

# Congressional Testimonial, May 2011

By Michael J. Economides

University of Houston

The Beverly Hillbillies entertained many generations, each program starting with Jed Clampett shooting at the hills with crude oil bubbling out of the ground. But the widely known image of Jed teaches us two things that are simply not true. First, recovering hydrocarbons isn't easy, particularly today, and secondly, the oil industry is far more concerned for the environment than this.

It took *many years* for industry to realize that, by pumping hydraulic pressure into a subsurface hydrocarbon filled rock, one could create a crack that would make it much easier for oil, or gas, to flow out of the rock. Today virtually all wells require this process to produce commercial quantities of gas (or oil). And, as shown here, it has taken industry over 20 years to figure out that horizontal wellbores combined with hydraulic fracturing are the key to producing commercial quantities of natural gas from shale formations.

This realization, combined with advancements in the ability to pump multiple fracture treatments in tight rock and shale formation has led to a huge boom in gas production. As shown here, shale and tight gas now accounts for over 2/3 of the daily gas produced in the United States, and has led to 87% of our natural gas supply being produced domestically. **It is important to realize that this gas production wouldn't be possible without hydraulic fracturing.**

Despite EPA having conducted several historical reviews of hydraulic fracturing, **and clearing the process as recently as 2004**, cap-and-trade proponents in Congress directed a new study in 2010. However, *this time* the internet tools of facebook, privately funded documentaries such as *Gasland*, and the national media have fueled a frenzy of anti-fracturing sentiment previously unknown.

So the EPA initiated a study of hydraulic fracturing in 2010, ostensibly to study the potential effects of hydraulic fracture on drinking water. Their study was issued through their own Office of Research, their hand-picked Science advisory council, and ultimately through the Hydraulic Fracturing Review Study Panel – a group of academics also selected by the EPA. The study is currently awaiting feedback from the Study Panel.

Now, the mandate to EPA was to employ a transparent, peer review process in this study of hydraulic fracturing. However, as I will show with a few examples, this process has been anything but that. For sure many of the 22-member Hydraulic Fracturing Study Panel are experts in their own area of groundwater, public health, etc., but almost all have no experience in hydraulic fracturing and no understanding of current industry practices. The panel excludes outright some of the most highly regarded individuals in the technical area of hydraulic fracturing; presumably being an expert on the subject immediately condemns one as an industry shrill.

And the lack of industry representation on the Panel is telling.

At the Stakeholder meetings held around the country (meetings the Study Panel themselves could not attend) and subsequent to those meetings, the public was encouraged to provide information about their water wells – cases that might form the bedrock of a forensic review to determine if fracturing had caused contamination.

Despite having thousands of hydraulically fractured wells to consider, EPA “stakeholder” meetings identified several handfuls of wells for their potential contamination to drinking water. Of these, **only four will receive forensic examination** within the context of a hydraulic fracturing water life cycle, including water source and availability, chemical mixing, well injection, flowback and disposal.

Key drivers in selecting the four retrospective cases are focused much more on data availability and likeliness of identifying problems, rather than applicability in representing the normal range of fracturing outcomes. From these limited cases EPA expects to draw massive conclusions, stemming from a hurried, single year of ‘research’.

There is simply no way four retrospective case studies can be considered a representative, or fair sampling *of any process*, regardless of how carefully those cases are selected. **Our risk as a nation is that one bad well will condemn an entire fracturing process with this study approach.**

And the expectation of research results in one year demonstrates even more clearly the lack of credibility. I have been a professor for many years and I rarely see funded projects that can even get started in a year’s time. With the EPA’s approach we must already know the answers.

Texas, Oklahoma, Kansas, Colorado and Wyoming each have over 60 years of extensive experience with the hydraulic fracturing process and these States have well developed regulatory processes in place. Treatments must be noticed to the State before they are performed, and each State regulatory agency elects to witness treatments. There are defined casing points, cementing and testing procedures, and treatment monitoring. An overwhelming majority of hydraulic fracturing treatments are witnessed by regulatory personnel.

In addition, STRONGER [*State Review of Oil and Natural Gas Environmental Regulations, a non-profit, multi-stakeholder organization*], is playing a clear role in unification of hydraulic fracturing oversight at the State level.

Yet, amazingly, the EPA study specifically excludes the State agencies experiences from the Study plan. There can be no question that this omission is a deliberate attempt to direct the conclusions of the fracturing study.

But ask yourself this question: Would it be more effective to have experienced field engineers and regulators witnessing each treatment, or an EPA clerk shuffling a stack of permits?

Last week there was a blowout from a tight gas well in the Marcellus Shale. Wisely, the leadership in Pennsylvania calmly noted that when we repeat a process thousands of times occasionally there is a rare problem. An unexpected equipment failure allowed a release of frac fluids at the surface. However, this was quickly rectified. My point in raising this is the frenzy of negative press, both before and after this event, is focused on *creating the fractures*, rather than wellbore or equipment reliability. Wellbore construction and hydraulic fracturing are completely different and after reading the Study Plan it isn't clear that the committee even recognizes that.

So let me show you a picture of fracture treatments mapped by Pinnacle in the Marcellus Shale. Each stage of fracture treatment is plotted with the red line representing the mid depth where the fractures originate. The shallowest point and deepest points are plotted. At the top, the blue is a plot of the deepest groundwater. As you can see, the fracture treatments are well confined heights, at least a mile below the deepest groundwater. The chance of propagating a fracture upward into groundwater is nil. You have a better chance of winning the lottery.

Interestingly, we also see another aspect. As the depth of fracture becomes shallower, fracture height decreases, reflecting the fact that the overburden is becoming the smallest subsurface stress. With continued decreases in depth, the fracture will become horizontal, also preventing the fracture from propagating into groundwater.

**But since all of this is happening in the subsurface, where it cannot be seen, it's tough to overcome that frenzy of fear.**

There are many, many deficiencies and concerns with respect to EPA's hydraulic fracturing study. The examples given today illustrate why the EPA's Hydraulic Fracturing Study is a Peep Show. On the outside the world is seeing one thing, from within the view is quite different. From within it is clear that the intent is to gain regulatory authority over hydraulic fracturing. And the consumer will bear that cost.

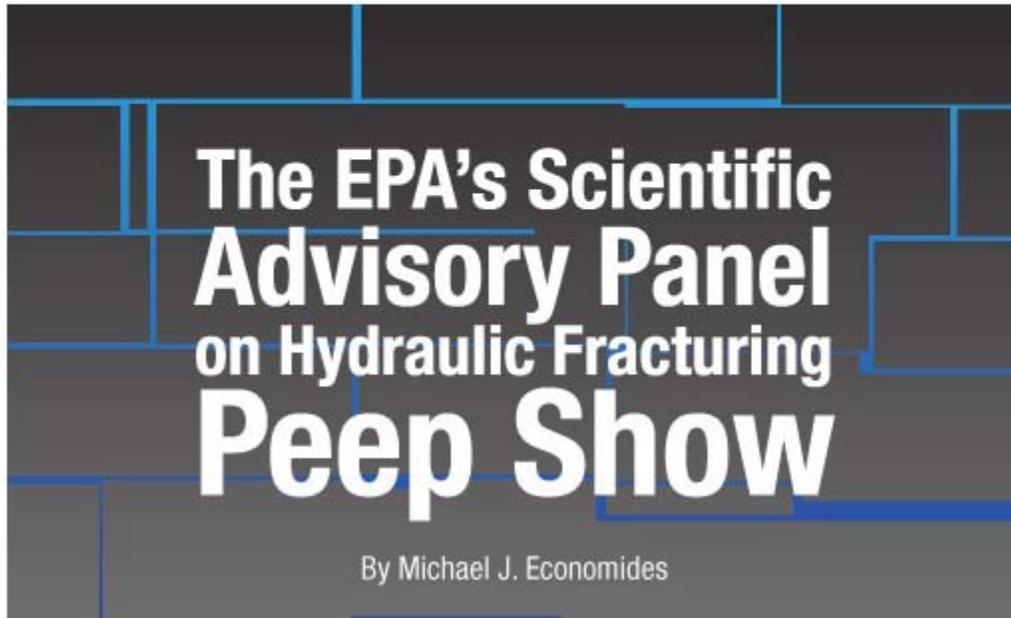
My contention is that the hydraulic fracturing process is safe, already well regulated by the various States, and the hysterical outcry over this process is completely unjustified

Ultimately, the frenzy of arguments over hydraulic fracturing distill to this single fact: **Either the United States wishes to utilize its natural gas resources, or it doesn't.** For development of shale or tight gas goes hand-in-hand with hydraulic fracturing. **Saying "no" to hydraulic fracturing really means you are saying "no" to natural gas production in the United States.**

## The EPA's Scientific Advisory Panel on Hydraulic Fracturing Peep Show

By [Michael J. Economides](#)

Posted on Mar. 21, 2011



There is no ending to the energy wars that have become culture wars and they have infested even ostensibly technocratic agencies of the government that ordinarily should be held above ideology. Not so in the imagery-loaded EPA under the Obama Administration.

The agency's latest foray is the establishment of a 22-member Scientific Advisory Board (SAB) Panel, referred to as "Panel for Review of Hydraulic Fracturing Study Plan for Assessment of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources." Now one would think that this is a noble undertaking but a look at the roster of the panelists, investigative approach, exclusivity and ramrod urgency would put this notion to immediate rest.

Certainly many of the review panelists are experts in their respective fields of ground water hydrology, toxicology, forestry, and public health, etc., but almost all have little to no experience in the well fracturing process and no understanding of current industry practices. The panel excludes outright any of the arguably most famous names on the subject: Holditch (author of 300 papers, author/editor of SPE Monograph on the subject), Meyer, Barree, Cleary, Smith (the creators of the four industry standard design softwares that could actually model fracture dimensions and fracture height) and myself, the author of 200 papers and five books on the subject. Presumably publications on the subject would be against the candidacy of these

individuals as panelists, an outrageous presupposition that their technical prowess would render them to be industry skills.

The almost surely intentional absence of industry participation, except for briefly orchestrated public testimony, is to say the least, curious. Coupling the absence of industry experts with the study plan itself provides even greater insights.

Despite having thousands of wells to consider, EPA has held “stakeholder” meetings in which several handfuls of wells have been identified for their potential contamination to drinking water. Of these, four will receive forensic examination within the context of a hydraulic fracturing water life cycle, including water source and availability, chemical mixing, well injection, flowback and disposal.

Key drivers in selecting the four retrospective cases are focused much more on data availability and likeliness of identifying problems, rather than applicability in representing the normal range of fracturing outcomes. From these limited cases EPA expects to draw massive conclusions, stemming from a hurried, single year of ‘research’. Given that the research has not yet been awarded, one wonders if the answers are already foregone conclusions.

Other aspects of the study are equally worrisome; the entire report focuses on *nanodarcy*, such as shale, rock completely ignoring the fact that most wells are fracture stimulated upon completion, including those in high permeability environments. Presumably one villain frac treatment in shale condemns an entire industry practice regardless of any technical differences in the fracturing process.

Most panel members simply could not distinguish (or probably would not even care) whether any observed contamination could be the result of faulty well construction (a rare but real possibility) or some entirely mythical “subsurface communication” as suggested in silly documentaries like *Gasland*. Wellbore construction and the fracturing processes are not at all the same things, yet lack any separate commentary under the header “well injection” in the flawed study plan. Only newly minted Ivy PhD’s in public policy (likely those who wrote this plan), or those pre-disposed against the production of any natural gas, would fail to make this distinction.

Another concern is the wholesale disregard for current State regulatory practices. The efficacy of existing regulations are not even considered in the EPA draft study plan, discounting the efforts that organizations such as STRONGER [*State Review of Oil and Natural Gas Environmental Regulations, a non-profit, multi-stakeholder organization*], have clearly played a unification and enforcement role at the State level. Their work is not considered as part of the proposed EPA Hydraulic Fracturing Study.

Even the outcomes of EPA modelers are misled. The study plan makes no mention of the hydraulic fracturing models developed by industry experts such as those noted herein, nor is there any mention of modeling with the use of microseismic post fracture morphology (fracturing height length) verifications from hundreds of treatments. Rather, esteemed modelers of the EPA will “assume” a fracture within the context of their subsurface hydrologic flow

models, perhaps without any geological context. This assumed fracture may bear no resemblance whatsoever to the actual fractures resulting from a pumped treatment.

And the list goes on and on.

Let's fast forward a year and imagine the results, assuming that EPA limits itself to study the four or so cases (out of hundreds of thousands) where suspicions may have arisen of water contamination either from natural gas production (unrelated to the fracturing itself, even if the well was fractured) or to the even rarer possibility of contamination because of fracturing fluid additives. Assuming that 3 out of 4 of these cases find some connection (the two Gasland examples were debunked) then one can see the headline: "EPA SAB finds that 75% of water contamination incidents were in fact caused by hydraulic fracturing," clearly a hatchet job, a truism that conveniently ignores the incredible rarity of the three case out of hundreds of thousands wells that are hydraulically fractured and, perhaps exactly, satisfying the latent motives of the creators of the EPA SAB on hydraulic fracturing.

A finding that contamination *can* happen through an accidental defect in well construction, even if it has happened in one case in 100,000, is something that simply cannot be determined from limited retrospective case studies, and any single official "finding" would have only one effect: alarm unnecessarily the public and reinforce the opinions of those that already have opinions on either side of the issue.

There is a "peep show" quality to the whole affair, with EPA actions occurring within the public eye but only 'glimpses' of the real picture within. With the introduction of the phrase "area of evaluation" in the study plan, it becomes clear that the "show within" is to impose area of review studies around any hydraulically fractured well in the United States. Such regulatory authority could shift the "frac, no frac" decision from State authorities to the EPA, resulting in gas well drilling moratoriums similar to the drilling largess now experienced in the Gulf of Mexico.

To somebody that understands (and believes in) the importance of natural gas to the country's welfare it is clear that only those predisposed against any hydraulic fracturing could be pleased with this study. The EPA panel has served their role in sanctifying this EPA hydraulic study plan, positioning researchers and other so-called experts to legitimize a clearly illegitimate and ideologically loaded attack on "fracking", done by people that are predisposed against any natural gas production.

Rarely have intentions been more transparent.