



Energy Bill Delayed – Several Sticking Points Remain

Energy Conference Chair Senator Domenici announced on October 24th that the energy conference meeting scheduled for October 28th had been cancelled. The Senator cited an impasse over several issues under discussion and that these issues must be resolved in order to proceed.

Among the issues cited: How to reform the excise tax on ethanol, whether or not tax credits to encourage alternative energy production should be tradable, and whether tax laws should encourage the construction of new, cleaner coal plants and environmental upgrades of existing plants.

Other disagreements are the House's insistence that MTBE producers be provided with faulty product liability protection without a provision for a "reasonable phase-down". The House is also seeking a number of proposals to amend the Clean Air Act.

The conferees have expressed an understanding of the importance of passing energy legislation. The producing industry must continue to encourage passage of the bill, to enhance

domestic energy production through improved access to the resources, improved access to capital, and reasonable regulation.

IOGA members will be asked to contact their congressional representatives in both the House and Senate from time to time. We will distribute email "call to arms" from IPAA as was done this week on the proposal on Stormwater from Representative Bob Filner.

Congressman Filner's proposal would allow the EPA to regulate stormwater discharges from construction activities under a different standard than that afforded operating facilities.

Stormwater discharge regulation continues to be a serious threat to producers nationwide, and particularly here in Pennsylvania. Permitting delays resulting from requiring stormwater permits will virtually cripple Pennsylvania's producing industry. These delays will harm our ability to help meet the Commonwealth's energy needs in the foreseeable future.

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Need not Register Water Use

Many producers have received letters from the Pennsylvania Department of Environmental Resources concerning registration under the state's new Water Resources Planning Act (Act 220 of 2002). The Act requires registration of water usage averaging 10,000 gallons per day over a thirty-day period.

At the October 15th Quarterly Meeting between IOGA and the Bureau of Oil and Gas Management, Association Executive Director Lou D'Amico asked for clarification of the Act's requirements. DEP attorney Scott Perry had researched the issue. Perry observed that the requirement trigger of 10,000 gallons per day average over thirty days was for a system.

If drilling and frac water were secured from a well or a permanent fixed point on a stream, we would be required to register. However, since drilling and frac waters are secured from multiple points in a watershed as well as from different watersheds, this would not apply to our operations.

Perry did note that as regulations are promulgated by the department for administering the requirements of the Act, IOGA should monitor and comment on these regulations to assure that inadvertent inclusion of our operations not occur.

IOGA will be reviewing any regulations promulgated under the Act.



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DEP Quarterly Meeting Update

The Quarterly Meeting between IOGA and the Bureau of Oil and Gas Management was held in the DEP Northwest Regional Office on October 15th. The lead topic of discussion was the impact of the Water Resources Act on the oil and gas industry. The results of that discussion can be found in a separate article in this edition of *IOGAnews*.

Another item placed on the agenda for this meeting was a policy change and change of interpretation on spacing waivers granted by the Department in coal areas. In the past, if the coal owner/operator would grant a waiver for a wellsite to encroach on the 330' setback from a property line, DEP would issue a permit for the wellsite.

Under the new policy, the permit would not be issued until every legal location site on the property not requiring a waiver was drilled. DEP attorneys have reviewed the language in Act 214 which addresses coal area spacing issues. The Department acknowledges that past approvals of waived spacing were in error in interpretation, and DEP is unable to address the issue unless legislative changes are made to Act 214.

An ad hoc group of IOGA members had previously met with the Pennsylvania Coal Association to discuss the coal industry's position on the issue. PCA members did not object to the past interpretation, however, given DEP's position there will be no return to prior year's policies unless changes are made to Act 214.

IOGA subsequently met with the Pennsylvania Oil and Gas Association to discuss the issue. It was agreed that the two associations would discuss the advisability at the next Board of Directors meeting of each association to reach consensus on what if any action will be taken legislatively on this issue.

The Department handed out drafts of the new Plat and Metadata forms for permit applications. There will also be a "Consideration of Public Resource Form" for operating on or adjacent to public lands.

DEP has formed a committee to develop a BMP manual for stormwater management that will focus on large scale development pertaining to Phase I NPDES permits.

STRONGER, the state oil and gas regulation review group will be reviewing and evaluating Pennsylvania's oil and gas regulations in Harrisburg on November 17-19th.

The Commonwealth's plugging program for orphan wells has plugged 131 wells in six counties to date this year. DEP has trained a group of volunteers to search Oil Creek State Park for abandoned wells. So far, 41 previously unknown wells have been found.

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Why Your Well May Not Produce Like It Should

Roger Myers

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Why don't some wells respond more favorably to hydraulic fractured treatments? Ever ask yourself that question? I have and so I recently sought some answers by attending a series of technical presentations on hydraulic fracturing at the SPE Annual Technical Conference and Exhibition in Denver. A couple papers in particular by ex-Marathon frac guru, Bob Barree, caught my attention. I was especially intrigued by a presentation Bob gave where he listed a litany of factors that damage the proppant pack inside the induced fracture. Damage the fracture conductivity enough and you can end up with a fracture that produces like it is only 5% - 10% of itself.

In September's *IOGA of PA Newsletter* I proposed that larger volume stimulation treatments and longer effective fracture lengths are the main drivers for low permeability gas reservoirs. Curiously, we know from pressure transient analysis that many wells do not produce as though the reservoir is in communication with a long fracture, rather the length may calculate to be pretty darn short. What follows is some of what I learned in Denver about why that may be so.

Barree spoke of 4 different fracture lengths that result from any hydraulic fracturing treatment. The first is the physical 3-D fracture geometry created by the injection of fluid pad, slurry and flush. Commercially available hydraulic fracture simulators predict these fracture dimensions, often yielding fracture half-lengths in excess of 500, or even 1000 feet. Negatively affecting the fracture conductivity of the fracture are such things as formation spalling or fines, gel filter cake (extrudes into sand pack), gel polymer fragments (plugs sand pack), relative permeability and capillary effects (no pressure to push water out of pore spaces), and in

Barree and other's opinion the most damaging, non-Darcy flow effects. Non-Darcy flow effects take into account a pressure loss down the fracture due to turbulent flow. The second and third lengths Barree gave are the infinite acting effective fracture half-length and finite acting effective fracture half-length. Too detailed for this article to get into now but suffice to say that a form of Darcy's Law for fractured reservoirs can be solved to determine these numbers. The last fracture length is the one we are left to deal with; the apparent fracture half-length. All too often half-lengths from advanced decline curve or pressure transient analysis are found to be less than 100 feet! These shortened lengths have a devastatingly negative effect on a well's production, and these calculations all assume the entire fracture is dry. What if it is partially loaded with gel, water, oil and condensate?

Dr. James Crafton, Performance Sciences, Inc. and I had a very interesting conversation about the issue of short apparent fracture half-lengths. Dr. Crafton told me that the number one cause of short fracture half-lengths and in essence, underperforming gas wells, is wellbore liquid loading. Everything is fine as long as the velocity everywhere in the fracture is high enough to keep gas and liquid thoroughly mixed. Out near the tip of the fracture and along the bottom, gravity segregation begins to occur with depletion. As the fluid level gets higher and closer to the wellbore, the apparent fracture length shortens or becomes less conductive. That drops the gas rate, which reduces the mixing, allowing more water to accumulate, lowering the gas rate more and on it goes.

Dr. Crafton helped develop a production analysis software program called the Reciprocal Productivity Index, RPI. RPI is a graphical technique used by production and reservoir engineers to gain insights into key reservoir parameters like permeability, areal extent of the reservoir, fracture half-length and signs of liquid loading. Dr. Crafton firmly believes that many operators don't "dry" up their wells (fractures) properly, nor do they have an effective method to keep the water off the pay zones once they are turned into the sales line. His reasoning goes like this: Once you allow the reservoir to get

back under water, you have in effect put a bottomhole choke in place. As the velocity drops, the Gas-Water Ratio increases which most folks think is a good sign. Actually, it can really signal that worse things are yet to come. Why? Because the water has been segregated, trapped and can't get out.

Speaking about multi-zone completions, Dr. Crafton opined that these wells often underperform because the wells production may be no more than what the upper most pay zone produces. Why? Because the bottom zones never clean up. Our low perm, low pressure gas sandstones are great candidates for this result.

Is there a solution to the problem of shortened fracture half-lengths and less than predicted production? One radical goal I explored with

experts in Denver was to clean up each zone as best as possible and then never allow the lowest perforation to be under water again. This would require setting a pump early time below the perforations, more like an Antrim Shale or CBM well. Any water that can flow will be lifted out before it has a chance to plunge the pay under as bottom hole flowing pressures are reduced.

Here is a quick note about perforating. Hopefully, the well gets perforated in a way that the water can easily drain out of the pay zone allowing for the "driest" condition possible. Water can be trapped with no way out if the perforations are too high. What you can end up with is a fracture half-length of 500 feet long but only effective over the top 1 foot of pay with the rest under water!

When should artificial lift be installed? Dr. Crafton would tell you yesterday, but with proper consideration of economics!



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