Elizabeth Maclin
Vice President for Eastern Conservation

Sent via email to: hanlon.edward@epa.gov and FAX (202-565-2098)

February 28, 2011

Ed Hanlon
U.S. Environmental Protection Agency
Science Advisory Board Staff Office
Mailcode 1400R
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460-4164

Re: Comments on EPA Draft Hydraulic Fracturing Study Plan, 2010-2012

Dear Mr. Hanlon:

Please accept the following comments from Trout Unlimited (TU), the Colorado Council of TU, the Idaho Council of TU, the Mid-Atlantic Council of TU, the Montana Council of TU, the New Jersey Council of TU, the New Mexico Council of TU, the New York Council of TU, the Ohio Council of TU, the Oregon Council of TU, the Pennsylvania Council of TU, the Utah Council of TU, the Virginia Council of TU, the West Virginia Council of TU, the Wyoming Council of TU, and the TU Chapter 722 in Heber Springs, Arkansas. TU is the nation's largest and oldest coldwater conservation organization dedicated to conserving, protecting and restoring North America's trout and salmon fisheries and other watersheds. With more than 140,000 members, we are deeply concerned about the potential impacts hydraulic fracturing and associated fluids may have on our rivers and watersheds and ultimately our drinking waters. Our organization conducts restoration and management programs that involve science, conservation and technical applications for watershed conservation both on private and public lands across the United States. We have been engaged at every level of oil and gas exploration and development—from project proposals to national policy reform—and offer our comments based upon our unique position and experience working for responsible energy development across the nation.

TU staff and volunteers have actively participated in the development of the Hydraulic Fracturing Study Plan, including participating in EPA's June 21, 2010 and February 15, 2011 webinars on the Hydraulic Fracturing Study (*Consultation with Environmental Organizations*),

attending the public hearings held across the country, and submitting written comments on the proposed scope of EPA's 2010-2012 Hydraulic Fracturing Research Study.

Background Review

With the boom of natural gas drilling in shale gas plays throughout the country, the number of reports of contamination to individual drinking water supplies, streams, and underground water resources has steadily risen. TU strongly feels that EPA's study must err on the side of protecting public health and the ecosystems that humans rely upon, with the goal of proactively identifying impacts before they occur. Shale gas drilling in Pennsylvania and West Virginia is increasing at a fast pace and New York State is poised to issue its Final Supplemental Generic Environmental Impact Statement. While TU appreciates the EPA's primary emphasis on hydraulic fracturing in shale formations, to the extent possible, the study should also consider the current impacts to water supplies from other unconventional oil and gas drilling processes that are being identified in Wyoming and Colorado.

The overall stated purpose of EPA's study is to analyze the relationship between hydraulic fracturing and drinking water resources. More specifically, the study will examine the conditions that may be associated with the potential contamination of drinking water resources, and identify the factors that may lead to human exposure and risks.

TU appreciates the opportunity to provide advice to the Science Advisory Board on the EPA's DRAFT Hydraulic Fracturing Study Plan, and we applaud the EPA for undertaking a detailed study on the impact of the hydraulic fracturing process on drinking water supplies, including groundwater and surface water drinking supplies. TU offers the following recommendations for improving the study scope to ensure that the resulting study (1) comprehensively assesses the cumulative impacts of all aspects of the hydraulic fracturing process from all types of oil and gas development on drinking water supplies, and (2) informs the regulatory and decision-making processes that govern hydraulic fracturing, making sure that all water resources are protected from degradation.

TU's specific recommendations for improving EPA's DRAFT study plan

1. Full lifecycle of water in hydraulic fracturing

EPA's study proposes to consider the full lifecycle of water in hydraulic fracturing—from water acquisition through the mixing of chemicals and actual fracturing to the post-fracturing stage, including the management of flowback and produced water and treatment/disposal. TU supports the concept of a life cycle approach, but suggests that it be broadened. By definition, this type of lifecycle framework must provide a detailed outline of all of the components of the hydraulic fracturing lifecycle, including all potential pollution pathways. The risk of contamination exists throughout the entire process and must be thoroughly evaluated to yield an in-depth understanding of the full impacts of hydraulic fracturing on drinking water supplies. The American Petroleum Institute (API) recognizes the inherent risk associated with transportation of hydraulic fracturing fluids, proposing to the industry in its guidance

documents to develop a transportation plan that addresses strategies to reduce environmental and social impacts. [*See "Water management Associated with Hydraulic Fracturing". API Guidance Document HF2, First Edition, June 2010].* API identifies the volume of trucks moving to and from oil and gas drilling sites as a potential surface impact, and encourages the appropriate design for the parking areas for industrial trucks containing hydraulic fracturing fluid, managing staging areas, waste management, handling and disposal of approved fluids, and appropriate transportation routes that minimize potential contamination issues.

Significant truck traffic will be needed to transport water, fracking fluids and wastewater to and from the well pad site for the hydraulic fracturing process, which will inevitably cause increases in erosion, sedimentation, and stormwater runoff. As thousands of access roads are developed to support transportation of the produced wastewater, increases in impervious surface will lead to adverse effects on water quality, aquatic ecosystems and human health. Additional impervious surface and soil compaction will result from the clearing of forestland for well pad development, thereby limiting forest re-growth potential. The impacts on drinking water supplies from loss of forestlands and the ecosystem services they provide—such as filtering out nutrients and sediments and allowing for slow replenishment of streams and groundwater—must also be considered. The increased number of roads will require stream crossings and the increased propensity for fish passage blockages, sediment source developments and stream channel modifications that may result in lethal and long standing degradations caused by dramatic changes in stream profiles which can have interminable effects on stream function, aquatic wildlife and water quality. In order to evaluate the true impacts on water quality, impacts from the entire range of infrastructure and activities associated with the hydraulic fracturing process must be analyzed in this study.

By ignoring the surface activities that serve as key pathways for contamination, such as stormwater runoff from construction of well pads and access roads and the significant trucking infrastructure necessary to complete fracturing of a well, the study fails to consider the more diffuse nonpoint source impacts associated with hydraulic fracturing that in the long-term will be more difficult to identify and manage. The hydraulic fracturing process itself cannot be studied in isolation of the necessary infrastructure that makes hydraulic fracturing possible. In addition, while we support EPA's proposed lifecycle approach in concept, we urge the SAB to recommend that all wells within a basin for each case study be considered, including multiple wells on a single pad and the multitude of wells within a given basin. Impacts to drinking water supplies cannot be adequately assessed if the impact of multiple wells on the entire hydrologic regime of a basin is not considered.

2. Water Availability and Quality

TU supports EPA's proposed research activities related to water acquisition. Specifically, TU applauds EPA's commitment to determining the cumulative impacts of large volume water withdrawals within a watershed and aquifer. While TU is very concerned about short-term impacts caused by large volume, high rate withdrawals from small streams in the headwaters of watersheds supplying drinking water, we also remain concerned about how removal of two to

eight million gallons of water for each well will cumulatively impact the overall hydrology of a watershed and its ecosystem components. This is of particular concern in the semi-arid and arid West where surface and groundwater resources are limited in nature, but are high in public use and interest. Because hydraulic fracturing involves consumptive uses of water, where anywhere between 60 to 90 percent of the water remains underground, TU recommends that the overall water use and the long-term impacts of that loss of water to the hydrologic regime be assessed. Finally, TU supports the EPA's plan to analyze changes in water quality to determine if changes are due to water withdrawals for hydraulic fracturing and recommends that the same analysis be conducted for the overall hydrology of the watershed.

In its analysis of existing data, the EPA correctly plans to assess varying geologic formations with varying climates, using data based upon various spatial scales (e.g. site, watershed, basin and play) and temporal scales (e.g. days, months, and years). This type of analysis will demonstrate how hydraulic fracturing will impact various regions throughout the country during different seasons. In developing water availability scenarios, the EPA intends to consider typical water requirements for hydraulic fracturing activities and will also account for estimated demands for water from other human needs (e.g. drinking water, agriculture and energy), adjusted for future populations. As the sustainability analysis will consider minimum river flow requirements, TU strongly urges the SAB to recommend that non-human needs such as aquatic life and terrestrial life be considered in scenario evaluations.

3. Wastewater impacts, treatment and disposal

TU remains concerned about the capacity of surface waters—where large water withdrawals are occurring for the hydraulic fracturing process—to assimilate treated drilling wastewater. In regions such as the Marcellus Shale, where hydraulic fracturing wastewater is treated by dilution, the EPA should assess whether these depleted streams will be able to adequately assimilate effluent that maybe high in total dissolved solid (TDS) levels or concentrations of other contaminants. In other regions where underground injection is the primary disposal method, the EPA should evaluate the casing and cementing standards of the underground injection well to ensure that fluid is preventing from moving into or between aquifers that serve as underground sources of drinking water.

As noted in TU's initial comments to the EPA, a full cumulative analysis of the various potential pathways of pollution associated with the entire hydraulic fracturing process is necessary to fully determine impacts on drinking water. For each oil or gas shale play, the full cumulative effects of the generation of significant amounts of wastewater should be analyzed on a watershed basis, including a determination of how the wastewater will be treated and what the impacts of inadequately treated wastewater discharges to surface waters may be. EPA has identified as a potential research outcome the assessment of short- and long-term effects resulting from inadequate treatment of hydraulic fracturing wastewaters. To fully perform this type of analysis, the cumulative impacts of the full life cycle of wastewater—from generation to treatment—must be understood.

4. Chemical mixing and indicators

As acknowledged in the draft study plan, the EPA lacks information regarding the frequency, quantity and concentrations of the chemicals used in the hydraulic fracturing process as much of this information is claimed to be protected as confidential business information by the industry. Without the necessary information, EPA cannot conduct a thorough assessment of the impacts of hydraulic fracturing on drinking water supplies. To determine the choice and quantity of chemicals used in the fracturing process, industry evaluates the relationship between what the oil or gas shale reservoir rock requires in terms of hydraulic fracturing composition and what type of return of water is expected for water management purposes. EPA should use similar evaluation techniques to estimate what type and quantity of chemicals are used in the fracturing process, as they develop case studies and formulate assessments for management of hydraulic fracturing operations. This type of analysis may assist EPA in estimating the type or level of impacts to drinking water supplies, if propriety information prevents a more thorough analysis.

The EPA expects to identify a short list of 10 to 20 chemical indicators to track fate and transport of hydraulic fracturing fluids through the environment. Given that hundreds of chemicals have been identified for potential use in hydraulic fracturing, TU recommends that the EPA increase the number of chemical indicators to be tracked, to ensure an analysis of a broad spectrum of potential impacts from hydraulic fracturing. The chemical indicators chosen should represent diverse range of toxicity.

5. Aquatic ecosystems.

TU continues to support the SAB's earlier recommendation that EPA initiate an additional research program in the future focused on water resources more generally, and their aquatic ecosystems and ability to support fishing, wildlife and recreation. However, because native trout populations and other aquatic species can serve as the canary in the coal mine when it comes to water quality, TU strongly urges that the study of the impact of hydraulic fracturing on fish populations and other aquatic species be undertaken now, to identify probable impacts to human and ecosystem health before they occur.

Healthy aquatic environments are dependent upon seasonal flow variations and the EPA should base its assessment of impacts upon whether contamination incidents are occurring at particular times of the year during various flow regimes and whether water demands and management for hydraulic fracturing use are increasing the intensity of contamination. In reviewing impacts from specific practices related to hydraulic fracturing for this study, the EPA should consider the different management options that may be available, based upon seasonal timing issues.

Summary

In conclusion, TU urges the SAB to recommend that the draft hydraulic fracturing study plan evaluate all related processes and activities associated with hydraulic fracturing, including the surface impacts that result from the infrastructure necessary to make hydraulic fracturing

possible. Further, TU recommends that the cumulative impacts of all wells within a basin for each case study be evaluated, as well as the compounding impacts associated with hydraulic fracturing wastewater.

Thank you for your consideration of TU's comments. If you have any questions, please do not hesitate to contact Elizabeth Maclin, TU's Vice President for Eastern Conservation at 703.284.9437 or emaclin@tu.org.

Sincerely,

Elizabeth Maclin
TU's Vice President for Eastern Conservation

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