CENTER for BIOLOGICAL DIVERSITY Because life is good.

Mr. Bryan Fuell
Manager, Wells Field Office, BLM
3900 E. Idaho St
Elko, NV 89801

January 4, 2013

Via e-mail: wwirthli@blm.gov

RE: Scoping Comments – Mary's River Exploration Wells Project

Dear Mr.Fuell:

I submit these comments on behalf of the Center for Biological Diversity ("Center"), its staff and over 375,000 members and on-line activists, all of whom care deeply about our planet and its environment, and many of whom visit the BLM public lands of Nevada, including the Wells Field Office, to recreate, conduct scientific studies and other pursuits and intend to continue to do so in the future, and are particularly interested in protecting the many native, imperiled, and sensitive species and their habitats that may be affected by the oil and gas lease sale.

The Center is a non-profit environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center also works to reduce greenhouse gas emissions and other air pollution to protect biological diversity, our environment, and public health.

We are highly concerned with the Mary's River Exploration Wells project ("project") and the short term, long term, and cumulative impacts that could arise from it and from future connected actions.

Our concerns are both specific and programmatic/policy centered.

1. **Impacts to sage grouse**

Sage-grouse populations in Nevada and throughout their range in the west have displayed a significant downward trend in both numbers and distribution. Sage grouse habitat losses have paralleled the trends in populations. In response to this decline, the greater sage grouse was found to be warranted for protections under the Endangered Species Act in March 2010.[1] Under a settlement agreement with the Center, the U.S. Fish and Wildlife Service is obligated to make a listing decision on the grouse not later than 2015.[2]

[1] Federal Register, March 5, 2010. See: http://www.fws.gov/mountain-prairie/species/birds/sagegrouse/FR03052010.pdf .
[2] See: http://www.biologicaldiversity.org/programs/biodiversity/species_agreement/pdfs/proposed_settlement_agreement.pdf .

The sage grouse has also been identified by the BLM Nevada State Office as sensitive under BLM Manual 6840.2. This direction establishes that, "…the BLM shall designate Bureau sensitive species and implement measures to conserve these species and their habitats, including ESA proposed critical habitat, to promote their conservation and reduce the likelihood and need for such species to be listed pursuant to the ESA."

Section 6840.2 C. on implementation of this direction provides:

> "On BLM-administered lands, the BLM shall manage Bureau sensitive species and their habitats to minimize or eliminate threats affecting the status of the species or to improve the condition of the species habitat, by:
>
> 2. Ensuring that BLM activities affecting Bureau sensitive species are carried out in a way that is consistent with its objectives for managing those species and their habitats at the appropriate spatial scale.
>
> 4. Working with partners and stakeholders to develop species-specific or ecosystem-based conservation strategies.
>
> 7. Considering ecosystem management and the conservation of native biodiversity to reduce the likelihood that any native species will require Bureau sensitive species status.
>
> 8. I the absence of conservation strategies, incorporate best management practices, standard operating procedures, conservation measures, and design criteria to mitigate specific threats to Bureau sensitive species during the planning of activities and projects."

BLM directives also provide that energy and right-of-way applications should be denied, or conditions imposed to protect priority habitat, and to re-route proposed transmission projects to avoid priority habitat.[3]

Sage grouse, as the name implies, is closely allied and dependent on various stages of sage brush development for their life stages and survival. Grouse are found in different stages of sagebrush development depending upon the season and the needs of the grouse during that time.[4] Despite the well-known importance of this habitat to sage grouse and other sagebrush obligates, the quality and quantity of sagebrush habitats have declined for at least the last 50 years and the welfare of the grouse mirrors this trend.[5] [6]

Sage grouse have a strong fidelity to their display, breeding, summering and wintering areas. Male grouse typically travel up to 1.3 miles to their lek sites, while during the breeding season,

[3] See: BLM Instruction Memorandums No. 2012-043 & 044.
[4] Doherty, Kevin E., David E. Naugle, Brett L. Walker, and Jon M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. J. of Wildlife Management 72(1):187-195.
[5] Connelly, John W., Michael A. Schroeder, Alan R. Sands, and Clait E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Soc. Bull. 28(4):967-985.
[6] Becker, JM, CA Duberstein, JD Tagestad, and JL Downs. 2009. Sage-grouse and wind energy: biology, habits and potential effects of development. Pacific Northwest National Laboratory, operated by Battelle, for the U.S. Department of Energy. Contract DE-AC05-76RL01830.

females typically travel less than 3 miles, but up to 22 miles to nest. Sage grouse exhibit both migratory and non-migratory behaviors, and populations of the grouse can contain both behaviors. Non-migratory grouse usually do not travel more than 6 miles annually, although migratory birds typically travel 21 miles annually, but travels up to 100 miles have been documented.[7]

In general, sage grouse nests are placed under shrubs having larger canopies and more ground and lateral cover as well as in stands with more shrub canopy cover than at random sites. Sagebrush cover near the nest site was greater around successful nests than unsuccessful nests in Montana and Oregon, and successful nests were in sagebrush stands with greater average canopy coverage than those of unsuccessful nests.[8]

Characteristics of sage grouse winter habitats are relatively similar throughout most of the species' range. Studies have shown that the grouse prefer sagebrush habitats with greater than 20% canopy cover. During winter, sage grouse feed almost exclusively on leaves of sagebrush.[9]

Faced with increasing demands on wild public lands to supply sites for renewable energy development, the Nevada Department of Wildlife ("NDOW") developed conservation standards to help protect and conserve the species and their habitats.[10] This document gathered and synthesized the most currently available research and scientific knowledge regarding the topic, and represents the current state-of-the-art and science. While the proposed action is not a renewable energy project, aspects of it such as motorized use and the development and operation of exploration wells have similar characteristics.

The Nevada standards for the conservation of sage grouse reflect the most current peer-reviewed science and the measures used by other states. They significantly strengthen the protections for the grouse by expanding the no occupancy/no disturbance areas. To highlight some of the more pertinent standards:

Regarding the testing and exploration phase:

> "1. Avoid drilling and associated activities within 3 miles of an active sage-grouse lek whenever possible.
>
> 2. If drilling within 3 miles of an active sage-grouse lek is unavoidable, conduct drilling activities from 15 July to 30 November to avoid disturbing sage-grouse during the breeding, nesting, early brood rearing, and winter periods.
>
> a. Temporary noise shields should be constructed around portions of the drilling rigs and used on standard construction equipment.

[7] Ibid.
[8] Ibid, Connelly etal. 2000.
[9] Ibid.
[10] Nevada Governor's Sage-Grouse Conservation Team. 2010. Nevada energy and infrastructure development standards to conserve greater sage-grouse populations and their habitats. 58 pages plus appendices.

3. Avoid drilling activities in identified winter habitat (even if outside a 3 mile radius from an active sage-grouse lek) from 01 December through 01 March to minimize disturbance to wintering sage-grouse.

a. In areas where winter and nesting habitat overlap and drilling cannot be avoided during the winter avoidance period (01 December through 01 March) then noise reduction abatement techniques (equipment) should be utilized to help minimize disturbance.

4. Avoid drilling activities within 0.6 miles (1 km) of springs, meadows or riparian corridors in identified brood rearing habitat from 01 June through 01 September to avoid disturbance (access to water sources) during the brood rearing period."[11]

With regards to development site selection:

"1. The NGSCT considers Category 1 habitats (leks and nesting habitat) irreplaceable and Category 2 habitats (quality winter and brood rearing habitats) critical to the long term persistence of sage-grouse populations. Energy or transmission development should be avoided within Category 1 and 2 sage-grouse habitats.

2. Energy development is strongly discouraged from occurring in Category 3 habitats; however, if unavoidable, projects in these habitats should be situated to minimize impact through placement in the least suitable portion of habitat.

1. Renewable energy developers are encouraged to pursue project development activities within Category 4 and 5 habitats within the range of sage-grouse in Nevada.

5. If habitat categories have not been identified for a certain area, energy facilities and transmission lines should not be sited within 3 miles of the nearest active lek location for non-migratory populations.

- To the greatest extent possible, energy developers should work closely with NDOW and pertinent federal agency biologists to determine important nesting, brood rearing and winter habitats and avoid those areas.

6. Where populations of sage-grouse are considered migratory, energy facilities and transmission lines should not be sited within 3 miles of the nearest active lek location and should not be sited within the associated nesting habitat for that particular population.

- Consideration should also be given to movement corridors between breeding, nesting, brood-rearing or winter habitat. These movement corridors may not be well defined unless significant radio marking investigations have been conducted for a particular population. It is recommended that these investigations take place where project proponents are proposing developments in likely movement corridors for sage-grouse.

[11] Ibid, page 24.

7. No development should occur within a 0.6 mile (1 km) radius around seeps, springs and wet meadows within identified brood rearing habitats. "

With respect to the development and operational phases:

"1. Where sage-grouse populations are non-migratory energy facilities should not be constructed within 3 miles of the nearest active lek site (see Chapter 1, Section C).

2. Where populations of sage-grouse are considered migratory, energy facilities should not be constructed within 3 miles of the nearest active lek location and should not be sited within the associated nesting habitat for that particular population.

3. If construction within 3 miles of an active sage-grouse lek is absolutely unavoidable, conduct construction activities from 15 July to 30 November to avoid disturbing sage-grouse during the breeding, nesting, early brood rearing and winter periods.

- If pumping stations are placed within 3 miles of an active lek, consideration should be given, and attempts made to place these features in an area where noise would least impact the actual lek using topography to help mask noise.

2. Avoid practices that remove sagebrush cover in these habitat categories as they may be the most important areas to sage-grouse using these habitats.

3. No development or infrastructure features should be placed within 0.6 miles (1 km) of identified late brood rearing habitats, especially meadow complexes and springs. These features can provide a competitive advantage for avian predators; therefore increasing sage-grouse mortality during a period when birds may be susceptible.

4. A comprehensive monitoring plan approved by the Nevada Department of Wildlife will be required to monitor sage-grouse demographics, vital rates and movement patterns before, during and after the construction phase within Category 1 – 3 habitats. The Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee provide sound recommendations in their Interim Guidelines for Evaluating the Impacts of Energy Development (Appendix D).

5. Within Category 1-3 sage-grouse habitats, a company representative should be on site to oversee compliance during construction and provide environmental training to on-site personnel. This individual is responsible for overseeing compliance with all protective measures and coordination in accordance with the permitting authority and resource agencies should have the authority to issue a "stop work order" if deemed necessary.

6. Human Activity (Daily Operations/Maintenance)
    - Vehicle trips should be limited to those times that would least impact nesting or wintering grouse:

i. Vehicle trips should not occur on a regular basis within 3 miles of an active lek or in identified nesting habitats from 01 March through 15 May.
    1) If vehicle trips are required during the lekking period, vehicles should only be operated from 10:00 a.m. to 5:00 p.m. daily.
ii. Public access to construction areas should be limited if construction activities are occurring from 01 March through 15 May. "[12]

There are other standards found in the NDOW document pertaining to standards for associated infrastructure that should be included in any stipulations for this proposed project.

The most up-to-date (December 13, 2012) mapping of sage grouse habitats in Nevada show that the envisioned project overlaps Category 1 ("irreplaceable/essential"), Category 2 ('important") and Category 3 ('moderate") habitats[13], which in light of the Governor's standards above and the imperiled status of the grouse raise serious concerns about the location of this project. The standards state, "The NGSCT considers Category 1 habitats (leks and nesting habitat) irreplaceable and Category 2 habitats (quality winter and brood rearing habitats) critical to the long term persistence of sage-grouse populations. Energy or transmission development should be avoided within Category 1 and 2 sage-grouse habitats."[14]

While we acknowledge that the scale of the mapping of sage grouse habitat was done to provide input to generalized planning, we also stress that the NDOW policy direction is to conduct further site-specific mapping and inventory in these areas of concern.

Older mapping by NDOW supports the contention that the project area is very important for grouse – the Bishop Flats, Metropolis, Tabor Flats and Antelope Springs areas are identified as sage grouse nesting areas.[15]

The Governor and NDOW have made it quite clear that a listing of the sage-grouse would seriously jeopardize the State's economy and the lifestyle of its citizens. The State's authority for management of the species would also be significantly compromised by a listing.

The preponderance of data showing the area's importance for sage grouse leads the Center to demand that the BLM initiate an environmental impact statement process rather than relying on an environmental assessment. Further, we insist that detailed habitat mapping for sage grouse be conducted in and around the proposed project area by qualified biologists in conjunction and coordination with NDOW.

[12] Ibid, pages 27-28.
[13] See: http://ndow.org/wild/conservation/sg/index.shtm .
[14] See footnote 9.
[15] Available from NDOW on GIS flat files.

2. Fracking is inherently hazardous to human health and the environment

The proposed master surface use plan provided by the proponent to the BLM discloses that fracking would be used as a component of the exploration. The oil and gas industry has recently developed new approaches to recover oil from deposits with low permeability by combining multi-stage slickwater hydraulic fracturing and horizontal drilling, which makes possible the profitable production of shale gas and shale oil.[16] Elements of these technologies have been used individually for decades. However, the combination of practices employed by industry recently is new: "Modern formation stimulation practices have become more complex and the process has developed into a sophisticated, engineered process in which production companies work to design a hydraulic fracturing treatment to emplace fracture networks in specific areas."[17] The first aspect of this technique is the hydraulic fracturing of the rock. When the rock is fractured, the resulting cracks in the rock serve as passages through which gas and liquids can flow, increasing the permeability of the fractured area.[18] To fracture the rock, the well operator injects hydraulic fracturing fluid at tremendous pressure.[19] The composition of fracturing fluid has changed over time. Halliburton developed the practice of injecting fluids into wells under high pressure in the late 1940s;[20] however, companies now use permutations of "slick-water" fracturing fluid developed in the mid-1990s.[21] The main ingredient in modern fracturing fluid (or "frack fluid") is generally water, although liquefied petroleum has also been used as a base fluid for modern fracking.[22] The second ingredient is a "proppant," typically sand, that becomes wedged in the fractures and holds them open so that passages remain after pressure is relieved.[23] In addition to the base fluid and proppant, a mixture of chemicals are used, for purposes such as increasing the viscosity of the fluid, keeping proppants suspended, impeding bacterial growth or mineral deposition.[24]

---

[16] CITI, *Resurging North American Oil Production and the Death of the Peak Oil Hypothesis* at 9 (Feb. 15, 2012) ("CITI"); USEIA 2011 at 4; Orszag, Peter, *Fracking Boom Could Finally Cap Myth of Peak Oil* (Jan. 31, 2011) ("Orszag"). The New York Department of Environmental Quality provides the following overview of Technological Milestones for hydraulic fracturing:

[17] Arthur, J. Daniel *et al.*, *Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale* at 2 (Sep. 2008) ("Arthur").

[18] Behrens, Carl E. et al., *U.S. Fossil Fuel Resources: Terminology, Reporting, and Summary*, Congressional Research Service at 6 (Dec. 28, 2011) ("Behrens"); Mathias, Simon, Hydraulic fracturing of shale gas reservoirs – implications for the surrounding environment at 3 (Sep. 2010) ("Mathias"); McDonald, Robert, *California's Silent Oil Rush*, New Times at 3 ("McDonald New Times"); Paleontological Research Institution, *Understanding Drilling Technology*, Marcellus Shale at 1 (Jan. 2012).

[19] Ibid, Mathias.

[20] Tompkins, *How will High-Volume (Slick-water) Hydraulic Fracturing of the Marcellus (or Utica) Shale Differ from Traditional Hydraulic Fracturing?* Marcellus Accountability Project at 1 (Feb. 2011).

[21] New York State Department of Environmental Conservation, *Revised Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program, Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs* at 5-5 (Sep. 7, 2011) ("NYDEC SGEIS").

[22] Arthur at 10; United States House of Representatives, Committee on Energy and Commerce, Minority Staff, *Chemicals Used in Hydraulic Fracturing* (Apr. 2011) ("Waxman 2011b").

[23] Arthur at 10.

[24] Arthur at 10.

Frack fluid is hazardous to human health, although industry's resistance to disclosing the full list of ingredients formulation of frack fluid makes it difficult for the public to know exactly how dangerous.[25] A congressional report sampling incomplete industry self-reports found that "[t]he oil and gas service companies used hydraulic fracturing products containing 29 chemicals that are (1) known or possible human carcinogens, (2) regulated under the Safe Drinking Water Act for their risks to human health, or (3) listed as hazardous air pollutants under the Clean Air Act."[26] Recently published scientific papers also describe the harmfulness of the chemicals often in fracking fluid. One study reviewed a list of 944 fracking fluid products containing 632 chemicals, 353 of which could be identified with Chemical Abstract Service numbers.[27] The study concluded that more than 75 percent of the chemicals could affect the skin, eyes, and other sensory organs, and the respiratory and gastrointestinal systems; approximately 40 to 50 percent could affect the brain/nervous system, immune and cardiovascular systems, and the kidneys; 37 percent could affect the endocrine system; and 25 percent could cause cancer and mutations.[28] Another study reviewed exposures to fracking chemicals and noted that trimethylbenzenes are among the largest contributors to non-cancer threats for people living within a half mile of a well, while benzene is the largest contributory to cumulative cancer risk for people, regardless of the distance from the wells.[29]

Separate from hydraulic fracturing, the second technological development underlying the recent shale boom is the use of horizontal drilling. Shale oil and shale gas formations are typically located far below the surface, and as such, the cost of drilling a vertical well to access the layer is high.[30] The shale formation itself is typically a thin layer, however, such that a vertical well only provides access to a small volume of shale—the cylinder of permeability surrounding the well bore.[31] Although hydraulic fracturing increases the radius of this cylinder of shale, this effect is often itself insufficient to allow profitable extraction of shale resources.[32]

Horizontal drilling solves this economic problem: by drilling sideways along the shale formation once it is reached, a company can extract resources from a much higher volume of shale for the same amount of drilling through the overburden, drastically increasing the fraction of total well length that passes through producing zones.[33] The practice of combining horizontal drilling with hydraulic fracturing was developed in the early 1990s.[34]

---

[25] Waxman 2011b; *see also* Colborn, Theo et al., Natural Gas Operations for a Public Health Perspective, 17 Human and Ecological Risk Assessment 1039 (2011) ("Colborn 2011"); McKenzie, Lisa et al., Human Health Risk Assessment of Air Emissions form Development of Unconventional Natural Gas Resources, Sci Total Environ (2012), doi:10.1016/j.scitotenv.2012.02.018 ("McKenzie 2012").
[26] Waxman 2011b at 8.
[27] Colborn 2011 at 1.
[28] Colborn 2011 at 1.
[29] McKenzie 2012 at 5.
[30] *See* CITI at 9; USEIA 2011 at 4; Orszag.
[31] *See* CITI at 9; USEIA 2011 at 4; Orszag.
[32] *See* CITI at 9; USEIA 2011 at 4; Orszag; Arthur at 8 (Figure 4).
[33] Venoco, Inc., Monterey Shale Focused Analyst Day Slide Show at 23 (May 26, 2010) ("Venoco Slide Show"), USEIA 2012a at 63.
[34] Venoco, Inc., Monterey Shale Focused Analyst Day Slide Show at 23 (May 26, 2010) ("Venoco Slide Show"), USEIA 2012a.

A third technological development is the use of "multi-stage" fracking. In the 1990s industry began drilling longer and longer horizontal well segments. The difficulty of hydraulic fracturing increases with the length of the well bore to be fractured, however, both because longer well segments are more likely to pass through varied conditions in the rock and because it becomes difficult to create the high pressures required in a larger volume.[31] In 2002 industry began to address these problems by employing multi-stage fracking. In multi-stage fracking, the operator treats only part of the wellbore at a time, typically 300 to 500 feet.[35] Each stage "may require 300,000 to 600,000 gallons of water," and consequently, a frack job that is two or more stages can contaminate and pump into the ground over a million gallons of water.[36]

This new combination of multi-stage slickwater hydraulic fracturing and horizontal drilling (hereinafter "fracking") has made it possible to profitably extract oil and gas from formations that only a few years ago were generally viewed as uneconomical to develop.[37]

The impacts associated with the fracking-induced oil and gas development boom has caused some jurisdictions to place a moratorium or ban on fracking. For instance, in 2011 France became the first country to ban the practice.[38] In May, Vermont became the first state to ban fracking. Vermont's governor called the ban "a big deal" and stated that the bill "will ensure that we do not inject chemicals into groundwater in a desperate pursuit for energy."[39] New York has halted the practice while it researches the issue, and Governor Andrew Cuomo is reportedly considering allowing fracking only in communities with ordinances allowing it.[40] Also, New Jersey's legislature recently passed a bill – that Governor Christie later vetoed – that would prevent fracking waste, like toxic wastewater and drill cuttings, from entering its borders,[41] and Pennsylvania, ground zero for the fracking debate, has banned "natural-gas exploration across a swath of suburban Philadelphia . . . ."[42] Numerous cities and communities, like Buffalo, Pittsburgh, Raleigh, Woodstock, and Morgantown have banned fracking.[43] Further, various legislative proposals have been introduced in California that would increase regulation of fracking, including one bill that would place a moratorium on fracking in the state.

---

[35] NYDEC SGEIS at 5-93.
[36] NYDEC SGEIS at 5-93.
[37] CITI at 9; USEIA 2011 at 4; Orszag.
[38] Castelvecchi, Davide, *France becomes first country to ban extraction of natural gas by fracking*, Scientific American (Jun. 30, 2011).
[39] CNN Staff Writer, *Vermont first state to ban fracking*, CNN U.S. (May 17, 2012).
[40] Esch, Mary, *New York Fracking Moratorium Causes Drilling Company to Shut off Gas in Avon, NY*, Huffington Post (Jul. 9, 2012).
[41] Tittel, Jeff, *Opinion: Stop fracking waste from entering New Jersey's borders* (Jul 14, 2012); Wall Street Journal, *Christie vetoes fracking wastewater ban* (Sept. 21, 2012); *see also* Friedman, Matt, N.J. Senate panel approves bill to ban fracking (2012) (describing the Senate Environment and Energy Committee's approval of a bill to ban fracking).
[42] Philly.com, *Fracking ban is about our water*, The Inquirer (Jul. 11, 2012).
[43] *Fracking* (Feb. 9, 2011); The Raleigh Telegram, *Raleigh City Council Bans Fracking Within City Limits* (Jul. 11, 2012); Kemble, William, *Woodstock bans activities tied to fracking*, Daily Freeman (Jul. 19, 2012); MetroNews.com, *Morgantown Bans Fracking* (June 22, 2011), http://www.wvmetronews.com/news.cfm?func=displayfullstory&storyid=46214.

Oil and gas operations can cause significant damage to water resources. Onshore oil and gas operations in the United States produce an estimated 56 million barrels of produced water *per day*,[44] and these wastes may leak or spill into the environment, allowing pollutants associated with those operations to reach water resources."[45] Common causes of water contamination and pollution include surface pits, underground injection of waste, unintentional spills and releases, and construction of oil and gas infrastructure.

Fracking fluid, flowback, and produced water are hazardous substances that can harm the environment. As explained above, frack fluid often contains a wide range of dangerous chemicals. In addition to what companies intentionally add to the fracking fluids, flowback and produced water can contain harmful substances the fracking process has released from deep underground. EPA has stated that these waters "can have high concentrations of several ions (e.g., barium, bromide, calcium, chloride, iron, magnesium, sodium, strontium, bicarbonate)"[46] Additionally, "[f]lowback likely contains radionuclides, with the concentration varying by formation"; "[v]olatile organic compounds (VOCs), including but not limited to benzene, toluene, xylenes, and acetone, have also been detected"; and a "limited time series monitoring program of post-fracturing flowback fluids in the Marcellus Shale indicated increased concentrations over time of [total dissolved solids], chloride, barium, and calcium; water hardness; and levels of radioactivity . . . ."[47] Frack fluid, flowback, and produced water can contaminate surface and groundwater as a result of spills on the surface, defects in the well casing or cementing, and through fluid migration through other subsurface conduits.

Frack fluid, flowback and produced water can contaminate groundwater as a result of faulty well construction, cementing, or casing. Oil or gas wells are constructed using layers of steel pipe, called casing, that are cemented, either completely or partially, into the surrounding rock and to each other.[48] This casing and cement helps to prevent oil, gas, and fluids in the well and in the rock from contaminating groundwater. However, when operators construct these parts of the well improperly, the casing and cement can fail to act as a barrier and can allow contaminants into the groundwater. As a result many cases of groundwater contamination, either by methane or fracking wastewater, are due to faulty casing.[49]

Also, fluids may contaminate groundwater by migrating through newly created fractures, neighboring wells, natural fracture networks. One of the major problems with fracking, is that it

---

[44] U.S. Government Accountability Office, Energy-Water Nexus: Information on the Quantity, Quality, and Management of Water Produced during Oil and Gas Production, Report to the Ranking Member, Committee on Science, Space and Technology, House of Representatives at 13, January 2012, available at http://www.gao.gov/products/GAO-12-156.

[45] Natural Resources Defense Council, Petition for Rulemaking Pursuant to Section 6974(a) of the Resource Conservation and Recovery Act Concerning the Regulation of Wastes Associated with the Exploration, Development, or Production of Crude Oil or Natural Gas or Geothermal Energy at 17 (Sep. 8, 2010) ("NRDC Petition for Rulemaking").

[46] U.S. Environmental Protection Agency, Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (Nov. 2011).

[47] Ibid.

[48] Natural Resources Defense Council, Water Facts: Hydraulic Fracturing can potentially Contaminate Drinking Water Sources at 2 (2012) ("NRDC, Water Facts").

[49] Food & Water Watch, The Case for a Ban on Fracking (2012) ("Food & Water Watch 2012") at 5.

creates a permanent threat of contamination. "According to the EPA . . . , studies conducted by the oil and gas industry, and interviews with industry and regulators, 20 to 85% of fracturing fluids may remain in the formation . . . ."[50] The amount of time the resulting pollution stays underground raises the risk of migration, even if that migration takes many years. Thus, it is cause for great concern that recent studies indicate that fracking pollutants can and will migrate through man-made or natural fractures.[51] The Draft EPA Investigation of Ground Water Contamination near Pavillion, Wyoming, found that chemicals found in samples of groundwater were consistent with the migration of contaminants from fracked wells.[52] EPA has subsequently confirmed the results with follow-up analyses.[53] The findings of EPA's draft report were also confirmed by hydrologic consultant Tom Myers, who stated that, ultimately, EPA's findings were not that surprising:

> "Because there are not any significant horizontal confining units within the Pavillion Field, the upward vertical contaminant transport is partially due to dispersion through relatively porous media. In areas with extensive horizontal confining layers, such as the Marcellus shale areas, transport through vertical fractures, similar to that through wellbores, could transport substantial contaminant mass through the impervious zones . . . If the bulk media bounding the fractures have conductivity less than one hundredth that in the fracture, the contaminants will transport with little dispersion, or loss, into the bulk media . . . . This appears to be the case in the Pavillion Field, given the existing geology. Thus, unless fracking is very carefully done, and well bores are solidly (not intermittently) bonded, this result is to be expected."[54]

The BLM must analyze impacts to water resources sufficiently. As BLM recognizes, hydraulic fracturing—or fracking—is a practice commonly used on oil and gas wells, and a stated procedure by this proponent. The possibility of fracking occurring on the leases raises several issues that BLM must address in NEPA. *See State of New Mexico v. BLM*, 656 F.3d 963, 714-15 (10th Cir. 2009) (EIS failed to take hard look at water quality impacts from proposed oil and gas lease sale where wells would generated significant amounts of waste water).

- Where will the water come from and what are the impacts of extracting such high

[50] Earthworks, Fracking 101 at 10.

[51] U.S. Environmental Protection Agency, Draft Investigation of Ground Water Contamination near Pavillion, Wyoming (2011), available at http://www.epa.gov/region8/superfund/wy/pavillion/EPA_ReportOnPavillion_Dec-8-2011.pdf; Warner, Nathaniel R., et al., Geochemical Evidence for Possible Natural Migration of Marcellus Formation Brine to Shallow Aquifers in Pennsylvania, PNAS Early Edition (2012); Xie, X., et al., Seismic Evidence for Fluid Migration Pathways from an Overpressured System in the South China Sea, 3 Geofluids 245 (2003)

[52] EPA Draft Pavillion Investigation; *see also* Gruver, Mead, Wyo. Got EPA to delay frack finding, The Miami Herald (2012) ("Wyoming's governor persuaded the head of the [EPA] to postpone an announcement linking hydraulic fracturing to groundwater contamination, giving state officials - whom the EPA had privately briefed on the study - time to attempt to debunk the finding before it rocked the oil and gas industry more than a month later"); Hou, Deyi, et al., Shale gas can be a double-edged sword for climate change, Nature Climate Change at 386 (2012).

[53] Drajem, Mark, Wyoming Water Tests in Line with EPA Finding on Fracking, Bloomberg (Oct. 11, 2012); USEPA, Investigation of Ground Water Contamination near Pavillion, Wyoming Phase V Sampling Event (Sep. 2012).

[54] Myers, Tom, Review of DRAFT: Investigation of Ground Water Contamination near Pavillion Wyoming Prepared by the Environmental Protection Agency, Ada OK (Apr. 30, 2012).

volumes of water on the environment, including springs, streams and wetlands that may be habitat for rare or imperiled species? According to the proponent over 54 million gallons of water will be needed for this exploration project alone.[55]

- What chemicals will be used in the drilling and fracking process?
- How will BLM ensure the collection and disclosure of that information?
- What limitations will BLM place on the chemicals used in order to protect public health and the environment?
- What measures will BLM require to ensure adequate monitoring of water impacts, both during and after drilling?
- What baseline data is available to ensure that monitoring of impacts can be carried out effectively? How will BLM collect baseline data that is not currently available? Much of the fracking fluid will be returned to the surface as toxic waste. Where would the discharge go?
- Is there the potential for subsurface migration of fracking fluids, or the potential for those fluids to escape into the groundwater by way of a faulty casing?
- What kinds of treatment will be required?
- What is the potential footprint and impact of the necessary treatment facilities?

Due to the serious environmental and human health risks and issues and uncertainty, the BLM must prepare an EIS rather than an EA for this project.

3. The BLM must analyze and disclose the project's air pollution impacts

The BLM must take a hard look at the impacts of the lease sale's air pollution emissions. Oil and gas operations emit numerous air pollutants including volatile organic compounds (VOCs), nitrogen oxides (NO_X), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), and, and methane. In particular, the expansion of fracking brings with it not only all of the air pollution associated with conventional oil and gas development, but additional air impacts unique to this unconventional process. In other areas of the country where fracking has facilitated a large increase in oil and gas production, it has caused severe air pollution problems, particularly ozone pollution. Some rural areas now experience ozone pollution levels akin to those in downtown Los Angeles which are caused almost entirely by fracking related activity. Moreover, increased temperatures due to global warming will increase ozone formation and further exacerbate the situation. Adding new, major sources of air pollution is untenable.

VOCs and NOX

Oil and gas operations also emit large amounts of volatile organic compounds (VOCs) and NO_X, which contribute to the formation of ozone. VOCs have severe impacts both due to air toxics and ozone precursors included in this category of air pollutants. NOx contributes to acid deposition and is also an ozone precursor.

[55] Noble Energy, Inc. October 2012. Mary's River Oil and Gas Exploration Proposal, page 3.

VOCs make up about 3.5 percent of the gases emitted by oil or gas operations.[56] The particular VOCs emitted include harmful BTEX compounds—benzene, toluene, ethyl benzene, and xylene—which Congress listed as Hazardous Air Pollutants under the Clean Air Act.[57] Flaring does not completely eliminate these pollutants: "The Ventura County Air Pollution Control District, in California has estimated that the following air pollutants may be released from natural gas flares: benzene, formaldehyde, polycyclic aromatic hydrocarbons (PAHs, including naphthalene), acetaldehyde, acrolein, propylene, toluene, xylenes, ethyl benzene and hexane."[58] There is substantial evidence of the harm of oil and gas emissions of these pollutants.[59] For instance, one health effects analysis found that 37 percent of the chemicals used during natural gas drilling, fracturing, and production were volatile, with the ability to become airborne.[60] The authors of this study compared the potential health effects of volatile chemicals with those more likely to be found in water, such as chemicals with high solubilities, and found that "far more of the volatile chemicals (81%) can cause harm to the brain and nervous system. Seventy one percent of the volatile chemicals can harm the cardiovascular system and blood, and 66% can harm the kidneys." This characteristic of volatile chemicals produced a profile that "displays a higher frequency of health effects than the water soluble chemicals."[61]

In addition to the issues with VOCs and NOx mentioned above, both pollutants are ozone precursors. As such, due to emissions of these pollutants, many regions around the country with substantial oil and gas operations are now suffering from extreme ozone levels.

Rural areas are now also experiencing serious ozone problems as a result of oil and gas development. For instance, on March 12, 2009, the governor of Wyoming recommended that the state designate Wyoming's Upper Green River Basin as an ozone nonattainment area.[62] The Wyoming Department of Environmental Quality assessed the ozone pollution problem and found that it was "primarily due to local emissions from oil and gas . . . development activities: drilling, production, storage, transport, and treating."[63] In 2011 alone, the residents of Sublette County had thirteen "unhealthy" ozone days, under EPA's current air−quality index, including days when the ozone pollution levels exceeded the worst days of smog pollution in Los Angeles.[64]

---

[56] Brown, Heather, Memorandum to Bruce Moore, U.S.EPA/OAQPS/SPPD re Composition of Natural Gas for use in the Oil and Natural Gas Sector Rulemaking, July 28, 2011 ("Brown Memo").at 3.
[57] 42 U.S.C. § 7412(b).
[58] Earthworks, Sources of Oil and Gas Pollution. http://www.earthworksaction.org/issues/detail/sources_of_oil_and_gas_air_pollution (last visited July 30, 2011) ("Earthworks, Sources of Oil and Gas Pollution").
[59] Colborn 2011; McKenzie 2012.
[60] Colborn 2011 at 8.
[61] Ibid
[62] See Letter from Wyoming Governor Dave Freudenthal to Carol Rushin, Acting Regional Administrator, USEPA Region 8, (Mar. 12, 2009); Wyoming Department of Environmental Quality, Technical Support Document I for Recommended 8−hour Ozone Designation of the Upper Green River Basin (March 26, 2009) ("WDEQ TSD").
[63] WDEQ TSD at viii.
[64] USEPA, Daily Ozone AQI Levels in 2011 for Sublette County, Wyoming (2011); see also Wendy Koch, *Wyoming's Smog Exceeds Los Angeles' Due to Gas Drilling*, USA Today (May 9, 2011); Craft, Elena, Environmental Defense Fund, Do Shale Gas Activities Play a Role in Rising Ozone Levels? (2012). http://blogs.edf.org/texascleanairmatters/2012/07/10/do-shale-gas-activities-play-a-role-in-rising-ozone-levels/ .

Ozone problems are appearing in other Rocky Mountain states, as well. Northeastern Utah has recorded unprecedented ozone levels in the Uintah Basin in recent years. In the first three months of 2010—which was the first time that winter ozone was monitored in the region— air quality monitors measured more than 68 exceedances of the federal health standard, and on three of these days, the levels were almost twice the federal standard.[65] Between January and March 2011, there were 24 days in the area where pollution concentrations were higher than the NAAQS for ozone, again with levels nearly doubling federal standards.[66] BLM has noted that the many oil and gas wells in the region are the primary cause of the problem.[67] The pollution problem has now become so severe that recently a coalition of public health and conservation groups sued EPA over the agency's failure to protect the Uinta Basin from dangerously high ozone levels.[68]

Particulate Matter

Numerous elements of oil and gas activities can emit particulate matter. Particulate matter consists of tiny particles suspended in the air. These particles include "inhalable coarse particles," which are smaller than ten micrometers in diameter (PM_{10}), and fine particulate matter, which are particles less than 2.5 micrometers in diameter ($PM_{2.5}$). PM_{10} is primarily formed from crushing, grinding or abrasion of surfaces, and $PM_{2.5}$ is primarily formed by incomplete combustion of fuels or through secondary formation in the atmosphere.[69] Some of the health effects associated with particulate matter exposure are "premature mortality, increased hospital admissions and emergency department visits, and development of chronic respiratory disease."[70] Sensitive populations, include the elderly, children, and people with existing heart or lung problems, are most at risk from particulate matter pollution.[71]

The oil and gas industry is a major source of particulate matter. Heavy equipment, such as drilling, completion and workover trucks, rigs and equipment such as pumps employ diesel engines, and the burning of diesel fuel generates fine particulate matter.[72] Research indicates that

---

[65] Streater, Scott, Air Quality Concerns May Dictate Uintah Basin's Natural Gas Drilling Future, N.Y. TIMES, October 1, 2010, available at http://www.nytimes.com/gwire/2010/10/01/01greenwire-air-quality-concerns-maydictate-uintah-basins-30342.html?pagewanted=all .

[66] USEPA, AirExplorer, Ozone Daily AQI Values in 2011 for Uintah County, UT (2011).

[67] Bureau of Land Management, GASCO Energy Inc. Uinta Basin Natural Gas Development Draft Environmental Impact Statement Chapter 3 Affected Environment (2012) at 13 ("GASCO DEIS").

[68] ENews Park Forest, Group Seeks Relief from Smog Pollution in Utah's Uinta Basin (July 23, 2012), http://www.enewspf.com/latest-news/science-a-environmental/34958-groups-seek-relief-from-smog-pollution-inutahs-uinta-basin.html .

[69] Bay Area Air Quality Management District, Particulate Matter Overview, Particulate Matter and Human Health, http://www.baaqmd.gov/Divisions/Planning-and-Research/Particulate-Matter.aspx#dpm (last visited Aug 1, 2012) ("BAAQMD"); BLM, West Tavaputs Plateau Natural Gas Full Field Development Plan Final Environmental Impact Statement (July 2010) ("West Tavaputs FEIS").

[70] US Environmental Protection Agency, National Ambient Air Quality Standards for Particulate Matter Proposed Rule, 77 Fed. Reg. 38,890, 38,893 (June 29, 2012).

[71] World Health Organization, Health Aspects of Air Pollution with Particulate Matter, Ozone, and Nitrogen Dioxide (2003)at 17, http://www.euro.who.int/__data/assets/pdf_file/0005/112199/E79097.pdf .

[72] Earthworks, Sources of Oil and Gas Pollution.

the particulate matter emitted by diesel engines is a particularly harmful form of the pollutant.[73] Vehicles also generate fugitive dust by traveling on unpaved roads during drilling, completion, and production activities.[74] Particulate matter precursors include pollutants discussed above, such as NO_x and VOCs.[75]

Particulate matter emissions from oil and gas operations are causing problems for certain communities. For example, monitors in Uintah County and Duchesne County, Utah, have repeatedly measured wintertime $PM_{2.5}$ concentrations above federal standards, and these elevated levels are linked to oil and gas activities in the Uinta Basin.[76]

Hydrogen Sulfide

Oil and gas operations can also emit hydrogen sulfide. Some natural gas contains hydrogen sulfide. Long−term exposure to hydrogen sulfide is linked to respiratory infections, eye, nose, and throat irritation, breathlessness, nausea, dizziness, confusion, and headaches.[77] Hydrogen sulfide may be emitted during all stages of development, including exploration, extraction, treatment and storage, transportation, and refining.[78]

Methane

Oil and gas operations emit significant amounts of methane. In addition to its role as a greenhouse gas, methane contributes to increased concentrations of ground-level ozone, the primary component of smog.[79] This is because methane is an ozone precursor, meaning that once emitted into the atmosphere, methane reacts with other compounds to form ozone.[80] The effect of methane on tropospheric ozone levels can be substantial. One scientific paper found that "[r]educing anthropogenic CH_4 emissions by 50% nearly halves the incidence of U.S. high-O_3 events . . . ."[81] Ozone is particularly harmful to human health and the environment. It is one of only six pollutants for which the EPA has issued a National Ambient Air Quality Standard ("NAAQS").[82] Ozone is associated with respiratory morbidity, including asthma attacks,

---

[73] BAAQMD.

[74] USEPA, Regulatory Impact Analysis for the Proposed Revisions to the National Ambient Air Quality Standards for Particulate Matter (June 2012) at 2-2, http://www.epa.gov/ttnecas1/regdata/RIAs/PMRIACombinedFile_Bookmarked.pdf at 2-2 ("EPA RIA") .

[75] EPA RIA at 2-2.

[76] GASCO DEIS.

[77] USEPA, Office of Air Quality Planning and Standards, Report to Congress on Hydrogen Sulfide Air Emissions Associated with the Extraction of Oil and Natural Gas (EPA ‐ 453/R ‐ 93 ‐ 045), at i (Oct. 1993)., http://www.fossil.energy.gov/programs/gasregulation/authorizations/2011_applications/exhibits_11-128-LNG/56._EPA_Hydrogen_Sulfide_Report.pdf. ("USEPA 1993") .

[78] Ibid.

[79] U.S. Environmental Protection Agency, Oil and Natural Gas Sector: NSPS and NESHAP for Air Pollutants Reviews, 76 Fed. Reg. 52738 (2011). ("76 Fed Reg 52738").

[80] Ibid.

[81] Fiore, Arlene et al., Linking ozone pollution and climate change: The case for controlling methane, 29 Geophys. Res Letters 19 (2002); *see also* Martin, Randal et al., Final Report: Uinta Basin Winter Ozone and Air Quality Study Dec 2010 - March 2011 (2011)at 7 ("CH_4 could be a significant player in atmospheric photochemistry of ozone formation in the Basin").

[82] See 40 C.F.R. §§ 50.9-.10.

hospital and emergency room visits, lost school days, and premature mortality.[83] It can also injure vegetation.[84]

In summary, BLM must take a hard look at the effects of the exploration and subsequent connected lease sale could have on air quality. BLM's analysis must also consider the numerous technologies available to control air pollution emissions. Given that oil and gas operations are causing rural communities to exceed ozone standards all around the county, BLM must analyzed the potential for emissions of methane, VOCs, and NOx to affect ozone levels, and the effect increased ozone levels will have on air quality. It is especially important that BLM analyze these potential impacts here because conventional operations or fracking on the leases could result in significant emissions of these pollutants. It also must evaluate the potential for hydrogen sulfide ("sour gas") and particulate pollution and their impacts on human health and the environment.

BLM's analysis must identify numerous available methods for controlling air pollution emissions as part of its requirement to consider all reasonable alternatives. BLM must rigorously explore and objectively evaluate all reasonable alternatives. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. Cal. 2008) (citing 40 C.F.R. § 1502.14(a)). This requirement applies to an EA as well as an EIS: "'NEPA requires that alternatives . . . be given full and meaningful consideration,' whether the agency prepares an EA or an EIS . . . ." *Id.* (quoting *Native Ecosystems Council v. US. Forest Serv.*, 428 F.3d 1233, 1246, 1245 (9th Cir. 2005)). Here, BLM must consider the inclusion of measures to control the waste of natural gas in the leases, as the inclusion of these measures would be reasonable.

4. BLM must adequately analyze and disclose the project's impact on climate

Oil and gas operations are a major cause of climate change. This is due to both emissions from the operations themselves, as well as emissions from the combustion of the oil and gas produced. Natural gas emissions are generally about 84 percent methane.[85] Methane is a potent greenhouse gas that contributes substantially to global climate change. Its global warming potential is approximately 33 times that of carbon dioxide over a 100 year time frame and 105 times that of carbon dioxide over a 20 year time frame.[86] EPA has found that methane, because of its effects on the climate, endangers public health and welfare within the meaning of the Clean Air Act.[87]

Addressing methane emissions in the short term is particularly important because methane's powerful near-term effects increase the risk that humanity will cross tipping points that inflict

[83] 76 Fed. Reg. 52738 at 52,791.
[84] Ibid.
[85] Brown Memo to EPA at 3; Power, Thomas, The Local Impacts of Natural Gas Development in Valle Vidal, New Mexico, University of Montana (2005) ("Power").
[86] Howarth, Robert, et al., Methane and the greenhouse-gas footprint of natural gas from shale formations, Climactic Change (Mar. 31, 2011) ("Howarth 2011"), available at http://www.eeb.cornell.edu/howarth/Howarth%20et%20al%20%202011.pdf. ;Shindell, Drew, Improved Attribution of Climate Forcing to Emissions, 326 Science 716 (2009).
[87] USEPA, Endangerment and Cause or Contribute Findings for Greenhouse Gases, 74 Fed. Reg. 66,496, 66,516 (Dec. 15, 2009).

irreversible damage before we can address climate change. Dr. James Hansen has stated that certain phenomena, such as "the instability of Arctic sea ice and the great ice sheets" indicate that we may have already gone too far.[88]

The great harm threatened by greenhouse gas emissions demands that we stabilize atmospheric CO_2e at a safe level.[89] The impacts of climate change caused by methane and other greenhouse gases include "increased air and ocean temperatures, changes in precipitation patterns, melting and thawing of global glaciers and ice, increasingly severe weather events, such as hurricanes of greater intensity and sea level rise."[90] Global warming will also destroy coastal lands in densely populated areas, diminish snowpack in Western states, including Nevada, increased wildfires, and reduce crop yields.[91] More frequent heat waves as a result of global warming have already affected public health,[92] leading to premature deaths. And threats to public health are only expected to increase as global warming intensifies. "For example, a warming climate will lead to increased incidence of respiratory and infectious disease, greater air and water pollution, increased malnutrition, and greater casualties from fire, storms, and floods. Vulnerable populations—such as children, the elderly, and those with existing health problems— are the most at risk from these threats."[93] One recent report estimates that increased heat alone could cause 150,000 additional deaths by the end of the century in populous United States cities.[94]

Oil and gas operations release large amounts of methane. For natural gas operations, production generates the largest amount; however, these emissions occur in all sectors of the natural gas industry, from drilling and production, to processing, transmission, and distribution.[95] For the oil industry, emissions result "primarily from field production operations . . . , oil storage tanks, and production-related equipment . . . ."[96] Emissions occur both expectedly, during normal operations

---

[88] Hansen, James, Global Warming twenty years later: Tipping Points Near (2008), http://www.columbia.edu/~jeh1/2008/TwentyYearsLater_20080623.pdf; Fussel, Hans-Martin, An updated assessment of the risks from climate change based on research published since the IPCC Fourth Assessment Report, 97 Climate Change 469, 473-74 (2009).

[89] *See* Meehl, Gerald, et al., Global Climate Projections (2007); Ackerman, Frank, et al., The Economics of 350: The Benefits and Costs of Climate Stabilization (2009); *see also* Baer, Paul, et al., A 350 ppm Emergency Pathway (2009) (describing pathways to achieving 350 ppm stabilization); Meinshausen, Malte, et al., Greenhouse-gas emission targets for limiting global warming to 2 °C, Nature (2009); Ramanathan V. & Y. Feng, On avoiding dangerous anthropogenic interference with the climate system: formidable challenges ahead, 105 Proc. Natl. Acad. of Sciences 14245 (2008); United Nations Environment Programme (UNEP), The Emissions Gap Report: Are the Copenhagen Accord Pledges Sufficient to Limit Global Warming to 2C or 1.5C? (2010), www.unep.org.

[90] 76 Fed. Reg. 52738 (citing U.S. EPA, 2011 US Greenhouse Gas Inventory Report Executive Summary (2011), http://www.epa.gov/climateexchange/emissions/downloads11/US‐GHGInventory‐2011‐Executive Summary.pdf) .

[91] Ibid, at 66,532–33.

[92] Smith, Joel B. et al., Assessing Dangerous Climate Change Through an Update of the Intergovernmental Panel on Climate Change (IPCC) "Reasons for Concern", 106 Proc. of the Natl. Acad. of Sciences of the U.S. 4133, 4135 (2009).

[93] Climate Change, Health and Environmental Effects, available at http://epa.gov/climatechange/effects/health.html .

[94] Natural Resources Defense Council, Killer Summer Heat: Projected Death Toll from Rising Temperatures in America Due to Climate Change (May 2012), available at http://www.nrdc.org/globalwarming/killer-heat/.

[95] USEPA, Natural Gas STAR Program Basic Information, http://www.epa.gov/gasstar/basicinformation/index.html#sources. ("EPA, Gas STAR Basic Info").

[96] Williams & Copeland at 6.

and routine maintenance, but also unexpectedly due to leaks and system upsets.[97] Significant sources of emissions include well venting and flaring, pneumatic devices, dehydrators and pumps, compressors, meters and pipelines, and storage tank venting.[98]

Although the total amount of methane emitted from oil and gas operations is unclear due to a lack of direct measurements, the amount is substantial. It is also underreported by industry.[99] "[A]ccording to the EPA Inventory of U.S. Greenhouse Gases and Sinks: 1990-2009, dated April 2011, oil and gas systems are the largest human-made source of methane emissions and account for 37 percent of methane emissions in the United States or 3.8 percent of the total greenhouse gas emissions in the United States."[100] Similarly, the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report (2007) found that total methane emissions from the oil and gas industry represent about 40 percent of the total methane emissions from all sources and account for about 5 percent of all CO_2e emissions in the United States.[101]

Also, in a report on opportunities to capture lost natural gas on federal leases, the Government Accountability Office ("GAO") states that:

> "[f]or onshore federal leases, operators reported to [the Oil and Gas Operators Report] that about 0.13 percent of the natural gas produced was vented and flared, while EPA estimates showed the volume to be about 4.2 percent, and estimates based on [Western Regional Air Partnership] data showed it to be as high as 5 percent".

The oil and gas that operators may produce from the leases would also contribute to climate change because the combustion of those fuels will emit carbon dioxide. Atmospheric carbon dioxide levels are increasing rapidly. Recently, for the first time in at least 800,000 years, those levels crossed 400 parts per million in the Arctic.[102] At the end of June 2012, the level was 395.77 at the top of Mauna Loa.[103] This is already well above 350 parts per million, which is the level "many scientists, climate experts, and progressive national governments are . . . saying is the safe upper limit for CO_2 in our atmosphere."[104] Burning additional fossil fuels will push atmospheric levels of carbon dioxide even higher, further imperiling human welfare and many—perhaps most—of the world's species.[105]

---

[97] Ibid.

[98] USEPA, Natural Gas STAR Program, Basic Information, Major Methane Emission Sources and Opportunities to Reduce Methane Emissions, http://www.epa.gov/gasstar/basic-information/index.html#sources (last visited Aug 1, 2012) (" USEPA, Basic Information").

[99] Petron, Gabrielle, et al., Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study, 117 Journal of Geophysical Research (2012).

[100] USEPA, Basic Information.

[101] 76 Fed. Reg. 52738 at 52,791-92.

[102] Yale Environment 360, *CO2 Milestone Reached As Levels Hit 400 PPM Across Arctic* (May 31, 2012) http://e360.yale.edu/digest/c02_milestone_reached__as_levels_hit_400_ppm_across_arctic/3488/ .

[103] CO_2Now.org, Earth's Home Page, http://co2now.org/ (last visited August 6, 2012).

[104] 350.org, 350 Science, http://www.350.org/en/node/26 .

[105] The IPCC concluded that 20% to 30% of plant and animal species will face an increased risk of extinction if global average temperature rise exceeds 1.5°C to 2.5°C relative to 1980-1999, with an increased risk of extinction for up to 70% of species worldwide if global average temperature exceeds 3.5°C relative to 1980-1999. Intergovernmental Panel on Climate Change, Climate Change 2007: Synthesis Report, An Assessment of the Intergovernmental Panel on Climate Change (2007). Other studies have predicted that 15%-37% of species will be

Some argue that producing natural gas for use as fuel actually provides a carbon benefit because it will replace other, more carbon-intensive fuels, like coal. Recent studies have shown, however, that the total lifecycle emissions of natural gas power production will exceed those of coal when there is a high methane leakage rate during production. [106] Researchers have shown that in order for natural gas to provide a greenhouse emissions benefit over a modern coal plant, leakage from the natural gas system must be less than 3.2 percent.[107] Yet some studies have estimated leakage rates above 3.2 percent for both conventional and unconventional wells.[108] Thus, it is unlikely that natural gas, in the absence of strong methane controls during production, storage, and transmission, provides much if any greenhouse benefit over coal-fired generation, and can in fact be worse.

To conclude this section, the BLM must analyze the potential climate impacts of the exploration and connected lease sale action. It must fully quantify potential emissions and analyze the potential impacts. NEPA does not allow BLM simply to give up on performing an analysis because obtaining data requires some searching. The Ninth Circuit has held that where the collection of further information may prevent speculation, NEPA mandates the preparation of an EIS. *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1240 (9th Cir. 2005) (internal citations omitted).

An analysis is possible because there are many available methodologies to quantify greenhouse gas emissions from oil and gas production. NEPA requires that the agency employ these methods to inform decisionmaking and facilitate public participation. *See, e.g., Sierra Club v. USACE,* 701 F.2d 1011, 1031 (2d Cir. 1983) (holding that the "FEIS did not reasonably adequately compile relevant information"). EPA has provided a tool to quantify emissions. It takes an annual inventory of greenhouse gas emissions, and releases the methodology for determining their numbers.[109] The most current inventory was released in April 2012, and includes a methodology for quantifying greenhouse gas emissions from energy production and usage. The EPA also released an entire annex on the carbon dioxide emissions from fossil fuel use.[110] Further, the Intergovernmental Panel on Climate Change (IPCC) released a detailed report on how to measure fugitive emissions from the oil and natural gas industry, such as venting, flaring

committed to extinction by 2050 under a mid-level emissions scenario, which the world has been exceeding. Thomas, Chris et al., Extinction Risk from Climate Change, 427 Nature 145 (2004); Raupach, Michael R. et al., Global and Regional Drivers of Accelerating CO2 Emissions, 104 Proc. of the Natl. Acad. of Sciences of the U.S. 10288 (2007); Global Carbon Project, Carbon Budget 2009 (2010).

[106] Brune, Michael, Statement of Sierra Club Executive Director Michael Brune Before the Committee on Oversight & Government Reform (May 31, 2012) ("Brune Statement"); Wang, Jinsheng, et al., Reducing the Greenhouse Gas Footprint of Shale (2011).

[107] Alvarez, Ramon et al., Greater focus needed on methane leakage from natural gas infrastructure, Proc of Nat'l Acad. Science Early Edition (Feb 13, 2012) at 3.

[108] Brune Statement; Howarth 2011; *see also* Howarth, Robert, et al., Venting and Leaking of Methane from Shale Gas Development: Response to Cathles et al., (2012), available at http://ecowatch.org/wpcontent/uploads/2012/01/report.pdf. ("Howarth 2012").

[109] United States Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2010, Apr. 15, 2012, http://www.epa.gov/climatechange/emissions/downloads12/US-GHG-Inventory-2012-Main-Text.pdf . ("US GHG Inventory 2012")

[110] U.S. Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2009: Annex 2, Methodology and Data for Estimating CO2 Emissions from Fossil Fuel Combustion (2012) .

and accidental releases of greenhouse gases.[111] These sources provide a range of available methods for measuring greenhouse gas emissions within the oil and gas industry in a quantifiable format. Additional quantification tools are also available, including the reports and technical support documents developed as part of the federal Greenhouse Gas Reporting Program, 40 C.F.R. Pt. 98. Subpart W of Part 98 focuses specifically on oil and gas production. The Technical Support Document for that subpart contains detailed, updated emissions factors for oil and gas production, which BLM could readily use to estimate emissions from possible wells on the leased lands.[112]

5. The BLM must analyze and disclose the potential for the exploration and connected lease sale to induce seismic activity

Although most earthquakes have natural causes, some of these events are related to human activity and are called "induced seismic events." Such events are well documented, with reports going back to the 1920s.[113] Energy technologies that involve injection or withdrawal of fluids from the subsurface have caused earthquakes large enough to be felt and measured. The expansion of oil and gas activities, including fracking, clearly increase the risk of induced earthquakes in Nevada and elsewhere, both from the activities at the well itself and, perhaps even more significantly, from the disposal of the massive amounts of wastewater in injection wells. BLM must consider these potential seismic effects in the course of taking the "hard look" that NEPA requires.

The National Research Council ("NRC"), which recently released a study of induced seismicity and energy technologies, explains the mechanism for induced seismicity as follows:

> Seismicity induced by human activity related to energy technologies is caused by change in pore pressure and/or change in stress taking place in the presence of (1) faults with specific properties and orientations, and (2) a critical state of stress in the rocks. In general, existing faults and fractures are stable (or are not sliding) under the natural horizontal and vertical stresses acting on subsurface rocks. However, the crustal stress in any given area is perpetually in a state in which any stress change, for example through a change in subsurface pore pressure due to injecting or extracting fluid from a well, may change the stress acting on a nearby fault. This change in stress may result in slip or movement along that fault creating a seismic event. Abrupt or nearly instantaneous slip along a fault releases

---

[111] Intergovernmental Panel on Climate Change, 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Chapter 4, Fugitive Emissions, 2006, *available at* http://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf .

[112] U.S. Environmental Protection Agency, Greenhouse Gas Reporting from the Petroleum and Natural Gas Industry, Background Technical Support Document (Nov. 2010), http://www.epa.gov/climatechange/emissions/downloads10/Subpart-W_TSD.pdf .

[113] National Research Council, Induced Seismicity Potential in Energy Technologies (2012) ("NRC 2012")at 3; Grasso, J.-R., Mechanics of Seismic Instabilities Induced by the Recovery of Hydrocarbons, 139 PAGEOPH 507 (1992); Kanamori, Hiroo, A Slow Earthquake in the Santa Maria Basin, California, 82 Bulletin of the Seismological Society of America 2087 (1992); Kerr, Richard, Learning How to NOT Make Your Own Earthquakes Seismology (2012) ("Researchers have known for decades that deep, high-pressure fluid injection can trigger sizable earthquakes.").

> energy in the form of energy waves ("seismic waves") that travel through the Earth and can be recorded and used to infer characteristics of energy release on the fault.[114]

Importantly, when adequate knowledge exists of "local crustal stress, rock properties, fault locations and properties, and the shape and size of the reservoir into which fluids are injected or withdrawn," the NRC notes that "the possibility exists to make accurate predictions of earthquake occurrences."[115]

In the past several years, increasing rates of induced seismic events related to energy development projects have drawn heightened public attention.[116] A recent study by United States
Geological Survey scientists linked this increase to oil and gas activities in particular, stating that the increase was "almost certainly man made."[117] The scientists noted that "[a] remarkable increase in the rate of [magnitude] 3 and greater earthquakes is currently in progress in the US midcontinent. The average number of [magnitude] >= 3 earthquakes/year increased starting in 2001, culminating in a six-fold increase over 20th century levels in 2011."

Seismic activity from oil and gas activity has occurred all across the country. With regard to induced seismicity from energy operations in general, the NRC reports that "seismic events caused by or likely related to energy development have been measured and felt in Alabama, Arkansas, California, Colorado, Illinois, Louisiana, Mississippi, Nebraska, Nevada, New Mexico, Ohio, Oklahoma, and Texas."[118] For oil and gas activities in particular, the USGS notes that these activities have triggered earthquakes in areas ranging from Alabama to the Northern Rockies.[119] The NRC reports one suspected and one confirmed induced seismic event due to fracking as well as eight confirmed induced events from wastewater injection wells.[120]

Thus, the risk of seismic activity resulting from oil and gas activities is obvious. In fact, the risk of seismic impacts is even more pronounced because Nevada, with its Basin and Range topography is a seismically active state.

The NRC both states it is possible to perform an analysis of potential seismic impacts, and provides recommendations indicating that BLM should perform such an analysis here. The NRC notes that "[m]ethodologies can be developed for quantitative, probabilistic hazard assessments of induced seismicity risk. Such assessments should be undertaken before operations begin in areas with a known history of felt seismicity and updated in response to observed, potentially

---

[114] Ibid, at 5.
[115] Ibid.
[116] NRC 2012 at 1; Ellsworth, William et al., Abstract: Are Seismicity Rate Changes in the Mid-continent Natural or Man-made? Seismological Society of America (2012) ("Ellsworth"); Arthur.
[117] Ellsworth; Horwitt, Dusty & Alex Formuzis, Environmental Working Group, USGS: Recent Earthquakes "Almost Certainly Manmade" http://www.ewg.org/analysis/usgs-recent-earthquakes-almost-certainly-manma (last visited May 2, 2012) ("Horwitt & Formuzis"); *see also* Olson-Sawyer, Kai, Fracking Operations Can Cause Earthquakes? "Almost Certainly," Says U.S. Geological Survey, EcoCentric (2012).
[118] NRC 2012 at 1 (report also covers geothermal energy).
[119] Horwitt & Formuzis.
[120] NRC 2012 at 6, 8.

induced seismicity."[121] In fact, the NRC has provided "specific practices that consider induced seismicity both before and during the actual operation of an energy project and that could be employed in the development of a 'best practices' protocol specific to each energy technology."[122] Some of the practices and tools include seismicity checklists and protocols developed for the purpose of management of induced seismicity for specific energy projects.

There is a clear need for BLM to analyze the project's potential impacts on seismic activity, and tools do exist allowing BLM to perform such an analysis.

6. BLM Must Prepare an Environmental Impact Statement

BLM has violated NEPA by failing to produce an EIS because the exploration and oil and gas operations that may result could clearly result in significant impacts. This is especially true in light of the potential for fracking to occur.

If an "EA establishes that the agency's action may have a significant effect upon the . . . environment," an EIS must be prepared. *Nat'l Parks & Conservation Ass'n*, 241 F.3d at 730 (emphasis in original; internal quotations omitted); *see also Hells Canyon Preservation Council v. Jacoby*, 9 F. Supp. 2d 1216, 1232 (D. Or. 1998) (a "plaintiff need not show that significant effects will in fact occur, but if the plaintiff raises substantial questions whether a project may have a significant effect, an EIS must be prepared"). If an agency decides not to prepare an EIS, it must supply a convincing statement of reasons to explain why a project's impacts are insignificant. *Blue Mountains Biodiversity Project*, 161 F.3d at 1211. Moreover, the Ninth Circuit has found that when an agency gives a "cursory and inconsistent treatment" of an issue, or no references or defense of a statement is given, "substantial questions" are raised, and an EIS is required. *Id.* at 1213-14.

In considering the potential for the lease sale to result in significant effects, NEPA's regulations require BLM to evaluate ten factors regarding the "intensity" of the impacts. 40 C.F.R. §1508.27(b). The Ninth Circuit has held that the existence of any "one of these factors may be sufficient to require preparation of an EIS." *Ocean Advocates*, 402 F.3d at 865; *Nat'l Parks & Conservation Ass'n*, 241 F.3d at 731. Several of these "significance factors" are implicated in the lease sale and clearly warrant the preparation of an EIS:

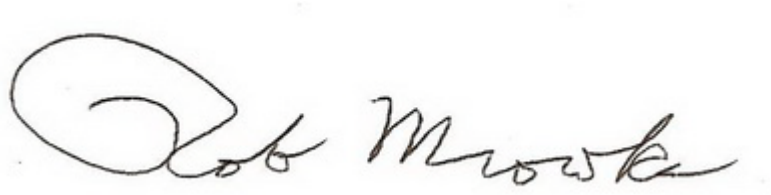
- The degree to which the effects on the quality of the human environment are likely to be highly controversial.
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
- The degree to which the proposed action affects public health or safety.
- The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973. 40 C.F.R. § 1508.27(b)(4), (5), (2) & (9).

[121] NRC 2012 at 1.
[122] NRC 2012 at 139.

Here, individually and considered as a whole, there is no doubt that significant effects may result from the lease sale; thus, NEPA requires that BLM must prepare an EIS for the action. It should be clear to the BLM that an EA is not needed to see that the issues involved raise the project to the status of an EIS.

The Center truly hopes that the BLM will end the EA process and initiate the necessary and appropriate EIS process. In any regards, the Center wishes to be notified of any and all agency actions associated with this project and other like it.

Sincerely yours in conservation,



Rob Mrowka
Ecologist and Nevada Conservation Advocate