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May 30, 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 JUNE 17, 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 June 17, 2008 lease sale for the states of Montana and North Dakota. *See* Exhibits 1 - 15 (maps detailing protested parcels based on BLM data downloaded from BLM's website on May 9, 2008).[1] Based on BLM's Competitive Oil and Gas Lease Sale Notice, 24 parcels are being offered for sale in Montana and 47 parcels in North Dakota, totaling 51,982 acres.

This Protest is predicated on BLM's failure to address global warming and climate change and the adverse consequences of this failure to the Protestors' interests (detailed below).[2] Of note, in March, we identified and raised identical concerns regarding BLM's April 8, 2008 lease sale for Montana and North Dakota. However, BLM proceeded with the April 8th lease sale, has yet to provide us with a decision regarding the Protest to the April 8th lease sale, and is moving forward, without any effort to address our concerns, with the June 17th lease sale.

We are thus compelled to emphasize, once again, that oil and gas production, processing, transmission, and distribution activities emit greenhouse gas pollution

[1] These maps were created using BLM's lease sale data in the Lease Sale Notice.

[2] Global warming 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.

("GHG") into the atmosphere, contributing to global warming and climate change.[3] Global warming and climate change also impacts the environment, stressing if not overcoming even strong, resilient ecological systems, in particular given the cumulative surface impacts caused by the spiderweb of oil and gas infrastructure on the landscape when coupled with impacts caused by other activities and events on the landscape. These impacts must therefore be addressed by BLM as it plans and implements management decisions.

Before surrendering lease rights, we therefore ask BLM to prepare an environmental analysis pursuant to the National Environmental Policy Act ("NEPA") to address the global warming and climate change issues and concerns identified by this Protest. We emphasize that this analysis must be prepared *before* lease rights are issued. This is for the simple reason that lease rights convey a right to develop the leasehold. On this point, BLM typically plays a misleading shell-game, pointing to broad, outdated management plans and environmental analyses as a basis for lease decisions which do not address climate change and, concurrently, promising future environmental analysis that will supposedly be prepared at the drilling stage at a point *after* lease rights have been sold. BLM's shell-game is untenable as a matter of law and an affront to the public's right to be meaningfully involved in oil and gas management decisions.

Given the nature of these issues and concerns, and the supporting evidence provided by this Protest, we surmise that an Environmental Impact Statement, rather than an Environmental Assessment, will be necessary. We further surmise the BLM will need to coordinate the NEPA process with Resource Management Plan revisions or amendments at a state or regional scale. 43 C.F.R. §§ 1610.5-5, 1610.5-6. In any event, *before* these lease parcels are offered for sale, we specifically ask that BLM:

> (1) Quantify past, present, and reasonably foreseeable emissions of GHG pollution 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 an emissions limit for GHG pollution or a GHG emissions reduction objective for BLM-authorized oil and gas activities;

[3] 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).

(3) Identify, consider, and adopt management measures – such as pre-commitment lease stipulations and post-commitment conditions of approval[4] – to reduce emissions of GHG pollution from BLM-authorized oil and gas management activities;

(4) Track and monitor emissions of GHG pollution from BLM-authorized oil and gas operations through time;

(5) Consider how global warming and climate change impacts the environment, and whether such impacts warrant additional environmental protections.

At the outset, it is important to emphasize that this Protest is not intended to prohibit oil and gas development. Rather, this Protest is designed to ensure that oil and gas development is held to the highest science-based standards, facilitate responsible domestic energy production, and protect the resiliency and integrity of the environment. In some instances, this may require BLM to withdraw certain parcels from sale. Fundamentally, BLM lease sale decisions must not exacerbate already daunting problems implicated by climate change.

The following sections constitute the statement of reasons in support of this Protest. These sections: identify the Protestors' interests (Section I); articulate the core reasons compelling BLM's urgent need to address global warming and climate change (Section II); explain the legal basis mandating BLM action (Section III); detail the specific actions, (1) – (5), identified above, that BLM must take (Section IV); and demonstrate the failures of the RMPs and RMP-stage NEPA analyses that BLM – through Documentations of Plan Conformance and NEPA Adequacy – is presumably using to justify the lease sale (Section V).

We acknowledge that global warming and climate change present BLM with complicated issues. The immediate intent in submitting this Protest is to ensure that BLM complies with existing legal duties to address global warming and climate change. Ultimately, we hope that BLM can pivot from the agency's current failure to address global warming and climate change to lead an effort that engages federal and state partners, the public, and the oil and gas industry in a constructive, transparent dialogue.

If you have any questions, or would like to discuss this Protest in person, please do not hesitate to contact undersigned counsel at 575.751.0351.

Sincerely,

FOR

Erik Schlenker-Goodrich
Western Environmental Law Center
Attorney and Director, Southwest Office

Megan Anderson
Western Environmental Law Center
Attorney, Southwest Office

[4] There are critical legal distinctions 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.

P.O. Box 1507
Taos, New Mexico 87571
Counsel for Protestors

P.O. Box 1507
Taos, New Mexico 87571
Counsel for Protestors

On behalf of:

Amy Mall
Natural Resources Defense Council

Bruce Baizel
Oil and Gas Accountability Project, a program of EARTHWORKS

Jeremy Nichols
Rocky Mountain Clean Air Action

STATEMENT OF REASONS IN SUPPORT OF THE NATURAL RESOURCES DEFENSE COUNCIL, OIL AND GAS ACCOUNTABILITY PROJECT, AND ROCKY MOUNTAIN CLEAN AIR ACTION'S PROTEST OF THE U.S. BUREAU OF LAND MANAGEMENT'S JUNE 17, 2008 LEASE SALE FOR THE STATES OF MONTANA AND NORTH DAKOTA

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I. ORGANIZATIONAL INTERESTS.

The Natural Resources Defense Council ("NRDC") 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. 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 ("OGAP") is a program of Earthworks, a 501(c)(3) nonprofit dedicated to working with communities to reduce and prevent the devastating impacts of drilling, digging and mining. OGAP/Earthworks works with community groups, landowners, organizations, and individuals to protect our environment, public health, and communities. OGAP provides technical, policy, and organizing assistance, and serves as a clearinghouse of information for organizations and individuals concerned with oil and gas development 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's interests in this 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 ("RMCAA") is a nonprofit public interest organization dedicated to protecting clean air for healthy children and healthy communities in the Rocky Mountain region. RMCAA seeks to secure sound and responsible clean air policy in the region, advocating for science-based decisions that safeguard human health and welfare. RMCAA'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

[5] 2007 IPCC Synthesis Report, Summary for Policymakers, at 2 (www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf) ("IPCC Synthesis Report") (attached as Exhibit 16).

IPCC's 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 18). The Protestors could not agree more. Fortunately, as detailed below, Congress has provided BLM with 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 NEPA analysis or regulatory guidance – BLM must begin to act, *now*, to ensure that meaningful global warming and climate change management measures can be implemented well before 2012. Our concern over time lags is underscored by the 2007 GAO Report's statement that:

> 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 (emphasis added). As compellingly stated in a recent 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]

[6] www.nytimes.com/2007/11/18/science/earth/18climatenew.html (emphasis added) (attached as Exhibit 17).

[7] Hansen, J., *et al.*, *Target Atmospheric CO_2: Where Should Humanity Aim?* (2008) (emphasis added) (attached as Exhibit 19).

Dr. Hansen also individually published an article in State of the Wild 2008-2009 entitled *Tipping Point: Perspective of a Climatologist* (attached as Exhibit 20) in which he states on page 8 that:

> Our home planet is dangerously near a tipping point at which human-made greenhouse gases reach a level where major climate changes can proceed mostly under their own momentum … The implications are profound and the only resolution is for humans to move to a fundamentally different energy pathway within a decade. Otherwise, it will be too late for one-third of the world's animal and plant species and millions of the most vulnerable members of our own species.

As Dr. Hansen recommends, "the best chance for all species is a conscious choice by humans to pursue an alternative energy scenario to stabilize the climate." *Id.* at 11. Critically, such an "alternative energy scenario" must be proactive. Again, Dr. Hansen:

> [A] wait and see and clean up the mess post facto, will not work in the case of carbon dioxide and climate change because of inertial effects, warming already in the pipeline, and tipping points. On the contrary, *ignoring emissions would lock in catastrophic climate change.*
>
> Instead, we must resolve to move rapidly to the next phase of the industrial revolution – expanding the benefits of advanced technology to help maintain the atmosphere, and consequently the wonders of the natural world. A review of basic fossil fuel facts reveals why the shift must be made soon. Based on the estimated amount of carbon dioxide locked in each remaining fossil fuel reservoir – including oil, gas, coal, and unconventional fossil fuels (tar sands, tar shale, heavy oil, methane hydrates) – burning readily available oil and gas resources alone will take atmospheric carbon dioxide to levels near 450 ppm.

Id. at 12.

The Department of the Interior has rhetorically stated that global warming and climate change is a "high priority." 2007 GAO Report at 175. Unfortunately, despite this representation, we have yet to see this "high priority" reflected in BLM decisions. This suggests serious, troubling merit in Dr. James Hansen's statement that "special interests have undue sway with our governments and have effectively promoted minimalist actions and growth in fossil fuels, rather than making the scale of investments [in climate change policies] necessary." Exhibit 20 at 15. If indeed global warming and climate is a "high priority" then it is surely the case that BLM's lease sales should be scrutinized in this context *before* BLM commits public resources to long-term oil and gas development. The time for action is now.

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 21). 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 (with emphases added), 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 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. This is particularly so given Section 3's express reference to resource utilization – which, clearly, includes oil and gas leasing and development – and, even more clearly, "planning *and* management activities associated with oil, gas and mineral development on public lands …."

To a degree, BLM's failure to comply with Secretarial Order 3226 appears political. As the GAO noted, "[o]fficials 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." *Id*. at 37. This seems to undercut BLM's representation that climate change is a "high priority." *Id*. 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. As FLPMA states:

> [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. Pursuant to these mandates, BLM must prepare an inventory of GHG pollution from oil and gas development and use that inventory to inform RMP-level decision-making.

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 essential purpose behind RMPs is to plan for affirmative land protection and management; without RMP-stage guidance, BLM is reduced to a reactive posture that is ultimately ineffective and contrary to FLPMA.

These planning principles are reinforced by FLPMA's imposition of affirmative environmental protection responsibilities on BLM. 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. § 1701(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) (emphasis added). 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)). Individually and in total, these broad, strong mandates obligate BLM to account for and reduce GHG pollution from oil and gas management activities.

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 pollution 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 completion of NEPA analysis before the leases are sold and issued. Pre-commitment NEPA analysis is irreplaceable 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) (emphasis added); *see also* 40 C.F.R. §§ 1500.2(e), 1506.1.

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 Environmental Assessment 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 and result from the GHG pollution emitted by oil and gas operations to the atmosphere; the indirect, secondary GHG pollution and impacts triggered by exploration, production, and processing, transportation and distribution, and refining; and the cumulative impacts of GHG pollution to the atmosphere from oil and gas operations in the broader region and from other GHG pollution sources, such as coal-fired power plants.

According to the American Petroleum Institute ("API"), "[t]he 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." API Compendium at 2-1.[8] GHGs released by oil and gas operations include CO_2, methane, and to a lesser extent nitrous oxide ("N_2O").[9]

Key sources of GHG pollution associated with oil and gas exploration, production, and processing (i.e., the upstream end of the oil and gas industry) 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 CO_2 from coalbed methane ("CBM") gas. These activities additionally involve the emission of GHGs from electricity imports. *See* Table 1 (below). To a lesser extent, N_2O is released by combustion sources associated with oil and gas exploration, production, and processing.

[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) ("API Compendium") (attached as Exhibit 22); *see also* http://ghg.api.org/documents/CompendiumErrata205.pdf (errata).

[9] According to the U.S. Environmental Protection Agency, methane is 21 times more potent than CO_2 as a greenhouse gas, while nitrous oxide is 310 times more potent. *See*, www.epa.gov/methane/scientific.html and http://www.epa.gov/nitrousoxide/scientific.html (last visited March 21, 2008).

Table 1. GHG Pollution from Oil and Gas Exploration, Production, and Processing Operations.[10]

EXPLORATION AND PRODUCTION	CO_2	N_2O	CH_4	Section
COMBUSTION SOURCES – Stationary Devices				
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
COMBUSTION SOURCES – Essential Mobile Sources				
Planes/helicopters	X	X	X	4.5
Supply boats, barges	X	X	X	4.5
Other company vehicles	X	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				
Gas sweetening processes	X		X	5.1
Dehydration processes			X	5.1
VENTED SOURCES – Other Venting				
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
VENTED SOURCES – Maintenance/Turnarounds				
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
VENTED SOURCES – Non-routine Activities				
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
FUGITIVE SOURCES				
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 CO_2 rich production streams (e.g., CO_2 flood or enhanced oil recovery). Significance of these sources depends on the CO_2 concentration and source-specific emission rate.

Downstream of oil and gas exploration, production, and processing operations, key sources of GHG pollution include the transportation and distribution of oil and gas, and oil refining. According to the API, GHG pollution from transportation and distribution are released

[10] *See* API Compendium at 2-5.

as crude oil and associated gas 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 GHG pollution in this subsector include process engines and heaters, storage tanks, and transportation activities. *See* Table 2.

Table 2. GHG Pollution from Oil and Gas Transportation and Distribution Operations.[11]

TRANSPORTATION AND DISTRIBUTION	CO_2	N_2O	CH_4	Section
COMBUSTION SOURCES – Stationary				
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
COMBUSTION SOURCES – Essential Mobile Sources				
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
COMBUSTION SOURCES - Indirects				
Electricity imports	X	X	X	4.7
Process heat/steam imports	X	X	X	4.7
VENTED SOURCES – Process Vents				
Storage tanks			X	5.4
Loading/unloading/transit			X	5.5
Pneumatic devices			X	5.6.1
VENTED SOURCES – Maintenance/Turnarounds				
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
VENTED SOURCES – Non-Routine Activities				
Pressure relief valves			X	5.7.4, 5.7.5
Surge tanks			X	5.7.4
FUGITIVE SOURCES				
Process equipment leaks			X	6.1
Pipeline leaks			X	6.1

With regards to oil refining, the API explains, "The refining segment consists of all refinery sites that take in crude and produce finish products, such as gasoline." API Compendium at 2-12. GHG pollution is 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 CO_2 is the key GHG pollutant associated with refining, methane and nitrous oxide are also released during the process. *See* Table 3 (below).

[11] *See* API Compendium at 2-11.

Table 3. GHG Pollution from Oil Refining Operations.[12]

REFINING	CO_2	N_2O	CH_4	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

According to the API, other oil and gas industry operations that may release GHGs include petrochemical manufacturing, mining, heat and electricity generation, and oil and gas retail and marketing. These processes utilize equipment and practices that release CO_2, methane,

[12] *See* API Compendium at 2-13.

and N_2O. *See* API Compendium at 2-10, 2-15, 2-16, and 2-17. As is evident, the cumulative GHG footprint of the oil and gas industry can be quite large, extending from a single well downstream to refineries and other major sources.

BLM must therefore take a hard look at the full lifecycle of GHG pollution emitted from oil and gas development (i.e., both upstream and downstream) and must not look at GHG emissions "in a vacuum." *Grand Canyon Trust v. FAA*, 290 F.3d 339, 342 (D.C. Cir. 2002).

Once this full lifecycle is understood, BLM can properly consider measures to reduce GHG pollution. *See* 42 U.S.C. § 4321, 4331 (detailing NEPA's purpose and declaration of national environmental policy). To do this, 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). 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 oil and gas development activities carried out on public lands – principally production-based activities. These measures must be identified and analyzed on the basis of decision-making and NEPA analysis completed *before* BLM makes a commitment by surrendering lease rights. While BLM of course retains the right to subject development to conditions of approval, the breadth and scope of such conditions are delimited by the lease rights. Thus, certain GHG pollution reduction measures may require BLM to subject the lease to a stipulation at the point of sale. Reliance on conditions of approval may be appropriate but only if these conditions are identified and evaluated prior to the point of commitment. Without pre-commitment decision-making and analysis, BLM cannot ensure that GHG pollution can be constrained within acceptable limits.

Pragmatically, given the GHG pollution caused by the full lifecycle of oil and gas development, broad-scale pre-commitment decision-making and NEPA analysis, whether completed regionally, state-wide, or for each Resource Area, offers significant efficiencies of scale, affords BLM the chance to reach out to federal and state partners, is better able to engage the public and the oil and gas industry in a meaningful, transparent dialogue, and allows all parties to plan for and implement GHG reduction measures in a uniform, efficient, and consistent fashion.

A review of BLM's recent NEPA logs for a number of Field Offices in Montana and North Dakota, including the Miles City Field Office, Great Falls Oil and Gas Station, Billings Field Office and the North Dakota Field Office, evidences numerous discrete oil and gas decisions and attests to the legal and pragmatic difficulty – if not impossibility – of addressing climate change and GHG emissions issue at the APD stage given: (1) the geographic scale of

climate change impacts; (2) the massive volume of APD-stage decisions; (3) the legal consequence of the lease rights to BLM's authority; (4) the fact that these APD-stage decisions typically present a singular, myopic element of the overall lifecycle of GHG emissions from production, processing, transmission, and distribution activities; and (5) the need for BLM to solicit public review and comment on these decisions.[13]

Furthermore, as demonstrated by BLM NEPA logs for Montana and North Dakota Field Offices, BLM is approving a number of new wells through use of "Categorical Exclusions" and "Determinations of NEPA Adequacy" ("DNAs") and is therefore rarely preparing either Environmental Assessments or Environmental Impact Statements.[14] Unlike, in particular, Environmental Impact Statements, categorical exclusions receive perfunctory and truncated review at best; often the decision to capture a decision within a categorical exclusion is supported by no more than a checklist. DNAs are not even expressly sanctioned by NEPA or CEQ regulations, and appear patently inappropriate in the context of approving oil and gas development. Regardless, given the much abbreviated treatment given to APDs, it is highly unlikely that BLM will – or could – consider climate change at this stage or afford the public a meaningful opportunity to raise climate change issues at the APD stage. Moreover, given the nature of the problem, and the evidence contained within this protest, it is, put simply, arbitrary and capricious to defer such consideration until the APD stage. These issues must be addressed at a broader scale. Finally, BLM frequently emphasizes that it has only limited resources. It is difficult to imagine that addressing the issues and concerns presented in this protest at the APD stage is possible given BLM's limited resources.

BLM must not only take a hard look at the emission of GHG pollution from oil and gas, but must also take a hard look at the impacts of climate change to the environment and to BLM management activities. BLM cannot blindly take a business-as-usual approach which ignores the impact of climate change impacts, and assumes that BLM management will not be affected by climate change.[15] Accordingly, BLM must not only take a hard look at climate change impacts, but also consider management alternatives designed to protect the environment from climate change impacts. Such alternatives involve the protection of landscape permeability, wildlife habitat (in particular core areas and migration/adaptation corridors), watersheds, *etc*.[16] Such

[13] Montana and North Dakota NEPA logs are available online at: http://www.blm.gov/mt/st/en/info/nepa.html, and pending and final applications for permits to drill are available online at: http://www.blm.gov/mt/st/en/prog/energy/oil_and_gas/apds.html.

[14] In many cases, BLM does not reference a NEPA document for an APD at all, thus providing no documentation of any NEPA review, and at the very least, making it extremely difficult to locate the NEPA document for a particular APD. *See, e.g.*, Great Falls Field Station Final APD Log, Exhibit 23, available online at: http://www.blm.gov/pgdata/etc/medialib/blm/mt/blm_programs/energy/oil_and_gas/apds.Par.99399.File.dat/GFFSfinal.pdf.

[15] The impacts of global warming and climate change are detailed below in Section IV.5.

[16] 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/landscope.jsp); Climate Impacts Group, University of Washington (http://cses.washington.edu/cig/pnwc/cc.shtml); Climate Change and Aspen: An Assessment of Impacts and

alternatives may also include measures to re-calibrate or reconsider the purpose, design, or efficacy of planned or ongoing management activities. Relative to protection of the environment, BLM needs to assure resiliency and adaptability in the face of climate change. In some instances, *in situ* conservation may be possible but, in other instances, *in situ* conservation may act as a death sentence for isolated environments. In these latter instances, BLM will have to coordinate intensively with its federal and state partners to protect, e.g., wildlife linkages to allow species to migrate towards more suitable environments. *See* 2007 GAO Report at 43-44. The cost of BLM's failure 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.[17]

Of note, once a NEPA analysis is completed, BLM 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 simplistically 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 – let alone a meaningful capacity. To rely on existing NEPA analyses, BLM would have to prepare a NEPA supplement.

However, importantly, the Protestors submit that the June 17, 2008 lease sale constitutes a distinct proposal for purposes of NEPA compared to RMP-stage proposals. 40 C.F.R. § 1508.23. Unfortunately, BLM is apparently relying on RMP-stage NEPA analyses to justify the lease sales. Thus, the Protestors believe that a supplemental NEPA analysis would generally not provide the proper basis for the lease sales unless BLM articulated the supplement's proposal ensured: (1) a lease-stage hard look at the impacts of oil and gas leasing within the precise context of the proposed parcels to properly understand the significance and acceptability of impacts; (2) the consideration of proper lease-stage alternatives; and (3) the consideration of alternatives that did not fixate solely on oil and gas but, more broadly, protection of the

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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.

[17] Even 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).

environment as a whole. On the second point, lease-stage alternatives are distinct from RMP-stage alternatives, in particular relative to BLM's duty to address a no action alternative. In short, an RMP-stage no action alternative consists of the "continuation of present level or systems of resource use" while a lease-stage no action alternative consists of the distinct option of not selling the lease. *See* 43 C.F.R. § 1610.4-5.

By adhering to NEPA's action-forcing mandates, BLM best 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 lease sale, however, violates this basic principal.

BLM should not be surprised by this Protest; beyond Secretarial Order 3226, 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."[18] CEQ then decided that the available scientific evidence showed that climate change is a reasonably foreseeable impact that must be considered in NEPA documents.[19] 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 environment 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."[20]

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.[21] 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.[22] 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.[23]

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[18] 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 24).

[19] *Id.* at 4.

[20] *Id.* at 3.

[21] *Id.* at 4, fn. 3.

[22] *Id.* at 2.

[23] *Id.* at 5.

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.[24] 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.[25] In keeping with its own guidance and CEQ's conclusion that climate change is a "reasonably foreseeable" impact of greenhouse gas emissions, MMS – right now – 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.[26] For example, in its programmatic Final EIS for Outer Continental Shelf Oil and Gas Leasing Program from 2007 to 2012, MMS estimated "the total emissions of CO_2 and CH_4 for all projected activities associated with the proposed 5-year program."[27] 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 to 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.[28] [29]

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[24] 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 25).

[25] *See* MMS, *NEPA Procedures, Global Climate Change*, available at http://www.mms.gov/eppd/compliance/nepa/procedures/climate/index.htm; MMS, *Global Climate Change Considerations* available at www.mms.gov/eppd/compliance/nepa/procedures/climate/considerations.htm (relevant excerpts of both attached as Exhibit 26).

[26] MMS, 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 27); MMS, Environmental 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, www.mms.gov/alaska/ref/EIS%20EA/BeaufortFEIS_195/Sale195/EA195without%20linkver4.pdf (relevant excerpts attached as Exhibit 28).

[27] Exhibit 27, MMS, 2007-2012 FEIS at IV-12, Tables IV-1 – IV-3, IV-5.

[28] Exhibit 28, EA for Proposed Oil and Gas Lease Sale 195, Appendix I; Appendix C, Section VI.C.4 of the Biological Evaluation.

[29] 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 limited post-commitment authority, pursuant to 30 U.S.C. § 226(g), with MMS' more expansive post-commitment authority, pursuant to 43 U.S.C. § 1351(h)).

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). In effect, here, the Public Trust Duty underscores the need for BLM to take a precautionary approach to managing the public lands and cannot hide behind the false premise that oil and gas interests are on a par with the broader interests of the whole public.

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, to a degree, 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 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. As noted, the Public Trust Duty, in a sense, tips the balance in favor of the broad public interest as compared to the insular interests of the oil and gas industry.

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 above, direct and indirect GHG emissions from oil and gas industry operations include CO_2, methane, and to a lesser extent N_2O, from a number of sources and processes. In Montana and North Dakota, the BLM's surrender of lease rights will open the door for conventional natural gas development, CBM development, crude oil development, as well as attendant operations that will facilitate this development.

Indeed, development of oil and gas, including CBM, occurs throughout Montana east of the Rocky Mountain Front, as well as in western North Dakota. Statistics with the Montana Board of Oil and Gas show that in 2007, 148 oil wells, 372 gas wells, and 63 CBM wells were drilled in the State.[30] Production data with the Montana Board of Oil and Gas also shows that virtually every County in eastern Montana produced oil and/or gas in 2007. *See* Table 4 below. According to the BLM's June 13, 2008 lease sale notice, oil and gas leases will be offered for sale in many of Montana's producing Counties, including Custer, Fallon, Musselshell, Phillips, Richland, Roosevelt, Sheridan, Stillwater, and Sweet Grass.

Table 4. Oil and Gas Production in Montana by County, 2007.[31]

County	Bbls Oil	Mcf Gas
Big Horn	61559	13062106
Blaine	228270	13035474
Carbon	457109	1952657
Carter	14734	96209
Chouteau	0	1619986
Custer	0	79839
Daniels	10033	0
Dawson	540988	210343
Fallon	7251299	26786265
Fergus	0	59850

[30] Montana Board of Oil and Gas data available online at http://bogc.dnrc.mt.gov/jdpintro.asp.

[31] Data from Montana Board of Oil and Gas

Garfield	14733	2190
Glacier	449982	1697997
Golden Valley	0	94673
Hill	2151	14684022
Liberty	78325	1948477
McCone	13226	0
Musselshell	144456	6601
Petroleum	26216	3936
Phillips	0	19985419
Pondera	128794	548295
Powder River	335830	95493
Prairie	93051	9481
Richland	20137661	16726594
Roosevelt	1398093	762518
Rosebud	273700	14835
Sheridan	1733665	876052
Stillwater	0	583553
Sweetgrass	0	69189
Teton	51535	1507
Toole	455589	4001343
Valley	122077	1132069
Wibaux	790113	605614
Yellowstone	22821	0

Similarly, lands in a number of western North Dakota Counties that currently produce oil and/or gas are slated to be leased by the BLM. According to the June 13, 2008 lease notice, lands in Divide, Dunn, McKenzie, Mountrail, Renville, Slope, and Williams Counties will be offered for lease. According to the North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division, oil and/or gas was produced in all seven of these Counties in 2007.[32] It is reasonable to conclude that leasing these lands in Montana and North Dakota will lead to further oil and gas development.

GHG emissions associated with 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 CO_2 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

[32] *See*, Oil and Gas Division Production Data by County. Reports online at https://www.dmr.nd.gov/oilgas/stats/countymot.pdf and https://www.dmr.nd.gov/oilgas/stats/countymgt.pdf.

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.[33]

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.[34] A draft report is presently available for review.[35] Archived EPA information provides reports for previous inventories.[36] MMS, as discussed above, has also 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:[37]

- **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 CO_2 equivalent ("CO_2e") in 2005, more than 4% of the state's total GHGs.[38] *See* Final Colorado Greenhouse Gas Emissions Inventory and Reference Case Projections 1990-2020 (attached as Exhibit 30).[39] Furthermore, GHGs from oil and gas operations are projected to increase by more

[33] 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 29) (available at www.wrapair.org/WRAP/ClimateChange/GHGProtocol/meetings/071025/Characterization_of_O&G_Operations_Sector_Emissions.pdf)

[34] www.epa.gov/climatechange/emissions/usinventoryreport.html.

[35] www.epa.gov/climatechange/emissions/downloads/08_CR.pdf.

[36] www.epa.gov/climatechange/emissions/usgginv_archive.html.

[37] Unfortunately, North Dakota has not developed a GHG inventory, making it even more critical that the BLM take steps to inventory potential GHG emissions from oil and gas leasing in this State.

[38] CO_2 equivalent refers to the global warming potential of a GHG, where CO_2 has a potential of "1" and, for example, methane has a potential of "21." Therefore, one ton of methane equals 21 tons of CO_2 equivalent.

[39] www.coloradoclimate.org/ewebeditpro/items/O14F13894.pdf.

than 80% by 2020. Although GHG emissions are reported to stem from both oil and gas production processing, and refining, the inventory states that "The natural gas industry accounts for the majority of both GHG emissions and emissions growth in the fossil fuel industry as a whole." Exhibit 30 at E-5.

- **Montana.** According to a September 2007 GHG inventory for the State of Montana, oil and gas operations released 4.7 million metric tons of CO_2e 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 31).

- **New Mexico.** According to the November 2006 GHG inventory for the State of New Mexico, oil and gas operations released 19.3 million metric tons of CO_2e 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 that appears invalid. 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 32).

- **Wyoming.** According to a Spring 2007 GHG inventory for the State of Wyoming, oil and gas operations released 11.5 tons of CO_2e 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 33).

These GHG quantification efforts provide a useful starting point for BLM. They largely constitute top-down efforts to quantify GHG emissions and are less refined then bottom-up inventories prepared on the basis of specific equipment inventories and GHG measurements.

Complementing this governmental GHG quantification work is the API Compendium, referenced extensively above. 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. Indeed, a recent review by the California Energy Commission

found that the API Compendium's "methods and data on evaluating combustion emissions and refinery emissions are considered the best information."[40] Although this same review recommended refinement of certain API Compendium methodologies, the review found the Compendium to be accurate and reliable.[41] A review of the API Compendium – as well as follow up assessments of the API such as the California Energy Commission's review – 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, the California Climate Action Registry identified methods to quantify GHG emissions from combustion sources, including compressor engines, direct emissions from process vents, fugitive emissions, and indirect GHG emissions.[42] 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.

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 important given that upstream oil and gas production involves individually minor, but collectively significant GHG emissions sources. Such refined data enables BLM to best support GHG reduction efforts by identifying the highest impact, most cost-effective 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.

Indeed, while the legal basis for quantifying GHG emissions is clear, there is a need for the BLM to refine existing top-down inventories to accurately and effectively implement GHG reduction strategies, as well as to instill certainty in the process. Findings from other Rocky Mountain State GHG inventories explain the need for the BLM to follow through with such

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[40] 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 34).

[41] 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.

[42] California Climate Action Registry, *Discussion Paper for a Natural Gas Transmission and Distribution Greenhouse Gas Reporting Protocol*, prepared by the URS Corporation and the LEVON Group (2007) (attached as Exhibit 35).

actions in Montana and North Dakota. As explained in the Final New Mexico GHG Inventory and Reference Case Projections, 1990-2020:

> The sheer number and wide diversity of oil and gas activities in New Mexico present a major challenge for greenhouse gas assessment. Emissions of carbon dioxide and methane occur at many stages of the production process (drilling, production, and processing/refining), and can be highly dependent upon local resource characteristics (pressure, depth, water content, etc.), technologies applied, and practices employed (such as well venting to unload liquids which may result in the release of billions of cubic feet of methane annually). With over 40,000 oil and gas wells in the State, three oil refineries, several gas processing plants, and tens of thousands of miles of gas pipelines in the State – and no regulatory requirements to track CO_2 or CH_4 emissions – there are significant uncertainties with respect to the State's GHG emissions from this sector.

Exhibit 33 at D-35. The Final New Mexico GHG Inventory and Reference Case Projections further noted:

> 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 national average emission rates) may be low. Furthermore, CO_2 emissions that may occur as the result of CO_2 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.

Id. at D-18. Although these statements relate to oil and gas development in the State of New Mexico, the situation is similar, if not exactly the same in Montana and North Dakota. As the Final Colorado Greenhouse Gas Emissions Inventory and Reference Case Projections 1990-2020 states:

> Emissions of CH_4 and entrained CO_2 can occur at many stages of production, processing, transmission, and distribution of oil and gas. With over 23,000 gas and oil wells in the state, 43 operational gas processing plants, 2 oil refineries, and over 32,000 miles of gas pipelines, there are significant uncertainties associated with estimates of Colorado's GHG emissions from this sector. This is complicated by the fact that there are no regulatory requirements to track CO_2 or methane emissions. Therefore, estimates based on emissions measurements in Colorado are not possible at this time.

Exhibit 31 at E-2. Simply put, while oil and gas industry GHG emissions are being inventoried, these inventories have yet to fully capture the diversity and magnitude of emissions from every source related to oil and gas industry operations. Coupled with its legal responsibilities and the various GHG quantification tools available, the BLM is well poised to conduct the very "further

analysis" that is needed to resolve uncertainty and ensure accurate planning, in Montana, North Dakota and the Rocky Mountain region as a whole.

In terms of scale, BLM should *at least* quantify GHG emissions from past, present, and reasonably foreseeable oil and gas development within each Resource Area in Montana and North Dakota. As suggested, however, a broader, regional landscape-scale effort may be warranted. Obviously, any effort – including Resource Area-specific efforts – should account for the cumulative impacts of other GHG sources across the landscape, including state permitted oil and gas development. Furthermore, BLM should assess the proportion of GHG emissions from oil and gas development relative to state, regional, and national GHG emissions totals.

Ultimately, it may behoove BLM to prepare a programmatic NEPA analysis to revise or amend RMPs throughout the Rocky Mountains to account for and reduce GHG emissions, properly justify oil and gas management activities, and properly protect the BLM-managed built and natural environments. Given the scale of this endeavor, it may also behoove BLM to initiate a top-level policy or rulemaking process to provide guidance to field staff and encourage the development of models to predict climate change. 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 36 is a summary of oil and gas leasing and APD activity in the Rocky Mountain region between 2001 – 2007 based on government data, and, also, attached as Exhibit 37, 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 quantifying and understanding the full magnitude of past, present, and reasonably foreseeable GHG pollution from oil and gas development. Also attached are maps detailing federally-leased lands in Montana's sister states of New Mexico, Wyoming, and Colorado. *See* Exhibits 38, 39, & 40. Of note, based on now-dated 2004 data, it appears that at least 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, only 2,702 wells were actually drilled. *See* Exhibit 41 (attached). Nonetheless, current estimates suggest approximately 126,000 new federal (thus excluding state and private) wells in the Rocky Mountain West in the next 15-20 years. *See* Exhibit 42 (attached). These data points suggest that BLM could – and, indeed, should – ratchet back its leasing decisions and APD approvals. In effect, BLM's leasing program seems to be enabling speculation and the stockpiling of leases, not actual energy development for the benefit of the country. Given BLM's limited resources, this may be compromising conservation efforts.

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 pollution 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 New Mexico has specifically called for a 20% reduction in methane

emissions from the oil and gas industry by 2020.[43] More generally, the Governor of Colorado has called for a 20% reduction in GHGs below 2005 levels by 2020 and an 80% reduction below 2005 levels by 2050. 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 the 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 climate change by not having a definable and achievable goal. Furthermore, without articulated GHG limits or GHG reduction objectives, it is difficult if not impossible to ensure that actual GHG reduction efforts are effective; put another way, those efforts are rudderless.

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 paper – *Target Atmospheric CO_2: Where should Humanity Aim?* – authored by, amongst others, Dr. James Hansen at the National Space and Aeronautics Administration discussed above and attached as Exhibit 20. According to the paper, "If humanity wishes to preserve a planet similar to that on which civilization developed, paleoclimate evidence and ongoing climate change suggest that CO_2 will need to be reduced from its current 385 ppm to at most 350 ppm." Exhibit 20 at 1. Notably, this is a lower overall ppm objective then set by IPCC. The 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 on-going 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 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 forcings are reduced." *Id*. Of note, while the paper focuses on CO_2, the reduction of non-CO_2 GHGs – such as methane – "could alleviate the CO_2 requirement, allowing up to about +25 ppm CO_2 for the same climate effect, while resurgent growth of non-CO_2 GHGs could reduce allowed CO_2 a similar amount." *Id*. at 11.

[43] *See* www.nmenv.state.nm.us/aqb/GHG/Docs/EO_2006_069.pdf. Similarly, the Governor of the State of Colorado has called for an 80% reduction in GHGs by 2050. *See* www.colorado.gov/cs/Satellite?c=Page&cid=1194261894265&pagename=GovRitter%2FGOVRLayout.

Of course, BLM, as a single federal agency, cannot alone constrain and reduce GHG emissions within the limits 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 Colorado, have taken this latter approach, calling for a 20% reduction in GHG emissions below 2005 levels by 2020 and an 80% reduction below 2005 levels by 2050. *See* Governor Bill Ritter, Jr., Colorado Climate Action Plan (November 2007) (attached as Exhibit 43). GHG emissions limits or GHG reduction objectives can then be used to constrain or even, if necessary, prohibit development to ensure that such development does not unacceptably contribute to global warming and climate change – a use that suggests the need for broad-scale decisions and NEPA analysis.

We anticipate that BLM may object to setting a GHG emissions limit or GHG reduction objective by punting to other federal or state agencies, such as the EPA. This would be a mistake. BLM has independent legal obligations pursuant to Secretarial Order 3226, FLPMA, NEPA, and the Public Trust Duty to address greenhouse gas emissions from oil and gas development and independent legal obligations to address climate change impacts to the environment. Moreover, as the steward of our federal onshore oil and gas resources, BLM is uniquely positioned to address greenhouse gas emissions from oil and gas development, in particular given the interplay between greenhouse gas pollution, climate change impacts, and the planning, authorization, and construction of oil and gas development. BLM must not shirk this responsibility.

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 been underway for some time but, unfortunately, have had only a limited effect and have not even come close to constraining GHG emissions within the limits recommended by the scientific community to mitigate anthropogenic climate change. Nonetheless, these efforts have demonstrated that GHG emissions reduction measures are technologically proven and frequently cost-effective, if not negative-cost and therefore an analogue of energy efficiency. This is for the common sense reason that if you reduce, for example, the emission of methane, a potent GHG pollutant, you end up putting more product in the pipeline for the benefit of the oil and gas company *and*, ultimately, the consumer. In accord with BLM's legal obligations, these efforts, must however be identified, evaluated, planned, and implemented in a uniform and consistent fashion to ensure that GHG reduction efforts are commensurate to the scale of the problem presented by climate change; *ad hoc*, voluntary, unplanned, and minimalist efforts simply will not suffice.

The intensification of these efforts through the development and implementation of planning and management frameworks is a logical component of the general legal prohibition against waste in oil and gas production; if, as a byproduct of implementing GHG reduction measures, the oil and gas operator creates a commercial product – such as carbon dioxide for Enhanced Oil Recovery or methane for consumers – then the failure to implement these

measures is, by definition, wasteful. In fact, for years, coalbed methane was itself considered little more than a waste product. By extension, this logic also supports a go-slow approach to oil and gas leasing and development to allow for the development of more robust technological GHG reduction measures with the capability of constraining GHG emissions within acceptable GHG limits or to ensure the achievement of GHG reduction objectives. While such an approach may not serve the short-term interests of the oil and gas industry, it does serve the long-term interests of the whole public. In effect, BLM needs to account for the public interest – not merely industry's desire for short-term profit margins – to ensure that oil and gas resources are developed through responsible, long-term, phased planning and development that minimizes waste and enables the widespread deployment of GHG pollution reduction measures.

In any event, as BLM moves forward in this endeavor, BLM should first look to EPA's 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.[44] EPA also manages the well-known, though underutilized, Natural Gas STAR program.[45] These programs provide useful starting points for BLM-based efforts to affirmatively reduce GHG emissions from federal oil and gas operations and ensure compliance with BLM's legal obligations.[46]

States, on the basis of their concerns over the consequences of global warming and climate change to their economies and environments, have also developed individualized Climate Action Plans to address global warming and climate change by reducing GHG emissions.[47] *See* 43 U.S.C. § 1712(c)(9) (requiring BLM to coordinate and act consistently with state-based plans and programs); 43 C.F.R. §§ 1610.3-1, 1610.3-2 (same). 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.[48] Draft design elements have supported the inclusion of upstream oil and gas operations.

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[44] www.epa.gov/methanetomarkets/.

[45] www.epa.gov/gasstar/. Notably, many major oil and gas producers in Montana and North Dakota are EPA Natural Gas STAR partners, including ConocoPhillips, EnCana Oil and Gas, Exxon, Marathon, and others. *See* http://www.epa.gov/gasstar/partner.htm.

[46] Of note, the Protestors have been in meetings with representatives of the oil and gas industry that participate in EPA's programs wherein the representatives have indicated that their deployment of GHG reduction measures may actually slow in anticipation of market-based GHG reduction programs. The reason behind this potential slow-down is that these companies may not otherwise be able to get credit for GHG reductions taken prior to the deployment of the market-based GHG reduction programs. This suggests that BLM must initiate near-term measures to ensure that efforts to reduce GHG emissions do not regress and potentially compromise long-term GHG reduction efforts.

[47] *See, e.g.*, Exhibit 43 (Colorado); Exhibit 44 (New Mexico Climate Change Advisory Group, Final Report (December 2006)).

[48] 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 the time is now for BLM to step up to the plate and address global warming and climate change in a meaningful way.

As an initial action, BLM should subject leases to the stipulation that the lessee *must* actively 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 and that lessees that derive profit from public resources should be held to the highest standards. BLM should also subject the leases to a stipulation that empowers BLM to fully implement future laws, policies, and plans designed to combat climate change and reduce GHG pollution. Once BLM surrenders lease rights, BLM may be unable to subject lease operations to these laws and policies without violating the lessees' rights. At the least, enforcing these laws and policies in the context of already-issued leases may be met with fierce resistance by the lessees. Given that lease development can last for decades, it would be unfortunate if BLM commits public lands to activities that would undercut anticipated laws and policies designed to combat global warming and climate change. Bottom line, a simple solution would be to expressly subject leases to stipulations to ensure that future GHG reduction laws and policies can be fully implemented. Oil and gas companies would then have a front-end incentive to implement GHG reduction measures and could account for the cost of these measures in their lease sale offers.

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 pollution reduction measures as a component of BLM's RMP planning process and NEPA alternatives analysis and thereby address whether leases should be subjected to more specific GHG reduction stipulations. The alternatives would consider, e.g., stipulations mandating, generally, that oil and gas operations will be subjected to the best available GHG reduction measures, or mandating, specifically, precise types of GHG reduction measures. In some instances, BLM may be able to rely on conditions of approval *if* BLM *first* identifies and evaluate the efficacy of these conditions of approval prior to the point of commitment. Again, pending broader RMP-level planning and NEPA analysis, it may also behoove BLM to take a go slow approach in authorizing development of existing leases to ensure that GHG pollution reduction measures can have the most significant cumulative benefit.

However BLM proceeds, the need for pre-commitment NEPA analysis is critical. Many existing GHG reduction measures are implemented because they are economically worthwhile from the perspective of the oil and gas operator. But even if these GHG reduction measures are implemented, they may be unable, without more, to achieve GHG limits or GHG reduction objectives. Moreover, just because a particular measure is economically beneficial does not mean that a company will in fact implement the measure. Oil and gas lessees, like any business, may find it more economically beneficial to invest in the drilling of new wells or other endeavors rather than in GHG pollution reduction measures. BLM may therefore find it necessary to mandate GHG pollution reduction measures to reflect BLM's broad conservation duties and to ensure that GHG emissions limits are not exceeded or to achieve GHG pollution reduction

objectives. Relatedly, BLM may need to expressly retain the legal authority to constrain development on the leasehold to ensure that emissions of GHG pollution are constrained within these limits or objectives. To do this, a lease stipulation would likely be required. Fundamentally, BLM needs to address these measures before lease rights are conferred. Pragmatically, pre-commitment decision-making and NEPA analysis BLM provides BLM 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 thus the basis to plan for drilling-stage activities in advance.[49]

In terms of the precise types of GHG reduction measures, and the types of GHG emissions they reduce, GHG reduction measures targeting methane emissions are especially important. Not only is methane a potent GHG, but methane reductions typically involve methane recovery, therefore yielding a high potential for payback.[50] Measures that reduce methane and often yield a payback include:

- Retrofitting or replacing high-bleed pneumatic controllers with low-bleed or no-bleed pneumatics.[51]

- 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.[52]

- Enhancing maintenance of compressor engines, including periodic replacement of compressor rods and rod packing.[53]

- Replacing glycol dehydrators with desiccant dehydrators, utilizing flash tank separators at glycol dehydrators, optimizing glycol circulation rate, or utilizing other zero emission dehydrator technologies.[54]

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[49] The distinction between BLM's pre- and post-lease authority is particularly important 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. 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.

[50] Current natural gas prices are around $7.50/Mcf at the wellhead. *See* http://tonto.eia.doe.gov/oog/info/ngw/ngupdate.asp. Thus, efforts to recover methane are, in essence, recovering money.

[51] *See* Exhibit 45 (www.epa.gov/gasstar/pdf/lessons/ll_pneumatics.pdf).

[52] *See* Exhibits 46 & 47. (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 48 (http://www.epa.gov/gasstar/workshops/glenwood_sept2007/04_recs.pdf).

[53] *See* Exhibit 49. (www.epa.gov/gasstar/workshops/glenwood_sept2007/03_methane_savings_from_compressors.pdf).

[54] *See* Exhibit 50 (www.epa.gov/gasstar/workshops/durango_sept2007/08_natural_gas_dehydration.pdf).

- Installing plunger lift systems in gas wells.[55]

- Conducting directed inspection and maintenance at wellheads, compressor stations, and processing plants to reduce fugitive leaks from valves, flanges, and other connectors.[56]

- Installing vapor recovery units on crude oil, condensate, or other tanks storing liquid petroleum products.[57]

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, www.epa.gov/gasstar/techprac.htm.

Additionally, many methane reduction measures are detailed in the recently finalized report by the Four Corners Air Quality Task Force. The Four Corners Air Quality Task Force, which the BLM was actively a part of, released its final report on mitigation options for the oil and gas industry on November 1, 2007.[58] This report details a number of potential strategies to reduce air pollution, including methane. Notably, the report indicates that many methane reduction measures concurrently reduce emissions of volatile organic compounds ("VOCs"). VOCs react with sunlight to form ground-level ozone, a criteria pollutant for which the Clean Air Act sets National Ambient Air Quality Standards ("NAAQS") to limit unhealthy concentrations nationwide. *See* 40 CFR § 50.10. The EPA just strengthened the NAAQS for ozone, limiting concentrations to no more than 75 parts per billion over an eight hour period. *See* 73 Fed. Reg. 16435-16514. It would behoove the BLM to reduce both methane and VOCs from oil and gas development to address both global warming and ozone impacts.[59]

Many, if not all, of the measures identified by the EPA's Natural Gas STAR program and the Four Corners Air Quality Task Force are applicable to oil and gas development in Montana and North Dakota. 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. It is no wonder that Colorado Governor Bill Ritter himself has called for the state to "work with the oil and gas sector to reduce methane leakage by expanding the use of proven emission reduction practices and encouraging the

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[55] *See* Exhibit 51 (www.epa.gov/gasstar/pdf/lessons/ll_plungerlift.pdf).

[56] *See* Exhibit 52 (www.epa.gov/gasstar/workshops/durango_sept2007/03_dim_in_gas_production_facilities.pdf).

[57] *See* Exhibit 53 (www.epa.gov/gasstar/pdf/lessons/ll_final_vap.pdf).

[58] This report is available at www.nmenv.state.nm.us/aqb/4C/Docs/4CAQTF_Report_FINAL_OilandGas.pdf.

[59] In fact, the BLM has a legal responsibility to ensure protection of the NAAQS in accordance with FLPMA. *See* 43 U.S.C. § 1712(c)(8); 43 C.F.R. § 2920.7(b)(3).

development of new technologies that both reduce emissions and save money." Exhibit 43 at 21 (Colorado State Climate Action Plan). Indeed, many companies producing oil and gas in Montana and North Dakota have already reported success in utilizing a number of methane reduction measures. For example:

- BP has successfully utilized green completions to reduce methane emissions from CBM well completions. *See* Exhibits 47 & 48.

- EnCana Oil and Gas (USA) has replaced a number of high-bleed pneumatic controllers with low-bleed pneumatics, installed a number of plunger lifts, and utilized green completions, replaced gas-actuated pumps with solar electric pumps, and utilized vapor recovery units.[60]

- Marathon Oil has undertaken a number of methane reduction measures, including installing vapor recovery units, replacing high-bleed pneumatic controllers with low or no-bleed pneumatic controllers, and installing plunger lifts.[61]

- Burlington Resources, a subsidiary of ConocoPhillips, has successfully reduced methane emissions through the use of plunger lift systems.[62]

While these are just some examples highlighting both the feasibility and acceptance of methane reduction measures among companies operating in Montana and North Dakota, they highlight the need for the BLM to conduct a more in-depth analysis of these methane reduction measures before surrendering lease rights to: (1) address whether these measures should be made mandatory through lease stipulations (because, e.g., they would otherwise conflict with a lease issued only with standard terms and conditions); (2) afford BLM the chance to reach out to federal and state partners; (3) engage the public and the oil and gas industry in a meaningful, transparent dialogue; and (4) allow all parties to plan for and implement GHG reduction measures in a uniform, efficient, and consistent fashion, as well as to take advantage opportunities to reduce emissions of other harmful air pollutants, such as VOCs.

Relative to carbon dioxide reductions from oil and gas operations, according to the state of New Mexico's Climate Change Advisory Group:

> There are a number of ways in which CO_2 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 efficiency, (4) improving performance of compressor cylinder ends, (5) capturing compressor waste heat, and (6) utilizing waste heat recovery boilers. Policies to

[60] *See* Exhibit 54 (http://www.epa.gov/gasstar/workshops/glenwood_sept2007/09_scott_mason_ancillary_equipment.pdf).

[61] *See* Exhibit 55 (http://www.epa.gov/gasstar/workshops/denver_apr08/denver2.pdf).

[62] *See* Exhibit 56 (http://www.epa.gov/gasstar/workshops/farmington-feb06/burlington_resources.pdf).

> 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 CO_2 emissions (the average carbon intensity of New Mexico electricity would need to be reduced by approximately 30% to make this option carbon-neutral).[63]

Such strategies are equally applicable in Montana and North Dakota. In part to address GHG emissions, but to also address the cumulative impact of climate change and oil and gas development 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, limit the amount of field processing equipment, roads, and other related development infrastructure, and ensure more uniform and consistent GHG pollution reduction planning and action.

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 environment to support adaptive management. 43 U.S.C. § 1711(a); 43 C.F.R. §§ 1610.4-3, 1610.4-9. 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 emission of GHG pollution and changes to the baseline through time, BLM has an informed basis 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.

[63] Exhibit 44 at 5-14.

5. BLM Must Consider How Global Warming and Climate Change Impact the Environment, and Whether Such Impacts Warrant Additional Environmental Protections.

a. Climate Change Impacts – Summary Information

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 impacted by global warming and climate change. Impacts, of course, are not limited to public resources, but extend across Montana's and North Dakota's landscape. BLM should account for this harm through a hard look NEPA analysis and by considering reasonable alternatives designed to protect the environment. Such pre-commitment decision-making and NEPA analysis affords BLM an informed basis to ensure a rational connection between the facts found and the ultimate choices made; a basis that also allows BLM to prevent permanent impairment, prevent unnecessary or undue degradation, minimize adverse environmental impacts, and comply with the Public Trust Duty. 43 U.S.C. §§ 1702(c), 1732(b)), 1732(d)(2)(A).

For example, pre-commitment lease-stage decision-making and NEPA analysis may demonstrate that BLM should or must: (1) place certain areas off limits to leasing or surface occupancy by oil and gas operators; (2) subject leases to stipulations or otherwise take affirmative action to protect the environment within or proximate to the leaseholds because of the significance and magnitude of climate change impacts; or (3) take a timeout on leasing and further oil and gas development to initiate a landscape-scale RMP amendment or revision to protect the environment's resiliency because existing management direction is inadequate and because of the need to coordinate and act consistently with the activities of other federal and state partners (43 U.S.C. § 1712(c)(9); 43 C.F.R. §§ 1610.3-1, 1610.3-2). Such options need to be addressed by BLM as reasonable NEPA alternatives prior to the point lease rights are sold.

Regardless, to understand the actual and potential harm suffered by BLM public resources as a consequence of global warming and climate change, 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."[64] Relative to observed global warming and climate change impacts, the IPCC Impacts Report concluded the following:

- "Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases."[65] The IPCC Impacts Report goes on to state that "[t]here is very high confidence … that recent warming is strongly affecting terrestrial biological systems,

[64] 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 University Press, Cambridge, United Kingdon and New York, NY, USA (www.ipcc.ch/SPM13apr07.pdf) ("IPCC Impacts Report") (attached as Exhibit 57).

[65] *Id.* at 1.

including such changes as … "poleward and upward shifts in ranges in plant and animal species."[66]

- "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."[67]

- "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."[68]

Beyond observed impacts, the IPCC Impacts Report also addresses the state of knowledge about future impacts. The IPCC Impact 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)."[69]

- "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 1.5-2.5ºC."[70]

- "For increases in global average temperature exceeding 1.5-2.5ºC 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."[71]

- 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."[72]

Five other general reports contain a summation of the current science-based understanding of climate change impacts to the environment in the Western U.S. and,

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[66] *Id.* at 2.

[67] *Id.*

[68] *Id.* at 3.

[69] *Id.* at 5.

[70] *Id.* at 6.

[71] *Id.*

[72] *Id.* at 11.

specifically, two of Montana's and North Dakota's sister states in the Rocky Mountain West, Colorado and New Mexico; which provide a solid foundation for initiating Montana- and North Dakota-based climate change efforts.

First, the GAO, in its 2007 Report (Exhibit 18), reinforces the IPCC Report and provides context for the state-level reports prepared by Colorado and New Mexico detailed below. The GAO identified a myriad of physical effects to federal public lands including "drought, floods, glacial melting, sea level rise, and ocean acidification." 2007 GAO Report at 5.

Second, the Rocky Mountain Climate Organization and NRDC just published a report entitled Hotter and Drier: The West's Changed Climate ("RMCO/NRDC Report") (attached as Exhibit 58). Synthesizing much of the existing research regarding climate change, and refining that research in the specific context of the Western U.S., the RMCO/NRDC Report warns that "[t]he American West has heated up even more than the world as a whole" and "in the five latest years" experienced warming "70 percent[] more than the overall planet's warming." RMCO/NRDC Report at iv; 1-6. The RMCO/NRDC Report proceeds to convincingly detail how the West is getting drier, how global warming is disrupting ecosystems, and how warmer temperatures affect business, recreation, and tourism. RMCO/NRDC Report at 7-34.

Third, the State of Colorado issued a Climate Action Plan in November 2007 ("CO Climate Action Plan") (Exhibit 43). As Governor Bill Ritter, Jr., noted in the CO Climate Action Plan's opening message:

> Global warming is our generation's greatest environmental challenge. The scientific evidence that human activities are the principal cause of a warming planet is clear, and we will see the effects here in Colorado. But the seeds of change are also here in Colorado, in our scientific and business communities, and in each of us individually.
>
> This Colorado Climate Action Plan is a call to action. It sets out measures that we in our state can adopt to reduce emissions of greenhouse gases by 20 percent by 2020, and makes a shared commitment with other states and nations to even deeper emissions cuts by 2050.
>
> Why is this important? For Colorado, global warming will mean warmer summers and less winter snowpack. The ski season will be weeks shorter. Forest fires will be more common and more intense. Water quality could decline, and the demand for both agricultural and municipal water will increase even as water supplies dwindle.

The CO Climate Action Plan proceeds to detail the present and future impacts of climate change to Colorado. Some of these impacts are indirect, caused by "the displacement of millions of people living in coastal areas, thawing of arctic ecosystems and accelerated loss of usable lands to deserts." CO Climate Action Plan at 7. Critically, the CO Climate Action Plan states that "the direct risks to the state are very serious." *Id*. These "direct risks" are numerous, including current observations of shorter and warmer winters, with thinner snowpack and earlier spring runoff, with less precipitation overall, and more of that precipitation falling as rain, not snow. *Id*.

Droughts are longer, and there are more wildfires "burning twice as many acres each year than before 1980." Beetle infestations are now "[w]idespread" and there is also a "[r]apid spread of West Nile virus." *Id*. On top of these observed impacts, "[i]n the coming decades, scientists project that Colorado and neighboring western states will see":

> (1) 3-4 degree temperatures increases by 2030, with more frequent and longer-lasting summer heat extremes;
>
> (2) even "[l]onger and more intense wildfire seasons" with fires "projected to claim more land each year than the year before";
>
> (3) "Midwinter thawing and much earlier melting of snowpack" with resultant "flooding," "ski season[s]" shortened by "three to six weeks," and "added stress on reservoirs";
>
> (4) "Much lower flows in rivers in the summer months and a greater vulnerability to drought with consequent impacts to the ability of "[a]lready over-used river systems" to satisfy "existing water rights and future growth," degradation of water quality, and a potential "decline" in "[h]ydropower production";
>
> (5) Slower recharge in groundwater aquifers, with an overall decline of 20% projected for the Ogallala aquifer if temperatures increase by more than 5 degrees F.
>
> (6) "Movement of plant and animal species to higher elevations and latitudes" and the fragmentation of high-elevation habitat. "Many of today's high-elevation species will face localized or total extinction";
>
> (7) "Insect attaches in forests" caused by warmer winter temperatures that will "reduce winterkill of beetles," warmer summer temperatures that will "allow faster insect lifecycles," and forests rendered vulnerable by "summer droughts";
>
> (8) "Less snow cover and more winter rain on farm lands" whereby the "[p]elting rain on bare ground will increase soil erosion"; and, if that isn't enough:
>
> (9) "More weeds."

Id. These impacts are obviously dramatic, extending, as noted by the CO Climate Action Plan, across state lines.

Fourth, the State of New Mexico, reflecting these trans-boundary impacts, prepared a 2005 Report entitled *Potential Effects of Climate Change on New Mexico* ("NM Climate Change Report") (attached as Exhibit 59) to inform its Climate Change Advisory Group. The NM Climate Change Report – mirroring the impacts identified in the CO Climate Action Plan – identified substantial impacts to: (1) water resources; (2) infrastructure (e.g., flood control, electrical power distribution, sewage, water supply, and transportation); (3) agriculture; (4) natural systems (e.g., forests, grasslands, deserts, lakes and streams); (5) outdoor recreation and

related tourism; (6) environmental quality and health (e.g., from intensified ozone levels); (7) environmental justice and native peoples (because of these communities limited resources to adapt and cope with climate change). NM Climate Change Report at 1-4.

Fifth, the Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research, recently issued a report entitled *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States* ("USDA Climate Change Synthesis") (attached as Exhibit 60). This report identifies the particular impacts of climate change on the Western United States, explaining that climate change "has very likely increased the size and number of forest fires, insect outbreaks, and tree mortality in the interior West, the Southwest, and Alaska, and will continue to do so." *Id.* at 7. In addition, the report notes that drought could be more severe and of increased intensity in the Western United States. *Id.* at 8. Furthermore, the report notes, climate change is resulting in reduced snowpack and earlier runoff, thus disrupting the use of water resources. *Id.* at 3, 192. In sum, the report concludes:

> Warmer summer temperatures in the western U.S. have led to longer forest growing seasons, but have also increased summer drought stress, increased vulnerability to insect pests and increased fire hazard. Changes to precipitation and the size of storm events affect plant-available moisture, snowpack and snowmelt, streamflow, flood hazard, and water quality.

Id. at 183.

The 2007 IPCC Report, 2007 CO Climate Action Plan, 2005 NM Climate Change Report, 2007 GAO Report, 2008 RMCO/NRDC Report, and 2008 USDA Climate Change Synthesis provide BLM with an excellent base of knowledge to begin the process of properly understanding and affirmatively taking action to address climate change in the region and, specifically, in Wyoming. Moving beyond these general reports, the sections below highlight and illuminate in more depth some of specific climate change impacts. Of note, many of the studies and reports referenced below pertain to Montana's and North Dakota's sister states – in particular Colorado and New Mexico. Insofar as BLM may be apt to dismiss these studies and reports on that basis, BLM would be making a mistake. Efforts are only now intensifying how climate change will impact localized environments. The studies and reports prepared for Colorado and New Mexico – and other Rocky Mountain landscapes – thus provide a starting point. They are of course not meant to supplant Montana-specific evaluation. Instead, they are intended to provide a basis of information that can be used by BLM to identify and evaluate Montana- and North Dakota-specific impacts.

b. Climate Change Impacts to Water

Perhaps the most obvious climate change impact noted above is the erosion of winter cold in the West's mountains. As GAO noted, "warmer springs have resulted in earlier snowmelt

…."[73] 2007 GAO Report at 5. Additionally, "more precipitation falls as rain and less as snow." *Id*. 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."[74]

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.[75] An increase of 9 to 11 degrees Fahrenheit could virtually eliminate the park's tundra.[76] 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.[77] As one researcher has said, "[w]e might be staring pika extinction in the Great Basin, maybe in Yosemite, too, right in the face. . . . They don't have much up-slope habitat left."[78] 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.

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[73] *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.

[74] 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 61).

[75] 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 62).

[76] *Id.*

[77] C. Mortiz, *Report – Year 4 of the terrestrial vertebrate resurvey of the 'Grinnel sites' in Yosemite National Park'* at 1 (2006) (http://mvz.berkeley.edu/Grinnell/pdf/Yosemite_Report_2006-FINAL.pdf).

[78] 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.

Changes to hydrological systems extend well beyond the alpine tundra. The CO Climate Action Plan was based on a stakeholder report prepared in 2006.[79] This report, in Chapter 8 of its appendices (Chapter 8 is attached as Exhibit 63), provided a discussion of the effects of GHG emissions on water resources ("CO Water Adaptation Analysis"). The CO Water Adaptation Analysis notes on page 1 that "[t]he consensus of the scientific community is that warming caused by [GHGs] resulting from a wide variety of human endeavors will likely have significant effects on water supplies and availability in many parts of the world, including the American West." These effects, summarized on pages 8-2 to 8-3, include what should become a familiar litany: (1) [r]educed snowpack and streamflow; (2) [m]ore drought; (3) [e]arlier snowmelt; (4) [i]ntense precipitation; (5) [i]ncreased water needs; (6) [d]egraded water quality; (7) Interstate compact calls; and (8) [s]econdary impacts" such as "more forest fires" and "outbreaks of forest pests," which, in turn, "may affect total runoff and runoff timing."

In 2007, the National Research Council's Committee on the Scientific Bases of Colorado River Basin Water Management published a detailed report entitled *Colorado River Basin Water Management: Evaluating and Adjusting to Hydroclimatic Variability* ("NRC CO River Report") (Executive Summary attached as Exhibit 64). Setting the stage for the Colorado River basin, the NRC CO River Report notes on page 1 that:

> It is known today that the Colorado River Compact of 1922 – the water allocation compact that divides Colorado River flows between the upper and lower Colorado River basin states – was signed during a period of relatively high annual flows. It is also accepted that the long-term mean annual flow of the river is less than the 16.4 million acre-feet assumed when the Compact was signed – a hydrologic fact of no small importance with regard to water rights agreements and subsequent allocations.

The stage thus set, the NRC CO River Report notes on page 4 that:

> Temperature records across the Colorado River basin and the western United States document a significant warming over the past century. These temperature records, along with climate model projections that forecast further increases, collectively suggest that temperatures across the region will continue to rise for the foreseeable future. Higher regional temperatures are shifting the timing of peak spring snowmelt to earlier in the year and are contributing to increases in water demands, especially during summer. Higher temperatures will result in higher evapotranspiration rates and contribute to increased evaporative losses from snowpack, surface reservoirs, irrigated land, and vegetated surfaces….
>
> *****
>
> Based on analysis of many recent climate model simulations, the preponderance of scientific evidence suggests that warmer future temperatures will reduce future

[79] www.coloradoclimate.org/Climate_Action_Panel.cfm.

> Colorado River streamflow and water supplies. Reduced streamflow would also contribute to increasing severity, frequency, and duration of future droughts.

On the basis of "[m]ulti-century, tree-ring based reconstructions of Colorado River flow," the NRC CO River Report on page 6 found that while "extended drought episodes are a recurring and integral feature of the basin's climate," and that "future droughts will recur," nonetheless, these "future droughts … may exceed the severity of droughts of historical experience, such as the drought of the late 1990s and early 2000s." The management implications are significant:

> Steadily rising population and urban water demands in the Colorado River region will inevitably results in increasingly costly, controversial, and unavoidable trade-off choices to be made by water managers, politicians, and their constituents. These increasing demands are also impeding the region's ability to cope with droughts and water shortages.

NRC CO River Report at 8.

These impacts and management consequences have been further illuminated by a January 23, 2008 report, accepted by the Journal of Water Resources Research, by the Scripps Institution of Oceanography entitled *When will Lake Mead go Dry?* ("Scripps Lakes Mead/Powell Report") (attached as Exhibit 65). Lake Mead, of course, is an important component of the Colorado River basin. The Scripps Lakes Mead/Powell Report notes on page 3 that global warming is causing "a decrease in runoff to the Colorado River" in the "range between 10-30 percent over the next 30-50 years." This should be a self-evidently action-sparking fact given that "[t]he Colorado River is quite literally the life's blood of today's modern southwest society and economy." Scripps Lakes Mead/Powell Report at 3. It is on this basis that the Scripps Lakes Mead/Powell Report looked at Lakes Mead and Powell to determine when they will 'go dry'; that is, when there function as a reservoir will end. [T]he answer is both startling and alarming." Scripps Lakes Mead/Powell Report at 4. As the Report explains on pages 4-5:

> It is obvious that once long-term outflow exceeds inflow the system is doomed to run dry … currently scheduled depletions (loss of water from consumptive use), along with water losses due to evaporation/infiltration and reduction in runoff due to climate change, have pushed the system into a negative net inflow regime that is no sustainable … natural variability, i.e., the change of getting strings of dry years consistent with the historical record, makes the system likely to run dry even with positive net inflow. When expected changes due to global warming are included as well, currently scheduled depletions are simply not sustainable.

Even in accord with very conservative assumptions, "live storage [in Lakes Mead and Powell] will be depleted completely 23-40 years from now …." Scripps Lakes Mead/Powell Report at pages 8-9. The consequence of reductions in large storage capacity would, however, be felt much earlier; "only 14 years into the future" there is a "50% chance" that the Lakes' "minimum power pool level" would be reached by 2021 and "[a]t that point (or before), there would be an abrupt dropt in the abilities of the reservoirs to generate hydroelectric power." *Id*. at 10. Again, this is likely an optimistic projection because these findings were based on very

conservative assumptions, including the assumption that "steady state where inflow to the reservoirs is equal to their discharge" (even though "Lake Mead is currently being overdrafted"), and analysis that neglects to include the "natural variability in River flow." *Id*. More realistic scenarios indicate that there is actually a "50% chance the minimum power pool levels will be realized by about 2017, in the absence of management responses," not the more optimistic estimate of 2021. *Id*. at 11. "It seems clear that the threat to power production on the Colorado is both real and more imminent than most might expect." *Id*.[80]

Impacts, of course, to the Colorado River basin are not limited to power production. The Colorado River is home to several aquatic species protected by the Endangered Species Act: Bonytail chub, Humpback chub, Colorado pikeminnow, and Razorback sucker ("CO River Fish"). These CO River Fish are already suffering considerable stress, as demonstrated by the Fish & Wildlife Service's 1994 critical habitat decision.[81]

Reinforcing the concerns identified in the NRC CO River Report and the Scripps Lakes Mead/Powell Report, in 2006, the New Mexico Office of the State Engineer and the Interstate Stream Commission published a report entitled *The Impact of Climate Change on New Mexico's Water Supply and Ability to Manage Water Resources* ("NM SEO/ISC Report") (attached as Exhibit 67). As the NM SEO/ISC Report emphasizes:

> Water is so critical to [sic] New Mexico's quality of life and economic vitality that any impacts to our water resources reverberate across the social, economic and environmental fabric of the State. The anticipated impact of climate change is particularly important since New Mexico is highly dependent on climate-sensitive natural resources (e.g., snowpack, streamflow, forests) and on natural-resource based economic activities (e.g., agriculture, recreation and tourism).

NM SEO/ISC Report at 2. Impacts to water resources identified by the report vary depending on the precise climate change prediction model used but there is consensus amongst the models that generally we will witness: (1) an increase in temperature – and potentially, extreme heat waves; (2) a trend towards a higher freezing altitude and reduction in snowpack with delays in the arrival of snow season, acceleration of spring snowmelt, a decrease in total snowfall, and rapid and earlier seasonal runoff (including, under regional models, a loss of sustained snowpack south of Santa Fe and the Sangre de Cristo range); (3) uncertain changes to precipitation, overall, but intensified evaporative losses from temperature increases that could counteract any increase in precipitation; (4) severe droughts; and (5) an increase in flood events. *Id.* at 5-16. Given the magnitude of these impacts, the report, in its Executive Summary, explains, relative to at least water resources, that:

> Climate change needs to be added as "another pressure" along with population growth, changing demographics, existing climate variability, increasing water demand and availability challenges, land use, species protection and other

[80] *See also* Robert Kunzig, *Drying of the West*, National Geographic (February 2008) (attached as Exhibit 66).

[81] 59 Fed. Reg. 13,374-13,375 (Mar. 21, 1994).

> ecosystem demands. Adaptive management strategies will need to be devised that are robust and flexible enough to address climate change.

Id. at v. As the NM SEO/ISC Report further notes, "[t]he key to successful adaptation is a robust planning structure that incorporates highly certain predictions (such as temperature increases) as well as less certain forecasts (such as precipitation changes) into scenarios that can direct implementation of flexible management strategies." *Id*. at vi. The NM SEO/ISC Report also encourages immediate action to address climate change impacts to water, explaining:

> Policy makers and managers are also constantly juggling multiple issues of immediate importance and have limited time and resources to take on what appears to be a "new" issue. Climate change is often viewed as one of those issues that can be addressed later when there is more certainty about what is really happening. However, many of the adaptive strategies required to address impacts of climate change will require years to plan and implement, and delaying may increase both vulnerability and ultimately the costs of mitigating those impacts. Often the tools needed to develop adaptive capacity for climate change are the same or similar to those used in current management practices.

Id. at 33.

An additional report, completed July 2007, entitled *Climate Change and its Implications for New Mexico's Water Resources and Economic Opportunities* ("NM Water & Economy Report") serves as an important source of additional water-related information to understand how climate change is and will impact the West.[82] Evidencing the deep concern that all Westerners – including the Protestors – have with climate change's impacts to water, the NM Water Report explains that:

> The Rio Grande, and the subterranean aquifers that it feeds in some regions, are the principal – and often only – water sources for cities and farms from Southern Colorado through New Mexico and into far West Texas, … The vulnerability that these water users face together – especially in light of potential climatic and hydrologic changes – is not only indicated by this high level of dependence on a sole source of supply, but by the oversubscribed nature and exhaustive use of this source …. The level of use is so exhaustive of surface supplies that after the thirst is satisfied it is, in fact, normal for the Rio Grande to trickle with salt-laden return flows and summer storm runoff for 180 miles until its confluence with Mexico's Rio Conchos – just above Big Bend national Park near Presidio, Texas – where, newly reconstituted, it continues its remaining 1,100 mile journey to the Gulf of Mexico.

NM Water & Economy Report at 1. The NM Water & Economy Report warns, based on tree-ring analysis and anthropological evidence, that:

[82] Hurd, Brian H. and Coonrod, Julie, *Climate Change and its Implications for New Mexico's Water Resources and Economic Opportunities* (July 2007) (attached as Exhibit 68).

> Observations indicate that significant climate anomalies are not unprecedented in [New Mexico]; and, that it is entirely plausible that with continued greenhouse gas forcing of the atmosphere, and its rising effects on the earth's energy balance, there can be a reasonable expectation of exceeding these natural extremes in the future (IPCC, 2007).

Id. at 2. Illustrating the feedbacks between factors such as temperature, the timing of precipitation, and the amount of precipitation, the NM Water & Economy Report identifies two key results of various climate scenarios:

> First, peak flow and total streamflow declines for all of the climate change scenarios, whether or not they are relatively 'wet'. The apparent robustness of this result could have important implications for the management of water resources in the region. Although, there is a potential for summer monsoonal activity to increase, as suggested by the 2080 Wet scenario, this is not likely, according to the model results, to offset the losses from diminished snowpack levels in the headwater regions. Second, there is a pronounced shift in later periods (i.e., 2080s time frame) in the peak runoff month by about 30 days. In all of the 2080 period runs, the peak occurs in April and, perhaps equally as important, there is a significant increase in late winter runoff compared to current conditions.

Id. at 11. Such reductions in peak flow and total streamflow, as well as the shift in timing, holds profound implications for Colorado's social and economic vitality and such impacts could similarly affect Montana and North Dakota:

> As might be expected for water use in a basin that exhausts even the present water supply in normal years, any reduction on long-run, average supply necessarily leads to a reduction in long-run average use … Heavily influenced by the pattern of agricultural irrigation that peaks in June, … total water use is curtailed as total supplies diminish with the severity of climate change. The dry scenarios lead to declines in total water use of nearly 10% and over 25% for the respective periods of 2030 and 2080. Declines of 2% and 18% accompany the middle scenarios, respectively; and for the wet scenarios water use declines of nearly 4% and 6.3% are projected, respectively.

Id. at 12. Impacts extend well beyond water quantity to encompass water quality:

> Reduced streamflow lowers assimilative capacity for both point and non-point pollutants. In non-attainment reaches of the river lower TMDLs (total maximum daily load) might be expected and could raise control costs. Climate change might also lead some river reaches to fall out of attainment and require TMDLs and higher pollution control costs.

Id. at 18.

c. Climate Change Impacts to Ecosystems

Climate change impacts to the hydrologic regime are of course intertwined with climate change impacts to freshwater and terrestrial ecosystems. As the NM Water & Economy Report explains:

> Increased drying of soils and significant reductions in soil moisture are likely with climate change as potential evapotranspiration rises with increasing temperatures. These effects will compound the adverse effects of changes in the hydrology of runoff and water availability throughout New Mexico. Such changes will affect the quality and condition of New Mexico's significant range- and forest-lands, which is likely to accelerate the severity and extent of forest fires but will likely diminish forage production on rangelands that will adversely impact livestock and wildlife across the region.

Id. (references omitted).

Broadening out from this specific link between water and land, experts have "anticipated shifts in the distribution, abundance, and ranges of both plant and animal species." 2007 GAO Report at 26. As "changes in species distribution are likely to occur in the future … nonnative species might eventually dominate or replace native species in some areas." *Id*.

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." *Id*. 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. *Id*. 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." *Id*. at 26.

At bottom, "native biodiversity will increase in many areas, and … new assemblages of species will be living together, with unknown consequences." *Id*. at 27. The impacts to plant and animal species also include changes to plant and animal "phenology" – the "life-cycle events that are influenced by environmental changes, especially seasonal variations in temperature and precipitation" – including "critical species interactions." *Id*. at 28-29.

Specifically 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*. As noted by the SEO/ISC Report:

> Aquatic and wetland ecosystems display high vulnerability to climate change. Changes in water temperature and shifts in timing of runoff will change aquatic habitats, resulting in species loss or migration as well as novel and unpredictable interactions of new combinations of species. Stream management practices will have to accommodate these new threats to aquatic species, increasing Endangered Species Act (ESA) and threatened species challenges.

NM SEO/ISC Report at 37.

Climate change will also spur insect and disease infestations, thereby negatively impacting aquatic and terrestrial ecosystems. As GAO noted, "[b]iological effects of climate change include increases 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." *Id*. 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." *Id*. at 23. And, further, a change from "episodic" to "persistent" infestations. *Id*. at 24.

Exemplifying the infestation issue are beetle infestations; 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.[83] In Colorado, the U.S. Forest Service and the Colorado State Forest Service recently predicted, "[a]t 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."[84] Beetles are also now causing widespread devastation of whitebark pines, a high-altitude species that grow where winters almost always have been too cold to allow beetle populations to reach outbreak numbers.[85] 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.[86]

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

[84] 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_higlights.pdf.

[85] J. Connelly, *West Can't Beat Heat of Global Warming*, Seattle Post-Intelligencer (April 23, 2006) (http://seattlepi.nwsource.com/connelly/282173_joel23.html).

[86] Logan J., Powell J., *Ghost Forests, Global Warming, and the Mountain Pine Beetle (Coleoptera: Scolytidae)*, American Entomologist. 47:3 161-162, 166-168 (2003); C. Petit, *In the Rockies, Pines Die and Bears Feel It*, New

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.

The World Wildlife Fund and the Pew Center on Global Climate Change have compiled compelling scientific evidence linking climate change and impacts to terrestrial and aquatic ecosystems. For example, in 2000, the World Wildlife Fund published a report – *Global Warming and Terrestrial Biodiversity Decline* – wherein the authors, Malcolm & Markham, provide several general conclusions that BLM should consider:

- "It is safe to conclude that although some plants and animals will be able to keep up with the rates reported here, many others will not.

- Invasive species and others with high dispersal capabilities can be predicted to suffer few problems and so pests and weedy species are likely to become more dominant in many landscapes.

- However, in the absence of significant disturbance, many ecosystems are quite resistant to invasion and community changes may be delayed for decades.

- Global warming is likely to have a winnowing effect on ecosystems, filtering out those that are not highly mobile and favoring a less diverse, more "weedy" vegetation or systems dominated by pioneer species.

- Non-glaciated regions where previous selection for high mobility has not occurred among species may suffer disproportionately. Therefore, even though high [required migration rates] are not as common in the tropics, there may still be a strong impact in terms of species loss.

York Times (January 30, 2007) (available at http://query.nytimes.com/gst/fullpage.html?res=9403E5DB143FF933A05752C0A9619C8B63).

- Some species have evolved *in situ* and may fail to migrate at all.

- Future migration rates may need to be unprecedented if species are to keep up with climate change.

- Human population growth, land-use change, habitat destruction, and pollution stresses will exacerbate climate impacts, especially at the pole-ward edges of biomes.

- Increased connectivity among natural habitats within developed landscapes may help organisms to attain their maximum intrinsic rates of migration and help reduce species loss.

- However, if past fastest rates of migration are a good proxy for what can be attained in a warming world, then radical reductions in greenhouse gas emissions are urgently required in order to reduce the threat of biodiversity loss."[87]

In *Ecosystems and Global Climate Change: A Review of Potential Impacts on U.S. Terrestrial Ecosystems and Biodiversity*, a 2000 report published by the Pew Center on Global Climate Change, authors Malcolm & Pitelka "provid[e] an overview of some of the potential effects of global warming on terrestrial ecosystems and their component species in the United States," focusing on "key findings, concepts, and information gaps."[88] Relative to effects on species and communities, Malcolm & Pitelka explain that:

> As a result of climate change, existing climatic conditions in many areas will become unsuitable for the species that currently live there, requiring them to migrate to survive … The fact that species will have to move in itself is not alarming – most have done so in the past and, even in the absence of human interference in the global climate system, will undoubtedly do so again. However, several aspects of anthropogenic global warming are of particular concern, including the potential rapidity of the change and the possibility that certain alpine or polar ecosystems, which are typical of very cold conditions, could be greatly reduced in size or lost entirely.[89]

Malcolm & Pitelka proceed to explain that "global warming has the potential to create a 'winnowing' or 'filtering' effect similar to the reduction in biodiversity sometimes observed during human development."[90] Additionally, there "is the possibility that different parts of the

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[87] Malcolm, J.R. & Markham, A., *Global Warming and Terrestrial Biodiversity Decline* at v-vi. World Wildlife Fund (2000) (attached as Exhibit 69).

[88] Malcolm, J.R. and Pitelka, L.F. *Ecosystems and Global Climate Change: A Review of Potential Impacts on U.S. Terrestrial Ecosystems and Biodiversity* at 1, Pew Center on Global Climate Change (2000) (attached as Exhibit 70).

[89] *Id.* at 21.

[90] *Id.* at 22.

ecosystem will respond to the warming at different rates, hence altering the combination of conditions that a species might require."[91] Malcolm & Pitelka offer conservation strategies to address these impacts relevant to BLM's efforts to comply with federal law:

> an important strategy for allowing organisms to respond to their full potential is to maintain the habitats that they currently live in – that is, to maintain overall ecosystem structure and species composition. This can be accomplished by reducing fragmentation, loss and degradation of habitat, increasing connectivity among habitat blocks and fragments, and reducing external anthropogenic environmental stresses (Markham and Malcolm, 1996). Thus, adaptation to climate change should benefit from existing strategies to conserve biodiversity and protect natural ecosystems. Various general strategies to conserve biodiversity include establishment and maintenance of viable protected area networks, management of wild populations outside of protected areas, and the maintenance of captive populations. Some characteristics of protected area networks that are though to improve their viability in the face of a changing climate include:
>
> - redundancy of populations;
> - maximization of reserve connectivity, size, and number;
> - protection of areas that offer significant heterogeneity in topography, habitat, and microclimate; and
> - development of biodiversity-friendly management schemes in the landscapes surrounding reserves (Markham and Malcolm, 1996; Malcolm and Markham, 1997).[92]

Authors Parmesan & Galbraith, in the 2004 Report *Observed Impacts of Global Climate Change in the U.S.* published by the Pew Center on Global Climate Change, reinforce the findings and conclusions in Malcolm & Markham's and Malcolm & Pitelka's previous studies, concluding that, "human-induced global warming has the potential to severely exacerbate the outcomes of already high levels of stress on ecosystems."[93] Parmesan & Galbraith discuss several anticipated effects to wild plants, animals, and ecological processes including: (1) evolutionary changes; (2) physical and physiological changes; (3) phenological changes; (4) range shifts; (5) community changes; and (6) ecosystem process changes.[94] Perhaps most troubling, however, is the fact that these potential changes may complicate species survival because "a variety of other anthropogenic forces are simultaneously stressing natural systems."[95]

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[91] *Id.* at 23.

[92] *Id*. at 33.

[93] Parmesan, C. & Galbraith, H., *Observed Impacts of Global Climate Change in the U.S.* at 1. Pew Center on Global Climate Change at 3 (2004) (attached as Exhibit 71).

[94] *Id.* at 7.

[95] *Id.* at 10.

"The net result of these pressures is that biological systems may already be in the early stages of a major extinction event that could result in the global loss of one-third of all species by 2100." [96]

Parmesan & Galbraith emphasize that adaptation of species to climate change could be compromised by the influence of "[m]odern, human-dominated landscapes":

> Natural ecosystems increasingly are confined to smaller and more isolated fragments, and population sizes of wild native species have generally declined (Groombridge, 2992). These constrictions have limited the options available to natural systems to contend with the predicted rapid changes in climatic extremes or in the frequency and intensity of disturbances. Reduced population sizes often result in diminished genetic variation, which could limit potential for local adaptation. The increased separation between natural habitat fragments decreases successful dispersal, thereby hindering simple shifts in species' distributions. Increased fragmentation also lowers the probability of successful recolonization of devastated areas after catastrophic disturbances because colonists not only have farther to travel, but they are coming from smaller source populations within impoverished communities. Consequently, modern ecological systems have lowered resiliency to the types of nonlinear climate dynamics predicted by scenarios of global climate change (Schneider and Root, 1996); Easterling et al., 2000a, b; Meehl et al., 2000 a, b; Parmesan e al., 2000; Alley et al., 2003).[97]

Parmesan & Galbraith recommend, as a general matter, the need for a "better understanding of which systems or species are most or least susceptible to projected climate change." Parmesan & Galbraith recommend several specific actions:

- "Reassess species and habitat classifications to evaluate their relative vulnerabilities to climate change."[98]

- "Design new reserves that allow for shifts in the distributions of target species," in particular by "protecting corridors or placing more value on areas with high topographic and elevational diversity."[99]

- "Promote native habitat corridors between reserves" to "aid the redistribution of wild species between preserved areas."[100]

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[96] *Id.*

[97] *Id.* at 39.

[98] *Id.* at 42.

[99] *Id.*

[100] *Id.*

- "Practice dynamic rather than static habitat conservation planning," in particular through "empirical adaptive management."[101]

- "Alleviate the effects of other stressors" given that "it may be easiest to reduce the overall stress on a species by mitigating some of the non-climate stressors."[102]

Relatedly, the Western Governors' Association ("WGA") has a Wildlife Corridors Initiative through which the WGA published an Oil & Gas Working Group Report (attached as Exhibit 72). The report is related to the Western Governors' Association's resolution emphasizing the "importance of wildlife corridors and crucial habitat" and "asks the Western states, in partnership with important stakeholders, to identify key wildlife corridors and crucial wildlife habitats in the West and make recommendations on needed policy options and tools for preserving those landscapes." Exhibit 72 at 1. As the Oil and Gas Working Group Report explains:

> Possible climate change poses further challenges for the region, with scientists projecting greater climate extremes, including increases in drought … fast-paced changes [resulting from population growth, land-use impacts, energy development, transportation infrastructure, and climate change] are resulting in notable landscape impacts – including habitat loss and habitat fragmentation – ultimately impacting the West's wildlife and aquatic resources.

Id.

To further assist BLM in its efforts to address impacts to the ecosystem – and to craft management alternatives to address these impacts accordingly – three published, peer-reviewed studies are attached. The first, *Catastrophic Shifts in Ecosystems* (Exhibit 73) emphasizes that there can be "sudden drastic switches" in ecosystems and recommends that "strategies for sustainable management of … ecosystems should focus on maintaining resilience."[103] The second, *Does Adaptive Management of Natural Resources Enhance Resilience to Climate Change* (attached as Exhibit 74), notes in its abstract that "[e]merging insights from adaptive and community-based resource management suggest that building resilience into both human and ecological systems is an effective way to cope with environmental change characterized by future surprises or unknowable risks" and "that these emerging insights have implications for policies and strategies for responding to climate change."[104] The third, *Forecasting the Effects of*

[101] *Id.*

[102] *Id.*

[103] Scheffer, M., *et al.*, *Catastrophic shifts in ecosystems*, Nature, Vol. 413:591-96 (October 11, 2001).

[104] Tompkins, Emma L. & Adger, W. Neil, *Does Adaptive Management of Natural Resources Enhance Resilience to Climate Change?*, Ecology & Society 9(2):10 (2004).

Global Warming on Biodiversity (attached as Exhibit 75), should provide assistance to BLM once BLM begins to address the consequences of climate change to BLM public resources.[105]

d. Climate Change Impacts to Socioeconomic Conditions

Broadening out the discussion from biological and ecological impacts, 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 to support local economies.[106] 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.

Climate change impacts – not only from extreme events but, also, degradation to aquatic and terrestrial ecosystems, detailed above – are already 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.[107] *See also* 2007 IPCC Synthesis Report at 2 ("In some marine and freshwater systems, shifts in ranges 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.[108] 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.[109] 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."[110]

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[105] Botkin, Daniel B. *et al.*, *Forecasting the Effects of Global Warming on Biodiversity*, BioScience, Vol. 57 No.3:227 (March 2007).

[106] *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 76).

[107] 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 77).

[108] *Id*.

[109] 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.

[110] R. Tosches, *Warm waters deadly to Yellowstone trout*, Denver Post (July 29, 2007).

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 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; *see also* SEO/ISC Report. "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.

These conclusions are supported by the NM Water & Economy Report—which should inform impacts in Montana and North Dakota—which explains that "[c]limate change introduces water supply changes – in these cases, reductions – that exacerbate relative scarcity and result in even larger price increases in order to induce water transfers from agriculture to urban water users." NM Water & Economy Report at 14. These impacts are economic as well as cultural. New Mexico's "long-standing Hispanic acequias communities will likely be early targets of water transfers – causing local economic dislocation and increased poverty." *Id*. at 19 (reference omitted). Additionally, "tourism, arts, and recreation, which together contribute $360 million to New Mexico's economy, might decline as the States' unique landscapes, environment, and scenic opportunities are potentially degraded by changes in riparian ecosystems and agrarian land use." *Id*.

In terms of the overall costs of climate change compared to the overall costs of climate change abatement, it is increasingly clear that abatement is not only economically feasible, but, economically, the only rational option. As the 2008 RMCO/NRDC Report explains:

> A new study by the business consulting firm McKinsey & Company, co-sponsored by NRDC, examines the cost and market potential of more than 250 greenhouse gas abatement technologies and concludes that the United States can do its part to stabilize the climate at little to no net cost, considering energy-efficiency savings. In sharp contrast, estimates of the annual benefits from stopping global warming range as high as 20 percent of total economic output. Moreover, the transition to a cleaner and more efficient energy economy will

> improve air and water quality, protect public health, and increase our energy security and productivity, all while we continue to grow our economy as forecasted, decade after decade.

RMCO/NRDC Report at 35.

Given the threats of climate change to public land resources, BLM faces an increasingly daunting challenge to protect the public resources for which BLM is responsible and to ensure that its actions do not compromise the interests of Montana, North Dakota, and the broader Rocky Mountain region. BLM should be cognizant of the fact that 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 at 7. As the 2005 NM Climate Change Report explains on page 8:

> Surprises are inevitable …. Climate changes and ecosystem responses are not always gradual, but can occur abruptly over a few decades or less. Complex human and natural systems often respond in a nonlinear manner to increasing stress. That is, they change gradually or not at all until a threshold ("tipping point") is reached, and then they change dramatically. Positive feedbacks can amplify the impacts of small changes into enormous effects, such as when a wildfire grows until it begins creating its own winds and "blows up" catastrophically.

These "[s]urprises" should not suggest that BLM can do nothing. As discussed above, taking action to improve the resiliency of ecological systems (in part by mitigation or eliminating impacts) by considering and adopting the conservation frameworks contained within the Heart of the West Conservation Plan and Southern Rockies Wildlands Network is an essential management step. Such action does not require a precise understanding of climate change impacts. As noted in a report authored by New Mexico's State Engineer and the Interstate Stream Commission relative to water resources management, but equally relevant to BLM public lands management:

> Policy and managerial responses need not (and should not) wait for better climate predictions. It is already clear that temperatures are rising and that extreme events are becoming more common, so assessing the vulnerabilities of existing management strategies and resource availability can proceed without certainty about changes in precipitation. A close look at risk, even without firm quantification, can often lead to optimal solutions that may not be immediately apparent and that may avoid expensive missteps …managers already operate within a context of uncertainty … Climate change is thus not a stand alone issue. It will add an additional layer of uncertainty to the complexity … Managers will thus need robust and resilient planning scenarios and processes, and highly adaptive management structures to adapt to changing predictions.

SEO/ISC Report at 37.

The evidence provided in this Protest is just the tip of an ever-growing iceberg – one that stands in stark contrast to the reality of shrinking icebergs and collapsing iceshelves in the Antarctic. This evidence demonstrates that global warming and climate change has the potential if not the reality to cause severe, unprecedented, and game-changing impacts to BLM public lands and, more broadly, to the Montana, North Dakota, and the Rocky Mountain West. If there is a silver lining, it is that these impacts can also be addressed and, hopefully, remedied through proactive land protection and management. Time, though, is running out.

V. BLM HAS FAILED TO ADDRESS GLOBAL WARMING, CLIMATE CHANGE, AND GREENHOUSE GAS EMISSIONS FROM FEDERAL ONSHORE OIL AND GAS DECISIONMAKING ACTIONS.

We are unaware of any lease-stage NEPA analyses and therefore presume that BLM has completed Documentations of Plan Conformance and NEPA Adequacy that purport to justify the lease sale on the basis of RMPs and RMP-stage NEPA Analyses. As noted, in the context of climate change at least, we do not believe that RMP-stage NEPA Analyses as presently constructed can supplant lease-stage NEPA requirements, in particular relative to BLM's duty to consider the option of not issuing leases, and BLM's duty to consider lease-specific stipulations rather than just standard lease terms and conditions.

In any event, not one of BLM's Resource Management Plans for the lease sale areas in Montana and North Dakota address global warming, climate change, or GHG emissions from oil and gas leasing and development. This failure is stark given: (1) Secretarial Order 3226's explicit mandate, in section 3, to consider climate change "when making major decisions regarding the potential utilization of resources under the Department's purview" and in "planning and management activities associated with oil, gas and mineral development on public lands"; (2) FLPMA's mandates to protect the environment, prevent "permanent impairment," prevent "unnecessary or undue degradation," and "minimize adverse impacts" (43 U.S.C. §§ 1701(a)(8), 1702(c), 1732(b), 1732(d)(2)(A)); (3) NEPA's mandate that BLM consider the adverse environmental impacts of and reasonable alternatives to a proposed action; and (4) BLM's Public Trust Duty.

In an April 21, 2008 Protest Decision, BLM dismisses a protest submitted by Montana Trout Unlimited which raised climate change concerns, stating that "the analysis of direct, indirect, and cumulative impacts to climate change from oil and gas leasing and development in the area in question would likely be low based on the level of activity forecast in the [Reasonably Foreseeable Development] scenarios for the different planning areas …."[111] BLM, frankly, has no basis for making this decision because it has never addressed climate change issues through the NEPA process or any other process for that matter; BLM's statement is thus little more than unsubstantiated speculation.

[111] Bureau of Land Management, Protest Decision Regarding November 13, 2007 Trout Unlimited Protest (April 21, 2008) (attached as Exhibit 78).

Furthermore, BLM seems to be arbitrarily minimizing the significance of GHG emissions from oil and gas activities by breaking these activities up into tiny pieces. As should be obvious, cumulative GHG emissions from intensive oil and gas development in, e.g., the Powder River Basin of both Montana and Wyoming, are extremely important. Estimates of recoverable coalbed methane in the Powder River Basin have increased from 1.1 to 14.3 trillion cubic feet, 5.0 TCF of which is in Montana and 9.3 TCF is in Wyoming.[112] Gas production in the Powder River Basin RMP area also spiked between 1999 and 2004.[113] In total, as of 2003, 37,233 oil and gas wells had been drilled in Montana.[114] Looking forward, in the next twenty years, BLM anticipates a low of 6,470 and a high of 18,225 new coalbed methane wells and a low of 450 and a high of 1,775 new conventional oil and gas wells in the Montana portion of the Powder River Basin.[115] The coalbed methane wells alone will require 250 to 700 field compressors, 25 to 70 sales compressors, and thousands of miles of gathering lines.[116] In the Wyoming portion of the Powder River Basin, BLM projects an astounding 39,367 new coalbed methane wells, over 1,300 compressors totaling 862,700 horsepower, and 3,200 new conventional oil and gas wells over the course of a ten-year period beginning in 2003; long-term projections range from 81,000 to 139,000 new coalbed methane wells and an untold amount of associated infrastructure.[117]

Of course, these data points pertain only to the most upstream components of the oil and gas industry. GHG pollution is emitted not merely at the point oil and gas is extracted from the grant, but, once extracted, throughout the lifecycle of exploration, production, and processing, transportation and distribution, and refining. Furthermore, as demonstrated by Montana's state-level GHG inventory, there are a host of other GHG pollution sources which should somehow be addressed through cumulative impacts analysis.

Regardless of the magnitude of oil and gas development, the fact of the matter is that BLM-authorized oil and gas leasing and development results in the emission of GHG pollution and there are a myriad of GHG pollution reduction measures available for oil and gas development that should be considered if not required prior to the surrender of lease rights. Applied broadly, these GHG reduction measures could go a long-way in ensuring that BLM-authorized activities do not exacerbate our climate change crisis. As is often noted, there are no silver bullets capable of remedying the climate change crisis, only silver buckshot. It is troubling to think that BLM would refuse to consider GHG pollution reduction measures as part of its alternatives analysis and would condone unnecessary pollution.

BLM's failure to address GHG pollution from oil and gas development and failure to

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[112] Draft Supplement to the Montana Statewide Oil and Gas Environmental Statement and Amendment of the Powder River and Billings Resource Management Plans, Volume II at Min-1 (December 2006).

[113] *Id.*, Volume II at Min-3.

[114] *Id.*, Volume II at Min-3.

[115] *Id.*, Volume II at Min-4, Min-18.

[116] *Id.*, Volume II at Min-18.

[117] Bureau of Land Management, *Final Environmental Impact Statements and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project*, Executive Summary at xxx, 2-10, and Appendix A-2 (Jan. 2003).

address the climate change impacts to the environment is not isolated to Montana or, for that matter, Wyoming. Across the entire Rocky Mountain West, BLM has buried its head in the sand. In New Mexico's Farmington RMP, for example, BLM provides no mention of climate change and global warming.[118] In the EIS for that RMP, BLM did however respond to a comment submitted by the San Juan Basin Health Department asking BLM to address the contribution of the proposed oil and gas development to CO_2 levels and greenhouse gas concerns, summarily stating: "Methods to determine the effects of the significance of greenhouse gas emissions (GGE) from individual projects to climate change do not exist and this issue is beyond the scope of this NEPA process."[119]

Additionally, in response to a comment provided during the planning process for Colorado's Glenwood Springs Resource Area Oil and Gas Leasing and Development Final Supplemental EIS which requested that BLM consider the impacts of the plan on climate change, BLM responded that, "Methane, carbon dioxide, and several other atmospheric chemicals have been postulated to have an effect on global climate." "However, both the nature and the degree of this suspected relationship are unknown at this time."[120] Unfortunately, the Glenwood Springs Oil and Gas RMP – though absurdly dismissive – is the only RMP that appears to even reference GHG emissions from oil and gas activities in Colorado.

Other relevant RMPs implicated by recent BLM lease sales in Montana and North Dakota – e.g., the Billings Resource Area RMP (1984), the Headwaters Resource Area RMP (1984), the Powder River Basin RMP (1985), the Big Dry RMP (1995), the North Dakota RMP (1987) - contain, based upon review, utterly no discussion concerning global warming, climate change, or GHG emissions from past, present, or reasonably foreseeable oil and gas leasing and development.

There are three fundamental problems with BLM's glib approach. First, as this Protest demonstrates, methods do exist to quantify and reduce climate change and other federal agencies – in particular MMS – are quantifying and reducing GHG emissions from oil and gas leasing and development at both the programmatic planning and leasing stages. Second, even if this were not the case, a presumed lack of methodology is not an excuse for barreling forward blindly with an activity known to contribute to a serious environmental issue. 40 C.F.R. § 1502.22. Third, global warming, climate change, and GHG emissions from oil and gas leasing and development are indisputably a component of BLM's legal responsibilities and cannot be waived away with unsubstantiated ten-word statements that they are beyond the scope of BLM's planning responsibilities.

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[118] Bureau of Land Management, *Farmington Resource Management Plan* (Dec. 2003).

[119] Bureau of Land Management, Farmington *Proposed Resource Management Plan and Final Environmental Impact Statement*, P-9 (Mar. 2003) (excerpts attached as Exhibit 79).

[120] Bureau of Land Management, *Glenwood Springs Resource Area Oil and Gas Leasing and Development Final Supplemental Environmental Impact Statement*, 5-17 – 5-18 (January 1999) available at: http://www.blm.gov/co/st/en/BLM_Programs/land_use_planning/rmp/glenwood_springs/glenwood_springs_amendments.html (last accessed April 22, 2008).

Insofar as BLM management – through RMP implementation – affords BLM with adaptive management capacity, adaptive management must be predicated on a foundation of planning and analysis that forthrightly addresses impacts and anticipated uncertainties to support and justify adaptive measures. Without such a foundation, BLM management would be relegated to a reactive posture that "can be ultimately more costly than making forward-looking responses that anticipate likely future conditions and events." SEO/ISC Report at 37. Put another way, adaptive measures are not a talisman for inaction; they must be tailored to address specific issues and concerns. It would thus be arbitrary and capricious for BLM to rely, simplistically, on adaptive management principles which were never intended to address an issue as serious and unique as climate change. More fundamentally, such reliance would violate a basic principle of management underlying Secretarial Order 3226, FLPMA, NEPA, and the Public Trust Duty: *look before you leap*.

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