

MEMORANDUM

TO: Kathleen Sgamma, VP of Government & Public Affairs, Western Energy Alliance
 FROM: John Dunham, Managing Partner
 DATE: July 22, 2013
 RE: Business Impact of Revised Completion Regulations

As per your request, we have examined the impact of a proposal that would require that companies drilling new wells for the extraction of petroleum products on federal lands face a plethora of new rules. The proposed regulation is being promulgated by the US Department of Interior's Bureau of Land Management (BLM) and as currently written, would apply only to federal wells on or impacting Federal and Indian lands, or split estate lands. However, this definition is remarkably broad and could potentially be applied to companies drilling on private lands in the western states.¹

Assuming a best case scenario, where the BLM approves 100 percent of all applications and assuming capital costs of only 7 percent, these regulations – if applied to all 3,566 projects currently under development in the western states – would **cost at least \$345.592 million annually.**² The anticipated average cost per well is estimated at \$96,913. Table 1 below outlines the estimated costs by source.

Table 1
Revised Cost Calculations

	JDA Estimate	Percent of Total
Initial Delay Costs	\$ 5,632,585	1.63%
Administrative Costs	\$ 1,765,170	0.51%
Enhanced Casing Costs	\$ 310,063,700	89.72%
Cement Log Costs for "Well Types"	\$ 2,603,465	0.75%
Cement Log Delay Costs	\$ 5,914,436	1.71%
Subtotal	\$ 325,979,357	94.32%
Cost of Tanks over Pits	\$ 19,613,000	5.68%
Total Costs	\$ 345,592,357	100.00%

Proposed Regulation and Background:

In May of 2012, the BLM proposed amendments to current regulations (43 CFR 3160.0-3) that would lead to significantly more permitting and operational expenses for companies drilling and completing oil and gas wells on federal lands. At that time, John Dunham and Associates (JDA) estimated that the regulations would impose costs on operators in excess of \$1.284 billion. (See Table 2 on the following page.)

¹ For the purpose of this analysis the western states include: Arizona, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. Also includes estimated wells subject to the rules due to rework.

² This figure is based on an average of two models. The first is based on the carrying costs of the project and the second on the discounted lost value of petroleum output. This also includes the costs associated with refracturing operations.

Since that time, the BLM has issued revisions to the proposed rule in response to the comments that it received from industry, environmentalists and the general public. The net result of these changes is that the implementation of the rule could cost the industry substantially less to implement; however, the total annual costs would still be far in excess of \$325.9 million, not accounting for the use of water storage tanks over lined pits. The major revisions that the BLM has incorporated into the proposed rule consist of:

- The elimination of provisions to require that all well stimulations, including acid stimulations, undergo the full requirements set forth by the proposed rule;
- The elimination of requirements that companies undertaking oil and natural gas well development submit an application to the BLM for approval prior to completing the well;
- The significant modifications of requirements that cement logs be required on all wells but rather on representative wells and that wells of a “similar type” do not need to undergo this procedure unless it is deemed necessary by the particular well characteristics;
- Substantial changes in the administrative reporting and permitting burden placed on operators by the proposed rule.

Table 2
Initial Cost Component Comparison

	BLM	Percent	JDA	Percent	Difference
Initial Delay Costs	\$ -	0.00%	\$ 56,404,007	4.39%	\$ 56,404,007
Pre Completion Delay Costs	\$ -	0.00%	\$ 38,326,948	2.99%	\$ 38,326,948
Administrative Costs	\$ 3,798,558	6.52%	\$ 2,503,710	0.20%	\$ (1,294,848)
Enhanced Casing Costs	\$ -	0.00%	\$ 439,793,100	34.25%	\$ 439,793,100
Cement Bond Log Costs	\$ 44,383,950	76.13%	\$ 736,773,570	57.38%	\$ 692,389,620
Mechanical Integrity Test Costs	\$ 10,116,000	17.35%	\$ 10,116,000	0.79%	\$ -
Total Costs	\$ 58,298,508	100.00%	\$ 1,283,917,335	100.00%	\$ 1,225,618,827

As a result of these changes, there are substantial differences in the calculation of the cost of the proposed rule from those calculated in June 2012. These are outlined below.

Number of Impacted Wells. The BLM assumes that this rule will apply to approximately 3,566 oil and natural gas wells.³ Based on pending APD applications, JDA’s earlier analysis calculated that 5,058 wells in just the 13 western states would be impacted. Without more detail from the BLM it is difficult to determine where the agency assumes these impacted wells will be located, but most of the federal leaseholds are in the modeled states. Therefore, to ensure that these estimates are moderate, the numbers in this analysis are calculated using 3,566 impacted wells rather than the original 5,058.

The elimination of specific provisions of the rule relating to all stimulation procedures for oil and natural gas wells. This specific provision had been estimated to cost the industry as much as \$233,100 per well or about \$273 million per year under the initial rule, most of which was due to maintenance activities such as acidization. It is now likely that most of these additional costs

³ This includes BLMs estimates of reworks that would be covered by the proposed rules.

will not be incurred as the rule would generally not apply to these operations unless they are refracturing operations.

The elimination of the requirement that well operators wait an unspecified amount of time for the BLM to approve completion plans prior to the completion of each well. This provision would have imposed substantial delays on well operators leading to significantly higher drilling and capital costs. In the earlier analysis these delays were estimated to have a cost of \$7,557 per well, for a total of \$38.327 million. While the rule as now written still does not ensure that a well will be approved after completion, the initial analysis assumed an eventual 100 percent approval rate. Keeping that assumption means that these delay costs would no longer be incurred.

The Cost of Mechanical Integrity Tests. The BLM rejected the idea that the proposed rule would increase the cost of Mechanical Integrity Tests (MIT) since they are already required at some point in the development of each well. JDA's earlier analysis suggested that additional MIT operations would be required on 20 percent of wells prior to commencing stimulation operations, and that these tests are assumed to cost approximately \$10,000 as per the BLM.⁴ This would lead to a total cost of \$10.116 million under the proposed rule. Assuming that the BLM is correct, and that MITs in excess of those already mandated or required by the specific characteristics of the well would not be required, there would be an additional reduction in costs of \$10.116 million compared to JDA's previous analysis.

Initial Delay Costs. The BLM recognizes that it does not have the capacity to implement these regulations with its current staffing levels, but nevertheless stated in the proposed rule that the agency will be able to review the new permits in conjunction with the APD and within "normal APD processing time frames."⁵ Considering that the agency already takes an average of 10 months, and often 2 or 3 years to process an APD, it is difficult to determine what a "normal APD time frame" may actually be. While it is unlikely that the additional process would take as long as the current permitting time there will undoubtedly be some delay. If for example, it took the BLM just an extra month to process an APD, the financial cost per well could be as high as \$6,770 – a total of nearly \$23.016 million. This includes the costs of delayed tax and royalty payments to leaseholders (primarily the federal government).

Assuming that there is only a one week delay period – not an unreasonable assumption considering the amount of paperwork and testing that needs to be completed – the cost of delay would average about \$1,580 per well.⁶ Even using the lower figure this equals over \$5.632 million in additional costs, a figure which is included in this report.

Administrative Costs. The BLM recognized our administrative cost assumption in its revised rule, and therefore, we do not believe that there would be any changes in the administrative burden as a result of the revisions to the rule that would reduce JDA's previously calculated figure. Also, there are no changes to the rule pertaining to the additional time that it would take before the approval of an Application for Permit to Drill (APD). Based on a cost of \$495 per

⁴ Ibid.

⁵ See: US Bureau of Land Management, *Well Stimulation Proposed Rule: Economic Analysis and Initial Regulatory Flexibility Analysis*, at: www.regulations.gov/#!documentDetail;D=BLM-2012-0001-0003.

⁶ John Dunham and Associates calculations for the Western Energy Alliance, 2012. Based on an interest rate of 7 percent to match the discount rate used in the BLM analysis.

well and assuming that 3,400 wells would be impacted, administrative costs alone will be \$1.765 million.

Modification of the requirements that cement logs be required on all wells to just requiring them on representative wells. This change could lead to substantial savings over the costs of the initial rule; however, the definition of a *type well* is unclear. This could mean that cement logs would still be required on 100 percent of new wells drilled on Federal and Indian lands. Taking the agency at its word that the proposed modifications are designed to simplify the regulatory process and minimize the regulatory burden, it is likely that the actual number would be lower.

According to the BLM in its proposed rule, additional cement logs will only be required on about 8 percent of the wells (representing “type wells.”) The BLM states that this is based on Automated Fluid Minerals Support System (AFMSS) data but does not provide substantive information on its calculations. Considering that modern drilling equipment and methods allow many wells to be drilled from the same platform, if one assumes that each of these wells is a *type well*, then it is likely that for every 6 to 8 wells only one cement log would be required. Taking the average of 7 would mean that this requirement would apply to just 14.29 percent of wells drilled on Federal and Indian lands. While this is more than the 8 percent assumed by the BLM, the costs from the smaller number of cement logs will be substantial. The earlier estimated cost of the CBL provision was about \$776.734 million. The cost was due to the combination of three factors. First, there is an additional cement log required for the surface casing for nearly every well. Second, the analysis assumed that additional cement log wait times would be required on all wells prior to the initiation of a completion. Last, the initial analysis assumed additional cement logs would be required for intermediate casing strings. Assuming that additional cement logs are required on 8 percent of new wells the new calculated cost from this provision would be \$2.603 million rather than the previously calculated \$736.774 million.⁷

In addition, there are delay costs associated with the requirement that all wells have a cement log performed on surface casing – something that is rarely done in practice. While the BLM assumes that there would be minimal wait times, the analysis itself suggests that 43.3 percent of all wells are not drilled using a preset rig. In the case where a single rig is being used, it will require a minimum of 24 additional hours of complete downtime waiting for cement to dry.⁸ The rental and operational costs for these rigs can vary however, the BLM claims that the cost is as low as \$45,600, so the cost of delay is not simply equal to the time value of the money being invested, but rather the cost of the rig equipment itself. Based on the assumption that 24 additional down hours will occur on 43.3 percent of the covered wells, this equals as much as \$5.914 million in additional costs.⁹ This is in addition to the \$2.6 million in additional costs for the CELs on surface and intermediate casing.

Additional Surface and Intermediate Casings. In addition, although the revised rule attempts to clarify the definition of “usable groundwater,” it does not eliminate the requirement that for

⁷ This includes about \$100,000 in costs for a limited number of cement logs on intermediate casings.

⁸ The BLM assumed 24 hours in its economic impact analysis, and noted that most states require between 8 to 18 hours. Some operators have suggested that the actual downtime would be as high as 72 hours. The 24 hour figure used in this analysis is conservative and agrees with the assumptions used by the BLM. This represents only actual down time where no other work can be done on the well. For the limited number of wells that the BLM assumes will need a cement log for intermediate casings a delay time of 48 hours is used to be consistent with BLMs methodology.

⁹ This includes about \$281,600 in delay costs for intermediate casings.

nearly all wells operators will have to run deeper surface casing, two-stage cementing on the production casing or the addition of an intermediate string of casing. Since ground water levels vary greatly across states, it is difficult to determine exactly how much additional casing will be required for an “average” well.¹⁰ According to the BLM in its Economic Impact paper, there would be no cost related to this provision, since operators already have to protect usable ground water. This statement simply does not make sense. If the provision requires no action, the BLM should see no need for the rule.¹¹

The simple fact is that the definition of “usable water” in the proposed rule is extremely broad, and could require operators to run and cement casings to depths far beyond any economically usable water. Current laws in the states require operators to case their wells to protect drinking water aquifers and other “useable” water aquifers, with the recognition that for aquifers to be deemed usable, they should also be economically viable. In North Dakota and Montana for example, water currently needs to be protected to a depth below the Pierre Shale, but the proposed rule could require an extra 3,800 feet of casing and cement in North Dakota in some circumstances.¹² Based on the broadest definition of “usable,” in Wyoming water needs to be protected to a level 100 feet below the deepest water well within a one mile radius of an oil or gas well. Generally, drinking water aquifers are above 1,000 feet in Wyoming but there are exceptions.¹³

The initial analysis used an average of approximately 2,350 feet of additional intermediate casing per well in its calculations but further analysis of the rule suggests that this might be a very conservative figure. Some operators have suggested that an additional 8,000 feet of casing may be required under certain circumstances. Using the conservative figure of 2,350 feet per well of additional casing, at a cost of \$37 per foot, this would add \$310.064 million in costs for something that the BLM admits is not even necessary.¹⁴

Cost of Tanks over Pits. This was not included in the initial analysis, and JDA has not analyzed this provision of the proposed rule. According to the BLM, the cost of renting storage tanks could be about \$6,000 to \$17,000 per well, while the cost of lining pits is about \$6,000 per pit. Storage tanks (as well as pits) could be used for multiple wells, and there would be development costs associated with both of these options. For simplicity, this analysis assumes that the

¹⁰ It is nearly impossible to develop an exact figure for the additional casing costs required under the proposed rule. The new definition of “usable water” is so broad that in practical terms, casings may be required to be run to significantly deeper depths than may be economically practical (particularly for gas wells located on federal lands.) In addition, calculating an exact figure would require an engineering examination of each of the geologic basins and the well designs in use – something which is not practical based on the available data.

¹¹ In practice, the BLM has deferred to the states in determining what formations require additional casing in order to protect usable water, and the states have had latitude in this process. The proposed rule bases the definition of usable water solely on the total amount of dissolved solids contained in a particular formation.

¹² Other areas, such as the Denver-Julesburg Basin would likely require no additional casing since they are already covered by state regulations.

¹³ Based on well permit data from the Wyoming State Engineer’s Office, the deepest domestic ground water well in the state is 10,660 feet deep. See: <https://seoweb.wyo.gov/e-Permit/common/login.aspx?ReturnUrl=/e-Permit/Default.aspx>

¹⁴ This does not suggest that operators do not have an obligation to protect actual drinking water sources; however, it does show that a generalized *one-size-fits-all* rule like the one being proposed by the BEA is both practically and economically inefficient. A prescriptive rule of this nature removes the discretion that state governments have long had in determining whether or not particular formations contained economically viable sources of drinking water. It should also be noted that this figure is highly subjective; however, even if the average estimate for additional casings were just one-third of what is presented here (about 800 feet), the estimated cost of the proposed rule on operators would still be greater than \$100 million.

development costs would be equal between pits (which need to be dug) and tanks (which need to be plumbed). It also assumes that a tank and a pit can each be used for a given well and that the tank costs are \$11,500 per well (BEA's average), the additional costs across 3,566 wells would be \$19.613 million, a figure that is included in this analysis.

In sum, the above analysis suggests that these proposed regulations will have a significant impact on the oil and gas production industry even without considering future discounted costs.

About John Dunham and Associates:

John Dunham and Associates is a leading New York City based economic consulting firm specializing in the economics of fast moving issues. JDA is an expert at translating complex economic concepts into clear, easily understandable messages that can be transmitted to any audience. Our company's clients include a wide variety of businesses and organizations, including some of the largest Fortune 500 companies in America, such as:

- Altria
- Diageo
- Feld Entertainment
- Forbes Media
- MillerCoors
- Verizon
- Wegmans Stores

John Dunham is a professional economist with over 25 years of experience. He holds a Master of Arts degree in economics from the New School for Social Research as well as a Masters of Business Administration from Columbia University. He also has a professional certificate in Logistics from New York University. Mr. Dunham has worked as a manager and an analyst in both the public and private sectors. He has experience in conducting cost-benefit modeling, industry analysis, transportation analysis, economic research, and tax and fiscal analysis. As the chief domestic economist for Philip Morris, he developed tax analysis programs, increased cost-center productivity, and created economic research operations. He has presented testimony on economic and technical issues in federal court and before federal and state agencies.

Prior to Phillip Morris John was an economist with the Port Authority of New York and New Jersey, the Philadelphia Regional Port Authority and the City of New York.