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September 10, 2012

U.S. Department of the Interior
Director (630), Bureau of Land Management
Mail Stop 2134 LM
1849 C Street, NW
Washington, D.C. 20240
Attention: 1004-AE26

RE: Comments on the BLM Proposed Rule for Oil and Gas; Well Stimulation Including Hydraulic Fracturing, on Federal and Indian Lands (43 CFR Part 3160; RIN 1004-AE26)

To Whom It May Concern:

Please accept the following comments from Trout Unlimited (TU) on the Bureau of Land Management's (BLM) proposed rule ("Rule") to regulate hydraulic fracturing on public lands and Indian lands. TU commends the BLM for initiating the rulemaking process in their continuing effort to oversee the protection of public lands and the environment. As the U.S. places more and more effort into developing energy resources within its boundaries and on our public lands, the public needs to know that activities associated with drilling, such as hydraulic fracturing, are conducted in ways that protect our watersheds and water resources.

Trout Unlimited has worked extensively with the BLM in seeking opportunities for developing oil and gas resources in a responsible manner. Our work has taken us from on-the-ground leasing and project reviews with field office and industry staff to land management policy advocacy in Washington, D.C. We believe strongly in responsible energy development where our nation's fish and wildlife resources, our waters, our air, our public lands, and our recreational opportunities will not be harmed as our energy resources are being developed. We are thankful the BLM heard the public concern during the many forums it hosted in 2010 and 2011 on hydraulic fracturing. TU was an invited participant in the November 2010 Department of Interior (DOI) forum in Washington, D.C. as well as the April 25, 2011 forum in Golden, Colorado.

The proposed Rule outlines three overall objectives: 1) to provide disclosure to the public of chemicals used in hydraulic fracturing on public lands and on Indian lands; 2) to strengthen current regulations related to well-bore integrity, and 3) to address issues related to flowback water. While we applaud the initial efforts the BLM's Rule proposes, we believe the Rule needs to be strengthened to improve its technical feasibility and to aid the application and enforcement of this Rule. We have provided our comments with suggestions and recommendations in an attempt to further strengthen this much-needed regulatory measure.

I. INTERESTS OF THE COMMENTOR

Trout Unlimited has a strong base support of anglers and sportsmen across the United States who depend on our public lands and natural resources for their multiple-use activities both now and in the future. Members of our organization value these public lands that sustain some of the cleanest water, the healthiest habitats and finest fishing and hunting in North America. TU is composed of more than 145,000 members nationwide with dedicated staff and volunteers working toward the protection of sensitive ecological systems necessary to support robust native and wild trout and salmon populations in their respective ranges.

II. BACKGROUND -- GENERAL SUMMARY AND SPECIFIC COMMENTS

A. Provisions of the Rule supported by TU

Trout Unlimited believes this Rule is an important step in managing the development of energy resources on America's public lands. We have identified several provisions that we strongly support and believe will help in the management of hydraulic fracturing activities.

- The goal to provide a consistent standard across all public and Indian lands for regulating and managing hydraulic fracturing activities, including the update of current BLM hydraulic fracturing regulations to complement individual state efforts.
- The BLM's efforts to coordinate closely with individual state governments to avoid duplicative regulatory requirements while actively implementing the most protective and effective regulations for Federal lands and resources and the environment.
- The requirement that prior approval be required for well stimulation activities.
- The requirement that operators will be required to submit cement bond logs before fracking operations begin.
- The requirement for mechanical integrity testing prior to hydraulic fracturing of existing wells.
- The inclusion of useable water definition updates and the inclusion of six new definitions for technical terms used in the Rule which will improve readability and clarity of the regulations.

- The reporting requirements that operators disclose specific information about the types of materials to be injected, and the pressures used.
- The reporting requirement that operators disclose specific information about the water source to be used in fracturing operations, recommending that flow standards be put in place—at either the state or federal level—to ensure existing uses are protected.
- The reporting requirement for pre-fracture activities which (1) requires surface treating pressures anticipated for stimulation; (2) maximum anticipated injection pressure for stimulation; (3) estimated fracture length and height; (4) volume of fluid to be recovered during flowback, swabbing and recover from production facility vessels.
- The requirement for BLM approval of how recovered fluids will be handled and description of the methods to manage recovered fluids and proposed disposal method of recovered fluids.
- The requirement for the operator to continuously monitor and record the pressure(s) during well stimulation activities and to notify BLM of any incident within 24 hours if the annulus pressure increases by more than 500 pounds per square inch preceding the fracturing stimulation.

B. Recommendations to Strengthen the Rule

Trout Unlimited appreciates the critical improvements that the BLM has outlined in the draft proposed Rule and will address specific concerns by sections.

1. General Recommendation: It has been thirty years since the last set of hydraulic fracturing rules were developed by the BLM. New technologies are rapidly advancing energy development opportunities and TU feels that the BLM should consider establishing a trigger mechanism within the Rules for revisiting the Rule if states and/or industry moves ahead of where the BLM regulations are. Our concern is the potential for the BLM to lag behind the states' regulatory standards causing unnecessary delays and the inability to adequately address new science and technology.

2. Geographic & Geologic Application: The Rule would apply to all wells administered by the BLM, including those on Federal, tribal, and individual Indian trust lands. We support the BLM including tribal and Indian trust lands.

U.S. Forest Service (FS) lands receive many applications for drilling projects and they are a public resource that receives much public use and attention. TU is aware of the Memorandum of Understanding (MOU) the BLM has with the FS regarding energy development on FS lands. With the increase in unconventional drilling opportunities and new discoveries of energy development opportunities that may involve hydraulic fracturing, we request that the BLM specifically address lands which are administered by the FS. Many of our headwaters of our great rivers and streams in the United

States originate on forest lands. By including FS lands in the Rule language, there is no ambiguity or confusion about the regulatory application.

Split-estate lands include those lands with federal minerals below private surface lands. Drilling activities occurring on split estate lands also involve the use of fracturing during drilling operations and it would seem a prudent measure for the BLM, who would be managing the subsurface resource, to be involved in the regulatory management effects permitted by the BLM. Because the act of fracturing using chemical contaminants would not differentiate between federal and split-estate lands in the event of a contamination leakage event, coupled with the lack of knowledge in many areas of many geological characteristics, we feel the BLM should address this under the new Rule. Deep horizontal and lateral drilling involves significant risk, and unexpected incidents with contamination migration, breach of well integrity, and movement of fluids has been known to occur. Much of the current hydraulic fracturing activities that have raised the public's concern are occurring on split-estate lands. TU feels that addressing split-estates in the Rule will increase transparency.

3. **Coordination efforts with national reporting entities:** While we applaud the BLM's effort to minimize any duplication between the reporting requirements for states, we do not think the use of FracFocus.org, as it currently is designed and operated, is the answer for decreasing duplication or even increasing accessibility to the public. FracFocus.org is a private industry-managed website in collaboration with Groundwater Protection Council (GWPC). It is managed without mandatory reporting requirements, little oversight, vague oil and gas well information, and difficulty in accessing information. In addition, since the FracFocus.org registry refuses to release the full database of fracturing information, it prevents the open-government framework that BLM seeks to employ. Many states do not have or will not release hydraulic fracturing disclosure information other than through the reference to FracFocus.org. BLM should not use FracFocus as the substitute for regulatory disclosure. FracFocus.org needs to do a lot more than just improve their database, and the BLM should not defer to FracFocus.org as the answer for reporting and transparency.

In addition, FracFocus.org provides little understanding of how each state's regulatory measures are obtainable. A web link is provided with each state listed; this link accesses that state's regulatory agency's website. Most of these states have inadequate websites, creating a difficult and complicated process for accessing information about specific hydraulic fracturing disclosure rules and chemical contents. For example, in Wyoming (which has an adequate set of fracturing rules and where the first set of hydraulic fracturing regulations was implemented), the Wyoming Oil and Gas Conservation Commission's website is one of the most difficult to navigate. Lack of a transparent and user-friendly access to important regulatory and reporting information creates a challenge for the general public and a barrier to the improved understanding that disclosure requirements seek to provide.

We suggest that the BLM consider including language in the Rule that acknowledges other credible, though not industry-related, reporting entities in addition to the Interstate Oil and Gas Commission. A selection of well-balanced resource organizations who could collectively design a disclosure process that provides transparency, ease of access and consistent information should be considered. Since it is the intent of the BLM to provide a way for the public to have a venue for seeking drilling activity information and awareness, we recommend a collaborative group of diverse representatives design a sensible and

updateable database entity. TU is concerned about the BLM depending on industry's self-reporting format, as it is currently recommended, particularly for those activities on public lands.

III. DISCUSSION OF THE PROPOSED RULE

Trout Unlimited supports the addition of the Federal Land Policy and Management Act (FLPMA) language into the Rule. Acknowledging the requirements of FLPMA to protect the quality of public lands that include ecological, environmental, and water resources, is an important element and goes to the heart of the public's concern for its public resources.

Under the discussion of definitions, the proposed Rule includes six new definitions for technical terms which we find helpful in the discussion. In addition to defining annulus, bradenhead, proppant, stimulation fluid, usable water, and well stimulation, we would also recommend that the Rule include the definitions for the following terms:

- Flowback waters
- Produced waters
- Waste water
- Acidizing or acidization
- Hydraulic fracturing (though it is included in this general discussion)

Further discussion centers on removing the definition of "fresh water" and resort to the onshore orders which include a statement that the BLM seek to protect all usable waters during drilling operations. There is confusion between the use of "useable waters" and "fresh water", and removing these terms will not improve the clarity. Rather, we suggest the BLM include these terms under the definition and formally state in the Rule that useable waters includes fresh water and any other source of water used in drilling activities. We believe there is an important distinction between types of water used in drilling operations, including the derived source of such waters used. By including language which clarifies the various types of water, the transparency is enhanced in terms of any reporting requirements and approval requirements.

A. Section by Section Discussion

During our review of the draft Rule document, we noticed that the preamble discussion and explanation of the Rule, which provides the section by section discussion language, and the Rule language itself (discussed under the Summary of Information Collection Requirements) differ. Principally, the differences occur in how the BLM and operators will adhere to the proposed sections (e.g., using the word "required" in specific sections of the preamble discussion versus using the word "may" in the same section discussion under the Rule language requirements). We support the strongest of the action language used in either discussion; however, we are unsure as to why there are such discrepancies and inconsistencies, and whether they will make a difference in the BLM's final adoption of hydraulic fracturing rules. In addition, it is a bit confusing in terms of offering comments to this proposed Rule. We have tried to identify some of those discrepancy areas in our discussion below. We request that the BLM correct these inconsistencies.

Proposed Section 3162.3-3(a): We recommend that all well stimulation activities be defined in this section. Currently the subsequent well operations, as described in section 3162.3-2(a) and (b) are not defined. It is entirely conceivable that recompletions at different intervals, well deepening, and any other type of subsequent well operations might involve fracturing. By defining these activities, the Rule would make it clear, as is the BLM intent, just what activities involve hydraulic fracturing. This process would allow the BLM to update its language as well since these older regulations were created long before the advent of horizontal drilling and improved drilling technologies.

Proposed Section 3162.3-3(b): We disagree with the “option” language as described in this section, as it is confusing and misleading. The BLM is requiring, in its first sentence of the section, that all well stimulation activity be approved, followed with a selection from three methods for seeking such approval. We support this requirement but would like to know what the alternative option would be for the operator who chooses not to seek the BLM’s approval in the APD process. Perhaps the BLM could provide additional discussion as to when and how an operator would go about getting approval using an alternative option.

In the third sentence of this section, the language for the operator submitting a Sundry Notice should be changed from “the operator *would* submit...” to “the operator *must* submit...”. This change would be consistent with the later sentence in which the operator must submit a Sundry Notice prior to well stimulation activity if the BLM’s previous approval for well stimulation is more than five years old or new information is found, or there are impacts to the resource. Since this language (the term “ must”) is consistent with state practices, we recommend the BLM include this change.

Proposed Section 3162.3-3(c)(1-7): For this entire section discussion, we recommend BLM review the language inconsistencies. There are numerous discrepancies between the written discussions in the preamble and the Rule summary requirements. Much of the preamble discussion contains the stronger language of “required” while the same section discussions in the Rule summary requirements soften the language with “may”. Further, in the Rule summary requirements discussion of this section, there is a reference to §3162.3-1 which is not identified in the preamble Rule discussion. This is confusing to the reader and we suggest that clarification be made in this section.

Proposed Section 3162.3-3(c)(1): We support the concept of reporting geological information and the drilling depth of well stimulation fluids; however, it is unclear where the BLM will hold this information and in what format. Will it be available to the public? We recommend there be a requirement that the BLM acknowledge this reporting process since the information requested would assist any remediation treatments should any accidents occur during the fracturing process.

Proposed Section 3162.3-3(c)(2): Cement bond log information will provide critical information in order to prevent migration of fluids in the annulus from the fracture zone to the usable water horizons. While we have reservations about the option to operators for the BLM to grant a variance, as long as the water source is protected, we support this portion of the Section. However, there is some conflicting language we feel the BLM needs to clarify. Section 3162.3-3(b) grants the operator an option in applying for BLM’s approval to stimulate a new well; if the operator chooses not to seek approval via the APD, as discussed under this (c)(2) section, the cement bond log would thus not be submitted. As we requested in Section

3162.3-3(b), it would be helpful if the BLM provided a discussion of the alternative options should an operator not supply a cement bond log through the APD process.

Proposed Section 3162.3-3(c)(3): As we have stated earlier in our comments, we support the disclosure by operators of the water source information. This section has three strong requirements that will provide the BLM and other agencies valuable information that should assist with resource management issues on public and Tribal lands. We support the BLM requiring operators to submit depth measurement reports, require water source disclosure, and require disclosure of the proppants used in the fracture injection process, as discussed in the preamble. However, in the Rule summary requirements discussion, the term “may” is substituted for describing water sources. Further, the Rule summary requirements do not include any discussion of the disclosure of the proppants used in the injection process. We recommend the BLM include this in the section in the Rule summary requirements discussion.

Finally, we request that the BLM also require disclosure in the Rule on the “amount” of water that is planned to be utilized, in addition to the location of the water source and that this information should be required prior to any fracturing activities.

Proposed Section 3162.3-3(c)(4): While this section requires certification from the operators that they have complied in writing with all applicable Federal, tribal, state and local laws, rules, and regulations, we request that the BLM provide a discussion on the enforcement actions which will be implemented should this not occur. The Rule should include language that describes the steps the BLM will take to rectify this lack of information, especially since it will be used in the decision-making process. Certification compliance such as those discussed under this Section should also be available to the public as part of the disclosure process.

For all of the requirements identified under Proposed Section 3162(c)(5), we suggest that timeframes for these activities be defined. In addition, requirements for most of these activities should be completed **prior** to any fracturing activities. Such pre-fracturing disclosure would support the BLM’s intended desire to verify, have all the necessary information, understand potential exceedences and problems, and to provide the best professional safety and environmental protection measures for our public lands.

Proposed Section 3162.3-3(c)(5): While this requirement is a good regulation, TU suggests that a time frame be specified for when the operator has to submit an estimate of the total volume of fluid to be used in the stimulation. In addition, the language must include where this information will be included (e.g., in the APD?).

Proposed Section 3162.3-3(c)(5)(iv): As described above, we suggest this information be required prior to fracturing and after fracturing. Additionally, this information should be made publicly available.

Proposed Section 3162.3-3(c)(6): We support this proposed section but request that the BLM describe the specific information required for the handling of recovered fluids. As stated in the draft Rule, the operator is to provide information pertaining to the handling of recovered fluids that will be used for the stimulation activities for approval. As written, this provides little information for the public. The BLM

should include language that requests amounts, locations, facilities for storage, chemical components, and options for recovering fluids for treatment, etc.

Proposed Section 3162.3-3(c)(6)(i): In addition to providing estimates of fluid volumes, the BLM should require the operators to provide actual numbers of the amounts/volumes of fluid recovered during the flow back, swabbing, and recovery from production facility vessels. This would provide a better understanding for the BLM (and other regulatory agencies) as to what is being left in the subsurface fractures, how this could compound itself over the course of a 400 well or 4,000 well field, and how management of such future drilling fields might be viewed. Providing estimates only does little in terms of reaching actual meaningful future management direction, though it will be helpful in the planning and permitting stages of project development.

The draft Rule discusses flow back waters but neglects produced waters. We recommend that the BLM include the discussion and management requirements for produced water in this Rule, particularly as it applies to understanding the facilities needed to press or contain the estimated volume of fluid dispersion and storage, either on pad location or off-site.

Proposed Section 3162.3-3(c)(6)(ii) & (iii): TU recommends the BLM define “recovered” fluids under these two sections. Many state regulatory agencies have specific language for handling recovered fluids and disposal of such fluids to the environment. We recommend the BLM start with the most protective measures and develop requirements that provide the strongest protection for public waters and habitat. The operators should be required to submit as much information as defined by both the BLM and state regulatory agencies that illustrates how and where recovered fluids will be disposed of.

Proposed Section 3162.3-3(c)(7): TU supports the concept behind the requirement for this section. This section is significant in its language as it provides the BLM with the ability to request information that may come about due to new technological advances, ownership changes in projects or fields, etc.

Proposed Section 3162.3-3(e)(1): The description of this section differs between the preamble discussion and the actual Rule language. Where the preamble “requires the operator to continuously monitor and record pressures...”, the actual Rule language includes the word “must be provided”. We request that the BLM coordinate these discrepancies so both discussions include the word “must”. TU suggests adding the term “and submit” after the requirement that the operator monitor and record the pressure(s) during the well stimulation operation. The BLM should develop a database program that processes and houses this type of information, as it is critical to well integrity and drilling management.

Proposed Section 3162.3-3(e)(2): In addition to orally notifying the BLM as soon as possible should the annulus pressure increase by more than 500 pounds, we suggest that a written document be prepared as well and submitted to the BLM and appropriate state regulatory agencies. Written notification provides a traceable document containing important information that could be useful to any number of agencies that become involved in remediation efforts of a well blowout or contamination event. This written notification is in addition to the Subsequent Report Sundry Notice that is required 15 days after the incident or occurrence.

Proposed Section 3162.3-3(f): TU does not support the proposed Rule for storage of recovered fluids in lined pits where sensitive rivers and drainages exist or where a strong groundwater to surface water communication exists. We believe it makes economic and environmental sense to use the most protective type of waste storage possible and to use wherever possible. All drilling waste, produced fluids, flow back fluids, and any other hazardous fluids associated with drilling activities must be stored in appropriate above-ground tanks or contained in a closed-loop system. This is especially true where vulnerable aquifers exist and could easily be contaminated. There are now several instances where contamination events have happened in the West and in the East. Some states, like Wyoming, require the operator to conduct aquifer tests prior to any type of disturbance and an operator must use an above ground storage tank or other waste storage transport facilities or systems where the aquifer is less than 60 feet from the surface. In addition, BLM should not make this requirement an option or a choice for operators; rather, it should be mandatory unless otherwise mechanically, technically, and scientifically proven that no harm will come to surface and groundwater systems.

The BLM cites the American Petroleum Institute (API) recommendations for handling completion fluids. While we support the API's recommendations and recognize their intent to provide the best technical and feasible methods for industry standards, the recommendations are not requirements but rather guidelines. TU suggests that BLM raise the bar to make this a requirement, in particular because (as the BLM states in the Rule on page 28) FLPMA requires that the agency "take any action necessary to prevent unnecessary or undue degradation of the public lands", and BLM regulations (43 CFR 3161.2) require that "all operations be conducted in a manner which protects other natural resources and the environmental quality."

Closed-Loop Systems. Where drilling activities are close to rivers, streams, lakes and floodplains, we strongly suggest that the BLM require all operators to test the aquifer depth prior to any drilling and approvals. For drilling projects that exist or will be developed in floodplains, sensitive rivers and drainages, reserve pits should be prohibited and closed loop systems should be installed. Flow back and produced fluid can contain hydraulic fracturing chemicals, salts, heavy metals, volatile organic compounds, hydrocarbons, naturally occurring radioactive materials (NORMS), and extremely high concentrations of total dissolved solids. The use of pits and/or centralized surface impoundments to contain these materials can result in greater surface and subsurface disturbance and higher risk of leaks and spills, which can result in groundwater or surface water contamination.

Closed-loop systems should be used to collect flow back and produced water for treatment and reuse or transport to a disposal facility. Tanks must be of sufficient size to capture the entire anticipated wastewater volume (which would be supplied under Section 3162.3-3(c)(6)(i)) and tanks must be located within secondary containment. Reserve pits should only be allowed where the applicant demonstrates that the closed-loop tank system would be technically infeasible; under no circumstances, however, should lined pits be placed in shallow aquifers.

Depending on the configuration and design, a closed-loop tank system can offer the following advantages:

- Eliminates the time and expense associated with reserve pit construction and reclamation;
- Eliminates the surface disturbance associated with construction of the reserve pit;

- Facilitates the re-circulation of drilling mud, which reduces the volumes of freshwater and the amount of mud additives needed for drilling. This decreases truck traffic and lowers the costs of water transportation and mud replacement;
- Reduces the wastes associated with drilling by separating additional drilling mud from the cuttings; and
- Reduces truck traffic and expenses associated with transporting drilling waste, due to the reduced volume of the waste.¹

Furthermore, the environmental risks of reserve pits are well documented. Pit leakage or failure could involve dispersal of well fluids into soils and groundwater supplies. Use of pits increases the potential for an accidental spill during transfer of waste to the pit, a liner leak or a pit failure if engineering controls and other mitigation measures are not sufficient. The risks are heightened if on-site pits for handling drilling fluids are located in headwater areas or aquifer areas, or are constructed on the filled portion of a cut-and-filled well pad.² Conveyances to and from centralized pits are also potential pathways for contaminants to reach the environment.

Additionally, it is inefficient from a logistics and energy use standpoint to construct a reserve pit for the temporary storage of waste fluids and drill cuttings, and then remove this pit at a later time. It is substantially more efficient to use a closed-loop tank system to collect these materials, because the capture tank containing the waste can then be directly transported to a waste handling facility. More fluid can be recycled with a closed-loop system than with reserve pits, and tanks may be reused in subsequent drilling operations.³ A mandatory tank system reduces the high cost and oversight requirements associated with pit closure activities. Closure and reclamation for a closed-loop system costs approximately \$3,000, as compared to \$104,000 for an open pit.⁴ In addition to lower potential for water contamination and land disturbance, truck trips for closed-loop systems can be reduced by up to 75%, due to a reduction in waste mud and fluids based on increases in recycling of wastewater.⁵ According to one study, this reduction has been shown to be as high as 15,625 barrels per site.⁶ Other positive effects of a closed-loop system include a reduced chance of groundwater contamination and thus reduced possibility of company liability.

For the above reasons, the use of a close-loop drilling waste handling system is the best practice to limit risk of contamination. Other states where oil and gas drilling is occurring, such as New Mexico and Wyoming, require closed-loop systems in many cases, and New York is proposing to require closed-loop waste systems in its hydraulic fracturing regulations.⁷ Regulations should be promulgated for closed-loop systems to ensure proper installation and maintenance, but the oversight requirements are far less than that of an open-air evaporation pit. Based upon research and studies prepared by the energy

¹ 2011 New York State Department Environmental Conservation (NYSDEC), RDSGEIS, Page 5-39.

² 2011 NYSDEC, RDSGEIS, Page 6-16.

³ (Alpha) Alpha Geoscience, Inc. 2011. Review of dSGEIS and Identification of Best Technology and Best Practices Recommendations, Tom Myers; December 28, 2009. Prepared for NYSERDA, Albany NY.

⁴ Id.

⁵ Id.; see also NY DSGEIS, 6-65-67.

⁶ Alpha, supra n. 7.

⁷ New Mexico, Energy, Minerals and Natural Resources Department, Oil Conservation Division, Regulations at Title 19, Chapter 15, Part 17; 2011 NYSDEC, RDSGEIS, Page 6-65, 66, 67; Wyoming, Pinedale BLM Field Office, Pinedale Anticline.

industry, the positives of a closed-loop system far outweigh the negatives.⁸ TU urges BLM to re-consider this section and adopt regulations that 1) require drillers to employ closed-loop tank systems for the on-site storage of fluids and waste products associated with hydraulic fracturing; and 2) limit the use of open air pits to situations where it has been proven that a closed-loop system is technologically infeasible.

Centralized Pit Standards. As witnessed in the past few years, there is a surge in unconventional oil and gas development across the nation on federal, state, municipal, private and tribal lands. We recognize that hydraulic fracturing is but one element of the many phases of oil and gas development, and the accompanying results of this process results in many avenues for contaminating our environment. Resulting wastewater, whether it be from flow back or produced waters, surface drainage runoff, accidental spills and leaks, or other drilling incidents, can significantly affect the quality of groundwater and surface water. TU recommends, given the extensive risks associated with hydraulic fracturing operations, the BLM consider implementing standard requirements for siting impoundments for storage, removal, and disclosure in the East and in areas on public lands where sensitive watersheds exist.

Reserve pits should only be permitted if the applicant can demonstrate that a closed-loop system is technically infeasible and a water source, above ground or below ground, is not affected. If reserve pits are determined to be the only technically feasible option, a geochemical analysis should be performed on all flow back and produced water at the time of deposit into the pit, and the results should be used to determine the most appropriate disposal method. Such analysis should include an assessment of all contaminants for which the Environmental Protection Agency (EPA) has set primary and secondary drinking water standards, hydrocarbons, standard inorganic ions, NORM, and hydraulic fracturing chemicals. Many of these standards and regulatory requirements exist in states and the BLM should closely coordinate with all states.

If open pits are to be used, BLM should adopt regulations or permit conditions that include the following provisions: require impermeable, chemical resistant liner material; limit the types of chemicals stored to those that are compatible with the liner material; require interior berm and buffer placements; and require standards that protect fisheries.

Even the smallest liner defect can release significant volumes of contaminated material over short periods of time, and any appreciable hydraulic pressure in the pit greatly increases the impact of any liner defect. In addition, in cases where a single-liner system is not ballasted with a protective soil layer and leakage is trapped in the interstitial area between the liner and liner sub-base, the increased hydraulic pressures and buoyant forces of the geomembrane materials may cause the geomembrane to float. This would typically result in more liner system damage.

For deep surface impoundments, the amount of ballast material needed to reduce this problem is significant, and the placement of this large amount of ballast material also increases the likelihood and severity of liner system defects. Rapid drawdown of the contained liquid can result in instability of the ballast materials on the impoundment's side wall, resulting in catastrophic damage of the liner system.

⁸ Id.; see also NY DSGEIS,

Trout Unlimited proposes that the BLM require liner material that prevents the migration of wastewater through the liner to the greatest degree that is technologically possible. This would involve the use of impermeable liner material that is designed, constructed and maintained so that the impounded materials do not adversely affect the physical and chemical characteristics of the liner and the liner is resistant to physical, chemical or other failure during transportation, handling, installation and use. We recommend that the BLM implement standards similar to that required by EPA. EPA requires that the liner compatibility satisfy the EPA's Method 9090 Compatibility Test for Wastes and Membrane Liner, a standard which is being supported by West Virginia in its new pit liner standards.⁹ Method 9090 is intended for use in determining the effects of chemicals in a surface impoundment on the physical properties of flexible membrane liner materials intended to contain them. While TU supports the use of the EWV Method 9090, the Rules should explicitly limit the types of chemicals stored in impoundments to those shown by the applicant to be compatible with the liner material.

Fish and Wildlife Protection Standards. In response to BLM's request for additional requirements that may be placed on a project by the BLM for the protection of our public resources, we offer the following. In oil and gas development there are landscape and water impacts that arise from not just the production operation of these facilities, but also from the extensive—if temporary—impacts arising during exploration, construction and post- construction management of those sites.

BLM should consider imposing standardized setbacks between well pads, centralized pits and waterways, in addition to considering the erosion and sedimentation that will result from the construction of the pit, and evaluate factors such as soils, slope and whether the waterway is considered high quality. We recognize that in many cases, BLM has responded positively and is on the right track in implementing stronger buffer protections to our public watersheds. Examples of such actions include the implementation of quarter-mile setbacks in perennial rivers and streams in the Little Snake BLM Field Office in Colorado, and half-mile setbacks or no surface occupancy stipulations for cutthroat trout waters in the Dillon and Butte BLM Field Offices in Montana. Other Field Offices in the West are in the resource management plan revision stages and are considering similar protective setback measures. We applaud the BLM for including these measures in their resource management plans and note that these stipulations additionally offer the flexibility to decrease buffers based on case-by-case evaluations.

However, these examples are more the exception than the rule and, more often, current BLM regional plans do not support such standards. Often current setbacks are less effective and are based on regulations designed thirty years ago and for development sites that did not include the many thousands of well pads and wells currently situated across our public lands. Increasingly, many oil and gas projects on our forests and BLM lands are adjacent to nearby rivers and streams containing sensitive coldwater and warmwater fish species. Some of these species are at risk in terms of habitat suitability, isolated populations, or are proposed for listing with U.S. Fish and Wildlife Service. In addition, many streams and rivers support healthy recreational fisheries and provide a robust economic contribution to state's tourism and business sector. We believe that by implementing stronger buffer setbacks in sensitive watersheds, the BLM can help minimize the risk of potential harm from inadequate protection measures.

⁹ West Virginia Depart. Environmental Protection, Design and Construction Standards for Centralized Pits (Dec. 23, 2011) at 3.

To minimize any chance of harming sensitive fish populations, TU requests that the BLM implement stronger setback buffers in those areas where resource management plans do not call for stronger river and stream measures. For perennial streams, we are requesting starting with 500 feet as a minimum setback. Further, we recommend a site-specific assessment be conducted to determine if greater buffers are needed based upon the factors referenced above. Additionally, TU recommends that BLM establish a buffer from intermittent streams, as these streams play an important role in supporting trout reproduction. TU feels that by implementing stronger setbacks for our important rivers and streams systems that provide water for drinking, agricultural, municipal and recreational use, this will ensure the protection of the environment and other resources BLM helps to manage.

Proposed Section 3162.3-3(g)(2)(3)(4) and (5): TU's preference is for pre-disclosure of all hydraulic fracturing fluids. We understand the dynamics industry and the federal government have to deal with but we feel that full disclosure prior to any hydraulic fracturing procedures provides a higher level of transparency and safety. Pre-disclosure assists both the BLM and other regulatory agencies in the ability to prepare stronger management and contingency plans for any oil and gas development project.

Trout Unlimited's greatest concern is the potential for contamination to our public watersheds. In order for any type of adequate and competent remediation to occur should a contamination event occur, it is important for agencies to know and understand the complex mix of chemicals that have been used in the hydraulic fracturing mix. While we believe the BLM is on the right track in terms of reporting chemical identities, we suggest that the BLM require a more robust reporting identity of the chemicals used in the stimulation fluids. As currently described in the draft Rule, the requirement is vague in how much information is being required to be reported. The use of FracFocus.org, as previously discussed in our comments, is not a substitute for full government disclosure.

Because the chemicals used in hydraulic fracturing are of a hazardous nature, it is a prudent and protective action that BLM should engage in by requiring disclosure prior to any type of hydraulic fracturing, for both horizontal drilling and directional drilling activities. Chemical disclosure should include all chemical constituents for all oil and gas drilling activities and operations. Fracturing a well can involve up to 30 fracturing events, using a complex and varying array of chemicals based on various geological formations. In addition, horizontal fracturing is a relatively new technology and the BLM has not necessarily kept up with these technological advances in horizontal drilling and fracturing. By postponing chemical disclosure reporting requirements until after the fact, in essence considerable and irretrievable damage could be done to the environment and the BLM and industry would thus be engaging in costly remediation and environmental cleanup.

Proposed Section 3162.3-3(g)(7): We support the statement that attaches responsibility to the operator for ensuring the accuracy of the information provided to the BLM in any hydraulic fracturing activity. We do have concerns about allowing the operator the flexibility to report online the information regarding chemical constituents and logging information, and to report it in the format as described (allowing the third party service contractor to submit reports as attachments). Due to the already difficult challenge that exists in accessing and understanding the information on FracFocus.org, we suggest the BLM strengthen this Section.

In the development of a more user-friendly format and open-government process, the BLM's potential website for hydraulic fracturing disclosure information could include a standardized format designed to capture the intended information, provide a summary of individual state's regulatory rules, provide links, and require any third party or fracturing service company to adhere to a standardized reporting format as well. The BLM should request that in addition to the stimulation fluids report (provided in the Chemical Abstract Service Registry Number (CAS#) by law), the chemical content of all materials be reported. Such reporting provides the public and BLM the information that would be most helpful in resource protection concerns.

Proposed Section 3162.3-3(g)(9): Some states (for instance, Wyoming, Texas, and Colorado) require wellbore integrity certification; however, not all states do, and we support the BLM's requirement that this be maintained and reported. We recommend a timeframe be included in this section.

Proposed Section 3162.3-3(g)(10): TU supports the reporting requirement for how operators will handle the fluids used for the well stimulation activities. As addressed in Section 3162.3-3(c)(6) and (c)(6)(i), additional information should be included that is more specific in order to address public concerns and environmental protection. In addition to providing how it will handle these fluids *prior* to the well stimulation (for BLM planning and best management purposes), the BLM should include a timeframe for when the operator will report the completion of the fluids disposal activities once the well has been stimulated.

Proposed Sections 3162.3-3(g)(10)(i),(ii),(iii): Timeframes must be identified for reporting requirements, as discussed in the similar Proposed Sections 3162.3-3(c)(6)(i) through 3162.3-3(c)(iii).

Proposed Section 3162.3-3(j): The language for variance allowances in the preamble of the draft Rule and the actual Rule language itself differs and we request that the BLM correct this discrepancy. The preamble discussion does not provide for how the request for a variance will occur, while the actual Rule language encourages the operator to use a BLM format to request a variance. Both discussions do not include adequate language to provide for the public's notice of variances. In addition, it does not provide a process for requesting variances nor does it provide any descriptive criteria which the BLM will use to determine whether the proposed alternative meets or exceeds the objective of the regulation. TU recommends this be included in the Rule.

Trout Unlimited also recommends that site-specific environmental review be required when a variance is requested. This allows the public an opportunity to comment on the criteria that the BLM is using to determine whether the alternative is acceptable.

Proposed Section 3162.5-2(d): We support the requirement that the operator isolate all usable water. However, because water quality and quantity remains a significant issue, especially in the arid West, TU recommends the following regulatory considerations to this Rule.

Additional Requirements-Water Quality Monitoring: Detecting and tracking leakage are difficult tasks. Often subsurface hydrogeology data is lacking and misunderstood. Deep lateral or horizontal drilling technology involves many risks. Surface spills, accidents, and inevitable pit leakage result in various and often slowly accumulating contamination occurrences. Therefore, extensive monitoring of

water quality is necessary to detect the entry and movement of contaminants into and through the ground or surface water. This is especially important in areas where drilling exploration and development occurs near rivers and streams.

Baseline water quality monitoring surveys should be completed prior to any surface disturbance for all new wells. We suggest the BLM develop a monitoring protocol that compliments those that are currently being completed in many states and that such monitoring be mandatory in important and sensitive river drainages. Such surveys are becoming standard as states begin to increase their oversight and drilling activities increase. For instance, in Colorado a statewide water sampling program has been implemented for oil and gas operations as of January 1, 2012. Though a voluntary standard, the purpose is to collect data on the surrounding groundwater before and after oil and gas drilling and completion operations to ensure that groundwater quality has not been affected. This new system has also standardized its testing and monitoring procedures as well as making the data centrally available to the public.¹⁰ In August 2012, the Marcellus Shale Coalition recommended that all operators conduct a pre-drill water survey on identified water supply sources within a given area of the well pad surface.¹¹

Monitoring wells should be required in sensitive watershed drainages and in the East rather than occur as a result of incidences of contamination. As the increase in rare but debilitating water contamination events occur across the U.S., many states are beginning to design monitoring systems. The BLM should work closely with each state to ensure that adequate and science-based monitoring surveys are implemented that meet or exceed state water quality regulations and requirements. For instance, systems for reserve pits should accurately characterize groundwater flow, groundwater chemistry and flow systems on the site and adjacent areas. Current BLM monitoring standards do little to ensure the early detection and accurate tracking of contaminants moving through ground and surface water systems. Thus, a monitoring well system should be designed so that a contaminant plume will neither pass horizontally between the monitoring wells nor above or below the screened interval.¹² The best way to be certain of intercepting a contaminant passing a point in an aquifer is to span the entire aquifer with well screen. A long screen may increase the chances of detecting the presence of a potential contaminant—which may indicate the pit being monitored has developed a leak but it has diluted the concentration by mixing contaminated water with cleaner water.

Concentrations of contaminants vary throughout an aquifer, both vertically and horizontally. The concentration determined from any well will represent an average over the entire screen length. Therefore, in areas where sensitive watersheds have been identified and to monitor trends in concentration, screens should span representative vertical sections.¹³ The spatial layout of the monitoring well system should be based on the conceptual flow and transport model for flow from the gas well through the aquifer, which includes flow pathways and possible contaminant dispersion. Monitoring wells should be placed as close to the expected flow path as possible, where the concentration will be highest. Given the uncertainty in the prediction of the flow path, multiple

¹⁰ Colorado Oil and Gas Conservation Commission. January 1, 2012.

¹¹ "Recommended Practices: Pre-Drill Water Supply Surveys." Marcellus Shale Coalition. August 28, 2012 MSC rp 2012-3.

¹² Myers, Tom, PhD, *Technical Memorandum Review and Analysis of NY RDSGEIS for High Volume Hydraulic Fracturing*. Prepared for Natural Resources Defense Council, New York, New York (September 2011).

¹³ Id.

monitoring wells should also be spaced laterally away from the possible flow paths.¹⁴ These lateral wells should detect lower concentrations than the one in the predicted flow path. If the lateral wells actually have higher concentrations, the predicted flow path may be incorrect and monitoring wells should be added further from the predicted flow path to improve the understanding of the flow and movement of the contaminant plume.

Monitoring wells or piezometers should be placed close to the potential source for early detection, and at a distance from the source to increase the chances that they will intercept the contaminant and to assess the rate of contaminant movement.¹⁵ If many wells detect the contaminant, the concentration variation would indicate the degree of dispersion.¹⁶ Denser well networks will have a better chance of detecting the contaminant and providing an accurate description of its dispersal.

Considering the above fundamentals of a monitoring system, the following recommendations, in addition to sampling the monitoring wells, should be added to the proposed standards:

- The applicant should prepare a conceptual flow path model for groundwater and contaminant transport from the impoundment to and through nearby aquifers and surface waters.
- As part of the conceptual model, the applicant should estimate the distance that a contaminant would travel from the impoundment in various time periods, including one month, six months, one year, and five years.
- Dedicated groundwater monitoring wells should be reasonably located along and perpendicular to the projected flow path out to the five-year travel distance. At a minimum, there should be a transect of monitoring wells/piezometers at the one-month travel distance from the impoundment and halfway between the impoundment and important receptors, such as wells, springs or streams.
- Monitor wells should span the surface aquifer and piezometers should have multiport sampling capabilities for 20-foot intervals at the top of the saturated zone and every 100 feet to the bottom of the freshwater zone. This will help establish vertical concentration and hydraulic gradients.
- The monitoring system should be in place to establish baseline data including seasonal variability prior to pit construction.¹⁷

Additional Requirements-Water Quality Data Collection: In the East and in areas with sensitive fisheries issues, water quality data should be collected and analyzed and completed more frequently than once per calendar quarter. In situations where pit liners are implemented, liners may be breached and leakage may occur at any time. The most reliable way to detect these events is with a system that collects and transmits water quality data in real time. If sampling must be relied upon, samples must be taken frequently and analyzed quickly. Too often, leaking events do not show up for months and often years. In the interest of early detection, well operators should be required to install the best available technology. This means monitoring wells and in-stream sensors that are capable of collecting and

¹⁴ Id. at 17-18.

¹⁵ Id. at 18.

¹⁶ Id.

¹⁷ Id.

transmitting real time data about fluctuations in water quality that may indicate the presence of a contamination plume. This data will allow a timely response to pollution incidents.

In addition, TU recommends that the temperature of ground and surface water should be closely monitored. Temperature affects the ability of water to hold oxygen, which can affect respiration and the ability of aquatic wildlife to resist certain pollutants, including the pollutants in fracking fluids, flowback, and produced brines. Pit leakage containing dissolved solids can increase the temperature of groundwater.¹⁸ The warmed groundwater can mix with surface waters down gradient of the impoundment, increasing the temperature and level of dissolved solids in rivers and streams. Higher solids in streams decrease the passage of light through water, which slows photosynthesis by aquatic plants, affecting coldwater species and the food upon which they feed. Coldwater temperatures are particularly at risk in certain shale regions in the East, where a lot of water is used for cooling purposes in power plants, resulting in warmer water releases downstream. To ensure this problem is not compounded by pit leakage, TU recommends a requirement that sensors or sondes be installed down gradient and downstream of impoundments in sensitive river or stream drainages when determined that water systems may be impacted. The sensors should monitor fluctuations in ground and surface water temperatures and transmit this data in real time to BLM. There are examples of such water quality monitoring requirements in the Dixie National Forest in Utah in order to protect valuable coldwater streams and fish habitat.¹⁹

For similar reasons, it would seem prudent to monitor dissolved oxygen concentrations of ground and surface waters down gradient and downstream from an impoundment. Dissolved oxygen is critical for the survival of aquatic organisms. In headwater areas, where groundwater is a large component of stream flow, the contribution of oxygen from groundwater discharge is critical.²⁰ The concentration of dissolved oxygen in surface water is controlled by temperature. Cold water can hold more dissolved oxygen than warm water. As the amount of dissolved oxygen drops below normal levels in water bodies, aquatic life that are reliant upon high dissolved oxygen content can be impacted. To protect aquatic life, TU recommends a requirement that field meters be installed down gradient and downstream of impoundments. The meters should continuously measure dissolved oxygen concentrations in ground and surface waters and transmit this data in real time to BLM.²¹

Additionally, TU recommends monitoring parameters that include specific contaminants found in the fracking compounds, produced fluids, flowback, drilling muds, and rock cuttings. Because these contaminants may escape an impoundment through pit leakage, it would be prudent to establish protocols to monitor ground and surface waters down gradient and downstream for their presence.

In the eastern national forests, there is the very real issue of NORM concentrations at higher levels than surrounding rock formations, especially where the forests overlay the Marcellus Shale. Gas drilling

¹⁸ USGS, Field Manual for Water Temperature, in National Field Manual for the Collection of Water-Quality Data, Ch. 6.1. June 2006. Available at http://water.usgs.gov/owq/FieldManual/Chapter6/6.1_contents.html.

¹⁹ Dixie National Forest Oil and Gas Leasing ROD. Aquatic Monitoring Amendment, USDA Forest Service. June 2010.

²⁰ USGS, Field Manual for Dissolved Oxygen, in National Field Manual for the Collection of Water-Quality Data, Ch. 6.2. June 2006. Available at http://water.usgs.gov/owq/FieldManual/Chapter6/6.2_contents.html

²¹ See, e.g. SRBC Remote Water Quality Monitoring Network, Real Time Data and Maps. Available at http://mdw.srbc.net/remotewaterquality/data_viewer.aspx.

brings NORM to the surface in the cuttings, flowback fluid and production brine, and NORM can accumulate in the pipes used to transfer these waste products to the impoundments. Using open pits to store these waste products makes the radioactive material more accessible to groundwater, streams, rivers, aquatic species, and wildlife. And because filter media from the treatment or reuse of production waters may concentrate NORM, additional controls should be required to prevent the transmission of these fluids into ground and surface waters.

While the above suggestions may seem excessive, we suggest that more companies are recognizing the efficiency in setting up protection measures prior to any drilling activities. Conducting baseline water sampling and employing preventive contamination measures prior to moving any surface dirt is the most cost-efficient method for protecting our natural resources and water quality. To ensure that these natural resources are protected, we recommend that the BLM develop a geographic-based water monitoring and sampling program for oil and gas wells located within sensitive drainages and aquifers on public lands.

B. Additional General Recommendations

The fracturing and water-quality data collected by the gas industry and others during shale-gas development would provide an important database for understanding and protecting the water resources if made available to government agencies, academia, and other interested parties. The proposed Rules currently do not include a mechanism for electronically storing and sharing the potentially large amount of data collected under this proposed Rule. Submittal of the water quality sampling results in electronic database format would allow sharing of that data for scientific purposes. Safeguards could be taken to protect personal information. An example of utility of these data in understanding ambient groundwater quality for constituents of concern such as methane was demonstrated by Molofsky and others (2011). To improve the consistency, comparability, and utility of the groundwater-quality data, TU recommends the following:

- A list of water-quality parameters should be a required submission.
- If the industry tests for other water-quality parameters, they should provide those results also, but not in lieu of the required list of parameters.
- The analysis method for each parameter must be specified as to an EPA lab procedure code and type (i.e., dissolved and [or] total for each parameter analyzed).
- Holding times for time-critical parameters (i.e., gross alpha and beta) should be specified, and the time limit not exceeded. If the limit is exceeded, this should be noted on the laboratory report.
- Field measurements should also be entered along with the parameter codes and results.
- The results of all analyses (field and lab) should be provided to BLM and the individual state agencies responsible for water quality data. This should be presented in a standard electronic spreadsheet format with all pertinent location information including GPS latitude/longitude coordinates.

IV. SUMMARY

Trout Unlimited has attempted to address our concerns in the BLM's proposed Rule while providing some recommendations for making the draft Rule stronger. Understandably, this is a huge undertaking on behalf of BLM and we applaud the agency for taking this on. We hope the BLM will place serious thought as to how the Rule will be implemented and coordinated with state regulatory agencies, and that a strong database tracking system is standardized and is user friendly. In addition, we recommend that the BLM take a hard look at involving a collective and coordinated group of participants with extensive knowledge on energy development and the environment that will assist the BLM in moving this important and necessary Rule forward.

Trout Unlimited appreciates this opportunity to provide our thoughts and recommendations on this monumental effort. Please do not hesitate to contact TU for any questions or additional information.

Sincerely,

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