970s, I was in the Soviet Union as a very small part of a team lead by Dr. David Simpson (now president of IRIS) to understand reservoir triggered (induced) seismicity. The Soviets had constructed a 1000 foot high earth-filled dam and feared that either the weight from the reservoir or water pressure along faults below the reservoir would trigger earthquakes. Again, it was, in part, about friction along faults and how water can help to reduce the push necessary to overcome frictional resistance and

trigger an earthquake. Triggered earthquakes become so 'famous' that Hollywood chimed in with a 1985 James Bond movie, "The View to a Kill". Max Zorin played by Christopher Walken was planning to set off an earthquake along the San Andreas fault which was to wipe out all of Silicon Valley by injecting high pressure along the fault. James Bond in the form of Roger Moore swoops into Silicon Valley just in time to save Steve Jobs' garage from certain destruction. If Hollywood embraces the idea, you know it is NOT possible.

[Lee]: WOW! Honestly, as a fellow academic, this is just embarrassing. The fallacy here is called "ad hominem": Attacking the person/source of a claim (in this case Hollywood) as opposed to the content of the claim (deep injection causes and/or triggers earthquakes). The source of a claim is logically irrelevant to the truth or falsity of that claim. The truth or falsity derives from the evidence and coherence of the argument in support of a claim—and that's it. Whether the claim comes from Hollywood, the USGS, or the woman on the moon has nothing to do with the claim's veracity. And Professor Engelder should know better. Perhaps he'd respond that he was simply aiming for levity. But that would be disingenuous—his aim is to tamp down the facts, and the resort to this staple of right-wing ridiculing rhetoric is more at home with the like of Sean Hannity than it should be with a tenured academic.

[Engelder]: Now, let's clear the air for once and for all regarding earthquakes triggered by industry. You know that injection of water under high pressure is required for hydraulic fracturing. It should not take a rocket scientist to immediately conclude that every horizontal well drilled and stimulated by high pressure water should have triggered earthquakes and lots of them. Right?

[Lee]: This claim is patently absurd and commits the fallacy of overgeneralization: Just because not all injection of (highly toxic—a fact Professor Engelder conveniently ignores) of frack water under high pressure produces earthquakes does not mean some injection does not have this effect. As is made abundantly clear by SciAm (see above), the likelihood of seismic activity depends upon the specific geology of a region. To reiterate: "The team also determined that the quakes were caused by slippage along a fault at about the same depth as the injection site, almost three kilometers down. Although LDEO scientists are not saying that the pumping caused the quakes, injection fluids have been implicated in other strike-slip earthquakes close to deep-injection wells. In essence, the fluids can act as lubricants between two abutting rock faces, helping them to suddenly slip along the boundary."

[Engelder]: But no one has phoned in with reports of earthquakes. The press is too sharp and too vigilant to have missed this story. Right?

As we speak, I have research contract funded by a collaboration between government and industry to study earthquakes triggered by massive slickwater fracturing. << I know, an academic-government-industry collaboration is not to be trusted or so 'This American Life' implied this past summer on NPR >>

[Lee]: Indeed, Professor Engelder is correct here. Because such collaborations have as their goal not truth but corporate profitability, they are in fact biased in favor of that goal. They are not to be trusted—and neither are, as Dean Marshall makes so clear in his piece on this letter, their paid representatives.

[Engelder]: Among the wells that I am studying, a typical hydraulic fracture stimulation in several stages triggered 5,853 earthquakes and these were just the earthquakes that could be detected. That is a lot of earthquakes for the press to have missed.

To date, the PADEP reports that over 4,000 wells have been drilled in the Marcellus. If we assume that my typical well is one of, say, 3,000 horizontal wells, then it seems that industry has caused at least 17,000,000 earthquakes in the State of PA over the past three years. None of these 17 million earthquakes have been newsworthy. Why?

[Lee]: What better strategy to utilize a sample of fallacious reasoning—overgeneralization and straw argument—than to simply repeat it as if its content had already been established? Except—for that it hasn't.

[Engelder]: They can't be felt by the local farmers because they are too small.

I should point out that the difference between hydraulic fracturing and waste disposal is in the volume of water injected. The disposal wells are vertical so a comparison with vertical fracked wells is necessary. I don't have the exact numbers but it is likely that vertical frack stimulations are under a million gallons. I don't know how much water has been injected in the Youngstown, OH, wells but I presume the volume is much larger. Here, volume at a point source matters and horizontal wells are not point sources which means that several million gallons is spread over a large area and so triggering 'felt' earthquakes is extraordinarily unlikely.

[Lee]: This reasoning is specious: (1) the issue is not that some earthquakes are too small to be felt by farmers (or anyone). The issue is that the earthquakes in Ohio could be, that they could cause damage, that their location is obviously relevant to that potential damage, and that future earthquakes—as predicted by the USGS among others—could be of greater magnitude and could—depending on their location—cause damage. (2) Volume of water does matter—and because hydraulic fracturing involves between 2-8 million gallons of water, that process both permanently removes water from the water table (hence the need for deep injection wells) and hence provides an estimate of what must be injected—except for this fact: as much as half of frack fluids are allowed to evaporate in open air pits—including their highly carcinogenic contents. But if even half of 8 million gallons of permanently contaminated water must find its way to injection wells, it is still a far greater volume that Professor Engelder acknowledges. If he responds that that number is still too high because so much of the frack fluid is lost—we should find this cold comfort because lost means seeped back into the water table.

[Engelder]: Of course, industry and the antidrillers

[Lee]: Translation of anti-driller: Proponent of environmental integrity and human and nonhuman health.

[Engelder]: will probably take the postures that they have assumed regarding frack fluid invading ground water. Industry

points to some very large numbers of wells that have been fracked without compromising ground water.

[Lee]: Also irrelevant: Given the carcinogenic and potentially radioactive toxins involved, the number of accidents involving groundwater is irrelevant. One is too many—and we have now seen many MANY more than one.

[Engelder]: The antidrillers point to a case in WVA and the Pavillion experiment to say that industry is wrong. Let me point out that hydraulic fracturing has undoubtedly triggered billions on earthquakes in the USA alone over the past 60 years, so I might conclude that the public is safe from this potential risk.

[Lee]: This can only be a deliberate obfuscation of vertical drilling and horizontal drilling for which the risks must be assessed separately.

[Engelder]: However, there is a risk and always will be. As my good colleague from the Sullivan County debate likes to point out, "Nothing in life is certain". He's absolutely right. The obvious conclusion is that with the triggering of billions of earthquakes during hydraulic fracturing stimulation, the probability that a felt earthquake will occur is extraordinarily low but not impossible. The punchline in the USA Today story is that, "The Ohio quake, which caused no damage, joins similar recent quakes in Texas and Arkansas linked to injections of wastewater from drilling operations".

Among the major issues associated with shale gas production, triggered earthquakes is probably not one of them.

[Lee]: No, Professor Engelder, the punchline is that as fracking comes to involve more and more drill sites, as more and more waste water must be committed to deep injection the risks of this operation from inception to conclusion become greater as well. The punchline is that these risks are demonstrably too great both with respect to environmental sustainability and health. The punchline is about a professor who abuses his status and his prestige as a professor to shill for an industry that pads a salary already far greater than the vast majority of the citizens of either Pennsylvania or Ohio. Sadly, however, this punchline is not very funny—indeed, for Professor Engelder, it is shameful.

Wendy Lynne Lee | Professor of Philosophy, Bloomsburg University

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7 Responses to *The Unholy Alliance of Big Energy, Big University, Big State: My Exchange with Terry Engelder*

Peter B on February 16, 2012 at 9:34 am

Wendy I was on that initial "shaking" email too. I'm at Penn State and didn't take the bait though I really wanted to. I'm glad you did. We could go to his office together some time and see what he thought of "intolerant fundamentalists" who bring cookies, good cheer, and a heavy dose of skepticism and precaution.

You wrote something I think is not quite right.

"He has a professional responsibility to represent facts honestly and without bias—even where this does not jibe with what he may want to be the case." As the history of science shows quite well, this is very difficult to do. The personal ambition in science makes it virtually impossible. Scientists are people with positions in the world and points of view, not all of which is subject to the jeopardy of the scientific method. Even if our identities and worldviews were subject to the scientific method, it would depend on what hypothesis was. In Engelder's view, the ends justify the means and the value of natural gas outweighs the alleged risks. He simply values things differently than we do. I think his ethics are hair-brained and dangerous. But I don't think he is being somehow unscientific in most cases. He's just doing what most of us do, selecting the stuff that supports his case. "A man hears what he wants to hear and he disregards the rest, La-la-la-la-la-la."

REPLY

▶ Wendy Lynne Lee on February 17, 2012 at 8:33 am

Hi PeterB

Thanks for your response. I agree it is a hard thing to be objective, but this does not absolve us the responsibility to try. Especially when we occupy significant positions of power, as does Engelder, and when we are public figures, as we both are.

REPLY

Peter B on February 16, 2012 at 9:36 am

I think I might ask Engelder if he'd like me to come to his class. If he wants an interaction with an "intolerant fundamentalist" then I'll come. Hmm.

REPLY

▶ Wendy Lynne Lee on February 17, 2012 at 9:01 am

If you do make this request, I'd love to know how it goes!

REPLY

Liz R. on February 16, 2012 at 6:15 pm

Ms. Lee, you seem to have fallen down the rabbit hole, and Engelder is the Mad Hatter... My hat's off to you for trying to bridge the ideological divide between those who value human health and those who would designate a "sacrifice zone" to exploit yet another filthy fossil fuel.

There's a landmark book, *University, Inc.* by Jennifer Washburn, which delves deep into The Corporate Corruption of Higher Education. I recommend it, and agree with the author's premise, that while industry should not be banned from funding academic research, it is vital to preserve a public research sphere that is distinct from that of industry.

Thanks for the post!

REPLY

Wendy Lynne Lee on February 17, 2012 at 9:21 am

Hi Liz R.,

Thank you for your response. I am not sure I have fallen down a rabbit hole exactly, but as PeterR said, I did opt to take Professor Engelder's bait. And he also took mine. I have read the Washburn—and thank you for recommending it. I am not sure I am trying to bridge any ideological divide—but I AM trying to act in the capacity of the public intellectual committed to preserving a terribly eroded and profoundly important distinction between the public good invested in the university and corporate interests whose aims are not that good—but profits—a VERY different thing. I have been called idealistic. That is true—and I think it part of my professional responsibility both as a philosopher and as a citizen. 😊

REPLY

Liz R. on February 17, 2012 at 2:17 pm

I've tried to bridge the ideological divide. I bring all the intellectual honesty to this debate that I can muster. I feel I've fallen down the rabbit hole when confronted with the basic fallacy of the pro-gas premise – that fracking is safe. It's the ultimate Argumentum ad Ignorantium... Fracking is safe

because no one can prove that it isn't. Fact is, there's more proof that it isn't safe everyday, even if Engelder and all the other academicians beholden to the gas industry for research dollars refuse to acknowledge it. I greatly appreciated that you "took his bait." You demonstrated how "tamping down the facts" turns education into indoctrination.

Peter, I'd love to hear how that class goes, too. Try not to get brainwashed!!

REPLY

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The Unholy Alliance of Big Energy, Big University, Big State: My Exchange with Terry Engelder

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