

Northwest
Eugene, Oregon

Southwest
Taos, New Mexico

Northern Rockies
Helena, Montana

Southern Rockies
Durango, Colorado

Defending the West

www.westernlaw.org

Western Environmental Law Center

March 21, 2008

Gene Terland, State Director
U.S. Bureau of Land Management, Montana State Office
5001 Southgate Drive
Billings, Montana 59101-4669

Re: PROTEST OF BLM's APRIL 8, 2008 OIL & GAS LEASE SALE

Dear State Director Terland:

The Natural Resources Defense Council, Oil and Gas Accountability Project, and Rocky Mountain Clean Air Action hereby protest the U.S. Bureau of Land Management's ("BLM") entire April 8, 2008 lease sale for the States of Montana and North Dakota. *See* Exhibits 1 - 8 (maps detailing protested parcels based on BLM data).

This Protest is predicated on BLM's failure to address global warming and climate change and the impacts of this failure upon the Protestors interests.¹ Upstream oil and gas production emits greenhouse gas emissions ("GHG") into the atmosphere, contributing to global warming and climate change.² Global warming and climate change also impacts the

¹ Global warming and climate change is a product of the greenhouse effect whereby greenhouse gases in the atmosphere trap the sun's heat and prevent it from being released into space. While the greenhouse effect is essential to life on earth, the marked increased in greenhouse gases from human activities has warmed the Earth's climate and thus set in motion a chain of impacts to the climate and the life systems that rely upon the climate.

² The IPCC (www.ipcc.ch/pdf/glossary/tar-ipcc-terms-en.pdf) defines GHGs as follows:

Greenhouse gases are those gaseous constituents of the *atmosphere*, both natural and *anthropogenic*, that absorb and emit radiation at specific wavelengths within the spectrum of *infrared radiation* emitted by the Earth's surface, the atmosphere, and clouds. This property causes the *greenhouse effect*. Water vapor (H₂O), *carbon dioxide* (CO₂), *nitrous oxide* (N₂O), *methane* (CH₄), and *ozone* (O₃) are the primary greenhouse gases in the Earth's atmosphere. Moreover there are a number of entirely human-made greenhouse gases in the atmosphere, such as the *halocarbons* and other chlorine- and bromine-containing substances, dealt with under the *Montreal Protocol*. Besides CO₂, N₂O, and CH₄, the *Kyoto Protocol* deals with the greenhouse gases *sulfur hexafluoride* (SF₆), *hydrofluorocarbons* (HFCs), and *perfluorocarbons* (PFCs).

built and human environments, stressing even strong, resilient ecological systems, in particular given the direct surface impact caused by the spiderweb of oil and gas infrastructure on the landscape, and affecting BLM's past, present, and future land protection and management activities.

Before surrendering lease rights, the Protestors therefore ask BLM to prepare an Environmental Impact Statement pursuant to the National Environmental Policy Act ("NEPA") to address global warming issues implicated by the lease sale's surrender of lease rights.³ Specifically, the Protestors ask that BLM, through the NEPA process:

- (1) Quantify past, present, and reasonably foreseeable GHG emissions from BLM-authorized oil and gas development to address the direct, indirect, and cumulative impacts of these GHG emissions to the environment;
- (2) Identify, consider, and adopt a GHG emissions limit or GHG reduction objective for BLM-authorized oil and gas activities;
- (3) Identify, consider, and adopt management measures – such as pre-commitment lease stipulations and post-commitment conditions of approval⁴ – to reduce GHG emissions from BLM-authorized oil and gas management activities;
- (4) Track and monitor GHG emissions from BLM-authorized oil and gas operations through time;
- (5) Consider how climate change affects ecological resiliency, and whether such impacts warrant enhanced ecological protections;

At the outset, it is important to emphasize that the intent behind this protest is not to prohibit oil and gas development but, rather, to simply ensure that oil and gas development on our public lands is held to the highest science-based standards, and to ensure that in our drive to produce domestic energy, we do not unintentionally compromise the resiliency and integrity of our socially, ecologically, and economically critical built and natural environments. Fundamentally, by submitting this protest, the Protestors are asking BLM to take the long-view, and to ensure that decisions made today do not compromise our ability to make informed decisions in the future.

The following sections constitute the statement of reasons in support of the protest. These sections identify the Protestors' interests (Section I), articulate the core reason compelling BLM's need to address global warming and climate change (Section II), explain the legal basis mandating BLM action to address global warming and climate change (Section III), detail the

³ Given the nature of the issues, the NEPA process may also implicate the need to prepare Resource Management Plan revisions or amendments.

⁴ There is a distinction between BLM's expansive pre-commitment authority to subject a lease to stipulations at the lease stage, and BLM's far more limited post-commitment authority to subject a lessee's exercise of its contractually-enforceable lease rights to conditions of approval at the Application for Permit to Drill stage.

specific actions, (1) – (5), identified above that BLM must take (Section IV), and provide a brief conclusion (Section V).

I. ORGANIZATIONAL INTERESTS

The Natural Resources Defense Council is a nonprofit organization of scientists, lawyers, and environmental specialists with members and online activists throughout the United States dedicated to protecting public health and the environment. One of our nation’s most effective environmental action groups, NRDC’s mission is to safeguard the Earth: its people, its plants and animals, and the natural systems upon which all life depends. To achieve this mission, NRDC is intensively involved in efforts to curb global warming and climate change, minimize the societal costs of the energy services that a healthy economy requires, and obtain a clean, secure energy future for America by reducing our dependence on fossil fuels.

The Oil and Gas Accountability Project is a program of Earthworks, a 501(c)(3) nonprofit dedicated to reducing and preventing the impacts of oil and gas development on oil and gas-field communities. OGAP/Earthworks works with community groups, landowners, organizations, and individuals to protect our environment, public health, and communities by providing technical, policy, and organizing assistance, and serving as a clearinghouse of information for organizations and individuals concerned with oil and gas development in Montana and throughout the United States. As a nonprofit organization dedicated to supporting the public interest on a number of issues associated with oil and gas development, OGAP/Earthworks’s interests in this rulemaking process are based solely on our interest in participating in, and informing the public at large about, energy policy in the United States.

Rocky Mountain Clean Air Action is a nonprofit public interest organization dedicated to protecting clean air for healthy children and healthy communities in the Rocky Mountain region. Rocky Mountain Clean Air Action seeks to secure sound and responsible clean air policy in the region, advocating for science-based decisions that safeguard human health and welfare. Rocky Mountain Clean Air Action’s interests in this protest are to secure a platform by which BLM can enhance the health and welfare of its citizens and set a leading example that other federal and state agencies working in the Rocky Mountain West can follow in their efforts to understand and control GHG emissions.

II. THE THREAT OF GLOBAL WARMING AND CLIMATE CHANGE DEMANDS IMMEDIATE ACTION BY BLM.

In its November 2007 Synthesis Report, Summary for Policymakers, the Nobel-prize winning Intergovernmental Panel on Climate Change (“IPCC”) determined that “[w]arming of the climate system is unequivocal” and, further, that “[o]bservational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases.”⁵ According to Rajendra Pachauri, the IPCC’s

⁵ 2007 IPCC Synthesis Report, Summary for Policymakers, at 2 (www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf) (attached as Exhibit 9).

Chairman, “If there’s no action before 2012, that’s too late ... What we do in the next two to three years will determine our future. This is the defining moment.”⁶

Simply put, BLM is part of this defining moment. As BLM has explained, the intersection of global warming and climate change with BLM’s management of the public lands “requires public engagement, science drawn from many disciplines, and careful balancing of multiple goals.” Government Accountability Office, *Climate Change: Agencies Should Develop Guidance for Addressing the Effects on Federal Land and Water Resources* at 174 (Aug. 2007) (“2007 GAO Report”) (attached as Exhibit 10). We could not agree more. Fortunately, as detailed below, Congress has provided BLM with the legal tools to address the two distinct, though intertwined land protection and management elements implicated by this intersection: mitigation and adaptation.

Through *mitigation*, BLM must quantify and reduce GHG emissions from oil and gas management activities. Through *adaptation*, BLM must address how global warming and climate change will impact the environment, and ensure that the built and natural environments BLM is responsible for are sufficiently resilient to withstand or adapt to global warming and climate change impacts. Given the time lag between the point a problem is acknowledged, and the point it is actually addressed – for example, through regulation or policy guidance – BLM must begin to act, *now*, to ensure that meaningful global warming and climate change management measures can be implemented before 2012. As noted in the 2007 GAO Report:

Some resource managers identified potential complications with issuing guidance related to climate change. In our workshop, resource managers discussing the grasslands and shrublands ecosystem said that policy development can take years; therefore, in their view, the agencies may not be able to respond to climate change in an appropriate time frame.

2007 GAO Report at 40. As stated in a recent draft paper on global warming and climate change, whose lead author is none other than Dr. James Hansen, of the National Space and Aeronautics Administration:

Humanity today, collectively, must face the uncomfortable fact that industrial civilization itself has become the principal driver of global climate. If we stay our present course, using fossil fuels to feed a growing appetite for energy-intensive life styles, we will soon leave the climate of the Holocene, the world of human history ... Humanity’s task of moderating human-caused global climate change is urgent.⁷

BLM has stated that global warming and climate change is allegedly a “high priority” for the Department of the Interior and its employees. 2007 GAO Report at 175. Unfortunately, despite BLM’s representation, we have yet to see this “high priority” reflected in actual land

⁶ www.nytimes.com/2007/11/18/science/earth/18climateneu.html (attached as Exhibit 11).

⁷ Hansen, J., *et al.*, Target Atmospheric CO₂: Where Should Humanity Aim? (Draft Paper, 2008) (attached as Exhibit 12).

protection and management decisions. If indeed global warming and climate is a “high priority” then it is surely the case that BLM’s lease sales should be scrutinized before BLM commits public resources to long-term oil and gas development.

III. BLM IS LEGALLY OBLIGATED TO ADDRESS GLOBAL WARMING AND CLIMATE CHANGE.

1. Secretarial Order 3226 Requires that BLM Consider and Analyze Potential Climate Change Impacts.

The starting point underscoring BLM’s legal obligation to address global warming and climate change is an Order issued by the Secretary of the Interior in 2001: Secretarial Order 3226, *Evaluating Climate Change Impacts in Management Planning* (January 19, 2001) (attached as Exhibit 13). This Order, in Section 1, explains that “[t]here is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision making.” Secretarial Order 3226 is action-forcing, mandating, in Section 3, the following:

Each bureau and office of the Department will consider and analyze potential climate change impacts when undertaking long-range planning exercises, when setting priorities for scientific research and investigations, when developing multi-year management plans, and/or when making major decisions regarding the potential utilization of resources under the Department’s purview. Departmental activities covered by this Order include, but are not limited to, programmatic and long-term environmental reviews undertaken by the Department, management plans and activities developed for public lands, planning and management activities associated with oil, gas and mineral development on public lands, and planning and management activities for water projects and water resources.

Section 3’s action-forcing mechanisms are self executing. Section 4 provides that Secretarial Order 3226 “is effective immediately and will remain in effect until its provisions are converted to the Departmental Manual or until it is amended, superseded or revoked, whichever comes first.” Thus, while the Department of the Interior, since 2001, has not yet developed global warming and climate change-related guidance for BLM and BLM’s field offices, this fact does not excuse BLM’s duties, here, to comply with Secretarial Order 3226. *See* 2007 GAO Report at 8. To a degree, BLM’s failure to comply with Secretarial Order 3226 appears political. As the GAO noted, “Officials at BLM headquarters stated that the order was signed during the prior administration, and that the order has not been emphasized because it was not consistent with the current administration’s previous position on climate change.” 2007 GAO Report at 37. This seems to undercut BLM’s representation that climate change is a “high priority.” 2007 GAO Report at 175. Further undercutting BLM’s representation is the view of federal land managers that “efforts to address the effects of climate change are ad hoc and piecemeal.” *Id.* at 37. Regardless, as set forth in this protest, global warming and climate change implicate legal obligations that cannot be excused on the basis of top-down political emphases or, as the case may be, de-emphases.

2. The Federal Land Policy and Management Act Requires that BLM Consider and Analyze Potential Climate Change Impacts.

Secretarial Order 3226 is complemented by the Federal Land Policy and Management Act (“FLPMA”). FLPMA provides BLM with the authority and responsibility to address global warming and climate change. This is done through inventories, land use planning, and actual land use protection and management. FLPMA states that:

[T]he national interest will be best realized if the public lands and their resources are periodically and systematically inventoried and their present and future use is projected through a land use planning process coordinated with other Federal and State planning efforts.

43 U.S.C § 1701(a)(2). This provision is reflected in an action-forcing mandate whereby BLM “shall prepare and maintain on a continuing basis an inventory of all public lands and their resource and other values” 43 U.S.C. § 1711(a). These inventories are used in the development and implementation of Resource Management Plans (“RMPs”). 43 U.S.C. § 1712.

By law, the BLM, in developing and revising RMPs, must adhere to a series of planning principles. 43 U.S.C. § 1712(c). In particular, BLM must “weigh long-term benefits to the public against short-term benefits” and “coordinate the land use inventory, planning, and management activities of or for such lands with the land use planning and management programs of other Federal departments and agencies and of the States and local governments within which the lands are located.” 43 U.S.C. § 1712(c)(7), (9). The entire purpose behind RMPs is to plan for land protection and management; without RMP-stage guidance, BLM is reduced to a reactive posture that is ineffective and inconsistent with FLPMA.

In addition to these planning principles, RMPs must be designed and implemented consistent with BLM’s affirmative environmental responsibilities. FLPMA requires that:

[T]he public lands be managed in a manner that will protect the quality of the scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use.

43 U.S.C. § 1702(a)(8). Generally managed for multiple use and sustained yield (43 U.S.C. § 1701(a)(7)), BLM is duty bound to manage the public lands for the broad public interest:

The term “multiple use” means the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over

areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resources uses that takes into account the long-term needs of future generations for renewable and non-renewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.

43 U.S.C. § 1702(c). These provisions are reinforced by affirmative mandates requiring that BLM: (1) “take any action necessary to prevent unnecessary or undue degradation of the lands” (43 U.S.C. § 1732(b)); and (2) “minimize adverse impacts on the natural, environmental, scientific, cultural, and other resources and values (including fish and wildlife habitat) of the public lands involved” (43 U.S.C. § 1732(d)(2)(A)).

3. The National Environmental Policy Act Requires that BLM Consider and Analyze Potential Climate Change Impacts.

Implementation of our Nation’s mineral leasing program must also comply with the National Environmental Policy Act (“NEPA”); global warming and climate change are issues that must be addressed through the NEPA process. *See, e.g., Ctr. for Biological Diversity v. Nat’l. Highway Traffic Safety Admin.*, 508 F.3d 508, 550 (9th Cir. 2007) (NHTSA failed to evaluate adequately global warming impacts of changes to fuel efficiency standards for vehicles); *Mid States Coalition for Progress v. Surface Transp. Bd.*, 345 F.3d 520 (8th Cir. 2003) (increased coal consumption and global warming emissions was reasonably foreseeable effect of railroad expansion to transport coal).

NEPA provides an overlay on all BLM authorities and responsibilities; “the policies, regulations, and public laws of the United States *shall* be interpreted and administered in accordance with the policies set forth in [NEPA]...” 42 U.S.C. § 4332(1) (emphasis added). NEPA thus functions as “our basic national charter for protection of the environment.” 40 C.F.R. § 1500.1(a). As our national charter, NEPA is designed to:

encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; [and] to enrich the understanding of the ecological systems and natural resources important to the Nation...

42 U.S.C. § 4321; *see also id.* § 4331. Accordingly, all federal agencies, when they articulate “proposals for ... major federal actions significantly affecting the quality of the human environment,” must prepare a hard look NEPA analysis *prior to* “any irreversible and

irretrievable commitments of resources which would be involved in the proposed action should it be implemented.” 42 U.S.C. § 4332(2)(C)(v). As federal courts have explained:

Agencies are to perform this hard look before committing themselves irretrievably to a given course of action so that the action can be shaped to account for environmental values.

Sierra Club v. Hodel, 848 F.2d 1068, 1093 (10th Cir. 1988). The lease sale, as the point of commitment, must therefore be justified through the NEPA process. Pre-commitment NEPA analysis is key because:

Ultimately, of course, it is not better documents but better decisions that count. NEPA’s purpose is not to generate paperwork – even excellent paperwork – but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on [an] understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.

40 C.F.R. § 1500.1(c); *see also* 40 C.F.R. § 1500.2(e).

To “foster excellent action,” NEPA’s implementing regulations provide that “[a]gencies shall not commit resources prejudicing selection of alternatives before making a final decision ([40 C.F.R. §] 1506.1).” *Id.*; 40 C.F.R. § 1502.2(f). The regulations further provide that the NEPA analysis “shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made.” 40 C.F.R. § 1502.2(g). Thus, BLM cannot merely promise to address global warming and climate change issues in the future; BLM has an immediate duty to address these issues now, before BLM sells lease rights.

Through the NEPA process, BLM must address a proposal’s “environmental impact” and the “adverse environmental effects which cannot be avoided should the proposal be implemented.” 42 U.S.C. §§ 4332(2)(C)(i), (ii); 40 C.F.R. §§ 1502.16 (requiring discussion of environmental consequences), 1508.9 (defining an EA as encompassing requirement to address environmental impacts and consider alternatives). These impacts fall into one of three categories: (1) direct impacts; (2) indirect impacts; and (3) cumulative impacts. 40 C.F.R. §§ 1508.7, 1508.8.

Here, direct impacts include the GHG emissions from oil and gas operations to the atmosphere; the indirect, secondary impacts triggered by the exploration, production, and processing, transportation and distribution, and refining; and the cumulative impacts of GHG emissions to the atmosphere from oil and gas operations when combined with oil and gas operations in other BLM Resource Areas, such as in Wyoming’s Buffalo Field Office, and other GHG emitting sources, such as coal-fired power plants. According to the American Petroleum Institute (“API”), “The oil and gas industry...includes all direct activities related to producing, refining, transporting, and marketing crude oil and associated natural gas, and refined products....These segments are the direct activities within the oil and gas industry that have the

potential to emit GHG.” See Exhibit 14 at 2-1.⁸ GHGs released by oil and gas operations include CO₂, methane, and to a lesser extent nitrous oxide (“N₂O”).⁹

Key direct sources of GHGs associated with oil and gas exploration, production, and processing include combustion sources, such as natural gas compressor engines, vented methane from sources such as tanks, pneumatic devices, well completions and workovers, and gas dehydration and sweetening, and vented CO₂ from coalbed methane gas. Additionally, these activities also involve the emission of GHGs from electricity imports. See Table 1.

⁸ Shires, T.M. and C.J. Loughran. *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry*. American Petroleum Institute (February 2004).

⁹ According to the U.S. Environmental Protection Agency, methane is 21 times more potent than CO₂ as a greenhouse gas, while nitrous oxide is 310 times more potent. See, <http://www.epa.gov/methane/scientific.html> and <http://www.epa.gov/nitrousoxide/scientific.html> (last visited March 21, 2008).

Table 1. GHGs from Oil and Gas Exploration, Production, and Processing Operations.¹⁰

EXPLORATION AND PRODUCTION	CO₂	N₂O	CH₄	Section
<i>COMBUSTION SOURCES – Stationary Devices</i>				
Boilers/Steam Generators	X	X	X	4.1, 4.2, 4.3
Heaters/Treaters	X	X	X	4.1, 4.2, 4.3
Internal Combustion (IC) Engines	X	X	X	4.1, 4.2, 4.3
Turbines	X	X	X	4.1, 4.2, 4.3
Flares	X	X	X	4.4
Incinerators	X	X	X	4.6
<i>COMBUSTION SOURCES – Essential Mobile Sources</i>				
Planes/helicopters	X	X	X	4.5
Supply boats, barges	X	X	X	4.5
Other company vehicles	X	X	X	4.5
<i>COMBUSTION SOURCES – Indirects</i>				
Electricity imports	X	X	X	4.7
Process heat/steam imports	X	X	X	4.7
<i>VENTED SOURCES – Process Vents</i>				
Gas sweetening processes	X		X	5.1
Dehydration processes			X	5.1
<i>VENTED SOURCES – Other Venting</i>				
Tanks	X		X	5.4
Pneumatic devices	X (*)		X	5.6.1
Chemical injection pumps	X (*)		X	5.6.2
Well testing	X (*)		X	5.6.3
Exploratory drilling	X		X	5.6.3
<i>VENTED SOURCES – Maintenance/Turnarounds</i>				
Vessel blowdown	X (*)		X	5.7.2
Well workovers	X (*)		X	5.7.2
Compressor starts	X (*)		X	5.7.2
Compressor blowdowns	X (*)		X	5.7.2
Gathering pipeline blowdowns	X (*)		X	5.7.2
<i>VENTED SOURCES – Non-routine Activities</i>				
Pressure relief valves (PRVs)	X (*)		X	5.7.2
Well tests and blowdowns (when not flared)	X (*)		X	5.7.2
Emergency shutdown (ESD)/ emergency safety blowdown (ESB)	X (*)		X	5.7.2
<i>FUGITIVE SOURCES</i>				
Equipment component leaks	X (*)		X	6.1

X Document provides an emission estimation approach for these sources.

*Emission estimation approach is provided, but only applicable to CO₂ rich production streams (e.g., CO₂ flood or enhanced oil recovery). Significance of these sources depends on the CO₂ concentration and source-specific emission rate.

Direct sources of GHGs associated with the exploration, production, and processing specifically from coalbed methane (“CBM”) production activities, which occur in southern Montana, are somewhat particularized. *See* Table 2. According to the API:

¹⁰ *See* Exhibit 14 at 2-5.

In conventional CBM operations, several gas production wells are drilled from the surface to the coal seam and the pressure in the coal beds is reduced, thereby releasing the CH₄ [methane]. GHG emissions result from the IC [internal combustion] engines used to drill the production wells. Flaring emissions are not routine but may occur if the natural gas is flared due to process upsets.

Emission sources associated with producing CBM are the same as those associated with conventional natural gas production. The recovered CBM is separated from other contaminants (e.g., formation water, CO₂) at the surface. Process equipment, such as water tanks, dehydrators, amine units, and/or pneumatic devices result in vented and fugitive emissions throughout the same mechanisms as conventional natural gas production. Combustion emissions result from compressors used to transport the recovered natural gas.

Exhibit 14 at 2-7. Indirectly, electricity imports can be a source of GHGs associated with CBM production.

Table 2. GHGs from Coalbed Methane Oil and Gas Exploration, Production, and Processing Operations.¹¹

COAL BED METHANE PRODUCTION	CO₂	N₂O	CH₄	Section
<i>COMBUSTION SOURCES – Stationary Devices</i>				
Boilers/steam generators	X	X	X	4.1, 4.2, 4.3
Internal combustion (IC) engines	X	X	X	4.1, 4.2, 4.3
Turbines	X	X	X	4.1, 4.2, 4.3
Flares	X	X	X	4.4
<i>COMBUSTION SOURCES – Essential Mobile Sources</i>				
Mining equipment	X	X	X	4.5
Other company vehicles	X	X	X	4.5
<i>COMBUSTION SOURCES – Indirects</i>				
Electricity imports	X	X	X	4.7
Process heat/steam imports	X	X	X	4.7
<i>VENTED SOURCES – Process Vents</i>				
Gas sweetening processes	X		X	5.1
Dehydration processes			X	5.1
<i>VENTED SOURCES – Other Venting</i>				
Water tanks			X	5.4.3
Coal-handling			X	5.6.5
<i>VENTED SOURCES – Maintenance/Turnarounds</i>				
Vessel blowdown			X	5.7.2
Well workovers			X	5.7.2
Compressor starts			X	5.7.2
Compressor blowdowns			X	5.7.2
Gathering Pipeline Blowdowns			X	5.7.2
<i>VENTED SOURCES – Non-routine Activities</i>				
Gathering pipeline leaks			X	5.7.2
Pressure relief valves (PRVs)			X	5.7.2
Well tests and blowdowns (when not flared)			X	5.7.2
<i>FUGITIVE SOURCES</i>				
Equipment component leaks			X	6.1

GHGs from transportation and distribution are released as crude oil and associated gas that are moved from the production sector to refineries or gas processing plants, and may also include the movement of natural gas or other petroleum products to market or distribution centers. Key direct sources of GHGs include process engines and heaters, storage tanks, and transportation activities. *See* Table 3.

¹¹ *See* Exhibit 14 at 2-8.

Table 3. GHGs from Oil and Gas Transportation and Distribution Operations.¹²

TRANSPORTATION AND DISTRIBUTION	CO₂	N₂O	CH₄	Section
<i>COMBUSTION SOURCES – Stationary</i>				
Turbines	X	X	X	4.1, 4.2, 4.3
Engines	X	X	X	4.1, 4.2, 4.3
Heaters	X	X	X	4.1, 4.2, 4.3
Flares	X	X	X	4.4
Catalytic and thermal oxidizers	X	X	X	4.6
<i>COMBUSTION SOURCES – Essential Mobile Sources</i>				
Marine, road, or railroad tankers	X	X	X	4.5
Barges	X	X	X	4.5
Planes/helicopters	X	X		4.5
Other company vehicles	X	X		4.5
<i>COMBUSTION SOURCES - Indirects</i>				
Electricity imports	X	X	X	4.7
Process heat/steam imports	X	X	X	4.7
<i>VENTED SOURCES – Process Vents</i>				
Storage tanks			X	5.4
Loading/unloading/transit			X	5.5
Pneumatic devices			X	5.6.1
<i>VENTED SOURCES – Maintenance/Turnarounds</i>				
Pipeline blowdowns			X	5.7.4, 5.7.5
Pigging operations			X	5.7.4
Compressor starts			X	5.7.4
Compressor blowdowns			X	5.7.4
Compressor station blowdowns			X	5.7.4
Vessel blowdowns			X	5.7.4
<i>VENTED SOURCES – Non-Routine Activities</i>				
Pressure relief valves			X	5.7.4, 5.7.5
Surge tanks			X	5.7.4
<i>FUGITIVE SOURCES</i>				
Process equipment leaks			X	6.1
Pipeline leaks			X	6.1

According to the API, “The refining segment consists of all refinery sites that take in crude and produce finish products, such as gasoline.” Exhibit 14 at 2-12. GHGs are released during distillation processes that separate petroleum hydrocarbons into narrower boiling ranges, and a number of processes that react the hydrocarbons, including cracking, coking, reforming, alkylation, and isomerization. While CO₂ is the key GHG associated with refining, methane and nitrous oxide are also released during the process. See Table 4.

¹² See Exhibit 14 at 2-11.

Table 4. GHGs from Oil Refining Operations.¹³

REFINING	CO₂	N₂O	CH₄	Section
COMBUSTION SOURCES – Stationary Devices				
Boilers	X	X	X	4.1, 4.2, 4.3
Process heaters	X	X	X	4.1, 4.2, 4.3
Turbines	X	X	X	4.1, 4.2, 4.3
Engines	X	X	X	4.1, 4.2, 4.3
Flares	X	X	X	4.4
Catalytic and thermal oxidizers	X	X	X	4.6
Coke calcining kilns	X	X	X	4.6
Incinerators	X	X	X	4.6
COMBUSTION SOURCES – Essential Mobile Sources				
Company vehicles	X	X		4.5
COMBUSTION SOURCES - Indirects				
Electricity imports	X	X	X	4.7
Process heat/steam imports	X	X	X	4.7
VENTED SOURCES – Process Vents				
Catalytic cracking	X			5.2.1
Catalytic reforming	X			5.2.1
Catalyst regeneration	X			5.2.1, 5.2.4
Thermal cracking				5.2.6
Flexi-coking	X			5.2.3
Delayed coking	X			5.2.3
Steam methane reforming (hydrogen plants)	X			5.2.2
Sulfur recovery units				5.2.6
Asphalt production				5.2.5
VENTED SOURCES – Other Venting				
Storage tanks				5.4
Pneumatic devices				5.6.1
Loading racks			X	5.5
VENTED SOURCES – Maintenance/Turnarounds				
Equipment/process blowdowns			X	5.7.6
Heater/boiler tube decoking			X	5.7.6
Compressor starts			X	5.7.6
VENTED SOURCES – Non-routine Activities				
Pressure relief valves (PRV)	X		X	5.7.6
Emergency shut down (ESD)	X		X	5.7.6
FUGITIVE SOURCES				
Fuel gas system leaks			X	6.1, B.3
Other process equipment leaks			X	6.1, B.3
Wastewater collection and treating			X	6.2.1
Sludge/solids handling				6.2.1
Cooling towers				6.2.1

Other oil and gas industry segments that may release GHGs include petrochemical manufacturing, mining, heat and electricity generation, and oil and gas retail and marketing.

¹³ See Exhibit 14 at 2-13.

These processes utilize equipment and practices that release CO₂, methane, and N₂O. *See*, Exhibit 14 at 2-10, 2-15, 2-16, and 2-17.

Fundamentally, BLM must take a hard look at the full lifecycle of GHG emissions from oil and gas development and must not look at GHG emissions “in a vacuum.” *Grand Canyon Trust v. FAA*, 290 F.3d 339, 342 (D.C. Cir. 2002). Beyond GHG emissions from oil and gas, BLM must also acknowledge that global warming and climate change affects land protection and management; a business-as-usual approach to management, in the face of global warming and climate change, is seems obviously self defeating, compromising, if not forthrightly addressed, past, present, and future management decisions.

Importantly, NEPA does not mandate that BLM simply disclose the impacts of oil and gas operations, but affirmatively obligates BLM to consider what to do about such GHG emissions. BLM must consider “alternatives to the proposed action” and “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.” 42 U.S.C. §§ 4332(2)(C)(iii), 4332(2)(E). As explained by NEPA’s implementing regulations, BLM must “[r]igorously explore and objectively evaluate all reasonable alternatives” and specifically “[i]nclude the alternative of no action.” 40 C.F.R. §§ 1502.14(a), (d). Alternatives, notably, constitute NEPA’s “heart.” 40 C.F.R. § 1502.14(a). Operating in concert with NEPA’s mandate to address environmental impacts, BLM’s fidelity to alternatives analysis allows agencies to “sharply defin[e] the issues and provid[e] a clear basis for choice among options by the decision maker and the public.” 40 C.F.R. § 1502.14.

Here, these alternatives consist of GHG-specific lease stipulations and post-lease conditions of approval to oil and gas operations designed to reduce GHG emissions from production-based activities. Given the nature of the problem, and how oil and gas development is authorized, these stipulations and conditions of approval must be identified, analyzed, and are generally best imposed on the basis of pre-commitment decision-making and NEPA analysis. Awaiting post-commitment decision-making and NEPA analysis is typically too late as BLM has surrendered lease rights and thus constrained its own legal authority. Pragmatically, pre-commitment decision-making and NEPA analysis also affords BLM the chance to reach out to federal and state partners, engage the public and the oil and gas industry in a meaningful, transparent dialogue, and allow all parties to plan for and implement GHG reduction measures in a uniform, efficient, and consistent fashion.

Beyond alternatives that consider GHG reduction measures, alternatives centered on protecting the built and natural systems on BLM-managed public lands must account for global warming and climate change impacts. Land protection and management measures involving the protection of landscape permeability, key wildlife habitats, in particular core areas and migration/adaptation corridors, key watersheds, *etc.* must be considered before lease rights are sold to ensure that the landscape is properly protected and managed.¹⁴ In some instances, we

¹⁴ Science-based mechanisms designed to compile information using computational models to predict landscape, vegetation, and wildlife changes in response to changing climate conditions are being developed now. *See* LandScope America, collaborative project of NatureServe and the National Geographic Society (<http://www.natureserve.org/projects/landscape.jsp>); Climate Impacts Group, University of Washington

surmise that *in situ* conservation, within BLM administrative boundaries, may be possible. In most instances, however, we surmise that BLM will have to coordinate intensively with BLM's federal and state partners to address protection and management issues at broader, landscape scales. *See* 2007 GAO Report at 43-44. The cost of failing to consider such alternatives in terms of damaged wildlands, shrinking fish and wildlife populations, lost tourist revenue, and disappearing drinking water supplies may very well be exorbitant.¹⁵

Of note, once a NEPA analysis is completed, an agency must prepare a supplement whenever “[t]he agency makes substantial changes in the proposed action that are relevant to environmental concerns” or “[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.” 40 C.F.R. §§ 1502.9(c)(1)(i)-(ii). As noted by the Supreme Court of the United States,

It would be incongruous with ... [NEPA's] manifest concern with preventing uninformed action, for the blinders to adverse environmental effects, once unequivocally removed, to be restored prior to the completion of agency action
.....

Marsh v. Or. Nat. Resources Council, 490 U.S. 360, 371 (1989). Thus, BLM cannot rely on existing NEPA analyses to justify the lease sales given that these NEPA analyses do not appear to address global warming and climate change in any capacity.

At bottom, agency adherence to NEPA's action-forcing mandates ensures that NEPA's noble purpose and policies (42 U.S.C. §§ 4321, 4331) are achieved. As explained by the Supreme Court, “the thrust of [NEPA] is ... that environmental concerns be integrated into the very process of agency decision-making.” *Andrus v. Sierra Club*, 442 U.S. 347, 350 (1979).

BLM's duty to address global warming and climate change through NEPA was acknowledged over ten years ago by the Council on Environmental Quality (“CEQ”). CEQ, in draft guidance issued in 1997, stated that the “NEPA process provides an excellent mechanism for consideration of ideas related to global climate change.”¹⁶ CEQ then decided that the available scientific evidence showed that climate change is a reasonably foreseeable impact that

(<http://cses.washington.edu/cig/pnwc/cc.shtml>); Climate Change and Aspen: An Assessment of Impacts and Potential Responses (2006) (http://www.agci.org/pdf/Canary/ACIA_Report.pdf); Easterling DR, Meehl J, Parmesan C, Chagnon S, Karl TR, Mearns LO. 2000. Climate extremes: observations, modeling, and impacts. *Science* 289:2068-74.

¹⁵ Even in circumstances where an agency determines that the “costs of obtaining information is exorbitant or the means to obtain it are not known,” CEQ regulations require an agency in its EIS to (1) state that the information is unavailable; (2) state the information's relevance; (3) give a summary of the existing “scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts”; and (4) evaluate such impacts based on “theoretical approaches or research methods generally accepted in the scientific community.” 40 C.F.R. § 1502.22(b).

¹⁶ Memorandum from McGinty, Kathleen A., Chairman, Council on Environmental Quality, to Heads of Federal Agencies on Draft Guidance Regarding Consideration of Global Climatic Change in Environmental Documents Prepared Pursuant to the National Environmental Policy Act 1 (Oct. 8, 1997) (www.mms.gov/eppd/compliance/reports/ceqmemo.pdf) (attached as Exhibit 15).

must be considered in NEPA documents.¹⁷ Of course, at this juncture, the available scientific evidence demonstrates that global warming and climate change are not merely reasonably foreseeable, but *observed*, with impacts to our built and natural environments being felt *now*. See, e.g., 2007 IPCC Synthesis Report. Regardless, CEQ concluded that “it would be prudent to consider in the context of planning for major federal actions, both their potential impact on emissions of greenhouse gases and how climate change might itself affect major federal projects.”¹⁸ CEQ importantly noted that “a regulatory change is not necessary in order to require federal agencies to consider global climate change in NEPA documents” because the scope of NEPA is broad enough to include such effects.¹⁹ In particular, the CEQ Guidance stated that “[c]onsideration of the potential impact of climate change on [large-scale] projects may be critical to avoiding costly operation and maintenance problems in future decades,” and therefore consideration of climate change is especially crucial in programmatic analyses.²⁰ Specifically, CEQ called upon federal agencies to determine how their activities contribute to the emission of GHGs and thus to global warming and climate change, and to review how the agencies’ activities will in turn be affected by the consequences of climate change.²¹

In accordance with CEQ’s Guidance, other agencies have issued guidance incorporating climate change into NEPA documents. The National Park Service’s Handbook for Environmental Impact Analysis notes that programmatic documents are often “ideal places” to address issues such as global warming.²² The Minerals Management Service (“MMS”), BLM’s counterpart in terms of managing offshore oil and gas resources, established NEPA Procedures for addressing climate change considerations in NEPA documents, citing to CEQ’s 1997 Guidance document.²³ In keeping with its own guidance and CEQ’s conclusion that climate change is a “reasonably foreseeable” impact of greenhouse gas emissions, MMS inventories emissions caused by oil and gas leasing on the Outer Continental Shelf and considers the contribution of such leases to climate change in both programmatic and lease-specific NEPA analyses.²⁴ For example, in its programmatic Final EIS for Outer Continental Shelf Oil and Gas

¹⁷ *Id.* at 4.

¹⁸ *Id.* at 3.

¹⁹ *Id.* at 4, fn. 3.

²⁰ *Id.* at 2.

²¹ *Id.* at 5.

²² National Park Service, Director’s Order No. 12 Handbook for Environmental Impact Analysis, 89 (2001), available at <http://home.nps.gov/applications/npspolicy/DOrders.cfm> (relevant excerpts attached as Exhibit 16).

²³ See Minerals Management Service, *NEPA Procedures, Global Climate Change*, available at <http://www.mms.gov/eppd/compliance/nepa/procedures/climate/index.htm>; Minerals Management Service, *Global Climate Change Considerations* available at www.mms.gov/eppd/compliance/nepa/procedures/climate/considerations.htm (relevant excerpts of both attached as Exhibit 17).

²⁴ Minerals Management Service, Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012 Final Environmental Impact Statement, IV-3 - IV-12 (April 2007), available at www.mms.gov/5-year/2007-2012_FEIS.htm (relevant excerpts attached as Exhibit 18); Minerals Management Service, Environmental

Leasing Program from 2007 to 2012, MMS estimated “the total emissions of CO₂ and CH₄ for all projected activities associated with the proposed 5-year program.”²⁵ MMS then used this information to determine potentially appropriate mitigation measures as well as to determine which GHG reductions would have the greatest impact in reducing GHG emissions. In addition to its programmatic NEPA analyses, MMS has also considered GHG emissions in individual lease sales which also address both the impact of climate change on the lease sale as well as the lease sale’s contributions to the adverse effects of climate change.^{26 27}

4. The Public Trust Duty Requires that BLM Consider and Analyze Potential Climate Change Impacts.

BLM is subject not only to its statutory responsibilities, but the Public Trust Duty, a principle embedded in law as an attribute of the Federal Government’s sovereignty. While the Public Trust Duty is most frequently applied to state governments, it applies with equal force to the Federal government. In basic terms, the Public Trust Duty is derived from the common law of property and acts as a fundamental safeguard to ensure that public trust resources are properly managed to ensure the public’s welfare and survival. *See Illinois Cent. R. Co. v. Illinois*, 146 U.S. 387, 455 (1892), *Geer v. Connecticut*, 161 U.S. 519, 525-29 (1896) (detailing ancient and English common law principles of sovereign trust ownership of air, water, sea, shores, and wildlife).

The Public Trust Duty imposes upon BLM a duty of “reasonable care” in protecting the trust. Restatement (Second) of Trusts § 176 (1957) (“The trustee is under a duty to the beneficiary to use reasonable care and skill to preserve the trust property.”). The Public Trust Duty is reflected in Secretarial Order 3226, FLPMA, and NEPA, providing a foundation to interpret and apply these statutory provisions in the context of federal public lands. *See, e.g.*, 42 U.S.C. § 4331(b)(1) (2006) (declaring a national duty to “fulfill the responsibilities of each generation as trustee of the environment for succeeding generations”). However, the Public Trust Duty is also fundamentally more expansive, imposing upon BLM a duty that cannot be excused by mere reference to or compliance with BLM’s statutory mandates. As the Court said in *Illinois Central*, “[t]he state can no more abdicate its trust over property in which the whole people are

Assessment Proposed Oil and Gas Lease Sale 195 Beaufort Sea Planning Area, Appendix I (July 2004) available at www.mms.gov/alaska/ref/eis_ea.htm, http://www.mms.gov/alaska/ref/EIS%20EA/BeaufortFEIS_195/Sale195/EA195without%20linkver4.pdf (relevant excerpts attached as Exhibit 19).

²⁵ MMS, 2007-2012 FEIS at IV-12, Tables IV-1 – IV-3, IV-5.

²⁶ EA for Proposed Oil and Gas Lease Sale 195, Appendix I; Appendix C, Section VI.C.4 of the Biological Evaluation.

²⁷ Accentuating BLM’s duty to address GHG emissions from onshore oil and gas leasing and development prior to the sale of a lease, it is notable that once a lease is sold, MMS retains more legal authority to protect the environment than BLM. *See, e.g.*, 43 U.S.C. § 1351(h) (delineating MMS’ development-stage legal authority); *see also Wyoming Outdoor Council*, 157 I.B.L.A. 259, 265-66 (October 15, 2002) (rejecting BLM argument that BLM may defer NEPA analysis subsequent to lease issuance by refusing to equate BLM’s authority, pursuant to 30 U.S.C. § 226(g), with MMS authority, pursuant to 43 U.S.C. § 1351(h)).

interested...than it can abdicate its police powers in the administration of government and the preservation of the peace....” 146 U.S. 387, 460.

As a trustee, BLM must protect trust resources for present and future generations. BLM is therefore prohibited from allowing irrevocable harm to public lands or the atmosphere by private interests. In *Geer v. Connecticut*, the Supreme Court explained that:

[T]he power or control lodged in the State, resulting from this common ownership, is to be exercised, like all other powers of government, as a trust for the benefit of the people, and not as a prerogative for the advantage of the government, as distinct from the people, or for the benefit of private individuals as distinguished from the public good. . . . [T]he ownership is that of the people in their united sovereignty.

161 U.S. 519, 529.

Here the trust resources, or “*res*,” are the public lands themselves and, more broadly, the atmosphere whose stability is harmed by anthropogenic GHG emissions. The Public Trust Duty obligates BLM to exercise its duty of reasonable care by quantifying GHG emissions from oil and gas operations on public lands, to affirmatively reduce those GHG emissions to protect the atmosphere and the public lands, and to affirmatively take action to ensure that the built and natural environments on BLM public lands are sufficiently resilient to withstand, as best as they are able, global warming and climate change impacts.

IV. BLM MUST ADDRESS GLOBAL WARMING, CLIMATE CHANGE, AND GREENHOUSE GAS EMISSIONS FROM FEDERAL ONSHORE OIL AND GAS DECISIONMAKING ACTIONS BEFORE LEASE RIGHTS ARE SOLD.

1. BLM Must Quantify Past, Present, and Reasonably Foreseeable GHG Emissions from Oil and Gas Development to Address the Direct, Indirect, and Cumulative Impacts of these GHG Emissions to the Environment.

As explained, GHG emissions directly and indirectly related to oil and gas industry operations include CO₂, methane, and to a lesser extent N₂O from a number of sources and processes. In the context of oil and gas operations in Montana and North Dakota, the BLM’s surrender of lease rights will open the door for conventional natural gas development, CBM development, and crude oil development.

GHG emissions associated such oil and gas development will stem from a number of potential sources. According to a review by the California Air Resources Board, such sources include:

- Exploration, which includes CO₂ emissions from truck motors used in vibroseis or other exploratory operations;

- Well development, which includes GHG emissions from pad clearing, road construction, rigging up and drilling, the use of drilling fluids, casing placement, and well completion and testing (including emissions from hydraulic fracturing and the flaring and venting of flowback gases);
- Primary and secondary production phases, which include GHG emissions from the installation and use of compressor engines, well treatment and workovers, wellsite visits, wellsite facilities (including separators, heater treaters, gas conditioning, dehydration, wastewater disposal, and evaporation ponds), leaks from primary and secondary production equipment (e.g., pipelines, valves, etc.), and accidental releases (e.g., well blowouts); and
- Site abandonment, which includes GHG emissions from plugging activities and site reclamation.²⁸

Inventories of GHG emissions from oil and gas activities are now commonplace. The Environmental Protection Agency (“EPA”) is currently in the process of updating its Inventory of U.S. Greenhouse Gas Emissions and Sinks for 1990-2006.²⁹ A draft report is presently available for review.³⁰ Archived EPA information provides reports for previous inventories.³¹ Additionally, MMS, as discussed above, has been quantifying GHG emissions from offshore oil and gas operations in both programmatic and lease-specific NEPA analyses.

Additionally, individual states, particularly in the Rocky Mountain region, have taken the initiative to understand and take action to reduce GHG emissions by preparing state-level inventories. In fact, several oil and gas producing states, including Montana, have developed GHG inventories and have specifically prepared estimates for the oil and gas industry:

- **Colorado.** According to an October 2007 GHG inventory for the State of Colorado, oil and gas operations directly released 5.16 million metric tons of CO₂ equivalent (“CO₂e”) in 2005, more than 4% of the state’s total GHGs.³² Furthermore, GHGs from oil and gas operations are projected to increase by more than 80% by 2020. GHG emissions from oil and gas operations in Colorado are reported to stem from CBM production and processing, conventional natural gas production and processing, and oil development and

²⁸ Zahniser, A. Characterization of greenhouse gas emissions involved in oil and gas exploration and production activities, review for California Air Resources Board (undated) (attached as Exhibit 20). Available online at http://www.wrapair.org/WRAP/ClimateChange/GHGProtocol/meetings/071025/Characterization_of_O&G_Operations_Sector_Emissions.pdf.

²⁹ www.epa.gov/climatechange/emissions/usinventoryreport.html.

³⁰ www.epa.gov/climatechange/emissions/downloads/08_CR.pdf.

³¹ www.epa.gov/climatechange/emissions/usgginv_archive.html.

³² CO₂ equivalent refers to the global warming potential of a GHG, where CO₂ has a potential of “1” and, for example, methane has a potential of “21.” Therefore, one ton of methane equals 21 tons of CO₂ equivalent.

refining. *See* Final Colorado Greenhouse Gas Emissions Inventory and Reference Case Projections 1990-2020 (attached as Exhibit 21).³³

- **Montana.** According to a September 2007 GHG inventory for the State of Montana, oil and gas operations released 4.7 million metric tons of CO₂e in 2005, more than 12% of the state's total GHG emissions. Furthermore, GHGs from oil and gas operations are projected to increase by more than 10% by 2020. GHG emissions from oil and gas operations in Montana are reported to stem from CBM production and processing, conventional natural gas production and processing, and oil development and refining. *See* Final Montana Greenhouse Gas Emissions Inventory and Reference Case Projections 1990-2020 (attached as Exhibit 22).
- **New Mexico.** According to a November 2006 GHG inventory for the State of New Mexico, oil and gas operations released 19.3 million metric tons of CO₂e in 2000, more than 23% of the state's total GHG emissions. Based on this data, oil and gas operations represent the second largest source of GHGs in New Mexico. Although this report shows that oil and gas GHGs are projected to increase by only 3.62% by 2020, the report based this projection on the assumption that there would be no change (i.e., decrease or increase) in natural gas or oil production in the state, an assumption does not appear to be coming to fruition. GHG emissions from oil and gas operations in New Mexico are reported to stem from CBM production and processing, conventional natural gas production and processing, and oil development and refining. *See* Final New Mexico Greenhouse Gas Emissions Inventory and Reference Case Projections 1990-2020. (attached as Exhibit 23).
- **Wyoming.** According to a Spring 2007 GHG inventory for the State of Wyoming, oil and gas operations released 11.5 tons of CO₂e in 2005, more than 20% of the state's total GHG emissions. Furthermore, by 2020, GHGs from oil and gas operations are projected to increase by nearly 10%. GHG emissions from oil and gas operations in Wyoming are reported to stem from CBM production and processing, conventional natural gas production and processing, and oil development and refining. *See* Final Wyoming Greenhouse Gas Emissions Inventory and Reference Case Projections 1990-2020 (attached as Exhibit 24).

These GHG quantification efforts provide a useful starting point for BLM. Notably, they largely constitute top-down efforts to quantify GHG emissions and are less refined than bottom-up inventories prepared on the basis of specific equipment inventories and GHG measurements. These top down inventories may, notably, underestimate GHG emissions. For example, as explained in the Final New Mexico GHG Inventory and Reference Case Projections, 1990-2020:

[T]he sheer number and diversity of GHG-emitting activities, combined with the fact that GHG emissions are typically unmonitored, means that there is significant uncertainty with regard to emission levels. Local estimates of field gas use and provided by [the New Mexico Oil & Gas Association] suggest that top-down estimates of natural gas production-related emissions provided here (based on

³³ www.coloradoclimate.org/ewebeditpro/items/O14F13894.pdf.

national average emission rates) may be low. Furthermore, CO₂ emissions that may occur as the result of CO₂ mining and use for enhanced oil recovery could be significant, but have not been estimated. Further analysis of emissions from activities in all of the State's principal gas and oil basins, as well as of emissions from transmission and distribution sources could help to resolve some of these uncertainties. Given the large emission reduction potential that may exist in these sectors, such efforts could be quite valuable.

Final New Mexico Greenhouse Gas Emissions Inventory and Reference Case Projections 1990-2020, Exhibit 23 at D-18.

Complementing this governmental GHG quantification work, the American Petroleum Institute published the "Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry," discussed above. *See* Exhibit 14. In addition to explaining sources of GHGs associated with the oil and gas industry, the API Compendium lists emission factors and methodologies for estimating GHG gas emissions from compressor engines, fugitive sources, pneumatic controllers, and among many other pieces of equipment and processes. The API Compendium provides the best available information to quantify GHG emissions from oil and gas operations, particularly with regards to combustion sources.³⁴ Indeed, a recent review by the California Energy Commission found that the API Compendium "methods and data on evaluating combustion emissions and refinery emissions are considered the best information."³⁵ Although this same review recommended that the API Compendium methodologies used to estimate methane emissions be refined, the review found the Compendium to be accurate and reliable.³⁶ A review of the API Compendium – as well as follow up assessments of the API – should provide BLM with a solid basis for quantifying GHG emissions from BLM-authorized oil and gas development.

The California Climate Action Registry is also in the process of finalizing protocol for quantifying GHGs from the natural gas transmission and distribution industry sector. In a 2007 final draft report entitled, "Discussion Paper for a Natural Gas Transmission and Distribution Greenhouse Gas Reporting Protocol," the Registry identified methods to quantify GHG emissions from combustion sources, including compressor engines, direct emissions from process vents, fugitive emissions, and indirect GHG emissions (attached as Exhibit 25). Although the final draft report focuses on the natural gas transmission and distribution sector, many of the processes and equipment used by this sector are also used at the exploration and production stage of natural gas development.

³⁴ Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry, American Petroleum Institute, Feb. 2004, www.api.org/ehs/climate/new/upload/2004_COMPENDIUM.pdf (attached as Exhibit 14); <http://ghg.api.org/documents/CompendiumErrata205.pdf> (errata).

³⁵ California Energy Commission. "Evaluation of Oil and Gas Sector Greenhouse Gas Emissions Estimation and Reporting." Prepared by TIAX LLC and ICF Consulting (April 14, 2006) (attached as Exhibit 26).

³⁶ In the California Energy Commission review of the API Compendium, ICF Consulting provides recommendations for refining estimates of methane emissions from oil and gas operations.

By quantifying GHG emissions, BLM can provide itself with a base of knowledge to properly address global warming and climate change through the NEPA process and, accordingly, can properly ensure compliance with not just NEPA, but BLM's legal responsibilities pursuant to Secretarial Order 3226, FLPMA, and the Public Trust Duty. How this knowledge is displayed is of course important. An aggregate GHG emissions total for BLM-authorized oil and gas development is important to determine the contribution of such development to global, national, regional, and local GHG emissions footprints. But, given the varied equipment and technologies used in oil and gas development, and the varied conditions and circumstances in the field, it is also important to refine this information as much as possible to identify the precise sources and magnitude of those GHG emissions. This is particularly so given that upstream oil and gas production involves individually minor, but collectively significant GHG emissions sources. Such refined data thus enables BLM to best support GHG reduction efforts by identifying the highest impact, most cost-effect GHG reduction measures, and positions BLM to work effectively with federal and state agency partners, the public, and the oil and gas industry. In so doing, BLM allows all parties the opportunity to plan for and implement GHG reduction measures in a uniform, efficient, and consistent fashion.

In terms of scale, BLM should at the least quantify GHG emissions for each Resource Area with oil and gas development. Ultimately, a programmatic analysis of GHG emissions, a programmatic amendment of RMPs to set in motion a plan to reduce GHG emissions across BLM public lands throughout the Interior Mountain West and to account for global warming and climate change impacts to the built and natural environments, and a top-level policy or rulemaking process, may be most helpful and desirable. As noted in the 2007 GAO Report, "resource managers said that they need local- and regional-scale models to predict change on a small scale as well as improved inventory and monitoring." 2007 GAO Report at 41.

Attached, as Exhibit 27, is a summary of oil and gas leasing and APD activity in the Rocky Mountain region between 2001 – 2007, and Exhibit 28, a summary of the percent of Federal minerals and acreage available for oil and gas development in selected RMPs for the Rocky Mountain West, both of which are relevant to GHG quantification efforts, as well as efforts to address region-wide impacts to the built and natural environments in the Rocky Mountain region. Of note, at least based on data as of 2004, it appears that over 35 million acres of federal public lands were already leased but only 11,671,000 acres were under production, and, further, that of 6,052 application for permit to drill granted to lessees, that only 2,702 wells were actually drilled. *See* Exhibit 29 (attached). Nonetheless, current estimates suggest approximately 126,000 new wells in the Rocky Mountain West in the next 15-20 years. *See* Exhibit 30 (attached).

2. BLM Must Identify, Consider, and Adopt a GHG Emissions Limit or GHG Reduction Objective for BLM-authorized Oil and Gas Activities.

Effective GHG emissions management should be based upon an enforceable GHG emissions limit set by BLM for oil and gas development. Alternatively, BLM could set an objective for overall GHG reductions in line with science-based recommendations. For example,

the Governor of the State of Colorado has called for an 80% reduction in GHGs by 2050.³⁷ Additionally, the Governor of the State of New Mexico has called for a 20% reduction in methane emissions from the oil and gas industry by 2020.³⁸ Establishing GHG limits or GHG reduction objectives are important to satisfy BLM's responsibility to prevent "permanent impairment," "prevent unnecessary or undue degradation," to "minimize adverse impacts on the natural, environmental, scientific, cultural, and other resources and values," and to satisfy BLM's Public Trust Duty. 43 U.S.C. §§ 1702(c), 1732(b), & 1732(d)(2)(A)). Without a GHG emissions limit or GHG emissions reduction objective, BLM may hamstring its own ability to address global warming and climate change, and is without an overall goal to plan for and achieve.

To set a GHG emissions limit, or GHG reductions objective, BLM should look to the latest science concerning overall global GHG concentration thresholds. The latest and best science appears to be the aforementioned draft paper – *Target Atmospheric CO₂: Where should Humanity Aim?* (attached as Exhibit 12) – authored by, amongst others, Dr. James Hansen at the National Space and Aeronautics Administration. According to the draft paper, "If humanity wishes to preserve a planet similar to that on which civilization developed, paleoclimate evidence and ongoing climate change suggest that CO₂ will need to be reduced from its current 385 ppm to at most 350 ppm." *Id.* at 1. Notably, this is apparently a lower objective than set by IPCC. The draft paper argues that this lower objective is necessary because:

Paleoclimate data and ongoing changes indicate that 'slow' climate feedback processes not included in most climate models, such as ice sheet disintegration, vegetation migration, and GHG release from soils, tundra or ocean sediments, may begin to come into play on time scales as short as centuries or less. Rapid ongoing climate changes and realization that Earth is out of energy balance, implying that more warming is 'in the pipeline', add urgency to investigation of dangerous level of GHGs.

Id. As the draft paper warns:

Realization that today's climate is far out of equilibrium with current climate forcings raises the specter of 'tipping points', the concept that climate can reach a point such that, without additional forcing, rapid changes proceed practically out of our control.

Id. at 10. Importantly, there is a distinction between "tipping levels" and the "point of no return – the "climate state beyond which the consequence is inevitable, even if climate forcing are reduced." *Id.* Of note, while the paper focuses on CO₂, the reduction of non-CO₂ GHGs – such as methane – "could alleviate the CO₂ requirement, allowing up to about +25 ppm CO₂ for the same climate effect, while resurgent growth of non-CO₂ GHGs could reduce allowed CO₂ a similar amount." *Id.* at 11.

³⁷ See www.colorado.gov/cs/Satellite?c=Page&cid=1194261894265&pagename=GovRitter%2FGOVRLayout.

³⁸ See www.nmenv.state.nm.us/aqb/GHG/Docs/EO_2006_069.pdf.

Of course, BLM, as a single federal agency, cannot alone constrain and reduce GHG emissions as recommended by the draft paper. BLM can, however, do its part by establishing a GHG emissions limit for federal oil and gas activities, e.g., by identifying a proportional amount of GHG reductions, or by setting GHG reduction objectives, e.g., a reduction of aggregate GHG emissions by 15% by 2015, a reduction of 25% by 2020, a reduction of 35% by 2025, *etc.* States, such as New Mexico, have taken this latter approach. *See* New Mexico Executive Order 2006-69 (December 28, 2006) (attached as Exhibit 31).

3. BLM Must Identify, Consider, and Adopt Management Measures to Reduce GHG Emissions from BLM-authorized Oil and Gas Management Activities.

Efforts to reduce GHG emissions from oil and gas development have already been underway for some time but, unfortunately, have had only a limited effect. Nonetheless, these efforts have demonstrated that GHG emissions reductions are frequently cost-effective, if not negative-cost. This is for the common sense reason that if you reduce, for example, the emission of methane, a potent GHG, you put more product in the pipeline for the oil and gas company *and* the consumer. These efforts, however, must be intensified to ensure that GHG reduction efforts are commensurate to the scale of the problem we face.

In this context, EPA manages several voluntary GHG reduction programs. For example, EPA manages a “Methane to Markets” program designed to advance “cost-effective, near-term methane recovery and use as a clean energy source ... to reduce global methane emissions in order to enhance economic growth, strengthen energy security, improve air quality, improve industrial safety, and reduce emissions of greenhouse gases.”³⁹ EPA also manages the well-known, though underutilized, Natural Gas STAR program.⁴⁰ These programs provide useful starting points for BLM-based efforts to affirmatively reduce GHG emissions from federal oil and gas operations.

States, on the basis of their concerns over the consequences of global warming and climate change to their economies and environments, have moved beyond mere inventories and developed individualized Climate Action Plans to address global warming and climate change by reducing GHG emissions.⁴¹ *See* 43 U.S.C. § 1712(c)(9) (requiring BLM to coordinate and act consistently with state-based plans and programs). These States, recognizing regional-scale solutions, have also come together in a collaborative effort called the Western Climate Initiative to develop a regional-scale market-based GHG reduction mechanism, and The Climate Registry, a regional-scale GHG emissions reporting program.⁴²

³⁹ www.epa.gov/methanetomarkets/.

⁴⁰ www.epa.gov/gasstar/.

⁴¹ Montana’s Climate Change Action Plan can be found here: www.mtclimatechange.us/CCAC.cfm.

⁴² Information pertaining to the Western Climate Initiative can be found at www.westernclimateinitiative.org/; information pertaining to The Climate Registry can be found at www.theclimateregistry.org/.

The EPA and the State-level efforts are admirable, and provide BLM with a host of information to assist BLM in meeting its own obligations pursuant to Secretarial Order 3226, FLPMA, NEPA, and the Public Trust Duty. These efforts, far from excusing BLM inaction, evidence the fact that it is time for BLM to step up to the plate and address global warming and climate change in a meaningful way.

As a starting point, BLM should subject leases to the stipulation that the lessee must participate in EPA's GHG reduction programs – e.g., EPA's Natural Gas STAR program – given that the mineral resources being extracted are the people's resources. Lessees that derive profit from public resources should thus be held to the highest standard. BLM should also subject the leases to a stipulation that empowers BLM to fully implement future global warming and climate change, and GHG reduction, laws and policies. Once BLM surrenders lease rights, BLM may be unable to subject lease operations to these laws and policies. At the least, enforcing these laws and policies may be met with fierce resistance by the lessees. Given that a lease is valid for a primary term of 10 years, but is often held indefinitely, it would be unfortunate if BLM should commit public lands to activities that would undercut anticipated global warming, climate change, and GHG reduction laws and policies.

These broad-brush measures, however, are only a first step. Given the existence, now, of technologically and economically viable GHG reduction measures, BLM should conduct a more in-depth analysis of these GHG reduction measures and address whether these measures should be made mandatory through lease stipulations. This is especially the case for methane reduction measures, which typically involve the recovery of methane and therefore the potential for payback.⁴³ Measures that reduce methane and often yield a payback include:

- Retrofitting or replacing high-bleed pneumatic controllers with low-bleed or no-bleed pneumatics.⁴⁴
- Requiring green completions to be used when completing CBM and conventional natural gas wells. Green completions essentially capture methane and other gases typically vented or flared during completion flowback operations. Green completions have been successfully used in CBM development, and are a proven method of reducing methane venting and flaring during conventional gas well completions.⁴⁵

⁴³ Current natural gas prices are around \$7.50/Mcf at the wellhead. *See* <http://tonto.eia.doe.gov/oog/info/ngw/ngupdate.asp>.

⁴⁴ *See* Exhibit 32 (www.epa.gov/gasstar/pdf/lessons/ll_pneumatics.pdf).

⁴⁵ *See* Exhibits 33 & 34 (www.epa.gov/gasstar/workshops/durango_sept2007/06_%20bp_rec_Greenhouse_gas_emision_reduction.pdf and www.epa.gov/gasstar/workshops/durango_sept2007/05_weatherford_rec.pdf). *See also* Exhibit 35 (http://www.epa.gov/gasstar/workshops/glenwood_sept2007/04_recs.pdf).

- Enhancing maintenance of compressor engines, including periodic replacement of compressor rods and rod packing.⁴⁶
- Replacing glycol dehydrators with desiccant dehydrators, utilizing flash tank separators at glycol dehydrators, optimizing glycol circulation rate, or utilizing other zero emission dehydrator technologies.⁴⁷
- Installing plunger lift systems in gas wells.⁴⁸
- Conducting directed inspection and maintenance at wellheads, compressor stations, and processing plants to reduce fugitive leaks.⁴⁹
- Installing vapor recovery units on crude oil, condensate, or other tanks storing liquid petroleum products.⁵⁰

Additionally, details on a number of other potential methane reduction measures for the oil and gas industry are readily available online at the EPA's Natural Gas STAR website, <http://www.epa.gov/gasstar/techprac.htm>.

Many, if not all, of these measures could be applied to oil and gas development in Montana and North Dakota. Indeed, by surrendering lease rights, the BLM will authorize some degree of oil and gas production. Natural gas production, including CBM, will utilize well drilling and completions, compressor engines, pneumatic controllers, dehydrators, wellhead equipment, among other processes and equipment where methane emissions could be reduced or eliminated. Oil production will utilize tanks, wellhead equipment, among other processes and equipment where methane could be reduced or eliminated. BLM should conduct a more in-depth analysis of these methane reduction measures and address whether these measures should be made mandatory through lease stipulations.

Relative to carbon dioxide reductions, according to the state of New Mexico's Climate Change Advisory Group:⁵¹

There are a number of ways in which CO₂ emissions in the oil and gas industry can be reduced, including (1) installing new efficient compressors, (2) replacing compressor driver engines, (3) optimizing gas flow to improve compressor

⁴⁶ See Exhibit 36 (http://www.epa.gov/gasstar/workshops/glenwood_sept2007/03_methane_savings_from_compressors.pdf).

⁴⁷ See Exhibit 37 (http://www.epa.gov/gasstar/workshops/durango_sept2007/08_natural_gas_dehydration.pdf).

⁴⁸ See Exhibit 38 (http://www.epa.gov/gasstar/pdf/lessons/ll_plungerlift.pdf).

⁴⁹ See Exhibit 39 (http://www.epa.gov/gasstar/workshops/durango_sept2007/03_dim_in_gas_production_facilities.pdf).

⁵⁰ See Exhibit 40 (http://www.epa.gov/gasstar/pdf/lessons/ll_final_vap.pdf).

⁵¹ See www.nmclimatechange.us/ewebeditpro/items/O117F10150.pdf.

efficiency, (4) improving performance of compressor cylinder ends, (5) capturing compressor waste heat, and (6) utilizing waste heat recovery boilers. Policies to encourage these practices can include education and information exchange, financial incentives, and mandates or standards that require certain practices.

The [Climate Change Advisory Group] recommends that New Mexico focus attention on reducing GHG emissions from fuel combustion in the oil and gas industry through education, financial incentives, mandates and/or standards – coupled with cost and investment recovery mechanisms, if appropriate – to: (1) improve the efficiency of compressors; (2) boost waste heat recovery for compressors and boilers including the deployment of CHP systems that could sell excess power back to the grid; and to a lesser extent, (3) replace gas-driven compressors with electrical compressors when doing so reduces CO₂ emissions (the average carbon intensity of New Mexico electricity would need to be reduced by approximately 30% to make this option carbon-neutral).

To emphasize a point made above, GHG reduction measures should be addressed prior to the point that lease rights are surrendered as a component of BLM's NEPA alternatives analysis. This is because the lease stage is the point of commitment for purposes of NEPA and, moreover, once leases are sold, BLM's authority to impose mitigation measures in post-commitment decision-making processes and NEPA analyses is delimited – i.e., hamstrung – by the lease rights. 43 C.F.R. § 3101.1-2. Thus, if not built into the lease as a stipulation, BLM may not have the authority to require a lessee to use GHG reduction measures. The distinction between pre- and post-lease authority is particularly problematic in the context of BLM's duty to address a “no action” alternative which, at the point a lease is offered for sale, is *the option of not issuing the lease* and thus the decision not to allow oil and gas development, period, under no circumstances. 40 C.F.R. § 1502.14(d). This option is foreclosed by the sale and issuance of the lease as the lessee is given the legal right to develop the lease. 43 C.F.R. § 3101.1-2.

Relative to GHG reduction measures, by identifying and analyzing GHG reduction measures prior to the point lease rights are sold, BLM can determine whether GHG reduction measures need to be required, legally, as stipulations attached to the lease, or whether BLM can impose GHG reduction measures through conditions of approval at the APD stage. Even in this latter case, however, pre-commitment decision-making and NEPA analysis is necessary to identify and assess the efficacy of those conditions of approval in light of the legal distinction between BLM's pre-commitment and post-commitment authority. Pragmatically, through pre-commitment decision-making and NEPA analysis, BLM provides itself with an informed basis to address GHG emissions, coordinate with federal and state agency counterparts, reach out to the public, ensure that GHG emissions can be constrained within acceptable limits, and provide the lessee with notice and a basis to plan for drilling-stage activities.

Beyond GHG reduction measures, pre-commitment decision-making and NEPA analysis is essential to address land protection and management options to ensure the resiliency of the built and natural environments in the face of global warming and climate change. Put another way, such decision-making and NEPA analysis allows BLM to prevent permanent impairment,

prevent unnecessary or undue degradation, and minimize adverse environmental impacts. 43 U.S.C. §§ 1702(c), 1732(b)), 1732(d)(2)(A).

Pre-commitment decision-making and NEPA analysis may demonstrate that: (1) certain areas available for leasing should in fact be off limits to development (whether through selection of a no action alternative or imposition of no surface occupancy stipulations); (2) affirmative land protection and management actions need to be taken to protect the built and natural environments; and (3) the need for special protective stipulations that should be attached to the lease to protect the built and natural environments.

To address GHG emissions as well as impacts to the built and natural environments, BLM should subject leases to unitization. Through unitization, BLM could reduce surface disturbance and damage, use fewer wells to access the shared subsurface resource, and limit the amount of field processing equipment, roads, and other related development infrastructure.

4. BLM Must Track and Monitor GHG emissions from BLM-authorized Oil and Gas Operations through Time.

Hand-in-hand with the need to quantify GHG emissions, setting GHG limits or reduction objectives, and requiring the implementation of GHG reduction measures, BLM must also establish a system to track and monitor GHG emissions, the efficacy of GHG reduction measures, and impacts to the built and natural environment to support adaptive management. As noted in the 2007 GAO Report, “Resource managers interviewed for our case studies ... stated that they need better resource inventories and monitoring systems.” 2007 GAO Report at 43. By quantifying GHG emissions and baseline conditions through inventories, and tracking and monitoring GHG emissions and changes to the baseline through time, BLM affords itself an informed basis with which to address global warming and climate change and ensures that BLM land protection and management activities comport with BLM’s duties pursuant to Secretarial Order 3226, FLPMA, NEPA, and the Public Trust Duty.

5. BLM Must Consider How Climate Change Impacts Ecological and Community Resiliency, and Whether Such Impacts Warrant Enhanced Management Protections.

Many of the public resources managed by the BLM – and, more broadly, BLM’s sister agencies in the Department of the Interior and Agriculture – are being harmed by global warming and climate change. To understand the nature of this harm, it is helpful to begin with the IPCC. The IPCC assessed the “current scientific understanding of impacts of climate change on natural, managed and human systems, the capacity of these systems to adapt and their vulnerability.”⁵² Relative to observed global warming and climate change impacts, the IPCC Report concluded the following:

⁵² IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Groups III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, M. Tignor and H.L. Miller (eds.)]. Cambridge

- “Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases.”⁵³ The IPCC Report goes on to state that “[t]here is very high confidence ... that recent warming is strongly affecting terrestrial biological systems, including such changes as ... “poleward and upward shifts in ranges in plant and animal species.”⁵⁴
- “A global assessment of data since 1970 has shown it is likely that anthropogenic warming has had a discernible influence on many physical and biological systems.”⁵⁵
- “Other effects of regional climate changes on natural and human environments are emerging, although many are difficult to discern due to adaptation and non-climatic drivers.”⁵⁶

Beyond observed impacts, the IPCC Report also addresses the state of knowledge about future impacts. The IPCC Report’s conclusions relative to terrestrial species are troubling:

- “The resilience of many ecosystems is likely to be exceeded this century by an unprecedented combination of climate change, associated disturbances (e.g., flooding, drought, wildfire, insects, ocean acidification), and other global change drivers (e.g., land use change, pollution, over-exploitation of resources).”⁵⁷
- “Approximately 20-30% of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5-2.5°C.”⁵⁸
- “For increases in global average temperature exceeding 1.5-2.5°C and in concomitant atmospheric carbon dioxide concentrations, there are projected to be major changes in ecosystem structure and function, species’ ecological interactions, and species’ geographic ranges, with predominantly negative consequences for biodiversity, and ecosystem goods and services e.g., water and food supply.”⁵⁹

University Press, Cambridge, United Kingdom and New York, NY, USA (www.ipcc.ch/SPM13apr07.pdf) (“IPCC Report”) (attached as Exhibit 41).

⁵³ *Id.* at 1.

⁵⁴ *Id.* at 2.

⁵⁵ *Id.* at 2.

⁵⁶ *Id.* at 3.

⁵⁷ *Id.* at 5.

⁵⁸ *Id.* at 6.

⁵⁹ *Id.*

- Calibrated specifically to North America, “[w]arming in western mountains is projected to cause decreased snowpack, more winter flooding, and reduced summer flows, exacerbating competition for over-allocated water resources.”⁶⁰

The GAO, in its 2007 Report, reinforces the IPCC report in the specific context of federal public lands. The GAO identified a myriad of physical effects including “drought, floods, glacial melting, sea level rise, and ocean acidification.” 2007 GAO Report at 5.

Global warming has eroded the severe winter cold of the West’s mountains. As GAO noted, “warmer springs have resulted in earlier snowmelt”⁶¹ 2007 GAO Report at 5. Additionally, “more precipitation falls as rain and less as snow.” 2007 GAO Report at 21. This limits winter recreational opportunities on public lands and diminishes water supplies that the public lands provide residents across the West. A recent article in *Science* “demonstat[ed] statistically that the majority of the observed low frequency changes in the hydrological cycle (river flow, temperature, and snow pack) over the western U.S. from 1950-1999 are due to human-caused climate changes from greenhouse gases and aerosols.”⁶²

Warming is thus already reducing the amount of alpine tundra in the West. For instance, scientists studying the effects of climate change on Rocky Mountain National Park, home to the largest expanse of alpine tundra in the United States outside of Alaska, projected that warming of 5.6 degrees Fahrenheit could cut the park’s area of tundra in half.⁶³ An increase of 9 to 11 degrees Fahrenheit could virtually eliminate the park’s tundra.⁶⁴ As the climate heats up, plant and animal species seek the habitat they need by moving toward the poles or to higher elevations. *See* 2007 IPCC Synthesis Report at 2 (“In terrestrial ecosystems, earlier timing of spring events and poleward and upward shifts in plant and animal ranges are with *very high confidence* linked to recent warming (italics original)). In Yosemite National Park, a century ago, pikas lived as low as 7,800 feet. Today, they cannot be found any lower than 8,300 feet.⁶⁵ As one researcher has said, “We might be staring pika extinction in the Great Basin, maybe in Yosemite,

⁶⁰ *Id.* at 11.

⁶¹ *See* also 2007 IPCC Synthesis Report at 2 (discussing observed changes to hydrological systems); Mote P. W., Hamlet A. F., Clark M. P., and Lettenmaier D. P. 2005. Declining Mountain Snowpack in Western North America. *Bulletin of the American Meteorological Society*. 86: 39-49.

⁶² Barnett, Tim P., *et al.*, “Human-induced changes in the hydrology of the western United States,” Revised version submitted to the *Journal Science* January 10, 2008, and published in *Science Express* January 31, 2008 (attached as Exhibit 42).

⁶³ N. Hobbs and others, “Future Impacts of Global Climate on Rocky Mountain National Park: Its Ecosystems, Visitors, and the Economy of its Gateway Community – Estes Park,” (2003) 1-45, 16-17, http://www.nrel.colostate.edu/projects/star/papers/2003_final_report.pdf (attached as Exhibit 43).

⁶⁴ *Id.*

⁶⁵ C. Mortiz, “Report – Year 4 of the terrestrial vertebrate resurvey of the ‘Grinnel sites’ in Yosemite National Park’ (2006 report), 1, http://mvz.berkeley.edu/Grinnell/pdf/Yosemite_Report_2006-FINAL.pdf.

too, right in the face. . . . They don't have much up-slope habitat left."⁶⁶ In Glacier National Park, the glaciers are melting; "since 1850, the estimated numbers of glaciers in the park has dropped from 150 to 26." 2007 GAO Report at 5. Generally, "[a]s alpine habitats warm, the tree line is expected to move upslope, with forests beginning to invade alpine and subalpine meadows." 2007 GAO Report at 28. With "[s]ome of these changes . . . already occurring," the impacts to wildlife that relies on these systems – "bighorn sheep, pikas (relatives of the rabbit), mountain goats, wolverines, and grizzly bears – "may be harmed." 2007 GAO Report on 28.

Warming is reducing fishing and hunting opportunities on the public lands. Some have predicted losses of western trout populations as high as 64 percent and of Pacific Northwest salmon of 20 to 40 percent by 2050.⁶⁷ See 2007 IPCC Synthesis Report at 2 ("In some marine and freshwater systems, shifts in ranges and changes and changes in algal, plankton and fish abundance are with *high confidence* associated with rising water temperatures, as well as related changes in ice cover, salinity, oxygen levels and circulation" (italics original)). In Montana, drought and higher temperatures have led to fishing closures and restrictions to sustain fish populations in eight out of the last ten years.⁶⁸ During the summer of 2007, closures were in force on 29 rivers in Montana by August 2. Since 2000, the number of annual fishing permits issued to Yellowstone National Park visitors has dropped by nearly a quarter, from 67,700 to 51,900, even as total park visitation remained steady.⁶⁹ One fly fisherman who has traveled from California each of the past 15 years to fish the Yellowstone River reacted to the decline: "I decided yesterday that I won't be back anymore. There just aren't enough fish to make it worthwhile."⁷⁰

These reduced fishing and hunting opportunities are linked to changes to freshwater and terrestrial ecosystems. Experts have "anticipated shifts in the distribution, abundance, and ranges of both plant and animal species." 2007 GAO Report at 26. Relative to freshwater ecosystems, "increased water body temperatures may increase the risk of toxic algal blooms as well as the severity of fish diseases." 2007 GAO Report at 25. In terms of species risk, "temperature increases are most likely to threaten cold-water species, such as trout, salmon, and amphibians." 2007 GAO Report at 28. Bull trout appear particularly vulnerable; "the bull trout can only survive in a very limited area, and many of its migration corridors have been cut off as a result of ecosystem fragmentation." *Id.* These impacts extend to the "phenology" of plant and animal

⁶⁶ J. Schwarz, "Tiny Pikas Seem to Be on March Toward Extinction in Great Basin," University of Washington Office of News and Information, December 29, 2005. See also, Beever EA, Brussard PF, Berger J. 2003. Patterns of apparent extirpation among isolated populations of pikas (*Ochotona princeps*) in the Great Basin. *J. Mammal.* 84:37-54.

⁶⁷ J. Williams, Trout Unlimited, testimony, U.S. Senate, Committee on Energy and Natural Resources, Subcommittee of Water and Power, June 6, 2007, <http://www.livingrivers.org/pdfs/CongressionalTestimony/WilliamsTestimony.pdf> (attached as Exhibit 44).

⁶⁸ *Id.*

⁶⁹ U.S. Department of the Interior, National Park Service, Yellowstone National Park, "Yellowstone Fish Reports," 2000 to 2005, <http://www.nps.gov/yell/planyourvisit/fishreports.htm> and "Park Statistics," <http://www.nps.gov/yell/parkmgmt/statistics.htm>.

⁷⁰ R. Tosches, "Warm waters deadly to Yellowstone trout," *Denver Post*, July 29, 2007.

species – “life-cycle events that are influenced by environmental changes, especially seasonal variations in temperature and precipitation” – including “critical species interactions.” 2007 GAO Report at 28-29.

As “changes in species distribution are likely to occur in the future ... nonnative species might eventually dominate or replace native species in some areas.” 2007 GAO Report at 26. In forest ecosystems, “forest composition – both the trees and the species that depend on the trees and forest vegetation – may change.” 2007 GAO Report at 26. “[S]ugar maple, white bark pine at high elevations, and subalpine spruce forests in the Rocky Mountains have already experienced such changes.” 2007 GAO Report at 26. In the context of the “grasslands and shrubland ecosystem,” “tree die-offs triggered by drought and exacerbated by higher temperatures may lead to a shift from woodland to shrubland or grassland Southwestern pinyon and juniper woodlands are particularly vulnerable to such changes” and such vulnerability may extend to ponderosa pine and chaparral. 2007 GAO Report at 26-27. The problem is so severe that “some rare ecosystems, such as alpine tundra, California chaparral, and blue oak woodlands in California may become extinct altogether.” 2007 GAO Report at 26. At bottom, “native biodiversity will increase in many areas, and ... new assemblages of species will be living together, with unknown consequences.” 2007 GAO Report at 27.

Public lands across the West have suffered as warming has spurred insect and disease infestations. As GAO noted, “[b]iological effects of climate change include increased in insect and disease infestations” 2007 GAO Report at 6. Such infestations “include bark beetles, grasshoppers, and various fungi as well as diseases caused by bacteria, parasites, and viruses.” 2007 GAO Report at 23. Notably, the effects may not involve merely the occurrence of these infestations, but an “increase [in] the range and effects of insects and disease infestation.” 2007 GAO Report at 23. And, further, a change from “episodic” to “persistent” infestations. 2007 GAO Report at 24.

Exemplifying the infestation issue, with minimum temperatures rising, more beetles can survive winters. Of note, warming is likely to be more intense at high elevations, and at latitudes further from the equator. *See, e.g.*, GAO Report at 17 (discussing elevated temperatures in Glacier National Park relative to global increases). In any event, beetles now can survive at higher latitudes and higher elevations, where extreme cold used to keep them from becoming widespread.⁷¹ In Colorado, the U.S. Forest Service and the Colorado State Forest Service recently predicted, “At current rates of spread and intensification of tree mortality, the MPB [mountain pine beetle] will likely kill the majority of Colorado’s large diameter lodgepole pine forests within the next 3-5 years.”⁷² Beetles are also now causing widespread devastation of whitebark pines, a high-altitude species that grow where winters almost always have been too

⁷¹ Regniere J., Bentz B. 2007. Modeling cold tolerance in the mountain pine beetle, *Dendroctonus ponderosae*, *Journal of Insect Physiology*, 53: 559–572, (www.usu.edu/beetle/documents/Regniere_Bentz2007.pdf). Logan J., J. Powell. 2003. Ghost Forests, Global Warming, and the Mountain Pine Beetle (Coleoptera: Scolytidae). *American Entomologist*, 47:3 161-162, 166-168. Logan J., Regniere J., Powell J. 2003. Assessing the impacts of global warming on forest pest dynamics. *Front. Ecol. Environ*, 1:130-37.

⁷² U.S. Forest Service, Region 2, and Colorado State Forest Service, “Forest Health Aerial Survey Highlights,” available at http://www.fs.fed.us/r2/news/2008/01/press-kit/survey_highlights.pdf.

cold to allow beetle populations to reach outbreak numbers.⁷³ In the Yellowstone ecosystem, the loss of whitebark pines threatens the survival of the region’s grizzly bears, which depend on the fatty seeds of the whitebark pine as their single most important food source.⁷⁴

Further exemplifying the infestation issue, in the BLM-managed Mojave Desert, “invasive grasses, combined with drought, caused, at least in part, by climate change, have increased the frequency and severity of wildland fires, destroying native plants and transforming some desert communities into annual grasslands.” As GAO noted:

Prolonged drought weakens the natural plant communities and then, in periods of wetness, invasive species – particularly grasses – fill the gaps between native vegetation. These invasive grasses can spread and grow faster than native species; the thicker and less evenly spaced vegetation leads to increased fire danger. If a fire starts, it burns much hotter due to the invasive grasses. Native plant communities, such as saguaro cacti and Joshua trees, are damaged, which provides further environment for invasive species and increased fire danger. According to experts, this shift in ecosystems from desert to grassland is likely to continue as the climate changes, which will in turn result in a loss of species diversity in these areas.

2007 GAO Report at 6.

Broadening out from the discussion concerning hunting and fishing, the public depends on the public lands and the ecological resources they contain, such as drinking water supplies, fish and game and diversity of species. These public lands also support the growth of many local economies.⁷⁵ As the GAO explained, “[e]conomic and social effects of climate change include adverse impacts on recreation and tourism; infrastructure; water supplies; and fishing, ranching, and other resource-use activities.” 2007 GAO Report at 6. The increased “frequency of extreme events, such as fire or drought, could limit recreational activities on federal lands.” 2007 GAO Report at 30. Moreover, “climate change could affect infrastructure and operational costs on federal lands.” 2007 GAO Report at 31. In terms of “water supplies and quality”:

Snow and ice serve as natural reservoirs in mountainous areas and northern regions of the United States, gradually supplying water into the summer months. Much of the west relies on spring snowmelt to provide a steady stream of water into summer months, when demand is highest. However, warmer temperatures

⁷³ J. Connelly, “West Can’t Beat Heat of Global Warming,” *Seattle Post-Intelligencer*, April 23, 2006, http://seattlepi.nwsource.com/connelly/282173_joel23.html.

⁷⁴ Logan J., Powell J. 2003. Ghost Forests, Global Warming, and the Mountain Pine Beetle (*Coleoptera: Scolytidae*). *American Entomologist*. 47:3 161-162, 166-168. C. Petit, “In the Rockies, Pines Die and Bears Feel It,” *New York Times*, January 30, 2007, <http://query.nytimes.com/gst/fullpage.html?res=9403E5DB143FF933A05752C0A9619C8B63>.

⁷⁵ See, e.g., M. Harris, P. Morton, Culver, *Natural Dividends: Wildland Protection and the Changing Economy of the Rocky Mountain West* (The Wilderness Society) (www.tws.org/Library/Documents/NaturalDividends.cfm) (attached as Exhibit 45).

and chances in winter precipitation patterns from snow to rain are expected to continue causing reduced snowpack and early snowmelt. Water supply shortages will likely increase the cost of water. In addition, the experts said that water quality is likely to decline if harmful algal blooms, bacteria, or botulism occur as a result of increased temperature; such occurrences would likely result in increased water treatment costs.

2007 GAO Report at 33. “Water issues are particularly significant in the southwestern United States ... According to experts discussing the fresh waters ecosystem, less surface water availability means lower groundwater recharge rates and further demand on the existing groundwater resources.” “[R]eductions in groundwater could affect communities ... causing wells to dry up, thereby forcing people to abandon homes or greatly increasing the cost of living in the area” and may also cause “greater competition for water, which could have a negative economic impact on ranchers and some communities situated near federal lands.” 2007 GAO Report at 33.

Given the threats of climate change to public land resources, BLM faces an increasingly daunting challenge to preserve the public resources for which BLM is responsible. The impacts of global warming and climate change will likely “depend on the rate and magnitude of climate change’ wherein “some changes will occur quickly and will be readily apparent, while others will occur gradually and be less apparent in the near term.” 2007 GAO Report. A huge concern is the fact that at least a certain amount of global warming and climate change, and the consequent global, regional, and local impacts, may be irreversible, regardless of what we do at this point. Regardless, global warming and climate change presents an issue that must be addressed through the NEPA process to properly inform substantive BLM decisions – such as the decision whether and how to issue oil and gas leases.

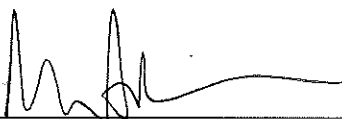
V. CONCLUSION

We acknowledge that global warming and climate change present BLM with complicated issues. Our fundamental purpose in recommending that BLM prepare an EIS is to engage BLM in a dialogue to address these issues with the participation of the broader public and the oil and gas industry. Ultimately, BLM, through the NEPA process, can lead a collective effort to address the serious, shared problems presented by global warming and climate change by engaging federal and state partners, the public, and the oil and gas industry in a constructive, transparent dialogue. If you have any questions, please do not hesitate to contact undersigned counsel at 575.751.0351 or eriksg@westernlaw.org.

Sincerely,



Erik Schlenker-Goodrich
Western Environmental Law Center
Counsel for Protestors



Megan Anderson
Western Environmental Law Center
Counsel for Protestors

On behalf of:

Sharon Buccino
Natural Resources Defense Council

Bruce Baizel
Oil and Gas Accountability Project

Jeremy Nichols
Rocky Mountain Clean Air Action