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

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

To Whom It May Concern:

The following comments are submitted on behalf of Sportsmen for Responsible Energy Development (SFRED) and its founding partners the National Wildlife Federation, the Theodore Roosevelt Conservation Partnership, and Trout Unlimited. SFRED is a coalition of more than 1000 businesses, organizations and individuals dedicated to conserving irreplaceable habitats so future generations can hunt and fish on public lands. The Theodore Roosevelt Conservation Partnership, Trout Unlimited, and the National Wildlife Federation lead the coalition.

SFRED has worked extensively with the Bureau of Land Management (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 appreciate the BLM's efforts to engage the public during the many forums it hosted in 2010 and 2011 on hydraulic fracturing. SFRED (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.

SFRED thanks the BLM for its willingness to address the expanding use of hydraulic fracturing technologies in the extraction of oil and gas on federal lands. Federal lands are a public trust, managed for multiple uses, including the conservation of fish and wildlife habitat. The BLM has the responsibility to ensure that activities on these lands are conducted safely and conscientiously in a manner that

preserves fish and wildlife habitats and recreation values for all Americans. BLM cannot abdicate this responsibility in the hope that the states or others will fill the void.

The revised proposed rule outlines three overall objectives: 1) to provide disclosure to the public of chemicals used in hydraulic fracturing on Federal and Indian lands; 2) confirmation that wells used in fracturing operations meet appropriate construction standards, and 3) requirement that operators put appropriate plans in place for managing flowback waters from fracturing operations. . We recognize the significant step forward from the existing rules that this regulation represents. We believe the rule needs to be strengthened to aid in 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. BACKGROUND

SFRED believes this rule is an important step in managing the development of energy resources on America's public lands. Our comments are predicated on the BLM's responsibility to ensure that our federal public lands are managed to protect the quality of their resources, ecological, environmental and water resources (Federal Land Policy and Management Act of 1976, or FLPMA).

We believe that it's essential for this rule to accomplish 3 primary objectives.

- To provide a consistent baseline standard across all public and Indian lands for regulating and managing hydraulic fracturing activities.
- Ensure full disclosure of chemicals that are being injected into the ground as part of the Hydraulic Fracturing process.
- Provide confirmation that wells meet appropriate construction standards that ensure no contamination of groundwater and surface water. Ensure that operators appropriately manage all fluids produced during oil and gas fracturing operations.

II. DISCUSSION OF THE REVISED PROPOSED RULE

SFRED appreciates the critical improvements that the BLM has outlined in the revised proposed rule and will address our review comments by sections.

Proposed Section 3160-5 Definitions. The revised proposed rule removes the terms "stimulation fluid" and "well stimulation", and replaces them with "hydraulic fracturing fluid". It also excludes acidizing. This appears contrary to the intent of the rule. Stimulation methods of various types increase well production and include hydraulic fracturing and fracture acidizing (or acidization). Fracture acidizing is one type of acid treatment used in well stimulation and involves pumping acid down the well under higher pressure to fracture and dissolve the reservoir rock. It is often used *in a hydraulic fracturing event* instead of a proppant when a formation to be fractured is limestone or dolomite, both easily dissolved by acids. In these cases, acids are injected at the front of the fracturing fluid. Resulting produced fluids can include these acids as waste materials. Acids are chemicals (included in the definition of "hydraulic

fracturing fluid") and can have a negative impact on water resources and the environment if not properly managed. Thus, for the BLM rule to be consistent in its intent to increase transparency for the public regarding the fluids used in the hydraulic fracturing process, we feel that all manners of stimulation activity that involves fracturing be included in the definitions and in the proposed rule discussion.

While the revised proposed rule contains eight definitions, we recommend that definitions for flowback water, produced water, and wastewater be included. These individual components of oil and gas development are distinctly and uniquely different and need to be defined as such. This is especially important since many operators do not differentiate between the terminology, and agencies fail to distinguish the difference when permits are issued. Flowback water is typically described as "frac water" that returns during the hydraulic fracturing process and contains dissolved solids from the reservoir and chemicals used in fracturing. Produced water is water from the reservoir itself (often referred to as naturally occurring water) that flows to the surface with gas during the life of the well. We urge the BLM to include these additional definitions in the revised proposed rule.

Proposed Section 3162.3-3(a): The revised proposed rule reduces the scope of the regulation by removing "other well stimulation activities" and only includes hydraulic fracturing and refracturing. The clarification that the rule applies to refracturing and the definition provided for refracturing are positive additions that help the clarity and implementation of the rule. However, the elimination of other "well stimulation" activities from the rule is short sighted and ultimately raises the risk that contamination of "useable water" will occur from one of these activities. We believe that a comprehensive regulation that ensures that all fluids used in the development of oil and gas wells on public lands are managed appropriately is essential. The elimination of "well stimulation" activities from the rule adds an unnecessary risk factor to oil and gas development operations on public lands.

Proposed Section 3162.3-3(b): We support this provision requiring fracturing and refracturing operations to meet the performance standard in section 3162.5-(d). We are pleased to see the requirement for the operator to isolate freshwater bearing and other usable water and other mineral bearing formations and protect them from contamination. This section also requires the tests and surveys to determine the effectiveness of the measures taken by the operator, which we support.

Proposed Section 3162.3-3(c): We support the intent of this section requiring the BLM's approval of all proposals for hydraulic fracturing or refracturing activities to be submitted by the operator and approved by the BLM prior to the commencement of operations. However, it is unclear in the regulation whether this information will be made public and how the public will be notified of its availability. We believe that this information should be available to the public prior to the commencement of operations.

Proposed Section 3162.3-3(c)(ii): If the operator has significant new information about the geology of the area, the stimulation operation, the technology to be used, or the anticipated impacts, the operator is required to submit, a new Notice of Intent (NOI) Sundry is required. While we agree with this concept, what incentive is there for the operator to reveal this information to the DOI thus requiring them to submit the new NOI Sundry? What is the penalty for non-compliance? It is our belief that this self-reporting mechanism will be extremely unreliable.

Proposed Section 3162.3-3(d): The new provision allowing the NOI Sundry to be submitted for a single well or a group of wells with the same geologic characteristics is of concern to us.
While we recognize the intent to reduce costs for oil and gas operators we believe that lessening the requirements to have Cement Evaluation Logs (CEL) on each well greatly increases the potential risk for contamination to occur. Recent advancements in technology have increased the ability for operators to drill multiple wells on a single pad, or drill wells closer together. Increased incidents of "frac hits" are expected to rise based on the increase in oil and gas exploration for shale oil and gas. Frac hits happen when the fractures of two wells intersect, and though many states regulate the geologic distance between two wells, distances are relatively small (600 feet), accidents are on the increase, and contamination of groundwater and surface contamination is occurring. By obtaining the approval prior to any hydraulic fracturing operations, the BLM is in a position to better understand the where and how of fracturing operations within a certain play. This should decrease and hopefully eliminate the risk of contamination events. In addition, the rule lacks clarity about the reporting process for determining similar geologic characteristics, whether this reporting process will be publicly available, whether there are limits to the size of area, and the number of wells that one test well could represent.

Proposed Section 3162.3-3(d)(3): We support the disclosure by operators of water source information. This section has strong requirements that will provide the BLM, other agencies and the public valuable information to assist in the development of energy resources on federal lands. We recommend the BLM strengthen the language by changing the use of the word "may" (in describing how the information will be provided on a map or in writing) with "must". We support the addition of reused or recyclable water in the list of sources of water supply. We also support identification of the route and transportation method for all water sources planned for use during the fracturing or refracturing operation.

Proposed Section 3162.3-3(d)(4): We support the additional requirements to protect aquifers by requiring estimated fracture direction, the plotting of propagation on a topographical map and the identification of the estimated vertical distance to the nearest usable water aquifer above the fracture zone will be provided. The revised proposed rule also calls for the listing of the estimated volume of fluid to be used during the hydraulic fracturing operation, which we feel will be of significant value to the BLM. To be even more valuable, we also suggest that wording be included in this section stating that after the fracturing operation is completed, the operator be required to report the actual amount of fluid utilized, as specified in Section 3162.3-3(i)(5).

Proposed Section 3162.3-3(d)(5): The revised proposed rule removes the requirement that operators provide the chemical composition of recovered flowback fluids from the submittal information to the BLM. This omission increases the risk that unknown chemicals will be spilled, leaked or otherwise contaminate usable water. It also removes an important component of public transparency that the BLM has stated it hopes to achieve with this policy. Estimated chemical composition of the flowback fluids can be given in percentages without revealing the "secret formula". Maintaining a database of the percentage of remaining flowback fluids is important information to better understand the hydraulic fracturing process and its risks. As a responsible land manager of our public lands, the BLM should keep this requirement in the revised proposed rule. This Section also allows the BLM to support any chemical composition changes for a fracturing operation after an approval has been provided, based on whether certain chemicals are available or geologic conditions change. While we recognize that a certain amount of uncertainty exists in drilling activities, we suggest that the operator provide a complete accounting of

those changes and submit them to the BLM. We also recommend that the chemical composition be added to the list of required information for the handling of recovered fluids.

Proposed Section 3162.3-3(d)(5)(ii): We support this proposed section but request that the BLM be more specific in the information required for the handling of recovered fluids. The revised proposed rule requires the operator to provide information pertaining to the handling of recovered fluids. As written the rule 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.

Proposed Section 3162.3-3 (e)(1): The operator is required to submit a cement operation monitoring report including the flow rate, density and treating pressure within 30 days of completion of the hydraulic fracturing operation. For this information to be of maximum value to the BLM and to the public it should be provided prior to the commencement of the hydraulic fracturing operation; providing it post-operation is of limited value.

Proposed Section 3162.3-3 (e)(2): We support the addition of the requirement to require a cement evaluation log on each casing that protects usable water. This log must be provided within 30 days of completion of the hydraulic fracturing operation. For this information to be helpful to the BLM and the public it should be provided prior to the commencement of the hydraulic fracturing operation; providing it post-operation is of limited value.

Proposed Section 3162.3-3(e)(3)(i and ii): The revised proposed rule provides an exception to the CEL requirement for wells within a similar geologic parameter to the test well. We recognize the incentive to reduce cost for the operators but we also know that leaks caused by improper cementing of wells is very common. Ground pressures, large temperature changes, ground movement from the drilling of nearby wells and shrinkage damage to the thin layer of cement that is utilized to seal the wells is very common. Getting the cement perfectly sealed as the drilling goes horizontally into shale is extremely challenging. The oil and gas industry has long worked to resolve these leaks but as of yet it remains a challenge. We believe that the best way to responsibly manage these public lands is to require a CEL on all wells drilled. Waiting until there are indications that there is an inadequate cement job defies the intent of this rule and BLM's responsibility to protect our natural resources.

Proposed Section 3162.3-3(c)(e)(4): The revised proposed rule requires the operator to report any indications of inadequate cementing to the BLM within 24 hours, with written confirmation within 48 hours. The operator would them be required to run a CEL showing it corrected the cementing job and furnish it at least 72 hours prior to starting the hydraulic fracturing operation. While we support this requirement we do have concerns that there is no incentive for the operator to provide this information. The low enforcement capability of the BLM due to staffing and the additional requirements that would be invoked when documentation of problems with the cementing occurs provides significant opportunity for the operators to not follow this requirement. We are concerned that the lack of a significant penalty for not complying with this rule renders it of little value and opens the door for non-compliance. We recommend the BLM require CELs on all wells to avoid the potential that this proposed section tries to address.

Proposed Section 3162.3-3(f): We support the requirement that mechanical integrity tests (MIT) are required prior to hydraulic fracturing or refracturing operations.

Proposed Section 3162.3-3(g)(1): *We* support the addition of refracturing operations to the requirement for monitoring and recording of the annulus pressure. This significant addition will provide BLM and operators with substantial informative information and the ability to detect ahead of time potential failures in well casing.

Proposed Section 3162.3-3(g)(2): We support the addition of refracturing operations to the requirement that annulus pressure increases over 500 pounds per square inch require immediate correction action. However, we have a few concerns. First, the operator is only required to report a problem orally. Should a problem occur during a time when the BLM contact is unavailable for receiving oral notification, it creates a problem. We recommend that in addition to oral notification, the operator also provide written (i.e., email, paper letter). Today's communication technology increases the variety of options for contacting officials and it also provides a documented trail, beneficial to all. Second, the 30-day reporting requirement is an increase from the 15 days required in the previous draft rule. The addition of 15 days seems inconsistent with the requirement to have these pressure surges fixed immediately. Providing this information to the BLM and to the public 30 days after the pressure increase would be of extremely limited value. We recommend the BLM return back to the 15-day reporting requirement.

Proposed Section 3162.3-3 (h): We recommend that closed loop systems be used on public lands. As a minimum we recommend that the BLM not permit the storage of recovered fluids in lined pits where there is a potential to harm water resources or there is a significant groundwater to surface water communication. 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 this has happened in the West and in the East. Some states, like Wyoming, require the operator to conduct aquifer tests 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. The BLM should make this requirement 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-2009) recommendations for handling completion fluids. While we support the API's recommendations they are not requirements but rather guidelines. In addition, since 2009 significant increases in drilling activities have created circumstances where the handling of fluids in line pits are becoming problematic in terms of available land space, contamination issues, and operators ignoring storage deadlines. SFRED suggests that BLM make require the storage of recovered fluids in tanks or closed-loop systems mandatory. This would help ensure that the FLPMA requirement that the agency "take any action necessary to prevent unnecessary or undue degradation of the public lands", and BLM regulations that all operations be conducted in a manner which protects other natural resources and the environmental quality are met.

Closed-Loop Systems. Where drilling activities are close to rivers and streams on public lands, we strongly suggest that the BLM require all operators to test the aquifer depth prior to any drilling and

approvals. 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.

SFRED urges the BLM to prohibit reserve pits and require a closed-loop tank system on all public lands where drilling occurs close to waterways. 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 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.

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. 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. 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. 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. According to one study, this reduction has been shown to be as high as 15,625 barrels per site. 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. 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. 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 industry, the positives of a closed-loop system far outweigh the negatives. SFRED urges the BLM to 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. There is 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. We feel, given the risks associated with hydraulic fracturing operations, the BLM should implement stringent requirements for siting impoundments for storage, removal, and disclosure.

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 fish and wildlife protection design standards.

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 sidewall, resulting in catastrophic damage of the liner system.

SFRED 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 that require 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. 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. These tests take a minimum of 120 days to generate conclusive data. Data from these tests will assist in deciding whether a given liner material is acceptable for a given reserve pit. Because the precise chemical makeup of hydraulic fracturing waste fluids can vary widely from one pad to another, BLM cannot assume that the compatibility of a specific liner material for one impoundment means that the same liner material would be adequate for all impoundments. Liner/waste compatibility must be tested for each and every impoundment prior to construction. While we support the use of 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.

Proposed Section 3162.3-3(i): We continue to have concerns about the BLM supporting and depending upon FracFocus as the database source for submitting fracturing fluid chemical information. We recommend the BLM develop an agency-supported process that compliments the already-used BLM database foundations that operators use to submit other reporting obligations. We do support attaching responsibility to the operator for information submitted by contractors or agents for ensuring the accuracy for any hydraulic fracturing activity. We also have concerns about allowing the operator to report online the information regarding chemical constituents and logging information, and to report it in the format as described. 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 public and environmental safety and resource protection concerns.

Proposed Section 3162.3-3(i)(1): The revised proposed rule adds this section requiring the operator to provide detailed information on the well and its drilling characteristics. We support this and applaud the BLM for expanding these requirements, including the addition of water volume reporting. However, we are disappointed that the BLM continues to rely on FracFocus as the source for reporting this

information. The Draft rule proposes the utilization of FracFocus.org to report chemicals utilized in the hydraulic fracturing process. We do not support the use of FracFocus.org, as it currently is designed and operated as the primary method for providing the public information about the chemicals that are used on federal lands. FracFocus.org is a private industry-managed website in collaboration with Groundwater Protection Council (GWPC). It is managed without mandatory reporting requirements, has little oversight, provides vague oil and gas well information, no aggregation of information and is difficult to use to access information. In addition, since the FracFocus.org registry will not release the full database of fracturing information, it prevents the open-government framework that BLM seeks to employ. The ownership of the information is in question and the applicability of fundamental public disclosure laws such as the Freedom of Information Act is unknown. 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. To be useable by the public 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 recognize that improvements are planned for this site and allegedly some of those improvements will improve the public's ability to obtain the information that they seek but we remain highly skeptical that this is the best method to provide public information.

We recommend that the BLM develop a reporting system that tracks the chemical use from hydraulic fracturing on public lands that is easily accessible to the public. Increased public transparency will help improve the public's trust and understanding of hydraulic fracturing. We recommend that collaborative group of diverse organizations be chosen to design a sensible and updateable database entity. SFRED is concerned about the BLM depending on industry's self-reporting format, as ultimately we don't believe that the system provides adequate access to needed information by the public and does not meet the public disclosure requirement that the BLM has for public land development.

The revised proposed rule requires chemical disclosure that conforms to the FracFocus form. The requirements are a reduction from the previous proposed rule. These changes actually reduce the public's ability to understand the chemicals that are used in the hydraulic fracturing operation. We recommend an expansion of the provided information related to the complete chemical makeup of all of the materials utilized in the fracturing fluid. This information is required to be submitted within 30 days of completion of the operation. We understand the concern from the operators about the circumstances that will prevent operators from knowing the exact chemicals to be used until shortly before the operation begins. However, we find this rationale to not be overly compelling and believe that the public and the Agency's right to know what chemicals are being utilized on Federal lands is

over-riding. A process can be developed to meet the needs of industry that allows for prompt changes to the chemical composition when that is needed.

SFRED's is concerned about the potential for contamination to our public watersheds. Incidents are increasing at an alarming rate and there is much that is happening below the surface that is unknown. For any type of adequate 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. The use of FracFocus.org, as previously discussed in our comments, is not a substitute for full government disclosure.

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 monitoring and enforcement has not kept up with the technological advances in horizontal drilling and fracturing.

By postponing chemical disclosure reporting requirements until after the fact considerable and irretrievable damage could be done to the environment and human health requiring costly remediation and environmental cleanup. It is a classic case of closing the barn door after the cows have escaped. Because the chemicals used in hydraulic fracturing are of a hazardous nature, it is a prudent and protective action that BLM should take to require disclosure prior to any type of hydraulic fracturing operations.

Proposed Section 3162.3-3(j)(1-4): The expanded use of the trade secret protection which allows the chemicals that are used in the hydraulic fracturing operation to be exempt from public disclosure is poor public policy and does not fulfill the responsibility of the managing federal agencies. The chemical information if requested by an operator to be exempt from public disclosure is not disclosed to the BLM or provided to FracFocus. The operator would simply submit an affidavit stating that they are entitled to withhold the information from the public under federal statute or regulation. This disclosure loophole is sure to be utilized frequently; as an example a similar provision was used so frequently in Wyoming, that the Wyoming Oil and Gas Commission issued a special order in July 2012 halting further exemptions due to certain misuses of the exemption language unless operators complied with new restrictions. By allowing this exemption clause, the BLM will be assured that the public will experience great frustration and little management information will be provided for the agency to make more informed management decisions in the future.

Proposed Section 3162.3-3(k): We are concerned about the provision that allows the operator to apply for a variance to utilize rules developed by a State or a tribe. Conceptually we think this provision could work but the details necessary for us to support it are not found in the current rule. There is no discussion of what process the BLM will utilize to determine if the proposed alternative meets or exceeds the objectives of the regulation. There is no mention of the public in this process, how they will be engaged, what notification will occur when a variance is requested and how they will be informed after the decision is reached. Many states have different and often weaker regulations regarding public

involvement and public disclosure, in particular, these concerns must be met for this variance process to work effectively.

III. GENERAL ADDITIONAL RECOMMENDATIONS

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. Effective 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. Such surveys are becoming more standard as states begin to increase their oversight and drilling activities increase. Currently Wyoming is in the process of seeking public review on the Wyoming Oil and Gas Conservation Commission's proposed baseline groundwater rules (August 2013). In addition, Colorado, Texas, and Indiana have implemented statewide water sampling programs for oil and gas operations. These new requirements reflect a trend nationwide in terms of our public water sources and the many concerns associated with the impacts of oil and gas drilling. States are implementing new systems that standardize its testing and monitoring procedures as well as making the data centrally available to the public. 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. [1]

Monitoring wells should be required 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 as 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.[1] 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 vary throughout an aquifer, both vertically and horizontally. The concentration determined from any well will represent an average over the entire screen length. Therefore, to

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[1] 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).

monitor trends in concentration, screens should span representative vertical sections.[2] 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 monitoring wells should also be spaced laterally away from the possible flow paths.[3] 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.[4] If many wells detect the contaminant, the concentration variation would indicate the degree of dispersion.[5] Denser well networks will have a better chance of detecting the contaminant and providing an accurate description of it 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.[6]

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[2] Id.

[3] Id. at 17-18.

[4] Id. at 18.

[5] Id.

[6] Id.

Water Quality Data Collection: For public lands, the BLM should require water quality data to be collected and analyzed 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 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, SFRED recommends that the temperature of ground and surface water 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 fracturing fluids, flowback, and produced brines. Pit leakage containing dissolved solids can increase the temperature of groundwater.[7] 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, SFRED recommends a requirement that sensors or sondes be installed down gradient and downstream of impoundments 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.[8]

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.[9] 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, SFRED recommends a requirement that field meters be installed down gradient and

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[7] 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.

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

[9] 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

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. [10]

Additionally, we recommends monitoring parameters that include specific contaminants found in the fracturing 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 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. To ensure that these natural resources are protected, implementation of a water sampling or survey system should be required. 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.

We understand that these additional requirements would add to the cost of the operation. 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.

Data base development: 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, SFRED 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).

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

- 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

SFRED believes that these regulations are a strong first step in better managing hydraulic fracturing operations on Federal lands. In our comments we have attempted to discuss the areas of the proposed regulation that we support and provide recommendations to strengthen the rule in areas that we find deficient. While we believe the rule needs strengthening we appreciate the challenging process that the BLM has undertaken to assure the public that its resources are being managed appropriately. The BLM may want to consider the engagement of a coordinated group of participants with extensive knowledge on development and the environment to assist the BLM in full implementation of this rule when it's completed.
We appreciate this opportunity to provide our thoughts and recommendations on this important effort.

Sincerely,



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