August 21, 2017

Bureau of Land Management
Attn: Liz Dailey, Project Lead
Pinedale Field Office
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Dear Ms. Dailey,

Please consider the following comments on the Draft Environmental Impact Statement ("DEIS") for the Proposed Normally Pressured Lance Natural Gas Development Project in Sublette County, Wyoming, submitted on behalf of the Center for Biological Diversity, Sierra Club's Wyoming Chapter and Our Wild America Campaign and its members and supporters nationwide.

The Center for Biological Diversity ("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 to protect biological diversity, our environment, and public health. The Center has over 1.1 million members and on-line activists, including those living in Wyoming who have visited public lands in the Sublette County and Pinedale region for recreational, scientific, educational, 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 proposed oil and gas leasing.

Since 1892, Sierra Club has worked to help people enjoy, explore and protect the planet. Many Sierra Club members, both in Wyoming as well as from across the country, are inspired by and treasure the beauty and largely undeveloped nature of the Wyoming high desert, and have a strong interest in fully participating in proposals for energy development on public lands in the state. Sierra Club is America's largest and most influential grassroots environmental organization, with more than 825,000 members nationwide. Sierra Club is dedicated to exploring, enjoying, and protecting the wild places of the Earth; to practicing and promoting the responsible use of the Earth's resources and ecosystems; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives.

The Center and Sierra Club are deeply concerned about the impacts to environmental and public health from Jonah Energy's proposal to achieve full exploitation of the Normally Pressured Lance ("NPL") gas field over an extremely short time frame. This proposal will result in alarmingly dense development and high levels of air pollutant emissions, among other serious environmental impacts. A thorough review of the DEIS reveals that the Bureau of Land Management ("BLM") has not adequately evaluated the impacts of the proposal.

I. The DEIS Fails to Adequately Analyze and Mitigate the Project's Harm to Air Quality, In Violation of NEPA.

Oil and gas operations emit numerous air pollutants, including volatile organic compounds (VOCs), NOX, particulate matter, hydrogen sulfide, and methane. Hydraulic fracturing ("fracking") operations are particularly harmful, emitting especially large amounts of pollution, including air toxic air pollutants. Permitting fracking and other well stimulation techniques will greatly increase the release of harmful air emissions in these and other regions. BLM failed to analyze air quality impacts from this new project in conjunction with the existing air quality landscape. BLM must analyze increased emissions as a whole, in order to prevent further degradation of local air quality, respiratory illnesses, premature deaths, hospital visits, as well as missed school and work days.

As fully acknowledged in the DEIS, ground-level ozone concentrations that greatly exceed national ambient air quality standard levels regularly occur in the Upper Green River Basin during the winter, and have been linked to the extensive oil and gas operations in the region.[1] A 2009 study documented ground-level hourly ozone concentrations in the vicinity of the Jonah–Pinedale Anticline natural gas field that reached 140 ppb in winter.[2] Another study documented wintertime ozone hourly values above 150 ppb and maximum daily 8-hour averages over 120 ppb, linked to the high ozone precursors emitted by fracking and drilling operations.[3]

The DEIS provides an incomplete review of air modeling for criteria pollutants to establish compliance with health-based federal Clean Air Act standards called the National Ambient Air Quality Standards (NAAQS), and state-based Wyoming Ambient Air Quality Standards (WAAQS). The DEIS does acknowledge that air emissions from the NPL project will result in potential future exceedances of the NAAQS/WAAQS for ozone and 1-hour PM10, but provides zero mandatory mitigation measures to address these potential exceedances.[4] Studies have shown that oil and gas drilling activities, particularly fracking and horizontal drilling techniques, can pollute air hundreds of miles from the well pad. For example, ethane pollution in

[1] Wyoming Department of Health, Associations of Short-Term Exposure to Ozone and Respiratory Outpatient Clinic Visits — Sublette County, Wyoming, 2008–2011 (March 1, 2013).
[2] Schnell, Russell C. et al., Rapid Photochemical Production of Ozone at High Concentrations in a Rural Site During Winter, 2 Nature Geoscience 120 (2009).
[3] Oltsmans, Samuel et al., Anatomy of wintertime ozone associated with oil and natural gas extraction activity in Wyoming and Utah, 2 Elementa: Science of the Anthropocene 000024, doi: 10.12952/journal.elementa.000024 (2014).
[4] DEIS at 2-7, 4-21, 4-41, 4-37, 4-51.

Baltimore, Maryland and Washington, D.C, has been attributed to the rapidly increasing natural gas production in the upwind, neighboring states of Pennsylvania and West Virginia.[5]

BLM's failure to identify mandatory environmental impact mitigation methods for controlling air pollution emissions in the DEIS violates NEPA's requirement that the agency identify mitigation measures, 40 C.F.R. § 1508.25, and consider all reasonable alternatives. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008) (citing 40 C.F.R. § 1502.14(a)).[6]

A. Types of Air Emissions.

Unconventional oil and gas operations emit large amounts and a wide array of toxic air pollutants,[7] also referred to as Hazardous Air Pollutants, which are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.[8] Air pollutants emitted by unconventional oil and gas production include toxic BTEX compounds (benzene, toluene, ethylbenzene, and xylene); volatile organic compounds (VOCs) such as methylene chloride; nitrogen oxides (NOx); particulate matter (including diesel exhaust); alkanes (methane, ethane, propane); formaldehyde; hydrogen sulfide; silica; acid mists; sulfuric oxide; and radon gas.[9] These toxic air contaminants and smog-forming chemicals (such as VOCs, NOx, methane and ethane) threaten local communities and regional air quality.

The reporting requirements recently implemented by the California South Coast Air Quality Management District ("SCAQMD") have shown that at least 44 chemicals known to be air toxics have been used in fracking and other types of unconventional oil and gas recovery in California.[10] Through the implementation of these new reporting requirements, it is now known that operators have been using several types of air toxics, including crystalline silica, methanol, hydrochloric acid, hydrofluoric acid, 2-butoxyethanol, ethyl glycol monobutyl ether, xylene, amorphous silica fume, aluminum oxide, acrylic polymer, acetophenone, and ethylbenzene. Many of these chemicals also appear on the U.S. EPA's list of hazardous air pollutants.[11] EPA has also identified six "criteria" air pollutants that must be regulated under the National Ambient

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[5] Vinciguerra,Timothy et al, Regional Air Quality Impacts of Hydraulic Fracturing and Shale Natural Gas Activities: Evidence From Ambient VOC Observations. 110 Atmospheric Environment 144 (2015).
[6] DEIS at 4-51.
[7] Sierra Club et al. comments on New Source Performance Standards: Oil and Natural Gas Sector; Review and Proposed Rule for Subpart OOOO (Nov. 30, 2011) ("Sierra Club Comments") at 13.
[8] See "About Hazardous Air Pollutants" at U.S. Environmental Protection Agency, Hazardous Air Pollutants, https://www.epa.gov/haps (accessed Jan 5, 2017)
[9] McKenzie, Lisa M. et al., Human Health Risk Assessment of Air Emissions From Development of Unconventional Natural Gas Resources, 424 Science of the Total Environment 79 (2012) ("McKenzie 2012); Shonkoff, Seth B.C. et al., Environmental Public Health Dimensions of Shale and Tight Gas Development, 122 Environmental Health Perspectives 787 (2014) ("Shonkoff 2014").
[10] Center for Biological Diversity, Air Toxics One Year Report (June 2014) at 1.
[11] U.S. Environmental Protection Agency, The Clean Air Act Amendments of 1990 List of Hazardous Air Pollutants, Technology Transfer Network Air Toxics Web Site, available at http://www.epa.gov/ttnatw01/orig189.html (accessed July 29, 2015).

Air Quality Standards (NAAQS) due to their potential to cause primary and secondary health effects. As detailed below, concentrations of many of these pollutants—ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide and lead—have been shown to increase in regions where unconventional oil and gas recovery techniques are permitted.

VOCs, from car and truck engines as well as the drilling and completion stages of oil and gas production, make up about 3.5 percent of the gases emitted by oil or gas operations.[12] The VOCs emitted include the BTEX compounds – benzene, toluene, ethyl benzene, and xylene – which are listed as Hazardous Air Pollutants.[13] There is substantial evidence showing the grave harm from these pollutants.[14] Recent studies and reports confirm the pervasive and extensive amount of VOCs emitted by unconventional oil and gas extraction.[15] For example, a study covering sites near oil and gas wells in five different states including Colorado, Wyoming, Ohio, Pennsylvania, and Arkansas, found that concentrations of eight toxic volatile chemicals, including benzene, formaldehyde and hydrogen sulfide, exceeded federal health and safety standards, at times by several orders of magnitude.[16] Another study determined that vehicle traffic and engine exhaust were likely the sources of intermittently high dust and benzene concentrations observed near well pads.[17] Recent studies have found that oil and gas operations are likely responsible for elevated levels of hydrocarbons such as benzene downwind of the Denver-Julesburg Fossil Fuel Basin, north of Denver.[18] Another study found that oil and gas operations in this area emit approximately 55 percent of the VOCs in northeastern Colorado.[19]

VOCs, NOx, methane, and ethane are potent ground-level (tropospheric) ozone precursors that are emitted by oil and gas drilling and fracking operations. Ozone can result in serious health conditions, including heart and lung disease and mortality.[20] Exposure to elevated levels of ozone is estimated to be cause ~10,000 premature deaths per year in the United States.[21] VOCs can form ground-level (tropospheric) ozone when combined with nitrogen oxides

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[12] 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.
[13] 42 U.S.C. § 7412(b).
[14] Colborn, T. et al., Natural Gas Operations from a Public Health Perspective, 17 Human And Ecological Risk Assessment 1039 (2011) ("Colborn 2011"); McKenzie 2012.
[15] McCawley, Michael., Air, Noise, and Light Monitoring Plan for Assessing Environmental Impacts of Horizontal Gas Well Drilling Operations (ETD-10 Project), West Virginia University School of Public Health, Morgantown, WV (2013) ("McCawley 2013"), available at http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/legislativestudies/Documents/WVU%20Final%20Air%20Noise%20Light%20Protocol.pdf; Center for Biological Diversity, Dirty Dozen: The 12 Most Commonly Used Air Toxics in Unconventional Oil Development in the Los Angeles Basin (Sept. 2013).
[16] Macey, Gregg P. et al., Air Concentrations of Volatile Compounds Near Oil and Gas Production: A Community-Based Exploratory Study, 13 Environmental Health 82 (2014) at 1.
[17] McCawley 2013.
[18] Pétron, G. et al., Hydrocarbon Emissions Characterization in the Colorado Front Range – A Pilot Study, 117 J. Geophysical Research D04304 (2012) at 8, 13 ("Pétron 2012).
[19] Gilman, Jessica B. et al., Source Signature of Volatile Organic Compounds from Oil and Natural Gas Operations in Northeastern Colorado, 47 Environmental Science & Technology 1297 (2013) at 1297, 1303 ("Gilman 2013").
[20] U.S. Environmental Protection Agency, Integrated Science Assessment (ISA) for Ozone (O3) and Related Photochemical Oxidants (2013).
[21] Caiazzo, Fabio et al., Air Pollution and Early Deaths in the United States. Part I: Quantifying the Impact of Major Sectors in 2005, 79 Atmospheric Environment 198 (2013).

(“NO_X”) from compressor engines, turbines, other engines used in drilling, and flaring,[22] in the presence of sunlight. This reaction can diminish visibility and air quality and harm vegetation. Many regions around the country with substantial oil and gas operations are now suffering from extreme ozone levels due to heavy emissions of these pollutants.[23] A recent study of ozone pollution in the Uintah Basin of northeastern Utah, a rural area that experiences hazardous tropospheric ozone concentrations, found that oil and gas operations were responsible for 98 to 99 percent of VOCs and 57 to 61 percent of NO_X emitted from sources within the Basin considered in the study’s inventory.[24]

Ground-level ozone can also be caused by methane, which is leaked and vented at various stages of unconventional oil and gas development, as it interacts with nitrogen oxides and sunlight.[25] In addition to its role as a potent greenhouse gas, methane’s effect on ozone concentrations can be substantial. One paper modeled reductions in various anthropogenic ozone precursor emissions and found that “[r]educing anthropogenic CH_4 emissions by 50% nearly halves the incidence of U.S. high-O_3 events . . . .”[26]

Ethane is also a potent precursor of ground-based ozone pollution as it breaks down and reacts with sunlight to create smog, as well as being a greenhouse gas. Ethane emissions have risen steeply in recent years due to U.S. oil and gas production. A recent study documented that ethane emissions in the Northern Hemisphere increased by about 400,000 tons annually between 2009 and 2014, with the majority coming from North American oil and gas activity, reversing a decades-long decline in ethane emissions.[27] Shockingly, about 60 percent of the drop in ethane levels that occurred over the past 40 years has already been made up in the past five years. At this rate, U.S. ethane levels are expected to hit 1970s levels in about three years. About two percent of global ethane emissions originate from the Bakken Shale oil and gas field alone, which emits 250,000 tons of ethane per year.[28] Because global ethane levels were decreasing

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[22] *See, e.g.*, U.S. Environmental Protection Agency, Oil and Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution: Background Technical Support Document for Proposed Standards at 3-6 (July 2011); Armendariz, Al, Emissions for Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements (2009) (“Armendariz 2009”) at 24.

[23] Armendariz 2009 at 1, 3, 25-26; Koch, Wendy, *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); Colorado Dept. of Public Health and Environment, Conservation Commission, Colorado Weekly and Monthly Oil and Gas Statistics (July 6, 2012) at 12.

[24] Lyman, Seth & Howard Shorthill, Final Report: 2012 Uintah Basin Winter Ozone & Air Quality Study, Utah Department of Environmental Quality (2013) (“Lyman 2013”); *see also* Gilman 2013.

[25] Fiore, Arlene et al., Linking Ozone Pollution and Climate Change: The Case for Controlling Methane, 29 Geophys. Res Letters 19 (2002) (“Fiore 2002”); U.S. Environmental Protection Agency, Oil and Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews Proposed Rule, 76 Fed. Reg 52,738 (Aug. 23, 2011).

[26] Fiore 2002; *see also* Martin, Randal et al., Final Report: Uinta Basin Winter Ozone and Air Quality Study Dec 2010 - March 2011 (2011) at 7.

[27] Helmig, Detlev et al,, Reversal of Global Atmospheric Ethane and Propane Trends Largely Due to US Oil and Natural Gas Production. 9 Nature Geoscience 490 (2016).

[28] Kort, Eric A. et al., Fugitive Emissions From the Bakken Shale Illustrate Role of Shale Production in Global Ethane Shift. 43 Geophysical Research Letters 4617 (2016).

until 2009, the U.S. shale gas boom is thought to be responsible for the global increase in levels since 2010.

Oil and gas operations can also emit hydrogen sulfide. The hydrogen sulfide is contained in the natural gas and makes that gas "sour."[29] Hydrogen sulfide may be emitted during all stages of operation, including exploration, extraction, treatment and storage, transportation, and refining. Long-term exposure to hydrogen sulfide is linked to respiratory infections, eye, nose, and throat irritation, breathlessness, nausea, dizziness, confusion, and headaches.[30]

The oil and gas industry is also a major source of particulate matter. The heavy equipment regularly used in the industry burns diesel fuel, generating fine particulate matter[31] that is especially harmful.[32] Vehicles traveling on unpaved roads also kick up fugitive dust, which is particulate matter.[33] Further, both NO_X and VOCs, which as discussed above are heavily emitted by the oil and gas industry, are also particulate matter precursors.[34] Some of the health effects associated with particulate matter exposure are "premature mortality, increased hospital admissions and development of chronic respiratory disease."[35]

Fracking results in additional air pollution that can create a severe threat to human health. One analysis found that 37 percent of the chemicals found at fracked gas wells were volatile, and that of those volatile chemicals, 81 percent can harm the brain and nervous system, 71 percent can harm the cardiovascular system and blood, and 66 percent can harm the kidneys.[36] The SCAQMD has identified three areas of dangerous and unregulated air emissions from fracking: (1) the mixing of the fracking chemicals; (2) the use of the silica, or sand, as a proppant, which causes the deadly disease silicosis; and (3) the storage of fracking fluid once it comes back to the surface.[37] Preparation of the fluids used for well completion often involves onsite mixing of gravel or proppants with fluid, a process which potentially results in major amounts of particulate matter emissions.[38] Further, these proppants often include silica sand, which increases

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[29] Sierra Club Comments.

[30] U.S. Environmental Protection Agency, 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) ("USEPA 1993").

[31] Earthworks, Sources of Oil and Gas Pollution (2011).

[32] Bay Area Air Quality Management District, Particulate Matter Overview, Particulate Matter and Human Health (2012).

[33] U.S. Environmental Protection Agency, Regulatory Impact Analysis for the Proposed Revisions to the National Ambient Air Quality Standards for Particulate Matter (June 2012), http://www.epa.gov/ttnecas1/regdata/RIAs/PMRIACombinedFile_Bookmarked.pdfat 2-2, ("EPA RIA")

[34] EPA RIA at 2-2.

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

[36] Colborn 2011 at 8.

[37] South Coast Air Quality Management District, Draft Staff Report on Proposed Rule 1148.2 - Notification and Reporting Requirements for Oil and Gas Wells and Chemical Suppliers (January 2013) at 15 ("SCAQMD Draft Staff Report PR1148-2").

[38] *Id.*

the risk of lung disease and silicosis when inhaled.[39] Finally, as flowback returns to the surface and is deposited in pits or tanks that are open to the atmosphere, there is the potential for organic compounds and toxic air pollutants to be emitted, which are harmful to human health as described above.[40]

The DEIS should study the potential for oil and gas operations sites in the planning area to emit such air toxics and any other pollutants that may pose a risk to human health, paying particular attention to the impacts of air pollution on environmental justice communities that already bear the burden of disproportionately high levels of air pollution.

The DEIS should rely on the most up-to-date information regarding the contribution of oil and gas operations to air pollution levels. Numerous studies demonstrate that state and federal emissions inventories significantly underestimate the levels of hazardous air pollution coming from oil and gas drilling and fracking operations. For example, aerial surveys of more than 8,000 oil and gas wells in seven US regions found that well pads emit considerably more methane and VOCs that captured by existing inventories.[41] Recent studies in Weld County, Colorado, show that existing emissions inventories likely underestimate the contribution of oil and gas operations to VOC levels by at least a factor of two, and that benzene emissions are underestimated by four to nine times[42] These studies suggest that the health risk assessments conducted using these inventories are inaccurate and underestimate exposures and health risks.[43] Similarly, the assessment of fracking in California by the California Council on Science and Technology found that current inventory methods underestimate methane and VOC emissions from oil and gas operations.[44]

B. Sources of Air Emissions.

Harmful air pollutants are emitted during every stage of unconventional oil and gas development, including drilling, completion, well stimulation, production, and disposal, as well as from transportation of water, sand, chemicals, and to and from the well pad.[45] The well stimulation stage can emit diesel exhaust, VOCs, particulate matter, ozone precursors, silica, and acid mists.[46] Drilling and casing the wellbore require substantial power from large equipment. The engines used typically run on diesel fuel, which emit particularly harmful types of air

[39] South Coast Air Quality Management District, Response to Questions re Air Quality Risks of Hydraulic Fracturing in California, Submission to Joint Senate Hearing (2013) at 3.
[40] SCAQMD Draft Staff Report PR1148-2 at 15.
[41] Lyon, David R. et al., Aerial Surveys of Elevated Hydrocarbon Emissions From Oil and Gas Production Sites, 50 Environmental Science & Technology 4877 (2016).
[42] Pétron 2012 at 1, 18 (noting state and federal inventories likely underestimate hydrocarbon emissions from oil and gas operations by as much as factor of two); Pétron, Gabrielle et al., A New Look at Methane and Non-Methane Hydrocarbon Emissions from Oil and Natural Gas Operations in the Colorado Denver-Julesburg Basin, 119 J. Geophysical Research: Atmospheres 6836 (2014) at 6836 ("Pétron 2014").
[43] Pétron 2014.
[44] Brandt, Adam et al., Ch 3: Air quality impacts from well stimulation, *An Independent Assessment of Well Stimulation in California*, Volume 2, California Council on Science and Technology (2015) ("CCST 2015").
[45] Shonkoff 2014.
[46] *Id.*

pollutants when burned. Similarly, high-powered pump engines are used in the fracturing and completion phase. This too can amount in large volumes of air pollution. Flaring, venting, and fugitive emissions of gas are also a potential source of air emissions. Gas flaring and venting can occur in both oil and gas recovery processes when underground gas rises to the surface and is not captured as part of production. Emissions from flaring typically include carbon monoxide, nitrogen oxides, benzene, formaldehyde and xylene, but levels of these smog-forming compounds are seldom measured directly.[47]

Fugitive emissions can occur at every stage of extraction and production, often leading to high volumes of gas being released into the air. Methane emissions from oil and gas production are as much as 270 percent greater than previously estimated by calculation.[48] Recent studies show that emissions from pneumatic valves (which control routine operations at the well pad by venting methane during normal operation) and fugitive emissions are higher than EPA estimates.[49]

Evaporation from pits can also contribute to air pollution. Pits that store drilling waste, produced water, and other waste fluid may be exposed to the open air. Chemicals mixed with the wastewater—including the additives used to make fracking fluids, as well as volatile hydrocarbons, such as benzene and toluene, brought to the surface with the waste—can escape into the air through evaporation. Some pits are equipped with pumps that spray effluents into the air to hasten the evaporation process. For example, evaporation from fracking waste pits in western Colorado was found to have added tons of toxic chemicals to the air, increasing air pollution in Utah.[50] In Texas, toxic air emissions from fracking waste pits are unmonitored and unregulated.[51] In California, unlined disposal pits for drilling and fracking waste are documented sources of contamination.[52] Even where waste fluid is stored in so-called "closed loop" storage tanks, fugitive emissions can escape from tanks.

As mentioned above, increased truck traffic will lead to more air emissions. Trucks capable of transporting large volumes of chemicals and waste fluid typically use large engines

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[47] Physicians for Social Responsibility and Concerned Health Professionals of NY, Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking, Fourth Edition, November 17, 2016 ("PSR 2016").

[48] Miller, Scot et al., Anthropogenic emissions of methane in the United States, 110 PNAS 50 (2013).

[49] Allen, David et al., Measurements of Methane Emissions at Natural Gas Production Sites in The United States, 110 PNAS 17768 (2013) ("Allen 2013"); Harriss, Robert et al., Using Multi-Scale Measurements to Improve Methane Emission Estimates from Oil and Gas Operations in the Barnett Shale Region, Texas, 49 Environ. Sci. Technol. 7524 (2015).

[50] Maffy, Brian , *Utah grapples with toxic water from oil and gas industry*, The Salt Lake Tribune, August 28, 2014, available at http://archive.sltrib.com/story.php?ref=/sltrib/news/58298470-78/danish-flats-ponds-company.html.csp; The company responsible for the waste pits was found to have operated without a permit, underreported emissions and provided erroneous data to regulators.

[51] Center for Public Integrity. *Open Pits Offer Cheap Disposal for Fracking Sludge But Health Worries Mount*, October 2, 2014.

[52] Stringfellow, William T. et al., Ch 2: Impacts of Well Stimulation on Water Resources, *An Independent Assessment of Well Stimulation in California,* Volume 2, California Council on Science and Technology (2015) ("CCST 2015") at 110-113.

that run on diesel fuel. Air pollutants from truck engines will be emitted not only at the well site, but also along truck routes to and from the site.

The DEIS must provide a more complete and thorough analysis and disclosure of the effects the NPL project could have on air quality, including the impacts that would result from fracking. The DEIS cannot postpone the discussion of air pollution mitigation measures until the drills obtain an air pollution permit, because BLM must analyze impacts at "the earliest practicable time," and no benefit would be gained from postponing the analysis, BLM must discuss these cumulative impacts before the DEIS is approved.

C. Impact of Increased Air Pollution.

The potential harms resulting from increased exposure to the dangerous air pollutants from unconventional oil and gas development are serious and wide-ranging. A growing body of scientific research has documented adverse public health impacts from unconventional oil and gas development, including studies showing air pollutants at levels associated with reproductive and developmental harms and the increased risk of morbidity and mortality.[53] A comprehensive review of the risks and harms of fracking to public health came to several key findings related to air pollution: (1) "drilling and fracking emissions contribute to toxic air pollution and smog (ground-level ozone) at levels known to have health impacts," (2)"public health problems associated with drilling and fracking, including reproductive impacts and occupational health and safety problems, are increasingly well documented"; and (3)"fracking infrastructure poses serious potential exposure risks to those living near it."

Air toxics and hazardous air pollutants, by definition, can result in harm to human health and safety. Understanding the full extent of the health effects of exposure is still far from being complete, but already there are numerous studies that have found these chemicals to have serious health consequences for humans exposed to even minimal amounts. The negative effects of criteria pollutants are well documented and are summarized by the U.S. EPA's website:

> *Nitrogen oxides* (NOx) react with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. NO_x and volatile organic compounds react in the presence of heat and sunlight to form ozone.
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> *Particulate matter* (PM) - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health

[53] Hays, Jake & Seth B.C. Shonkoff, Towards an Understanding of the Environmental and Public Health Impacts of Unconventional Natural Gas Development: A Categorical Assessment of the Peer-Reviewed Scientific Literature, 11 PLoS ONE e0154164 (2016); Shonkoff 2014; Webb, Ellen et al., Developmental and reproductive effects of chemicals associated with unconventional oil and natural gas operations, 29 Rev Environ Health 307 (2014); McKenzie 2012; Clean Air Task Force, Fossil Fumes: A Public Health Analysis of Toxic Air Pollution From the Oil and Gas Industry, June 2016, available at http://www.catf.us/resources/publications/files/FossilFumes.pdf.

problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including: premature death in people with heart or lung disease, increased mortality, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.[54]

Sulfur Dioxide (SO_2) – has been shown to cause an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms.[55] Studies also show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics.[56]

Carbon Monoxide (CO) can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. At extremely high levels, CO can cause death.[57] Exposure to CO can reduce the oxygen-carrying capacity of the blood. People with several types of heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress.[58] For these people, short-term CO exposure further affects their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion.[59]

Ozone (O_3) can trigger or worsen asthma and other respiratory ailments.[60] Ground level ozone can have harmful effects on sensitive vegetation and ecosystems. Ozone may also lead to loss of species diversity and changes to habitat quality, water cycles, and nutrient cycles.

The range of illnesses that can result from the wide array of air pollutants from fracking were summarized in a study by Dr. Theo Colburn, which charts which chemicals have been shown to be linked to certain illnesses.[61] This study analyzed air samples taken during drilling operations near natural gas wells and residential areas in Garfield County, and detected 57

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[54] U.S. Environmental Protection Agency, Particulate Matter, (PM) http://www.epa.gov/airquality/particlepollution/health.html (accessed July 30, 2015); Ostro, Bart et al., Long-term Exposure to Constituents of Fine Particulate Air Pollution and Mortality: Results from the California Teachers Study, 118 Environmental Health Perspectives 3 (2010).

[55] U.S. Environmental Protection Agency, Sulfur Dioxide, http://www.epa.gov/airquality/sulfurdioxide/health.html, (accessed July 29, 2015).

[56] *Id.*

[57] U.S. Environmental Protection Agency, Carbon Monoxide, available at http://www.epa.gov/airquality/carbonmonoxide/health.html (accessed July 29, 2015).

[58] *Id.*

[59] *Id.*

[60] U.S. Environmental Protection Agency, Ground Level Ozone, available at http://www.epa.gov/airquality/ozonepollution/health.html (accessed July 29, 2015).

[61] Colborn 2011; Colborn, Theo, et al., An Exploratory Study of Air Quality near Natural Gas Operations, The Endocrine Disruption Exchange (2012)("Colborn 2012").

chemicals between July 2010 and October 2011, including 44 with reported health effects.[62] For example:

> Thirty-five chemicals were found to affect the brain/nervous system, 33 the liver/metabolism, and 30 the endocrine system, which includes reproductive and developmental effects. The categories with the next highest numbers of effects were the immune system (28), cardiovascular/blood (27), and the sensory and respiratory systems (25 each). Eight chemicals had health effects in all 12 categories. There were also several chemicals for which no health effect data could be found.[63]

The study found extremely high levels of methylene chloride, which may be used as cleaning solvents to remove waxy paraffin that is commonly deposited by raw natural gas in the region. These deposits solidify at ambient temperatures and build up on equipment.[64] While none of the detected chemicals exceeded governmental safety thresholds of exposure, the study noted that such thresholds are typically based on "exposure of a grown man encountering relatively high concentrations of a chemical over a brief time period, for example, during occupational exposure."[65] Consequently, such thresholds may not apply to individuals experiencing "chronic, sporadic, low-level exposure," including sensitive populations such as children, the elderly and pregnant women.[66] For example, the study detected polycyclic aromatic hydrocarbon (PAH) levels that could be of "clinical significance," as recent studies have linked low levels of exposure to lower mental development in children who were prenatally exposed.[67] In addition, government safety standards do not take into account "the kinds of effects found from low-level exposure to endocrine disrupting chemicals . . . , which can be particularly harmful during prenatal development and childhood.[68]

Adverse health impacts documented among residents living near drilling and fracking operations include reproductive harms, increased asthma attacks, increased rates of hospitalization, ambulance runs, emergency room visits, self-reported respiratory problems and rashes, motor vehicle fatalities, trauma, and drug abuse. A recent review concluded:

> By several measures, evidence for fracking-related health problems is emerging across the United States. In Pennsylvania, as the number of gas wells increase in a community, so do rates of hospitalization. Drilling and fracking operations are correlated with elevated motor vehicle fatalities (Texas), asthma (Pennsylvania), self-reported skin and respiratory problems (southwestern Pennsylvania), ambulance runs and emergency room visits (North Dakota), infant deaths (Utah), birth defects (Colorado), high risk pregnancies (Pennsylvania), premature birth (Pennsylvania), and low birthweight (multiple states). Benzene levels in ambient air surrounding drilling and fracking

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[62] Colborn 2012 at pp. 21-22 (pages refer to page numbers in attached manuscript and not journal pages).
[63] Colborn 2012 at 11.
[64] *Id*. at 10.
[65] *Id*. at 11-12.
[66] *Id*. at. 12.
[67] *Id*. at 10-11.
[68] *Id*. at 12.

operations are sufficient to elevate risks for future cancers in both workers and nearby residents, according to studies. Animal studies show that two dozen chemicals commonly used in fracking operations are endocrine disruptors that can variously disrupt organ systems, lower sperm counts, and cause reproductive harm at levels to which people can be realistically exposed.[69]

A rigorous study by Johns Hopkins University, which examined 35,000 medical records of people with asthma in Pennsylvania, found that people who live near a higher number of, or larger, active gas wells were 1.5 to 4 times more likely to suffer from asthma attacks than those living farther away, with the closest groups having the highest risk.[70] Increased asthma risks occurred during all phases of well development. A recent Yale University study identified numerous fracking chemicals that are known, probable, or possible human carcinogens (20 air pollutants) and/or are linked to increased risk for leukemia and lymphoma (11 air pollutants), including benzene, 1,3-butadiene, cadmium, diesel exhaust, and polycyclic aromatic hydrocarbons.[71]

Numerous studies suggest that higher maternal exposure to fracking and drilling can increase the incidence of high-risk pregnancies, premature births, low-birthweight babies and birth defects. A study of 9,384 pregnant women in Pennsylvania found that women who live near active drilling and fracking sites had a 40 percent increased risk for having premature birth and a 30 percent increased risk for having high-risk pregnancies.[72] Another study found that pregnant women who had greater exposure to gas wells (measured in terms of proximity and density of wells) had a much higher risk of having low-birthweight babies; the researchers identified air pollution as the likely route of exposure.[73] In rural Colorado, mothers with greater exposure to natural gas wells were associated with a higher risk of having babies with congenital heart defects and possibly neural tube defects.[74]

Other studies have found that residents living closer to drilling and fracking operations had higher hospitalization rates[75] and reported more health symptoms, including upper respiratory problems and rashes.[76]

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[69] PSR 2016 at 93.

[70] Rasmussen, Sara G. et al., Association Between Unconventional Natural Gas Development in the Marcellus Shale and Asthma Exacerbations, 176 JAMA Internal Medicine 1334 (2016).

[71] Elliot, Elise G. et al., A Systematic Evaluation of Chemicals in Hydraulic-Fracturing Fluids and Wastewater for Reproductive and Developmental Toxicity, 27 Journal of Exposure Science and Environmental Epidemiology 90 (2016).

[72] Casey, Joan A., Unconventional Natural Gas Development and Birth Outcomes in Pennsylvania, USA, 27 Epidemiology 163 (2016).

[73] Stacy, Shaina L. et al., Perinatal Outcomes and Unconventional Natural Gas Operations in Southwest Pennsylvania. 10 PLoS ONE e0126425 (2015).

[74] McKenzie, Lisa M., Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado, 122 Environmental Health Perspectives 412 (2014).

[75] Jemielita, Thomas et al., Unconventional Gas and Oil Drilling Is Associated with Increased Hospital Utilization Rates. 10 PLoS ONE e0131093 (2015).

[76] Rabinowitz, Peter M. et al., Proximity to Natural Gas Wells and Reported Health Status: Results of a Household Survey in Washington County, Pennsylvania, 123 Environmental Health Perspectives 21 (2015).

Workers suffer high risks from toxic exposure and accidents.[77] As summarized by a recent review:

> Drilling and fracking jobs are among the most dangerous jobs in the nation with a fatality rate that is five times the national average and shows no sign of abating. Occupational hazards include head injuries, traffic accidents, blunt trauma, burns, inhalation of hydrocarbon vapors, toxic chemical exposures, heat exhaustion, dehydration, and sleep deprivation. An investigation of occupational exposures found high levels of benzene in the urine of wellpad workers, especially those in close proximity to flowback fluid coming up from wells following fracturing activities. Exposure to silica dust, which is definitively linked to silicosis and lung cancer, was singled out by the National Institute for Occupational Safety and Health as a particular threat to workers in fracking operations where silica sand is used. At the same time, research shows that many gas field workers, despite these serious occupational hazards, are uninsured or underinsured and lack access to basic medical care.[78]

Methods of collecting and analyzing emissions data often underestimate health risks by failing to adequately measure the intensity, frequency, and duration of community exposure to toxic chemicals from fracking and drilling; failing to examine the effects of chemical mixtures; and failing to consider vulnerable populations.[79] Of high concern, numerous studies highlight that health assessments drilling and fracking emissions often fail to consider impact on vulnerable populations including environmental justice communities[80] and children.[81] For example, a recent analysis of oil and gas development in California found that 14 percent of the state's population (5.4 million people) live within a mile of at least one oil and gas well. More than a third of these people (1.8 million) also live in areas most burdened by environmental pollution.[82]

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[77]Esswein, Eric J. et al., Occupational Exposures to Respirable Crystalline Silica During Hydraulic Fracturing, 10 Journal of Occupational and Environmental Hygiene 347 (2013); Esswein, Eric et al., Evaluation of Some Potential Chemical Exposure Risks during Flowback Operations in Unconventional Oil and Gas Extraction: Preliminary Results, 11 Journal of Occupational and Environmental Hygiene D174 (2014); Harrison, Robert J. et al., Sudden Deaths Among Oil and Gas Extraction Workers Resulting from Oxygen Deficiency and Inhalation of Hydrocarbon Gases and Vapors — United States, January 2010–March 2015. 65 MMWR Morb Mortal Wkly Rep 6 (2016); PSR 2016.

[78] PSR 2016 at 80

[79] Brown, David et al., Understanding Exposure From Natural Gas Drilling Puts Current Air Standards to the Test. 29 Reviews on Environmental Health 277 (2014).

[80] NRDC [Natural Resources Defense Council], Drilling in California: Who's At Risk?, October 2014 ("NRDC 2014"); Clough, Emily & Derek Bell, Just Fracking: A Distributive Environmental Justice Analysis of Unconventional Gas Development in Pennsylvania, USA, 11 Environmental Research Letters 025001 (2016); McKenzie, Lisa M. et al., Population Size, Growth, and Environmental Justice Near Oil and Gas Wells in Colorado, 50 Environmental Science & Technology 11471 (2016).

[81] Webb, Ellen et al., Potential Hazards of Air Pollutant Emissions From Unconventional Oil and Natural Gas Operations on The Respiratory Health of Children And Infants. 31 Reviews on Environmental Health 225 (2016).

[82] NRDC 2014.

The DEIS should incorporate a literature review of the harmful effects of each of these chemicals known to be used in fracking and other unconventional oil and gas extraction methods. Without knowing the effects of each chemical, the DEIS cannot accurately project the true impact of unconventional oil and gas extraction.

Courts interpret BLM's duty to provide supporting and detailed analyses, calculations and reports broadly, especially in the NEPA air quality impacts context. A recent Ninth Circuit decision provides a clear explanation of this agency duty. In *Great Basin Resource Watch v. BLM*, BLM's use of a zero baseline value for some pollutants was found to be unreasonable. 844 F.3d 1095, 1102 (9th Cir. 2016). BLM claimed that its decision to use a zero baseline for those pollutants was reasonable because it was "based on recommendations from the [NDEP's Bureau of Air Pollution Control], the agency with Nevada-specific expertise." *Id.* The FEIS similarly used the expertise of the NDEP's Bureau of Air Pollution Control ("BAPC"), preceding the table of baseline values with the note that "[t]he BAPC was contacted to obtain representative background concentrations for the modeling analysis." *Id.* In addition, the air impacts analysis submitted to BLM, the study that underlined the FEIS' air impacts analysis, noted that the "NDEP-BAPC recommends assuming zero background for" the remaining pollutants. *Id.* However, the only "expert recommendation" in the record was a short email from an NDEP official. *Id.* at 1103. The email was, in fact, the sole source of the zero baseline value cited in the FEIS.[83]

The court held that BLM's analysis of air impacts was inadequate. *Id.* at 1104. BLM did not provide any support for its use of baseline values of zero for several air pollutants, and significantly, the email did not explain why or how the NDEP arrived at zero. *Id.* at 1103. Such a basic assertion of opinion[84] coming from a BLM expert, without any supporting reasoning, is insufficient in an EIS. *Id.*

Courts have also held that if an agency relies only on expert opinion without supplying the underlying data supporting that opinion, such an activity destroys the public's ability to challenge government action. In other words, "NEPA requires that the public receive the underlying environmental data from which a [reviewing agency] expert derived her opinion." *Idaho Sporting Congress v. Thomas*, 137 F.3d 1146, 1150 (9th Cir. 1998); reversed on other grounds by *Lands Council v. McNair*, 537 F.3d 981, 997 (9th Cir. 2008).

An agency must also support its conclusions with studies the agency deems reliable. *Tri-Valley Cares v. U.S. Dep't of Energy*, 671 F.3d 1113, 1124 (9th Cir. 2012). The fact that such

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[83] That email read: "In an un-monitored area, BAPC uses 10.2 µg/m^3 for a 24-hour average background and 9.0 µg/m^3 for an annual average background for PM10. *All other pollutants are assumed to be 0*. If there is on-going quality assured monitoring representative of an area, we can rely on that data to set a different background. I'm not aware of any monitoring being performed by BAPC in the area you propose." (Emphasis added.)

[84] In the absence of data, the value that must be used as a baseline concentration for a particular air pollutant is a question of expert judgment, not one of fact. *Great Basin Resource* Watch, 844 F.3d 1095 at 1102. There is no uncertainty that the baseline pollutant levels are not zero; the question is what must be used for purposes of modeling. *Id.* In fact, the email to the NDEP official requested "some guidance on what background concentration values . . . *to use for a modeling analysis* in [the] Mount Hope area." (Emphasis added.) *Id.*

conclusions come from an expert at a state agency is of no significance to the analysis. *Natural Resources Defense Council, Inc. v. Herrington*, 768 F.2d 1355, 1412–14 (D.C. Cir. 1985). In *Natural Resources Defense Council*, the Department of Energy ("DOE") was required to prescribe energy efficiency improvement targets for thirteen appliances. *Id.* at 1362. The DOE expressed the overall costs of one of these appliances to a consumer as the "life-cycle cost" of the appliance. *Id.* at 1386. In determining these life-cycle costs, the DOE increased its real annual discount rate from 5 percent to 10 percent because an Office of Management and Budget ("OMB") Circular prescribed that figure as a government-wide discount rate. *Id.* at 1412. The court held that the OMB circular was essentially a "general instruction to government agencies and [did] not explain the reasoning behind the discount rate it recommend[ed]." *Id.* at 1413. It reasoned that "in a rulemaking which must be supported by substantial evidence, [an agency] may not rely without further explanation on an unelaborated order from another agency. Neither we as a reviewing court nor participants in the rulemaking can possibly discover the substantive basis of [the second agency's] edict." *Id.*

Here too, BLM failed to provide complete, defensible or verifiable data to support its air pollution analysis in the DEIS. These deficiencies must be corrected before the DEIS is finalized.

II. BLM Failed to Adequately Demonstrate the Project's Conformity with the Clean Air Act.

Implementation of the Clean Air Act exemplifies cooperative governance between the states and the federal government. The Clean Air Act aims "to protect and enhance the quality of the Nation's air resources . . . ." 42 U.S.C. § 7401(b)(1). The Clean Air Act states that, "No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve, any activity" that does not conform to an approved state air quality implementation plan. 42 U.S.C. § 7506(c)(1). "The assurance of conformity . . . shall be an affirmative responsibility of the head of such . . . agency." To ensure conformity, agency actions must not "cause or contribute to any new violation of any [air quality] standard" or "increase the frequency or severity of any existing violation of any standard in any area." *Id.* § 7506(c)(1)(B). This statute is very broadly applicable.

A SIP is a federally approved set of state regulations that are designed to prevent air quality deterioration and to restore clean air in areas that are out of attainment with federal standards. Conformity to a SIP as defined in the Clean Air Act, 42 U.S.C. § 7506(c)(1)(AB), means:

> (A) conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards; and
> (B) that such activities will not—
>
> > (i) cause or contribute to any new violation of any standard in any area;

(ii) increase the frequency or severity of any existing violation of any standard in any area; or
(iii) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The "assurance of conformity" to a SIP "shall be an affirmative responsibility" of a federal agency. 42 U.S.C. § 7506(c)(1). For Federal actions not related to transportation plans, "a conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal action would equal or exceed . . . 10/25/50/100 [tons/year.]." 40 C.F.R. § 95.153(b).

There are certain limited exceptions to general conformity requirements under the Clean Air Act, such as when emissions from federal actions are below de minimis thresholds. Portions of federal actions that require a permit under the Clean Air Act's new source review program, as set forth under 42 U.S.C. §§ 7410(a)(2)(c) and 7503, are also not subject to general conformity requirements. *See* 40 C.F.R. § 93.150(d).

The purpose of general conformity is to "prevent the Federal Government from interfering with the States' abilities to comply with the CAA's requirements." *Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752, 758 (2004). An action "delays attainment only if its implementation *postpones* attainment beyond the date by which it would have been achieved without the project." *Nat. Res. Def. Council v. E.P.A.*, 661 F.3d 662, 665 (D.C. Cir. 2011).

Before action is taken, a federal agency must make a determination that the federal action conforms to "certain threshold emission rates set forth in § 93.153(b)." *Pub. Citizen,* 541 U.S. at 771. If the action's direct and indirect emissions will exceed *de minimis* levels, then the agency must demonstrate conformity. *Ctr. for Biological Diversity v. Bureau of Land Mgmt.*, 833 F.3d 1136, 1148 (9th Cir. 2016); *see also* 40 C.F.R § 93.153(b)(1) (defines *de minimis* emission rates). Because "[n]either the federal nor the state rule identify the form an agency must use when deciding whether a project necessitates a full-scale conformity determination," courts have found it sufficient for an agency to explain their conformity decision in a NEPA document. *California ex rel. Imperial Cty. Air Pollution Control Dist. v. U.S. Dep't of the Interior*, 767 F.3d 781, 799 (9th Cir. 2014). Thus, "[a]n agency need not prepare a stand-alone document explaining such a decision." *Id.* Likewise, the Federal Land Policy and Management Act (FLPMA) requires the Secretary of the Interior, in developing and revising land use plans, to "provide for compliance with applicable pollution control laws, including State and Federal air, water, noise, or other pollution standards or implementation plans." 43 U.S.C. § 1712(c)(8).

For purposes of conformity, direct emissions are those emissions that are "caused or initiated by the Federal action . . . occur at the same time and place as the action and are reasonably foreseeable." 40 C.F.R. § 93.152. Indirect emissions are defined "as being (1) caused by federal action but occurring at a different time or place as the action, (2) reasonably foreseeable, (3) practically controlled by the agency, and (4) under the continuing program responsibility of the agency." *California ex rel. Imperial Cty. Air Pollution Control Dist.*, 767 F.3d at 799; *see also* § 93.152. "[T]he EPA has made clear that for purposes of evaluating causation in the conformity review process, some sort of 'but for' causation is sufficient." *Pub. Citizen*, 541 U.S. at 772. To demonstrate causation, projected emission concentrations with and without the project are compared. *Nat. Res. Def. Council*, 661 F.3d at 665. If "the project's emissions would result in either a new or aggravated violation relative to the initial emissions trajectory," then the project does not conform. *Id*.

Ozone is a criteria pollutant under the federal Clean Air Act, 42 U.S.C. § 7408. The Clean Air Act establishes a National Ambient Air Quality Standard ("NAAQS") for each criteria pollutant that represents the maximum allowable concentration of each pollutant that can occur in the air and still protect public health. See 42 U.S.C. § 7409. In 2008, EPA published a final rule strengthening the ozone NAAQS by lowering the 8-hour standard to 0.075 ppm. 73 Fed. Reg. 16,436 (March 27, 2008). In response to evolving science and public health needs, in 2015 EPA again lowered the 2008 ozone NAAQS, setting a new, more stringent 8-hour limit of 0.070 ppm. 80 Fed. Reg. 65,292 (Oct. 26, 2015). According to EPA, the new limit was necessary "to provide requisite protection of public health and welfare, particularly for at-risk groups including children, older adults, people of all ages with lung diseases such as asthma, and people who are active outdoors, both for recreational and work purposes. It will also improve the health of trees, plants, and ecosystems." *Id*.

EPA's decision to strengthen the ozone standard was based on numerous human health studies conducted over the past decade documenting the adverse effects of ozone on public health. Ozone concentrations are measured on an hourly basis. 40 C.F.R. § 50.15. An exceedance of the ozone standard occurs if the average of eight consecutive hourly readings exceeds 0.075 ppm, which is the 2008 NAAQS for ozone. *Id*. A violation of the standard occurs when the "3-year average of the annual fourth-highest 8-hour" ozone concentrations exceeds 0.075 ppm. *Id*.

When the 3-year average for ozone levels for any given region falls below 0.075ppm, the region is considered to be in attainment with the ozone NAAQS. 42 U.S.C. § 7407(d)(1)(A)(ii). Conversely, when the 3-year ozone average is above 0.075 ppm, the region is considered a nonattainment area for ozone. 42 U.S.C. § 7407(d)(1)(A)(i).

A 2011 interagency guidance memorandum of understanding, signed by the Department of Interior, outlines a commitment by the agency to undergo detailed analyses of air quality compliance, with a particular focus on non-attainment areas. The MOU establishes "a clearly defined, efficient approach to compliance with [NEPA] regarding air quality . . . in connection with oil and gas development on Federal lands."[85] The MOU "provides for early interagency consultation throughout the NEPA process; common procedures for determining what type of air quality analyses are appropriate and when air modeling is necessary; specific provisions

[85] Memorandum of Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions through the National Environmental Policy Act Process, Preamble (2011), available at: https://www.epa.gov/sites/production/files/2014-08/documents/air-quality-analyses-mou-2011.pdf.

for analyzing and discussing impacts to air quality and for mitigating such impacts; and a dispute resolution process to facilitate timely resolution of differences among agencies."[86] The goal of this process is to ensure that "[F]ederal oil and gas decisions do not cause or contribute to exceedances of the National Ambient Air Quality Standards (NAAQS)."[87] The MOU outlines recommended technical, quantitative procedures to follow, which include identifying the reasonably foreseeable number of oil and gas wells and conducting an emissions inventory of criteria pollutants. Further air quality modeling is required if certain criteria are met, based on the level of emissions impact and the geographic location of the action.[88]

In response to this interagency MOU, BLM implemented internal regulations in 2012 establishing a 10-step process for conducting a general conformity determination in compliance with the Clean Air Act section 176(c).[89] BLM circumvents CAA conformity requirements for the NPL project by excluding emissions from the Project's largest ozone emission source, drilling rigs.

A. BLM improperly excluded emissions from the CAA General Conformity Determination.

Excluding emissions from sources that may *voluntarily* obtain a permit from the Wyoming Department of Environmental Quality (DEQ) from the conformity evaluation is not permissible. The DEIS explains that BLM has excluded drill rig and production sources permitted by the Wyoming DEQ from the emissions levels considered in assessing whether the project's emission levels are below the de minimis threshold of 100 tons/yr of NOx or volatile organic compounds (VOCs).[90] Although 40 C.F.R. § 93.153(d)(1) provides that a conformity determination is not required for the portion of a federal action that includes stationary sources that *require* a permit under the new source review or prevention of significant deterioration programs, the regulation does not apply where the permit is voluntary rather than required. These voluntary permits may not require any offsets or other measures to actually account for the additionality of pollutants, and may not be subject to measures that ensure attainment of the NAAQS. Moreover, these voluntary permits, unlike the required permits referred to in 40 C.F.R. § 93.153(d)(1), may not be federally enforceable. Whereas the DEIS states that the drill rig permits in question are indeed federally enforceable, it does not address whether the other state permitted sources listed as excluded from the conformity determination reflect federally enforceable requirements. *See id*. BLM should explicitly evaluate whether all of the state-issued permits in question will include federally enforceable terms to ensure attainment of NAAQS prior to relying on such permitting to exclude consideration of emissions from the conformity determination.

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[86] *Id*. at 4.
[87] *Id*. at 1, 2.
[88] *Id.* § V.E.1., pg. 9.
[89] United States Department of the Interior, Bureau of Land Management, Instruction Memorandum No. 2013-025, Guidance for Conducting Air Quality General Conformity Determinations (December 4, 2012) *found at* https://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2013/IM_2013-025.html.
[90] *See* DEIS at 4-21.

Even if the state regulations under the state implementation plan purport to exempt activities covered under voluntary or non-federally enforceable permits from the conformity determination, the Clean Air Act itself still compels consideration. The statute itself spells out that conformity to a state implementation plan means more than compliance with the terms of the plan, but rather requires that the federal action not cause or contribute to a violation of air quality standards, increase the severity or frequency of violations, or delay the attainment of standards. 42 U.S.C. § 7506(c)(1)(B). Thus, BLM must consider whether emissions from activities covered by voluntary state permits in evaluating conformity.

B. BLM's "mitigation" associated with the conformity requirement is a radically different project from the considered alternatives and should be fully analyzed as a separate alternative.

Even exempting consideration of the sources described above, the levels of ozone precursors (NOx) for the annual increments of new emissions added in years 2 through 10 of the proposal still exceed the *de minimis* level of 100 tons/yr. This is true for the applicant's proposal, as well as for each alternative other than the no-action alternative.[91] Rather than acknowledge that the project proposal simply does not conform with the non-attainment requirements, BLM asserts that it will "mitigate" the non-conformity by only approving the amount of new annual well development that would be at or below 100 tons/yr.[92] The DEIS states that this "could result in a level of development less than 350 wells per year."[93] The DEIS acknowledges that this "mitigation measure" would mean that the period of development for the full 3,500 wells would extend beyond the 10-year time frame proposed by Jonah Energy.[94] Problematically, the DEIS does not acknowledge or evaluate how drastically this limitation would likely alter the timing, impact of emissions, or economics of the project.

The estimated NOx levels for the 350 new wells added in each year for years 4 through 10 are nearly *double* the de minimis threshold level.[95] Appendix M of the DEIS states that most of the non-excluded emissions causing the exceedance result from the operation of completion rigs.[96] Though the main text of the DEIS does not discuss it, according to the conformity determination in the Appendix M, the number of new wells that actually could be approved for completion each year is approximately 160.[97] Consequently, the development period likely would be more than double the planned ten-year period. The DEIS mentions that pollution control measures adopted by Jonah Energy may reduce emissions below the de minimis level, but provides no analysis of how the speculative adoption of these measures would affect the lengthened timeline under the "mitigated" version of the action alternatives. As discussed

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91 *See* DEIS at ES-11, 4-21 to 4-22.
92 DEIS at 4-22, 4-51.
93 DEIS at 4-22, 4-51.
94 DEIS at 4-51.
95 *See* DEIS 4-22, Table 4-4 (showing annual emissions between 191.7 tons/yr and 194.1 tons/yr NOx for years 4 through 10).
96 *See* Appendix M at M-4.
97 DEIS Appendix M at M-5 to M-6.

below, the DEIS does not provide analysis on how the very different pattern of development under the "mitigated" version of the action alternatives would affect the timing of air pollution impacts, economic impacts, or many other impacts of the project.

C. The DEIS fails to evaluate the air quality impacts in light of the lengthened timeline for emissions associated with the "mitigated" approach.

The DEIS does not evaluate whether the delayed timing for the peak emissions of ozone precursors associated with the "mitigated" version of the action alternatives would extend the duration of 8-hr ozone non-attainment. As in *New Mexico ex rel. Richardson v. Bureau of Land Mgmt*., where the court recognized that a "modified" alternative required additional analysis because the different location of lands subject to development restrictions would result in different habitat impacts than the alternative examined in the DEIS, here the difference in timing of the peak emission levels for the "mitigated" alternative will result in a different impact with respect to *when* ozone levels exceed the NAAQS and the duration of the exceedance. *See* 565 F.3d 683, 707 (10th Cir. 2009). Although at first blush, it may seem that stretching out the development period necessarily reduces pollution impacts by reducing the new pollution sources that come on line each year, this shift also changes the pattern of total annual emissions from the project. Peaks in total ozone precursor emissions may come at a time that is significantly later than the timing BLM has used to model the total air pollution impacts on NAAQS attainment or maintenance. For example, the modeling in the DEIS shows that when the peak ozone impacts from the project occur, they will not independently cause non-attainment of the 8–hr ozone NAAQS because ozone will be generally declining in all but one location (Boulder) and ozone levels in Boulder are expected to result in non-attainment even without the NPL project, with the project contributing 0.1 ppb to a total exceedance of roughly 2.0 ppb above the 70 ppb standard.[98] But if the peak ozone precursor emissions from the NPL project actually occur at a later date, when ozone levels at the Boulder site (or elsewhere) may otherwise be closer to and below the NAAQS, the sizable contribution from the NPL project could be the difference between attainment and non-attainment, and therefore would have the effect of sustaining the period of non-attainment longer than it otherwise would be. In short, although reducing total emissions at a given point in time is generally desirable, the altered pace of development may also shift the peak pollutant levels forward in time and thereby prolong the period of time where the public will suffer from unsafe levels of ozone in the Boulder, WY area.

D. The DEIS fails to re-evaluate the economic impacts in light of the lengthened timeline for emissions associated with the "mitigated" approach, and thereby exaggerates the benefits of the project.

The DEIS misleadingly exaggerates the economic benefits of the project by quantifying the benefits only for the scenario where full development occurs within 10 years, even though it has concluded that such development cannot occur without violating the Clean Air Act conformity requirement. Courts have recognized that the presentation of misleading economic information violates NEPA where it subverts NEPA's purpose of providing decisionmakers and

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[98] *See* DEIS at 4-37, Table 4–13.

the public with an accurate assessment. *See, e.g., Nat. Res. Def. Council v. U.S. Forest Serv.,* 421 F.3d 797, 812 (9th Cir. 2005) ("Had the decision makers and public known of the accurate demand forecast . . . and the concomitant lower employment and earnings potential, the Forest Service may have selected an alternative with less adverse environmental impact[.]"). The DEIS explicitly quantifies the economic benefits that are likely to accrue from the action alternatives, in each case relying on the assumption that 3,500 wells will be completed within 10 years as the basis for the calculations.[99] But BLM has made plain that the proposed rate of development would violate the conformity requirements, and that BLM therefore will only authorize a significantly slower pace of well development to ensure compliance with NAAQS non-attainment requirements.

As discussed above, the permissible rate of development likely could not exceed 160 wells per year. Yet the DEIS provides no analysis of how the economic benefits would be different, and makes no attempt to quantify the economic benefits under the pace of development that necessarily must constrain the alternatives. Instead, the DEIS merely states that impacts would be reduced, but would spread over more years.[100] The economic stimulus created by this type of project is not necessarily a linear function where lengthening the project would merely stretch out the time over which benefits accrue. An expedited development schedule may result in very different short and long term economic consequences. The DEIS in no way provides the public or the decision-makers with an idea of how much less the economic benefits will be from the mitigated version of the project, or how different the timeline will be for realizing those reduced economic benefits. The result of this absence of analysis is that the DEIS overstates the economic benefits of the project by quantifying benefits only for development scenarios that it has already determined are impermissible in light of the Clean Air Act conformity requirement.

In sum, the development scenario that BLM describes as a "mitigation measure" is really an independent alternative to the no-action alternative, as BLM has conceded that it cannot approve any alternative that would allow for full development within 10 years. To provide the fair comparison of alternatives that NEPA mandates, the impacts and benefits of the "mitigated" versions of the action alternatives should be analyzed and made explicit with the same level of detail provided for the no-action and original action alternatives. At present, the DEIS conceals the true level of impacts from the "mitigated" version of the action alternatives, making it impossible for decision-makers or the public to engage in a direct comparison of benefits and costs. Prior to finalization of the EIS, BLM should fully analyze the mitigated versions of the action alternatives and present that analysis to the public for comment.

E. BLM should explain how its conclusions regarding ozone impacts take into account the inability of the CMAQ model to predict high winter ozone levels.

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[99] *See* DEIS at 4-164 to 4-182; DEIS Appendix H-1 (economic analysis turning on assumption of a 10-year development phase and a 40-year production phase that overlaps with the initial 10-year development phase).
[100] DEIS at 4-177.

The DEIS acknowledges that the CMAQ modeling it has relied upon does not capture the high wintertime ozone concentrations occurring primarily in Sublette County.[101] With regard to the conclusions that can be drawn from the modeling, the DEIS states that "any impacts that are close to a level of concern should be viewed with this uncertainty in mind."[102] Problematically, the conclusions drawn by the DEIS about how the addition of ozone precursors associated with the peak emissions levels from the project do not appear to take into account this serious weakness of the model.[103] The consequence is that the DEIS likely understates the extent of NAAQS exceedance, both because it underestimates the background level of ozone pollution that is likely to occur without the project, and because it underestimates the extent to which the ozone precursors added by the NPL project will exacerbate those high wintertime ozone concentrations. The DEIS purports that NAAQS exceedance is expected for Boulder, but not for other sites within Sublette County,[104] but does not discuss how the model's inability to capture wintertime highs for those other locations in Sublette County may mean that NAAQS exceedances will likely occur there as well. The tabulated data thus misleadingly indicates that future NAAQS violations for ozone will be less severe and less widespread than is likely based on past observations of wintertime highs. The effect of this error is that decision makers and the public will not place sufficient weight on the importance of avoiding additional large contributions of ozone precursors, such as those that will result from the NPL project's accelerated development schedule.

This issue is even more important because the wintertime high ozone concentrations in the past have been linked to ozone precursors emitted by oil & gas activities.[105] Further, recent highs in wintertime ozone concentrations demonstrate how important it is that BLM examine this issue more carefully. In the winter of 2017," average ozone levels in the Upper Green River Basin exceeded the federal health-risk standard of 70 parts per billion for the first time since 2011. Eight-hour averages topped the standard on seven days — Jan. 18 and 19; Feb. 14, 15 and 17; and March 3 and 4" and reached a peak of 85 ppb.[106]

III. The DEIS Fails to Adequately Analyze Greenhouse Gas Impacts and Fails to Assess the Significance of Climate Change Impacts from the Project, in violation of NEPA.

The DEIS's analysis of the direct and indirect impacts of the greenhouse gas ("GHG") emissions that would result from the Project is wholly inadequate. First, the DEIS significantly

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[101] DEIS at 4-14. *See also* DEIS Appendix L Air Quality Assessment, Attachment C: CMAQ BASE-YEAR MODELING RESULTS AND MODEL PERFORMANCE EVALUATION at 69 ("For these same sites, as noted earlier, model performance is poor for the winter months and the time-series plots (not shown) indicate that the high concentrations that occur on several days in February and March are not simulated by the model.").
[102] DEIS at 4-14.
[103] *See* DEIS at 4-35 to 4-37.
[104] *See* DEIS at 4-37, Table 4-13.
[105] Sept. 29, 2016 Letter from Gov. Matt Mead to EPA Region 8 Administrator, Attachment 2 at 3, *available at* https://www.epa.gov/sites/production/files/2016-11/documents/wy-rec.pdf.
[106] Mead Gruver, US News, Winter Ozone Problem Returns to Western Wyoming Gas Fields (Mar. 20, 2017), https://www.usnews.com/news/best-states/wyoming/articles/2017-03-20/winter-ozone-problem-returns-to-western-wyoming-gas-fields.

underestimates the GHG emissions that would be produced during the construction, drilling, completion, and production phases over the lifetime of the Project. Secondly, the DEIS inexplicably fails to acknowledge and analyze the enormous quantities of GHG emissions that would result from the combustion of the natural gas and condensate produced by the Project. These downstream emissions would consume a significant portion (~1.2 percent) of the remaining U.S. carbon budget needed to avoid the worst dangers of climate change.

The DEIS estimates the direct GHG emissions produced during well construction, drilling, completion, and production phases, but *only* during the 10-year "development" period of the Project.[107] In doing so, the DEIS erroneously implies that the GHGs emitted by well production, drilling, and completion will somehow stop in year 11. However, the 3,500 natural gas wells proposed by the Project will keep producing over their lifetimes, well beyond the 10-year period covered by the DEIS's GHG analysis. At year 10, for example, well production alone will emit ~140,000 tons CO_2eq,[108] and annual production emissions will clearly continue to be large over the 40-year estimated lifetime of the Project. The 3,500 wells will also need to be maintained over their lifetimes, which will likely require additional drilling and completion activities, such as fracking, that will produce more GHG emissions. The EIS must acknowledge and fully estimate the GHG emissions that will come from drilling, completion, and production activities over the lifetime of the 3,500 wells.

The DEIS also vastly underestimates the global warming impact of the methane emissions that will be produced by the Project. Methane is an extremely potent GHG with a high global warming potential ("GWP"). The 2013 IPCC Fifth Assessment Report established a GWP of 87 for fossil fuel sources of methane over a 20-year time period, and a GWP of 36 over a 100-year time period.[109] In other words, over a 20-year period, methane is 87 times stronger in trapping heat than CO_2. However, the DEIS inexplicably uses a long-outdated and much lower estimate for methane GWP of 21 from the 1996 IPCC Second Assessment Report.[110] The DEIS's use of this outdated GWP does not reflect the best available science represented by the IPCC Fifth Assessment Report and must be corrected. Additionally, natural gas wells have been documented to be major sources of fugitive methane emissions during the extraction and production phases.[111] One recent study reported that methane emissions from gas and oil production are as much as 270 percent greater than previously estimated.[112] However, it is unclear how the DEIS accounted for fugitive methane emissions. It is also unclear how the

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[107] DEIS at 4-57.
[108] DEIS at Appendix L, pdf page 552.
[109] Myhre, Gunnar et al., 2013. Anthropogenic and Natural Radiative Forcing. Pp 659–740 in Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change IPCC. Stocker, T.F. et al., eds. Cambridge University Press, Cambridge UK and New York USA, at Table 8.7.
[110] DEIS at Appendix L at L-7.
[111] Allen 2013; Harriss, Robert et al., Using Multi-Scale Measurements to Improve Methane Emission Estimates from Oil and Gas Operations in the Barnett Shale Region, Texas, 49 Environmental Science & Technology 7524 (2015).
[112] Miller 2013.

DEIS calculated that Project GHG emissions in 2020 would total 0.19 MMt ("million metric tons") CO_2eq[113] since this figure does not align with Table 4-22.

A fatal flaw of the DEIS is that it fails to acknowledge and analyze the GHG emissions that would result from the combustion of the natural gas and natural gas condensate produced by the Project. The DEIS estimates that the Project will yield 3,500 to 7,000 billion cubic feet of gas and 17.5 to 140 million barrels ("bbls") of condensate over the estimated 40-year life of the Project[114] based on an estimated ultimate recovery of 1 to 2 billion cubic feet of gas per well for the 3,500 directionally drilled natural gas wells.[115] Using the EPA conversion factor for natural gas of 0.054717 metric tons CO_2/Mcf (where Mcf is defined as one thousand cubic feet),[116] the combustion of 3,500 to 7,000 billion cubic feet of gas would produce 192 million to 383 million metric tons of CO_2. Methane and nitrous oxide would also be produced by the combustion of natural gas,[117] and additional GHGs would be produced by the combustion of the condensate.

The DEIS states that "[t]he GHG emissions resulting from the development of the NPL Project under the Proposed Action scenario would contribute to the overall regional and global budget of GHG's in the atmosphere and increase GHG emissions compared to the No Action Alternative."[118] The DEIS also states that it is not possible to "estimate the net effect of the Proposed Action or alternatives on global GHG emissions or climate change."[119] However, the potential downstream emissions of more than 383 million metric tons of CO_2 that would result from the Project is demonstrably significant in the scope of national, state, and local level commitments to implementing rapid GHG emissions reductions to avoid the worst impacts of climate change. As detailed below, the estimated lifecycle CO_2 emissions that would result from this Project would comprise an astounding 1.2 percent of the remaining U.S. carbon budget for staying well below 2°C. At a time when the U.S. must rapidly ratchet down GHG emissions to avoid the worst dangers of climate change, BLM should not be committing to new fossil fuel development and infrastructure on our public lands that locks in carbon intensive oil production for years into the future.

The DEIS acknowledges that the Project will contribute to climate change and that climate change is a threat. It admits the largest contributor of GHG emissions is the "combustion of fossil fuels in power plants; on-road and off-road vehicles; drilling engines, pumps, and compressors used in oil and natural development; and construction equipment."[120] In addition, it

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[113] DEIS at 4-58.
[114] DEIS at ES-1 & 1-3.
[115] DEIS at 1-3.
[116] EPA conversion factors for **natural gas** *available at* https://www.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references; U.S. Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, U.S. EPA #430-R-15-004 (2015), *at* Annex 2 (Methodology for estimating CO_2 emissions from fossil fuel combustion), Table A-40 and Table A-47.
[117] U.S. Environmental Protection Agency, Emission Factors for Greenhouse Gas Inventories (April 4, 2014), https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf.
[118] DEIS at 4-60.
[119] DEIS at 4-58.
[120] DEIS at 3-39.

concedes that many activities in the Project Area currently generate GHGs.[121] Those direct emissions in the Project Area include "current and ongoing oil and gas and other minerals development, fire events, motorized vehicle use (e.g., off-highway vehicles), livestock grazing, facilities development, and other fugitive emissions."[122] The DEIS also acknowledges that GHG emissions from the Project will contribute to the global atmospheric budget, and that the resulting effects on climate change and global warming could impact local and regional weather patterns, "including increases in temperature that could affect the amount of water vapor in the atmosphere, the timing and amount of precipitation, the intensity of storm systems, snow melt, and soil moisture."[123] Thus, the DEIS itself makes a solid argument that the Project will contribute to increasing dangerous climate change impacts.

A robust body of scientific research has established that most fossil fuels must be kept in the ground to avoid the worst dangers of climate change. Human-caused climate change is already causing widespread damage from intensifying global food and water insecurity, the increasing frequency of heat waves and other extreme weather events, flooding of coastal regions by sea-level rise and increasing storm surge, the rapid loss of Arctic sea ice and Antarctic ice shelves, increasing species extinction risk, and the worldwide collapse of coral reefs.[124] The Third National Climate Assessment makes clear that "reduc[ing] the risks of some of the worst impacts of climate change" will require "aggressive and sustained greenhouse gas emission reductions" over the course of this century.[125]

The U.S. has committed to the climate change target of holding the long-term global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels"[126] under the Paris Agreement.[127] The U.S. signed the Paris Agreement on April 22, 2016 as a legally binding instrument through executive agreement,[128] and the treaty entered into force on November 4, 2016. The Paris Agreement codifies the international consensus that climate change is an "urgent threat" of global concern.[129] The Agreement also requires a "well below 2°C" climate target because 2°C

[121] *Id.*
[122] *Id.*
[123] DEIS at 4-385.
[124] Melillo, Jerry M., Climate Change Impacts in the United States: The Third National Climate Assessment, Terese (T.C.) Richmond, and Gary W. Yohe, Eds., U.S. Global Change Research Program (2014).
[125] *Id.* at 13, 14, & 649.
[126] *See* United Nations Framework Convention on Climate Change, Conference of the Parties, Nov. 30–Dec. 11, 2015, Adoption of the Paris Agreement Art. 2, U.N. Doc. FCCC/CP/2015/L.9 (Dec. 12, 2015), http://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf ("Paris Agreement").
[127] On December 12, 2015, 197 nation-state and supra-national organization parties meeting in Paris at the 2015 United Nations Framework Convention on Climate Change Conference of the Parties consented to the Paris Agreement committing its parties to take action so as to avoid dangerous climate change.
[128] *See* United Nations Treaty Collection, Chapter XXVII, 7.d Paris Agreement, List of Signatories; U.S. Department of State, Background Briefing on the Paris Climate Agreement, (Dec. 12, 2015). Although not every provision in the Paris Agreement is legally binding or enforceable, the U.S. and all parties are committed to perform the treaty commitments in good faith under the international legal principle of *pacta sunt servanda* ("agreements must be kept"). Vienna Convention on the Law of Treaties, Art. 26.
[129] *See* Paris Agreement, at Recitals.

of warming is no longer considered a safe guardrail for avoiding catastrophic climate impacts and runaway climate change.[130]

Immediate and aggressive GHG emissions reductions are necessary to keep warming well below 2°C rise above pre-industrial levels. The IPCC Fifth Assessment Report and other expert assessments have established global carbon budgets, or the total amount of carbon that can be burned while maintaining some probability of staying below a given temperature target. According to the IPCC, total cumulative anthropogenic emissions of CO_2 must remain below about 1,000 gigatonnes ("$GtCO_2$") from 2011 onward for a 66 percent probability of limiting warming to 2°C above pre-industrial levels, and to 400 $GtCO_2$ from 2011 onward for a 66 percent probability of limiting warming to 1.5°C.[131] These carbon budgets have been reduced to 850 $GtCO_2$ and 240 $GtCO_2$, respectively, from 2015 onward.[132]

Published scientific studies have estimated the U.S.' portion of the global carbon budget by allocating the remaining global budget across countries based on factors including equity and economics. Estimates of the U.S. carbon budget vary depending on the temperature target used by the study (1.5°C versus 2°C), the likelihood of meeting the temperature target (50 percent or 66 percent probability), the equity principles used to apportion the global budget among countries, and whether a cost-optimal model was employed. The U.S. carbon budget for limiting temperature rise to well below 2°C has been estimated at 38 $GtCO_2$, while the estimated budget for limiting temperature rise to 2°C ranges from 34 $GtCO_2$ to 158 $GtCO_2$.

Du Pont et al. (2017) averaged across five IPCC-AR5 sharing principles (e.g. capability, equal per capita, greenhouse development rights, equal cumulative per capita, and constant emissions ratio) to estimate the U.S. carbon budget through 2100 based on a cost-optimal model.[133] Du Pont et al. (2017) estimated the U.S. carbon budget at 57 $GtCO_2$eq (equal to ~38 $GtCO_2$)[134] for a 50 percent chance of returning global average temperature rise to 1.5°C by 2100, which is the only target among the studies that is consistent with the "well below 2°C"

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[130] *See* the comprehensive scientific review under the United Nations Framework Convention on Climate Change (UNFCCC) of the global impacts of 1.5°C versus 2°C warming: U.N. Subsidiary Body for Scientific and Technological Advice, Report on the Structured Expert Dialogue on the 2013–2015 review, FCCC/SB/2015/1NF.1 (2015), http://unfccc.int/resource/docs/2015/sb/eng/inf01.pdf; Schleussner, Carl-Friedrich et al., Differential climate impacts for policy-relevant limits to global warming: the case of 1.5C and 2C, 7 Earth Systems Dynamics 327 (2016).
[131] IPCC, 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change; Summary for Policymakers 25 (2013); IPCC, Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland 63–64 & Table 2.2 (2014).
[132] Rogelj, Joeri et al., Differences between carbon budget estimates unraveled, 6 Nature Climate Change 245, Table 2 (2016).
[133] Du Pont, Yann Robiou et al., Equitable mitigation to achieve the Paris Agreement goals, 7 Nature Climate Change 38 (2017).
[134] *See* Meinshausen, Malte et al., Greenhouse gas emission targets for limiting global warming to 2 degrees Celsius, 458 Nature 1158 (2009); we used a conversion factor of 1 $GtCO_2$ = 1.5 $GtCO_2$eq based on Table 1 in Meinshausen et al. 2009.

temperature commitment of the Paris Agreement. The U.S. carbon budget for a 66 percent probability of keeping warming below 2°C was estimated at 104 $GtCO_2eq$ (equal to ~69 $GtCO_2$).[135]

For a 66 percent probability of keeping warming below 2°C, Peters et al. (2015) estimated the U.S. carbon budget at 34 $GtCO_2$ based on an equity approach for allocating the global carbon budget, and 123 $GtCO_2$ under an inertia approach.[136] The "inertia" approach bases sharing on countries' current emissions, while the "equity" approach bases sharing on population size and provides for equal per-capita emissions across countries. Similarly using a 66 percent probability of keeping warming below 2°C, Gignac et al. (2015) estimated the U.S. carbon budget at 78 to 97 $GtCO_2$, based on a contraction and convergence framework, in which all countries adjust their emissions over time to achieve equal per-capita emissions.[137] Although the contraction and convergence framework corrects current emissions inequities among countries over a specified time frame, it does not account for inequities stemming from historical emissions differences. When accounting for historical responsibility, Gignac et al. (2015) estimated that the U.S. has an additional cumulative carbon debt of 100 $GtCO_2$ as of 2013. Using a non-precautionary 50 percent probability of limiting global warming to 2°C, Raupach et al. (2014) estimated the U.S. carbon budget at 158 $GtCO_2$ based on a "blended" approach of sharing principles that averages the "inertia" and "equity" approaches.[138]

Under any scenario, the remaining U.S. carbon budget consistent with limiting global average temperature rise to 1.5°C or 2°C is extremely small and is rapidly being consumed. In 2015 alone, global CO_2 emissions totaled 36 $GtCO_2$[139] and U.S. emissions totaled 6.5 $GtCO_2eq$.[140]

The more than 383 million metric tons of downstream CO_2 emissions that would result from this Project would comprise a shocking ~1 percent of the remaining U.S. carbon budget of 38 $GtCO_2$ for a 50 percent chance of returning global average temperature rise to 1.5°C by 2100. Lifecycle GHG emissions for the natural gas produced by the Project can also be generated using the Center's peer-reviewed carbon calculator and lifecycle GHG emissions model developed by EcoShift consulting.[141] In the context of this Project, the 3,500 to 7,000 billion cubic feet of gas

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[135] *Id.* 1 $GtCO_2$ = 1.5 $GtCO_2eq$ based on Table 1 in Meinshausen et al. 2009.
[136] Peters, Glen P. et al., Measuring a fair and ambitious climate agreement using cumulative emissions, 10 Environmental Research Letters 105004 (2015).
[137] Gignac, Renaud & Matthews, H. Damon, Allocating a 2°C cumulative carbon budget to countries, 10 Environmental Research Letters 075004 (2015). In a contraction and convergence approach, national emissions are allowed to increase or decrease for some period of time until they converge to a point of equal per capita emissions across all regions at a given year, at which point all countries are entitled to the same annual per capita emissions.
[138] Raupach, Michael et al., Sharing a quota on cumulative carbon emissions, 4 Nature Climate Change 873 (2014) at Supplementary Figure 7.
[139] *See* Le Quéré, Corrine, et al., Global Carbon Budget 2016, 8 Earth System Science Data 605 (2016), www.globalcarbonproject.org/carbonbudget/16/data.htm.
[140] U.S. EPA Inventory of Greenhouse Gas Emissions and Sinks 1990-2013 (2015)
[141] *See* Ecoshift Consulting, The potential Greenhouse Gas Emissions of U.S. Federal Fossil Fuels, Center for Biological Diversity and Friends of the Earth (2015), http://www.ecoshiftconsulting.com/wp-content/uploads/Potential-Greenhouse-Gas-Emissions-U-S-Federal-Fossil-Fuels.pdf.

would result in estimated lifecycle emissions of 0.22 $GtCO_2eq$ to 0.44 $GtCO_2eq$, not counting the emissions from the combustion of the condensate. Potential emissions from this Project alone would consume ~1.2 percent of the remaining U.S. carbon budget for staying well below 2°C, which is significant and alarming.

Furthermore, a large body of scientific research has established that the vast majority of global and U.S. fossil fuels must stay in the ground in order to hold temperature rise to well below 2°C.[142] Studies estimate that 68 to 80 percent of global fossil fuel reserves must not be extracted and burned to limit temperature rise to 2°C based on a 1,000 $GtCO_2$ carbon budget.[143] For a 50 percent chance of limiting temperature rise to 1.5°C, 85 percent of known fossil fuel reserves must stay in the ground.[144] Effectively, fossil fuel emissions must be phased out globally within the next few decades.[145]

A 2016 global analysis found that potential carbon emissions from developed reserves in currently operating oil and gas fields and mines would lead to global temperature rise beyond 2°C.[146] Excluding coal, the current operation of oil and gas fields alone would take the world beyond 1.5°C.[147] To stay well below 2°C, the clear implication is that no new fossil fuel extraction or transportation infrastructure should be built, and governments should grant no new permits for new fossil fuel extraction and infrastructure.[148] Moreover, some fields and mines, primarily in rich countries, must close before fully exploiting their resources. The analysis concludes that because "existing fossil fuel reserves considerably exceed both the 2°C and 1.5°C carbon budgets[, i]t follows that exploration for new fossil fuel reserves is at best a waste of money and at worst very dangerous."[149]

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[142] The IPCC estimates that global fossil fuel reserves exceed the remaining carbon budget for staying below 2°C by 4 to 7 times, while fossil fuel resources exceed the carbon budget for 2°C by 31 to 50 times. *See* Bruckner, Thomas et al., 2014: Energy Systems. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, at Table 7.2, http://ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter7.pdf.

[143] To limit temperature rise to 2°C based on a 1,000 $GtCO_2$ carbon budget from 2011 onward, studies indicate variously that 80 percent (Carbon Tracker Initiative, Unburnable Carbon 2013: Wasted capital and stranded assets (2013)), 76 percent (Raupach et al. 2014), and 68 percent (Oil Change International, The Sky's Limit: Why the Paris Climate Goals Require a Managed Decline of Fossil Fuel Production (2016)) of global fossil fuel reserves must stay in the ground. *See* Carbon Tracker Initiative 2013; Raupach 2014; Oil Change International 2016.

[144] Oil Change International 2016.

[145] Rogelj et al. (2015) estimated that a reasonable likelihood of limiting warming to 1.5° or 2°C requires global CO_2 emissions to be phased out by mid-century and likely as early as 2040–2045. *See* Rogelj, Joeri et al., Energy system transformations for limiting end-of-century warming to below 1.5°C, 5 Nature Climate Change 519 (2015). Climate Action Tracker indicated that the United States must phase out fossil fuel CO_2 emissions even earlier—between 2025 and 2040—for a reasonable chance of staying below 2ºC. *See, e.g*. Climate Action Tracker, USA, (last updated 25 Jan. 2017), http://climateactiontracker.org/countries/usa.

[146] Oil Change International 2016.

[147] *Id.* at 5.

[148] *Id.* at 5.

[149] *Id.* at 17.

According to a U.S.-focused analysis,[150] the U.S. alone has enough recoverable fossil fuels, split about evenly between federal and non-federal resources, that if extracted and burned, would exceed the global carbon budget for a 1.5°C limit, and would consume nearly the entire global budget for a 2°C limit.[151] Specifically, the analysis found:

- Potential GHG emissions of federal fossil fuels (leased and unleased) if developed would release up to 492 gigatons ("Gt") of carbon dioxide equivalent pollution ("CO_2e"), representing 46 percent to 50 percent of potential emissions from all remaining U.S. fossil fuels;
- Of that amount, up to 450 Gt CO_2e have not yet been leased to private industry for extraction;
- Releasing those 450 Gt CO_2e (the equivalent annual pollution of more than 118,000 coal-fired power plants) would be greater than any proposed U.S. share of global carbon limits that would keep emissions well below 2°C.[152]

Fracking has also opened up vast resources that otherwise would not be available, increasing the potential for future GHG emissions.

The long-lived GHG emissions and fossil fuel infrastructure that would result from this Project would contribute to undermining climate commitments and increasing dangerous climate change impacts at a time when there is urgent need to keep most fossil fuels in the ground.

A. The DEIS fails to meaningfully consider the negative economic impacts of the greenhouse gases contributed by this proposal.

The DEIS summarily asserts that calculating the social cost of carbon would be of limited use in comparing alternatives and therefore doesn't make any attempt to calculate it, or to provide any estimate of the economic harms associated with the project's greenhouse gas contributions.[153] The failure to assess the negative economic impacts of the project's greenhouse gas emissions resulting from climate change effects violates NEPA. *See, e.g.*, *CBD v. NHTSA*, 538 F.3d 1172, 1198 (9th Cir. 2008). Dramatically accelerating the release of an enormous quantity of greenhouse gases, cumulatively with other activities that are presently contributing to climate change, has undeniable economic consequences resulting from climate change impacts on human health and the environment both within and outside of the project area. Failing to make any attempt to quantify these economic impacts improperly skews the comparison of the project's costs and benefits. This deficiency in the DEIS should be addressed prior to finalization

[150] Ecoshift Consulting 2015.
[151] *Id.* at 4.
[152] For the United States, Raupach et al. (2014) provided a mid-range estimate of the U.S. carbon quota of 158 $GtCO_2$ for a 50 percent chance of staying below 2°C, using a "blended" scenario of sharing principles for allocating the global carbon budget among countries. This study estimated U.S. fossil fuel reserves at 716 $GtCO_2$, of which coal comprises the vast majority, indicating that most fossil fuel reserves in the U.S. must remain unburned to meet a well below 2°C carbon budget (Raupach 2014 at Supplementary Figure 7).
[153] *See* DEIS at 4-58 (project impacts) and 4-387 (cumulative impacts).

of the EIS, and the analysis should be presented to the public for comment prior to finalization of the DEIS.

The DEIS asserts that “It is not possible at this time to link projected GHG emissions associated with the Proposed Action to specific environmental impacts within the analysis area.”[154]. Examining the economic impacts from the project’s contribution of GHGs does not require establishing such a specific link, as federal guidance documents on the “Social Cost of Carbon” have made clear. Regardless of whether those guidance documents have been withdrawn by the current administration, the rational, evidence-based conclusions and methodologies therein still demonstrate that these negative economic impacts can indeed be assessed. The assertion that establishing such a link is a necessary predicate to assessing the negative impacts of the project’s GHG contributions turns on an erroneous view of the relevant area for determining impacts and of the other actions with which the project’s emissions have a cumulative effect.

IV. The DEIS Fails to Take a Hard Look at Impacts to Wildlife.

The NPL DEIS systematically fails to acknowledge or mitigate foreseeable harms to a variety of wildlife species from the proposed project. In addition, the proposed action relies on undefined and uncertain-to-occur future actions to mitigate those harms, such as the proposed decision to authorize surface-disturbing development within greater sage-grouse winter habitat under undefined future conditions, DEIS at 2-12, and fails to analyze any alternative (such as the wildlife protection and winter concentration avoidance alternatives rejected without consideration in detail) that would significantly mitigate the habitat loss from the proposed project.

A. Pronghorn

The Path of the Pronghorn migration corridor, stretching more than 170 miles from summer ranges in Grand Teton National Park to winter ranges in Seedkadee National Wildlife Refuge and near the Red Desert, passes through the NPL project area. This narrow migration corridor has been used by pronghorns for more than 5,800 years.

The NPL Project Area, if fully developed, could create a complete obstruction, to the essential and narrow migration corridor for this pronghorn herd. According to Berger et al. (2006: 530), “The narrow corridor appears invariant (figure 2), for all animals that move northward to reach the park used the same pathway though not moving in synchrony and up to one month apart.” Migrating pronghorn exhibited high use the undeveloped portion of the NPL Project Area during all 5 years of a recent pronghorn migration study. Pronghorn spent 78% of their time at stopovers along the migration route during spring migration; these stopovers were not related to higher-quality habitat but instead to migration obstructions, leading the researchers to conclude, “migrating pronghorn may experience trophic mismatch leading to reduced fitness of summering herds.”

[154] DEIS at ES-11.

This is the only migration corridor available to this herd, and obstructing it would likely extirpate the entire pronghorn population in Grand Teton National Park.[155] The DEIS, however, does include concrete measures to monitor or mitigate impacts to the irreplaceable pronghorn migration corridor. Instead, the DEIS states, "Jonah Energy will work with BLM, WGFD, and other stakeholders to better understand, and if possible preserve, migration corridors in the Project Area." DEIS at B-35. A vague and unenforceable promise to "better understand" and "if possible preserve" provides no assurances whatsoever that NPL development will not impair or even obstruct completely the migration corridor.

Multiple studies have documented that migrating pronghorn along the Path of the Pronghorn avoid oil and gas development. In addition, oil and gas development has caused pronghorn to abandon their crucial winter ranges in this region.[156] Beckmann's 2012 study recommends that land managers should minimize impacts not only in designated pronghorn winter range, but also in other areas identified as having concentrated pronghorn winter use as shown in the study's use maps.

BLM cannot defer research and mitigation, but must determine what the Project's site-specific impacts to pronghorn would be, and how they will be mitigated. Furthermore, BLM must analyze impacts of noise and other disturbance—including construction, drilling, and production-related activities and vehicle traffic—on pronghorn both from the NPL project directly and the cumulative effects with neighboring wellfields, highways, and other disturbances taken into account. The percentage of surface disturbance allowed is significant for pronghorn. According to Beckman, "On average, habitat patches with the highest probability of use have 3.8% surface disturbance due to construction of roads and well-pads versus 5.3% and 5.2% surface disturbance for patches with high to medium use, respectively (tables 4-8)." Thus, the best available science indicates that the proposed 5% surface disturbance cap on sage-grouse priority habitat proposed in the DEIS is insufficient to protect pronghorn winter habitats.

B. Mule Deer

The DEIS fails to take a hard look significant new research showing adverse effects to mule deer migrations and population from energy development. It further fails to justify BLM's refusal to engage in actual site-specific assessment of effects on particular deer subpopulations, winter use areas, and/or migration corridors. Merely describing the "the *category* of impacts anticipated from oil and gas development" fails to meet NEPA's hard look requirement when it is reasonable for BLM to do more. *See New Mexico*, 565 F.3d at 707 (emphasis original). "NEPA does not permit an agency to remain oblivious to differing environmental impacts, or hide these from the public, simply because it understands the general type of impact likely to

[155] Berger, J., S.L. Cain, and K.M. Berger. 2006. Connecting the dots: An invariant migration corridor links the Holocene to the present. Biol. Lett. 2: 528-531

[156] Berger 2006; Beckmann, Jon et al., Human-mediated shifts in animal habitat use: Sequential changes in pronghorn use of a natural gas field in Greater Yellowstone, 147 Biological Conservation 222 (2012), doi:10.1016/j.biocon.2012.01.003

occur. Such a state of affairs would be anathema to NEPA's 'twin aims' of informed agency decisionmaking and public access to information." ***Id.***

Research shows that residential and energy development has reduced all ungulates across the West. The low-elevation valleys and mountain foothills, once important habitat for ungulates, are filled with cities and towns.[157] The same is true particularly on winter ranges.[158] For example, between 1980 and 2010, western Colorado saw a 37% increase in residential land-use in mule deer habitat, primarily on their winter range.[159] The resulting lack of high-quality winter range is limiting robust mule deer population growth.[160]

An earlier dearth of high-quality, long-term, and controlled studies made it difficult to evaluate with precision the role of oil and gas development in mule deer habitat and population decline.[161] Clearly, mule deer demonstrate avoidance of roads and oil and gas infrastructure, with as-yet inadequately-understood consequences for migration, energy budgets, adult and fawn survival, and population.[162]

Some of the best available long-term, controlled studies evaluate mule deer population density before and after oil and gas development in the Sublette mule deer herd.[163] The Sublette mule deer study has compared mule deer density in control and development zones, and found mule deer densities declined 30% in the development area, as opposed to 10% in the control area.[164] Sawyer and Strickland found that "the observed decline of mule deer in the treatment area was likely due to gas development, rather than drought or other environmental factors that have affected the entire Sublette Herd unit."[165]

The Sublette example is particularly important when considering energy development's effects on mule deer populations, their winter range, and their migration patterns in sagebrush habitats of the west. For example, even in its relatively early stages compared to Wyoming, the most recent spatial analysis of already-occurring effects on mule deer in western Colorado finds

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[157] Polfus, J. L., and P. R. Krausman. 2012. Impacts of residential development on ungulates in the Rocky Mountain West. Wildlife Society Bulletin 36:647-657.
[158] Johnson, H.E., et al. 2016. Increases in residential and energy development are associated with reductions in recruitment for a large ungulate. Global Change Biology, doi: 10.1111/gcb.13385 ("Johnson et al. 2016").
[159] Johnson et al. 2016.
[160] Bergman, E. J.,et al. 2015. Density dependence in mule deer: a review of evidence. Wildlife Biology 21:18-29; Johnson et al. 2016.
[161] Hebblewhite, Mark. 2011. Effects of Energy Development on Ungulates. Energy Development and Wildlife Conservation in Western North America 71-94. Island Press, Washington D.C.
[162] Hebblewhite 2011; Sawyer, H., et al. 2013. A framework for understanding semi-permeable barrier effects on migratory ungulates. Journal of Applied Ecology 2013:50, doi:10.1111/1365-2664.12013; Lendrum, P.E. et al.. 2012. Habitat selection by mule deer during migration: effects of landscape structure and natural-gas development. Ecosphere 3(9):82.
[163] Sawyer, H., R. Nielson, and D. Strickland. 2009. Sublette Mule Deer Study (Phase II): Final Report 2007. Western Ecosystems Technology, Inc. Cheyenne, Wyoming, USA.
[164] *Id*.
[165] *Id.*

energy development has the second-largest effect on deer recruitment, exceeded only by residential development.[166]

Most recently, Hall Sawyer and colleagues published their conclusions from seventeen years of telemetry data on mule deer exposed to energy development in Pinedale area, and found that, despite the using of timing stipulations and other, more aggressive, mitigation measures, development of oil and gas infrastructure within seasonal habitat and migration corridors has massive and long-term adverse effects on mule deer population levels:

> Mule deer consistently avoided energy infrastructure through the 15-year period of development and used habitats that were an average of 913 m further from well pads compared with predevelopment patterns of habitat use. Even during the last 3 years of study, when most wells were in production and reclamation efforts underway, mule deer remained >1 km away from well pads. The magnitude of avoidance behavior, however, was mediated by winter severity, where aversion to well pads decreased as winter severity increased. Mule deer abundance declined by 36% during the development period, despite aggressive onsite mitigation efforts (e.g. directional drilling and liquid gathering systems) and a 45% reduction in deer harvest. Our results indicate behavioral effects of energy development on mule deer are long term and may affect population abundance by displacing animals and thereby functionally reducing the amount of available habitat.[167]

It is demonstrated that oil and gas development affects mule deer habitat use and migration patterns by causing site avoidance, particularly in daytime,[168] and creating "semi-permeable" barriers to migration routes.[169] In addition, it is well-documented that human development causes direct habitat loss and fragmentation through the construction of infrastructure, and indirect habitat loss through deer avoidance of infrastructure and related activities; these consequences likely reduce the carrying capacity of the landscape.[170] A recent study shows that oil and gas development causes significant habitat loss:

> Energy development drove considerable alterations to deer habitat selection patterns, with the most substantial impacts manifested as avoidance of well pads with active drilling to a distance of at least 800 m. Deer displayed more nuanced responses to other infrastructure, avoiding pads with active production and roads to a greater degree during the day than night. In aggregate, these responses equate

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[166] Johnson et al. 2016.
[167] Sawyer, Hall et al., Mule Deer and Energy Development—Long-term trends of habituation and abundance, Global Change Biology 2017:1-9, *available at* http://onlinelibrary.wiley.com/doi/10.1111/gcb.13711/epdf.
[168] Lendrum 2012.
[169] Sawyer et al 2013.
[170] Johnson et al. 2016.

to alteration of behavior by human development in over 50% of the critical winter range in our study area during the day and over 25% at night.[171]

Additionally, mule deer may suffer higher mortality rates in developed landscapes because of increased vehicle collisions and accidents (i.e., entrapment in fences); moreover, increased road densities expose mule deer to more hunters, poachers and predatory domestic pets.[172]

Mule deer also need migration corridors that are protected from human development. An ongoing mule deer study by members of the Wyoming Migration Initiative has found that mule deer migration patterns are altered by human development – herds will move faster, stop less to feed, and detour around developed portions of their route.[173] Moreover, herds that can't migrate in search of the most nutritious grasses just end up smaller in number. As a result, Wyoming Game and Fish Department is working to further protect migration routes in the state, for instance, no more than four oil and gas well pads allowed in a migration corridor and no development allowed in corridors narrower than a quarter mile.

C. Greater Sage-Grouse

Protecting wintering habitats is essential to assuring the continued existence and ultimate recovery of the species, and these wintering habitats are frequently located outside the protective boundaries of designated Priority Habitats. BLM's sage-grouse amendments EIS analysis provides an explanation of why these habitats are important to protect: "Doherty et al. (2008) demonstrated that Greater Sage-Grouse in the Powder River Basin avoided otherwise suitable wintering habitats once they have been developed for energy production, even after timing and lek buffer stipulations had been applied." Buffalo RMP Revision DEIS at 367. In addition, Carpenter et al. (2010) found that wintering sage grouse avoided otherwise suitable habitats within a 1.2-mile radius of wellsites. Dzialek et al. confirmed these relationships for wintering sage grouse in Wyoming, and concluded:

> First, we can say with increasing confidence that the winter pattern of occurrence among sage-grouse shows consistency throughout disparate portions of its distribution. Second, avoidance of human activity appears to be a general feature of winter occurrence among sage-grouse.

This indicates a broad consistency in sage grouse sensitivity to human development in wintering habitats throughout the species' range.

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171 Northrup, J. M. et al. Quantifying spatial habitat loss from hydrocarbon development through assessing habitat selection patterns of mule deer, Global Change Biology (Aug. 2015), available at http://onlinelibrary.wiley.com/doi/10.1111/gcb.13037/epdf.
172 Johnson et al. 2016.
173 Sawyer 2013.

More recently, Holloran et al.,[174] determined that increasing well-pad density had a negative impact on sage grouse winter habitat use regardless of whether liquid gathering systems were used to reduce human activity levels or not, and also found a negative impact of distance to wellsites (within 2.8 km or 1.75 miles) and distance to roads. The NPL DEIS concedes that BLM lacks an adequate understanding of the effects of allowing development within Winter Concentration Areas: “the potential impacts on Sage-Grouse resulting from development in the NPL Project Area Winter Concentration Areas are not well understood.” DEIS at 2-11. Despite this admission that relevant and critical impacts have not been analyzed, all alternatives authorize development within Winter Concentration areas, proposing to “defer authorizing development in Winter Concentration Areas until additional research is completed to better inform the appropriate level of development, potential impacts, and appropriate mitigation.” DEIS at 2-12. Yet, despite the fact that substantial evidence does confirm adverse effects on winter habitat use within 1.75 miles of oil and gas development activities, the DEIS declines to even consider an alternatives that would either prohibit surface occupancy within Winter Concentration Areas or adopt a 1.75-mile buffer on new roads, drilling sites, or other forms of disturbance.

Thank you for providing the opportunity to comment and we hope that you will give our recommendations strong consideration.

Sincerely,

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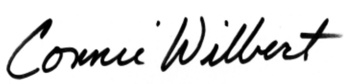

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[174] Holloran, M.J., B.C. Fedy, and J. Dahlke. 2015. Winter habitat use of greater sage-grouse relative to activity levels at natural gas well pads. J. Wildl. Manage. 79:630-640.

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