

Appendix D – Comments by Submittal

Greater Crossbow Oil and Gas Project,
BLM Buffalo Field Office
1425 Fort Street,
Buffalo, WY 82834

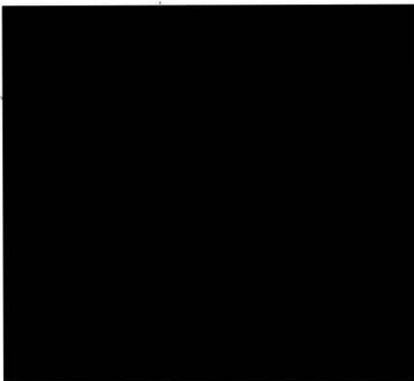
Dear Mr. Bills,

Please accept this letter of support for the Greater Crossbow Oil and Gas Project. Our support for this project is based in part on the job creation from this project and on the fact that we are confident that EOG will execute their plans in an environmentally safe manner.

In terms of the economic advantages, there are many. The development will generate business for many locals and could mean new families moving into the region. The impact on the community from more income being spent locally will mean more jobs and more financial security. New jobs and more business means additional revenue for local and state governments. This will help support many public goods.

As far as environmental risks, it is important to remember that this industry has many regulations designed to protect the environment. In addition, I know that EOG goes out of their way to do many things they are not required to do. These things are discussed in their plan and seem to be very thorough and satisfactory. I trust that the system and EOG will both ensure that the impact to our roads, wildlife and surface will be as minimal as possible. In that vein, it seems we should avoid unnecessary construction and rig moves by allowing this project to occur year round.

Our community is ready to welcome new, working members to our communities and to reap the benefits of oil and gas development. Thank you for your time and commitment to the wise management of our public lands.



COMANCHE NATION

Wyoming High Plains District
Attn: Tom Bills
1425 Fort Street
Wyoming 82834-2436

December 07, 2015

Re: Greater Crossbow Oil and Gas Exploration and Development Project
1311 (Crossbow)

Dear Mr. Bills:

In response to your request, the above reference project has been reviewed by staff of this office to identify areas that may potentially contain prehistoric or historic archeological materials. The location of your project has been cross referenced with the Comanche Nation site files, where an indication of "*No Properties*" have been identified.

Please contact this office at (580) 595-9960/9618 if you require additional information on this project.

This review is performed in order to identify and preserve the Comanche Nation and State cultural heritage, in conjunction with the State Historic Preservation Office.

Regards

Comanche Nation Historic Preservation Office
Theodore E. Villicana ,Resource Technician
#6 SW "D" Avenue , Suite C
Lawton, OK. 73502

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: "Greater Crossbow Scoping"
Date: Tuesday, December 22, 2015 9:46:38 AM
Attachments: [Greater Crossbow Scoping WY.docx](#)

----- Forwarded message -----

From: **Theodore Villacana** <theodorev@comanchenation.com>
Date: Mon, Dec 7, 2015 at 8:27 AM
Subject: "Greater Crossbow Scoping"
To: "blm_wy_buffalogceis@blm.gov" <blm_wy_buffalogceis@blm.gov>

Attached you will find consult response for Greater Crossbow Scoping



WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006

Phone: (307) 777-4600 Fax: (307) 777-4699

wgfd.wyo.gov

GOVERNOR
MATTHEW H. MEAD

DIRECTOR
SCOTT TALBOTT

COMMISSIONERS
CHARLES PRICE – President
T. CARRIE LITTLE – Vice President
MARK ANSELM
PATRICK CRANK
KEITH CULVER
RICHARD KLOUDA
DAVID RAE

December 9, 2015

WER 13747.00

Bureau of Land Management

Buffalo Field Office

Notice of Intent to Prepare an Environmental Impact Statement

Greater Crossbow Oil and Gas Project

Possible Amendments to the Casper RMP

Tom Bills

Project Manager

BLM Buffalo Field Office

1425 Fort Street

Buffalo, WY 82834

Dear Mr. Bills:

The staff of the Wyoming Game and Fish Department (Department) has reviewed the Notice of Intent to Prepare an Environmental Impact Statement for the Greater Crossbow Oil and Gas Project and Possible Amendments to the Casper RMP. We offer the following comments for your consideration.

Terrestrial Considerations:

Sage-Grouse

The project area encompasses non-core sage-grouse habitat. There is one occupied lek within the project area boundary, and one occupied lek within 2mi of the project area boundary. Non-core area No Surface Occupancy (NSO) buffers (0.25mi) and seasonal use stipulations (March 15 – June 30) should be considered and analyzed in the forthcoming EIS.

Big Game and Hunting Access

The project area supports yearlong and winter-yearlong habitat for mule deer and pronghorn. Aside from impacts to big game habitat, we recommend the forthcoming EIS analyze impacts to hunting access and related issues. Publicly accessible land is limited in the project area and increased oil and gas development has the potential to impact what little access does exist. The ability of sportsmen to access big game is an important issue for the WGFD and influences the Department's ability to meet population objectives. Additionally, the impacts of oil and gas

development on big game species and their habitats also can affect the Department's ability to meet population objectives. These issues should be considered and analyzed.

Other issues that should be analyzed are related to an increase in the number of non-public roads that may create trespass issues (maintained non-public roads can be easily mistaken for public roads when not properly signed) and oil field-related poaching. We recommend specific measures that minimize trespass and poaching concerns are developed and incorporated into the EIS.

Non-Game Wildlife

The project area supports a number of Species of Greatest Conservation Need (SGCN) as identified by the WGFD in the 2010 State Wildlife Action Plan (SWAP). We recommend impacts to shrubland and grassland SGCN are analyzed in the forthcoming EIS, and mitigation measures are developed as appropriate. The project has a specific focus on migratory birds given the number of raptor nests within the project area boundary. The 2010 SWAP and Wyoming Partners in Flight – Wyoming Bird Conservation Plan may be used to develop alternatives, support impacts analyses, and develop mitigation measures. Preconstruction surveys for migratory birds, small mammals, and bats may aid in project level siting.

Roads, Traffic, and Noise

The proposed development will result in new roads, associated traffic, and development-related noise. The impacts of these activities on wildlife species and habitats should be considered and analyzed in the EIS. Additionally, we recommend a traffic plan (e.g., approved routes and speed limits) is developed for the project area and mitigation measures developed as appropriate.

Siting

Project siting is an important factor in minimizing habitat disturbance and impacts to wildlife. The project area may offer many opportunities for co-locating new disturbance with existing disturbance. We recommend protocols for project-level siting are developed that encourage co-location of new disturbance features with existing disturbance features to the extent practical to reduce habitat loss and fragmentation. Avoiding infrastructure line of sight to occupied sage-grouse leks should be considered as a mitigation measure. Additionally, avoiding siting of above ground infrastructure in riparian areas and draws should be considered as a mitigation measure to reduce impacts to wildlife species.

Vegetation, Reclamation, and Restoration

The forthcoming EIS should include a detailed reclamation plan with an implementation time table and clear criteria for successful reclamation in the various habitat types that will be impacted. The EIS should also clarify to what extent BLM has jurisdiction to require reclamation on split estate lands where the surface is privately owned.

Additionally, a weed prevention and control plan should be developed and implemented during all stages of the proposed development. Preventing the establishment and spread of noxious weeds and cheatgrass should be a high priority as these species can quickly degrade the quality of habitats and rangelands.

The EIS should analyze the number of acres for specific habitat types that will be impacted by the proposed project. We suggest any loss of sagebrush habitat should be analyzed as a long-term disturbance, despite interim reclamation, as it may take decades for this type of habitat to re-establish and become functional again.

Cumulative Impacts

The forthcoming EIS should include a cumulative impacts analysis with a large analysis area for wildlife resources. Within or adjacent to the project area there is existing oil and gas development, CBM development, coal mines, uranium development, and wind energy development. The Converse County Oil and Gas Project, which proposes 5,000 new wells adjacent to the Crossbow project area, is currently in the EIS process. These existing and future developments in conjunction with the proposed project will likely constitute significant impacts to wildlife on a landscape scale.

Development Alternatives

A range of alternatives for the EIS should be developed in coordination with Cooperating Agencies. We recommend consideration is given to developing a resource protection alternative that minimizes the amount of surface disturbance in the project area, avoids sensitive habitats, and applies all appropriate seasonal and distance stipulations for wildlife. As suggested in the operator's plan of development, year-round development is a priority for this project. We would suggest clarification early on in the process on whether or not this aspect of the proposed action is feasible under the current RMPs. The operator has also proposed a very specific well pad and infrastructure layout for this project. An alternative that evaluates a more traditional exploratory development layout may be useful for comparison of impacts.

Aquatic Considerations:

The EIS needs to analyze the impacts of increase sediment loading into streams and rivers, particularly Antelope Creek and Bates Creek.

Antelope Creek contains the following species: plains topminnow (Tier 2), plains killifish (Tier 3), black bullhead, fathead minnow, sand shiner, white sucker, northern leopard frog (Tier 3), boreal chorus frog, bullsnake, carp, Eastern snapping turtle, green sunfish, and Woodhouse's toad. Bates Creek contains white sucker and green sunfish.

The Department has categorized the plains topminnow as a Tier 2 species. Tier 2 species are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions appear to be stable. If this project is conducted in a manner that avoids alterations of habitats (i.e. increasing sedimentation, destabilizing the river channel), then impacts to the above-mentioned species would be avoided.

Preventing the spread of aquatic invasive species (AIS) is a priority for the State of Wyoming, and in many cases, the intentional or unintentional spread of organisms from one body of water to another would be considered a violation of State statute and Wyoming Game and Fish Commission Regulation. To prevent the spread of AIS, the following is required:

1. If equipment has been used in a high risk infested water [a water known to contain Dreissenid mussels (zebra/quagga mussels)], the equipment must be inspected by an authorized aquatic invasive species inspector recognized by the state of Wyoming prior to its use in any Wyoming water.
2. Any equipment entering the state by land from March through November (regardless of where it was last used), must be inspected by an authorized aquatic invasive species inspector prior to its use in any Wyoming water
3. If aquatic invasive species are found, the equipment will need to be decontaminated by an authorized aquatic invasive species inspector.
4. Any time equipment or surface water is moved from one 4th level (8-digit Hydrological Unit Code) watershed to another within Wyoming, the following guidelines are recommended:
DRAIN: Drain all water from watercraft, gear, equipment, and tanks. Leave wet compartments open to dry.
CLEAN: Clean all plants, mud, and debris from vehicle, tanks, watercraft, and equipment.
DRY: Dry everything thoroughly. In Wyoming, we recommend drying for 5 days in summer (June - August); 18 days in Spring (March - May) and Fall (September - November); or 3 days in Winter (December - February) when temperatures are at or below freezing.

Thomas Bills
December 9, 2015
Page 5 of 5 - WER 13747.00

*A list of high risk infested waters and locations in Wyoming to obtain an AIS inspection can be found at:
wgfd.wyo.gov.

Thank you for the opportunity to comment. If you have any questions or concerns, please contact
Amanda Withroder, Staff Biologist, at (307) 473-3436 or Rick Huber, Staff Aquatic Biologist, at
(307) 777-4558.

Sincerely,


John Kennedy
Deputy Director

JK/mf/ns

cc: USFWS
Erika Peckham, WGFD, Sheridan Region
Lynn Jahnke, WGFD, Sheridan Region
Todd Caltrider, WGFD, Sheridan Region
Paul Mavrakis, WGFD, Sheridan Region
Willow Hibbs, WGFD, Casper Region
Justin Binfet, WGFD, Casper Region
Zack Walker, WGFD, Lander Region
Lynn Gemlo, USFWS, Ecological Services Wyoming Field Office
Misty Hays, U.S. Forest Service, Douglas Ranger District
Chris Wichmann, Wyoming Department of Agriculture, Cheyenne

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: WER 13747.00 Greater Crossbow Oil and Gas Project
Date: Tuesday, December 22, 2015 9:47:21 AM
Attachments: [wer13747.00 Signed Letter.pdf](#)

----- Forwarded message -----

From: **Nancy Stange** <nancy.stange@wyo.gov>
Date: Thu, Dec 10, 2015 at 2:04 PM
Subject: WER 13747.00 Greater Crossbow Oil and Gas Project
To: blm_wy_BuffaloGCEIS@blm.gov
Cc: "Madson, Erin" <erin_madson@fws.gov>, Erika Peckham <erika.peckham@wyo.gov>, Lynn Jahnke <lynn.jahnke@wyo.gov>, Todd Caltrider <todd.caltrider@wyo.gov>, Paul Mavrakis <paul.mavrakis@wyo.gov>, Willow Hibbs <willow.hibbs@wyo.gov>, Justin Binfet <justin.binfet@wyo.gov>, Zack Walker <zack.walker@wyo.gov>, Chris Wichmann <chris.wichmann@wyo.gov>, mahays@fs.fed.us, lynn_gemlo@fws.gov

Mr. Bills,
The Wyoming Game and Fish Department's comments for WER 13747.00 Greater Crossbow Oil and Gas Project are attached.
Thank you,

Nancy Stange
Wyoming Game and Fish Department
Habitat Protection Secretary
5400 Bishop Blvd.
307-777-4506
nancy.stange@wyo.gov

E-Mail to and from me, in connection with the transaction of public business, is subject to the Wyoming Public Records Act and may be disclosed to third parties.



United States Department of the Interior

NATIONAL PARK SERVICE
INTERMOUNTAIN REGION
12795 West Alameda Parkway
P.O. Box 25287
Denver, Colorado 80225-0287



IN REPLY REFER TO:
IMR-EQ-L7617

DEC 08 2015

VIA ELECTRONIC MAIL: NO HARD COPY TO FOLLOW

Memorandum

To: Tom Bills, Project Manager, Buffalo Field Office, Bureau of Land Management

Through: Regional Director, Midwest Region *C. D. Sholly*

From: Regional Director, Intermountain Region

Subject: NPS Scoping Comments on Bureau of Land Management (BLM) Notice of Intent (NOI) to Prepare an Environmental Impact Statement (EIS) for the Greater Crossbow Oil and Gas Project and Possible Amendments to the Casper Resource Management Plan, Campbell and Converse Counties, Wyoming

The National Park Service (NPS) has reviewed the subject NOI for the Bureau of Land Management's (BLM) preparation of an Environmental Impact Statement (EIS) for the Greater Crossbow Oil and Gas Project and Possible Amendments to the Casper Resource Management Plan. We appreciate having the opportunity to provide you with our initial thoughts and comments about how this project may affect units of the National Park System.

Preliminarily, the NPS has identified eight areas administered by the NPS that could be affected by development covered by the Greater Crossbow EIS. These areas are located within approximately 70 miles of the project area. They are: Devils Tower National Monument and Fort Laramie National Historic Site, located in the Intermountain Region; and Agate Fossil Beds National Monument, Badlands National Park, Jewel Cave National Monument, Mount Rushmore National Memorial, Scotts Bluff National Monument, and Wind Cave National Park, located in the Midwest Region.

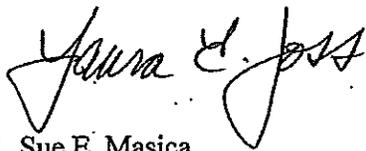
Resources of concern include:

- Air Quality and Air Quality Related Values – in particular, Badlands and Wind Cave National Parks are designated as Class I areas under the Clean Air Act, and are afforded an additional measure of protection from the harmful effects of air pollution.
- Climate Change
- Night Skies
- Surface and Ground Water Quality and Quantity
- Cave and Karst Resources at Jewel and Wind Caves

In reply to Buffalo Field Office Manager Duane W. Spencer's February 23, 2015 memorandum, the NPS's Intermountain and Midwest Regional Directors appreciate and hereby accept BLM's invitation to become a cooperating agency under the National Environmental Policy Act (NEPA) for the preparation of the EIS for the Greater Crossbow Oil and Gas Project and Possible Amendments to the Casper Resource Management Plan. Accepting BLM's invitation to become a cooperating agency underscores the NPS commitment to work closely with the BLM and to contribute valuable information to the environmental review process.

NPS has special expertise regarding the unique resources within and surrounding park units, including cultural and historic resources, biological resources, water quality and quantity, scenic vistas, night skies, soundscapes, and air quality. Moreover, through its Organic Act, NPS is charged with protecting park resources for the enjoyment of future generations. As such, NPS looks forward to working with BLM as a cooperating agency on this project.

If you have any questions, please contact Linda Dansby, IMR Energy and Minerals Program Coordinator, at 505-988-6095, or by e-mail at linda_dansby@nps.gov.



efj Sue E. Masica

cc: Rob Billerbeck, Acting Associate Regional Director, Resource Stewardship and Science, IMR
Nancy Finley, Associate Regional Director, Natural Resource Stewardship and Science, MWR
Patrick Malone, Assistant Regional Director, Natural Resources, IMR
Chris Holbeck, Natural Resources, Stewardship and Science, MWR
Tom Lincoln, Assistant Regional Director, Cultural Resources, IMR
Don Stevens, Acting Program Lead for Cultural Resources, MWR
Nick Chevance, Chief, Environmental Quality Division, MWR
Melissa Trenchik, Chief, Environmental Quality Division, IMR
James Hill, Superintendent, Agate Fossil Beds National Monument
Eric Brunnemann, Superintendent, Badlands National Park
Tim Reid, Superintendent, Devils Tower National Monument
John Keck, Montana/Wyoming State Coordinator, Eastern Wyoming Group Superintendent
Tom Baker, Superintendent, Fort Laramie National Historic Site
Larry Sandarciero, Acting Superintendent, Jewel Cave National Monument
Cheryl Schreier, Superintendent, Mount Rushmore National Memorial
Ken Mabery, Superintendent, Scotts Bluff National Monument
Vidal Davila, Superintendent, Wind Cave National Park

bcc:

Reed Robinson, Deputy Superintendent, Badlands National Park
Eddie Childers, Acting Chief, Science and Natural Resources, Badlands National Park
Rene Ohms, Chief, Resource Management, Devils Tower National Monument
Maryann Neubert, Museum Curator, Fort Laramie National Historic Site
Mike Wiles, Chief, Resource Management, Jewel Cave National Monument
Bruce Weisman, Integrated Resource Program Manager, Mount Rushmore National
Memorial
Robert Manasek, Chief, Resource Management, Scotts Bluff National Monument
Greg Schroeder, Chief, Natural Resources, Wind Cave National Park
Carol McCoy, Chief, Air Resources Division (NRSS-ARD)
Michael George, Air Resources Specialist, Natural Resources Stewardship and
Science, IMR
David Pohlman, Air Resources Specialist, Natural Resources Stewardship and
Science, MWR
Frank Turina, Natural Sounds and Night Skies Division (NRSS-NSNSD)
Lochen Wood, Natural Sounds and Night Skies Division (NRSS-NSNSD)
Randy Stanley, Natural Sounds and Night Skies Coordinator, Natural Resources
Program, IMR
Forrest Harvey, Chief, Water Resources Division (NRSS-WRD)
Alan C. Ellsworth, Chief, Aquatic Systems Branch, Water Resources Division
(NRSS-WRD)
Sharla Stevenson, Water Resources Specialist, Water Resources Division (NRSS-WRD)
Dave Steensen, Chief, Geologic Resources Division (NRSS-GRD)
Harold Pranger, Chief, Geologic Features and Systems Branch, Geologic Resources
Division (NRSS-GRD)
Dale Pate, National Cave and Karst Program Coordinator, Geologic Resources
Division (NRSS-GRD)
Heidi Riddle, Renewal Energy Specialist, MWR
Linda Dansby, Energy and Minerals Program Coordinator, Environmental Quality
Division, IMR
David Hurd, Environmental Protection Assistant, Environmental Quality Division, IMR

From: [Thomas \(Tom\) Bills](mailto:Thomas (Tom) Bills)
To: tbills@blm.gov
Cc: [Ellen Carr](mailto:Ellen_Carr); [Meredith Griffin](mailto:Meredith_Griffin)
Subject: Fwd: NPS Scoping Comments re BLM NOI to Prepare EIS for Greater Crossbow Oil and Gas Project...
Date: Friday, December 11, 2015 10:03:12 AM
Attachments: [ATT00001.htm](#)
[NPS Scoping Comments on BLM EIS for Greater Crossbow Oil and Gas Project.pdf](#)

Sent from my iPhone

Begin forwarded message:

From: "MWR RD Correspondence, NPS"
<mwr_rd_correspondence@nps.gov>
Date: December 10, 2015 at 1:47:35 PM MST
To: "Thomas (Tom) Bills" <tbills@blm.gov>
Cc: Rob Billerbeck <rob_p_billerbeck@nps.gov>, Nancy Finley <nancy_finley@nps.gov>, Patrick Malone <patrick_malone@nps.gov>, Christopher Holbeck <chris_holbeck@nps.gov>, Thomas Lincoln <thomas_lincoln@nps.gov>, Donald Stevens <don_stevens@nps.gov>, Nicholas Chevance <nicholas_chevance@nps.gov>, Melissa Trenchik <melissa_trenchik@nps.gov>, James Hill <james_hill@nps.gov>, Michael Pflaum <mike_pflaum@nps.gov>, Tim Reid <tim_reid@nps.gov>, John Keck <john_keck@nps.gov>, Thomas Baker <thomas_m_baker@nps.gov>, Donald Hart <don_hart@nps.gov>, Cheryl Schreier <cheryl_schreier@nps.gov>, Thomas Schaff <tom_schaff@nps.gov>, Vidal Davila <vidal_davila@nps.gov>, Eddie Childers <eddie_childers@nps.gov>, Rene Ohms <rene_ohms@nps.gov>, Maryann Neubert <maryann_neubert@nps.gov>, Michael Wiles <mike_wiles@nps.gov>, Bruce Weisman <bruce_weisman@nps.gov>, Robert Manasek <robert_manasek@nps.gov>, Gregory Schroeder <greg_schroeder@nps.gov>, Carol McCoy <carol_mccoy@nps.gov>, Michael George <michael_george@nps.gov>, David Pohlman <david_pohlman@nps.gov>, Frank Turina <frank_turina@nps.gov>, Lochen Wood <lochen_wood@nps.gov>, Randy Stanley <randy_stanley@nps.gov>, Forrest Harvey <Forrest_Harvey@nps.gov>, Alan Ellsworth <alan_ellsworth@nps.gov>, Sharla Stevenson <sharla_stevenson@nps.gov>, Dave Steensen <dave_steensen@nps.gov>, Harold Pranger <harold_pranger@nps.gov>, Dale Pate <dale_pate@nps.gov>, Heidi Riddle <heidi_riddle@nps.gov>, Linda Dansby <linda_dansby@nps.gov>, David Hurd <david_hurd@nps.gov>
Subject: NPS Scoping Comments re BLM NOI to Prepare EIS for Greater Crossbow Oil and Gas Project...

Mr. Bills:

Please find the subject memorandum attached.

Thank you.

Hoinon'ainino'

**Northern Arapaho Tribe
TRIBAL HISTORIC PRESERVATION OFFICE**

P.O. Box 67 - St. Stephens, Wyoming 82524 - PH: 307.856.1628 - nathpodd@gmail.com

December 14, 2015

Bureau of Land Management
Buffalo and Casper Field offices

Subject: Greater Crossbow Project Comments for EIS

After reviewing your request under the NHPA and NEPA, Section 106 process, our office would like to comment on the proposed project:



The NATHPO would like to express gratitude for the invite regarding the consultation of the proposed project. After attending the meeting I have thought through the concerns that I have with the area and offer the following recommendations in regards to cultural resources. 1.) What type of wildlife corridors (openings in gates and fences to allow animals to move freely) are being proposed? If none, I am recommending the consideration of some so that the animals do not hurt themselves trying to jump over or crawl through fences. 2.) What types of measures are being taken to assure that birds do not drink the water from the associated "pits" that every rig produces? If there are none, I am recommending that some type of nets or protective measures be installed to cover the pits to assure that we can protect and prevent the migratory birds in the area from drinking the contaminated fluid. 3.) What type of studies have been conducted to find out how associated project areas will affect other wildlife that live and use the area? If there have been none, I am recommending that small animal surveys be conducted to minimize and mitigate the adverse effects of development that might be associated with an animal's natural habitat. 4.) If any Inadvertent Discoveries occur during construction I will ask that you contact the appropriate THPO offices to be in compliance with NAGPRA.

Thank you for consulting with the Northern Arapaho THPO and have a Great Day!!

Devin Oldman
NATHPO-Deputy Director
nathpodd@gmail.com
307-856-1628 Office
307-438-5318 Cell

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Greater Crossbow EIS Comments
Date: Tuesday, December 22, 2015 9:49:17 AM
Attachments: Greater Crossbow Project Comments, 12.14.15.docx

----- Forwarded message -----

From: **Devin Oldman** <nathpodd@gmail.com>
Date: Mon, Dec 14, 2015 at 9:52 AM
Subject: Greater Crossbow EIS Comments
To: BLM_WY_BuffaloGCEIS@blm.gov

Attached you will find the comments from our office in regards to the proposed projects EIS. If you have any question or concerns please feel free to contact me at anytime.

Thank you for Consulting with the Northern Arapaho Tribe.

Sincerely,

Devin Oldman

NATHPO Deputy Director

Phone (307-856-1628) Cell (307-438-5318)

nathpodd@gmail.com



December 18, 2015

Mr. Thomas Bills
Greater Crossbow Oil and Gas Project
BLM Buffalo Field Office
1425 Fort Street
Buffalo, Wyoming 82834
Via Email: BLM_WY_BuffaloGCEIS@blm.gov

Re: Scoping Comments for the Greater Crossbow Oil and Gas Project Environmental Impact Statement

Dear Mr. Bills:

Please accept these scoping comments from the Environmental Defense Fund (EDF) regarding the environmental impact statement (EIS) for the above-referenced project (hereinafter Greater Crossbow Oil and Gas Project) that the Bureau of Land Management (BLM) is preparing.

EDF is a national environmental organization with over one million members, many of whom are deeply concerned about pollution from the oil and natural gas sector. EDF brings a strong commitment to sound science, collaborative efforts with industry partners, and market-based solutions to our most pressing environmental and public health challenges.

The following comments will highlight issues and concerns that should be fully addressed and considered in the forthcoming EIS for the Greater Crossbow Oil and Gas Project. Specifically, they focus on two topics of particular concern to EDF and of major importance to the state of Wyoming: 1. Air Quality, and 2. Sage Grouse.

I. AIR QUALITY: BLM MUST ADDRESS AIR POLLUTION FROM THE GREATER CROSSBOW OIL AND GAS PROJECT

The BLM has initiated a scoping process and indicated its intent to prepare an EIS for EOG's proposed Greater Crossbow Oil and Gas Project.¹ BLM has identified air quality as an issue that must be addressed in the EIS, and solicits information related to air quality, as well as other values.²

Emissions from oil and gas operations contribute to harmful air pollution that threatens human health and the environment. Indeed, a growing body of scientific information demonstrates that emissions are much greater than official estimates suggest, underscoring the need for federal land managers such as BLM to rigorously analyze and address such emissions. Fortunately, cost-effective measures exist to reduce or eliminate air pollutants emitted from oil and gas activities. Some such measures are required, or have been proposed by the U.S. EPA and the air quality and oil and gas regulators for the state of Wyoming. Oil and gas activities associated with the Greater Crossbow project must comply with EPA and any other federal air or waste requirements. However, compliance with existing state and federal requirements is not sufficient to ensure that BLM meets its statutory duty to prevent waste³ and prevent "unnecessary or undue degradation" of the lands, including air quality,⁴ as existing regulatory measures lack sufficient provisions to minimize emissions. In particular, existing federal and state requirements fail to mandate that operators routinely check for and promptly repair leaks that stem from malfunctioning or poorly maintained equipment.

A. *The Oil and Gas Sector is a Substantial Source of Climate-Altering Methane and Smog-Forming Volatile Organic Compounds.*

Oil and gas facilities are the largest industrial source of methane in the United States, accounting for over 7 million tons or approximately thirty percent of the nation's total methane emissions.⁵ Moreover, recent scientific evidence suggests that this number is far too low, with recent studies documenting emissions that are 90% higher than national inventories would predict, as discussed in more detail below.

Frequently, methane from oil and gas facilities is co-emitted together with other harmful pollutants, including ozone precursors such as VOCs and carcinogenic substances such as benzene and other hazardous air pollutants ("HAPs").⁶ According to the 2014 National Emissions Inventory (NEI), "Petroleum & Related Industries" was the second largest source of VOCs nationally, excluding miscellaneous emissions, and the fifth largest

¹ 80 FR 65,252 (Oct. 26, 2015).

² *Id.*

³ 3 U.S.C. §§ 187,189. See also *Boesche v. Udall*, 373 U.S. 472 (1963).

⁴ See 43 §§ C.F.R. 3809.415(a), 3809.420(b)(4) (providing the protection of air quality through compliance with federal and state clean air requirements constitutes prevention of "unnecessary or undue degradation").

⁵ EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013* (2015) ("2013 GHGI"), at ES- 6, Table ES-2, available at <http://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2015-Main-Text.pdf>.

⁶ Pétron, et al., (2014), *A new look at methane and nonmethane hydrocarbon emissions from oil and natural gas operations in the Colorado Denver-Julesburg Basin*, *J. of Geophysical Research: Atmospheres*, **119:11** ("Petron (2014)"), at 6836, 6850, available at <http://onlinelibrary.wiley.com/doi/10.1002/2013JD021272/pdf>.

source of NO_x emissions nationally.⁷ The ICF Cost Curve Report projects that the oil and natural gas sector will be responsible for over 1.5 million tons of VOC emissions in 2018.⁸

B. *Emissions from the Oil and Natural Gas Sector Have Been Linked to Unhealthy Levels of Ozone*

The oil and gas sector's substantial emissions have been linked to unhealthy levels of ozone pollution, including monitored ozone exceedances and ozone "action days" (days when the air quality in an area becomes unhealthy and people, especially susceptible populations, are encouraged to take certain precaution or stay indoors).⁹ Examples include the following:

1. Wyoming. In designating Sublette County and portions of Lincoln and Sweetwater Counties in Wyoming as failing to attain the 2008 ozone standard, EPA noted that the ozone air quality problems were "primarily due to local emissions from oil and gas activities: drilling, production, storage, transport and treatment of oil and natural gas."¹⁰ The Wyoming Department of Environmental Quality provided a similar assessment, and then-Governor Freudenthal recommended that parts of the Upper Green River Basin be designated as an ozone non-attainment area,¹¹ which EPA did in May of 2012.¹² Since this time, ozone levels have fallen. This decline is partially due to oil and gas air quality standards put in place by Wyoming Department of Environmental Quality.
2. Utah. The Utah Department of Environmental Quality has noted that "[i]ncreased oil and gas development in the Uinta Basin have [sic] led to environmental issues regarding air quality, water quality, and management of drilling wastes."¹³ The Uinta Basin Winter Ozone Study found that the high ozone episodes observed in the December 2013 to March 2014 time period, which corresponded with colder temperatures, snow cover, and atmospheric inversions, were triggered by compounds "directly released from various emission sources and form in the atmosphere from directly emitted volatile organic compounds (VOCs) such as those emitted from oil and natural gas exploration and production activities."¹⁴

⁷ EPA, National Emissions Inventory (NEI) Air Pollutant Emissions Trends Data, <http://www3.epa.gov/ttnchie1/trends/>.

⁸ ICF International, "Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries," 4-12 (March 2014).

⁹ AirNow Action Days: <http://airnow.gov/index.cfm?action=airnow.actiondays>; Air Quality Guide for Ozone, <http://www.airnow.gov/index.cfm?action=pubs.aqiguideozone>.

¹⁰ 77 Fed. Reg. 34221 et. seq; see also EPA, TECHNICAL SUPPORT DOCUMENT, WYOMING AREA DESIGNATIONS FOR THE 2008 OZONE NATIONAL AMBIENT AIR QUALITY STANDARDS (2012), available at http://www.epa.gov/ozonedesignations/2008standards/documents/R8_WY_TSD_Final.pdf (Wyoming).

¹¹ Letter to Ms. Carol Rushin, Acting Regional Administrator from Governor Dave Freudenthal (March 12, 2009), [http://deq.state.wy.us/AOD/Ozone/Gov%20Ozone%20to%20EPA%20\(Rushin\)_Final_3-12-09.pdf](http://deq.state.wy.us/AOD/Ozone/Gov%20Ozone%20to%20EPA%20(Rushin)_Final_3-12-09.pdf).

¹² 77 Fed. Reg. 30,088, 30,157 (May 21, 2012).

¹³ Utah Dept. of Environmental Quality, "Uinta Basin, Ozone in the Uinta Basin," available at <http://www.deq.utah.gov/locations/U/uintahbasin/ozone/overview.htm>.

¹⁴ "Final Report: 2014 Uinta Basin Winter Ozone Study" (2015) Prepared by Environ for the Utah Division of Air Quality, http://www.deq.utah.gov/locations/U/uintahbasin/ozone/docs/2015/02Feb/UBWOS_2014_Final.pdf.

The Greater Crossbow EIS must fully evaluate the methane and VOC emissions associated with the project and put in place adequate measures to eliminate or minimize such emissions. We join in comments submitted by the Wyoming Outdoor Council requesting BLM model the air quality impacts associated with the Greater Crossbow Project and undertake a comprehensive cumulative impacts analysis that considers the impacts from the Project as well as other nearby oil and gas projects.¹⁵

C. Emissions are Likely Significantly Higher than Inventories Suggest

A growing body of scientific studies shows that emissions are significantly higher than inventories would suggest. Recently, the Proceedings of the National Academy of Sciences published the results of a series of coordinated studies conducted at a diverse selection of facilities in the in the Barnett Shale.¹⁶ Consistent with numerous prior studies undertaken nationally, the Barnett Campaign researchers measured emissions significantly higher than inventories estimate.¹⁷ Indeed, per the Barnett Campaign, emissions in the Barnett Shale are 90% higher than EPA's inventory data suggests.¹⁸ The primary reason for the discrepancy between inventories and measured emissions is the failure of inventories to account for unpredictable emissions from leaks, equipment malfunctions and improper maintenance.

D. BLM Must Ensure the EIS and ROD Contain Adequate Measures to Eliminate or Minimize Emissions, Including Leaks

BLM must ensure compliance with existing air requirements designed to eliminate or minimize emissions from the Greater Crossbow project.¹⁹ However, compliance with existing requirements is not sufficient. BLM must also impose additional measures to limit emissions where existing state or federal requirements are insufficient.

One clear area where existing requirements fall short is with respect to leak detection and repair. Per the growing body of science, leaks contribute significant amounts of emissions to the atmosphere. Moreover, these emissions occur unpredictably across facilities over time. From a policy standpoint the clear solution to these currently unmitigated emissions is a robust leak detection and repair program. Accordingly, as explained more fully below, BLM must require operators in the Greater Crossbow area

¹⁵ See Sections II, III and X Wyoming Outdoor Council Re: Scoping Comments for the Greater Crossbow Oil and Gas Project.

¹⁶ Zavala-Ariaza, et al., "Reconciling Divergent Estimates of Oil and Gas Methane Emissions," PNAS Early Edition, available at <http://www.pnas.org/content/early/2015/12/03/1522126112.full.pdf>.

¹⁷ See e.g. Allen, D.T., et al, (2013) "Measurements of methane emissions at natural gas production sites in the United States," *Proc. Natl. Acad.* 2013, 110 (44), available at <http://www.pnas.org/content/110/44/17768.full>; Allen, D.T., et al, (2014), "Methane Emissions from Process Equipment at Natural Gas Production Sites in the United States: Pneumatic Controllers," *Environ. Sci. Technol.*, 2015, 49 (1), pp. 633–640 (referencing 2013 Allen study), available at <http://pubs.acs.org/doi/abs/10.1021/es5040156>; Mitchell, A.L., et al, (2015) "Measurements of Methane Emissions from Natural Gas Gathering Facilities and Processing Plants," *Environ. Sci. Technol.*, 2015, 49 (5), pp 3219–3227, available at <http://pubs.acs.org/doi/abs/10.1021/es5052809>; R. Subramanian, et al, (2015) "Methane Emissions from Natural Gas Compressor Stations in the Transmission and Storage Sector: Measurements and Comparisons with the EPA Greenhouse Gas Reporting Program Protocol," *Environ. Sci. Technol.*, available at <http://pubs.acs.org/doi/abs/10.1021/es5060258>.

¹⁸ Zavala-Ariaza, *supra* note 16.

¹⁹ See 3 U.S.C. §§ 187,189; 43 §§ C.F.R. 3809.415(a), 3809.420(b)(4).

institute quarterly inspections using modern leak detection instruments, coupled with expeditious repair time-frames, to identify and fix leaking equipment.

Existing state requirements do not adequately address equipment leaks. The Wyoming Oil and Gas Conservation Commission does not require operators take any steps to identify or mitigate equipment leaks. Similarly, the Department of Environmental Quality's Air Division does not require any standard LDAR program in the eastern part of Wyoming home to the Greater Crossbow Project.²⁰ We have requested the DEQ expand its quarterly inspection requirement in effect in the Upper Green River Basin to the eastern part of the state.²¹ However, at this point, DEQ has not done so. Accordingly, existing state requirements will not ensure that equipment leaks are adequately mitigated.

Similarly, EPA's recent proposed New Source Performance Standard for oil and gas facilities falls short. As explained in our comments to EPA, the proposal suffers from a number of flaws, including an insufficiently frequent monitoring regime, an overly-broad exemption for low-producing wells and stand-alone wellheads, and the inclusion of a provision that would permit even less frequent monitoring than semi-annual.²² We have urged EPA to strengthen its LDAR program. However, to ensure BLM meets its legal duties to protect air quality and minimize waste, BLM must also put in place a rigorous LDAR program grounded in at least quarterly inspections using modern leak detection instruments.

In addition to LDAR, numerous other cost-effective measures are available to reduce emissions. A recent report that EDF commissioned from the independent consulting firm ICF International shows that approximately 40 percent of methane emissions from the nation's oil and gas sector could be eliminated by 2018 at a total cost of just one penny per thousand cubic feet of gas produced in the country.²³ BLM must consider all available measures to eliminate or minimize emissions associated with the Greater Crossbow project, including, but not limited to, those measures evaluated by ICF.

II. SAGE GROUSE

A. BLM Should Follow the Mitigation Hierarchy

In order to conserve natural resources under the jurisdiction of the agency, BLM must adhere to the mitigation hierarchy with a goal of at least no net loss of resources. The Presidential Memorandum "Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment" (released November 3, 2015) directs the Department of Interior and the BLM to establish a policy of "a net benefit goal or, at a minimum, a no net loss goal for natural resources the agencies manages". DOI released a

²⁰ Wyoming Department of Environmental Quality, Oil and Gas Production Facilities Permitting Guidance (Sept. 2013), (WY Permitting Guidance) http://deq.state.wy.us/aqd/Oil%20and%20Gas/September%202013%20FINAL_Oil%20and%20Gas%20Revision_UGRB.pdf.

²¹ EDF and WOC "Informal comments on Department of Environmental Quality, Air Quality Division, Update to the Oil and Gas Production Facilities, Chapter 6, Section 2 Permitting Guidance," (July 28, 2015).

²² Clean Air Task Force, et al., comments submitted to EPA on Oil and Natural Gas Sector: Emission Standards for New and Modified Sources, Docket No. EPA-HQ-OAR-2010-0505 (Dec. 4, 2015).

²³ ICF Int'l, *Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries* (Mar. 2014).

companion chapter to the Departmental Manual, titled “Implementing Mitigation at the Landscape-Scale” (600 DM 6), which directs agency officials to use the mitigation hierarchy, defined as a sequenced approach of using avoidance, minimization and compensatory mitigation for remaining residual impacts. It is essential that BLM evaluate the application of the mitigation hierarchy for the Crossbow Oil and Gas Project and that the prioritization of avoidance and minimization followed by compensatory mitigation for unavoidable impacts become a required component and a condition of EIS and permit approval.

BLM must comply with the stipulations in the applicable Resource Management Plans (RMPs) and should reflect the provisions of the Governor’s Executive Order (updated 2015-4). It is critical that BLM not backtrack by allowing development in the core areas / Wyoming BLM Preliminary Priority Habitat (PPH) in excess of established policies. This includes careful consideration of any exceptions to timing-limitation restrictions that serve to protect wildlife. Compensatory mitigation should be used to offset impacts that cannot otherwise be avoided or minimized, and not as a loophole to avoid existing policies. Compensatory mitigation should be used to create net benefit for the residual impacts that remain *after* appropriate avoidance and minimization.

Finally, we note that when evaluating the impacts of oil & gas operations, it is important to consider both direct (surface) impacts as well as indirect and cumulative impacts consistent with the requirements of NEPA.

B. BLM Should Hold All Compensatory Mitigation Mechanisms to High and Equivalent Standards

Where impacts to wildlife species of concern like the greater sage-grouse are unavoidable, BLM should implement effective, consistent compensatory mitigation strategies to offset impacts at the landscape-scale. The approach should be consistent with the Regional Mitigation Strategies being designed by BLM for the greater sage-grouse. We believe a programmatic approach to mitigation designed to produce net benefit will be a critical part of successful conservation of the greater sage-grouse. BLM’s Departmental Memo (600 DM 6) affirms that BLM must require meaningful and equivalent compensatory mitigation for unavoidable impacts. This should be to a standard of at least no net loss as established by the Presidential Memo.

High-standard compensatory mitigation for the greater sage-grouse should:

- result in a measurable net benefit to the greater sage-grouse and other species of concern;
- apply a standardized, scientifically-based methodology for assessing and quantifying the habitat conditions and outcomes associated with impacts and offsets across the range of the species;

- utilize a transparent and clearly articulated process for accounting, administering, and tracking mitigation projects and outcomes;
- enable conservation offsets that match or exceed the time frame of impacts;
- include independent, third-party verification of impacts, offsets, and performance; and
- apply a monitoring and assessment framework that assures adaptive management of the mitigation program.

We strongly suggest BLM follow the above criteria for any mitigation designed to offset unavoidable impacts to sage-grouse habitat or other wildlife habitat. We also note the adoption of compensatory mitigation that ensures transparent and consistent mitigation at the landscape-scale would be consistent with the Secretarial Order “Improving Mitigating Policies and Practices of the Department of Interior” (Order No. 3330). A high quality programmatic compensatory mitigation framework such as an Exchange would meet these criteria.

We also note that, when identifying mitigation sites, priority should be given to mitigation sites that are proximate to impacts but also the best locations for long-term conservation within the surrounding landscape, regardless of whether these sites are located on private, state or federal land. We urge BLM to seek to maximize the value of conservation and mitigation through siting decisions that direct development to low-value habitat and promote conservation of high-value unfragmented habitat, whether that habitat is on public or private land.

C. BLM Should Evaluate the Role for Compensatory Mitigation Options Like an Exchange

Environmental Defense Fund is working with partners and sage grouse experts to develop a mitigation tool for the greater sage-grouse. Called an Exchange, the program would enable industry such as energy companies to purchase mitigation credits to offset the unavoidable impacts of their activities.

In Wyoming, EDF is a part of the Wyoming Conservation Exchange (WCE), a collaborative process that includes the Sublette County Conservation District, the University of Wyoming, the Wyoming Chapter of the Nature Conservancy, and the Wyoming Stock Growers Association. These organizations and individuals have worked together for the past three years to create a framework for an Exchange – a platform to facilitate the creation of mitigation projects to offset impacts from oil and gas and other forms of development. Conservation exchanges entail a standardized process for the creation, quantification, verification, and monitoring of mitigation projects consistent with U.S. Fish and Wildlife Service (the Service) and BLM policies. Exchanges can be applied to private, state, or federal land, including BLM land.

The WCE has submitted documentation to the Service and a review team that includes BLM. We believe that the WCE can play an important role in helping to mitigate the habitat impacts of projects like the Crossbow Oil and Gas Project. The structure of the WCE meets the standards of the BLM as set forth in 600 DM 6, and thus can provide high-quality compensatory mitigation for the Crossbow Oil and Gas Project. If there are permitted impacts to sage grouse habitat or to the habitat of other critical species that cannot be avoided or further minimized, we strongly recommend that BLM and the project proponents evaluate and look for opportunities to mitigate those impacts with off-site projects using a compensatory mitigation program such as an Exchange that meets the criteria outlined previously and that follows high and equivalent standards.

Finally, tools like a Habitat Quantification Tool (HQT) developed for the Exchange offer a way to quantify changes to habitat value. The tool is comprised of a set of measurements and methods to evaluate vegetation and environmental conditions related to habitat quality and quantity. We offer our assistance to BLM in the development and evaluation of methods to evaluate habitat quality and changes to habitat value.

III. CONCLUSION

Thank you for considering these comments. We look forward to remaining engaged as the Greater Crossbow EIS is developed.

Sincerely,

A handwritten signature in black ink, appearing to read "Dan Grossman", is written over a light yellow rectangular background.

Dan Grossman
EDF Rocky Mountain Regional Director

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Comments on Greater Crossbow Oil and Gas Project
Date: Tuesday, December 22, 2015 10:04:55 AM
Attachments: [EDF Greater Crossbow BLM Comments .pdf](#)

----- Forwarded message -----

From: **Elizabeth Paranhos** <elizabethparanhos@delonelaw.com>
Date: Fri, Dec 18, 2015 at 12:46 PM
Subject: Comments on Greater Crossbow Oil and Gas Project
To: "BLM_WY_BuffaloGCEIS@blm.gov" <BLM_WY_BuffaloGCEIS@blm.gov>
Cc: dan grossman <dgrossman@edf.org>, jon goldstein <jgoldstein@edf.org>

Dear federal land manager,

Please accept these comments submitted on behalf of the Environmental Defense Fund regarding BLM's intent to prepare an Environmental Impact Statement for the Greater Crossbow Oil and Gas Project.

Best,
Elizabeth

Elizabeth Paranhos
Delone Law Inc.
1555 Jennine Place
Boulder, Colorado 80304
(303) 442-0610 (o)
(303) 880-4285 (m)

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444 East 800 North
Logan, UT 84321
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e: Bruce@wyomingoutdoorcouncil.org

Greater Crossbow Oil and Gas Project
BLM Buffalo Field Office
c/o Mr. Thomas Bills
1425 Fort Street
Buffalo, WY 82834

December 18, 2015

Re: Scoping Comments for the Greater Crossbow Oil and Gas Project

Dear Mr. Bills:

Please accept these scoping comments from the Wyoming Outdoor Council regarding the environmental impact statement (EIS) for the above-referenced project (hereinafter Crossbow Project) that the Bureau of Land Management (BLM) is preparing. The Wyoming Outdoor Council is the state's oldest independent conservation organization. We've worked for more than four decades to protect Wyoming's environment and quality of life for future generations.

The following comments will highlight issues and concerns that should be fully addressed and considered in the forthcoming EIS for the Crossbow Project.

I. THE EIS SHOULD INCLUDE AN ANALYSIS OF THE HUMAN HEALTH IMPACTS OF DRILLING AND PRODUCTION ACTIVITIES ON WORKERS AND PEOPLE WHO LIVE IN THE PROJECT AREA

Air concentrations of potentially dangerous compounds and chemical mixtures are frequently present near oil and gas production sites. A recent study has shown that concentrations of benzene (a known human carcinogen), formaldehyde, hexane, and hydrogen sulfide in oil and gas fields are found at levels that exceed health-based risk levels by as many as several orders of magnitude.¹ Assuming the Crossbow Project's proximity to homes and ranches,

¹ Air concentrations of volatile compounds near oil and gas production: a community-based exploratory study. Gregg P Macey, *et al.* Environmental Health 2014, 13:82. <http://www.ehjournal.net/content/13/1/82>, which is included herewith.

this is a particular concern. Because high concentrations of chemicals were detected at much greater distances than previously identified, setbacks from production equipment to homes and other occupied structures of 300-500 feet may not be adequate to reduce the human health risks. The need for greater setbacks is addressed in the next section of these comments. In addition to impacts on people who live in the area, workers at oil and gas development sites can also be exposed to these unhealthy levels of air pollutants. These concerns are addressed in detail in the Macey *et al.* study, which we submit for consideration in the Crossbow Project EIS. It is clear the Crossbow Project record of decision (ROD) should put in place adequate measures to protect the health of people living in the area, including oil and gas field workers.

II. THE BLM SHOULD REQUIRE A ONE-QUARTER MILE SETBACK OF OIL AND GAS WELLS FROM RESIDENCES

As a component of ensuring human health is protected from oil and natural gas development activities, the BLM should put in place requirements that there shall be a one-quarter mile setback of oil and gas field wells from residences in the Crossbow Project area. Oil and gas development within close proximity to human dwellings has become increasingly controversial. This is especially the case in a situation like the Crossbow Project area where 88 percent of the land in the project area is privately owned or held by the State of Wyoming. This is ranching country, and there are homes in the project area associated with ranching and other agriculture practices. These residences, and the people who live there, should be protected to the greatest extent possible. An oil and gas well closer than one-quarter mile from homes can destroy a family's quality of life and potentially threaten their health.

The BLM should prohibit oil and natural gas development pursuant to the Crossbow Project EIS when such development would be within one-quarter mile of an occupied residence. Such a provision would be in compliance with Lease Notice No. 1, which is made part of all federal oil and gas leases.² This notice provides that the lease may contain lands that "contain special values, may be needed for special purposes, or may require special attention to prevent damage to surface and/or other resources." These are referred to as "special areas" and they include lands "within 1/4 mile of occupied dwellings." In these cases, "surface use or occupancy within such special areas will be strictly controlled or, if absolutely necessary, prohibited." The intent of this lease notice is to inform lessees that "when one or more of the above conditions exist, surface disturbing activities will be prohibited unless or until the permittee or the designated representative and the surface management agency (SMA) arrive at an acceptable plan for mitigation of anticipated impacts."

Additionally, in the "Mitigation Guidelines for Surface-Disturbing and Disruptive Activities, Wyoming Bureau of Land Management" that is incorporated into the Buffalo RMP, the Special Resource Mitigation Guideline provides that activities or surface use will not be allowed where certain resource values are found, including "occupied dwellings." Bureau of

² The provisions of Lease Notice No. 1 are also incorporated into the Buffalo Field Office Resource Management Plan (RMP). Bureau of Land Management Buffalo Field Office Approved Resource Management Plan at Appendix B.

Land Management Buffalo Field Office Approved Resource Management Plan at Appendix F. This provision too would allow the BLM to specify a one-quarter mile setback distance.

III. METHANE EMISSIONS FROM OIL AND GAS WELL DEVELOPMENT IN THE CROSSBOW PROJECT AREA DUE TO EQUIPMENT LEAKS SHOULD BE REDUCED

Significant actions are being undertaken to reduce methane emissions from the oil and gas industry. One of the most important efforts relates to reducing methane (natural gas) leaks from oil and gas field equipment and infrastructure, an effort referred to as leak detection and repair (LDAR). These efforts are being taken at both the state and federal level.

Pursuant to President Obama's "Climate Action Plan Strategy to Reduce Methane Emissions," the BLM has been charged with proposing regulations to "reduce the loss of natural gas through the venting or flaring of methane produced from Federal and Indian oil and gas leases." This rulemaking, which is pending, will modify Onshore Order No. 9³, which governs royalties on natural gas that is vented or flared as well as "avoidably lost" (wasted) natural gas. When the rule is proposed in the near future there is a strong likelihood it will include LDAR requirements. Moreover, the existing NTL 4A provides authority to provide LDAR requirements so as to prevent "avoidably lost" natural gas from being "wasted."

Additionally, the Environmental Protection Agency (EPA) has proposed regulations that will reduce methane emissions as well as volatile organic compound (VOC) emissions from the oil and gas sector. 80 Fed. Reg. 56593 (Sept. 18, 2015). The proposed regulations include LDAR requirements, and there is little doubt they will be carried forward in the final rule. The EPA oil and gas sector methane regulations will have nationwide applicability.

The state of Wyoming has also put in place strong LDAR requirements in the Upper Green River Basin. Recently the state updated its Chapter 6 Section 2 Presumptive Best Available Control Technology (P-BACT) guidance requirements in the "statewide" area, which includes the Crossbow Project area. These new P-BACT requirements include a significant strengthening of many of the P-BACT requirements in the statewide area, but unfortunately there are no LDAR requirements in the statewide area. We expect, however, that this shortcoming will be rectified soon. According to the acting Air Quality Division Administrator in office when the P-BACT revisions in the statewide area were adopted, it is the state's intention to put in place LDAR requirements in the statewide area "sooner rather than later."

Given these three pending state and federal rulemakings, the BLM should ensure the Crossbow Project fully complies with upcoming LDAR requirements, and the ROD for this EIS should reflect this compliance.

As the President's Climate Strategy recognizes, in 2012, 28 percent of methane emissions in the United States were attributed to the oil and natural gas sector. Approximately 31 percent of

³ We understand Onshore Order No. 9 has been replaced by Notice to Lessee (NTL) 4A.

methane emissions came from production sources. Some recent studies are indicating even greater emissions of methane from oil and gas operations. Methane, of course, is a very powerful greenhouse gas—86 times more potent than carbon dioxide on a 20-year basis—and contributes significantly to global warming. For this reason there is a compelling need to reduce methane emissions from oil and natural gas development. Vented, flared, and wasted natural gas (methane) must be reduced from the Crossbow Project to the maximum extent practicable. There are many economically and technically practical means that can be used to reduce methane emissions from oil and natural gas development, including equipment upgrades or replacements and operational and processes changes. Companies can recover the costs of installing these technologies quickly due to the fact an economically valuable commodity is being recovered.

IV. COMPLIANCE WITH THE DEPARTMENT OF THE INTERIOR MITIGATION STRATEGY AND PRESIDENT OBAMA’S MITIGATION MEMORANDUM

In April 2014 the Department of the Interior released “A Strategy for Improving the Mitigation Policies and Practices of the Department of the Interior.” This strategy outlines a number of policies and practices that agencies in the Department of the Interior will implement to improve mitigation of the environmental and social impacts of projects that the agencies propose and pursue, on a landscape-scale level. The BLM should ensure that it fully complies with this strategy as it develops the Crossbow Project EIS.

The BLM indicates in the Federal Register notice for this EIS that it intends to comply with this new mitigation policy. It states that one of the preliminary issues identified for treatment in the EIS is, “the identification of opportunities to apply mitigation hierarchy strategies for on-site, regional, and compensatory mitigation, and, as appropriate, landscape-level conservation and management actions to achieve resource objectives,” 80 Fed. Reg. 65242, 65243 (Oct. 26, 2015). These mitigation strategies include avoidance, minimization, or compensation, the mitigation measures prescribed by the Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations. 40 C.F.R § 1508.20. We encourage the BLM to follow through on these statements in the Crossbow Project EIS.

This new mitigation strategy requires the BLM to “incorporate landscape-scale approaches into all facets of development and conservation planning and mitigation” and to “[u]tilize the full mitigation hierarchy in project planning and review.” The full mitigation hierarchy includes avoidance and minimization of impacts, as well as compensation for them. And the Mitigation Strategy emphasizes that avoidance and minimization must receive priority, not just compensation for impacts. *See* Mitigation Strategy at 7 and 10 (stating that greater attention should be given to avoidance, and projects must be more effectively designed to avoid and minimize impacts).

We ask the BLM to ensure it complies with this policy for the Crossbow Project. This will require the BLM to adhere to the guiding principles for landscape-scale mitigation that are specified in the Mitigation Strategy, and to abide by the landscape-scale mitigation strategy implementation provisions specified in the Mitigation Strategy (including the use of oil and gas

master leasing plans). Several near-term deliverables are specified in the Mitigation Strategy, and these should be reflected in the Crossbow EIS. In particular, BLM must finalize its “Interim Draft Regional Mitigation Manual Section 1794.”⁴

Furthermore, on November 3, 2015 President Obama released the “Presidential Memorandum: Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment.” This sweeping new policy directs the Department of the Interior and the BLM to establish a policy of “a net benefit goal or, at a minimum, a no net loss goal for natural resources the agency manages” It emphasizes that avoidance and minimization of impacts, not compensation, must be given priority, especially for resources that are of “irreplaceable character.” By November 3, 2016 the Department of the Interior, through the BLM, is directed to “finalize a mitigation policy that will bring consistency to the consideration and application of avoidance, minimization, and compensatory actions or development activities and projects impacting public lands and resources.” The Department of the Interior is also directed to develop program guidance for the use of mitigation projects, within one year of issuance of the memorandum. The BLM must ensure it complies with this Presidential memorandum as it develops the Crossbow Project EIS.

In the last section of these comments we discuss various mitigation measures (“doing it right” principals) that the BLM can require to better protect the environment from oil and natural gas development. We believe these concepts tie in with BLM’s obligations under the Department of the Interior Mitigation Strategy and the President’s Mitigation Memorandum. We urge the BLM to consider those principals to ensure that it meets the requirements of the mitigation policies.

V. THE NEED FOR A CUMULATIVE IMPACT ANALYSIS OF OIL AND GAS FIELD PROJECTS

To meet the “landscape-level” mitigation direction that is evident in the Department of the Interior Mitigation Strategy and the Presidential Memorandum, the BLM should fully consider the cumulative impacts of the large number of massive oil and gas projects it is moving toward approving in Wyoming. All of these projects are in the midst of NEPA review and compliance through the development of EISs or environmental assessments (EA). Besides the Crossbow Project’s proposed 1,500 oil and natural gas wells affecting a 120,000-acre project area, according to the BLM’s most recent NEPA Hotsheet, the following projects are also under review and development in Wyoming:

- Black’s Fork (Moxa Arch) Project EIS, 7,500 wells affecting 633,532 acres.
- Continental Divide Creston Project EIS, 8,950 wells affecting 1,100,000 acres.
- Hiawatha Project EIS, 2,200 wells affecting 157,335 acres.
- Normally Pressured Lance Project EIS, 3,500 wells affecting 141,080 acres.

⁴ Under the Mitigation Strategy deliverables, BLM is also to initiate development of a handbook for implementing its Regional Mitigation Policy and is to convene a policy forum of scientists and policy experts to “share methods for identifying potential landscape-scale conservation and development priorities and to discuss how those methods may be better integrated into BLM Resource Management Plans and U.S. Forest Service Forest Plans.”

- Moneta Divide Project EIS, 4,250 wells affecting 265,000 acres.
- Bird Canyon Project EIS, 348 wells affecting 17,612 acres.
- Horseshoe Basin Project EA, 20 wells affecting 24,972 acres.
- Converse County Project EIS, 5,000 wells affecting 1,500,000 acres.
- Desolation Road Project EA, 17 wells affecting 117 acres.
- North Dutch John Project EA, 1 well affecting 10 acres.

Including the Crossbow Project, this represents 33,286 oil and natural gas wells affecting 3,959,658 acres of land.

The combined impacts of these projects could be massive and these projects will affect vast areas of the state, if not the region. As the BLM is well aware, it must consider the cumulative impacts of these projects. *See* 40 C.F.R. § 1508.7 (defining cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions . . .” and providing that cumulative impacts “can result from individually minor but collectively significant actions . . .”). “Effects” of a project include cumulative impacts. *Id.* § 1508.8. In defining the scope of a project the BLM must consider actions, alternatives, and impacts. *Id.* § 1508.25. In considering both actions and alternatives to determine scope, cumulative impacts must be considered. *Id.* §§ 1508.25(a)(2) and (c)(3). Moreover, “connected actions” and “similar actions” contribute to the scope of a project, and there is little doubt these other oil and gas fields constitute either connected actions or similar actions. In addition, the CEQ regulations make provision for evaluating the impacts of multiple proposals in the following ways: 1) By geographic area where actions occur in the same general area such as a region *Id.* § 1502.4(c)(1); 2) Or generically, “including actions which have relevant similarities, such as common timing, impacts, alternatives, methods of implementation, media, or subject matter.” *Id.* § 1502.4(c)(2). The need for this comprehensive cumulative impacts analysis that reflects the numerous oil and gas projects being considered in Wyoming should be acknowledged and evident in the Crossbow Project EIS.

VI. THE SCOPE OF THE CROSSBOW PROJECT EIS SHOULD BE EXPANDED TO INCLUDE THE CONVERSE COUNTY OIL AND GAS PROJECT

The CEQ regulations addressing the scope of an EIS (40 C.F.R. §1508.25) present a strong argument for analyzing the 1,500-well Crossbow Project and the 5,000-well Converse County Project in a single EIS. The two projects are in initial pre-draft EIS phases of NEPA compliance, and are located adjacent to one another in the same basin, sharing a common boundary. The proposed actions are similar (drilling and producing oil and natural gas) as are the direct, indirect, and cumulative impacts to air and water quality, ranching and agriculture, wildlife, recreation, cultural resources, etc. There is likely a similarity of alternatives (e.g., phased development, number of wells per pad, setbacks from residences,) as well as a similarity of mitigation measures. The BLM should merge these two EISs into a single document because it “is the best way to assess adequately the combined impacts of similar actions or reasonable alternatives...” 40 C.F.R. § 1508.25(a)(3). Analyzing the combined effects of 6,500 wells in a single EIS will certainly lead to a more accurate and complete disclosure of the environmental

effects of these related projects than the separate approach currently proposed. Indeed, it seems the only argument for bifurcating the analyses relates to the preference and convenience of the operators: the Crossbow Project has a single operator, EOG Resources, Inc., while the Converse County Project involves a consortium of operators. This factor should not decide the scope of the EIS.

Combining these two projects, the 5,000-well Converse County project and the 1,500-well Crossbow Project, into a single EIS also makes sense from an efficiency and economic standpoint. The public, state, and federal agency reviewers, project proponents, and other stakeholders would only be required to review and comment on a single document instead of two separate documents. And the cost of revising the Converse County EIS to add an additional 1,500 wells associated with the Crossbow Project would be far less than preparing an entirely separate, stand-alone EIS as envisioned now.

VII. THE BLM SHOULD ENSURE COMPLIANCE WITH WYOMING'S VENTING AND FLARING RULES

As indicated in the discussion above, the BLM should seek to eliminate venting and reduce flaring of natural gas from oil and natural gas development activities in the Crossbow Project area. The state of Wyoming is currently reviewing and updating the Wyoming Oil and Gas Conservation Commission (WOGCC) rules on flaring and venting. These new rules should be finalized by early 2016.

At this time it appears the new rules will contain important new provisions differentiating flaring requirements from venting requirements and will require venting and flaring volumes to be reported separately to the WOGCC. There are likely to be requirements for the use of auto-igniters, 98 percent destruction efficiency at flares, and for a gas capture and beneficial use plan, among other provisions. We hope that the final rule will also prohibit venting with the exception of emergencies and require a flaring permit for any well that flares (not just wells flaring an average of more than 60,000 cubic feet per day).

In addition to ensuring compliance with these new state rules, the BLM should also be sure to consider public concerns regarding flaring and venting that have become increasingly prominent in recent years. It should make a provision in the Crossbow Project ROD for public hearings to address means to reduce impacts from venting and flaring on nearby residents. Concerns about air pollution are especially noteworthy, and the BLM should address these concerns.

VIII. BONDS MUST BE ADEQUATE TO COVER WELL PLUGGING AND RECLAMATION COSTS

Historically, the bonds required of operators were either insufficient to properly plug and abandon wells, or idle well bonds were not posted at all. This has resulted in thousands of abandoned coalbed methane wells in the Powder River Basin, which threaten groundwater supplies as they continue to sit idle or in a "not producing" state. This has created a backlog of thousands of orphaned wells that the state must now pay to plug. To ensure this problem does not

reoccur, the BLM should consider adequate bond amounts necessary to ensure oil and gas wells are properly plugged and abandoned. Bonds should also cover the costs of surface reclamation needs.

There is no doubt the BLM has authority to provide for increased bond amounts. *See, e.g.,* BLM Instruction Memoranda (IM) 2006-206 and 2010-161, and Memorandum from Assistant Solicitor Onshore Minerals to Deputy State Director Mineral Resources Wyoming State Office dated July 19, 2004 (all addressing bonding issues and making clear that BLM can increase bond amounts as needed). The WOGCC has also just revised its bonding requirements, and the BLM should ensure compliance with those rules.

IX. ISSUES RELATED TO GRANTING TIMING LIMITATION STIPULATION EXEMPTIONS

The Federal Register notice for this project states that the project proponent (EOG Resources, Inc.) hopes to, “[c]onduct year-round drilling where seasonal raptor restrictions may otherwise apply.” 80 Fed. Reg. at 65243. There are a number of timing limitation stipulations (TLS) in place pursuant to the Buffalo RMP within the boundaries of the Crossbow Project area that apply to raptors. BLM Buffalo Field Office Approved RMP at Appendix B. Due to the sensitive nature of these species and the extent of habitat fragmentation currently present within the project area boundary, it would be inappropriate to allow area-wide or blanket exceptions to these restrictions. Processes exist by which lease stipulations may be modified or waived on a case-by-case basis, making area-wide exceptions unnecessary. 43 C.F.R. § 3101.1-4.

In the case of Raptors of Conservation Concern,⁵ conservative planning should be considered to maintain and enforce regulatory mechanisms for management of these species. Many of these species are BLM special status species, and under the policies applicable to those species the BLM “shall manage [the species] and their habitats to minimize or eliminate threats affecting the status of the species or to improve the condition of the species habitat,” and the objective for these species is “to initiate proactive conservation measures that reduce or eliminate threats . . . to minimize the likelihood of and need for listing of these species under the ESA.” BLM Special Status Species Management Manual 6840. To adhere to these requirements no exceptions to raptor TLS on an area-wide basis should be made.

X. SAGE-GROUSE

Operations conducted in connection with the Crossbow Project must comply with the applicable RMP. *See* Federal Land Policy and Management Act (FLPMA) § 302(a). The Buffalo RMP and the Casper RMP have been updated with new provisions regarding the management of the Greater sage-grouse that closely track the requirements set forth in the Governor’s Executive Order. However, due to the timing of the release of Governor Mead’s new EO 2015-4, the BLM’s revised/amended RMPs (September 2015) do not reflect the most up-to-date provisions,

⁵ U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp.

including revisions to core area boundaries that are specified in EO 2015-4. The Crossbow Project EIS should acknowledge that the new EO applies, and address it accordingly.

The Casper and Buffalo RMPs contain a number of new stipulations intended to protect sage-grouse. The BLM is well aware of these stipulations and its duty to conserve the Greater sage-grouse. Our comments highlight a few issues and areas of concern for consideration in the Crossbow Project EIS.

Exceptions, modifications and waivers of lease stipulations

As noted, the BLM's Greater sage-grouse conservation strategy contains multiple layers of protection for this sensitive species. These measures include, but are not limited to, limits on density and disturbance; 0.6 mile no surface occupancy (NSO) buffers around leks; protection for breeding, nesting and early brood rearing habitats; and protection for winter concentration areas and connectivity corridors. Any deviation (i.e., exception, modification or waiver) from the conservation measures set forth in the RMPs should be supported by scientifically-defensible environmental analysis and documentation, subject to public review and comment. Specifically, the Crossbow Project EIS should describe a process for processing exceptions, modifications and waivers that includes the following safeguards and checks and balances:

- 1) Any request for an exception, modification or waiver of a protective stipulation within a priority habitat management area (PHMA) should automatically be treated as "an issue of major concern to the public" and therefore be subject to a 30-day public review under 43 CFR § 3101.1-4. In addition, such requests should be reviewed by the Wyoming Sage-Grouse Implementation Team (SGIT).
- 2) All requests seeking an exception, modification or waiver should be reviewed by qualified personnel within the Wyoming Game and Fish Department (WGFD), including requests for modification of lease stipulations.
- 3) All approvals of exceptions, modifications or waivers of a stipulation should be reported quarterly to the BLM State Office, WGFD, and the SGIT.
- 4) A central, publically accessible database of final agency action taken on requests for exceptions, modifications or waivers should be maintained by the BLM or WGFD.

Noise Controls

The SGIT has established a subcommittee to investigate whether current policy expressed in BLM's updated RMPs and EO 2015-4 adequately protects the sage-grouse. The "9 Plan" states that "[s]pecific noise protocols for measurement and implementation will be developed as additional research and information emerges." See MD SSS 12 at 37. Based on a review of best available science, we believe that current noise stipulations are inadequate to protect the sage-grouse, and therefore submit herewith recommendations developed by leading researchers in the field. We ask that these recommendations be incorporated into applications for permit to drill (APD) and other land use authorizations as conditions of approval.

XI. THE BLM MUST REDUCE AIR POLLUTION FROM THE CROSSBOW PROJECT AND ENSURE COMPLIANCE WITH THE CLEAN AIR ACT

The BLM, Forest Service, and the EPA have entered into a memorandum of understanding (MOU) that guides the air quality impacts analysis in NEPA documents related to oil and natural gas development projects. The BLM should ensure careful compliance with this MOU as it moves forward with the Crossbow Project. For example, the MOU requires modeling of air quality impacts if a proposed action will cause a substantial increase in emissions or will materially contribute to potential adverse cumulative air quality impacts, and the project is in close proximity to a Class I area or an area where compliance with National Ambient Air Quality Standards is threatened. We believe that the terms of the MOU require careful, quantitative modeling of air quality impacts in the Crossbow Project area, and compliance with its other provisions.

The need for this careful analysis is highlighted not only by the 1,500 wells proposed in the Crossbow Project area, but also the 5,000 wells proposed in the adjacent Converse County Oil and Gas Project. It is well documented that high levels of oil and gas development are occurring in eastern Wyoming, and development in this area has become a dominant trend. Ozone levels in Laramie and Albany Counties have reached 67 parts per billion (ppb) and 68 ppb, respectively, only a couple of parts shy of the new 70 ppb National Ambient Air Quality Standard for ozone. It is well documented that oil and gas development is associated with high ozone levels in Wyoming. The EIS for the Crossbow Project and the ROD should put in place conditions of approval (COA) or best management practices (BMP) measures as necessary to mitigate emissions from oil and gas development.

Furthermore, the BLM should ensure compliance with the state of Wyoming's Chapter 6 Section 2 P-BACT guidance for oil and gas development activities. While in the past the provisions applicable in the "statewide" area, where the Crossbow Project is located, were the least stringent in the state, that is changing. As of January 1, 2016 the state will significantly improve the air pollution control requirements in the statewide area. There will be significantly improved requirements to reduce emissions from flashing, dehydration units, pneumatic pumps, pneumatic controllers, truck loading, well completions (green completions), produced water tanks, and from blowdown/venting. Although the state is not putting in place LDAR requirements in the statewide area at this time (LDAR requirements apply in the Upper Green River Basin), LDAR will likely be required in the statewide area in the near future. All of these P-BACT requirements will be in place before the Crossbow Project draft EIS is released, and the BLM should ensure full compliance with these provisions.

XII. THE BLM MUST ENSURE ADEQUATE INSPECTION OF OIL AND GAS WELLS

There were a number of press reports in 2014 documenting the BLM's failure to adequately inspect the oil and gas wells it permits for compliance with environmental and safety requirements. A Government Accountability Office report found 57 percent of "high priority" wells needing inspections at the drilling stage were not inspected during this stage of development. <http://www.gao.gov/products/GAO-14-238>. Between 2009 and 2012, 3,486 wells

were drilled on Federal and Indian lands, but many wells at high risk for pollution were not inspected. It is critical that inspections occur during well drilling, not subsequently, if potential environmental and safety problems are to be detected.

In fact, “Wyoming led the nation with the highest proportion of uninspected wells.” <http://www.motherjones.com/environment/2014/06/uninspected-oil-gas-wells-map>. As the map and chart in this report show, while Converse County had relatively few uninspected wells, adjacent Campbell, Natrona, and Johnson Counties had very high numbers of uninspected wells. During the period 2009 to 2012, 45 percent of new, high priority wells were not inspected in Wyoming.

The BLM should ensure that similar problems are not repeated as the 1,500 wells anticipated to be drilled in Crossbow Project area are developed. It must ensure that it has adequate personnel to accomplish these inspections. Lack of adequate staffing is the documented reason for the inadequate number of well inspections. If adequate staffing is not available to do timely inspections (i.e., during the well drilling stage), the pace of development in the Crossbow Project area should be adjusted accordingly.

XIII. THE BLM SHOULD ENSURE “DOING IT RIGHT” PRINCIPLES ARE APPLIED TO THE CROSSBOW PROJECT

Appendix 1 to these comments presents a report the Wyoming Outdoor Council developed that discusses numerous practices that can be required of oil and natural gas development projects to ensure the BLM and the operator are “doing it right” when it comes to oil and gas development. We ask the BLM to consider these doing it right principles and to require relevant provisions as BMPs, COAs, or stipulation requirements before approving development in the Crossbow Project area. This will help ensure important resources such as raptor nesting and foraging areas, sage-grouse habitat, and big game crucial winter ranges are protected. They will also help ensure human health and safety is protected. Compliance with these provisions will have the further benefit of helping to ensure compliance with the Department of the Interior Mitigation Strategy and the President’s Mitigation Memorandum.

XIV. CONCLUSION

We appreciate the BLM’s consideration of these scoping comments from the Wyoming Outdoor Council for the Greater Crossbow Oil and Gas Project environmental impact statement. We look forward to remaining engaged in this process.

Sincerely,



Bruce Pendery

Appendix 1

Doing it Right: Designing Oil and Gas Development Projects to Safeguard Wyoming's Outdoor Heritage

Wyoming Outdoor Council

Bruce Pendery and Lisa McGee

Wyoming has world-class energy resources and world-class natural resources. To ensure the Wyoming we love remains an incredible place to live and visit, the Wyoming Outdoor Council has established a balanced, two-pronged approach when it comes to energy development on public lands and federally owned minerals. There are some areas that are too valuable to our state for recreation, wildlife habitat, or other sustainable uses to risk losing to industrial development. These areas, which we often refer to as Heritage Landscapes, are places where development should not occur. You can see the Heritage Landscapes on our website at http://www.wyomingoutdoorcouncil.org/html/what_we_do/public_lands/heritage_landscapes.shtml.

In areas where energy development is not inappropriate, it should be “done right.” That means safeguards should be put in place to protect human health, our clear skies and clean water, open space, and wildlife habitat. This review deals with this second category of lands, lands where oil and gas development must be “done right.” These represent the majority of the public lands and federally owned minerals in Wyoming.

This report focuses on practices that are designed to minimize the impacts oil and gas development can have. Each project and every landscape is unique, and this report is not intended to be a one-size-fits-all set of recommendations. Because new technologies and better science are being developed every day, this report is a starting point. And because one practice or technique may be appropriate in some places, but not in others, permitting agencies must tailor project design features appropriately in order to ensure development is “done right” every time.

There are several stages that precede an oil and gas development proposal on public land and federally owned minerals. Although many of our “doing it right” suggestions focus on practices and strategies agencies can require, and companies can undertake, at the drilling stage, there are two prior opportunities to condition development, and both are also critically important.

Land and Resource Management Plans

On public lands and federally owned mineral estates, the first opportunity citizens have to ensure oil and gas development is “done right” is during the planning stage. Both the Bureau of Land Management (BLM) and the Forest Service are required by law to develop overarching plans that guide land management decisions. Known as resource management plans on BLM lands and forest plans on National Forest lands, these documents are revised every fifteen years or so. Within plan revision processes, the public is asked to weigh in about appropriate uses on

specific lands. An environmental impact statement, which considers a range of alternatives and the impacts associated with them, accompanies a land use plan.

Although BLM and National Forest lands are managed for multiple uses, not all uses can coexist on the same acreage. For this reason, plans designate areas suitable or unsuitable for certain types of uses. An area of crucial moose winter range for example, or a popular recreation area, may be unsuitable and eventually determined to be unavailable for future oil and gas development. If lands are made available for oil and gas development, various stipulations and conditions may be recommended for certain parcels within available lands.⁶ Depending on the values at stake, sometimes doing it right means not doing it at all.

Oil and Gas Leasing

Once lands are designated available for leasing, the BLM and the Forest Service may receive requests from interested companies or individuals to lease various parcels for oil and gas development.⁷ The agencies will consider whether to lease (or in the Forest Service's case whether to consent to have the BLM lease) the parcels. If the agencies decide to lease, there is opportunity to prepare additional environmental analysis. The agencies will also determine what stipulations to attach to the lease at that time. Stipulations define the basic terms of the lease contract. Many of the suggestions discussed below can be incorporated at the leasing stage in the form of no surface occupancy stipulations, stipulations that limit the times of the year companies can access certain areas, or stipulations that control surface use in other ways like creating buffers around sensitive areas. Stipulations are not the only terms or restrictions placed on a leaseholder; all federal oil and gas leases are issued "subject to" the terms and conditions of lease (which include significant environmental protection provisions) and all state and federal statutes, regulations, and other formal orders.

Drilling Stage

After public lands are leased, a company must file an Application for Permit to Drill (APD) that outlines its plans to drill and to disturb the surface. There is usually site-specific environmental analysis at this time, which can result in the addition of conditions of approval. These are additional terms a company must comply with in order to be granted permission to drill. This stage of the oil and gas development process, the drilling stage, is the focus of this report.

⁶ There is no mandate that the agencies must lease available lands. Plans are designed to be visionary, "big picture" documents that guide management actions; but they do not typically make final decisions themselves. However, it is most always the case that lands made unavailable for leasing within a plan will not be leased during the life of the plan. Agencies have the ability to amend plans if circumstances warrant. Further environmental analysis is needed to amend a plan.

⁷ The BLM has adopted guidance for how it will conduct oil and gas leasing. This Instruction Memorandum puts in place a number of requirements to ensure environmental protection prior to leasing. One of the most important provisions requires the development of "Master Leasing Plans" if certain requirements are met, and an MLP must consider a number of ways to reduce the impacts of oil and gas development, including not developing the area.

Many of the “doing it right” suggestions below can be added as conditions of approval at the APD stage or as stipulations during earlier stages when lands are leased. Listed below are suggested actions and technologies that if implemented have the potential to minimize threats to wildlife, air and water quality, and human health.⁸

Safeguarding Wyoming’s Wildlife

In Wyoming, we live in a place that still supports large, free-roaming wildlife populations. Wyoming’s wildlife is diverse and bountiful. Our outdoor heritage is rooted in our appreciation for wildlife, and the many opportunities we have to encounter wildlife. The Wyoming Outdoor Council’s goal is to ensure that if oil and gas development is authorized that it is conducted in a manner that safeguards wildlife to the greatest extent possible. Depending on the values at stake, sometimes doing it right might mean not leasing an area in the first place.

In addressing how best to conserve wildlife in places that are already leased and facing oil and gas development proposals, the Wyoming Game and Fish Department has developed recommendations, which are based on the following prioritized approach:

The approach recommended to protect and maintain important wildlife resources ... sets forth the following priority of actions: 1) avoid the impact; 2) minimize the impact through appropriate planning and management actions; 3) mitigate the impact by providing replacement or substitute resources; and 4) provide financial compensation only when no reasonable alternative is available to avoid, minimize or mitigate the impact.⁹

We support attempting to avoid the impacts in the first place and minimizing impacts through appropriate planning and management action. That is why the planning and leasing stages are so important. But there is also much that can be done to condition development at the drilling stage in order to mitigate impacts. The following are practices that agencies may require and/or companies may voluntarily adopt in order to safeguard wildlife.

- 1) Wildlife:
 - a. Collect species-specific baseline data:
 - i. Collect sufficient baseline data on all species of concern prior to development so that there is a full understanding of the species’ needs.
 - b. Reduce ground disturbance:
 - i. Maintain large tracts of undeveloped/roadless lands by clustering development/consolidating infrastructure;

⁸ Three additional sources of information about practices that can help reduce the impacts of oil and gas drilling are the University of Colorado’s website on oil and gas best management practices (BMPs), the EPA’s Natural Gas STAR Program website, and the Earthworks Oil and Gas Accountability Project’s website. These websites can be found at <http://www.oilandgasbmps.org/>, <http://www.epa.gov/gasstar/>, and <http://www.earthworksaction.org/bestpractices.cfm>.

⁹ Recommendations for Development of Oil and Gas Resources in Important Wildlife Habitats, Wyoming Game and Fish Department, Revised April 2010, at 4. This report can be found at <http://gf.state.wy.us/downloads/doc/O&G%20Recommendations%20April%202010%20with%20changes%20identified.pdf>.

- ii. Drill multiple wells per pad;
 - iii. Phase development, i.e., no new well pads until other pads are reclaimed in part or in full;
 - iv. Construct irregularly shaped/contoured well pads that blend with the landscape;
 - v. Require interim reclamation of pads after drilling is completed;
 - vi. Consider alternative access points to ensure minimal roadbuilding, or require road building in less sensitive areas;
 - vii. Gate single-purpose roads (i.e., new access roads) and close/reclaim all unnecessary roads;
 - viii. If an area is particularly sensitive (e.g., steep slopes, unstable soil, roadless, etc.) require helicopter access instead of new road construction;
 - ix. Require ancillary facilities (work camps, water treatment facilities, etc.) to be located off site in less sensitive areas.
- c. Avoid and/or provide adequate buffers for road or well pad construction in sensitive areas such as:
- i. Known migration/stopover habitat;
 - ii. Big game crucial winter range;
 - iii. Sage-grouse core areas;
 - iv. Critical habitat for Endangered Species Act listed species or other agency-recognized sensitive species;
 - v. Key parturition areas;
 - vi. Den sites;
 - vii. Raptor nests and foraging areas; and
 - viii. Wetland and riparian areas.
- d. Implement timing limitations:
- i. Prohibit access during key times of the year such as in parturition habitats, crucial wintering areas, denning sites, and migration/stopover times.
 - ii. To the extent possible, these timing limitations should be applied for the life of the project, not only during the drilling stage.
 - iii. Remote monitoring and/or shutting in wells for part of the year may be required.
 - iv. Timing of operations may be controlled and limited to periods of the day when wildlife are less active.
- e. Additional practices to minimize impacts to wildlife:
- i. Prohibit open reserve fluid pits in favor of closed loop systems;
 - ii. Install mufflers or noise reduction devices on compressor stations and other mechanical equipment;
 - iii. Require workers to carpool to reduce truck traffic;
 - iv. Install a centralized liquids gathering system to reduce truck traffic;
 - v. Require training of employees about respectful and safe wildlife practices;
 - vi. Prohibit workers from carrying firearms to prevent poaching;
 - vii. Restrict the use of lighting, to be used at night only, to periods when people are present on the site and as required by safety regulations;
 - viii. Bury pipelines and power lines.

- f. Monitoring, adaptive management and enforcement:
 - i. For species of concern, baseline data should be collected throughout the life of the project (drilling, production, and reclamation).
 - ii. Population thresholds or triggers should be established, and if met, pre-determined, specific management responses should be required.
 - iii. Clear consequences should be outlined and agreed to prior to drilling authorization if thresholds are exceeded. Consequences could include slowing the pace of development or disallowing new disturbances if warranted.
 - iv. Adequate oversight and an active presence by regulatory agencies are necessary to ensure all mitigation measures are being implemented.
- g. Mitigation:
 - i. Establish a mitigation plan for loss of habitat.
 - ii. Onsite mitigation is preferable to offsite mitigation.
- h. Reclamation:
 - i. Require interim (i.e., partial) reclamation of well pads as soon as possible.
 - ii. Require adequate bonding to ensure the protection of resources after the close of production.
 - iii. Clear standards should be set and enforced regarding the extent to which the surface area must be returned to its pre-development condition.
 - iv. Pre-disturbance ecological conditions should be reestablished.
 - v. Require the use of appropriate native plants for reseeded efforts.
 - vi. Monitor for several years after reseeded to determine whether reclamation was successful.

Protecting Wyoming's Air Quality

Historically Wyoming has enjoyed some of the cleanest air and clearest skies in the country. In fact, until recently, the air quality in Wyoming was said to be some of the best in the world—rivaling rural, mountainous countries like Tibet. In areas of the state with some of the most concentrated oil and gas developed, however, all of that has changed. The formerly clear skies and 100-mile mountaintop views from the Pinedale area are now often marred by haze. And, dangerous levels of ozone have been recorded, resulting in the state's recommendation to the Environmental Protection Agency (EPA) that some areas in the western part of the state are not in attainment of the national ambient air quality standards. In a 2009 technical report, the Air Quality Division of the Wyoming Department of Environmental Quality attributed high ozone levels in this part of the state to local oil and gas operations.¹⁰

The Wyoming Outdoor Council believes clean air and clear skies are essential components in keeping people in Wyoming healthy and providing for our high quality of life. State and federal agencies must do a better job of addressing air quality issues and ensuring air quality is something Wyoming can boast about again. Wyoming citizens should not have to

¹⁰ See <http://deq.state.wy.us/aqd/Ozone%20Main.asp> for access to this report and other information on high ozone levels in the Pinedale area.

sacrifice these values when there are practices and technologies agencies can require oil and gas companies to implement to ensure air quality is protected.

1) Air:

- a. Comply with existing laws, regulations and policies aimed to safeguard air quality:
 - i. In areas now facing violations of the Clean Air Act due to existing oil and gas development, it is reasonable to question whether new oil and gas drilling projects can and should be authorized.
 1. Denying or pacing development is an option within areas that are not meeting standards.
 - ii. In areas out of compliance with existing ozone standards, companies must adhere to Wyoming's state policy regarding offsets for nitrogen oxides (NOx) and volatile organic compounds (VOCs), precursors to the formation of ground-level ozone, a regulated air pollutant.
- b. Accept additional safeguards to protect human health:
 - i. There could be stricter standards for ozone or NOx and VOCs, or new regulations that may be designed to regulate all immobile oilfield equipment owned and/or operated by a single company as a single source.
 - ii. Companies should show a commitment to "doing it right."
- c. Conduct air quality monitoring and prepare modeling of future impacts:
 - i. Monitor existing air quality to establish baseline data before new projects are authorized.
 - ii. Modeling should be prepared to assess whether new development will be likely to violate existing laws and regulations that control pollution and protect visibility.
 1. Specific project design features should be incorporated within the modeling.
 - iii. As a condition of project approval, monitoring throughout the life of the project should be conducted and established thresholds or triggers should be set with tangible consequences if exceeded.
 1. This can mean adjusting the rate, timing and places of development.
 2. Project design features and best management practices may be refined accordingly.
- d. Adhere to BLM's "Best Management Practices" recommendations to protect air quality¹¹ and the Forest Service's techniques for reducing emissions from oil and gas activities.¹² These include:
 - i. Reducing tailpipe emissions and fugitive dust from truck traffic by:

¹¹ Many of the following recommendations come from BLM's May 9, 2011, Air Resource Best Management Practices for Fluid Mineral report at http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION_/bmps.Par.60203.File.dat/WO1_Air%20Resource_BMP_Slideshow%2005-09-2011.pdf.

¹² Emissions Reduction Techniques for Oil and Gas Activities. U. S. Forest Service. 2011. Available at <http://www.fs.fed.us/air/documents/EmissionReduction-072011x.pdf>.

1. Directional drilling.
 2. Centralized water storage and delivery.
 3. Centralized fracturing (fracking) pads with “hard line frac pipes” that can serve multiple wells.
 4. Off-site centralization of production.
 5. Use of liquids gathering systems.
 6. Remote monitoring and well automation.
 7. Carpooling workers in vans.
 8. Applying water to dirt roads.
 9. Applying chemicals to dirt roads.
 10. Lowering speed limits.
 11. Preventing dust by chip seal/asphalt.
- ii. Reducing emissions during the drilling stage by:
1. Requiring Tier 4 diesel drill rigs or the equivalent (e.g., natural gas or electric drill rigs).
 2. Prohibiting venting and flaring of gases during drilling stage and requiring “green completions” to recapture emissions.
- iii. Reducing emissions during the production stage by:
1. Installing chemical pumps rather than pneumatic pumps.
 2. Monitoring of wells with remote telemetry.
 3. Using electricity, rather than diesel engines, to power compressor stations if the presence of overhead power lines doesn’t pose a threat to wildlife or visual resources.
 4. Updating seals, hatches, and valves to minimize VOC fugitive emissions.
 5. Requiring the use of enclosed tanks rather than open pits to contain fugitive VOC emissions.
 6. Using “vapor recovery units” on oil, condensate, and produced water tanks to reduce fugitive VOC emissions.
 7. Optimizing glycol circulation in dehydrators to reduce methane emissions.
 8. Capture and recycle methane by installing “flash tank separators.”¹³
 9. Use “selective catalytic reduction” technology in compressor (and drill rig) engines.
 10. Replace “wet seals” with “dry seals” in centrifugal compressors.
 11. Replace compressor rod packing at frequent intervals.
 12. Replace “high-bleed” pneumatic devices with “low-bleed” devices and install retrofit bleed reduction kits on high bleed devices.

¹³ For additional technical methods to reduce methane emissions see *Cost Effective Methane Emissions Reductions for Small and Midsize Natural Gas Producers*, Roger Fernandez, et al. published in the June 2005 issue of the *Journal of Petroleum Technology*. The report can be found at: <http://www.oilandgasbmps.org/docs/GEN07-Cost-EffectiveMethaneEmissionsReductionsforSmallandMidsizeNaturalGasProducers.pdf>.

13. Install “plunger lift systems” and “automated systems” in gas wells.
- iv. Monitoring at the well head:
 1. Implement a “directed inspection and maintenance” and “infrared leak detection” program.
 - Leaks can be detected with infrared cameras, organic vapor analyzers, soap solutions, and ultrasonic leak detectors.
 - Leaks can be measured using calibrated bagging, rotameters, and high volume samplers.
- e. Adhere to Wyoming Department of Environmental Quality (DEQ) best available control technology (BACT) requirements for oil and gas development¹⁴ and the offsets policy for ozone precursor emissions.¹⁵ These provisions include:
 - i. 98 percent control of emissions from tank flashing, dehydration units, pneumatic pumps, and produced water tanks in the Jonah/Pinedale Anticline Development Area (JPDA).
 - ii. Additional controls in the JPDA for pneumatic controllers, well completions, blow downs/venting, and truck loading.
 - iii. Similar controls are applicable in other parts of the state, especially in Concentrated Development Areas in the southwest quarter of the state.
 - iv. Offsetting increases in NO_x emissions at a 1.1:1 ratio and increases in VOC emissions at a 1.5:1 ratio in Sublette County.

Safeguarding Wyoming’s Clean Water and Protecting Water Reserves

Clean and abundant water is essential for the health of Wyoming residents, for our fish and wildlife populations, and for agricultural production. Oil and gas development can threaten the quality of surface waters and groundwater in several ways. Water contamination can occur through direct spills, leaking pits and tanks coupled with stormwater runoff, erosion and sedimentation, well blow-outs or underground migration of fluids and gases during drilling, and hydraulic fracturing (“fracking”) operations. Although the stated goal in all development proposals is that contamination should not occur, human error and technical failure is not uncommon. For this reason, adherence to the highest operational standards is critical to prevent and remedy these serious problems.

Oil and gas development also requires vast quantities of water, and in the case of coalbed methane development, millions of gallons of groundwater are brought to the surface as a consequence of extracting natural gas. Depletion of aquifers is a concern to nearby landowners, whose water wells may be drawn down. In addition, the disposal of such large amounts of often salty water into streambeds can negatively affect water quality, fish and amphibians, and vegetation. Careful planning and siting as well as proper disposal methods for produced water should be incorporated into any oil and gas development proposal.

¹⁴ The DEQ’s BACT requirements are available at <http://deq.state.wy.us/aqd/oilgas.asp>.

¹⁵ The offsets policy is available at <http://deq.state.wy.us/aqd/Ozone%20NSR%20Policy.asp>.

1) Water:

- a. Comply with existing laws, regulations and policies aimed to safeguard water quality:
 - i. Adhere to voluntary agreements not to use diesel fuel in fracking fluids.¹⁶
 - ii. Support proposed regulation of all injections of fracking fluids under safe drinking water law designed to protect underground sources of drinking water.
 - iii. Comply with the Wyoming Oil and Gas Conservation Commission's regulations regarding disclosure of fluids used in fracking.
 - iv. Rules regarding stormwater runoff and any needed Clean Water Act permitting should be adhered to.
- b. Information gathering:
 - i. Conduct groundwater/aquifer characterization, including areas (residential wells, springs, recharge areas) potentially affected within and down gradient of the project area.
 - ii. Based on characterization results:
 1. Groundwater modeling will be used to adjust drilling based on projected impacts to springs, surface water, and groundwater.
 2. Groundwater monitoring wells will be established.
 3. Pre-drilling groundwater sampling in key aquifers will be conducted to establish a baseline.
 4. Limits will be established on the number of supply water wells that will be drilled. Locations and depths will be based on the groundwater characterization study and will inform the decision regarding concentration of facilities/footprint.
 5. Provide nearby property owners with information prior to development identifying the recommended water testing parameters/constituents for their private wells, to assist in their water quantity and quality baseline testing, if they so choose.
 - A Water Well Mitigation Agreement should be offered to owners of wells and springs that could potentially be affected by drilling operations.¹⁷
 6. Develop a groundwater pollution prevention and monitoring plan to be implemented during the life of the project through an agency-community team and with public review and comment.
 7. Monitor water wells throughout the life of the project.
 - iii. Acquire baseline data for surface water quality:
 1. Map wetlands, flood plains and riparian areas and include classification of streams and flows.

¹⁶ One such agreement can be found at http://www.epa.gov/ogwdw000/uic/pdfs/moa_uic_hyd-fract.pdf.

¹⁷ See Coalbed Methane Best Management Practices: A Handbook at 13, Western Governors' Association April 2006 at http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION_energy/oil_and_gas.Par.1132.File.dat/CoalBedMethane_WGA_2006.pdf.

2. As a result of the mapping,
 - Test surface water quality in any streams in the project area prior to any development.
 - Establish a storm water pollution prevention plan for construction, with runoff and erosion controls factored in. Adhere to best management practices in the plan.
 - Monitor surface water quality for the life of the project.
- iv. Public disclosure of chemicals used:
 1. Require full disclosure of all chemicals (using CAS numbers for identification) used in drilling and fracking operations.
 - Include disclosure of the ingredients,
 - Disclosure of the proportions of chemicals (i.e. the “formula”),
 - Made a certain length of time before fracturing operations are scheduled to begin (e.g., 90 days advance notice), and
 - Do not accept trade secret exemptions to the disclosure requirement.
 - * Or, if trade secret exemptions are made, allow disclosure of trade secrets to regulatory agencies and to health care professionals (whenever exposure has occurred) on as as-needed basis.
 - Require notification to affected landowners where drilling/fracking is scheduled to occur.
- v. Project design features that can safeguard water resources:
 1. Apply NSO stipulations (or don't lease areas) that overlie sole source aquifers or other important sources of drinking water.
 2. Require well pads to be sufficiently setback from all streams, riparian areas, wetlands, springs, groundwater wells and homes.
 - At least a 1/2 mile, or possibly 1-mile.
 3. Require back flow prevention devices to be installed and used on all water supply wells and locked to prevent unauthorized use.
 4. No open pits whatsoever should be allowed in favor of tanks and a closed loop system.
 5. All wastes should be gathered and disposed of in proper locations off-site.
 6. In coalbed methane production, produced water should be re-injected into the same aquifer or formation (or into an aquifer or formation of equal or lesser quality) to prevent degrading higher water quality and prevent surface water degradation.
 7. Development should be prohibited in areas of steep slopes or unstable soils.
 8. Require good well integrity.
 - Properly case, plug and abandon all wells no longer in use.
 - Properly case and screen all wells that are in current use.

- Ensure that all water wells have good well integrity from top to bottom, to insure that excursions of fluids into those wells from other pressurized wells will not occur.

Supporting Communities and Our Small Town Quality of Life

In Wyoming, we treasure our small towns and safe, livable communities. An influx of temporary, non-resident workers—characteristic of oil and gas development—can have significant impacts on communities. Many towns around the state are experiencing increased crime and traffic, high housing costs, impacts to county and town roads and other infrastructure as well as overloaded services as a result of increased oil and gas development. Housing and non-energy related workforce shortages can be severe.

Although there is no easy solution to the societal consequences of oil and gas development, careful pacing of leasing and drilling may alleviate some of the adverse realities associated with a “boom and bust” economy. Phased development and proper long-range planning can help ensure that economic benefits of oil and gas development are realized into the future, not only for a short time. Special funding may also be required to maintain adequate social services, like law enforcement, medical clinics, and schools.

Special issues with Split Estate Lands

In Wyoming approximately 12.9 million acres of privately owned land (48 percent of all private land in Wyoming) is “split estate.” This means that the federal government owns and controls the minerals underlying a piece of ground while a private landowner, often a farmer or rancher, controls the surface. The federal government can and does lease many of these split estate lands for oil and gas development. Obviously this creates important and difficult land management issues.

While this more complicated legal situation comes into play when there is a split estate, the BLM is still permitted and even obligated to protect surface resources on a split estate when it approves oil and gas drilling. If there are sage-grouse leks, or crucial big winter ranges, or sensitive aquatic resources, the agency must still take steps to protect these resources. That is, the “doing it right” provisions listed above can and should be applied to split estates as a condition of federal approval for drilling operations.

That said, a surface owner of split estate lands has special rights and a special role. Generally speaking the oil and gas operating company must demonstrate it has arrived at a surface owner agreement, received a waiver from the surface owner for access to the leased lands, arrived at a compensation agreement for damages to crops or tangible improvements, or in lieu thereof, the BLM can ensure an adequate bond is posted, as required by the Stock Raising Homestead Act, which is the law that governs operations on many split estates. Moreover, the surface owner is entitled to participate in on-site visits to the proposed drilling location, and this affords the landowner an opportunity to have input regarding surface use protection provisions and reclamation specifications. The BLM is sensitive to this landowner input. The surface owner

of a split estate has a special opportunity to ensure oil and gas development is “done right” on his or her property.

Wyoming has a law that affords split estate owners additional rights. This law, the Wyoming Surface Owner Accommodation Act, W.S. § 30-5-401 *et seq.*, provides that:

- 30 days notice must be given prior to obtaining access to private lands to allow for negotiations that allow activities with the least impact.
- Requires fair compensation to landowners for economic losses, including lost land value.
- Requires oil and gas companies to negotiate with landowners to plan oil and gas activities that could affect their lands, including placement of roads, pipelines, well sites, traffic patterns, etc.
- Where agreement cannot be reached, provisions for bonding are provided.

This law opens up additional opportunities to ensure oil and gas development is “done right” on privately owned surface lands. The BLM should commit to abiding by this Wyoming law.

Conclusion

If the above practices and procedures were fully applied, oil and gas development could occur in many areas of Wyoming, and in a way that makes the social and environmental impact of this activity acceptable to many citizens. Consequently, the BLM and the Forest Service should require and fully implement these practices.¹⁸ Requiring these procedures is a means to not only ensure needed environmental protections, but also to maintain support for oil and natural gas development, and the oil and gas industry, among the citizens of Wyoming.

¹⁸ Staff at the Wyoming Outdoor Council have developed a report that outlines the rights the agencies have to require these measures, and in fact their obligation to require them. See Bruce M. Pendery, *BLM's Retained Rights: How Requiring Environmental Protection Fulfills Oil and Gas Lease Obligations*, 40 ENVTL. L. 599 (2010). Available at: http://law.lclark.edu/law_reviews/environmental_law/past_issues/volume_40/40-2.php.

RESEARCH

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Air concentrations of volatile compounds near oil and gas production: a community-based exploratory study

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Abstract

Background: Horizontal drilling, hydraulic fracturing, and other drilling and well stimulation technologies are now used widely in the United States and increasingly in other countries. They enable increases in oil and gas production, but there has been inadequate attention to human health impacts. Air quality near oil and gas operations is an underexplored human health concern for five reasons: (1) prior focus on threats to water quality; (2) an evolving understanding of contributions of certain oil and gas production processes to air quality; (3) limited state air quality monitoring networks; (4) significant variability in air emissions and concentrations; and (5) air quality research that misses impacts important to residents. Preliminary research suggests that volatile compounds, including hazardous air pollutants, are of potential concern. This study differs from prior research in its use of a community-based process to identify sampling locations. Through this approach, we determine concentrations of volatile compounds in air near operations that reflect community concerns and point to the need for more fine-grained and frequent monitoring at points along the production life cycle.

Methods: Grab and passive air samples were collected by trained volunteers at locations identified through systematic observation of industrial operations and air impacts over the course of resident daily routines. A total of 75 volatile organics were measured using EPA Method TO-15 or TO-3 by gas chromatography/mass spectrometry. Formaldehyde levels were determined using UME_x 100 Passive Samplers.

Results: Levels of eight volatile chemicals exceeded federal guidelines under several operational circumstances. Benzene, formaldehyde, and hydrogen sulfide were the most common compounds to exceed acute and other health-based risk levels.

Conclusions: Air concentrations of potentially dangerous compounds and chemical mixtures are frequently present near oil and gas production sites. Community-based research can provide an important supplement to state air quality monitoring programs.

Keywords: Benzene, Community monitoring, Formaldehyde, Grab and passive samples, Hydraulic fracturing, Hydrogen sulfide, Oil and gas

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Background

New drilling and well stimulation technologies have led to dramatic shifts in the energy market. The Energy Information Administration forecasts that by the 2030s, the United States will become a net exporter of petroleum liquids such as shale oil [1]. Already an exporter of natural gas, the U.S. will retrieve nearly half of its gas from shale formations by that time [2]. Reserves such as shale oil and gas are referred to as “unconventional” because fuels within them do not readily flow to the surface [3]. Instead, they are distributed among tight sandstone, shale, and other geologic strata. Intensive practices are used to retrieve them, such as directional drilling (many kilometres underground and one or more kilometres horizontally through a formation) and hydraulic fracturing to break up the formation and ensure movement through source rock (using millions of gallons of water mixed with chemicals and sand, or “proppants”) [4]. These technologies present public health challenges, including threats to air quality [5-7].

Unconventional oil and gas (hereinafter “UOG”) development and production involve multiple sources of physical stressors (e.g., noise, light, and vibrations) [6], toxicants (e.g., benzene, constituents in drilling and hydraulic fracturing fluids) [8], and radiological materials (e.g., technologically-enhanced, naturally-occurring radioactive material) [9], including air emissions [10,11]. Air quality near UOG sites is an underexplored human health concern for several reasons. For a time, environmental scientists and regulators were primarily interested in potential impacts to surface and groundwater quality. High-profile impacts and the subsurface nature of technologies (e.g., hydraulic fracturing) encouraged this research trajectory [12]. This was true despite the fact that UOG development brings to the surface, in the case of natural gas, methane (78.3%), non-methane hydrocarbons (17.8%), nitrogen (1.8%), carbon dioxide (1.5%), and hydrogen sulfide (0.5%) [13]. These constituents, as well as emissions from combustion processes at the surface, are released to the air throughout the life cycle of a productive well [14].

Air emissions from UOG operations have been generally understood for some time – volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and criteria air pollutants such as NO_x and PM_{2.5} can be released at the wellhead, in controlled burns (flaring), from produced water storage pits and tanks, and by diesel-powered equipment and trucks, among other sources [15]. Yet the full range of emissions from drilling, well completion, and other activities remains elusive. New source categories are discovered, emissions from life cycle stages such as transmission and well abandonment have yet to be determined, and even stages such as drilling continue to present uncertainty [16]. We do not understand the extent of drilling-related

air emissions as pockets of methane, propane, and other constituents in the subsurface are disturbed and released to the atmosphere [17]. Emissions measurements during flowback vary by orders of magnitude [18]. These and other data gaps limit the accuracy of state and federal emissions inventories, which compile and track known emissions sources. Inventories are also limited by self-reporting and data collection, and rely in some cases on outmoded emissions factors [15]. Flawed inventories constrain human health risk assessment and other research [7] and slow the identification of phenomena such as photochemical ozone production during winter months [19].

State pollution monitoring networks also constrain research on the air impacts of UOG development. Historically, air quality monitoring targeted urban areas, and criteria air pollutants such as particulate matter and ozone precursors were the primary chemicals of concern [10]. Monitoring stations were designed to ensure compliance with National Ambient Air Quality Standards (NAAQS) for a half-dozen pollutants. Even networks that focus on oil and gas emissions, such as one operated by public health officials in Garfield County, Colorado, do not target individual well pads. The Garfield County network encompasses five sites to monitor a suite of VOCs and (at three sites) particulate matter, in a jurisdiction that covers nearly 3,000 square miles of complex terrain [20]. The Texas Commission on Environmental Quality has arguably the most extensive monitoring network for UOG air emissions in oil and gas regions. Its monitors were sited to minimize urban source impacts and target locations where the public might be exposed to air emissions [21]. Still, its networks can be sparse; there are five permanent monitoring stations in the Eagle Ford Shale region, where 7,000 oil and gas wells have been drilled since 2008 [22]. These and other limited networks potentially mask local hot spots, the effects of unique topography, and fugitive emissions at certain well pads.

Even a denser monitoring network taking continuous samples may be unable to capture the full range of air impacts of UOG operations. Sources of variability of air emissions and concentrations of VOCs and other pollutants near UOG sites include: (1) the spatial variability of UOG operations; (2) the discontinuous use of equipment such as diesel trucks, glycol dehydrators, separators, and compressors during preparation, drilling, hydraulic fracturing, well completion, and other stages; (3) the composition of shale and other formations and the specific constituents of the drilling and hydraulic fracturing fluids used on-site (which can influence the makeup of produced or flowback water stored in pits and tanks); (4) intermittent emissions from venting, flaring, and leaks; (5) the shifting location, spacing, and intensity of well pads in response to market conditions,

improvements in technology, and regulatory changes; (6) the effects of wind, complex terrain, and microclimates; and (7) considerable differences among states in permitting, leak detection and repair, and other requirements [10,16,23-25]. Wind, for example, can influence outdoor and indoor concentrations of air pollutants. Brown et al. found that local air movement and mixing depth contribute to peak exposure to VOCs one mile from a compressor station [25]. Colborn et al. noted the role of wind and topography in higher VOC concentrations during winter months, when inversions trap air near ground level [10]. Fuller et al. identified wind speed and wind direction as significant predictors of indoor particulate matter levels near highways [26]. Similar variation can be found within and across geologic formations. Unconventional wells in the Barnett Shale play, for example, differ considerably in terms of reservoir quality, production rates, and recoverable gas [27]. Domestic shale gas plays exhibit even greater diversity, including depth and thickness of recoverable resources, the amount and range of chemicals present in produced water, and the presence of constituents such as bromide, naturally occurring radioactive material, hydrogen sulfide, and other toxic elements [23,28].

These and other sources of variability, and the adaptive drilling and well completion techniques they encourage, complicate the design of setback and well spacing rules that are protective of the public. They also explain why air quality studies carried out in UOG regions yield conflicting results. For example, McKenzie et al. [11] found greater cumulative cancer risks and higher non-cancer hazard indices for residents living less than 0.5 miles from certain well pads in Colorado, while Bunch et al. [21] analyzed data from monitors focused on regional atmospheric concentrations in the Barnett Shale region and found no exceedance of health-based comparison values. Colborn et al. [10] gathered weekly, 24-hour samples 0.7 miles from a well pad in Garfield County, and noted a "great deal of variability across sampling dates in the numbers and concentrations of chemicals detected." Eapi et al. [29] found substantial variation in fenceline concentrations of methane and hydrogen sulfide, which could not be explained by production volume, number of wells, or condensate volume at natural gas development sites.

Institutional factors also influence research on ambient air quality near UOG sites. Congressional exemption of oil and gas operations from provisions of the Clean Air Act, Clean Water Act, Safe Drinking Water Act, Emergency Planning and Community Right-to-Know Act, and other statutes limits data collection on the impacts of oil and gas development [30,31]. In addition, the peer-reviewed literature is divided between "top-down" and "bottom-up" treatments of air quality. The first set of studies explores the impact of UOG operations on regional air quality, with a

concern for methane emissions and ozone precursors in regions such as the Green River Basin in Wyoming [32], the Uintah Basin in northeastern Utah [33], and the Denver-Julesburg Basin, home of the Wattenberg Field in northeastern Colorado [34]. These studies rely on airborne and tower measurements, and are at times supplemented by ground measurements such as mobile monitoring.

For example, Petron et al. [35] found a strong alkane signature downwind from the Denver-Julesburg Basin, based on samples taken at a 300-m tall tower (the National Oceanic and Atmospheric Administration Boulder Atmospheric Observatory) and a mobile monitoring unit. In the Uintah Basin, where winter ozone levels exceeded the NAAQS 68 times in 2010, Helmig et al. [36] carried out vertical profiling of ozone precursors at a tower at the northern edge of a gas field. They found levels of atmospheric alkanes during temperature inversion events in 2013 that were 200–300 times greater than regional background. These and other "top-down" studies are also used to estimate methane leakage, which is helpful in comparing the climate-forcing impact of UOG to the use of coal-fired power plants. Loss rate estimates for methane and other hydrocarbons vary considerably by study, from 17% [37] (Los Angeles Basin) to 8.9% [38] (Uintah Basin) (6.2-11.7%, 95% C.I.) to 4% [35] (Denver-Julesburg Basin) (2.3-7.7%, 95% C.I.). A number of studies share the finding that EPA underestimates methane leakage rates across the life cycle (their estimate was 1.65% in 2013) [16], but others, extrapolating from emissions factors and/or direct measurement, produce estimates as low as 0.42% [18]. None of these studies attempts to characterize air concentrations within residential or publicly-accessible areas near UOG operations.

Other studies follow a "bottom-up" approach to air quality, which is limited by access to well pads and other infrastructure, the availability of a power source for monitoring equipment, the stage of operation underway, scheduled or unscheduled flashing, flaring, and fugitive releases, or movement of truck traffic and equipment at or near a well pad during a given sampling period. Thus, bottom-up studies vary in terms of distance to site, sample frequency, and chemicals targeted. This helps explain the range of findings in the published literature. Nevertheless, existing research gives support to resident reports of acute and long-term health symptoms and other reductions in quality of life. Even as they offer conflicting evidence of the relative importance of one stage of production or another to air emissions [10,11], or differ in their ultimate conclusion regarding the existence [10,11,14,35,36,39] or lack [21,40,41] of human health threats from air emissions, they find VOC concentrations in ambient air considerable distances from well pads, including in residential areas and public spaces.

The research questions that guide existing studies create a final barrier to our ability to characterize air emissions in UOG regions. Top-down studies are motivated by questions such as identifying sources of regional nonattainment of ozone standards, or estimating methane and other hydrocarbon leakage rates from UOG operations. Bottom-up research gathers data from one or a limited number of well pads, chosen for reasons such as access or cooperation by owners and operators. The data are used to discuss general exposure conditions for an often-hypothetical community, or used to derive a risk factor. In either mode of study, resident exposure does not directly motivate the sampling protocol. Rather, it is considered obliquely in a study's choice of sample location (e.g., a one that is "near a small community"), assumed in measurements of concentrations within a certain distance of UOG activity, or ignored. What are missing from these studies are protocols grounded in a community's experience of air quality impacts of UOG operations.

Our multi-state air quality monitoring study uses a community-based, participatory research (CBPR) design to explore conditions near UOG operations [42]. Its sampling protocol is based not on access to a well pad, data needs conditioned by an existing averaging standard, or regional policy concerns. Rather, we partnered with residents in UOG regions to measure air quality under circumstances that, given local knowledge of operations (e.g., emissions from particular equipment or intermittent practices) gained through daily routines (e.g., regular observation of well pads) and use of public and private spaces nearby (e.g., livestock movement, farming) were viewed by community members as potential threats to human health. Existing studies often lack a data set suitable for statistical analysis. When such analyses are occasionally imposed on bottom-up data sets, they explain only a fraction of the variance in air quality outcomes. For example, the highest R^2 values in a study of 66 sites, which, due to the study's broad spatial range was limited to measurements of methane and hydrogen sulfide, were 0.26 (H_2S concentration vs. condensate volume nearby) and 0.17 (H_2S and number of wells nearby) [29]. CBPR studies, by comparison, are place-based – they begin with the experience of a population in order to identify environmental stressors and explore the heterogeneity of circumstances under which they arise [43,44]. Rather than discount these circumstances for lack of statistical power, they can be used to define the scope of confirmatory studies, tailor air quality monitoring networks and studies, or suggest novel pollution control measures and best management practices.

Methods

We explore air quality at a previously neglected scale: near a range of UOG development and production sites

that are the focus of community concern. Residents conducted sampling in response to operational conditions, odor events, and a history of the onset of acute symptoms. Residents selected sampling sites after they completed a training program run by Global Community Monitor (GCM), an organization that has developed and modified community-based sampling protocols for more than twenty years. Sampling is designed to obtain accurate readings of public exposure near UOG development in the part-per-billion range [45]. Training sessions followed a written manual on proper sampling protocol and included instruction by experienced members of GCM in a classroom setting for five hours. In addition, samplers were trained in the field to properly demonstrate Quality Assurance/Quality Control (QA/QC) methods, such as use of data sheets and chain of custody records, sampling procedures including not taking samples in the presence of vehicle traffic or other sources of VOCs, and protocols for storage and delivery to an analytic laboratory [45]. Chain of Custody forms provided by the laboratory were explained and filled out in exercises in which each sampler participated. The trainings for community-based air sampling and related QA/QC measures were developed in conjunction with the Environmental Protection Agency under the federal Environmental Monitoring for Public Access and Community Tracking (EMPACT) program, and refined in cooperation with agencies including the Health Services Department of Contra Costa County, California and the Delaware Department of Natural Resources [46,47]. Any sample that did not meet QA/QC criteria was not included in the final data set.

Community monitors gauged industrial activity using field log sheets ("pollution logs") that allow each resident to record what they see, hear, feel, smell, and taste in areas downwind of industrial activity as they go about their daily routines. Each community monitor participated voluntarily in data collection for this study. They provided consent to use data gathered with questionnaires that they co-designed as well as grab and passive samplers. Residents documented activity including: (a) visible emissions drifting off-site; (b) odors that appear to derive from a site; (c) acute health symptoms that occur while in proximity to a site or during a specific industrial activity; (d) audible sounds of particular equipment in use within the boundaries of an operating well pad or related infrastructure; and (e) visible activity on-site, including the number and types of heavy trucks and tanks, vehicle traffic, workers present and job categories, and physical changes such as noise and vibrations near certain equipment. Similar to a neighborhood police watch, each resident determined locations that they would continue to observe and potentially return to for sampling.

Sampling for volatile compounds other than formaldehyde was carried out using methods described in

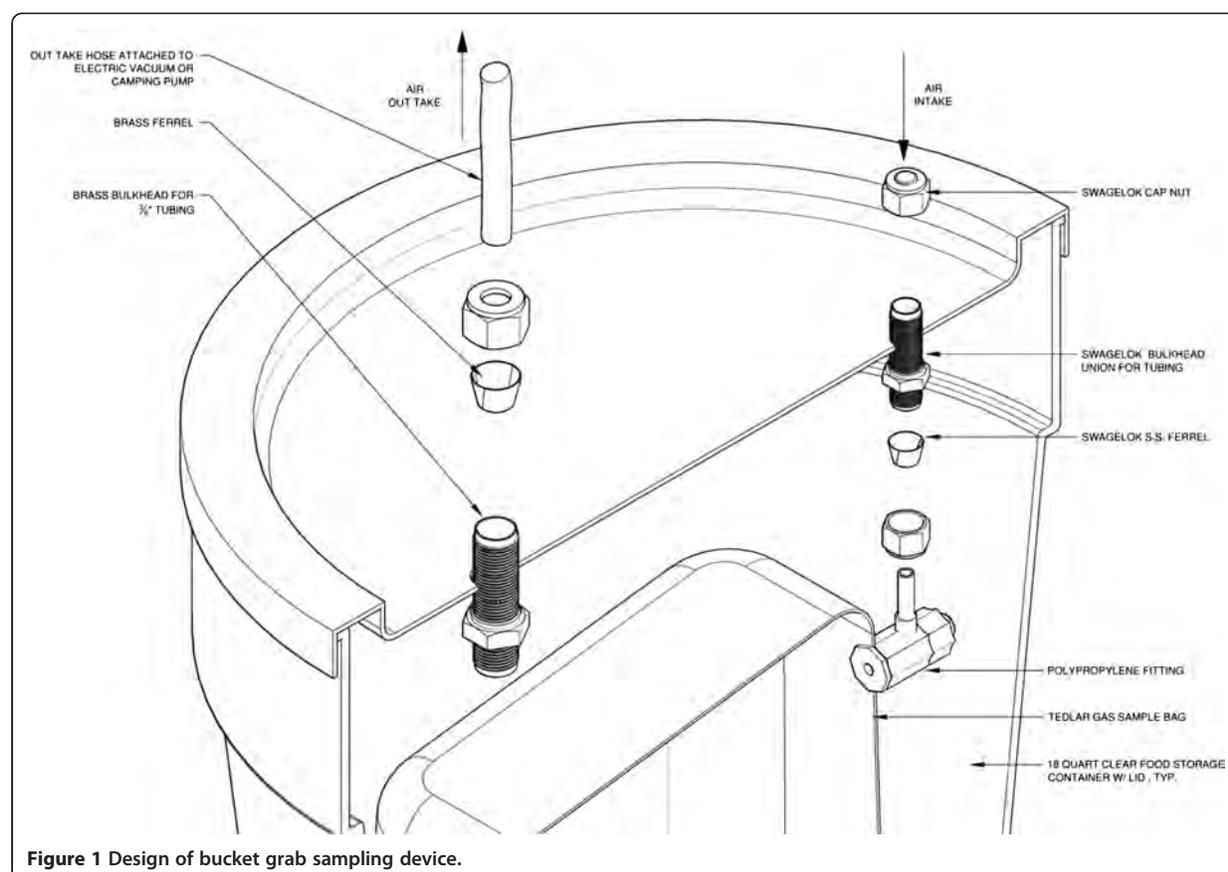
O'Rourke and Macey [48] and Larson et al. [49] using an evacuated sampling ("bucket") vessel modelled after the Summa canister [50]. The bucket is inexpensive, portable, and consists of a 10-liter Tedlar bag and vacuum to take a grab sample of air for two to three minutes (Figure 1). Air is collected using a battery-operated pump that forces air out of the bucket. Negative pressure created inside the sealed bucket by the external vacuum pump opens the bag when a stainless steel bulkhead is opened. After taking the sample, the Tedlar bag is sealed and sent to an analytical laboratory. The bucket sampler operates on the same principle that Summa canisters employ. Rather than collect a sample in a stainless steel can, the bucket contains a special bag made of Tedlar to hold the sample. Bags are obtained from the laboratory that processes the sample and purged three times with pure nitrogen by the laboratory prior to use. GCM's founder developed the sampling program under a project for Communities for a Better Environment, a non-profit organization founded in 1978 that provides legal, scientific, and technical assistance to heavily polluted communities. The device has been subjected to numerous validation tests organized by government agencies and independent laboratories [51-54].

Refinements include the use of field duplicates, which demonstrate no significant variation in results across comparison studies [45].

Residents collected 35 grab samples at locations of community concern, under conditions that would lead them to register a complaint with relevant authorities such as a county public health department or state oil and gas commission. Health symptoms contributed to the decision to take a grab sample on 29 occasions. The most common symptoms reported by samplers were headaches (17 reports), dizziness or light-headedness (13 reports), irritated, burning, or running nose (12 reports), nausea (11 reports), and sore or irritated throat (11 reports). Further details regarding each sample are provided in Additional file 1 (Tables S1 through S5).

In addition to grab samples, 41 formaldehyde badges were deployed in the five states targeting production facilities and compressor stations based on the results of pollution patrols. UME_x100 Passive Samplers for Formaldehyde are manufactured by SKC Inc. Samplers were placed near operating compressor stations and production facilities for a minimum of eight hours.

Samples were ultimately collected near production pads, compressor stations, condensate tank farms, gas



processing stations, and wastewater and produced water impoundments in five states (Arkansas, Colorado, Ohio, Pennsylvania, and Wyoming). The states were chosen to reflect a diverse range of urban and rural communities, operations (e.g., number of wells permitted and developed), history of development, and stages of production (see Table 1).

Air samples were analyzed for 75 volatile organic compounds (VOCs), including benzene, ethylbenzene, acrylonitrile, methylene chloride, toluene, hexane, heptane, and xylene by ALS Laboratories (Simi Valley, CA 93065) using EPA Method TO-15 or TO-3 (methane) by gas chromatograph/mass spectrometer interface to a whole air preconcentrator. Formaldehyde samples were analyzed using EPA Method TO-11A, modified for the sampling device by high performance liquid chromatography with UV detection. Samples were also analyzed for 20 sulfur compounds by ASTM D 5504–08 using a gas chromatograph equipped with a sulfur chemiluminescence detector. All compounds with the exception of hydrogen sulfide and carbonyl sulfide were quantitated against the initial calibration curve for methyl mercaptan. Chemicals of concern were compared to U.S. Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels (MRLs) and EPA Integrated Risk Information System (IRIS) cancer risk levels. MRLs are estimates of daily human exposure that can occur without appreciable risk of human health effects. They are derived for acute (1–14 days), intermediate (15–364 days), or chronic (365 days or longer) periods of exposure. The laboratory is certified by ten state departments of health or environment, the American Industrial Hygiene Association, and the U.S. Department of Defense.

Results

Table 1 shows the diverse range of operation, including number of wells permitted and developed and setbacks from housing and other occupied structures, in UOG regions where grab and passive air samples were collected through partnership with community-based organizations.

Air contaminants

We identified unique chemical mixtures at each sample location (see Tables S1 through S5 in Additional file 1). In addition, we identified eight volatile compounds at concentrations that exceeded ATSDR minimal risk levels (MRLs) or EPA Integrated Risk Information System (IRIS) cancer risk levels (see Table 2). Although our samples represent a single point in time, we compared concentrations to acute as well as chronic risk levels as many of the activities that generate volatile compounds near UOG operations are long-duration (the life cycle of an unconventional natural gas well can span several decades) [16]. Residents chose sample locations where

odors and symptoms were the “norm” for the area, not a one-time event. In addition, a growing body of research suggests that peak (e.g., 1-hr. maximum), rather than average exposure to air emissions may better capture certain risks to human health [55–57].

Sixteen of the 35 grab samples, and 14 of the 41 passive samples, had concentrations of volatiles that exceeded ATSDR and/or EPA IRIS levels. ATSDR MRLs and EPA IRIS levels for chemicals of concern are provided in Table 2. The chemicals that most commonly exceeded these levels were hydrogen sulfide, formaldehyde, and benzene. Background levels for these chemicals are 0.15 $\mu\text{g}/\text{m}^3$ for hydrogen sulfide, 0.25 $\mu\text{g}/\text{m}^3$ for formaldehyde, and 0.15 $\mu\text{g}/\text{m}^3$ for benzene [58–60]. Our samples that exceeded health-based risk levels were 90–66,000 \times background levels for hydrogen sulfide, 30–240 \times background levels for formaldehyde, and 35–770,000 \times background levels for benzene. Details of our results are presented in Tables 3, 4, and 5 and in Figures 2, 3, and 4 (greater detail is provided in Additional file 1). A state-by-state summary follows.

Wyoming (Park County)

Nine of the ten grab samples contained volatiles above ATSDR MRLs or EPA IRIS risk levels. Seven contained high concentrations of hydrogen sulfide (one was over 600 \times the ATSDR acute MRL) and three contained high levels of benzene, including one over 12,000 \times the ATSDR acute MRL. The sample with the highest benzene concentrations also contained 480,000 micrograms per cubic meter of heptane, 3,100,000 micrograms per cubic meter of pentane, and 4,100,000 micrograms per cubic meter of butane, all hydrocarbons that are frequently associated with methane. These hydrocarbon concentrations exceeded occupational health standards (NIOSH recommended exposure limits). Four of the seven samples with high levels of hydrogen sulfide were taken in northeast Park County (near Deaver), and three of the four samples with high benzene levels were taken in northwest Park County (near Clark). One of the five passive samples contained formaldehyde at levels that exceeded ATSDR MRLs and the 1/10,000 cancer risk level (Table 3, Figure 2).

Wyoming (Fremont County)

Four of the five grab samples contained volatiles at concentrations that exceeded ATSDR MRLs or EPA IRIS risk levels. One sample contained six volatiles exceeding these levels, including benzene at 75 \times the ATSDR acute MRL and 22 \times the EPA IRIS 1/10,000 cancer risk level. A second sample contained three volatiles exceeding ATSDR or EPA IRIS levels and also contained 4,167,000 micrograms per cubic meter of methane, an amount that exceeds its occupational health standard (Threshold Limit Value). None of the passive samples contained

Table 1 Oil and gas operations by state

| State | Drilling permits issued (year) | Wells | | Production | | Setback requirements (dwellings and occupied structures) | Ambient air quality standards |
|-------|--|---------------------------|---------------------------------|--------------------------|--------------------------|---|---|
| | | Drilled (year) | Producing (year) | Gas (Tcf) (year) | Oil (MMbbl) (year) | | |
| AR | ~ 890 (2012) ^a ~ 1,090 (2011) ^a | - | 8,538 (gas) (2012) ^b | 1.15 (2012) ^b | 6.59 (2012) ^a | 200 ft. (from produced fluids storage tanks to habitable dwelling) 300 ft. (from produced fluids storage tanks to school, hospital, or other public use building) | 20 ppm (5 min); 80 ppb (8-hr) (H ₂ S) ^f |
| CO | 4,025 (2013) ^a 3,775 (2012) ^a | - | 46,697 (2014) ^d | 1.71 (2012) ^b | 6488 (2013) ^a | 500 ft. (from well to home or building, absent waiver) 1,000 ft. (from well to high occupancy building, absent hearing and approval) | - ^c e |
| OH | 903 (2012) ^a 690 (2011) ^a | 553 (2012) ^a | 51,739 (2012) ^a | .084 (2012) ^b | 4.97 (2012) ^a | 150 ft. (occupied dwelling in urbanized area, absent consent) 150 ft. (occupied or public dwelling, non-urban area) 200 ft. (occupied dwelling w/in drilling unit due to mandatory pooling) | - ^c e |
| PA | 4,617 (2013) ^a 4,090 (2012) ^a | 2,174 (2013) ^a | 55,812 (2011) ^f | 2.26 (2012) ^b | 2.7 (2011) ^a | 500 ft. (from well bore to building or water well) | 0.1 ppm (1-hr); 0.005 ppm (24-hr.) (H ₂ S) ^{c, e} |
| WY | 3,230 (Sept. 2013-Aug. 2014) ^a | - | 37,301 (2012) ^a | 2.23 (2012) ^b | 57.5 (2012) ^a | 350 ft. (from wellhead, pumping unit, pit, production tank, and/or production equipment to residence, school, or hospital) | 40 µg/m ³ (half-hr. ave., 2x w/in 5 days) (H ₂ S) ^{c, e} |

^aState agency data.

^bU.S. Energy Information Administration data.

^cIn addition to National Ambient Air Quality Standards for criteria air pollutants and federal emissions standards – new source performance standards (40 C.F.R. §§ 60.5360 - 60.5430) and national emission standards for hazardous air pollutants (40 C.F.R. §§ 63.760 - 63.777) – applicable to the oil and gas industry.

^dPersonal communication with state agency.

^eIn addition to state emissions standards (e.g., VOC emissions from glycol dehydrators; green completions; valve requirements for pneumatic devices). See, for example, Colorado Department of Public Health and Environment's revised Air Quality Control Commission Regulation Numbers 3, 6, and 7 (adopted 23 February 2014).

^fEarthworks data.

Table 2 ATSDR minimal risk levels and EPA IRIS cancer risk levels for chemicals of concern (all data in $\mu\text{g}/\text{m}^3$)

| Chemical | ATSDR MRLs | | | IRIS cancer risk levels | | |
|------------------|------------|--------------|---------|-------------------------|-----------|----------|
| | Acute | Intermediate | Chronic | 1/1,000,000 | 1/100,000 | 1/10,000 |
| Benzene | 29 | 20 | 10 | .45 | 4.5 | 45 |
| 1,3 butadiene | | | | 0.03 | 0.3 | 3 |
| Ethylbenzene | 21,700 | 8,680 | 260 | | | |
| Formaldehyde | 49 | 37 | 10 | 0.08 | 0.8 | 8 |
| N-hexane | | | 2,115 | | | |
| Hydrogen sulfide | 98 | 28 | | | | |
| Toluene | 3,750 | | 300 | | | |
| Xylenes | 8,680 | 2,604 | 217 | | | |

Table 3 Concentrations of volatile compounds exceeding health-based risk levels in samples collected in Wyoming

| State/ID | County | Nearest infrastructure | Chemical | Concentration ($\mu\text{g}/\text{m}^3$) | ATSDR MRLs exceeded | EPA IRIS cancer risk exceeded |
|-------------|---------|---------------------------------------|------------------|--|---------------------|-------------------------------|
| WY-4586 | Fremont | 5 m from separator | Hydrogen sulfide | 590 | I, A | n/a |
| WY-4586 | Fremont | 5 m from separator | Benzene | 2,200 | C, I, A | 1/10,000 |
| WY-4586 | Fremont | 5 m from separator | Toluene | 1,400 | C | n/a |
| WY-4586 | Fremont | 5 m from separator | Ethylbenzene | 1,200 | C | n/a |
| WY-4586 | Fremont | 5 m from separator | Mixed xylenes | 4,100 | C, I | n/a |
| WY-4586 | Fremont | 5 m from separator | n-hexane | 22,000 | C | n/a |
| WY-1103 | Fremont | 20 m from separator | benzene | 31 | C, I, A | 1/100,000 |
| WY-2069 | Fremont | 110 m from work-over rig ^a | Hydrogen sulfide | 30 | I | n/a |
| WY-4861 | Fremont | 5 m from separator | Benzene | 230 | C, I, A | 1/10,000 |
| WY-4861 | Fremont | 5 m from separator | Mixed xylenes | 317 | C | n/a |
| WY-4861 | Fremont | 5 m from separator | n-hexane | 2,500 | C | n/a |
| WY-4478 | Park | 25 m from separator | Hydrogen sulfide | 91 | I | n/a |
| WY-4478 | Park | 25 m from separator | Benzene | 110,000 | C, I, A | 1/10,000 |
| WY-4478 | Park | 25 m from separator | Toluene | 270,000 | C, A | n/a |
| WY-4478 | Park | 25 m from separator | Mixed xylenes | 135,000 | C, I, A | n/a |
| WY-4478 | Park | 25 m from separator | n-hexane | 1,200,000 | C | n/a |
| WY-129 | Park | 55 m from separator | benzene | 100 | C, I, A | 1/10,000 |
| WY-3321 | Park | 5 m from compressor | benzene | 35 | C, I, A | 1/100,000 |
| WY-4883-005 | Park | 5 m from compressor | Formaldehyde | 46 | C, I | 1/10,000 |
| WY-4864 | Park | 5 m from discharge canal | Hydrogen sulfide | 210 | I, A | n/a |
| WY-4865 | Park | 10 m from discharge canal | Hydrogen sulfide | 1,200 | I, A | n/a |
| WY-4496 | Park | 20 m from well pad | Hydrogen sulfide | 6,100 | I, A | n/a |
| WY-106 | Park | Adjacent to discharge canal | Hydrogen sulfide | 5,600 | I, A | n/a |
| WY-184 | Park | 15 m from discharge canal | Hydrogen sulfide | 240 | I, A | n/a |
| WY-187 | Park | 15 m from discharge canal | Hydrogen sulfide | 66,000 | I, A | n/a |
| WY-187 | Park | 15 m from discharge canal | Benzene | 23 | C, I | 1/100,000 |

C = chronic; A = acute; I = intermediate.

^aInfrastructure used to pull and replace a well completion.

Table 4 Concentrations of volatile compounds exceeding health-based risk levels in samples collected in Arkansas

| State/ID | County | Nearest infrastructure | Chemical | Concentration (µg/m ³) | ATSDR MRLs exceeded | EPA IRIS cancer risk exceeded |
|-------------|-----------|------------------------|---------------|------------------------------------|---------------------|-------------------------------|
| AR-3136-003 | Faulkner | 355 m from compressor | Formaldehyde | 36 | C | 1/10,000 |
| AR-3136-001 | Cleburne | 42 m from compressor | Formaldehyde | 34 | C | 1/10,000 |
| AR-3561 | Cleburne | 30 m from compressor | Formaldehyde | 27 | C | 1/10,000 |
| AR-3562 | Faulkner | 355 m from compressor | Formaldehyde | 28 | C | 1/10,000 |
| AR-4331 | Faulkner | 42 m from compressor | Formaldehyde | 23 | C | 1/10,000 |
| AR-4333 | Faulkner | 237 m from compressor | Formaldehyde | 44 | C, I | 1/10,000 |
| AR-4724 | Van Buren | 42 m from compressor | 1,3-butadiene | 8.5 | n/a | 1/10,000 |
| AR-4924 | Faulkner | 254 m from compressor | Formaldehyde | 48 | C, I | 1/10,000 |

C = chronic; I = intermediate.

volatiles at concentrations that exceeded ATSDR MRLs or EPA IRIS cancer risk levels (Table 3, Figure 2).

Arkansas (Cleburne, Faulkner, and Van Buren Counties)

One of the 8 grab samples, and 7 of the 13 passive samples, contained volatiles above ATSDR MRLs or EPA IRIS risk levels. One of the passive samples (taken at a residence) had formaldehyde levels that were close to the ATSDR MRL and exceeded EPA's 1/10,000 cancer risk level (Table 4, Figure 3).

Pennsylvania (Susquehanna County)

One of the four grab samples contained benzene at concentrations that exceeded the EPA 1/100,000 cancer risk level. Six of the ten passive samples contained formaldehyde at levels that exceeded ATSDR MRLs or EPA IRIS risk levels. Two of the samples exceeded both the acute MRL and the 1/10,000 cancer risk level (Table 5, Figure 4).

Colorado (Boulder and Weld Counties)

One of the five grab samples contained 41 micrograms per cubic meter of hydrogen sulfide and exceeded the

ATSDR intermediate MRL. None of the passive samples had volatiles exceeding the ATSDR MRLs or EPA IRIS risk levels.

Ohio (Athens, Carroll, and Trumbull Counties)

None of the four grab samples or five passive samples contained volatiles at concentrations that exceeded the ATSDR MRLs or EPA IRIS risk levels.

State air quality monitoring survey

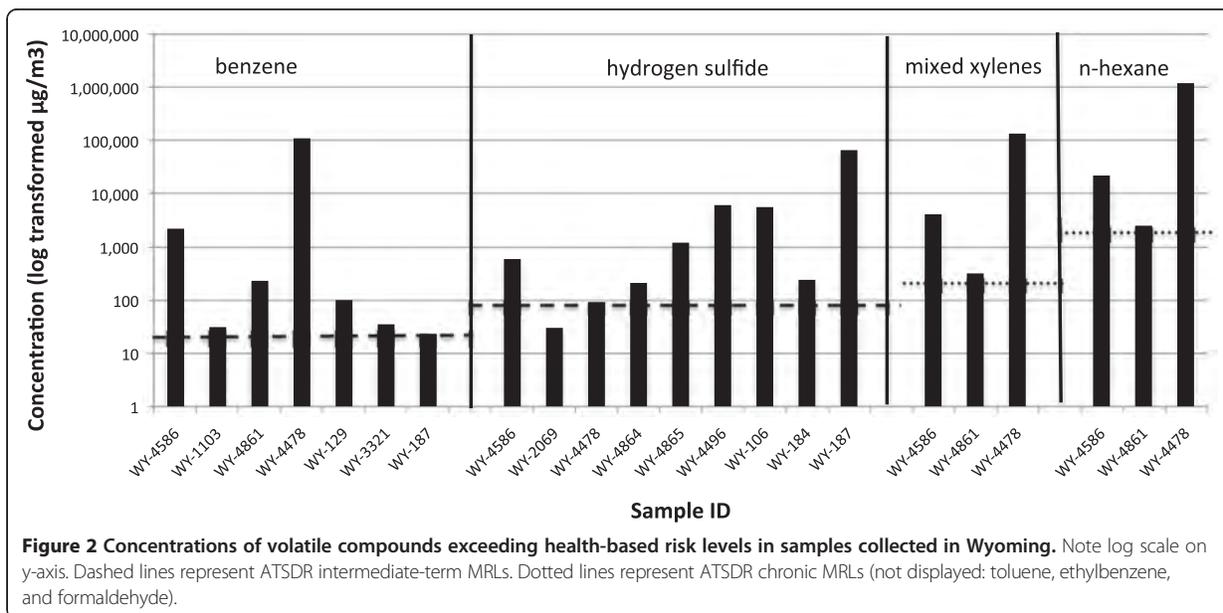
We reviewed air quality monitoring by state agencies in the five states covered by our sampling. We reviewed one study in Arkansas, seven in Colorado, one in Ohio, four in Pennsylvania, and one in Wyoming. Most of the studies measured VOC levels, two included hydrogen sulfide, and seven included methane and/or other hydrocarbons. Sampling durations ranged from four hours to 24 months; five of the studies lasted more than four weeks. Target compounds were detected in all studies that have been completed, including mixtures of 42 non-methane VOCs. None of the studies concluded that detected compounds posed significant human health risk (Table 6).

Table 5 Concentrations of volatile compounds exceeding health-based risk levels in samples collected in Pennsylvania

| State/ID | County | Nearest infrastructure | Chemical | Concentration (µg/m ³) | ATSDR MRLs exceeded | EPA IRIS cancer risk exceeded |
|-------------|-------------|------------------------------------|--------------|------------------------------------|---------------------|-------------------------------|
| PA-4083-003 | Susquehanna | 420 m from compressor | Formaldehyde | 8.3 | | 1/10,000 |
| PA-4083-004 | Susquehanna | 370 m from compressor | Formaldehyde | 7.6 | | 1/100,000 |
| PA-4136 | Washington | 270 m from PIG launch ^a | Benzene | 5.7 | | 1/100,000 |
| PA-4259-002 | Susquehanna | 790 m from compressor | Formaldehyde | 61 | C, I, A | 1/10,000 |
| PA-4259-003 | Susquehanna | 420 m from compressor | Formaldehyde | 59 | C, I, A | 1/10,000 |
| PA-4259-004 | Susquehanna | 230 m from compressor | Formaldehyde | 32 | C | 1/10,000 |
| PA-4259-005 | Susquehanna | 460 m from compressor | Formaldehyde | 34 | C | 1/10,000 |

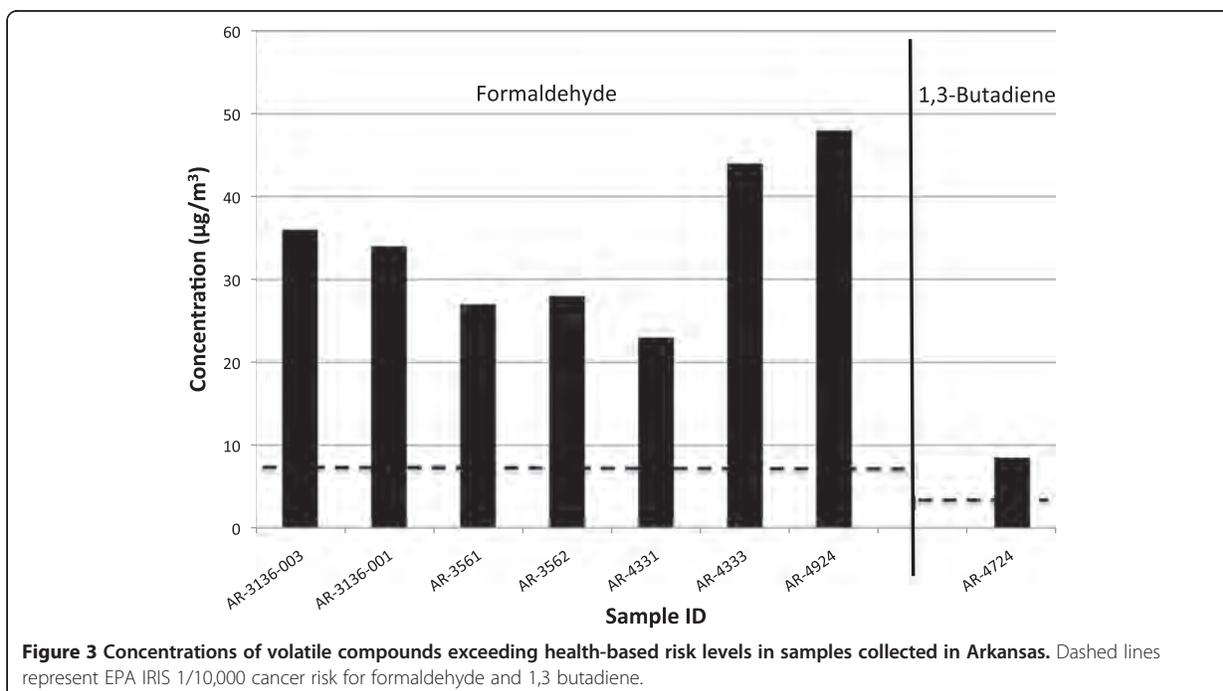
C = chronic; A = acute; I = intermediate.

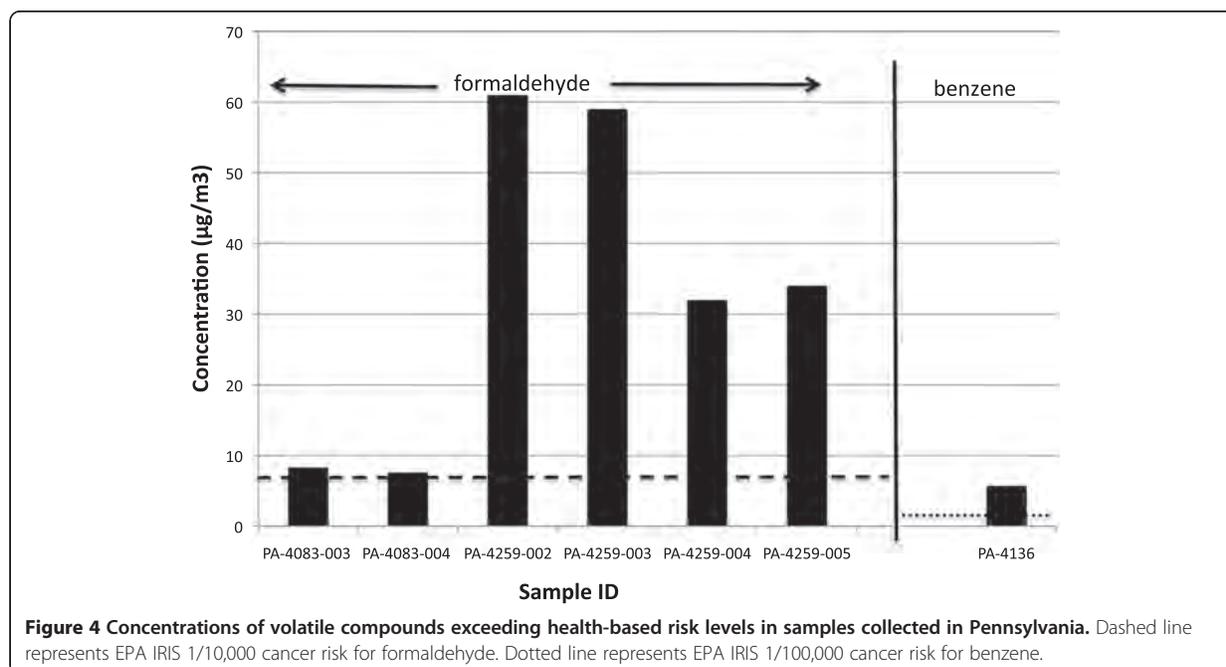
^aLaunching station for pipeline cleaning or inspection tool.



Discussion
 We identified significant concentrations of four well-characterized chemicals: benzene, formaldehyde, hexane, and hydrogen sulfide. Benzene was detected at sample locations in Pennsylvania and Wyoming. Concentrations exceeded health-based risk levels by as many as several orders of magnitude. Previous studies similarly found benzene concentrations near oil and gas development [10,11]. Our monitors detected benzene at higher concentrations

(5.7 – 110,000 µg/m³) than those found in the published literature. The results are of concern given their proximity to subdivisions, homes, and farms. In Wyoming, multiple samples with high benzene concentrations were taken on residential property 30–350 yards from the nearest well, or on farmland along the perimeter of a well pad. Equipment included separators, compressor stations, discharge canals, and pipeline cleaning operations. The results suggest that existing regulatory setback distances from wells to





residences may not be adequate to reduce human health risks [61]. Setbacks from wellheads to homes and other occupied structures cluster around the 150 to 500 feet range in the five states (see Table 1). We found high concentrations of volatile compounds at greater distances, including formaldehyde (up to 2,591 feet) and benzene (up to 885 feet). High levels of benzene near oil production wells indicate that EPA should revisit the extent to which oil wells are addressed in its new source performance standards [62].

Benzene is a known human carcinogen. Chronic exposure to benzene increases the risk of leukemia [63]. The increased risk occurs at low levels of exposure with no evidence of threshold level [64]. Benzene exposure increases risk of birth defects [65], including neural tube and other defects found near natural gas development [24]. Respiratory effects include pulmonary edema, acute granular tracheitis, laryngitis, and bronchitis [60].

UOG fields present multiple sources and exposure routes for benzene. Benzene occurs naturally in shale and other hydrocarbon deposits, and is vented, flared, or released as fugitive emissions along numerous points of production, such as wells, production tanks, compressors, and pipelines [6]. It can volatilize and disperse from flowback and produced water at drilling sites and remain in the air for several days [66]. It was among the first pollutants found in air samples near shale gas operations [67]. Previous studies found benzene to be the largest contributor to excess lifetime cancer risk near gas fields [12]. Residents exposed to VOCs including benzene experience immediate health symptoms and illness. Within days after a flaring event at a

Texas City refinery, children exhibited altered blood profiles, liver enzymes, and somatic symptoms [68]. Future research is needed to determine whether the concentrations of benzene we measured are due to continuous releases or flaring, fugitive emissions, or facility upsets.

Formaldehyde is another volatile compound that exceeded health-based risk levels near compressor stations in Arkansas, Pennsylvania, and Wyoming. As with benzene, there are known sources of formaldehyde emissions along the production chain. Formaldehyde is a product of incomplete combustion emitted by natural gas-fired reciprocating engines at compressor stations [69]. Formaldehyde is also formed from methane in the presence of sunlight, which may be an important source given significant amounts of methane that are known to escape from UOG sites [70]. But air monitoring studies, particularly in shale gas regions, either do not measure for formaldehyde [12,14] or find it at lower concentrations. For example, the Barnett Shale Energy Education Council [71] found levels that did not pose a risk to human health. Colborn et al. [10] found formaldehyde and acetaldehyde in each of 46 samples with a mean of 1.0 part per billion by volume. In contrast, our CBPR framework resulted in the targeting of compressor stations for passive sampling, where diesel emissions likely account for the higher levels that we found. Our results are similar to the Fort Worth Natural Gas Air Quality Study, which found formaldehyde concentrations in areas with multiple large compressor engines [72]. We found high concentrations of formaldehyde near fourteen compressor stations in three states.

Table 6 Five-state survey of air quality monitoring studies, unconventional oil and gas operations

| Agency (year) | Target compound | Sampling equipment | Sample sites | Duration | Representative findings |
|------------------------|--|---|--|-------------------|--|
| ADEQ (2011) | VOCs (total) NO NO ₂ | PID (fixed) PID (handheld) | 4 compressor stations 6 drilling sites 3 well sites (fracking) 1 upwind | 1 d (4-6 hrs.) | VOCs "almost always below or near detection limits" VOCs at drilling sites elevated (ave. 38-678 ppb; max. 350-5,321 ppb) NO/NO ₂ rarely exceed detection limits |
| CDPHE (2012) | NMOCs (78) Methane | Canister | 1 well pad (Erie) | 3 wks. | Detects = 42 of 78 compounds in >75% of samples Benzene "well within EPA's acceptable cancer risk range" Acute and chronic HQs "well below" 1 |
| CDPHE (2009) | NMOCs (78) VOCs PM _{2.5} | Canister PID (handheld) Filter (handheld) | 8 wells (4 drilling, 4 completion) | 1 d | Total NMOC ave. 273 - 8,761 ppb at 8 sites Total VOC ave. 6-3,023 ppb at 8 sites PM _{2.5} ave. 7.3 - 16.7 µg/m ³ at 8 sites |
| CDPHE, GCPHD (2007) | VOCs (43) PM ₁₀ | Canister Filter | 14 sites 7 sites | 24 mos. | Detects = 15 of 43 compounds Benzene ave. 28.2 µg/m ³ , max 180 µg/m ³ (grab) Toluene ave. 91.4 µg/m ³ , max 540 µg/m ³ (grab) |
| CDPHE (2003-2012) | NMOCs Carbonyls | Canister | 5 sites (2003) 6 sites (2006) 3+ sites (2012) | 2 mos. | Methane ave. 2,535 ppb (Platteville) vs. (1,780 ppb Denver) Top NMOCs in Platteville = ethane, propane, butane Benzene, toluene higher in Platteville |
| CDPHE (2002) | VOCs (42) SO ₂ NO, NO ₂ | Canister Continuous | 2 well sites 1 residential 1 active flare 2 up-, down-valley 1 background | 1 mo. | Detects = 6 of 42 VOCs Benzene in 6 of 20 (2.2-6.5 µg/m ³) Toluene in 18 of 20 (1.5-17 µg/m ³) |
| OEPA (2014) | VOCs (69) VOCs PM ₁₀ /PM _{2.5} H ₂ S CO | Canister GC/MS Filter | 1 well site 1 remote site | 12 mos. | Ongoing; data update provided in February 2014 Detects include BTEX, alkanes (e.g., ethane, hexane), H ₂ S Second site planned near processing plant |
| PA DEP (2010) | VOCs (48) Alkanes Leak detection | Canister OP-FTIR GC/MS FLIR | 2 compressor stations 1 condensate tank 1 wastewater impoundment 1 background | 5 wks. | Detects include methane, ethane, propane, benzene (max. 758 ppb) No conc.'s "that would likely trigger air-related health issues" Fugitive gas stream emissions |
| PA DEP (2011) | VOCs (48) Alkanes Leak detection | Canister OP-FTIR GC/MS FLIR | 2 compressor stations 1 completed well 1 well site (fracking) 1 well (tanks, separator) 1 background | 4 wks. | Detects include BTEX (benzene max. 400 ppb), methylbenzenes No conc.'s "that would likely trigger air-related health issues" Fugitive emissions from condensate tanks, piping |
| PA DEP (2011) | VOCs (48) Alkanes | Canister OP-FTIR GC/MS | 2 compressor stations 1 well site (flaring) 1 well site (drilling) 1 background | 4 wks. | Detects include benzene (max. 400 ppb), toluene, ethylbenzene Natural gas constituent detects near compressor stations Conc.'s "do not indicate a potential for major air-related health issues" |
| PA DEP (2012) | Criteria VOCs/HAPs Methane H ₂ S | "Full suite" | 1 gas processing 2 large compressor stations 1 background | 12 mos. | Ongoing; report due in 2014 |

Table 6 Five-state survey of air quality monitoring studies, unconventional oil and gas operations (Continued)

| | | | | | |
|-------------|--|--|---|---------|--|
| WDEQ (2013) | VOCs/NMHCs Ozone Methane NO, NO ₂ PM ₁₀ /PM _{2.5} | Canister UV Photometric FID Chemiluminescence Beta Attenuation | 7 permanent stations (e.g., Boulder, Juel Spring, Moxa) 3 mesonet stations (Mesa, Paradise Warbonnet) 2 mobile trailer locations (Big Piney, Jonah Field) | Ongoing | WDEQ mobile monitors placed at locations w/ oil & gas development Mini-SODAR also placed adjacent to Boulder permanent station "Relatively low concentrations" of VOCs found in canister samples VOCs "consistently higher" at Paradise site (near oil & gas sources) |
|-------------|--|--|---|---------|--|

BTEX = benzene, toluene, ethylbenzene, and xylenes; FID = flame ionization detector; FLIR = forward looking infrared; GC/MS = gas chromatography/mass spectrometry; HAP = hazardous air pollutant; NAAQS = National Ambient Air Quality Standard; NMHC = non-methane hydrocarbon; NMOC = non-methane organic compound; OP-FTIR = open-path Fourier transform infrared; PID = photoionization detector; VOC = volatile organic compound.

Formaldehyde is a suspected human carcinogen [73]. It can affect nearly every tissue in the human body, leading to acute (dermal allergies, asthma) and chronic (neuro-, reproductive, hematopoietic, genetic and pulmonary toxicity and cellular damage) health effects [74]. The science of childhood exposure to formaldehyde is progressing rapidly [75]. State agencies and international organizations continue to lower exposure limit values and guidelines for formaldehyde [76]. Our results exceed those guidelines. Symptoms reported by community members mirror the effects of acute formaldehyde exposure, which causes irritation of the eyes, nose, throat, and skin.

Other volatiles of concern included hexane and hydrogen sulfide. Hexane detects were most prevalent near oil and gas operations in Wyoming near well pads, compressor stations, separators, and produced water discharges. Other studies in oil and gas regions found hexane, but at low concentrations [10,12]. The circumstances under which high concentrations of hexane were found in Wyoming suggest a combination of leaks, spills, and fugitive emissions as potential causes. Acute exposure to hexane affects the central nervous system, causing dizziness, nausea, and headache. Chronic effects include neurotoxicity [77].

We also found elevated levels of hydrogen sulfide in Wyoming along the chain of production (pump jacks, produced water discharge impoundments, discharge canals) and near a well pad in Colorado. Hydrogen sulfide is a broad-spectrum toxicant that can impact most organ systems [78]. As such, it contributes to a range of short- and long-term neurological, upper respiratory, and blood-related symptoms, including those that were prevalent among community samplers in Wyoming (headaches, dizziness, eye irritation, fatigue) [79]. Hydrogen sulfide is a natural component of crude oil and natural gas [5] and is released during many industrial processes. In addition, five samples from Wyoming exceeded ATSDR health-based risk levels for toluene and xylenes.

Health-based risk levels provide only a limited sense of potential human health impacts from air emissions. They do not fully account for vulnerable subpopulations, and toxicity values are available for a comparatively small number of compounds. The levels that we found for the above chemicals of concern suggest that state monitoring studies are incomplete. Recent state-funded projects found air volatiles at UOG sites that were either near detection limits or within acceptable limits to protect the public [80-82]. One area of agreement between our community-based and state monitoring studies concerns the presence of complex chemical mixtures. These mixtures demonstrate the contingent nature of ambient air quality near UOG infrastructure.

For example, one sample, taken midday in early winter near a well pad in Wyoming with clicking pneumatic pumps, found high concentrations of hydrogen sulfide,

hexane, benzene, and xylenes. It also captured cyclohexane, heptane, octane, ethylbenzene, nonane, 1,2,4-trimethylbenzene, and 15 tentatively identified compounds (TICs). TICs are compounds that a device or analytic process is not designed to measure. Total VOC concentrations in the sample exceeded 1.6 million $\mu\text{g}/\text{m}^3$, excluding methane. While toxicity values are not available for every TIC in our samples, they exceeded reference concentrations available for related compounds such as hexane [77]. Another sample taken in Arkansas, during autumn in the afternoon near a compressor station, captured 17 volatile compounds and five TICs. A third sample, near a separator shed in Wyoming in late autumn at midday, showed spikes in hydrogen sulfide, benzene, and hexane, 19 additional VOCs, and 15 TICs, with total VOC concentrations exceeding 25 million $\mu\text{g}/\text{m}^3$, excluding methane. These and other complex mixtures are provided in Additional file 1.

The mixtures that we identified are related to sources commonly used in well pad preparation, drilling, well completion, and production, such as produced water tanks, glycol dehydrators, phase separators, compressors, pipelines, and diesel trucks [14]. They can be released during normal operating conditions and persist near ground level, especially in regions where topography encourages air inversions [83]. The toxicity of some constituents is well known, while others have little or no toxicity information available. Our findings of chemical mixtures are of clinical significance, even absent spikes in chemicals of concern. The chemical mixtures that we identified should be further investigated for their primary emissions sources as well as their potential cumulative and synergistic effects [84]. Clinical and subclinical effects of hydrocarbons such as benzene are increasingly found at low doses [85]. Chronic and subchronic exposure to chemical mixtures is of particular concern to vulnerable subpopulations, including children, pregnant women, and senior citizens [86].

Apart from chemicals of concern (including known and suspected human carcinogens) and chronic exposure to complex mixtures, our findings point to the value of community-based research to inform state testing protocols. Air quality near the diverse range of equipment and stages of UOG development is inherently complex. While states sometimes rely on state-of-the-art technologies such as wireless sensors to characterize local air quality, they continue to collect only a "snapshot" of near-field conditions. For example, Arkansas carried out a technologically ambitious program, placing multi-sensor gas monitors on five-foot tripods along each perimeter of a well pad at several sites. AreaRAEs (the trade name for a wireless monitor produced by RAE Systems) use electrochemical sensors to measure nitrous oxides and a photoionization detector to determine VOC concentration.

The continuous monitors wirelessly transmitted data at five-second intervals over a four- to six-hour period (see Table 6). In addition, Arkansas Department of Environmental Quality (ADEQ) personnel carried handheld versions of the AreaRAE along the perimeter of the sites every one or two hours. While the study did not identify individual VOCs, it found that total VOC emissions at the edge of a well pad fluctuate wildly over a five-hour period. The agency concluded, "The spatial and temporal distribution of VOC concentrations at most drilling sites was significantly affected by monitor location, wind, and the interaction between location and wind direction" [81]. Other studies noted similar variation, although the extent to which short-term spikes and unique chemical mixtures might pose a risk to human health was not considered.

Community-based research can improve the spatial and temporal resolution of air quality data [87] while adhering to established methods. Our findings can inform and calibrate state monitoring and research programs. Additional file 1: Table S6 gives a more in-depth overview of community monitoring in action, including sample site selection factors, sources of public health concern at each site, and the range of infrastructure present and life cycle stage when samples were taken. For example, grab samples in Wyoming with some of the highest VOC concentrations were collected during production, as opposed to well completion (see Table S6, Additional file 1). The timing and location of our samples were driven by two primary factors: local knowledge gleaned from daily routines, and a history of chronic or subchronic symptoms reported by nearby residents. For example, a separator shed was targeted because of subchronic symptoms (dizziness, nausea, tight chest, nose and throat problems, metallic taste, and sweet smell) and loud sounds nearby ("hissing, clicking, and whooshing"). Well pads were selected based on impacts to livestock, pasture degradation from produced water, and observations of residents and farmers. Other samples were driven by observations of fugitive emissions, including vapor clouds, deposition, discoloration, and sounds (see Table S6 in Additional file 1).

Community-based research can identify mixtures, and their potential emissions sources, to prioritize for study of their additive, cumulative, and synergistic effects [88]. The mixtures can be used to determine source signatures [14] and isolate well pads for more intensive monitoring. Symptom-driven samples can define the proper length of a sampling period, which is often limited to days or weeks. They can inform equipment placement for continuous monitoring and facilitate a transition from exploratory to more purposive sampling. Testing informed by human health impacts, and more precise knowledge of the mix and spacing of sources that may

contribute to them, contrasts with state efforts, which are limited by access to property, sources of electrical power, fixed monitoring sites, and the cooperation of well pad owners and operators. In these ways, community-based monitoring can extend the reach of limited public resources.

Conclusions

Community-based monitoring near unconventional oil and gas operations demonstrates elevations in concentrations of hazardous air pollutants under a range of circumstances. Of special concern are high concentrations of benzene, hydrogen sulfide, and formaldehyde, as well as chemical mixtures linked to operations with observed impacts to resident quality of life.

Additional file

Additional file 1: Contains six tables, including complete results from grab and passive sampling (Tables S1 through S5) and data on sample location selection in Wyoming (Table S6).

Abbreviations

ADEQ: Arkansas Department of Environmental Quality; ATSDR: Agency for Toxic Substances and Disease Registry; BTEX: benzene, toluene, ethylbenzene, and xylenes; CBPR: community-based participatory research; CDPHE: Colorado Department of Public Health and Environment; EMPACT: Environmental Monitoring for Public Access and Community Tracking; EPA: Environmental Protection Agency; FID: flame ionization detector; FLIR: forward looking infrared; GCM: Global Community Monitor; GC/MS: gas chromatography/mass spectrometry; GCPHD: Garfield County Public Health Department; HAP: hazardous air pollutant; IRIS: Integrated Risk Information System; MRL: minimal risk level; NAAQS: National Ambient Air Quality Standard; NIOSH: National Institute for Occupational Safety and Health; NMHC: non-methane hydrocarbon; NMOC: non-methane organic compound; OEPA: Ohio Environmental Protection Agency; OP-FTIR: open path Fourier transform infrared; PA DEP: Pennsylvania Department of Environmental Protection; PAH: polycyclic aromatic hydrocarbon; PID: photoionization detector; QA/QC: Quality Assurance/Quality Control; TIC: tentatively identified compound; UOG: unconventional oil and gas; VOC: volatile organic compound; WDEQ: Wyoming Department of Environmental Quality.

Competing interests

The authors declare they have no competing financial interest. Ruth Breech, Mark Cherniak, Caroline Cox, Denny Larson, and Deb Thomas are employed by non-profit organizations whose mission is to reduce exposure to toxic chemicals.

Authors' contributions

GPM provided study design and project management, a survey of state-sponsored air quality monitoring studies, data analysis, and initial drafts of the Background, Methods, Discussion, and Tables 1 and 6, and Additional file 1: Tables S1 through S6. RB managed air quality monitoring teams and provided an initial draft of the Methods. MC provided data analysis and interpretation of grab and passive samples. CC provided data analysis and interpretation of grab and passive samples and initial drafts of the Results, Tables 2, 3, 4, 5 and Figures 2, 3 and 4. DL developed the protocol for community-based air sampling and provided an initial draft of the Methods. DT managed air quality monitoring teams in Wyoming and provided an initial draft of Additional file 1: Table S6. DOC provided study design and guidance, data analysis, and initial drafts of the Background and Discussion. All authors participated in the study design, data analysis and interpretation, and drafting of the manuscript. All authors read and approved the final manuscript.

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Wyoming Governor's Executive Order 2011-5, Greater Sage-grouse Core Area Protection.

Attachment B, Paragraph No. 6. Noise: New noise levels, at the perimeter of a lek, should not exceed 10 dBA above ambient noise (existing activity included) from 6:00 pm to 8:00 am during the initiation of breeding (March 1 - May 15). Ambient noise levels should be determined by measurements taken at the perimeter of the lek at sunrise.

Although this section appears straightforward and logical, there are some important issues with the manner in which the section is worded that could lead to decreasing protection for greater sage-grouse. There are two fundamental problems with the current wording that should be addressed: 1) the manner in which "existing ambient" is established at "sunrise" (i.e. using the sunrise time period of 5 am to 7 am when grouse are displaying); and 2) using "existing ambient" as described in the EO as the basis for impact assessment. Below we explain both problems, and then offer recommendations for new language which avoids these problems and provides more clarity about how compliance should be assessed. We also address other issues: use of a fixed, state-wide ambient; use of 10 dBA over ambient as a threshold; situations where ambient currently exceeds threshold levels; adjusting hours of lekking; and addressing hours outside lekking.

Problem 1: Using the Time Period 5 am to 7 am to Establish "Existing Ambient"

Grouse display sounds can significantly increase sound levels when measured at the perimeter of a lek during display periods (Patricelli et al. 2013; Ambrose and Florian 2014). Although grouse often display from 1800-0900, the most intense period of display is 5 am to 7 am, making this time period particularly problematic for measurement of other sounds. For example, sound level measurements were made at two leks west of the Pinedale Anticline Project Area in April 2013 (Ambrose and Florian 2014). There were no gas field sounds audible at these leks, but common rural Wyoming sounds were present, including birds, insects, and wind through vegetation, as well as distant vehicles, aircraft, and common ranching/farming sounds. Sound levels from 5-7 am averaged 24.2 dBA, while sound levels during the entire lekking period averaged 15.8 dBA. Sound levels during the 5-7 am period were 2.6 times greater than sound levels measured over the longer time period from 6 pm to 8 am. These increases in sound levels during the 5-7 am period were attributable solely to grouse display sounds (determined via digital recordings). For this reason, the time period around sunrise, roughly 5-7 am during late March to early May, is not an appropriate time period to use for establishing existing ambient sound level.

Sound levels for the time period 6 pm to 5 am (to exclude grouse sounds) averaged 14.8 dBA (1.0 dBA different from 6 pm to 9 am). Thus, use of all hours during the display period, 6 pm to 9 am, to establish ambient and/or assess compliance will not be unduly influenced by grouse sounds and will represent sound levels for the entire display period.

Problem 2: Use of Changing or Fixed “Existing Ambient” for Assessing Impacts

The approach used in the current Executive Order is to include "existing activity" when establishing ambient sound levels. The problem with this approach is that existing ambient sound levels almost always increase incrementally over time, and with an ever increasing ambient sound level, protection for greater sage-grouse is reduced (Patricelli et al. 2013).

For example, assume sound levels at a lek in rural Wyoming are 15 dBA during the lekking period, 1800-0900. Assume in year 1 a gas drilling operation is proposed 4.0 miles away, leading to an increase in the sound level at the lek to 21 dBA. This is less than 10 dBA over existing ambient of 15 dBA, and thus would be in compliance with the EO. The new existing ambient at this lek would become 21 dBA. Then assume in year 2 a gas drilling operation is proposed 2.0 miles away, leading to an increase in the sound level at the lek to 27 dBA. This is less than 10 dBA over the existing ambient of 21 dBA, and thus would be in compliance. The new existing ambient would become 27 dBA. Then assume in year 3 a gas drilling operation is proposed 1.0 miles distant, leading to an increase in the sound level at the lek to 33 dBA. This is less than the 10 dBA over existing ambient of 27 dBA, and thus would be in compliance. The new existing ambient would become 33 dBA. And so on. In this example, the "existing ambient" increases incrementally with each new and closer activity, even though no single annual increase exceeded the 10 dBA over ambient threshold. This could continue until the drilling operation was 100 feet from the lek, with the same assessment of "no impact." However, the best available evidence suggests that additional noise will increase the impact on these leks, because sage-grouse do not adapt to the presence of noise over time (Patricelli et al. 2013). In a 3-year experimental introduction of noise to leks, Blickley et al. (2012a) found an immediate decline in male lek attendance, which did not abate over time, and increased stress hormones in the second and third years of playback (Blickley et al. 2012b). The inclusion of existing noise into ambient values clearly does not protect greater sage-grouse.

RECOMMENDED LANGUAGE FOR THE EXECUTIVE ORDER

Noise: Noise levels should not exceed 25 dBA at the perimeter of the lek during lekking hours (6 pm to 9 am) during the initiation of breeding (March 1 to May 15). This metric will be calculated using the median of all hours during the lekking period, 6 pm to 9 am. Using this metric, one or more hours may exceed 25 dBA, but the median of all hours will be <25 dBA. Outside of these times, reasonable efforts should be made to keep noise as close to these limits as possible. In situations where existing noise levels at leks exceed 25 dBA before project initiation, new projects should not contribute to an increase in sound levels at leks; this can be accomplished through noise mitigation measures, such as pad siting and sound baffles that limit the combined noise exposure. 25 dBA represents a level 10 dBA above existing ambient noise levels in sage-grouse habitats in rural Wyoming.

All measurement should be made at the perimeter of the lek, with a Type I Sound Level Meter (capable of measuring the acoustic environment of the study area), for a minimum of 7 days (to cover normal variability due to different meteorological conditions), during the lekking period (6 pm to 9 am). Microphone height should be 12” to approximate ear height of greater sage-grouse. The median of hourly L₅₀ values during monitoring period should be used to assess compliance. Measurement methods should follow published standards of the American National Standards Institute (ANSI) or specified by the SGIT.

BACKGROUND ON RECOMMENDATIONS FOR REVISED LANGUAGE

Use of a Fixed, State-wide Ambient Sound Level

We recommend using a fixed “existing ambient” value state-wide rather than measuring ambient on a lek-by-lek or site-by-site basis for the following reasons: 1) because accurate measurement of ambient noise levels at each lek or development site is difficult and expensive, 2) because nearly every error in the choice, placement and maintenance of the equipment will lead to overestimation of ambient values, thus higher allowable noise limits (Patricelli et al. 2013), and 3) because even accurate measures would include existing activity in the baseline, leading to incremental increases in impacts to sage-grouse, as discussed above. The State of Wyoming, through the Sage-grouse Local Working Groups (LWGs), funded a recent effort to measure ambient noise levels in sage habitats in four of the eight LWG Areas in Wyoming in April 2014 (13-22 days, total of 1805 hours). The four working LWG areas were: Bighorn Basin, Wind River/Sweetwater River Basin, Bates Hole/Shirley Basin, and Upper Green River Basin. Lekking hours (6 pm to 8 am) averaged 14.2 dBA (L_{90}) and 15.4 dBA (L_{50}) (Ambrose et al. 2014a). Common sounds included in these L_{50} measurements were birds, insects, and wind through vegetation, as well as farming, ranching, vehicles, and aircraft (but absent oil and gas development or other continuous noise sources). Therefore, this value represents ambient noise levels in typical sage-grouse habitat in Wyoming with some audible anthropogenic sounds, but does not include sounds of developed industrial areas. American National Standards Institute (ANSI) recommends using the L_{90} as the “residual noise level” or “background ambient” and L_{50} as “existing ambient.” In rural areas of Wyoming, prior to development, L_{90} and L_{50} values are very similar (<1.0 dBA difference), thus the choice is inconsequential.

It is important to note sound levels reported in Ambrose et al. (2014a) were often near the lower limit (noise floor) of the sound level meters used (13.5 dBA). This means that actual environmental sound levels were lower than reported by the meters. At one location, a very sensitive, 1” low-noise microphone (noise floor = 0 dBA) was deployed simultaneously with a standard ½” microphone system. For this 7-day measurement period, the ½” microphone system reported L_{90} and L_{50} levels of 14.5 dBA and 16.7 dBA, respectively. For the same time period, the 1” microphone system reported L_{90} and L_{50} levels of 7.2 dBA and 14.0 dBA, respectively. In all likelihood, sound levels in rural, undeveloped Wyoming are lower than reported by Ambrose et al. (2014a) during lekking hours.

Recommendation: For the purposes of establishing noise stipulations relative to greater sage-grouse, we recommend using a state-wide ambient of 15 dBA.

Threshold Level of Impacts to Greater Sage-grouse due to Anthropogenic Sounds

Noise levels >10 dBA over ambient has been found to impact populations of songbirds (Nicholoff 2003, Dooling and Popper 2007). Several studies have suggested that anthropogenic noise is also detrimental to greater sage-grouse (Rogers 1964; Braun 1998; Holloran 2005) and recent studies demonstrate this impact by experimentally introducing industrial noise to otherwise undisturbed leks, finding declines in lek attendance as well as increased stress hormones and altered behaviors (Blickley 2012; Blickley et al. 2012a; Blickley et al 2012b). However, these studies did not establish the noise levels at which these impacts occur. Recent research in the Pinedale Anticline Project Area south of Pinedale, WY, provides insight into this question. In the PAPA, 22 leks (19 in PAPA, 3 outside PAPA) were studied by counting male grouse at the leks (2000-2014) (Wyoming Department Game and Fish, unpublished data) and measuring sound levels at the leks (2013-2014) (Ambrose et al. 2014b). L_{50} dBA sound levels at the leks were strongly associated with Poisson transformed

trends in grouse counts ($R^2 = 0.552$, $P < 0.001$); the higher the L_{50} dBA, the greater the likelihood of a declining trend. Of the 19 leks in the PAPA, 6 had sound levels <25 dBA and 13 had sound levels >25 dBA. Of the 6 leks with sound levels <25 dBA, 3 had increasing trends and 3 had declining trends. Of the 13 leks with sound levels >25 dBA, 3 were increasing and 10 were declining (7 of these had no grouse present for the last 2 or more years). Average decline at leks with $L_{50} >25$ dBA was 61%. These data suggest that at L_{50} sound levels >25 dBA, negative impacts to grouse due to anthropogenic sounds begin to occur (see Figure 1).

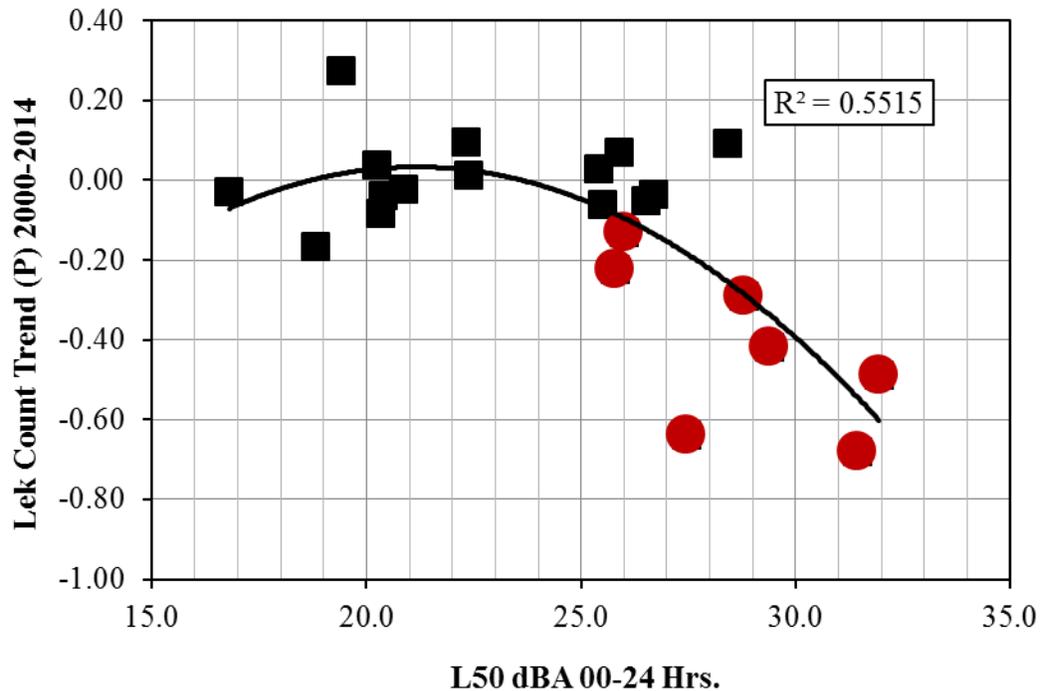


Figure 1. Trends of grouse counts (2000-2014) and L_{50} dBA levels (2013-2014) at 22 leks (19 in the PAPA and 3 outside the PAPA). Larger, red symbols indicate that the leks have been inactive for 2 years or more. Trend lines are polynomial regression analysis.

The use of 25 dBA is further supported by comparisons of the leks that have remained active or become inactive. We examined whether the proportion of leks that were inactive for at least the past 2 years (during noise measurement) was higher for leks exposed to median noise levels (L_{50}) of >25 dBA compared to leks exposed to <25 dBA. Of the leks that had L_{50} values <25 dBA, no leks (0%) were inactive; of the leks that had L_{50} values >25 dBA, 7 of 13 leks (54%) were inactive. Even in this small sample, this represents a significant increase in the probability of a lek becoming inactive when exposed to >25 dBA of noise (Fisher's Exact Test, $p=0.034$). Further, the median L_{50} of inactive leks (28.8 dBA) was significantly higher than the median L_{50} of active leks (23.9 dBA) (Mann-Whitney $U=8$, $p<0.005$).

Recommendation: For the purposes of assessing acoustic impacts to greater sage-grouse, we recommend using 25 dBA as the threshold for noise exposure (ambient 15 dBA + 10 dBA). For compliance with this limit, we recommend that measurement be made at the perimeter of the lek, with a Type I Sound Level Meter (capable of measuring the acoustic environment of the study area), for a minimum of 7 days (to cover normal variability due to different meteorological conditions) during the lekking period. The sounds of lekking birds will have minimal impacts on these measures

(as discussed above). Pater et al. (2009) recommend noise measurement at the height most relevant to assessing noise impacts on wildlife (see also Delaney et al. 1999, Patricelli et al 2013, and others), which is also consistent with ANSI standards (1994, Section 7.3.2.4), therefore we recommend that SLM microphone height should be 12” to approximate ear height of greater sage-grouse; this microphone placement will also reduce the impact of wind, which could artificially inflate measures and count against compliance. We recommend that the median of hourly L_{50} values during monitoring period should be used to assess compliance. Using this metric, one or more hours may exceed 25 dBA, but the median of all hours should be <25 dBA.

Situations When Existing Ambient Exceeds 25 dBA

There may be situations where sound levels at leks exceed an L_{50} of 25 dBA before project initiation due to existing noise sources, though recent data suggest that this is unlikely outside of heavily-developed areas (Ambrose et al. 2014a and 2014b). In these cases, the best available evidence suggests that additional noise will increase the impact on these leks, as sage-grouse do not adapt to the presence of noise over time (as discussed above; Patricelli et al. 2013). Therefore, to limit impacts on sage grouse, new projects should not contribute to an increase in sound levels at leks already exceeding the noise limits. This rule would not preclude further development at sites that already have sources exceeding 25 dBA due to the non-additive way that multiple sound sources combine to determine overall noise levels. For example, a new source with an L_{50} 9 dB quieter than the L_{50} of an existing source at the measurement site would add only 0.5 dB to the total noise exposure. Therefore new projects could proceed by increasing the distance to the lek or through the use of noise-mitigation technology.

Recommendation: New projects must not contribute to an increase in sound levels at leks already exceeding the noise limits.

Lekking hours of Greater Sage-grouse

The Executive Order currently applies to the hours between 6 pm to 8 am during the lekking season, but this leaves a significant portion of on-lek activity unprotected. Based on observations of attendance patterns and behaviors over 12 lek-years (5 leks, some in multiple years, between 2006 and 2014) near Hudson, WY, an average of 17% of copulations in a lek-year were observed to occur after 8am (this ranged from 4% in one lek-year to 41% in another lek-year) (Patricelli and Krakauer, unpublished data). Further, this same study found that the mean departure time of birds from their leks is approximately 9:00 am, with activity extending some days until 11 am. Studies of lek attendance in Colorado and Montana also found that lek activity commonly continues past 8 am (Jenni and Hartzler 1978; Walsh et al. 2004).

Recommendation: To protect lekking activities, we recommend that the protected period be extended to include 6 pm to 9 am.

Hours Outside the Lekking Period

Maintaining lek activity involves males and females foraging, roosting, nesting and brood-rearing before and after lekking times on a daily and seasonal basis, and noise impacts may also occur during these off-lek activities (e.g. Vehrencamp et al. 1989; Wallestad and Schladweiler 1974; Schoenberg 1982; Patricelli et al. 2013).

Recommendation: Outside of lekking times, reasonable efforts are recommended to keep noise as close to these limits as possible.

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Schoenberg, T. J. 1982 Sage grouse movements and habitat selection in North Park, Colorado: Colorado State University, Fort Collins, CO.

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Greater Crossbow Project Scoping Comments
Date: Tuesday, December 22, 2015 10:01:59 AM
Attachments: [Crossbow Scoping Comments 12-18-15.pdf](#)
[Report- Air concentrations of volatile compounds near oil and gas production.pdf](#)
[EO noise rec. Ambrose et al .doc](#)

----- Forwarded message -----

From: **Bruce Pendery** <bruce@wyomingoutdoorcouncil.org>
Date: Fri, Dec 18, 2015 at 6:17 AM
Subject: Greater Crossbow Project Scoping Comments
To: BLM_WY_BuffaloGCEIS@blm.gov

Dear Mr. Bills:

Please accept these scoping comments from the Wyoming Outdoor Council for the Greater Crossbow oil and gas project environmental impact statement that is being developed by the BLM.

Bruce Pendery

Chief Legal Counsel

Wyoming Outdoor Council

440 East 800 North

Logan, Utah 84321

(435)-752-2111

This message may be protected by the attorney client privilege and work product doctrine. If you receive it by mistake please delete it and notify me.

The Wyoming Outdoor Council has worked to protect Wyoming's land and wildlife since 1967. We need your help. Please join us today at <http://www.wyomingoutdoorcouncil.org>.

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); sserreze@ene.com
Subject: Fwd: Greater Crossbow
Date: Thursday, December 24, 2015 9:15:12 AM

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From: **Carol Seeger** <CJS06@ccgov.net>
Date: Tue, Dec 22, 2015 at 10:52 AM
Subject: Greater Crossbow
To: blm_wy_buffalogceis@blm.gov
Cc: Garry Becker <GGB01@ccgov.net>, Matt Avery <GMA01@ccgov.net>, Kendra Anderson <KRC01@ccgov.net>, Mark Christensen <MAC01@ccgov.net>, Micky Shober <MJS01@ccgov.net>, Robert Palmer <RPP01@ccgov.net>, Rusty Bell <RRB01@ccgov.net>

To Whom It May Concern:

Please accept the following comments in anticipation of the preparation of an EIS for the above referenced project. These comments are being submitted on behalf of the Board of Campbell County Commissioners.

Campbell County would like the EIS to explore and provide a thorough analysis of the potential socioeconomic impacts of this project. The project is relatively more extensive than similar developments leading to the potential for more significant socioeconomic impacts. Typically, we have not seen such impacts adequately addressed through the EIS process and would refer the BLM to the analysis done for the Industrial Siting Council as an example for identifying such impacts.

Additionally, Campbell County would suggest that potential economic impacts and/or mineral development impacts be made a part of this EIS. The area covered by this project also includes coal reserves. This project could negatively impact the development of these reserves and it is suggested that the EIS address means and methods by which development of both minerals can be supported.

Air quality is of particular concern in Campbell County. Campbell County expends considerable resources itself to mitigate negative impacts to air quality particularly with regard to its roads. The proposed development has the potential to negatively impact air quality and careful attention should be paid to establish base line levels and include methods by which air quality may be monitored and mitigated. The same would hold true for the potential for water.

Campbell County is responsible for the operation of a county landfill for the disposal of waste. As such, the county is interested in the EIS studying and providing information regarding the generation of petroleum contaminated products including suspected amounts and time frames for such generation. Additionally, if there are other times during which this project may generate higher than normal levels of waste or items of waste that will require special handling, this information should be included.

With regard to data, Campbell County would suggest and offer data contained in its Natural Resource and Land Use Plan. This plan has recently undergone extensive revision with inclusion of recent data which is likely to be useful in development of an EIS for this project. The plan amendment is currently in draft form but largely complete and is awaiting final approval pending a period for public comment prior to adoption.

On behalf of the Board of Campbell County Commissioners, I would like to extend appreciation for the opportunity to provide suggestions in the formulation of the EIS for this project. I would appreciate receiving project updates on behalf of the Board and inclusion on your mailing list.

Sincerely,

Carol Seeger, Deputy Campbell County Attorney
Campbell County Attorney's Office
500 S. Gillette Ave., Ste. B200
Gillette, Wyoming 82716
(307) 682-4310
cjs06@ccgov.net

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From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Greater Crossbow project
Date: Thursday, December 24, 2015 9:16:00 AM

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From: **Carol Seeger** <CJS06@ccgov.net>
Date: Tue, Dec 22, 2015 at 2:20 PM
Subject: Greater Crossbow project
To: blm_wy_buffalogceis@blm.gov
Cc: Garry Becker <GGB01@ccgov.net>, Matt Avery <GMA01@ccgov.net>, Kendra Anderson <KRC01@ccgov.net>, Mark Christensen <MAC01@ccgov.net>, Micky Shober <MJS01@ccgov.net>, Robert Palmer <RPP01@ccgov.net>, Rusty Bell <RRB01@ccgov.net>, jim.willox@conversecountywy.gov

To Whom It May Concern:

Please consider the following as a supplement to comments provided by me earlier on behalf of the Board of Campbell County Commissioners.

The Board sponsored a Raptor Symposium earlier this year and engaged the services of a consultant for this event. The purpose of the symposium was to generate information regarding the inventory, nest sites and monitoring of Raptors, energy development and its effects on Raptors as well as Raptor effects on energy development. Representatives from a wide range of disciplines participated including; Jason Carlisle with the University of Wyoming, Steve Slater with Hawk Watch International, Bob Oakleaf, retired from Wyoming Game & Fish, James Dwyer with EDM International Inc., Jeff Birek with Rocky Mountain Bird Observatory, Gwyn McKee with Thunderbird Wildlife Consulting, and participation from BLM and USFS representatives.

Campbell County would encourage use of information learned from this symposium and would offer to assist in facilitating access to this information for use in the preparation of the EIS.

Again, thank you.

Sincerely,

Carol Seeger, Deputy Campbell County Attorney
Campbell County Attorney's Office
500 S. Gillette Ave., Ste. B200
Gillette, Wyoming 82716
(307)682-4310
cjs06@ccgov.net

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Matthew H. Mead, *Governor*
Doug Miyamoto, *Director*
2219 Carey Ave. • Cheyenne, WY 82002
Phone: (307) 777-7321 • Fax: (307) 777-6593
Web: agriculture.wy.gov • Email: wda1@wyo.gov

The Wyoming Department of Agriculture is dedicated to the promotion and enhancement of Wyoming's agriculture, natural resources and quality of life.

December 23, 2015

Mr. Thomas Bills, NEPA Coordinator
Bureau of Land Management
Buffalo Field Office
1425 Fort Street
Buffalo, WY 82834

Dear Mr. Bills:

Following are the Wyoming Department of Agriculture (WDA) scoping comments pertaining to the Buffalo Bureau of Land Management Field Office's (BLM) and United States Forest Service, Douglas Ranger District (FS) proposed Environmental Impact Statement (EIS) for the Greater Crossbow Oil and Gas Exploration and Development Project (project).

Our comments are specific to our mission: dedication to the promotion and enhancement of Wyoming's agriculture, natural resources and quality of life. As the proposed project could affect our industry, citizens, and natural resources it is important that you continue to inform us of proposed actions and decisions and continue to provide the opportunity to communicate pertinent issues and concerns.

As the majority of this project will occur on private lands (roughly 87%) we highly recommend the BLM/FS and EOG Resources Inc. (EOG) work closely with private landowners. Reclamation will be a key component of this project and private landowners retain the right to request the use of non-native species on reclamation sites. We support the private landowners' right to develop reclamation plans specific to their operation and needs. The BLM/FS should not apply any design features limiting this ability.

We further would like to highlight that Wyoming law requires EOG, at minimum, to "reasonably accommodate existing surface uses,"¹ such as agriculture; provide notice of entry²; a written notice of proposed operations³; and "attempt good faith negotiations" with surface owners.⁴ EOG must also secure either written consent for entry onto the land, a surface use agreement, or a sufficient surety bond.⁵

If any BLM or FS livestock grazing allotments are affected by the project, the agencies should explore ways in which to limit or mitigate impacts. Additionally, no mandatory rest/deferment schedules should be placed on reclamation on federal surface (i.e., mandatory "two years rest"); the timeframe in which grazing on federal surface can recommence should be based upon ecological objectives, not arbitrary timelines.

¹ Wyoming Statute § 30-5-402 (a)

² Wyoming Statute § 30-5-402 (b)

³ Wyoming Statute § 30-5-402 (d)

⁴ Wyoming Statute § 30-5-402 (c)

⁵ Id.

Equal Opportunity in Employment and Services

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Greater Crossbow Oil & Gas Project

12/23/15

Page 2 of 2

In conclusion, we thank you for the opportunity to comment and look forward to working with you throughout the development of the EIS.

Sincerely,

Stacia Berry
for Doug Miyamoto

Doug Miyamoto
Director

DM/jb

CC: Governor's Policy Office
Wyoming Board of Agriculture
Wyoming Association of Conservation Districts
Wyoming Farm Bureau Federation
Wyoming Game and Fish Department
Wyoming State Grazing Board
Wyoming Stock Growers Association

From: [Bills, Thomas \(Tom\)](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); [Serreze, Susan](#)
Subject: Fwd: WDA Comment Letter - Greater Crossbow Oil and Gas Exploration and Development Project
Date: Thursday, December 24, 2015 8:47:42 AM
Attachments: [12-23-15Greater Crossbow Oil and Gas Exploration.pdf](#)

Thomas Bills

NEPA & Environmental Coordinator
BLM Buffalo Field Office
(307) 684-1133

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From: **Michelle MacDonald** <michelle.macdonald@wyo.gov>
Date: Thu, Dec 24, 2015 at 8:30 AM
Subject: WDA Comment Letter - Greater Crossbow Oil and Gas Exploration and Development Project
To: tbills@blm.gov
Cc: Joe Budd <joe.budd@wyo.gov>

Please see the attached comment letter from the Wyoming Department of Agriculture pertaining to the Buffalo Bureau of Land Management Field Office's and United States Forest Service, Douglas Ranger District proposed EIS for the Greater Crossbow Oil and Gas Exploration and Development Project.

Thank you,
Michelle MacDonald

Michelle MacDonald
Natural Resources & Policy Division
WY Department of Agriculture
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Cheyenne, WY 82002-0100
(307) 777-7323
Fax: (307) 777-6593

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United States Department of the Interior



FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

DEC 29 2015

In Reply Refer To:
06E13000-2014-CPA-0158

Memorandum

To: Field Manager, Bureau of Land Management, Buffalo Field Office,
Buffalo, Wyoming

From: Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office,
Cheyenne, Wyoming 

Subject: Greater Crossbow Oil and Gas Exploration and Development Project
Administered by the Bureau of Land Management

Thank you for the scoping notice dated November 18, 2015, with attached map of the proposed Greater Crossbow Oil and Gas Exploration and Development Project (Project) that was received in our office on November 23. The Bureau of Land Management (BLM) is proposing to prepare an Environmental Impact Statement (EIS) for the Project and requests the U.S. Fish and Wildlife Service (Service) provide comments for the EIS. This Project includes exploration for and development of 1,500 oil and gas wells and other infrastructure on 107,000 acres in southern Campbell and northern Converse Counties between Wright and Bill, Wyoming.

You have requested information regarding species listed under the Endangered Species Act of 1973, as amended (ESA), 16 U.S.C. 1531 *et seq.* In response to your request, the Service is providing comments and recommendations for protective measures for threatened and endangered species in accordance with the ESA. We are also providing comments and recommendations concerning migratory birds in accordance with the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703, and the Bald and Golden Eagle Protection Act (Eagle Act), 16 U.S.C. 668. Wetlands are afforded protection under Executive Orders 11990 (wetland protection) and 11988 (floodplain management), as well as section 404 of the Clean Water Act. Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 *et seq.*, and the Fish and Wildlife Act of 1956, as amended, 16 U.S.C. 742a-742j.

The Service has transitioned to a new online program to deliver species lists: the Information, Planning, and Conservation (IPaC) system. To obtain a current list of endangered, threatened, proposed, and candidate species and their designated and proposed critical habitat that occur in or may be affected by actions associated with your proposed Project, please visit our website at

<http://ecos.fws.gov/ipac/>. This website will provide you with an immediate response to your species list request. The response will also include information regarding other Service trust authorities. When entering a project location in IPaC, be sure to define the action area, not just the project footprint. The action area includes all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action [50 CFR 402.02].

At this time, we are providing the following comments based on our understanding of the Project.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

NEPA analysis should disclose the full extent of proposed development. This includes the direct and indirect effects of all aspects of the Project (pre-construction, construction, pipelines, access roads, water wells/storage ponds, utility lines, drilling, completion operations, production facilities, workovers, reclamation), and the cumulative impacts of past, present, and reasonably foreseeable future actions regardless of who is responsible for those actions.

MBTA/EAGLE ACT

The Project includes a request to waive discretionary timing limitations to conduct year-round drilling. The Service typically does not support requests to waive all discretionary timing limitations for projects when there could be risk of violating the MBTA and/or the Eagle Act; however, early coordination meetings in 2014 and 2015 with representatives of EOG Resources and Kleinfelder and staff from the BLM, U.S. Forest Service, and the Service have resulted in development of a draft Raptor Conservation and Mitigation Plan (Plan). The Service looks forward to collaboration with all parties in the development of the Plan. The Plan should include avoidance and minimization actions due to Project impacts on birds and compensatory mitigation as well as emphasizing conservation benefits to migratory birds.

Under the MBTA, the Eagle Act, and Executive Order 13186 (66 FR 3853; January 17, 2001), federal agencies have an obligation to protect all species of migratory birds, including eagles and other raptors, which may occur on lands under their jurisdiction. Of particular focus are the species identified in the Service's Birds of Conservation Concern (BCC) (U.S. Fish and Wildlife Service 2008). In accordance with the Fish and Wildlife Conservation Act (16 USC 2912 (a)(3)), this report identifies "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing" under the ESA. This report is intended to stimulate coordinated and proactive conservation actions among federal, state, and private partners and is available at <https://www.fws.gov/migratorybirds/pdf/management/BCC2008.pdf>.

The MBTA, enacted in 1918, prohibits the taking of any migratory birds, their parts, nests, or eggs, except as permitted by regulations, and do not require intent to be proven. Section 703 of the MBTA states, "Unless and except as permitted by regulations ... it shall be unlawful at any time, by any means or in any manner, to ... take, capture, kill, attempt to take, capture, or kill, or possess ... any migratory bird, any part, nest, or eggs of any such bird...." The Eagle Act prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity,

any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing.

The Memorandum of Understanding (BLM MOU WO-230-2010-04) between the BLM and the Service outlines a collaborative approach to promote the conservation of migratory bird populations through Executive Order 13186, 66 Fed. Reg. 3853 (January 17, 2001). This MOU states that the BLM shall, at the project level, "evaluate the effects of the BLM's actions on migratory birds during the NEPA process, and identify where take reasonably attributable to agency actions may have a measurable negative effect on migratory bird populations" and that "BLM will implement approaches lessening such take." The MOU also states that BLM shall "modify conservation measures to be more effective in reducing unintentional take, and as practicable, to restore and enhance the habitat of migratory birds."

Removal or destruction of such nests or causing abandonment of a nest could constitute violation of one or both of the above statutes. Removal of any active migratory bird nest or nest tree is prohibited. For golden eagles, inactive nest permits are limited to activities involving resource extraction or human health and safety. Mitigation, as determined by the local Service field office, may be required for loss of these nests. No permits will be issued for an active nest of any migratory bird species, unless removal of an active nest is necessary for reasons of human health and safety. Therefore, if nesting migratory birds are present on or near the Project area, timing is a significant consideration and needs to be addressed in Project planning.

In an effort to help ensure activities do not take nesting birds, their eggs, or immature birds, for many raptor species protected by the MBTA/Eagle Act, we recommend implementing voluntary spatial and seasonal buffer zones to protect individual nest sites. These include: (1) keeping a distance between the activity and the nest (distance buffers); (2) maintaining natural areas between the activity and around nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season territories (see the Wyoming Ecological Services website at http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/Raptors.html). The buffer areas serve to minimize visual and auditory impacts associated with human activities near nest sites. The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there are little or no forested or topographical buffers, such as in many western states, distance alone must serve as the buffer.

For optimal conservation benefit, we recommend that no temporary or permanent surface occupancy occur within species-specific spatial buffer zones. These recommendations may be modified on a site-specific and project-specific basis based on field observations and knowledge of local conditions. For example, in those situations where raptors appear to have habituated to the current level of disturbance and human-induced impacts additional spatial and seasonal restrictions may not be necessary. Please review enclosed Raptor Guidelines.

Ferruginous Hawks

There is broad concern over the conservation status of the ferruginous hawk in Wyoming. In addition to helping ensure compliance with the MBTA, implementing protective measures for

this species now is likely to maintain or improve its conservation status and may help to preclude the need for additional protections in the future. Ferruginous hawks are listed as Birds of Conservation Concern (BCC) (US Fish and Wildlife Service 2008) and without additional conservation actions, are likely to become candidates for listing under the ESA. Additionally, the BLM lists the ferruginous hawk as a Sensitive Species while the State of Wyoming lists the ferruginous hawk as a Tier I species (Species of Greatest Conservation Need) in the State Wildlife Action Plan (Wyoming Game and Fish Department 2010). The BLM developed this designation to "ensure that any actions on public lands consider the overall welfare of these sensitive species and do not contribute to their decline."

Eagles

Golden eagles are also one of the species identified in the Service's BCC (2008) (U.S. Fish and Wildlife Service 2008). In addition to meeting the requirements of the MBTA and Eagle Act, we encourage you to implement measures to enhance the conservation of golden eagles and to take steps to help secure the status of this species.

Power Lines

We recommend that power lines be buried through areas of high avian use areas (i.e., away from areas used for nesting, foraging, roosting or migrating), to minimize bird electrocution and collision potential. If the avian survey data available for the Project do not provide the detail needed to determine normal bird habitat use and movements, we recommend collecting that information prior to determining locations for infrastructure.

Where power lines are constructed overhead, we recommend use of bird flight diverters in all areas identified as having high potential use of migratory birds and eagles. The diverters should be placed at 5 meter intervals (APLIC 2012) to reduce collision potential. We also recommend that all power lines, new or old construction, meet or exceed the recommendations contained in Suggested Practices for Raptor Protections on Power Lines: The State of the Art 2006 (APLIC 2006).

Agencies have at times recommended the use of perch discouragers on power poles to limit perching of raptors and corvids with the intent to reduce predation on sensitive prey species (e.g. greater sage-grouse, mountain plover, and black-footed ferret). Using perch discouragers on power poles may reduce, but will not prevent, raptors from preying on species of concern (Slater and Smith 2010), and may increase electrocution risk for avian species (APLIC 2006). Perch discouragers may also increase nesting substrate for corvids, which could impact population demographics of sensitive prey species (Howe *et al.* 2014). Therefore, it is our position not to recommend the use of perch discouragers to reduce predation on sensitive prey species.

To minimize avian predation on sensitive prey species, we recommend that: (1) power lines are sited outside of sensitive prey species' habitat; (2) structures are designed to minimize perching and nesting (such as tubular instead of lattice structures), especially in areas of high resource value; and/or (3) where appropriate and feasible, lines are buried. Additionally, we do not recommend that perch discouragers be installed in place of raptor safe equipment and construction. If Service recommendations are not followed and perch discouragers are used, the

Service recommends that perch discourages are installed and maintained to specifications which will minimize the likelihood of avian electrocutions.

ESA SECTION 7

In accordance with section 7(c) of the ESA, we have determined that the following species or their designated habitat may be present in the proposed Project area. We would appreciate receiving information as to the current status of each of these species within the proposed Project area.

**Endangered, Threatened, Proposed, and Candidate Species
And Their Designated and Proposed Critical Habitat That Occur
In or May Be Affected by Actions in the Proposed Project Area**

December 2015

| <u>Species/Critical Habitat</u> | <u>Scientific Name</u> | <u>Status</u> | <u>Habitat</u> |
|--|--|--|---|
| <u>Platte River Species</u> <ul style="list-style-type: none"> • Least Tern (Interior Population), • Pallid Sturgeon, • Piping Plover, • Western Prairie Fringed Orchid, • Whooping Crane | <i>Sterna (Sternula) antillarum</i> <i>Scaphirhynchus albus</i> <i>Charadrius melodus</i> <i>Platanthera praeclara</i> <i>Grus americana</i> | Endangered Endangered Threatened Threatened Endangered | Riverine habitat downstream of Wyoming in the Platte River system |
| <u>Platte River Species Critical Habitat</u> | Designated for whooping crane in Nebraska in riverine habitat of the Platte River system (see 50 CFR 17.95(b)) | | |
| <u>Preble's Meadow Jumping Mouse</u> | <i>Zapus hudsonius preblei</i> | Threatened | Lush riparian vegetation or herbaceous understories of wooded areas near water |
| <u>Ute Ladies'-tresses</u> | <i>Spiranthes diluvialis</i> | Threatened | Seasonally moist soils and wet meadows of drainages below 7,000 ft. elevation |
| <u>Northern Long-eared Bat</u> | <i>Myotis septentrionalis</i> | Threatened | Under bark, in cracks, crevices, and cavities of trees in upland forests; also in buildings and under bridges |
| <u>Sprague's Pipit</u> | <i>Anthus spragueii</i> | Candidate | Open grasslands/prairies |

Platte River Species: If the proposed action may lead to consumptive use of water or have the potential to affect water quality in the Platte River System, there may be impacts to threatened and endangered species inhabiting the downstream reaches of this river system and to designated critical habitat. For more information on how to seek coverage under the ESA for water-related activities through the Platte River Recovery Implementation Program, please visit our web site at <http://www.fws.gov/platteriver>.

Preble's Meadow Jumping Mouse: Federal listing status under the ESA for Preble's meadow jumping mouse (*Zapus hudsonius preblei*) as a threatened species in Wyoming was reinstated on August 6, 2011 (76 FR 47490). The Preble's meadow jumping mouse is a small rodent in the Zapodidae family and is one of 12 recognized subspecies of *Z. hudsonius*, the meadow jumping mouse. This subspecies has a body length of 3 to 4 inches, a bicolored tail 4 to 6 inches in length, large hind feet adapted for jumping, and a distinct dark stripe down the middle of its back bordered on either side by gray to orange-brown fur. Their diet consists of seeds, fruits, fungi, and insects. The Preble's meadow jumping mouse is primarily nocturnal or crepuscular (active during twilight), but has been observed during daylight. This subspecies hibernates from October to May in small underground burrows.

The Preble's meadow jumping mouse exhibits a preference for lush vegetation along watercourses or herbaceous understories in wooded areas near water. The mouse occurs in low undergrowth consisting of grasses or forbs; in wet meadows and riparian corridors; or areas where tall shrubs and low trees provide adequate cover. The subspecies uses upland habitats as far as 330 feet beyond the 100-year floodplain. In Wyoming, the Preble's meadow jumping mouse has been documented in Albany, Laramie, Platte and Converse Counties, and may occur in Goshen County. If a proposed project will disturb suitable habitat within any of these five counties, surveys are recommended prior to any action. Surveys should be conducted by knowledgeable biologists trained in conducting Preble's meadow jumping mouse surveys.

Ute Ladies'-tresses: Ute ladies'-tresses (*Spiranthes diluvialis*) is a perennial orchid, 8 to 20 inches tall, with white or ivory flowers clustered into a spike arrangement at the top of the stem. Ute ladies'-tresses typically blooms from late July through August. However, it may bloom in early July or still be in flower as late as October, depending on location and climatic conditions. Ute ladies'-tresses is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams where it colonizes early successional point bars or sandy edges. The elevation range of known occurrences is 4,200 to 7,000 feet (although no known populations in Wyoming occur above 5,750 feet). Soils where Ute ladies'-tresses have been found typically range from fine silt/sand, to gravels and cobbles, as well as to highly organic and peaty soil types. Ute ladies'-tresses is not found in heavy or tight clay soils or in extremely saline or alkaline soils. Ute ladies'-tresses typically occurs in small, scattered groups found primarily in areas where vegetation is relatively open.

Many orchid species take 5 to 10 years to reach reproductive maturity; this appears to be true for Ute ladies'-tresses (57 FR 2048; January 17, 1992). Furthermore, reproductively mature plants do not flower every year. For these reasons, 2 to 3 years of surveys are necessary to determine presence or absence of Ute ladies'-tresses. Surveys should be conducted by knowledgeable botanists trained in conducting rare plant surveys.

Northern Long-Eared Bat: The northern long-eared bat (*Myotis septentrionalis*) is listed under the ESA as a threatened species (80 FR 17974; April 2, 2015). The listing decision included an interim special rule under section 4(d) of the ESA that provides flexibility to landowners, land managers, government agencies and others as they conduct activities in areas that could be northern long-eared bat habitat. In areas of the northern long-eared bat's range that have not yet been affected by white-nose syndrome, as defined in the interim 4(d) rule, such as in Wyoming, incidental take (unintentional harm to bats incidental to otherwise lawful activities) is not prohibited. Even though the 4(d) rule excepts incidental take, Federal agencies still have an obligation to consult on may affect determinations. In addition, based on the interim 4(d) rule, removing bats from human dwellings does not need to be regulated. However, purposeful take, other than removal of bats from dwellings, is prohibited. Critical habitat is not proposed at this time. More information about the 4(d) rule and a current white-nosed syndrome buffer map are available at <http://www.fws.gov/midwest/endangered/mammals/nleb/>.

This bat is a medium-sized bat, distinguished from other *Myotis* species by its characteristically large ears and long, pointed tragus (projection of skin in front of the external ear). Northern long-eared bats are found throughout eastern and central North America and occur in the extreme northeastern portions of Wyoming. Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch in flight using echolocation, or by gleaning (picking) from vegetation. In the summer, male and reproductive female bats roost singly or in colonies in cracks, crevices, cavities, and under the bark of live and dead trees, while other males and non-reproductive females roost in cooler places like caves and mines. Northern long-eared bats can also be found roosting in buildings and under bridges. Maternity habitat for the northern long-eared bat is summer habitat used by juveniles and reproductive (pregnant, lactating, or post-lactating) females. Breeding occurs in late summer and fall when bats swarm at entrances of hibernacula; however, females delay fertilization until spring when they emerge from hibernation.

The northern long-eared bat is threatened by white-nose syndrome (WNS), a disease caused by the cold-loving fungus, *Pseudogymnoascus (Geomyces) destructans*. First observed in New York in 2006, WNS has spread rapidly across the Northeast and into the Midwest and Southeast. Throughout the range of WNS, up to 99 percent of infected bats die from the disease. Although there is uncertainty about the spread of WNS, experts agree that the fungus will likely spread throughout the United States. The northern long-eared bat is also threatened by the loss and degradation of summer habitat caused by human development, and by collision with or barotrauma (injury to the lungs due to a change in air pressure) caused by wind turbines. Mine closures and vandalism of winter roosts and hibernacula also pose threats to this species. In areas that may provide potential habitat for the northern long-eared bat, we recommend tree-clearing and controlled burns be avoided during the roosting season (approximately April through September) unless an emergence or other survey developed in coordination with the Service determines that no northern long-eared bats are using the area. Actions to benefit the northern long-eared bat include installing bat boxes in a safe, sunny location (instructions at <http://www.fws.gov/midwest/endangered/mammals/inba/pdf/BatBoxPlanForIN.pdf>), protecting hibernacula, and reducing insecticide use that targets prey species of the northern long-eared bat.

CANDIDATE SPECIES

A candidate species is one for which the Service has sufficient information on their biological status and threats to propose for listing under the ESA, but the development of a proposed listing rule is precluded by other higher priority listing actions. Listing actions are prioritized by the degree or magnitude of threats to the species, the immediacy of the threats, and the taxonomic distinctiveness of the species. Candidates are reviewed annually to determine if they continue to warrant listing or if their status or priority has changed. Conservation measures for candidate species are voluntary, but recommended. Protection provided to these species now may preclude possible listing in the future. We would appreciate receiving information as to the current status of these species in or near the Project area.

Sprague's Pipit: Sprague's pipit (*Anthus spragueii*) is a candidate for listing under the ESA (75 FR 56028; September 15, 2010). Sprague's pipit is a relatively small ground nesting passerine bird that breeds in open grasslands of the Northern Great Plains. Males and females are similar in appearance with buff and blackish streaking on the crown, nape, and underparts, and a plain buff-colored face with a large eye-ring. Sprague's pipit is closely tied to native prairie habitat and breeds in the north-central United States in Minnesota, Montana, North Dakota, and South Dakota, as well as south-central Canada. Wintering occurs in Arizona, Texas, Oklahoma, Arkansas, Mississippi, Louisiana, and New Mexico. A number of threats to its continued existence have been identified including: habitat fragmentation on the breeding grounds, energy development, roads, and the inadequacy of existing regulatory mechanisms.

SPECIFIC COMMENTS

Drilling

The Project presents one of the benefits of year-round drilling to be shorter full-pad development time frames. During scoping we learned from EOG Resources that it is not their intent to drill all wells on each pad consecutively. Rather, phased drilling could occur and a few wells could be drilled during one phase while noting that EOG Resources may not return to drill more wells on that pad for several years. The Service recommends that the Project and the EIS clearly describe the development plan that EOG Resources intends to follow. The request for year-round drilling is not supported by the proposal to move the drilling rig without completing all wells on that pad.

Infrastructure

The Service requests more information about existing infrastructure in the Project area and how it relates to the Project. For example, what are the benefits to the spine and rib approach when existing development already occurs in the Project area? Could existing operations still affect wildlife resources since existing operations will not be tied into the proposed infrastructure?

For our internal tracking purposes, we would appreciate notification of any decision made on this Project (such as issuance of a permit or signing of a Record of Decision or Decision Memo). Notification can be sent in writing to the letterhead address or by electronic mail to FW6_Federal_Activities_Cheyenne@fws.gov.

We appreciate your efforts to ensure the conservation of endangered, threatened, and candidate species and migratory birds. If you have questions regarding this letter or your responsibilities under the ESA or other authorizes, please contact Lynn Gemlo of my office at the letterhead address or phone (307) 772-2374, extension 228.

Attachment (1)

cc: BLM, Endangered Species Program Lead, Cheyenne, WY (C. Keefe) (ckeefe@blm.gov)
BLM, Project Manager, Buffalo, WY (T. Bills) (tbills@blm.gov)
WGFD, Statewide Nongame Bird and Mammal Program Supervisor, Lander, WY
(Z. Walker) (zack.walker@wyo.gov)
WGFD, Habitat Protection Biologist, Casper, WY (A. Withroder)
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WGFD, Habitat Protection Secretary, Cheyenne, WY (N. Stange)
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U.S. Fish and Wildlife Service, Wyoming Ecological Services Field Office**Protections for Raptors**

Raptors, or birds of prey, and the majority of other birds in the United States are protected by the Migratory Bird Treaty Act, 16 U.S.C. 703 (MBTA). A complete list of migratory bird species can be found in the Code of Federal Regulations at 50 CFR 10.13. Eagles are also protected by the Bald and Golden Eagle Protection Act, 16 U.S.C. 668 (Eagle Act).

The MBTA protects migratory birds, eggs and nests from possession, sale, purchase, barter, transport, import, export, and take. The regulatory definition of take, defined in 50 CFR 10.12, means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to hunt, shoot, wound, kill, trap, capture, or collect a migratory bird. Activities that result in the unpermitted take (e.g., result in death, possession, collection, or wounding) of migratory birds or their eggs are illegal and fully prosecutable under the MBTA. Removal or destruction of active nests (i.e., nests that contain eggs or young), or causing abandonment of an active nest, could constitute a violation of the MBTA, the Eagle Act, or both statutes. Removal of any active migratory bird nest or any structure that contains an active nest (e.g., tree) where such removal results in take is prohibited. Therefore, if nesting migratory birds are present on or near a project area, project timing is an important consideration during project planning. As discussed below, the Eagle Act provides additional protections for bald and golden eagles and their nests. For additional information concerning nests and protections under the MBTA, please see the U.S. Fish and Wildlife Service's (Service) Migratory Bird Permit Memorandum, MBMP-2.

The Service's Wyoming Ecological Services Field Office works to raise public awareness about the possible occurrence of birds in proposed project areas and the risk of violating the MBTA, while also providing guidance to minimize the likelihood that take will occur. We encourage you to coordinate with our office before conducting actions that could lead to the take of a migratory bird, their young, eggs, or active nests (e.g., construction or other activity in the vicinity of a nest that could result in a take). If nest manipulation is proposed for a project in Wyoming, the project proponent should also contact the Service's Migratory Bird Office in Denver at 303-236-8171 to see if a permit can be issued. Permits generally are not issued for an active nest of any migratory bird species, unless removal of the nest is necessary for human health and safety. If a permit cannot be issued, the project may need to be modified to ensure take of migratory birds, their young or eggs will not occur.

For infrastructure (or facilities) that have potential to cause direct avian mortality (e.g., wind turbines, guyed towers, airports, wastewater disposal facilities, transmission lines), we recommend locating structures away from high avian-use areas such as those used for nesting, foraging, roosting or migrating, and the travel zones between high-use areas. If the wildlife survey data available for the proposed project area and vicinity do not provide the detail needed to identify normal bird habitat use and movements, we recommend collecting that information prior to determining locations for any infrastructure that may create an increased potential for avian mortalities. We also recommend contacting the Service's Wyoming Ecological Services office for project-specific recommendations.

Additional Protections for Eagles

The Eagle Act protections include provisions not included in the MBTA, such as the protection of unoccupied nests and a prohibition on disturbing eagles. Specifically, the Eagle Act prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagle or their body parts, nests, chicks or eggs, which includes collection, possession, molestation, disturbance, or killing. The term "disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.3 and see also 72 FR 31132).

The Eagle Act includes limited exceptions to its prohibitions through a permitting process. The Service has issued regulations concerning the permit procedures for exceptions to the Eagle Act's prohibitions (74 FR 46836), including permits to take golden eagle nests which interfere with resource development or recovery operations (50 CFR 22.25). The regulations identify the conditions under which a permit may be issued (i.e., status of eagles, need for action), application requirements, and other issues (e.g., mitigation, monitoring) necessary in order for a permit to be issued.

For additional recommendations specific to Bald Eagles please see our Bald Eagle information web page (http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/BaldEagle.html).

Recommended Steps for Addressing Raptors in Project Planning

Using the following steps in early project planning, agencies and proponents can more easily minimize impacts to raptors, streamline planning and permitting processes, and incorporate measures into an adaptive management program:

1. Coordinate with appropriate Service offices, Wyoming Game and Fish Department, Tribal governments, and land-management agencies at the earliest stage of project planning.
2. Identify species and distribution of raptors occurring within the project area by searching existing data sources (e.g., Wyoming Game and Fish Department, Federal land-management agencies) and by conducting on-site surveys.
3. Plan and schedule short-term and long-term project disturbances and human-related activities to avoid raptor nesting and roosting areas, particularly during crucial breeding and wintering periods
4. Determine location and distribution of important raptor habitat, nests, roost sites, migration zones and, if feasible, available prey base in the project impact area.
5. Document the type, extent, timing, and duration of raptor activity in important use areas to establish a baseline of raptor activity.
6. Ascertain the type, extent, timing, and duration of development or human activities proposed to occur, and the extent to which this differs from baseline conditions.
7. Consider cumulative effects to raptors from proposed projects when added to past, present, and reasonably foreseeable actions. Ensure that project mitigation adequately addresses cumulative effects to raptors.
8. Minimize loss of raptor habitats and avoid long-term habitat degradation. Mitigate for unavoidable losses of high-valued raptor habitats, including (but not limited to) nesting, roosting, migration, and foraging areas.
9. Monitor and document the status of raptor populations and, if feasible, their prey base post project completion, and evaluate the success of mitigation efforts.
10. Document meaningful data and evaluations in a format that can be readily shared and incorporated into wildlife databases (contact the Service's Wyoming Ecological Services office for details).

Protection of nesting, wintering (including communal roost sites), and foraging activities is considered essential to conserving raptors. In order to promote the conservation of migratory bird populations and their habitats, Federal agencies should implement those strategies directed by Executive Order 13186, "Responsibilities of Federal Agencies To Protect Migratory Birds" (66 FR 3853).

Recommended Seasonal and Spatial Buffers to Protect Nesting Raptors

Because many raptors are particularly sensitive to disturbance (that may result in take) during the breeding season, we recommend implementing spatial and seasonal buffer zones to protect individual nest sites/territories (Table 1). The buffers serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest trees and provide for alternative or

replacement nest trees. The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there is little or no forested or topographical separation, distance alone must serve as the buffer. Adequate nesting buffers will help ensure activities do not take breeding birds, their young or eggs. For optimal conservation benefit, we recommend that no temporary or permanent surface occupancy occur within species-specific spatial buffer zones. For some activities with very substantial auditory impacts (e.g., seismic exploration and blasting) or visual impacts (e.g., tall drilling rig), a larger buffer than listed in Table 1 may be necessary, please contact the Service's Wyoming Ecological Services office for project specific recommendations on adequate buffers.

As discussed above, for infrastructure that may create an increased potential for raptor mortalities, the spatial buffers listed in Table 1 may not be sufficient to reduce the incidence of raptor mortalities (for example, if a wind turbine is placed outside a nest disturbance buffer, but inadvertently still within areas of normal daily or migratory bird movements); therefore, please contact the Service's Wyoming Ecological Services office for project specific recommendations on adequate buffers.

Buffer recommendations may be modified on a site-specific or project-specific basis based on field observations and local conditions. The sensitivity of raptors to disturbance may be dependent on local topography, density of vegetation, and intensity of activities. Additionally, individual birds may be habituated to varying levels of disturbance and human-induced impacts. Modification of protective buffer recommendations may be considered where biologically supported and developed in coordination with the Service's Wyoming Ecological Services Field Office.

Because raptor nests are often initially not identified to species (e.g., preliminary aerial surveys in winter), we first recommend a generic raptor nest seasonal buffer guideline of January 15th – August 15th. Similarly, for spatial nesting buffers, until the nesting species has been confirmed, we recommend applying a 1-mile spatial buffer around the nest. Once the raptor species is confirmed, we then make species-specific and site-specific recommendations on seasonal and spatial buffers (Table 1).

Activities should not occur within the spatial/seasonal buffer of any nest (occupied or unoccupied) when raptors are in the process of courtship and nest site selection. Long-term land-use activities and human-use activities should not occur within the species-specific spatial buffer of occupied nests. Short-term land use and human-use activities proposed to occur within the spatial buffer of an occupied nest should only proceed during the seasonal buffer after coordination with the Service, State, and Tribal wildlife resources management agencies, and/or land-management agency biologists. If, after coordination, it is determined that due to human or environmental safety or otherwise unavoidable factors, activities require temporary incursions within the spatial and seasonal buffers, those activities should be planned to minimize impacts and monitored to determine whether impacts to birds occurred. Mitigation for habitat loss or degradation should be identified and planned in coordination with applicable agencies.

Please contact the Service's Wyoming Ecological Services Field Office if you have any questions regarding the status of the bald eagle, permit requirements, or if you require technical assistance regarding the MBTA, Eagle Act, or the above recommendations. The recommended spatial and seasonal buffers are voluntary (unless made a condition of permit or license) and are not regulatory, and they do not supersede provisions of the MBTA, Eagle Act, Migratory Bird Permit Memorandum (MBMP-2), and Endangered Species Act. Assessing legal compliance with the MBTA or the Eagle Act and the implementing regulations is ultimately the authority and responsibility of the Service's law enforcement personnel. Our recommendations also do not supersede Federal, State, local, or Tribal regulations or permit conditions that may be more restrictive.

Table 1. Service's Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors

| Raptors of Conservation Concern (see below for more information) | | |
|---|--|------------------------|
| Common Name | Spatial buffer (miles) | Seasonal buffer |
| Golden Eagle | 0.50 | January 15 - July 31 |
| Ferruginous Hawk | 1.00 | March 15 - July 31 |
| Swainson's Hawk | 0.25 | April 1 - August 31 |
| Bald Eagle | see Bald Eagle information web page ¹ | |
| Prairie Falcon | 0.50 | March 1 - August 15 |
| Peregrine Falcon | 0.50 | March 1 - August 15 |
| Short-eared Owl | 0.25 | March 15 - August 1 |
| Burrowing Owl | 0.25 | April 1 - September 15 |
| Northern Goshawk | 0.50 | April 1 - August 15 |

Additional Wyoming Raptors

| Common Name | Spatial buffer (miles) | Seasonal buffer |
|--|-------------------------------|---------------------------|
| Osprey | 0.25 | April 1 - August 31 |
| Cooper's Hawk | 0.25 | March 15 - August 31 |
| Sharp-shinned Hawk | 0.25 | March 15 - August 31 |
| Red-tailed Hawk | 0.25 | February 1 - August 15 |
| Rough-legged Hawk (winter resident only) | ---- | ---- |
| Northern Harrier | 0.25 | April 1 - August 15 |
| Merlin | 0.50 | April 1 - August 15 |
| American Kestrel | 0.125 | April 1 - August 15 |
| Common Barn Owl | 0.125 | February 1 - September 15 |
| Northern Saw-whet Owl | 0.25 | March 1 - August 31 |
| Boreal Owl | 0.25 | February 1 - July 31 |
| Long-eared Owl | 0.25 | February 1 - August 15 |
| Great Horned Owl | 0.125 | December 1 - September 30 |
| Northern Pygmy-Owl | 0.25 | April 1 - August 1 |
| Eastern Screech -owl | 0.125 | March 1 - August 15 |
| Western Screech-owl | 0.125 | March 1 - August 15 |
| Great Gray Owl | 0.25 | March 15 - August 31 |

¹ http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/BaldEagle.html**Raptors of Conservation Concern**

The Service's Birds of Conservation Concern (2008) report identifies "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing" under the Endangered Species Act (16 U.S.C 1531 et seq.). This report is intended to stimulate coordinated and proactive conservation actions among Federal, State, and private partners. The Wyoming Partners in Flight Wyoming Bird Conservation Plan identifies priority bird species and habitats, and establishes objectives for bird populations and habitats in Wyoming. This plan also recommends conservation actions to accomplish the population and habitat objectives.

We encourage project planners to develop and implement protective measures for the Birds of Conservation Concern as well as other high-priority species identified in the Wyoming Bird Conservation Plan. For

additional information on the Birds of Conservation Concern that occur in Wyoming, please see our Birds of Conservation Concern web page.

Additional Planning Resources

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, CA.

Edison Electric Institute and the Raptor Research Foundation. 1996. Suggested Practices for Raptor Protection on Power Lines - The State of the Art in 1996. Washington, D.C.

Edison Electric Institute's Avian Power Line Interaction Committee and U.S. Fish and Wildlife Service. 2005. Avian Protection Plan Guidelines.

Edison Electric Institute and the Raptor Research Foundation. 1994. Mitigating Bird Collisions with Power Lines - The State of the Art in 1994. Washington, D.C.

U.S. Fish and Wildlife Service. 2000. Siting, Construction, Operation and Decommissioning of Communications Towers and Tower Site Evaluation Form (Directors Memorandum September 14, 2000), Arlington, Virginia.

U.S. Fish and Wildlife Service. 2007. National Bald Eagle Management Guidelines. United States Department of Interior, Fish and Wildlife Service, Arlington, Virginia. 23 pp.

Wyoming Game and Fish Department Internet Link to Raptor Information

References

50 CFR 10.12 – Code of Federal Regulations. Title 50--Wildlife and Fisheries, Chapter I--United States Fish and Wildlife Service, Department of the Interior, Part 10--General Provisions.

50 CFR 10.13– Code of Federal Regulations. Title 50--Wildlife and Fisheries, Chapter I--United States Fish and Wildlife Service, Department of the Interior, Part 10--General Provisions.

50 CFR 22.3 – Code of Federal Regulations. Title 50--Wildlife and Fisheries, Chapter I--United States Fish and Wildlife Service, Department of the Interior, Part 22—Eagle Permits.

50 CFR 22.25– Code of Federal Regulations. Title 50--Wildlife and Fisheries, Chapter I--United States Fish and Wildlife Service, Department of the Interior, Part 22—Eagle Permits.

66 FR 3853 - Presidential Documents. Executive Order 13186 of January 10, 2001. Responsibilities of Federal Agencies To Protect Migratory Birds. Federal Register, January 17, 2001.

72 FR 31132 - Protection of Eagles; Definition of "Disturb". Final Rule. Federal Register, June 5, 2007.

74 FR 46836 - Eagle Permits; Take Necessary To Protect Interests in Particular Localities. Final Rule. Federal Register, September 11, 2009.

U.S. Fish and Wildlife Service. 2003. Migratory Bird Permit Memorandum, MBMP-2, Nest Destruction (Directors Memorandum April 15, 2003), Washington, D.C.

Enclosure

U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp.

From: [Bills, Thomas \(Tom\)](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); [Serreze, Susan](#); [Carlos Jallo \(carlos_jallo@eogresources.com\)](#); [Verplancke, James](#); [Shane Gray](#)
Subject: Fwd: Greater Crossbow Scoping - FWS Reference Number WY14CPA0158
Date: Tuesday, December 29, 2015 2:39:02 PM
Attachments: [WY14CPA0158_DEIS Comments_Greater Crossbow Project_20151229.pdf](#)

FWS scoping comments attached.

Carlos,
I'm sending you these comments as many of the comments relate to the project design and raptor mitigation plan.

Tom

Thomas Bills

NEPA & Environmental Coordinator
BLM Buffalo Field Office
(307) 684-1133

----- Forwarded message -----

From: **O'Donnell, Donna** <donna_odonnell@fws.gov>
Date: Tue, Dec 29, 2015 at 1:51 PM
Subject: Greater Crossbow Scoping - FWS Reference Number WY14CPA0158
To: BLM_WY BuffaloGCEIS <blm_wy_buffalogceis@blm.gov>
Cc: Christopher Keefe <ckeefe@blm.gov>, "Thomas (Tom) Bills" <tbills@blm.gov>, Zack Walker <zack.walker@wyo.gov>, amanda.withroder@wyo.gov, Mary Flanderka <mary.flanderka@wyo.gov>, Nancy Stange <nancy.stange@wyo.gov>, Kimberly Dickerson <kimberly_dickerson@fws.gov>, Nathan Darnall <nathan_darnall@fws.gov>, Pauline Hope <pauline_hope@fws.gov>, Lynn Gemlo <lynn_gemlo@fws.gov>

Attached.

Donna O'Donnell
Administrative Support Assistant
U.S. Fish and Wildlife Service - Wyoming ES Office
5353 Yellowstone Road, Suite 308A
Cheyenne, WY 82009
Phone: (307) 772-2374, Ext. 223
Fax: (307) 772-2358
donna_odonnell@fws.gov

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Support for the Greater Crossbow Oil and Gas Exploration and Development Project
Date: Wednesday, December 30, 2015 1:18:36 PM

----- Forwarded message -----

From: [REDACTED]
Date: Tue, Dec 29, 2015 at 7:36 PM
Subject: Support for the Greater Crossbow Oil and Gas Exploration and Development Project
To: blm_wy_buffalogceis@blm.gov
Cc: [REDACTED]

BLM,

I am writing this email to support the Greater Crossbow Oil and Gas Exploration and Development Project. As a member of the community and energy industry I believe this project is a much needed development for the oil industry and is in the best interest of those involved. The entire community has been negatively affected by the diminished oil prices and I support any development promoting growth in the energy sector.

Sincerely,

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

ENCOURAGING RESPONSIBLE DEVELOPMENT TODAY ~ FOR TOMORROW

934 N. MAIN ST. SHERIDAN, WY 82801 (307) 672-5809 FAX (307) 672-5800
INFO@POWDERRIVERBASIN.ORG WWW.POWDERRIVERBASIN.ORG



December 29, 2015

Bureau of Land Management
Buffalo Field Office
Attn: Tom Bills, Project Manager
1425 Fort Street
Buffalo, WY 82834-2436
Submitted via electronic mail to: blm_wy_buffalogceis@blm.gov

RE: Greater Crossbow Project

Dear Mr. Bills,

Thank you for soliciting comments regarding the scope of BLM's EIS for the proposed Greater Crossbow Project. On behalf of our members who live, work, and recreate in Campbell and Converse Counties, we submit the following comments.

Scope of the Action

Please explain how BLM arrived at the scope of the proposed action, including the number of wells, well pads, and wells per pad, in addition to the size of pads. Please describe how the Plan of Development (PoD) was calculated and please disclose all correspondence with oil and gas operators regarding the PoD scenario.¹ Please disclose any uncertainties related to the PoD scenario, especially if the actual drilling could be greater than what is now anticipated. Please also fully disclose whether drilling will be allowed prior into federal minerals prior to the EIS completion, and if so, how BLM is legally authorized to do that under NEPA.

Alternatives

Please consider a robust range of alternatives commensurate with NEPA's requirements. Specifically, BLM should propose, consider, and select a phased development alternative that requires reclamation of drilled areas before drilling in new areas can proceed (see the Fortification Creek EA as an example of a phased development approach that could be required). Phased development is necessary to reduce the impacts of this project. Since the proposed project is multi-year, we ask that BLM consider a multi-year phased development approach that is enforceable based on socioeconomic and public health impact criteria and on reclamation goals and objectives. Additionally, if resource impacts become unacceptable (e.g. if air quality

¹ We note that information that is incorporated by reference in a NEPA document must be available for public review and comment under CEQ regulations.

limits are exceeded or sage-grouse or ferruginous hawk populations are locally extirpated, BLM should impose a moratorium on new leasing and permitting in the project area.

Mitigation Measures

BLM must consider a wide range of mitigation measures in its EIS and adopt measures that are needed to prevent undue and unnecessary degradation of federal land and mineral resources and undesirable social and economic impacts. The mitigation measures should include: 1) phased development and concurrent reclamation to reduce impacts to water, air, land, and wildlife; 2) adequate bonding tied to the true cost of reclamation; 3) expanded buffers around sage grouse core and connectivity areas, and ferruginous hawk, mountain plover, and bald and golden eagle nests, and a review of additional critical wildlife habitat that should be protected, including areas used by migratory birds; 4) requirements for recycling of drilling and fracking water and measures to ensure tracking of flowback water disposal to help eliminate the impacts of wastewater disposal and limit illegal dumping of flowback water; 5) measures to implement increased inspection and enforcement in the field; 6) assurances that orphaned, abandoned, or permanently idle oil and gas wells are properly plugged and reclaimed prior to new drilling in the area; 7) additional bonding for oil facilities, including pits and tank farms, to ensure reclamation on private and public surface when federal minerals are developed; 8) reclamation standards and enforceable goals that must be met before industry can proceed to another area; 9) groundwater quantity and quality monitoring; 10) measures to prevent flaring and venting of gas resources; 11) minimizing the amount and distance of access roads and other associated surface impacts; and 12) increased air quality monitoring and emissions reduction plans.

Please consider each of the above-listed mitigation measures in the EIS, and if they are found to be reasonable and effective, please incorporate them into the preferred alternative for the EIS.

Interim Development

We are concerned that the BLM is considering allowing EOG to drill approximately 150 wells before the NEPA process is complete. We understand that the BLM will prepare site-specific NEPA analyses for wells that will be drilled in the interim, however, in doing so, BLM will be allowing drilling to commence without a complete analysis and understanding of the cumulative impacts of the project. NEPA requires BLM to fully disclose all impacts, *prior* to the agency action.

Please explain how BLM's proposal meets the requirements of NEPA.²

Protection of Air Quality & Public Health

As part of this EIS, we ask BLM to assess current air quality conditions, disclosing the most recent air emissions inventories for Converse and Campbell Counties and results of any site-specific monitoring in and near the project area. BLM should also conduct air quality modeling to predict emissions of all current and proposed oil and gas development and associated gas processing facilities to fully disclose the cumulative impacts of all air quality emissions.

² If BLM is concerned about potential drainage of federal mineral resources, there are other measures available to the agency, such as unitization agreements, that will allow BLM to be compensated from any drainage that may occur while the NEPA process is ongoing.

BLM cannot and should not allow permitting if air quality standards will be exceeded. BLM should also consider and propose mitigation measures to protect air quality, including emission reduction measures such as those required in other geographic areas, like the Upper Green River Basin. BLM should also consider and require on site testing for air quality emissions and implement measures to reduce impacts to nearby residents and populated areas. In conjunction with the DEQ and EPA, please develop an extensive air quality monitoring program as part of this EIS.

Please also disclose whether the BLM will allow produced and flowback water to be used for dust abatement and please discuss any known negative impacts from the application of magnesium chloride and other commercial suppressants.

Reducing Impacts of Flaring and Venting

BLM should require measures to eliminate or minimize to the greatest extent possible the flaring and venting of gas associated with oil and gas production. Flaring and venting should be limited to well testing periods and other times when it is unavoidable. The BLM should also ensure that the Greater Crossbow Project complies with any new policies or mitigation measures required as a result of the agency's flaring and venting rulemaking efforts currently underway, including payment of royalties on any flared or vented gas. In addition to air quality impacts, flaring and venting results in the waste of a public resource. If flaring and/or venting is authorized under this plan, the BLM should require operators to report all flared or vented gas amounts, and disclose anticipated revenue losses and associated environmental impacts, including contributions to global climate change.

Protection of Water Quality & Quantity

We ask that BLM please disclose and analyze any and all impacts related to the project's projected water usage. Please disclose the specific water sources, including any aquifers that will be used for drilling, hydraulic fracturing, and oil production activities. We also request that BLM fully analyze the current status and availability of these water sources and any impacts that might result to their long-term viability from depletion caused by oil activities. The PoD includes the construction of 10 new water wells and mentions that anywhere from 60,000 to 150,000 bbl of water could be required to complete an individual well. Please fully disclose the source of the water and consider lost future uses of that water, including using the aquifer to meet future public water needs.

Please also fully explain all impacts to water quality, including impacts from hydraulic fracturing, drilling operations, drilling and production pits, chemical storage, spills, leaks, and other activities associated with oil drilling and production. Please disclose how produced water will be stored, transported, and disposed of. We also ask that BLM analyze the produced water for radiation and disclose any radiation issues associated with produced water in this area to ensure proper storage and disposal protocols are in place. BLM should also analyze and disclose produced water disposal impacts regarding both deep injection and surface disposal. Please explain what formations disposal wells will be injecting waste into, how communication between fluids will be avoided, and how underlying and overlying aquifers will be protected. According to the PoD, produced water will be disposed at the McBeth and Linch facilities both of which

lack financial assurance needed for closure and reclamation. Additionally, the Linch facility has faced a string of violations from the Wyoming Department of Environmental Quality. We ask that the BLM consider the regulatory status and discuss any outstanding liabilities or violations for any commercial oilfield wastewater disposal facility (COWDF) under consideration for use by the project.

BLM should require disclosure of all chemicals used in hydraulic fracturing and drilling operations as required by BLM's hydraulic fracturing regulations.³ Please also describe how BLM will help ensure that Wyoming's state hydraulic fracturing regulations are enforced and achieved at federal wells, including chemical disclosure and well integrity requirements.

Please consider and propose mitigation measures to reduce impacts to water resources. These measures include closed loop drilling and the prohibition of pits. If pits are to be allowed please provide specific details on how the contents of the pit will be disposed of and prevent groundwater contamination and exposures to toxic constituents and ensure compliance with BLM's hydraulic fracturing regulations.

In addition, we ask BLM to develop a groundwater monitoring plan that includes baseline sampling before drilling begins and long-term monitoring once drilling commences. Such a sampling plan should meet or exceed the standards required by Wyoming's baseline water regulation for wells located in close proximity to residential drinking water sources. However, BLM should also focus sampling in areas on or near federal land and associated federal water resources.

Spacing, Units and Frack Hits

BLM must analyze and address the issue of spacing and drilling units and the potential for frack hits when so many wells, up to 22, are located on a single pad or when pads are so near to each other. The phenomena of frack hits is an issue BLM is familiar with in New Mexico and one that has resulted in spills and impacts to adjacent wells and mineral owners. BLM should disclose the impacts of frack hits and propose measures that will prevent their occurrence.

Social and Economic Impacts

Please consider and disclose socioeconomic impacts that will stem from increased oil and gas development in Converse and Campbell Counties. Specifically, how an influx of workers, may impact traffic, crime, emergency response, fires, health care, domestic violence, and housing issues in the surrounding area. Please disclose where workers will live and what strain that will place on the local housing market, specifically affordability and availability of rental housing and hotel space. We ask that BLM also consider how the proposed project may impact property values, and the ability of nearby homeowners to acquire homeowners insurance. We also request that BLM fully consider and disclose impacts to livestock that graze next to oil and gas wells. Please assess impacts to county roads related to both the cost of road maintenance and road condition and safety. Please also analyze and disclose worker health and safety issues.

³ While the rule is currently stayed, it should be anticipated that it will be in effect at the end of the NEPA process for this project.

Protection of Private Surface Property

Since a majority of the BLM federal minerals underlie private surface, BLM must propose additional mitigation measures to reduce impacts to private surface property. These include the analysis of additional bonding requirements to ensure oil wells will be plugged and the surface fully reclaimed in a timely fashion. We also ask that BLM ensure that the company has legal access to the land through surface use and damage agreements.

Please involve impacted surface owners in your NEPA process, including soliciting their comments and information on the draft EIS, as well as scheduling site visits prior to the draft EIS.

Invasive and Noxious Weeds

We understand that EOG has proposed to control invasive and noxious weeds along ODPs, access roads, pipeline corridors, or other facilities as specified by surface owner, County, State, BLM, and USFS regulations. We also ask that BLM focus on avoiding invasive species introduction and spread by requiring all equipment to be cleaned before entering new areas.

Slopes, Soils, & Erosion Prevention

Please disclose what percent of the project area lies in areas with steep slopes (greater than 25%), sensitive soils, and/or areas with limited reclamation potential. Please consider mitigation measures to prevent erosion and other impacts associated with development in these areas. Please disclose any lease stipulations that may apply.

Protection of the Greater Sage-Grouse

The BLM must acknowledge Governor Mead's new executive order, EO 2015-4, which addresses sage grouse mitigation. BLM should also consider implementing buffers around sage grouse connectivity areas and critical winter range that are managed the same as core areas. Dr. Naugle's study prepared for the Buffalo Field Office in 2012 showed that development outside core areas can threaten the integrity of core areas. Additionally, BLM should prevent new development until a percentage of sage-grouse habitat from existing development is fully reclaimed.

Big Game

Please disclose any reasonably foreseeable impacts to pronghorn and deer populations in and near the project area, including impacts to habitat and population. Please discuss mitigation measures for big game populations. Please also discuss any impacts to hunting access during the project timeframe.

Raptors

Please disclose any reasonably foreseeable impacts to raptors, including eagles and hawks in the and near the project area. Please discuss mitigation measures for raptor populations.

Non-Waiver of Lease Stipulations/Year-Round Drilling

BLM should not waive, modify, or create exceptions for lease stipulations as part of the Crossbow Project EIS. Year-round drilling creates unacceptable impacts to sensitive wildlife populations—wildlife populations that are highly valued by Converse County and Campbell

County residents and which BLM has an obligation to protect as part of its duties to prevent unnecessary and undue degradation under FLPMA. Year-round drilling will only further stress wildlife populations already vulnerable to harsh winter conditions and habitat fragmentation caused by well pads, roads, and pipeline corridors. BLM should also require and enforce stipulations to prevent drilling in areas with limited reclamation potential, steep slopes, or severe erosion hazard.

Climate Change

BLM should integrate the latest and best climate change science into its impacts analysis for the EIS. Please include a quantitative and qualitative assessment of greenhouse gas emissions and impacts with this EIS. Specifically, BLM should consider how climate change will impact BLM related activities such as increased difficulty for reclamation of lands disturbed for energy development, a greater need for wildfire management on BLM lands, and decreased revenues from a dwindling domestic coal industry. BLM should also consider mitigation measures to reduce methane emissions and alternatives related to reducing the impacts of climate change.

Transportation Impacts

In your EIS, please disclose how water, oil, produced water, and other chemicals will be transported. Please disclose the amount and location of truck traffic, rail traffic, pipelines, and other means of transportation. Please discuss what public roads and rail lines will be used and how current uses of those roads and rail lines will be impacted. We also ask the BLM consider measuring the volatility of the oil extracted and take steps to ensure the oil is stable before it is transported.

Public Transparency

BLM should require all APDs that will be tiered to this EIS to be open to public notice and comment. Please describe the process related to APD approval, including the anticipated use of any categorical exclusions under NEPA. If APDs will be approved without public notice and comment, BLM should include a commitment in this EIS to receive additional public comment at least once a year as part of the adaptive management plan for the EIS. Regardless of the permitting process, BLM should commit to having all APD files and records open to public inspection, at all times. Please include a transparency and public accountability plan as part of this EIS.

Cumulative Impacts & Connected Actions

Cumulative impacts are perhaps the most important impacts to consider in a programmatic EIS. Please include a chapter solely on cumulative impacts in your EIS that documents how this project interfaces with other oil and gas development projects in the state, including the Converse County EIS and Casper RMP. Cumulative impacts should include all other resource impact areas – air, water, land, wildlife, and socioeconomic impacts – considered at the cumulative stage. In assessing cumulative impacts, please consider private activities, such as fee estate drilling and production, coal mining, gas and oil facilities, and rail and pipeline infrastructure.

Please also disclose and analyze the total volume of frack sand that will be required, where it is coming from, where it will be stored, and how it will be transported. Please also propose

mitigation measures for reducing any exposure to workers and the public concerning the health impacts of silicosis from frack sand exposure.

Additionally, please address the cumulative impacts of the total volume of hydraulic fracturing chemicals that will be required and utilized, where these chemicals will be stored and how they will be transported. Please propose mitigation measures to reduce any accidents or spills occurring from the storage, use or transportation of these chemicals.

Conclusion

In closing, we have attached a CD of studies, articles and reports concerning unconventional oil and gas development issues and impacts. We request that you review these reports and consider their conclusions and recommendations into your analysis. Development can be done right and it is your job to ensure that stewardship of the *public* resources including the development of *public* minerals is done with the utmost care and thought for our current and future well-being and with respect for our private property and health.

Sincerely,

Megan Taylor
Shannon Anderson
Powder River Basin Resource Council
934 N. Main St.
Sheridan, WY 82801

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Scoping Comments on Greater Crossbow EIS
Date: Wednesday, December 30, 2015 1:17:00 PM
Attachments: [Powder River Crossbow Scoping Comments.pdf](#)

----- Forwarded message -----

From: **Shannon Anderson** <sanderson@powderriverbasin.org>
Date: Tue, Dec 29, 2015 at 12:10 PM
Subject: Scoping Comments on Greater Crossbow EIS
To: blm_wy_buffalogceis@blm.gov

Dear Mr. Bills,

Please see our attached comments. I will also be sending a hard copy along with a CD of attachments to your office.

Thanks, and Happy New Year,

Shannon Anderson

Powder River Basin Resource Council

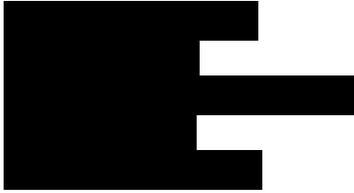
934 N. Main St., Sheridan, WY 82801

307-672-5809 cell: 307-763-0995

sanderson@powderriverbasin.org

Join us at www.powderriverbasin.org

Follow us at <https://twitter.com/PRBResCouncil>



Mr. Tom Bills
Project Manager
Greater Crossbow Project
BLM—Buffalo Field Office
1425 Fort St.
Buffalo WY 82834

December 27, 2015

Mr. Bills:

Re: The Greater Crossbow Project

I met you at the Converse County scoping meeting re: the above listed project. If you remember our conversation our ranch is located 

 Needless to say our ranch is not only our sole business but also our home. We are hoping to pass this ranch on to our children so they can continue on this land for the fifth generation. This project has the potential to devastate our water, the land, livestock/wildlife and alter our home and business forever and certainly not for the better. We have been dealing with EOG off and on for the last few years, and I can assure you they are certainly not one of our better operators. Their ongoing arrogant attitude certainly escalates our concern re: this new project they have presented with almost no pertinent upfront information. Information that should have been provided at this meeting in order to make our own critical comments to your agency as well as to the DEQ & all other state and federal agencies and the Wyoming agriculture community as to the huge effect this project will have on not only our ranching operation but most of the rural area in two counties as well as the towns involved, Wright, Bill & Douglas.

It certainly gives a perception of deception the way EOG has approached this issue and how it was presented to us at the meeting with the barest information possible & most of our questions left unanswered or swept under the rug. I have contacted many of our neighbors and have been appalled that EOG has been attempting to “strong arm” them into signing “global” SUA’s that would effect their land forever, and would be a horrible business decision due to rapid changes we have been experiencing in the oil patch for at least the last ten to twenty years.. Using a “big stick” and the threat of legal action & condemnation to force people to acquiesce to a much lower area price & sub standard safeguards for their land and water is unconscionable.

Another major concern is the lack of information re: disposal wells that I point blank asked for at the meeting as to the location etc., & was told there wasn’t any information available regarding these 4 private disposal wells. But in the BLM information there were four private disposal wells listed? Area ranchers must be notified not only re the proposed locations of these wells but the volume of production

water dumped, its content, the amount of trucks involved, private & public roads & wells effected etc. These wells are a disaster to the environment, completely wreck and ruin private land & water, the volume of truck traffic on these mostly unpaved pasture roads are horrendous and very detrimental to livestock/wildlife etc., not to mention to any human habitation. There is a state of the art disposal facility located on highway 59 and I would think that the state and federal government would require the disposal of these huge volumes of production waste water at this facility.

EOG is proposing 4 possibly 40 acre well pads in our ranch's most important pasture that we historically lamb all our sheep. Anyone in the agriculture business can tell you how extremely important & critical it is for ewe's not to be disturbed when they lamb and their lambs are young. We do not access this pasture for any reason other than an emergency ourselves as we know it can ruin our lamb crop and bum large numbers of our lambs who die or are taken by predators. The worst possible scenario I can imagine to happen to our lambing pasture other than an E5 tornado is to have EOG establish an industrial corridor in that pasture with all the subsequent construction, large roads, huge volumes of vehicular traffic, heavy industrial equipment, large buildings being moved in and out, semi trucks, pipe trucks not to mention the dust which reaches 30 or more feet in the air and covers large portions of our pastures with a thick layer of dirt for miles from the incessant Wyoming wind. This dust will cause dust pneumonia in our livestock & wildlife and cut down our carrying capacity for livestock drastically. The impact of this corridor that could be a quarter mile long and a quarter mile wide will involve miles of our land and the ensuing infrastructure of roads, pipelines, & electric lines will devastate our lamb crop and sheep business.

Civilization and our culture can survive without mass production of oil & gas, and most certainly has alternatives; but civilization and our culture will not survive with out clean safe water and a safe dependable food source.

Agriculture can continue to exist with respect & responsibility from the energy sector and with a partnership but not a contentious arrogant attitude of "taking with a big stick" along with a "big dose" of deception to enable these bad actor energy entities to run rough shod over & squeeze every dime they can out of a land owner as they ruin the very land we live on and poison our water.

Please find below some of our area's thoughts and concerns regarding this project, the lack of useful information provided by EOG and the BLM and the apparent failure of this scoping process.

- 1) The sole information the BLM has provided to the public on this information is a small plat with lines and squares on it. The BLM has admitted it has much more information on the project the EOG has provided but failed to give it to the public, even when that information was asked for. This failure to provide the information the BLM has on the project severely limits the public's ability to provide helpful scoping comments as we don't know exactly what EOG is asking for or proposing.

- 2) The spine and rib approach EOG is requesting will not produce lesser impacts, it will simply concentrate those impacts into corridors. With impacts spread out over wider areas (as has been the historic case in oil and gas development), companies have a greater likelihood of being able to reclaim the surface so that the damage isn't apparent and the surface can still be used by both ranchers in their ranching operations and wildlife. The corridors in a spine and rib configuration will have such concentrated activity and damage that they will be utterly unusable to both ranchers and wildlife. The long-term effects of the corridors will last beyond the time of EOG's use, also, as the land will be so damaged and compacted that it will never re grow anything.

- 3) The corridors will give rise to roads that are the equivalent of "super highways" across the private ranches, instead of the two tracks that are generally used now. These super highways will have a dramatic effect on the ranching operations, air quality, wildlife habitat and
 - a. In today's world, ranchers ranch because it's their heritage and way of life, not for the money. A large part of that way of life is the privacy of the ranches and caring for the land. The super highways will make it impossible for a rancher to control trespassers, unlike when there is a two track with minimal traffic. This will have major effects on the ranch operations.
 - b. Oil and gas companies have a hard time controlling dust on any roads larger than a two track. There is literally no way possible that EOG will be able to control the dust on these super highways that have enormous truck traffic in windy Wyoming. The inability to control the dust will ruin the forage for both livestock and wildlife as well as cause dust pneumonia in both livestock and wildlife.
 - c. Having such nice, built-up roads will increase the speeds at which the trucks can drive, increasing the likelihood of vehicle collisions with both livestock and wildlife. This will also increase the likelihood of vehicle rollovers in which toxic and hazardous substances contaminate both the surface and the local water table.
 - d. Bigger pipelines create greater liability in a landowner (even though he did not volunteer to let the pipeline be placed on his property) as if he damages the pipeline, the associated damages the company suffers will be higher. This liability would dramatically effect a rancher's socio-economic status.

- 4) The spine and rib approach would require much larger pipelines than would be required in traditional oil and gas development. Bigger pipelines exponentially increase all the risks associated with pipelines.
 - a. Bigger pipelines will increase the amount of oil that is spilled onto the surface in the event of a breach of a pipeline. This will increase the risk to every aspect of the land, whether it is the soil contamination, water contamination, risk to livestock and wildlife and destruction of habitat.
 - b. Bigger pipelines will increase the danger associated with any type of explosion, as they will be under higher pressure and will have more fuel to burn. This will increase the danger to every living thing on the surface, as well as affect the air quality and potentially effect water resources.
 - c. Bigger pipelines require make damage to the surface to install and repair than smaller pipelines and decreases the likelihood that the surface will ever be fully reclaimed.
 - d. The BLM admitted at the public scoping hearing that EOG was seeking to install pads up to 40 acres. That is a well pad size that has never before been seen in this area and would Bigger pipelines create greater liability in a landowner (even though he did not volunteer to let the pipeline be placed on his property) as if he damages the pipeline, the associated damages the company suffers will be higher. This liability would dramatically effect a rancher's socio-economic status.

- 5) have significant impacts on the land.
 - a. A graveled and level 40 acre well pad in the middle of a rancher's pasture will significantly affect his ability to be able to enjoy his ranching operations. It will convert that pasture from an agricultural area into an industrial area, thus destroying the character of the ranch.
 - b. The sheer size of a 40 acre well pad will make it much harder for wildlife to acclimate to the disturbance, unlike much smaller well pads, and will drive wildlife from the area.
 - c. It will be much harder to routinely inspect and keep track of all activity on a 40 acre well pad than a traditionally sized one. This increases the likelihood of contamination, spill and erosion issues being undiscovered for a much longer period of time.
 - d. The number of oil wells that can be placed on a 40 acre well pad will be substantially higher than a normal sized well pad. This creates a number of problems.
 - i. The level of contamination on the well pad will be significantly increased because if each well or equipment leaks only a little (like they routinely do) all of that contamination is aggregated on the

- ii. pad. Greater levels of contamination in one area increases the saturation into the ground and increase the likelihood of contamination of the water table and surrounding soils.
 - iii. In the case of an explosion in one well, the more wells surrounding it, the greater the final explosion will be. This would endanger every living thing on the surface, as well as increasing the likelihood that the fire would escape the well pad and burn wildlife habitat and livestock forage.
 - iv. If one well explodes, all of the wells will explode on the pad. The more wells that explode will increase the economic impact on the royalty owners, as more people will lose their royalty income.
- 6) The concentration of the development in the spine and rib approach would have a detrimental effect on the water resources in the area.
- a. The concentration of the wells would increase the likelihood that EOG would draw it's drilling water from a much more concentrated area. This would increase the likelihood of drawing down the water table in the area. This would effect a rancher's ability to water his livestock and the wildlife. It would also likely effect the springs and artesian wells in the area.
 - b. The concentration of the wells would increase the likelihood that EOG would dispose of the produced water and drilling waste in a more concentrated area. This would increase the likelihood of contamination of the water through leaks or fractured formations under pressure. It would also increase the damage done by the leaks and fractured formations as there would be more contaminants let loose into the water.

The spine and rib approach that EOG is proposing would eliminate the rancher's ability to work with the company to change the location of facilities to decrease the impact oil and gas development has on their ranching operation. With traditional development, the company and rancher work together for everyone's best interest. If EOG's spine and rib approach is approved by the BLM under this EIS, then EOG will refuse to negotiate with the ranch to decrease their facilities' impact on the ranching operations and the rancher's life. This is because EOG will try to claim that any other pattern of development would require another EIS. Therefore, if you approve this EIS with no alternatives to the spine and rib development approach, you are hamstringing the landowner's ability to protect his land, the water and air, and the wildlife, on a case by case basis. As the protection of these assets is the foundation of ranching life and culture, you will be destroying his ability to protect his culture.

I am hopeful that this scoping process can be revamped and restructured to require EOG to provide real answers in real time, to private property owners critical questions regarding this massive energy project that will effect our entire area, our ranches, our homes and livelihood, our lives and the generations to follow.

I would assume that you all at the BLM are well aware of the energy impact in our area. If not, I would most certainly take the time to take you on a tour of our ranch and area and show you first hand what we face as ranchers and agriculture producers and the devastating effect these energy projects are having on our private property, roads, water, livestock/wildlife and infrastructure.

Regards,

A large black rectangular redaction box covering the signature area.

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Greater Crossbow Project--EIS
Date: Wednesday, December 30, 2015 1:21:58 PM
Attachments: [REDACTED] [Crossbow Project.docx](#)

----- Forwarded message -----

From: [REDACTED]
Date: Wed, Dec 30, 2015 at 11:08 AM
Subject: Greater Crossbow Project--EIS
To: blm_wy_buffalogceis@blm.gov

Mr. Tom Bills
Buffalo—BLM
Project Mgr.—Greater Crossbow EOG Project—EIS

Enclosed my comment letter for the Greater Crossbow Project—EIS

Thanks!

[REDACTED]

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Bob Maul
BJ Clark

December 30, 2015

Mr. Thomas Bills, NEPA Coordinator
Bureau of Land Management
Buffalo Field Office
1425 Fort Street
Buffalo, WY 82834

Re: Scoping Comments for the Greater Crossbow Oil and Gas Exploration and Development Process.

Dear Mr. Bills:

The Campbell County Conservation District (CCCD) would like to submit the following comments in regards to the preparation of the proposed environmental impact statement (EIS) for the Greater Crossbow Oil and Gas Exploration Project (Project). Our comments are specific to our mission: To provide leadership for the conservation of Campbell County's soils and water, protect the agricultural resource base, promote the control of soil erosion, promote and protect the quality and quantity of Campbell County's water and all other natural resources, preserve and enhance wildlife habitat, protect the tax base and promote the health, safety and general welfare of the county through responsible conservation ethic.

Surface ownership

With approximately 87 percent of the total surface area within the project being privately owned, CCCD would like to recommend that EOG Resources Inc. (EOG), BLM and USFS work with landowners to achieve reclamation goals without imposing federal rules onto private landowners. There are several agricultural producers within the project area, these producers should not be forced to reclaim their property with native or one size fits all seed mix. By contrast EOG should work with landowners to meet their needs, while addressing resource concerns. CCCD supports landowners' right to develop their own reclamation plans that address their need and desired operational goals.

Some of the project area also includes USFS and BLM grazing allotments. CCCD requests that the respective agencies take into consideration the impact that this project may have on the current permittees. Furthermore CCCD supports reclamation plans that are based upon ecological objectives and not generalized deferment schedules.

Wildlife

EOG appears to have completed several raptor associated studies within the project area; however, CCCD would like the EIS to also address the projects potential impacts to other wildlife. There are

several species of concern and federally listed species within or adjacent to the project area, including Mountain Plover (*Charadrius montanus*), Greater Sage-grouse (*Centrocercus urophasianus*), and even botanicals such as Ute Ladies'-tresses orchid (*Spiranthes diluvialis*)¹. It is imperative that the effects of the project to their habitat be examined as well as the impacts on the movement and range of big game animals.

Water Quality

CCCD has several concerns about the projects potential impacts to surface and ground water. The project area encompasses the majority of the Antelope sub-watershed and will potentially impact the water quality of Bates and Spring Creek. This watershed has not had an assessment performed since 2007². The quality of the water in the area should have baseline data recorded prior to project implementation. This project also has potential to effect the ground water of the area. Although EOG does not anticipate initial waste water injection, the final project will repurpose four wells for disposal. The process of hydraulic fracturing and underground waste water disposal increases the potential for ground water quality degradation. In the EPA's most recent draft assessment of hydraulic fracturing, they found potential for this method to impact drinking water. This can be caused by spills of hydraulic fracturing fluids, fracturing directly into underground drinking water resources, and below ground migration of liquids and gases³. It is imperative that these concerns be addressed as it has the potential to contaminate the domestic and private drinking wells within the area.

Air Quality

Air quality will also be impacted by the project. As previously stated the project will not only have regular traffic by workers but in the initial phases of the project will also require transportation of waste water. This will result in more traffic on county roads and increased potential for production of dust and exhaust. These trucks will also impact the traffic and increase the maintenance costs for those roads.

CCCD would like to thank BLM for the opportunity to comment and looks forward to working on the development of the EIS for the project.

Sincerely,



Jennifer Hinkhouse
District Manager, CCCD

Cc: Wyoming Association of Conservation Districts
Campbell County Commissioners

¹United State Fish & Wildlife Service. Wyoming Ecological Service Species. December 28, 2015 <http://www.fws.gov/wyominges/Pages/Species/Species_WYESList.html>.

² Hargett, Eric. Water Quality Conditions of Antelope Creek, Black Thunder Creek and the Cheyenne River 2002-2006. Wyoming: Wyoming Department of Environmental Quality, 2007.

³ USEPA, Overview: EPA's Draft Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas. December 21, 2015 <http://www.epa.gov/sites/production/files/2015-06/documents_hf_assesment_fs_6_3_15_508_km_0.pdf>.

From: [Bills, Thomas \(Tom\)](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); [Serreze, Susan](#)
Subject: Fwd: Scoping Comments Greater Crossbow Project
Date: Wednesday, December 30, 2015 1:16:36 PM
Attachments: [Crossbow comments.pdf](#)

Thomas Bills

NEPA & Environmental Coordinator
BLM Buffalo Field Office
(307) 684-1133

----- Forwarded message -----

From: **Jennifer Hinkhouse** <icd@vcn.com>
Date: Wed, Dec 30, 2015 at 11:36 AM
Subject: Scoping Comments Greater Crossbow Project
To: BLM_WY_BuffaloGCEIS@blm.gov
Cc: tbills@blm.gov

Dear Mr. Bills,

Please find the attached scoping comments on the Greater Crossbow Oil & Gas Project. Thank you for the opportunity to comment and we look forward to working with you during the NEPA process.

Sincerely,

Jennifer Hinkhouse

District Manager

Campbell County Conservation District

601 4 J Court, Suite D

Gillette, WY 82716

(307)682-1824

December 30, 2015

Sent Via Federal Express and Electronic Mail BLM_WY_BuffaloGCEIS@blm.gov

Greater Crossbow Oil & Gas Project
Attn: Thomas Bills
BLM Buffalo Field Office
1425 Fort Street
Buffalo, WY 82834

Re: Scoping Comments – Greater Crossbow Oil and Gas Project and Possible Land
Use Plan Amendments

Dear Mr. Bills:

EOG Resources, Inc. (“EOG”) submits these scoping comments regarding the Greater Crossbow Oil and Gas Exploration and Development Project Environmental Impact Statement (“Crossbow EIS” or “Crossbow Project”). EOG is the proponent for the Crossbow Project and will be impacted by the EIS and final Record of Decision (“ROD”) outcome. EOG thanks the Bureau of Land Management (“BLM”) for the opportunity to submit comments regarding this very important project, and looks forward to working with the BLM during the environmental review and public disclosure process mandated by the National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321–4370h (“NEPA”).

BLM Must Encourage the Development of Domestic Hydrocarbons

The production of natural gas, oil, and other hydrocarbons (“Hydrocarbons”) from the Crossbow Project Area is consistent with this nation’s energy policy as articulated in the Comprehensive National Energy Strategy announced by the United States Department of Energy in April of 1998, the Energy Policy and Conservation Act, 42 U.S.C. § 6201, the National Energy Policy, Executive Order No. 13212, 66 Fed. Reg. 28357 (May 18, 2001), and the Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594. Hydrocarbon production in the Crossbow Project

Area increases domestic energy resources and provides sources of revenue to stimulate the local and national economies.

With continued geopolitical instability, the need for reliable, domestic sources of energy continues to grow. Moreover, public lands managed by the BLM and USFS must be utilized for multiple uses, including energy development. 43 U.S.C. § 1702(l) (2012) (defining mineral development as a principal or major use of the public lands); 16 U.S.C. § 528 (noting that use of mineral resources within National Forest System is consistent with multiple use requirements). The Crossbow Project can and will achieve a balance between environmental protection, economic growth, and other multiple uses to help meet our nation's energy needs. The development of oil and gas resources from federal land is particularly important as production from federal land has decreased significantly in recent years while production from private land has increased. *See* Congressional Research Service, U.S. Crude Oil and Natural Gas Production in Federal and Non-Federal Areas, April 10, 2014.

Hydrocarbon production from the Crossbow Project will benefit the national, state, and local economies. Development of one oil and natural gas well can yield hundreds of thousands of dollars that are paid to governments and reinvested in the local community. Production of Hydrocarbons provides revenue to county, state, and federal governments through royalties and taxes. Furthermore, development of Hydrocarbons will increase employment, and the operators will make substantial economic investments in the local economies. The proposal to develop 1,500 additional wells in the Crossbow Project Area will substantially contribute to the national, state, and local economies.

The Crossbow Project Conforms to Applicable Land Use Plans

The Crossbow Project conforms to the management prescriptions in applicable land use plans as required by the Federal Land Policy and Management Act ("FLPMA") and the National Forest Management Act ("NFMA") and their implementing regulations. *See* 43 U.S.C. § 1712; 43 C.F.R. § 1610.5-3 (2012); 16 U.S.C. § 1604(i); 36 C.F.R. § 219.15(b). BLM manages the public lands and resources within the Crossbow Project Area under the direction and guidance of two BLM Resource Management Plans (RMPs) and a U.S. Forest Service (USFS) Land and Resource Management Plan (LRMP). The Casper Resource Management Plan was completed in 2007 and amended in 2015 to address greater sage-grouse management. *See* BLM, Record of Decision and Approved Resource Management Plan Amendments for the Rocky Mountain Region, Attachment 4: Casper, Kemmerer, Newcastle, Pinedale, Rawlins, and Rock Springs Field Offices ("Wyoming Sage-Grouse ARMPA"); BLM, Record of Decision and Approved Casper RMP (Dec. 2007) ("Casper RMP"). The Buffalo RMP, which also covers part of the Project Area, underwent a full revision in September 2015. BLM, Record of Decision and Approved RMP Amendments for the Rocky Mountain Region, Attachment 6: Buffalo RMP (Sept. 2015) ("Buffalo RMP"). In addition, the USFS manages a small portion of the Project Area's surface (five percent)

under the Thunder Basin National Grasslands LRMP (“TBNG LRMP”), which also was amended to address sage-grouse management. *See* USFS, Greater Sage-Grouse Record of Decision for Northwest Colorado and Wyoming, Attachment B: Greater Sage-Grouse Wyoming Plan Amendment (Sept. 2015) (“USFS Rocky Mountain ROD”). All of these plans allow for and encourage oil and gas leasing and development. The Casper RMP states that “[t]he Casper Field Office is open to mineral leasing, . . . unless specifically identified as administratively unavailable for the life of the plan for mineral leasing.” Casper RMP, pg. 2-15; *see also id.*, Map 3; Wyoming Sage-Grouse ARMPA, pg. 52. The Buffalo RMP and TBNG LRMP similarly both allow for and encourage oil and gas leasing and development. Buffalo RMP, pg. 90; USFS Rocky Mountain ROD, pg. 110 (allowing oil and gas leasing consistent with terms of LRMP amendment); Final Environmental Impact Statement and LRMP Revision Record of Decision, Thunder Basin National Grassland, pg. 1 (July 2002) (“TNBG 2002 ROD”); *see also* Record of Decision: Available Lands Oil and Gas Leasing West of Wyodak Coal Outcrop Record of Decision, Western Portion of the Thunder Basin National Grassland, pg. 5 (Aug. 2006) (“TBNG 2008 ROD”). Accordingly, the Crossbow Project is consistent with the management prescribed by the Casper RMP, the Buffalo RMP, and the TBNG LRMP.

The Crossbow Project is Consistent with the Wyoming Sage-Grouse Strategy

The Crossbow Project is also consistent with sage-grouse protection and is a priority under Wyoming’s sage-grouse management strategy. In 2008, Governor Dave Freudenthal signed Executive Order 2008-2 to implement the sage-grouse management strategy developed by the Governor’s Sage Grouse Implementation Team. *See* Wyoming Executive Order 2008-2, Aug. 1, 2008. Governor Freudenthal renewed the State’s commitment to this strategy in 2010, and Governor Matt Mead again affirmed the policy in 2011 and 2015. Wyoming Executive Order 2015-4, July 29, 2015; Wyoming Executive Order 2011-5, June 2, 2011; Wyoming Executive Order 2010-4, Aug. 18, 2010. The U.S. Fish and Wildlife Service (FWS) has endorsed the Wyoming strategy as a “long-term, science-based vision” for sage-grouse conservation, and an “excellent model” for conserving the species. Wyoming Executive Order 2015-4, pg. 3. More recently, the FWS determined that the Wyoming strategy has proven its efficacy in conserving the sage-grouse and its habitat. According to FWS, “[t]he Wyoming Plan has been in place for 8 years, and has demonstrated its conservation value by protecting areas identified as important to sage-grouse conservation.” 80 Fed. Reg. 59,858, 59,883 (Oct. 2, 2015).

Not only is the Crossbow Project consistent with the Wyoming strategy, its development is a priority under the strategy. Wyoming Executive Order 2015-4 requires state agencies to “encourage, enhance, and prioritize development outside of Core Population Areas” Wyoming Executive Order 2015-4, pg. 5 (July 29, 2015). Because the entire Crossbow Project Area is outside of sage-grouse core areas, Wyoming’s sage-grouse strategy requires that the Project be prioritized. The BLM should respect the state’s determination and prioritize the Crossbow Project.

EOG Supports Amendments to the Casper & Buffalo Resource Management Plans and the Thunder Basin National Grasslands Land & Resource Management Plan

EOG supports proposed amendments to the Casper RMP, Buffalo RMP, and TBNG LRMP as part of the Crossbow EIS in order to give the BLM and USFS greater flexibility to grant exceptions and waivers to timing stipulations on a programmatic basis. When operators are unable to drill and stimulate all the wells located on a single pad within the time constraints imposed by seasonal timing limitations, operators are required to delay interim reclamation until all wells on the pad are completed. This can lead to larger disturbed areas for longer time periods, thus increasing impacts to wildlife and the potential for erosion. Further, working within shortened development periods significantly increases traffic as operators are required to mobilize and demobilize drilling and completion equipment several times. Allowing oil and gas operators to conduct drilling activities year-round substantially reduces the number of rig mobilizations required to effectively develop an area. Given the increasing use of horizontal development techniques, year-round operations are particularly important because operators will be able to drill and complete multiple wells from a single pad with fewer disruptive mobilizations. Allowing year-round drilling also eliminates seasonal boom-bust cycles, which can adversely impact local and regional economies. During meetings with the Campbell and Converse county commissioners, they have expressed their support for year-round drilling and the benefits it would have on the local communities. The reduction in disruptive mobilizations of equipment also significantly reduces impacts from truck traffic and associated emissions as well as traffic congestion and wear and tear on local roads. Further, as technology continues to improve, operators may be able to drill as many as four full governmental sections from a single pad. EOG encourages the BLM and USFS to adopt an alternative that allows timing exceptions to be granted on a programmatic basis, especially if such proposals are combined with reasonable mitigation measures. EOG believes the BLM and USFS should develop an alternative that would allow operators and the BLM/USFS to voluntarily develop mitigation-based proposals. EOG does not support, however, any proposal that would mandate compensatory mitigation for all oil and gas development projects.

The Crossbow EIS is a Programmatic Document and Will Not Analyze the Site-Specific Impacts of Development

The Crossbow EIS is intended to analyze the potential impacts of the Crossbow Project at the programmatic level. As a result, BLM should not engage in speculative analysis of potential impacts resulting from the placement of individual wells because these impacts will be analyzed once specific development is proposed. The analysis of site-specific potential impacts of development will appropriately occur when applications for permit to drill (“APDs”) are filed. The exact placement of future well locations is not presently known, and any attempt to anticipate well locations and the resulting site-specific impacts “would be predictably inaccurate.” *See Biodiversity Conservation Alliance*, 174 IBLA 1, 15 (2008).

The IBLA has endorsed BLM's analysis of project-level impacts of development in programmatic documents such as the Crossbow EIS, and allowed BLM to defer analysis of individual well locations until development is actually proposed. NEPA's requirement that a project's impacts be evaluated at an early stage in the planning process is "tempered by the preference to defer detailed analysis until a concrete development proposal crystallizes the dimensions of a project's probable environmental consequences." *Biodiversity Conservation Alliance*, 174 IBLA at 16 (quoting *Ilio'ulaokalani Coal. v. Rumsfeld*, 464 F.3d 1083, 1095-96 (9th Cir. 2006)). As a result, "BLM is generally permitted to defer site-specific environmental analysis regarding likely air quality impacts . . . until it defines the activity proposed to be undertaken to explore for and recover such resources," with the definition of the activity usually occurring upon submission of an APD or a Plan of Development ("POD"). *WildEarth Guardians*, 185 IBLA 193, 203 (2015). The CEQ has also recently confirmed this approach to programmatic NEPA documents, stating that while programmatic reviews "address[] the broad environmental consequences" of the action, "a subsequent tiered EA or EIS will address more particularized considerations, but can benefit from the programmatic by summarizing and incorporating by reference parts of it." Memorandum from Michael Boots, Council on Environmental Quality, to Heads of Federal Departments and Agencies: Effective Use of Programmatic NEPA Reviews, at 30 – 31 (Dec. 18, 2014); *see also Biodiversity Conservation Alliance*, 174 IBLA at 16. Due to the broad and strategic nature of programmatic documents such as the Crossbow EIS, "[s]ite- or project-specific impacts need not be fully evaluated at the programmatic level when the decision to act on a site development or its equivalent is yet to be made." Memorandum from Michael Boots, Council on Environmental Quality, to Heads of Federal Departments and Agencies: Effective Use of Programmatic NEPA Reviews, at 31 (Dec. 18, 2014). Accordingly, when evaluating the impacts of the Crossbow Project, BLM must evaluate potential impacts on a broad, programmatic level. BLM need not become mired in the details of site-specific analysis when such analysis will occur at the APD stage.

The Crossbow EIS Must Analyze Reasonable Alternatives

It is well established that NEPA only requires an agency to consider "reasonable alternatives" to a proposed action. 40 C.F.R. § 1502.14. When developing alternatives for analysis in the Crossbow EIS, BLM must consider the purpose of the operator's proposal. "In determining whether an agency considered reasonable alternatives, courts look closely at the objectives identified in an EIS's purpose and needs statement." *Citizens' Comm. to Save Our Canyons v. U.S. Forest Serv.*, 297 F.3d 1012, 1030 (10th Cir. 2002). Where, as in this case, the proposed action is triggered by an application from a private party, "it is appropriate for the agency to give substantial weight to the goals and objectives of that private actor." *Id.*, 297 F.3d at 1030; *accord Colo. Env'tl. Coal. v. Dombeck*, 185 F.3d 1162, 1174-75 (D. Minn. 1999); Council on Environmental Quality Guidance Regarding NEPA Regulations, 48 Fed. Reg. 34,263, 34,267 (July 28, 1983) ("There is . . . no need to disregard the applicant's purposes and needs and the

common sense realities of a given situation in the development of alternatives.”). When developing alternatives and the purpose and need statement for the EIS, the BLM must consider the project proponent’s objectives and goals. *Theodore Roosevelt Conservation Alliance v. Salazar*, 661 F.3d 66, 73 (D.C. Cir. 2011) (holding with respect to the Pinedale Anticline Project that BLM appropriately analyzed objectives of the proponents). Here, the purpose of EOG’s proposal is to develop and maximize recovery of the Hydrocarbon resources underlying its federal, state, and private mineral leases within the Project Area. In addition, the further intent of the proposed action is to prevent the drainage of federal minerals by oil and gas wells located on adjacent non-federally owned lands (i.e., the State of Wyoming and private lands). In developing alternatives for the Crossbow EIS, BLM must consider these purposes. *Id.*

Furthermore, BLM must ensure that it only analyzes alternatives that meet the purpose and need of the project. *Wyoming Outdoor Council*, 176 IBLA 15, 21 (2008) (reasonable alternatives include those “which will accomplish the intended purpose, are technically and economically feasible, and yet have a lesser or no impact”). Federal courts and the IBLA have made clear that “[a]lternatives that do not accomplish the purpose of an action are not reasonable and need not be studied in detail by the agency.” *Citizens’ Comm. to Save Our Canyons*, 297 F.3d at 1030 (quoting *Custer Cnty. Action Ass’n v. Garvey*, 256 F.3d 1024, 1041 (10th Cir. 2001)) (internal quotations omitted); *see also Santa Fe Nw. Info. Council, Inc.*, 174 IBLA 93, 117 (2008) (holding that BLM need not analyze an alternative that does not meet project’s purpose and need); *Wyoming Outdoor Council*, 151 IBLA 260, 272 (1999). BLM may not analyze alternatives that are not consistent with the Crossbow Project’s purpose and need of developing hydrocarbon resources within the Crossbow Project Area. The Crossbow EIS should include a detailed explanation of the rationale for the development of each alternative considered, including how the alternative satisfies the operators’ purpose and need.

Finally, BLM must ensure that the alternatives analyzed in the Crossbow EIS are both feasible and economic. The CEQ has described reasonable alternatives as “those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable.” *CEQ’s Forty Most Asked Questions*, Question 2a, 46 Fed. Reg. 18026, 18027 (Mar. 23, 1981) (emphasis added). BLM need not analyze speculative, impractical, or uneconomic alternatives. *Citizens’ Comm. to Save Our Canyons*, 297 F.3d at 1030-31. Overly stringent restrictions or conditions of approval (“COA”) may render development uneconomic. In the Crossbow EIS alternatives analysis, BLM must recognize that the hydrocarbon resources within the project area may not be developed if restrictions render development economically unfeasible.

The Alternatives Analyzed in the Crossbow EIS Must be Consistent with EOG’s Existing Lease Rights

The alternatives analyzed in the Crossbow EIS may not affect EOG’s ability to access minerals under existing leases. Once the BLM issues leases, neither it nor the USFS may preclude

development or impose additional lease stipulations. An oil and gas lease is a contract between the federal government and the lessee and cannot be unilaterally modified by BLM or the USFS. *See Mobil Oil Exploration & Prod. Southeast, Inc. v. U.S.*, 530 U.S. 604, 620 (2000) (recognizing that lease contracts under the Outer Continental Shelf Lands Act gives lessees the right to explore for and develop oil and gas); *Oxy USA, Inc. v. Babbitt*, 268 F.3d 1001, 1006-7 (10th Cir. 2001) (citing *Phillips Petroleum Co. v. Lujan*, 4 F.3d 858, 860 n.1 (10th Cir. 1993)) (noting that the Tenth Circuit has long held that federal oil and gas leases are contracts), *abrogated on other grounds*, *BP America Production Co. v. Burton*, 549 U.S. 84 (2006).

Once the BLM has issued a federal oil and gas lease without no surface occupancy stipulations, and in the absence of a nondiscretionary statutory prohibition against development, neither the BLM nor the USFS can completely deny development on the leasehold. *See, e.g., National Wildlife Federation, et al.*, 150 IBLA 385, 403 (1999). Only Congress has the right to completely prohibit development once a lease has been issued. *W. Colo. Cong.*, 130 IBLA 244, 248 (1994) (citing *Union Oil Co. of Cal. v. Morton*, 512 F.2d 743, 750-51 (9th Cir. 1975)). Further, the agencies cannot take EOG's valid and existing lease rights. When it enacted FLPMA, Congress made it clear that nothing therein, or in the land use plans developed thereunder, was intended to terminate, modify, or alter any valid or existing property rights. *See* 43 U.S.C. § 1701 note. In order to effectuate this purpose, the BLM promulgated policies regarding the contractual rights granted in an oil and gas lease. BLM Instruction Memorandum 92-67 states that "[t]he lease contract conveys certain rights which must be honored through its term, regardless of the age of the lease, a change in surface management conditions, or the availability of new data or information. The contract was validly entered based upon the environmental standards and information current at the time of the lease issuance." As noted in the BLM's Instruction Memorandum, the lease constitutes a contract between the federal government and the lessee which cannot be unilaterally altered or modified by the BLM. The BLM and USFS cannot modify existing lease rights through a plan amendment or through a programmatic document. *See also Forest Guardians v. Thomas*, 967 F. Supp. 1536, 1560 (D. Ariz. 1997) (holding that forest plan amendment could not operate retroactively so as to impair existing rights in previously issued permits).

The Casper RMP, Buffalo RMP, and the TBNG LRMP all recognize valid existing rights. Wyoming Sage-Grouse ARMPA, pgs. 20, 23, 24, 28, 34, 35, 54, 104; Buffalo RMP, pgs. 8, 22, 40, 43, 44, 50, 81, 90, 120, 123; USFS Rocky Mountain ROD, pgs. 22, 23, 57; Casper RMP, pg. 1-11; TBNG 2006 ROD, pg. 5; TBNG 2002 ROD, pg. 12. It is important for the BLM to recognize that oil and gas operators such as EOG have the right to access and develop their leaseholds and alternatives analyzed in the Crossbow EIS must be consistent with these valid existing rights.

Development May Continue in the Project Area During Preparation of the Crossbow Oil and Gas Project Environmental Impact Statement

The BLM must continue allowing oil and gas development supported by site-specific NEPA analysis during the development of the Crossbow EIS. As BLM is aware, an EIS takes considerable time to prepare and implement. BLM should not halt development during this time, but should instead continue to permit individual wells subject to site-specific NEPA analyses. Continued exploration of oil and gas resources within the Crossbow Project Area is crucial given the exploratory nature of oil and gas development in the area and the programmatic nature of the EIS. Operators in the area are still learning about the nature of the resource and the best means to develop said resource. Without continued exploration, it would also be impossible for the BLM to adequately measure and analyze potential impacts of future oil and gas potential and development in the Crossbow EIS.

Although CEQ and BLM regulations require that agencies take no actions during the NEPA process that would adversely impact the environment or limit the choice of reasonable alternatives, 40 C.F.R. § 1506.1(a), these regulations only apply to actions not currently covered by an existing programmatic environmental impact statement. 40 C.F.R. § 1506.1(c); 43 C.F.R. § 46.160; *see National Wildlife Federation*, 169 IBLA 146, 156 – 57 (2006); *Colorado Environmental Coalition*, 169 IBLA 137, 144 (2006); *Wyoming Outdoor Council*, 156 IBLA 377, 384 (2002); *In re Bryant Eagle Timber Sale*, 133 IBLA 25, 28 (1995). Several federal court decisions have concurred with this result. *See, e.g., Sierra Club v. Bosworth*, 352 F. Supp. 2d 909, 921 (D. Minn. 2005) (holding 40 C.F.R. § 1506.1 did not require Forest Service to complete management plan revision prior to approving management actions consistent with existing land use plan); *Biodiversity Alliance v. U.S. Forest Serv.*, 226 F. Supp. 2d 1270, 1304 – 05 (D. Wyo. 2002) (holding that 40 C.F.R. § 1506.1 did not require Forest Service to revise land use plan by statutory deadline prior to approving interim management actions); *Western Land Exch. Project v. Dombek*, 47 F. Supp.2d 1196, 1213 (D. Or. 1999) (holding 40 C.F.R. § 1506.1 did not bar Forest Service from approving activities pending completion of an EIS for an updated or revised RMP where covered by existing programmatic EIS). The governing land use plans permit oil and gas development within the Project Area, and development is consistent with the operators' existing lease rights. *See Wyoming Sage-Grouse ARMPA*, pg. 52; *Buffalo RMP*, pg. 90; *USFS Rocky Mountain ROD*, pg. 110 (allowing oil and gas leasing consistent with terms of LRMP amendment); *Casper RMP*, pg. 2-15; *TBNG 2002 ROD*, pg. 1 (July 2002); *see also TBNG 2006 ROD*, pg. 5 (Aug. 2006). Therefore, CEQ regulations permit the BLM to continue to permit development in the Project Area, subject to site-specific NEPA analysis, during the preparation of the Crossbow EIS.

In addition, 40 C.F.R. § 1506.1's prohibition on prejudicing the ultimate decision or limiting the choice of reasonable alternatives in the Crossbow EIS does not require the BLM to preclude all development in the Project Area pending completion of the EIS. This is particularly true where existing leases were issued under management regimes that allowed for oil and gas

leasing and development. In this case, at the time EOG's leases were issued, the Buffalo and Casper RMPs and the TBNG LRMP provided for leasing of oil and gas and for oil and gas development subsequent to leasing. Casper RMP, pg. 2-15; Approved Resource Management Plan for Buffalo Field Office, pg. 9 (April 2001); Buffalo Resource Management Plan, pg. 16 (Oct. 1985); TBNG 2006 ROD, pg. 5; TBNG 2002 ROD, pg. 1. Once the BLM issues federal oil and gas leases without no surface occupancy stipulations, and in the absence of a nondiscretionary statutory prohibition against development, the BLM may not prohibit development on these leases. *See Nat'l Wildlife Federation*, 150 IBLA 385, 403 (1999). Only Congress has the power to completely prohibit development on such oil and gas leases. *W. Colo. Congress*, 130 IBLA 244, 248 (1994). Therefore, the BLM may not legally analyze or implement an alternative prohibiting development.

Similarly, NEPA's requirement that the BLM analyze a no action alternative does not require the BLM to analyze an alternative in which no development takes place, and therefore approving individual oil and gas projects will not prejudice BLM's no action alternative in the Crossbow EIS. NEPA does not require an agency to preclude all development in order to preserve a no-action alternative, because the no-action alternative does not necessarily preclude development. Rather, the no-action alternative simply refers to maintenance of the status quo. If current management prescriptions allow for a certain level of development, the no action alternative for the Crossbow EIS is to maintain that same level of development, not to halt development altogether. The IBLA recently explicitly confirmed that once a programmatic EIS has analyzed and allowed for oil and gas leasing and development, and once leases have been issued, "the BLM [can] not consider entirely precluding leasing, and the drilling and development" of lands already leased. *WildEarth Guardians*, 185 IBLA 193, 212 n.20 (2015) (finding BLM not required to address no development alternative in NEPA analysis of a plan of development where oil and gas leases had already been issued under land management prescriptions allowing for development).

The CEQ has long provided by regulation and guidance as well that a no action alternative is not a no development alternative, but rather maintains the status quo:

[In cases] such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed . . . 'no action' is 'no change' from current management direction or level of management intensity. To construct an alternative that is based on no management at all would be a useless academic exercise. Therefore, the 'no action' alternative may be thought of in terms of continuing with the present course of action until that action is changed.

Council on Environmental Quality, Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18,026, 18,027 (March 23, 1981) (emphasis

added); see *Pacific Coast Federation of Fishermen's Associations v. U.S. Dep't of the Interior*, 929 F. Supp. 2d 1039, 1052 (E.D. Cal. 2013) (citing *American Rivers v. Fed. Energy Regulatory Commission*, 201 F.3d 1186, 1200 – 01 (9th Cir. 2000)) (finding that Federal Power Act requirement that Bureau of Reclamation renew hydropower license “renders a ‘no contract’ alternative inappropriate, even as the ‘no action’ alternative”); *Ark Initiative v. U.S. Forest Serv.*, Civil Action No. 06-cv-02418-WDM-MJW, 2010 WL 3323661, at *11 (D. Colo. Aug. 18, 2010) (approving Forest Service decision to allow a no action alternative representing “no development beyond what was previously approved in” prior NEPA analysis). Under clear case law and CEQ guidance, the BLM simply needs to maintain the status quo until it completes the Crossbow EIS; it need not halt all development within or near the Project Area. In this case, the status quo is to continue allowing oil and gas development on leases issued consistent with the Casper RMP, Buffalo RMP, and TBNG LRMP. Continuing to approve individual development projects, consistent with existing land use management direction, while the BLM prepares the Crossbow EIS thus does not “violate[] the directive in 40 C.F.R. §1506.1(a) that no action concerning a proposed Federal action occur while the proposal is under consideration in an EIS.” *S. Utah Wilderness Alliance*, 141 IBLA 85, 89 (1997).

Additionally, the BLM should clearly inform the public that selection of the no action alternative would not meet the purpose and need of the proposed action, would be inconsistent with the BLM’s mandate to encourage oil and gas production from federal lands, and would be contrary to the National Energy Policy and Executive Order 13211, 66 Fed. Reg. 28355 (May 18, 2001).

The Crossbow EIS Must Recognize that the State of Wyoming Has Authority to Regulate Impacts to Air Quality

In the Crossbow EIS, BLM and USFS must expressly recognize that the State of Wyoming, and not the BLM, has authority for regulating air quality within the Project Area. The complex regulatory scheme established by the Clean Air Act (“CAA”) delegates to the State of Wyoming the authority to regulate Wyoming’s air resources. Neither BLM nor the USFS may infringe upon the State’s authority by attempting to regulate air quality or air emissions in the Crossbow EIS.

Neither the BLM nor the USFS has direct authority over air quality or air emissions under the CAA. 42 U.S.C. §§ 7401 *et seq.* Under the express terms of the CAA, the EPA has the authority to regulate air emissions. In Wyoming, the EPA has delegated its authority to the Wyoming Department of Environmental Quality (“WDEQ”). See 42 U.S.C. §§ 7401 - 7671q; 40 C.F.R. pts. 50 - 99; 40 C.F.R. §§ 52.2620–52.2637 (Wyoming’s State Implementation Plan); WYO. STAT. ANN. §§ 35-11-201 to 214; Wyo. Air Quality Stds. & Regs. (“WAQSR”) Chs. 1 – 14; 79 Fed. Reg. 62,859 (Oct. 21, 2014); 78 Fed. Reg. 49685 (Aug. 15, 2013). The Secretary of the Interior, through the IBLA, has unequivocally determined that in Wyoming, the State of Wyoming, and not the BLM, has authority over air emissions:

In Wyoming, ensuring compliance with Federal and State air quality standards falls under the administrative jurisdiction of [Wyoming Department of Environmental Quality], subject to EPA oversight. WDEQ is responsible for setting maximum allowable limits (NAAQS and WAAQS) for six criteria pollutants (CO (carbon monoxide), SO₂ (sulfur dioxide), NO₂ (nitrogen dioxide), ozone, and particulate matter (PM₁₀ and PM_{2.5})), and setting maximum allowable increases (PSD increments) above legal baseline concentrations for three of these pollutants (SO₂, NO₂, and PM₁₀) in Class I and Class II areas.

Wyoming Outdoor Council, et al., 176 IBLA 15, 26 (2008). Decisions of the IBLA are binding upon the BLM and have the same force and effect of a Secretarial decision. 43 C.F.R. § 4.1 (noting that the Office of Hearings and Appeals, which includes the IBLA, may decide matters as fully and finally as the Secretary of the Interior); *see also IMC Kalium Carlsbad, Inc. v. Interior Bd. of Land Appeals*, 206 F.3d 1003, 1009 (10th Cir. 2000) (holding that IBLA has *de novo* review authority over the decisions of subordinate agencies such as the BLM). Given previous determinations by the Secretary, the BLM must recognize WDEQ's, and not the BLM's, authority over air quality and air emissions in Wyoming. The BLM does not have the authority to impose regulations or mandate control measures on emission sources, including oil and gas operations, within Wyoming. *Wyoming Outdoor Council, et al.*, 176 IBLA at 26. The USFS's authority over air quality regulation is similarly limited. *See Amigos Bravos v. U.S. Bureau of Land Mgmt.*, No. 6:09-cv-00037-RB-LFG, 2011 WL 7701433, at *38 (D.N.M. Aug. 3, 2011) (holding that although the Forest Service is required to ensure that its actions do not violate the Clean Air Act, "[t]his does not mean that the Forest Service is required to enforce the Clean Air Act").

With respect to potential visibility impacts, the BLM's and USFS's authority is also limited by existing federal law. Under the CAA, a federal land manager's authority is strictly limited to considering whether a "proposed major emitting facility will have an adverse impact" on visibility within designated Class I areas. 42 U.S.C. § 7475(d)(2)(B). Oil and gas operations do not meet the definition of a major emitting facility.¹ Further, under the CAA, the regulation of potential impacts to visibility, and authority over air quality in general, rests with the WDEQ. 42 U.S.C. § 7407(a). The goal of preventing impairment of visibility in Class I areas will be achieved through the regional haze state implementation plans ("SIPs") that were recently approved. 42 U.S.C. § 7410(a)(2)(J); 79 Fed. Reg. 5032 (Jan. 30, 2014); 78 Fed. Reg. 54828 (Sep. 6, 2013); 78 Fed. Reg. 49685 (Aug. 15, 2013); 77 Fed. Reg. 73,926 (Dec. 12, 2012). Although federal land managers with jurisdiction over Class I areas may participate in the development of regional haze SIPs, neither the BLM nor the USFS has such jurisdiction in the Project Area because they do not manage any Class I areas in the Project Area. 42 U.S.C. § 7491; *see also* WYO. STAT. ANN. §§ 35-11-201 to

¹Major emitting sources are those that emit or have the potential to emit 250 tons per year of any regulated pollutant, or any of the 28 listed industrial sources that have the potential to emit 100 tons per year of any regulated pollutant. 42 U.S.C. § 7479(1); 40 C.F.R. §§ 51.166(b)(1), 52.21(b)(1).

214; Buffalo RMP, pg. 546; Casper RMP, pg. 2-17; TBNG 2002 ROD, pg. 39. Accordingly, neither the BLM nor the USFS has any authority over air quality and neither may impose emissions restrictions, either directly or indirectly, on oil and gas operations in the Crossbow Project Area, particularly if the overall goal is to reduce potential visibility impacts.

The BLM and USFS should also recognize that they do not have the authority to implement, regulate, or enforce the prevention of significant deterioration (“PSD”) increment. The agencies’ lack of authority regarding PSD increment analysis was recently recognized in the MOU issued by the Department of the Interior, Department of Agriculture, and the EPA, which indicates that BLM and USFS NEPA documents relating to oil and gas activities will model PSD increment consumption for informational purposes only. *See* Memorandum of Understanding Among Department of Agriculture, Department of the Interior, and the Environmental Protection Agency (“EPA”) Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act Process (“Air MOU”), Section V.G (June 23, 2011). Wyoming’s PSD program was approved by the EPA in June of 2012, 77 Fed. Reg. 33,022 (June 4, 2012), and currently controls Wyoming’s enforcement of the PSD program within the State of Wyoming.

Further, neither the Federal Land Policy and Management Act of 1976 (FLPMA) nor the National Forest Management Act (NFMA) authorizes the BLM or USFS to regulate air quality. Section 202(c)(8) of FLPMA does not require or authorize the BLM to enforce air quality controls. Instead, section 208(c)(8) of FLPMA provides: “In the development and revision of land use plans, the Secretary shall— . . . (8) provide for compliance with applicable pollution control laws, including State and Federal air, water, noise, or other pollution standards or implementations plans.” 43 U.S.C. § 1712(c)(8). The very language of the statute demonstrates BLM is required to “provide for compliance,” not independently regulate air emissions. *Id.* So long as the BLM is not interfering with the enforcement of State and Federal pollution laws, the BLM has satisfied its obligations under FLPMA. FLPMA simply does not authorize the BLM to independently regulate air quality control measures. Similarly, NFMA does not delegate any air quality enforcement responsibility to the USFS. *See Amigos Bravos v. U.S. Bureau of Land Mgmt.*, No. 6:09-cv-00037-RB-LFG, 2011 WL 7701433, at *38 (D.N.M. Aug. 3, 2011).

Finally, from a NEPA perspective, the BLM and USFS may analyze air quality impacts, but NEPA does not authorize the agencies to impose air emissions regulations. As the BLM and USFS are aware, NEPA is a procedural statute intended to produce informed decision making by federal agencies. *U.S. Dep’t of Trans. v. Public Citizen*, 541 U.S. 752, 756-57 (2004); *Theodore Roosevelt Conservation P’ship v. Salazar*, 616 F.3d 497, 503 (D.C. Cir. 2010); *Lee v. U.S. Air Force*, 354 F.3d 1229, 1237 (10th Cir. 2004). While NEPA mandates that agencies follow specific procedures when reaching decisions that significantly affect the environment, NEPA does not impose any requirement on agencies to reach a particular decision. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350-51 (1989); *Theodore Roosevelt Conservation P’ship*, 616 F.3d

at 503; *Lee*, 354 F.3d at 1237. Moreover, NEPA does not require agencies “to elevate environmental concerns over other valid concerns.” *Lee*, 354 F.3d at 1237. Once the agency adequately identifies and evaluates environmental concerns, “NEPA places no further constraint on agency actions.” *Pennaco Energy, Inc. v. U.S. Dep’t of the Interior*, 377 F.3d 1147, 1150 (10th Cir. 2004).

Because BLM and USFS lack authority under the CAA over air quality, the agencies may not attempt to regulate air emissions in the project area. Moreover, in the Crossbow EIS, BLM and USFS should expressly acknowledge that, as a matter of federal law, the State of Wyoming has the authority to directly regulate air quality in the project area. Furthermore, BLM and USFS must acknowledge that they defer the regulation of emissions to the State’s authority.

The BLM Must Recognize that the Reasonably Foreseeable Development Scenarios for the Casper RMP, the Buffalo RMP, and the TBNG LRMP Do Not Limit Future Development

EOG understands the BLM and USFS believe the Casper RMP, the Buffalo RMP, and the TBNG LRMP may need to be amended because the Crossbow Project involves a greater number of wells than are anticipated in these planning documents. When discussing the Reasonably Foreseeable Development (RFD) Scenario, the BLM and USFS must inform the public that the RFD Scenario is not a limit or threshold on future development. The agencies should also explain that the RFD Scenario is only a tool utilized by the BLM and USFS to estimate the potential impacts of oil and gas development. The development of the RFD Scenario is not expressly required by FLPMA, NEPA, NFMA, or the BLM’s planning regulations at 43 C.F.R. part 1600. Rather, the RFD concept arises from NEPA’s general requirement to consider the potential cumulative impacts of a major federal action significantly affecting the quality of the human environment. Amendment of the RFD associated with the Casper RMP was considered during development of the Converse County EIS, but the BLM determined that an amendment is not necessary for reasons including those described above. EOG supports this decision and would like to see the same reasoning applied to the Crossbow EIS.

The regulations implementing NEPA require agencies to consider cumulative impacts when conducting NEPA analysis. 40 C.F.R. §§ 1508.7, 1508.25(c). The BLM adopted this requirement into its planning regulations by requiring resource management plans to estimate the potential physical, biological, economic, and social effects of each alternative considered. 43 C.F.R. § 1610.4-6. The regulations specifically note that this estimate may be stated in terms of probable ranges where effects cannot be precisely determined. 43 C.F.R. § 1610.4-6. In order to estimate the potential impacts of oil and gas development within a particular resource area, the BLM developed the requirement for the agency to prepare the RFD Scenario in connection with the preparation of the EIS accompanying a new or revised resource management plan. *See* 43 C.F.R. § 1601.0-6 (requiring the preparation of an EIS when preparing a new or revised resource

management plan). The BLM incorporated this requirement into the BLM Land Use Planning Handbook H-1624 – Planning for Fluid Mineral Resources. *See* BLM Land Use Planning Handbook H-1624 – Planning for Fluid Mineral Resources, Chapter III (Rel. 1-1582 5/7/90). The BLM’s Fluid Mineral Planning Handbook provides that the cumulative impacts of RFD are one of three factors for analysis which should be considered when making fluid mineral determinations in resource management plans or plan amendments. *See* BLM Land Use Planning Handbook H-1624 – Planning for Fluid Mineral Resources, Chapter III.A. (Rel. 1-1582 5/7/90). Thus, the BLM’s Fluid Mineral Planning Handbook is the original source of the term “RFD Scenario.” The USFS, however, has adopted a similar requirement in its oil and gas leasing regulations. 36 C.F.R. § 228.102(c)(3).

Rather than a limit, the RFD Scenario is intended to serve as a tool assisting in NEPA compliance. “To ensure NEPA compliance a minimum level of exploration and development activities should be projected.” *See* BLM Land Use Planning Handbook H-1624 – Planning for Fluid Mineral Resources, Chapter III.B.4.a.(2) (Rel. 1-1582 5/7/90). The BLM defined and interpreted the purpose and role of the RFD Scenario in an Instruction Memorandum and amendment to the BLM Land Use Planning Handbook H-1624 – Planning for Fluid Mineral Resources issued in 2004. *See* BLM Instruction Memorandum 2004-089, Policy for Reasonably Foreseeable Development Scenario for Oil and Gas (Jan. 16, 2004) (I.M. 2004-089).² The RFD Scenario is defined by the BLM as a “baseline scenario of activity assuming all potentially productive areas can be open under standard lease terms and conditions, except those areas designated as closed to leasing by law, regulation or executive order.” *See* I.M. 2004-089, Attachment 1-1. The RFD Scenario is neither a Planning Decision nor the “No Action Alternative” in the NEPA document. *See* I.M. 2004-089, Attachment 1-1. “In the NEPA document, the RFD baseline scenario is adjusted under each alternative to reflect varying levels of administrative designations, management practices, and mitigation measures.” *See* I.M. 2004-089, Attachment 1-1. “The RFD is based on review of geologic factors that control the potential for oil and gas resource occurrence and past and present technological factors that control the type and level of oil and gas activity.” *See* I.M. 2004-089, Attachment 1-3. “The RFD also considers petroleum engineering principles and practices and economics associated with discovering and producing oil and gas.” *See* I.M. 2004-089, Attachment 1-3.

The Secretary of the Interior, through the IBLA, has made clear in at least nine separate decisions—mostly involving development within Wyoming—that the RFD Scenario is not a

² The heading on BLM Instruction Memorandum 2004-089, Policy for Reasonably Foreseeable Development (RFD) Scenario for Oil and Gas (Jan. 16, 2004) indicates that it expired on September 30, 2005, but the actual text of the Instruction Memorandum states that “This policy becomes effective upon date of issuance and remains in effect until cancelled or amended.” *See* BLM Instruction Memorandum 2004-089, Policy for Reasonably Foreseeable Development (RFD) Scenario for Oil and Gas (Jan. 16, 2004), pg. 1. EOG, therefore, assumes Instruction Memorandum 2004-089 is still in effect.

planning decision, nor is it a limit on future development. *Wyoming Outdoor Council, et al.*, 176 IBLA 15, 45 (2008); *Biodiversity Conservation Alliance, et al.*, 174 IBLA 1, 9 – 13 (2008) (holding with respect to the Great Divide RMP that the RFD Scenario is not a limitation on development); *Deborah Reichman*, 173 IBLA 149, 157 – 158 (2007) (holding with respect to the Dakota Prairie Grasslands Little Missouri National Grasslands RMP that the RFD Scenario is not a limitation on development); *National Wildlife Fed'n*, 170 IBLA 240, 249 (2006) (holding with respect to the Great Divide RMP that the RFD Scenario is not a limitation on development); *Wyoming Outdoor Council, et al.*, 164 IBLA 84, 99 (2004) (holding with respect to the Pinedale RMP that the RFD Scenario does not establish “a point past which further exploration and development is prohibited”); *S. Utah Wilderness Alliance*, 159 IBLA 220, 234 (2003) (holding that the Book Cliffs RMP did not establish a well limit); *Theodore Roosevelt Conservation P’ship, et al.*, IBLA Docket No. 2007-208, Order at *22 (Sept. 5, 2007); *Wyoming Outdoor Council, et al.*, IBLA Docket No. 2006-155, Order at *26–27 (June 28, 2006); *Biodiversity Conservation Alliance, et al.*, IBLA No. 2004-316, Order at *7 (Oct. 6, 2004) (citing *S. Utah Wilderness Alliance*, 159 IBLA at 234) (holding with respect to the Great Divide RMP that the “RFD scenario cannot be considered to establish a limit on the number of oil and gas wells that can be drilled in a resource area.”).

Similarly, at least two federal court decisions have confirmed that the RFD Scenario is not intended as a limit on oil and gas development. The U.S. District Court for the District of Columbia recently affirmed that the RFD Scenario is not a limit on future oil and gas development. *Theodore Roosevelt Conservation P’ship v. Salazar*, 605 F.Supp.2d 263, 283 (D. D.C. 2009). The trial court’s determination was affirmed by the U.S. Court of Appeals for the District of Columbia Circuit, a decision that can only be overturned by the Supreme Court of the United States. In the decision, the federal appellate court determined that the RFD Scenario is merely an analytical tool, not “a point past which further exploration and development is prohibited.” *Theodore Roosevelt Conservation P’ship v. Salazar*, 616 F.3d 497, 509 (D.C. Cir. 2010).

The USFS has also recognized that the RFD Scenario is an analytical tool, not a limit on development. For example, the recent USFS White River Oil and Gas Leasing RFD Scenario explicitly states that “[a]n RFDS is not a decision, and it does not establish or imply a ‘cap’ on development.” Reasonably Foreseeable Development Scenario for Oil and Gas Activities on the White River National Forest, pg. 1 (Sept. 2010). Rather, the RFD Scenario is a “possible reasonable scenario of activity under a specified set of assumptions.” *Id.* The USFS explicitly restated this policy in its recent White River Oil and Gas Leasing Environmental Impact Statement. White River National Forest Oil and Gas Leasing Final Environmental Impact Statement, pg. 42 (“An RFDS is not a decision, and it does not establish or imply a ‘cap’ on development.”). Both BLM and the USFS recognize that the RFD Scenario is a tool, not a limit, and both agencies should ensure the public is made aware of this distinction.

It is particularly important for the BLM and USFS to explain that the RFD Scenario is not a limit on future development because the oil and gas development proposed for the project

exceeds the RFD Scenarios set forth in applicable land use plans. The BLM and USFS should carefully describe the purpose of the RFD scenario in the Crossbow EIS.

BLM Should Not Analyze a Phased Development Alternative

The BLM is not required to analyze alternatives that require phased development of oil and gas resources. The United States Court of Appeals for the Tenth Circuit, the jurisdiction of which covers all of Wyoming, recently affirmed a BLM decision not to require a phased leasing resource management plan in the Buffalo Field Office specifically because such an alternative would delay the production of energy resources and was not otherwise practical. *Biodiversity Conservation Alliance, et al. v. Bureau of Land Management, et al.*, 608 F.3d 709, 715 (10th Cir. 2010). The BLM need not analyze such an unreasonable and impractical alternative. Further, allowing oil and gas developers to develop leases in only one portion of a geologic basin or area at a time will limit and preclude exploration and development activities. Before an oil and gas operator will be willing to commit the millions of dollars necessary to drill even a single exploratory oil and gas well, it must secure a large enough lease position to justify the expense. If phased development is delayed by the BLM in portions of the project area, they would bear unreasonable financial risks because they would be unable to secure a reasonable return on their investment. The BLM should not develop an alternative that will unreasonably constrain oil and gas development such as phased development.

The Crossbow EIS Must Analyze the Economic Impacts of the Project

The Crossbow EIS must include an analysis of the economic effects of the project. *See* 40 C.F.R. § 1508.14 (“When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment.”). This analysis should begin with a historical perspective of land use in the project area and a discussion of how oil and gas development has facilitated economic growth. This description would provide a baseline to assess current economic conditions and how future development scenarios would affect the local and regional economy. From this information, BLM can best analyze the beneficial economic impacts that will result from the project. In this analysis, BLM must evaluate the beneficial impacts of the revenues the federal government, State of Wyoming, and Campbell and Converse counties will receive from royalties and taxes on production. Furthermore, BLM must analyze the beneficial impacts to public services that depend on tax revenues generated by oil and gas operations, such as public school districts. BLM must also analyze the impacts from the project on the local and regional economy from the project’s demand for additional goods and services, which results in the creation of additional jobs, additional sales of materials, and increased sales tax revenue.

Just as the Crossbow EIS must analyze the project’s economic benefits, it must also analyze the adverse economic effects of overly restrictive management alternatives. BLM must explain

how overly restrictive management of the project may lead to decreased development, which negatively impacts the local and regional economy through decreased royalty revenue, decreased tax revenue, and the creation of fewer jobs.

The BLM Need Not Utilize the EPA's Social Cost of Carbon Protocol

In February 2010, twelve federal agencies³ released a “Technical Support Document” providing other agencies with estimates of the monetized social cost of carbon for federal agencies to use in analyzing the impacts of agency actions. Notably, neither the BLM nor the Department of the Interior were among the agencies that developed or adopted the Social Cost of Carbon Protocol. Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (Feb. 2010) (“Social Cost of Carbon Protocol”).⁴ This document has been heavily criticized for its purportedly “arbitrary” choice of discount rates; for the lack of theoretical or empirical foundation for its descriptions of climate change impacts; and for “tell[ing] us nothing” about the possibility of a catastrophic climate outcome. Robert S. Pindyck, *Climate Change Policy: What do the Models Tell Us?*, 51 J. Econ. Lit., 860, 860 (2013).⁵ The BLM and USFS should avoid using this academically and economically controversial tool in the Crossbow EIS.

The BLM and USFS are well within their authority to decline to utilize the protocol in developing the Crossbow EIS. The U.S. Court of Appeals for the D.C. Circuit and the U.S. District Court for the D.C. District have held that agencies are not required to estimate the actual impacts of carbon emissions where the agency has provided a reasoned explanation for refusing to do so. *See, e.g., WildEarth Guardians v. Jewell*, 738 F.3d 298, 309–10 (D.C. Cir. 2013); *WildEarth Guardians v. Bureau of Land Mgmt.*, Civil Case No. 1:11-cv-1481 (RJL), 2014 WL 1285505, at *10–11 (D.D.C. Mar. 31, 2014). The agencies had explained in those cases that calculating the monetized impacts of carbon emissions was “speculative” and unsupported by current science, and noted the impracticability of providing such estimates where significant uncertainties existed regarding the regional impacts of climate change. *WildEarth Guardians v. Jewell*, 738 F.3d at 309–10; *WildEarth Guardians v. Bureau of Land Mgmt.*, 2014 WL 1285505 at *10–11. In this case, the BLM and USFS should adopt similar reasoning, explain that reasoning in detail in the Crossbow EIS, and decline to use the Social Cost of Carbon Protocol.

³ Council of Economic Advisers, Council on Environmental Quality, Department of Agriculture, Department of Commerce, Department of Energy, Department of Transportation, Domestic Policy Council, Environmental Protection Agency, National Economic Council, Office of Management and Budget, Office of Science and Technology Policy, Department of the Treasury.

⁴ Available at <http://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf>.

⁵ Available at <http://web.mit.edu/rpindyck/www/Papers/PindyckClimateModelsJELSept2013.pdf>.

Although a federal district court in Colorado recently held the USFS and BLM were required to use the Social Cost of Carbon Protocol in an EIS, that case is factually distinguishable and isn't binding on the agencies in Wyoming. In *High Country Conservation Advocates v. United States Forest Service*, the court held that where the USFS and the BLM calculated monetary benefits from a coal mine expansion and lease modification and had the Social Cost of Carbon Protocol available to monetize and calculate the social costs of carbon, the agencies were required to calculate the social cost of carbon. *High Country Conservation Advocates v. U.S. Forest Serv.*, Civil Action No. 13-cv-01723-RBJ, 2014 WL 2922751 (D. Colo. June 27, 2014). In that case, however, the agencies had included such an estimate based on the Social Cost of Carbon Protocol in their draft EIS, but removed it from the final EIS with very little explanation. *Id.* at *9. In a more recent case, the court upheld the USFS's choice not to include an estimate of the impacts on carbon storage resulting from a logging project. *League of Wilderness Defenders/Blue Mountain Biodiversity Project v. Connaughton*, No. 3:12-cv-02271-HZ, 2014 WL 6977611 (D. Ore. Dec. 9, 2014). The court distinguished the *High Country Conservation Advocates* decision on the grounds that in that case, the agencies had actually used the Social Cost of Carbon Protocol in the draft EIS and removed it with little explanation. *Id.* at 26–27. In the *League of Wilderness Defenders* case, on the other hand, the USFS consistently reasoned from the beginning that current science did not support anything more than a speculative estimate of the effects of logging on climate change due to change in carbon storage. *Id.* The USFS provided a qualitative discussion of the general impacts of climate change and did not purport to compare them to the benefits of the project in a cost-benefit fashion. *Id.*

Here, the USFS and BLM should not use the Social Cost of Carbon Protocol in analyzing climate change impacts from the Crossbow project. The BLM and USFS should consistently inform the public that they will not utilize the protocol for the Crossbow EIS. The agencies should further explain that a global estimate of the impacts of carbon emissions provides no meaningful comparison to the local and regional economic benefits that will be analyzed in the Crossbow EIS. *WildEarth Guardians v. Jewell*, 738 F.3d 298, 309–10 (D.C. Cir. 2013). Further, such estimates would provide little more than the speculative and impractical analysis of carbon emissions impacts that the D.C. Circuit has determined is not required in BLM NEPA analyses. *Id.* Therefore, the agencies should not use the Social Cost of Carbon Protocol in the Crossbow EIS.

CONCLUSION

EOG appreciates and applauds the BLM and USFS for the considerable efforts the agencies have and will put forth in developing the Crossbow EIS. EOG encourages the agencies to proceed with the project as quickly as possible.

EOG would like to continue its participation in the Crossbow EIS process as well as any amendments to the Buffalo RMP, Casper RMP, or TBNG LRMP as a result of the project. Please ensure Carlos Jallo is on the BLM's mailing list for all future information regarding this project

Bureau of Land Management
December 30, 2015
Page 19 of 19

and do not hesitate to contact us should you require additional information. We request that you please specifically provide EOG complete paper copies of the Draft EIS, Final EIS and Record of Decision for this project at the address provided above.

Sincerely,

A handwritten signature in blue ink that reads "Carlos Jallo". The signature is written in a cursive style with a long horizontal stroke at the end.

Carlos Jallo
NEPA Coordinator
EOG Resources, Inc.

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Greater Crossbow
Date: Wednesday, December 30, 2015 1:21:08 PM
Attachments: [image001.png](#)
[EOG Crossbow EIS Scoping Comments Dec. 30 2015.pdf](#)

----- Forwarded message -----

From: **Carlos Jallo** <Carlos_Jallo@eogresources.com>
Date: Wed, Dec 30, 2015 at 10:28 AM
Subject: Greater Crossbow
To: "blm_wy_buffalogceis@blm.gov" <blm_wy_buffalogceis@blm.gov>
Cc: Carlos Jallo <Carlos_Jallo@eogresources.com>, Kaylene Gardner <Kaylene_Gardner@eogresources.com>

Good morning,

Attached are EOG's scoping comments on the Greater Crossbow Oil & Gas Exploration and Development Project EIS. Please contact me with any questions. A paper copy of these comments has also been sent via Federal Express to Tom Bill's attention at the BLM Buffalo Field Office.

Regards,

Carlos

Carlos Jallo

Environmental Advisor / NEPA Manager

 EOG Resources, Inc.

600 17th Street, Suite 1000N

Denver, CO 80202

Office: 303-262-9454

Cell: 303-328-8218

carlos_jallo@eogresources.com

[REDACTED]

Greater Crossbow Project
Attn: Tom Bills, Project Manager
Bureau of Land Management - Buffalo Field Office
1425 Fort Street
Buffalo, WY 82834

December 29, 2015

Att: Tom Bills:

Hello! My name is [REDACTED] and I was present at the scoping meeting regarding the Greater Crossbow Project in Douglas, WY earlier this month. I attended on behalf of my family's ranching operation which is located in the proposed project area. I am the fifth generation of my family to participate in this difficult, yet highly rewarding profession. The [REDACTED] [REDACTED], and continues to run sheep, cattle and other livestock. We have had a long and frequently contentious history with the oil and gas companies who have leased the minerals under our land and have recently been harassed by individuals in the employment of EOG. My enclosed comments will further reflect our past and current experience with the proposed development outlined in the project.

Furthermore, [REDACTED] are working to take over the ranch and will be profoundly affected by the results of this survey — especially if EOG is granted the ability to interpret the survey to suit their own business strategy (such as employing the spine and rib method when other avenues would have had a less damaging effect on the surface area).

I was surprised and devastated to learn that EOG had not contacted the landowner prior to announcing this proposal. As private land ownership accounts for over 87 percent of the proposed area, it was a shock find out about the project in a sidebar article in the Douglas Budget. The meeting itself was also disappointing, as EOG and the BLM had neglected to release the entirety of the information regarding the project to the public — a gross act that made it challenging to write effective comments.

In order to be an effective cooperating agency, the BLM must address this lack of communication and seek to include the landowner in the project as it moves forward. I can assure you that I will be signing up for project updates and following every bit of progress that is made. To this end, I have included the following comments that must be addressed by the EIS. In addition to this email, I have also sent a paper copy by post.

- 1) The sole information the BLM has provided to the public on this project is a small plat with lines and squares on it. The BLM has admitted it has much more information on the project the EOG has provided but failed to give it to the public, even when that information was asked for. This failure to provide the information the BLM has on the project severely limits the public's ability to provide helpful scoping comments as we don't know exactly what EOG is asking for or proposing.
- 2) The spine and rib approach EOG is requesting will not produce lesser impacts, it will simply concentrate those impacts into corridors. With impacts spread out over wider areas (as has been the historic case in oil and gas development), companies have a greater likelihood of being able to reclaim the surface so that the damage isn't apparent and the surface can still be used by both ranchers in their ranching operations and wildlife. The corridors in a spine and rib configuration will have such concentrated activity and damage that they will be utterly unusable to both ranchers and wildlife. The long-term effects of the corridors will last beyond the time of EOG's use, also, as the land will be so damaged and compacted that it will never regrow anything.
- 3) The corridors will give rise to roads that are the equivalent of "super highways" across the private ranches, instead of the two tracks that are generally used now. These super highways will have a dramatic effect on the ranching operations, air quality, wildlife habitat and:
 - a. In today's world, ranchers ranch because it's their heritage and way of life, not for the money. A large part of that way of life is the privacy of the ranches and caring for the land. The super highways will make it impossible for a rancher to control trespassers, unlike when there is a two track with minimal traffic. This will have major effects on the ranch operations.
 - b. Oil and gas companies have a hard time controlling dust on any roads larger than a two track. There is literally no way possible that EOG will be able to control the dust on these super highways that have enormous truck traffic in windy Wyoming. The inability to control the dust will ruin the forage for both livestock and wildlife as well as cause dust pneumonia in both livestock and wildlife.
 - c. Having such nice, built-up roads will increase the speeds at which the trucks can drive, increasing the likelihood of vehicle collisions with both livestock and wildlife. This will also increase the likelihood of vehicle rollovers in which toxic and hazardous substances contaminate both the surface and the local water table.
- 4) The spine and rib approach would require much larger pipelines than would be required in traditional oil and gas development. Bigger pipelines exponentially increase all the risks associated with pipelines.

- a. Bigger pipelines will increase the amount of oil that is spilled onto the surface in the event of a breach of a pipeline. This will increase the risk to every aspect of the land, whether it is the soil contamination, water contamination, risk to livestock and wildlife and destruction of habitat.
 - b. Bigger pipelines will increase the danger associated with any type of explosion, as they will be under higher pressure and will have more fuel to burn. This will increase the danger to every living thing on the surface, as well as affect the air quality and potentially effect water resources.
 - c. Bigger pipelines require more damage to the surface to install and repair than smaller pipelines and decreases the likelihood that the surface will ever be fully reclaimed.
 - d. Bigger pipelines create greater liability in a landowner (even though he did not volunteer to let the pipeline be placed on his property) as if he damages the pipeline, the associated damages the company suffers will be higher. This liability would dramatically effect a rancher's socio-economic status.
- 5) The BLM admitted at the public scoping hearing that EOG was seeking to install pads up to 40 acres. That is a wellpad size that has never before been seen in this area and would have significant impacts on the land.
- a. A graveled and level 40 acre wellpad in the middle of a rancher's pasture will significantly affect their ability to be able to enjoy their ranching operations. It will convert that pasture from an agricultural area into an industrial area, thus destroying the character of the ranch, not to mention the viability of the business operations inherent in the ranching profession.
 - b. The sheer size of a 40 acre wellpad will make it much harder for wildlife to acclimate to the disturbance, unlike much smaller wellpads, and will drive wildlife from the area.
 - c. It will be much harder to routinely inspect and keep track of all activity on a 40 acre wellpad than a traditionally sized one. This increases the likelihood of contamination, spill and erosion issues being undiscovered for a much longer period of time.
 - d. The number of oilwells that can be placed on a 40 acre wellpad will be substantially higher than a normal sized wellpad. This creates a number of problems.

- i. The level of contamination on the wellpad will be significantly increased because if each well or equipment leaks only a little (like they routinely do) all of that contamination is aggregated on the pad. Greater levels of contamination in one area increases the saturation into the ground and increase the likelihood of contamination of the water table and surrounding soils.
 - ii. In the case of an explosion in one well, the more wells surrounding it, the greater the final explosion will be. This would endanger every living thing on the surface, as well as increasing the likelihood that the fire would escape the wellpad and burn wildlife habitat and livestock forage.
 - iii. If one well explodes, all of the wells will explode on the pad. The more wells that explode will increase the economic impact on the royalty owners, as more people will lose their royalty income.
- 6) The concentration of the development in the spine and rib approach would have a detrimental effect on the water resources in the area.
 - a. The concentration of the wells would increase the likelihood that EOG would draw it's drilling water from a much more concentrated area. This would increase the likelihood of drawing down the water table in the area. This would effect a rancher's ability to water his livestock and the wildlife. It would also likely effect the springs and artesian wells in the area.
 - b. The concentration of the wells would increase the likelihood that EOG would dispose of the produced water and drilling waste in a more concentrated area. This would increase the likelihood of contamination of the water through leaks or fractured formations under pressure. It would also increase the damage done by the leaks and fractured formations as there would be more contaminants let loose into the water.
- 7) The spine and rib approach that EOG is proposing would eliminate the rancher's ability to work with the company to change the location of facilities to decrease the impact oil and gas development has on their ranching operation. With traditional development, the company and rancher work together for everyone's best interest. If EOG's spine and rib approach is approved by the BLM under this EIS, then EOG will refuse to negotiate with the ranch to decrease their facilities' impact on the ranching operations and the rancher's life. This is because EOG will try to claim that any other pattern of development would

require another EIS. Therefore, if you approve this EIS with no alternatives to the spine and rib development approach, you are hamstringing the landowner's ability to protect their land, the water and air, and the wildlife, on a case by case basis. As the protection of these assets is the foundation of ranching life and culture, you will be destroying our ability to protect our culture.

Thank you for your time and consideration. Feel free to contact me should you have any further questions.

Sincerely,

A solid black rectangular box used to redact the signature of the sender.

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: EIS Comments -- Greater Crossbow Project
Date: Thursday, December 31, 2015 2:05:41 PM
Attachments: [EIS Comments for Greater Crossbow Project](#) [REDACTED]

----- Forwarded message -----

From: [REDACTED]
Date: Wed, Dec 30, 2015 at 5:45 PM
Subject: EIS Comments -- Greater Crossbow Project
To: BLM_WY_BuffaloGCEIS@blm.gov

Tom Bills:

Hello, enclosed are my cover letter and comments regarding the Greater Crossbow Project. Let me know if you have any questions or comments. I will also be sending a hard copy via post.

Sincerely,

[REDACTED]

[REDACTED]



Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.



Matthew H. Mead, Governor



Todd Parfitt, Director

December 30, 2015

Tom Bills, Project Manager
1425 Fort Street
Buffalo, WY 82834

Dear Mr. Bills,

Thank you for the opportunity to provide input regarding the preparation of the proposed environmental impact statement (EIS) for the Greater Crossbow Oil and Gas Exploration and Development Project.

The following scoping level comments or concerns are organized by Department of Environmental Quality division.

Water Quality:

The Plan of Development (POD) appears to address many environmental concerns common in oil and gas development projects by the spine and rib approach utilizing multi-well pads, the use of pipelines in corridors for fluids and gas transport, and the use of closed loop drilling technology. However, the BLM should consider developing an alternative for the EIS that may reduce the footprint and impact of the project even further. Such an alternative should consider:

- Centralized fracking facilities which would serve several well pads and reduce their size; this methodology is currently used in the Piceance Basin to frack wells within a two miles radius of the facility.
- Running all pipelines along roads to reduce long-term surface disturbance.
- Maximize water recycling.

The POD states that waste fluids will be initially disposed of into existing commercial wells, then later in EOG's disposal wells when they are drilled. The EIS should disclose locations of the disposal wells, the receiving formations, and the expected volumes of waste water under the various alternatives. The EIS should also clarify the difference between Class I disposal wells, permitted by WDEQ and Class II disposal wells, permitted by WOGCC.

It is unclear in the POD how and where drill cuttings will be disposed of; the EIS should clarify this.

There are several WQD permits and other requirements that may apply to the project, depending on the eventual scope of the project.

- Storm Water Associated with Construction Activities. This permit is required any time a project results in clearing, grading, or otherwise disturbing one or more acres. The disturbed area does not need to be contiguous. The permit is required for surface disturbances associated with construction of the project, access roads, construction of wetland mitigation sites, borrow and stockpiling areas, equipment staging and maintenance areas and any other disturbed areas associated with construction. A general permit has been established for this purpose and either

the project sponsor or general contractor is responsible for filing a Notice of Intent (NOI) and complying with the provisions of the general permit. The NOI should be filed no later than 30 days prior to the start of construction activity. Please contact Barb Sahl at 307-777-7570, or John Gorman at 777-5622 for additional information.

- **Discharge Permit.** Any discharges to “waters of the state”, including discharges from cofferdam dewatering, discharges from hydrostatic pipeline testing, or discharge of other waste waters must be permitted under the Wyoming Pollutant Discharge Elimination System (WYPDES) program. This program is part of the federal Clean Water Act, but is administered by the WQD. For clarification, waters of the state include rivers, streams, dry draws, wetlands, lakes, reservoirs and even stock ponds. This permit will require some sampling and will incorporate effluent limits for any constituents of concern. Roland Peterson (307-777-7090) can provide additional information.
- **Land Application or Road Application Permit.** Water from hydrostatic pipeline testing may be applied to roads or land surfaces if it will not reach a water of the state, meets certain water quality standards and a permit is obtained from the WQD. Please contact Seth Tourney (307-777-7088) for land application information, or Dennis Lamb (307-473-3452) for road application information.
- **Temporary Turbidity Variance.** Wyoming has turbidity criteria for waters designated as fisheries or drinking water supplies. Any type of construction activity within these streams is likely to result in exceedences of these criteria. However, in accordance with Section 23(c)(2) of the Chapter 1 Surface Water Quality Standards, the administrator of the Water Quality Division may authorize temporary increases in turbidity above the numeric criteria in Section 23 (a) of the Standards in response to an individual application for a specific activity. While it is not required to get this authorization, this project has the potential to exceed the turbidity criteria and a variance is recommended. An application must be submitted and a variance approved by the administrator before any temporary increase in turbidity above the numeric limits takes place. This process generally takes about 45 days. Please contact Cathy Norris at 307-777-6372 for more information.
- **Spill Reporting.** Chapter 4 of the WDEQ Water Quality Rules and Regulations requires that the WQD be notified of spills or releases of chemicals and petroleum products. The EIS should reiterate this and explain how soils, groundwater and surface will be protected from releases of chemicals, petroleum products and produced water.

Permits/Authorizations from other Agencies:

- **Water Supply Wells.** The WQD would like to remind the BLM that the Wyoming State Engineer (SEO) has regulations governing the sanitary construction of water supply wells and the Wyoming Oil and Gas Conservation Commission (WOGCC) has regulations governing the siting and construction of water supply wells proximal to oil and gas exploration and production facilities.
- **Aquatic Invasive Species (AIS).** Preventing the spread of aquatic invasive species (AIS) such as zebra/quagga mussels is a priority for the State of Wyoming; in many cases, the intentional or unintentional spread of organisms from one body of water to another would be considered a violation of State statute and Wyoming Game and Fish Commission Regulation. To prevent the spread of AIS, there are several inspection and transportation requirements for equipment

entering the state, operating in waters of the state and/or used to transport surface water. Further information on AIS regulations and requirements can be found at: <https://wgfd.wyo.gov/AIS>.

- Section 404. While not a state permit, this project may require a section 404 permit from the US Army Corps of Engineers. Any time work occurs within waters of the US a 404 permit may be required. Additionally, a number of activities such as dam construction will require section 401 certification from the state. Please contact the Corps (307-772-2300) for specific information regarding jurisdiction and requirements.
- Baseline Groundwater Monitoring. The Wyoming Oil and Gas Conservation Commission requires operators to submit a baseline sampling, analysis and monitoring plan for water sources in the vicinity of proposed oil and gas wells. Further information is available from the WOGCC <http://wogcc.state.wy.us/>.

Land Quality:

The proposed development falls within the Bureau of Land Management (BLM) defined coal boundary of the approved Resource Management Plan. A significant portion of the proposed project area is currently in leased coal production or projected for future leasing and production. The EIS should address the administration of oil and gas development as it relates to mine blasting, existing mined land reclamation, and the potential for sterilization of coal reserves if oil and gas development occurs in future mining areas. These potential conflicts need to be identified and the BLM approach to managing these issues should be defined.

BLM should consult with the Office of Surface Mining Reclamation and Enforcement and the Mine Safety and Health Administration regarding the proposed project to mitigate potential regulatory issues that may arise.

The EIS should analyze potential revenue impacts from the resource development substitution.

Air Quality:

The Interagency Memorandum of Understanding (MOU) establishes common procedures for the agencies to follow in analyzing and mitigating the potential air quality impacts of proposed oil and gas activities on federally managed public lands through the NEPA process.

Sincerely,



Todd Parfitt
Director

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Greater Crossbow Scoping
Date: Thursday, December 31, 2015 2:04:33 PM
Attachments: [Scanned Doc003136.pdf](#)

----- Forwarded message -----

From: **Brian Lovett** <brian.lovett@wyo.gov>
Date: Wed, Dec 30, 2015 at 1:30 PM
Subject: Greater Crossbow Scoping
To: blm_wy_buffalogceis@blm.gov

Comments attached. Thank You, Brian.

--

Brian K. Lovett
Outreach Program Manager
Wyoming Department of Environmental Quality - Administration Division
122 West 25th Street, Herschler Building 4W
Cheyenne, WY 82002
(W) 307-777-7388 (C) 307-214-6644

E-Mail to and from me, in connection with the transaction of public business, is subject to the Wyoming Public Records Act and may be disclosed to third parties.



WYOMING MINING ASSOCIATION

Physical Address
2601 Central Avenue
Cheyenne, WY 82001

Phone: 307.635.0331

Mailing Address
PO Box 866
Cheyenne, WY 82003

Fax: 307.778.6240

December 28, 2015

Greater Crossbow Oil and Gas Project
BLM Buffalo Field Office,
1425 Fort Street
Buffalo, Wyoming 82834

To whom it may concern:

The Wyoming Mining Association (WMA) is a statewide trade organization that represents and advocates for 39 mining company members producing bentonite, coal, trona and uranium, as well as one company in the permitting and development process for a rare earth element mine. WMA also represents 129 associate member companies, two railroads and 180 individual members.

The WMA has numerous comments pertinent to the scoping process for this proposed project. WMA members have taken a particular interest in it because the project area overlaps lands on which solid mineral leases have been issued, or may be issued in the future by the Bureau of Land Management (BLM). It is in all of our interests to ensure that any and all environmental analysis documents are consistent, thorough, and meet all of the program requirements of the various leasing programs. It is also critical that resource development conflicts are actively managed by the United States Government as the owner of the solid and liquid minerals.

Importantly, the proposed project area falls within the area of Coal Development Potential. This area, so named and delineated by the BLM, identifies the area in which future federal coal leases are expected to be located. The project area also falls within existing lease boundaries and the boundary of at least one current Wyoming Permit to Mine for a surface coal mine. Other types of mineral leases or claims as well as Wyoming mining permits may also be located in or near the vicinity of this proposed Greater Crossbow Oil and Gas Exploration and Development Project. We believe that mineral lease or claim overlaps require explicit and thorough examination by the BLM in this Environmental Impact Statement (EIS). The agency needs to identify the overlap issues, identify whether the overlaps can be avoided, and if not identify strategies they will use to manage possible conflicts. Evaluation of this issue is essential for the agency officials to be fully informed of the impacts associated with the decisions they will be asked to make.

In addition to this over-riding concern, other WMA comments are addressed below.

Project Versus Programmatic EIS

There were numerous questions and issues that were discussed or mentioned in the December 10th public scoping meeting in Gillette for which no answers were available. Yet, it was stated that the BLM is intending to construct a programmatic EIS. A programmatic EIS, it was stated, requires less site-specific information and is intended to address more broadly-defined plans and goals. We have been unable to find mention of this issue of programmatic versus project EIS for this project anywhere in the scoping information handed out at the meeting.

In 2014 the Council on Environmental Quality (CEQ) proposed guidance for the use of programmatic environment reviews, including environmental impact statements. (79 FR 50578; Pages 50578 - 50589). In that proposal the CEQ defined the term programmatic as,

“...any broad or high-level NEPA review; it is not limited to a NEPA review for a particular program.”

CEQ further stated there are other reasons for a programmatic NEPA review, including,

“...when there are limitations in available information and uncertainty regarding the timing, location, and environmental impacts of subsequent implementing action(s). For example, in the absence of certainty regarding the environmental consequences of future tiered actions, agencies may be able to make broad program decisions and establish parameters for subsequent analyses based on a programmatic review that adequately examines the reasonably foreseeable consequences of a proposed program, policy, plan, or suite of projects.”

Oil and Gas exploration and development have occurred throughout this area in projects large and small for a long time. To assert that the necessary information to evaluate impacts is unavailable, or the certainty of development and subsequent impacts constitute an unknown in the development of these federal lease rights is disingenuous.

We believe a programmatic EIS will be completely unsuitable for informing the BLM on the decisions they will be faced with when/if the project is implemented. The size of the project area (107,000 acres) is larger than most mining permit areas in the State of Wyoming. More importantly, the 4,000-acre affected area (100 pads @ 40 acres each) may be likened to a medium-sized mining lease. The project would also appear to add no less than 50 miles of new unpaved roads to the area, increasing the total affected lands by another 3-5%. Although the size may be larger than most oil and gas exploration projects, the project components appear to be the same.

For virtually any other energy project of this size the BLM and the US Forest Service (USFS) have routinely conducted full a project-level EIS including all the specific development details for that project. These EIS analyses have been thorough, specific and justified as necessary to properly inform the BLM and the USFS prior to deciding whether to issue leases, authorize development, or issue special use permits. It should be noted that most of these recent project-specific EISs have been upheld in appeals.

The ‘rib and spine’ concept is purported to be a new concept and will reduce affected acres. This may be the case but should be demonstrated with a specific plan of development. In fact, the ‘rib and spine’ approach has likely reduced the overall affected area substantially. But this approach should not be used to mask the sheer size of the project and its potential impacts. We believe an equivalent project-specific EIS is warranted, and will ultimately be beneficial for this project.

Air Emissions

The nature of this project was characterized in the Gillette public meeting as much more concentrated than traditional oil and gas exploration projects. Numerous wells could be placed on each of the 100 well pads, thereby concentrating the drilling, and pumping activities. While this may be beneficial from the perspective of total disturbed acres, this will also concentrate activities such as transportation and emissions of air pollutants.

Unpaved roads in the oil and gas sector currently contribute significantly to particulate emissions throughout the area. Not only worker traffic but also the continual access of contractors and suppliers as well as larger tanker and service truck traffic contribute significantly to the emissions from untreated and unpaved roads. Numerous industrial particulate monitors, operated by mining companies, are located downwind of this project. Rather than to wait for exceedances to be recorded at these monitors, we believe the BLM is obliged to fully evaluate particulate emissions from the proposed activities in conjunction with existing permitted and unpermitted emission sources in the area. In order to ensure that current compliant air quality is maintained in the area, the EIS needs to include an evaluation of emission control strategies with the Wyoming Department of Environmental Quality, including requirements and enforcement for best practices and standard emission control activities.

It was noted that the project will involve 125,000 hp of new gas compression in the area. With the recent reduced ozone standard, the EIS should carefully evaluate ozone emissions and ozone formation in the general area. The evaluation needs to be in sufficient detail to ascertain whether the project will contribute to ozone formation in violation of the new standard.

Impacts to Water Resources

Several questions were asked by the public at the Gillette meeting on December 10th, relating to which aquifers are to be impacted for water withdrawal and also for waste water disposal. BLM and project proponent personnel were all unable to answer questions about both of these topics at the scoping meeting. Furthermore, with more than 4,000 acres projected to be disturbed over the longer term, the impacts upon surface water are also a concern. The EIS should be detailed enough to analyze impacts to the quality and quantity of groundwater withdrawal and disposal sources. The EIS should also be detailed enough to evaluate impacts to surface water runoff on water in streams and to water available to downstream water users.

Impacts to Wildlife

There was some discussion at the meeting in Gillette regarding a request by the project proponent to drill and develop wells throughout the entire year without regard to nesting restrictions for raptors and Greater sage-grouse. The BLM presentation seemed to imply that this was a primary objective of the program. WMA strongly suggests that seasonal nesting restrictions cannot and should not be ignored. The EIS needs to specifically address impacts to raptor and sage-grouse populations. In so doing, the request needs to be evaluated against habitat and population concerns as addressed in the recent resource management plan amendments by the BLM, the land use plan amendments by the USFS, and the Wyoming Governor's Executive Order dealing with the Greater sage-grouse.

Raptor populations in the area pose a different concern. There are currently decades-old projects and programs for the management of raptor populations to the north, east, and south of this proposed project. Impacts to the populations in the vicinity of this proposed project could become manifest as impacts on adjacent populations, and the projects and programs being implemented by other energy and mining industry companies. The EIS should specifically evaluate the impact of the proposed project on raptor populations of the project site as well as the secondary impacts to nearby raptor populations and territories. The project area cannot be viewed in isolation from the perspective of raptors.

The USFS has indicated in their Resource Management Plan that areas within the Thunder Basin National Grasslands will be dedicated to re-introduction of the Black-footed Ferret. The impacts of the

Greater Crossbow Oil and Gas project need to be evaluated with regard to the ferret reintroduction plans as well as other USFS plans for the area.

Resource Management Plan

It was noted in the Gillette meeting presentation that the project area extends into both the Casper and the Buffalo Resource Management Plan areas. There was no discussion regarding which of the two Resource Management Plans is to control decisions on the project. In addition, we could find no information in the scoping literature about which plan will control this project. The issue becomes further complicated by the presence of the USFS as a cooperating agency. The EIS needs to also address what plan will control on the 8% of the land surface of the project area that is administered by the USFS.

How do the various resource and land use management plans differ and what changes will have to be made to one plan or the other in order to proceed under one plan or the other? The BLM needs to evaluate this issue in the EIS including whether the various Resource Management Plans are equivalent in their treatment of resource and environmental protection, remediation, and reclamation.

On a related issue, the BLM should evaluate in the EIS how each of the two existing BLM Resource Management Plans will deal with resource development conflicts. BLM should propose a clear and unambiguous strategy for actively resolving all conflicts between solid and liquid minerals leased by the federal government in these overlapping areas.

Transportation

Traffic on State Highway 59 is a concern to local residents, the regional energy industry companies, and County and State governments. The BLM should assess whether this additional development will increase traffic on Highway 59 now and in the future. The evaluation needs to consider current and longer range plans by the state for addressing this traffic.

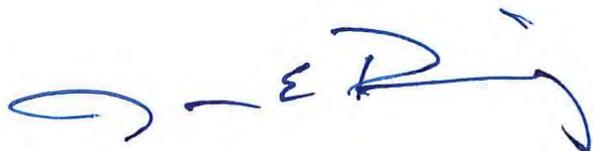
Miscellaneous

At the meeting in Gillette it was stated that as many as 300 (of the 1500 total) wells might be drilled under some other authority, concurrent with the programmatic NEPA analysis. There were no specifics regarding these 300 wells, other than the general statement that their purpose is to help define the project. We have been unable to find mention of these 300 wells anywhere in the scoping literature.

Again we believe these issues are justifications for a project-specific EIS. It would be appropriate, if not necessary, for the EIS to evaluate impacts from these additional 300 wells also.

WMA appreciates the opportunity to provide scoping comments on this project.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jonathan Downing". The signature is stylized and somewhat cursive.

Jonathan Downing
Executive Director

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: WMA Comments - BLM Greater Crossbow Oil and Gas Project
Date: Wednesday, December 30, 2015 1:19:55 PM
Attachments: [151228 WMA Comments BLM Greater Crossbow Oil and Gas Project.pdf](#)

----- Forwarded message -----

From: **Travis Deti** <tdeti@vcn.com>
Date: Wed, Dec 30, 2015 at 6:06 AM
Subject: WMA Comments - BLM Greater Crossbow Oil and Gas Project
To: BLM_WY_BuffaloGCEIS@blm.gov
Cc: jdowning@wyomingmining.org, "Dinsmoor, Phil"
<PDinsmoor@peabodyenergy.com>

To whom it may concern,

Attached please find comments of the Wyoming Mining Association on the proposed Greater Crossbow Oil and Gas Project.

Thank you for your attention.

Travis Deti

Assistant Director

Wyoming Mining Association

307-635-0331

www.wyomingmining.org



December 31, 2015

VIA EMAIL TRANSMISSION ONLY

BLM_WY_BuffaloGCEIS@blm.gov.

Mr. Thomas Bills
NEPA Coordinator
Greater Crossbow Oil and Gas Project
BLM Buffalo Field Office
1425 Fort Street, Buffalo, WY 82834

RE: Objection and Initial Comments of Cloud Peak Energy, Inc. and Antelope Coal, LLC to pending BLM Notice of Intent to Prepare an Environmental Impact Statement for the Greater Crossbow Oil and Gas Project and Possible Amendments to the Casper Resource Management Plan, 80 Fed. Reg. 65242 (October 26, 2015).

Dear Mr. Bills:

Cloud Peak Energy Inc. (Cloud Peak), through its wholly owned subsidiary, Antelope Coal LLC ("Antelope"), respectfully submits these scoping comments in response to the above-referenced notice of intent (NOI) to prepare an environmental impact statement (EIS) for the Greater Crossbow Oil and Gas Project and Possible Amendments to the Casper Resource Management Plan (collectively, the Project). As described in the NOI and on the Bureau of Land Management's (BLM's) website, the Project involves EOG Resources Inc.'s (EOG's) proposal to develop an oil and gas field consisting of 1,500 oil and natural gas wells on over 106,000 acres of land, which includes 87% private surface, 8% State of Wyoming surface, and 5% on the Thunder Basin National Grassland. As explained by the BLM at the December 10th scoping meeting in Gillette, Wyoming, EOG apparently plans to complete wells in up to six horizons with an average of 15 wells per well pad and typical well pad sizes of forty acres.

Cloud Peak is one of the largest U.S. coal producers, specializing in the production of low-sulfur subbituminous coal. Cloud Peak owns and operates three surface coal mines in the Powder river Basin, including the Antelope Mine, which straddles the Campbell and Converse County, Wyoming lines.

Cloud Peak and Antelope respectfully object to the proposed Project and its NEPA disclosures, notice and planning to date. The Project as proposed, described and noticed by EOG and the BLM to date does not comply with numerous basic NEPA requirements and totally fails to provide the "hard look" analysis, alternative discussion and disclosure that NEPA always mandates for this type of proposal on federal lands. The BLM and other agencies involved in this proposal also have an ongoing affirmative duty not to consider or implement policies that violate their own existing planning policies for coal development in this area. Cloud Peak and Antelope will be directly and adversely impacted by this proposal if it is allowed to go forward as described. Cloud Peak requests that you consider the negative impacts the Project will have on Antelope Mine's current and future operations, future recovery of federal coal resources, and the inconsistency of approving the Project, as proposed, in light of the multiple use

resource development policy underlying all BLM land and mineral management decisions and as set forth in the Buffalo and Casper Resource Management Plans.

Prior to Cloud Peak representatives attending the December 10, 2015 EIS Scoping Meeting, EOG representatives had not contacted Cloud Peak Energy or Antelope Coal to discuss the Project, logical well and infrastructure placement, or even the location of the existing Antelope Mine Permit and any possible impacts on obvious known existing or pending coal LBAs or LBMs. Cloud Peak also understands that EOG and the BLM likely did not provide proper and timely notice and explanation of this proposal and its ramifications to the United States Office of Surface Mining prior to or during this scoping and notice process.

Project Versus Programmatic EIS

We agree with the Wyoming Mining Association's concerns that this Project may not be appropriate for a Programmatic EIS and should, instead, be a Project EIS focused on the direct and indirect impacts of the Project and specific steps that can be taken to mitigate conflicts. There were numerous questions and issues that were discussed or mentioned in the December 10th public meeting in Gillette, for which no answers were available. Yet, it was stated that the BLM is intending to construct a programmatic EIS. A programmatic EIS, it was stated, requires less site-specific information, and is intended to address more broadly-defined plans and goals. We have been unable to find mention of this issue of programmatic versus project EIS anywhere in the scoping information, on the BLM's Project website, or elsewhere.

The programmatic EIS approach will be completely unsuitable for informing the BLM on the decisions it will face when/if the project is implemented and planning in this summary way will deprive numerous stakeholders, including Cloud Peak and Antelope, and the public, of adequate notice and information about this project during the critical opening planning and comments stages under NEPA. For example, the size of the project area (107,000 acres) is larger than most mining permit areas in the State of Wyoming. Moreover, and more importantly, the 4,000-acre affected area (estimated assuming 100 pads @ 40 acres each) may be likened to a medium-sized mining lease. The project would also appear to add no less than 50 miles of new unpaved roads to the area, increasing the total affected lands by another 3-5%.

For virtually any other project of this size, the BLM has routinely conducted a full project-level EIS including all of the specific details for that project. These EIS analyses have been thorough, specific and justified as necessary to properly inform the BLM and the USFS prior to deciding whether to issue leases or special use permits. It should be noted that most of these project-specific EISs have been upheld in appeals as appropriate and sufficient.

The 'rib and spine' concept that is purported to reduce affected acres, should not be used to mask the sheer size of the project and its potential impacts. We believe an equivalent project-specific EIS is warranted, and will be beneficial for this project.

Direct Adverse Impacts to Antelope Mine

EOG's proposed Project overlaps the existing Antelope Mine permit boundary, including land owned by Cloud Peak through its subsidiary, Antelope, and overlaps most of Antelope's previously submitted application for West Antelope III LBA and all of its West Antelope II South LBM, as shown on the included map. The Project even proposes well pads to be located within the West Antelope III LBA as though the LBA does not exist at all. The Project's location would likely negatively impact Antelope Mine's ability to advance the mining operation and to efficiently and properly recover federal coal resources and reclaim those coal lands as existing planning documents such as the Buffalo RMP mandate.

It is unclear whether BLM proposes allowing oil and gas surface infrastructure within Antelope's current and future permit boundaries. If allowed, this would also raise numerous safety and environmental control and reclamation concerns.

To conduct operations safely, Antelope Mine requires a one-half mile offset from its Permit line to allow for safe blasting operations. Additionally, due to the unique regulations to which coal mining is subject and oil and gas is not (MSHA, SMCRA, etc.), it would be difficult to safely and repeatedly admit oil and gas operators and their contractors into and out of the mine permit area to conduct oil and gas operations. It would also be difficult for differing agencies to administer reclamation obligations in a comingled oil and gas and coal environment. The Project's scoping notice and explanation contains no useable facts, data or explanations whatsoever about how EOG or the BLM would somehow propose to plan for and ever allow oil and gas development activity within the highly regulated MSHA and SMCRA operation and active reclamation boundaries of the existing Antelope Mine or in adjacent areas that are already committed to orderly coal development in the latest Buffalo RMP and in pending lease nominations.

Further, no indication has been made anywhere in the Project disclosures as to the expected well life for the planned wells; however, once a horizontal oil well is drilled, so long as any oil is being produced, the operator has very little incentive to remove the well, incur plugging and reclamation costs, and lose the oil and gas lease. This leaves numerous of marginally productive oil and gas wells, which are expensive to remove, in the line of future coal mining. With BLM's conflict resolution measures, the coal company is often forced to buy out, usually at significantly above market-value, any oil and gas wells in the line of future coal mining. Due to the proposed number of wells per well pad, and associated cost of potentially buying out the remaining well life, plugging the well, and reclamation, the location of each well is vitally important to Antelope Mine's future development plans.

In many cases, the oil and gas leases have priority in time over coal leases because the leases have been held in place by shut-in coal bed methane wells and unitization with other horizontal oil and gas wells. Due to the large bonus payment required to obtain a coal lease, coal companies do not apply for more coal leases than they actually plan to mine in the near term. This creates an advantage for oil and gas operators in establishing earlier federal lease priority dates.

We request that your EIS be rescope and renoticed for comment to expressly include an accurate and thorough review and explanation of all of the specific and direct affects the Project would have on the existing Antelope Mine and orderly development of federal coal resources, including West Antelope III LBA and West Antelope II South LBM. This analysis would require the specific location of EOG's well pads, wells, laterals, roads, pipelines, and other similar infrastructure. We request that you consider requiring EOG to provide exact well locations to be considered as a part of the EIS process.

We also request you consider the health and safety hazards of allowing oil and gas development in or near an active mine permit area and how safety, environmental and reclamation obligations would be allocated in the event oil and gas development were allowed within a mine permit area.

Compliance with the Applicable Resource Management Plans

Buffalo Resource RMP. The Buffalo Resource Management Plan (RMP) was approved by ROD on September 21, 2015, after years of public input and review, beginning with scoping meetings in 2008. The RMP expressly restricts oil and gas surface use or occupancy within areas identified as highly likely to be considered in a Coal Lease by Application (LBA) to ensure "the orderly development of the coal resource..." p. 236, Buffalo RMP. " The 2015 RMP adopted and included this specific mineral resource management policy expressly favoring coal development in areas like the Antelope Mine and nearby LBAs for several important reasons. First, clearly applying a "coal development first" development policy to these areas insures the most logical, orderly and productive development of minerals in these areas for the U.S. Treasury and the tax payers and recognizes the surface coal mine planning, leasing, permitting and bonding takes more time that oil and gas planning. Second, the policy of favoring coal development first was included in the 2015 RMP after Cloud Peak and others had repeatedly come to the BLM for management relief and guidance when a federal oil and gas developer had intentionally attempted to obtain leases and development permits in committed coal mining areas or planned LBA's where they knew that if they could begin development quickly, they could abuse the overall planning process to try to force the coal mining companies to pay unreasonable amounts to buy out existing marginal wells intentionally sited in the line of future coal mining.

As the 2015 RMP was supposed to expressly recognize and settle, the only way to allow for orderly development of both the oil and gas and coal resources is to give coal priority over oil and gas in areas likely to be the subject of future coal leasing and mining, which is why the BLM has been adding stipulations limiting oil and gas development on oil leases located within the potential coal development area. BLM identified the potential coal development area in the Powder River Basin as early as the 1920s and it has not changed significantly since that time. The coal located near Antelope Mine and within the potential coal development area is high quality, 8,800 Btu coal found at economically mineable depths. To allow the scale of oil and gas development EOG proposes within the potential coal development area and so close to Antelope Mine will significantly impede future coal development.

While the 2015 RMP allows BLM authorized officer some discretion to grant an exception only if it is determined that the action will not interfere with coal operations." *Id.* "An exception, waiver, or modification must be based on two criteria... the factors leading to [the stipulation's] inclusion in the lease have changed sufficiently to make the protection provided by the stipulation no longer justified or if the proposed operations would not cause unacceptable impacts. *Appendix B, Section B.3.* The 2001 RMP Update Map 3-5 Mineral Resources Leasable – Coal defines the Coal Development Potential Area.

None of these criteria can be met based upon EOG proposal. The Casper RMP was approved in December of 2007. One of its mineral resource objectives is to maintain both coal and oil and gas leasing while “minimizing impacts to other resource values.” Table 1-1, 2000 Mineral Resources, MR:2.1 and 2.2. “On current LBAs, oil and gas leasing will be deferred until the LBA lease is issued.” *Id.*, MR:3.3. Casper Resource RMP. The Casper RMP also references Map 2 Mineral Resources Leasable – Coal and was adopted with express intent to coordinate and efficiently promote coal development based on these important policies.

Both RMPs support the orderly development of both the coal and oil and gas minerals. Over half of the proposed Project lands, approximately 53,575 acres, lay over the top of the BLM’s only Coal Development Potential Area within the Powder River Basin. Therefore, EOG’s Project proposes to intentionally locate oil wells directly over limited known leasable coal reserves located in or near an existing active surface coal mine. The presence and activity of the Antelope Coal Mine is obvious and well known to EOG and the BLM. This EIS process is an opportunity for the BLM to consider adding stipulations to all oil and gas leases within the Project area to ensure the orderly development of the coal resource.

The BLM cannot change these long considered and developed orderly mineral development policies just because EOG submit a new proposal to drill a series of lines of new oil and gas wells along Section lines in this area. It is not appropriate at this time for EOG’s proposal to serve as some sort of *de facto* overall amendment of these important development policies as they were established in the 2015 RMP in this sort of scoping notice. It also is not appropriate for EOGs’ proposal to serve as a vehicle for changes in coal development policy that are designed to effectively put Cloud Peak and Antelope out of business due to increased costs imposed upon them in an after-the-fact fashion through oil and gas project planning.

Cloud Peak and Antelope request that in the event this EOG Project is even allowed to proceed for further NEPA analysis given its many flaws, in order for EOG’s proposal to comply with the existing orderly development requirements for coal, oil and gas under the current 2015 RMP, the BLM must require added stipulations to any existing or newly issued federal oil and gas lease subject to the 2015 RMP and this EIS, and within the overlap area between the Project and the Coal Development Potential Area, which:

1. Prohibits surface occupancy within the area of federally leased coal lands, for any applied for federal coal lease, and within an existing coal mine permit boundary; and
2. For all other areas, allows the oil and gas operator up to 15 years to develop the oil and gas resource, subject to coal mine-through rights at the oil and gas operator’s sole risk and expense after expiration of that time.

Other Important RMP and Overall Planning Issues It was noted in the Gillette meeting presentation that the project area spans into both the Casper and the Buffalo Resource Management Plan areas. There was no discussion regarding which of the two Resource Management Plans is to control decisions on the project. In addition, we could find no information in the scoping literature about which plan will control this project. The issue becomes further compounded by the presence of the US Forest Service as a

cooperating agency. The EIS needs to address what plan will control on the 8% of the land surface of the project area that is administered by the US Forest Service.

How do the various resource and land use management plans differ and what changes will have to be made to one plan or the other in order to proceed under one plan or the other? The BLM needs to actually analyze and evaluate this issue in the EIS in detail, including whether the various Resource Management Plans are equivalent in their treatment of resource and environmental protection, remediation, and reclamation.

On a related issue, the BLM should evaluate in the EIS how each of the two existing BLM Resource Management Plans will deal with resource development conflicts. BLM should propose a clear and unambiguous strategy for actively resolving all conflicts between solid and liquid minerals leased by the federal government in these overlapping areas.

Air Quality Impacts

The nature of this project was characterized in the Gillette public meeting as much more concentrated than traditional oil and gas exploration projects. Numerous wells could be placed on each of the 100 well pads, thereby concentrating the drilling, and pumping activities. While this may be beneficial from the perspective of total disturbed acres, this will also concentrate activities such as transportation and emissions of air pollutants. Unpaved roads in the oil and gas sector currently contribute significantly to particulate emissions throughout the area. Not only worker traffic but also the continual access of contractors and suppliers as well as larger tanker and service truck traffic contribute significantly to the emissions from untreated and unpaved roads. Similar oil and gas projects have been developed in Wyoming, including the Jonah field in the Pinedale area, which has significantly contributed to the deteriorating air quality in that area over the past decade. In that case, the deterioration of air quality due to oil and gas activity ultimately led the Wyoming Department of Environmental Quality, Air Quality Division, to declare the area non-attainment. Due to its sheer size, this project could have similar results. Such a non-attainment determination would likely result in sanctions against any future development in the area and/or limitations on existing industrial activities in the area.

Numerous industrial particulate monitors, operated by mining companies, are located downwind of this project. Rather than to wait for exceedances to be recorded at these monitors, we believe the BLM is obliged to fully evaluate and model particulate and other emissions from the proposed activities in conjunction with existing permitted and unpermitted emission sources in the area. Modeling should include evaluation of peak concentrations of air pollutants including particulate, NO_x, and ozone. In order to ensure that current compliant air quality is maintained in the area, the EIS needs to include an evaluation of emission control strategies with the Wyoming Department of Environmental Quality, including requirements and enforcement for best practices and standard emission control activities.

Given the likelihood of EOG's Project contributing to air pollutants, Cloud Peak and Antelope request supplemental monitoring be conducted by EOG to attempt to attribute EOG's emissions back to their source to assist the Department of Environmental Quality in analyzing air quality exceedances, causes, and to determine appropriate corrective actions.

It was noted that the project will involve 125,000 hp of new gas compression in the area. With the recent reduced ozone standard, the EIS should carefully evaluate NOx emissions and ozone formation in the general area to determine if this amount and scope of new emissions even falls under the allowable limit with current present ozone sources. The evaluation needs to be in sufficient detail to ascertain whether the project will contribute to ozone formation in violation of the new standard.

Cloud Peak and Antelope have invested years of time and effort and significant funds in studying, permitting and operating mining in full compliance with air quality standards. We request that you fully review the potential air quality impacts of the Project with respect to the current air quality standards and meet the BLM's objective of minimizing the air quality impacts as required per Table 1-1, page 2-10 of the Casper Resource Management Plan. This review should include the additional vehicular traffic associated with the initial drilling and development of the project, anticipated flaring and all other emissions such as those from compressors, separators, tanks, ponds and engines.

Impacts to Wildlife other than Raptors

There was some discussion at the meeting in Gillette regarding a request by the project proponent to drill and develop wells throughout the entire year without regard to nesting restrictions for raptors and sage grouse. The BLM presentation seemed to imply that this was a primary objective of the program. We have been unable to find mention of this request anywhere in the scoping literature. WMA strongly suggests that seasonal nesting restrictions cannot and should not be ignored. The proposed Project area includes important habitat for species of high interest and in need of special protection, including raptors and sage grouse. The EIS needs to specifically address the request to remove protections for these species. In so doing, the request needs to be evaluated against habitat and population concerns as addressed in the recent resource management plan amendments by the BLM, the land use plan amendments by the US Forest Service, and the Wyoming Governor's Executive Order dealing with the Greater sage-grouse. We also note that BLM should address the wildlife impacts resulting from one agency (BLM) lifting timing restrictions and another federal agency (USFS) that is also a large area land manager for this project that will not removing timing restrictions.

Much of the project area includes habitat that is suitable for sage grouse. Sage grouse narrowly escaped a federal listing as a protected species in 2015. BLM should fully evaluate the impacts that the Project may have on sage grouse populations and consider the appropriate mitigation related to reducing the impact and ultimately restoration of the loss of sage grouse habitat.

Raptor Management

Raptor populations in the area pose a different concern. There are currently decades-old projects and programs for the management of raptor populations to the north, east, and south of this proposed project. Impacts to the populations in the vicinity of this proposed project could become manifest as impacts on adjacent populations, and the projects and programs being implemented by other energy and mining industry companies.

As an illustration of the magnitude of the raptor considerations, it's important to note that there are scores of intact raptor nests within the Antelope survey area that also fall within the Crossbow project

area. The EIS should specifically evaluate the impact of the proposed project on each specific potentially affected raptor populations of the project site as well as the secondary impacts to nearby specific raptor populations and territories. The project area cannot be viewed in isolation from the perspective of raptors.

BLM must very carefully consider the impacts that allowing drilling without timing restrictions will have on area raptor populations. At a minimum, procedures must be put into place to minimize these impacts, monitor the impacts, require adequate mitigation, and not adversely impact the mitigation efforts already being undertaken in the area.

The BLM may have the authority to waive its stipulations regarding surface activities, but only the USFWS has the authority to enforce the Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act, etc. ALL non-game migratory birds (raptors, songbirds, etc.) are protected under the MBTA. Eagles are protected under both laws. What is EOG's specific plan to prevent "take" under these Federal laws if they want to have all protective stipulations waived? The BLM has no authority to authorize "take" and will itself be liable for any take if they waive stipulations and take then occurs (per Trish Sweanor in the Cheyenne ESO office at the March 2015 raptor symposium in Gillette).

The Project's potential impacts to raptors must be specifically evaluated based on the specific location of Project infrastructure and appropriate protective measures as identified in page 633 through 637 of the RMP must be considered for the Project. Cloud Peak and Antelope have previously experienced multiple incidents in which an oil and gas development company like EOG has been allowed to develop federal oil and gas resources in or near preexisting active surface coal mining operations or reclamation and the oil and gas operator has interfered with or harmed federally protected raptor planning and protection that we have invested heavily in to comply with our reclamation obligations.

Coal mines in this area, including Antelope, have very rigorous raptor protection plans that have been in place and successfully implemented for decades. We are especially concerned that EOG's Project will adversely harm the raptor populations but may also adversely impact Antelope's ongoing mitigation efforts. This is a very real possibility and has in fact already occurred. In 2013, after Antelope contacted EOG and notified it of an existing raptor nest, EOG constructed a new well pad site during nesting restriction timing for raptors and within less than 500 feet from an active golden eagle nesting site. Antelope had tracked this particular golden eagle and its nesting sites for over thirty years, as it was within one mile of Antelope Mine. The US Fish and Wildlife Service became aware of impacts to the nest and took action to suspend well activities. This is a clear example of oil and gas activity harming the coal mining industry's mitigation efforts.

The failure to identify these areas and to conduct their operations in a manner that is consistent with the raptor study and management that we spend years and significant money to manage properly can result in avoidable damage to these management plans, and actual loss of raptors in our areas of operations.

Impacts to Water Resources

Several questions were asked by the public at the Gillette meeting on December 10th, relating to which aquifers are to be impacted for water withdrawal and also for waste water disposal. BLM and project proponent personnel were all unable to answer questions about both of these topics at the scoping meeting. These impacts must be evaluated for the targeted aquifer during the EIS evaluation.

Furthermore, with more than 4,000 acres projected to be disturbed, the impacts upon surface water should also be analyzed including impacts to the quality and quantity of water in streams and available to downstream water users. Questions such as these are best analyzed in a project specific EIS so that the specific impacts to the various water sources can be analyzed.

Miscellaneous

At the meeting in Gillette it was stated that as many as 300 (of the 1500 total) wells might be drilled prior to completion of the EIS with BLM's oversight and concurrent with the programmatic NEPA analysis. There were no specifics provided regarding these 300 wells, other than the general statement that their purpose is to help define the project. We have been unable to find any material mention of these 300 wells anywhere in the scoping literature. Again, we believe these issues effectively demand a full blown project specific EIS. It is necessary for the EIS to evaluate site specific and cumulative impacts from all of these additional 300 wells.

Statement and Reservation Concerning Objections

To the extent that the scoping notice or its explanatory or supporting materials are deficient with regard to disclosure and explanations about each of these issues, Cloud Peak and Antelope hereby expressly and fully reserve their rights to object to this process based on these issues at a later time.

Thank you for considering Cloud Peak Energy's comments. Please contact Darryl Maunder at Darryl.Maunder@cldpk.com with any follow-up questions you may have.

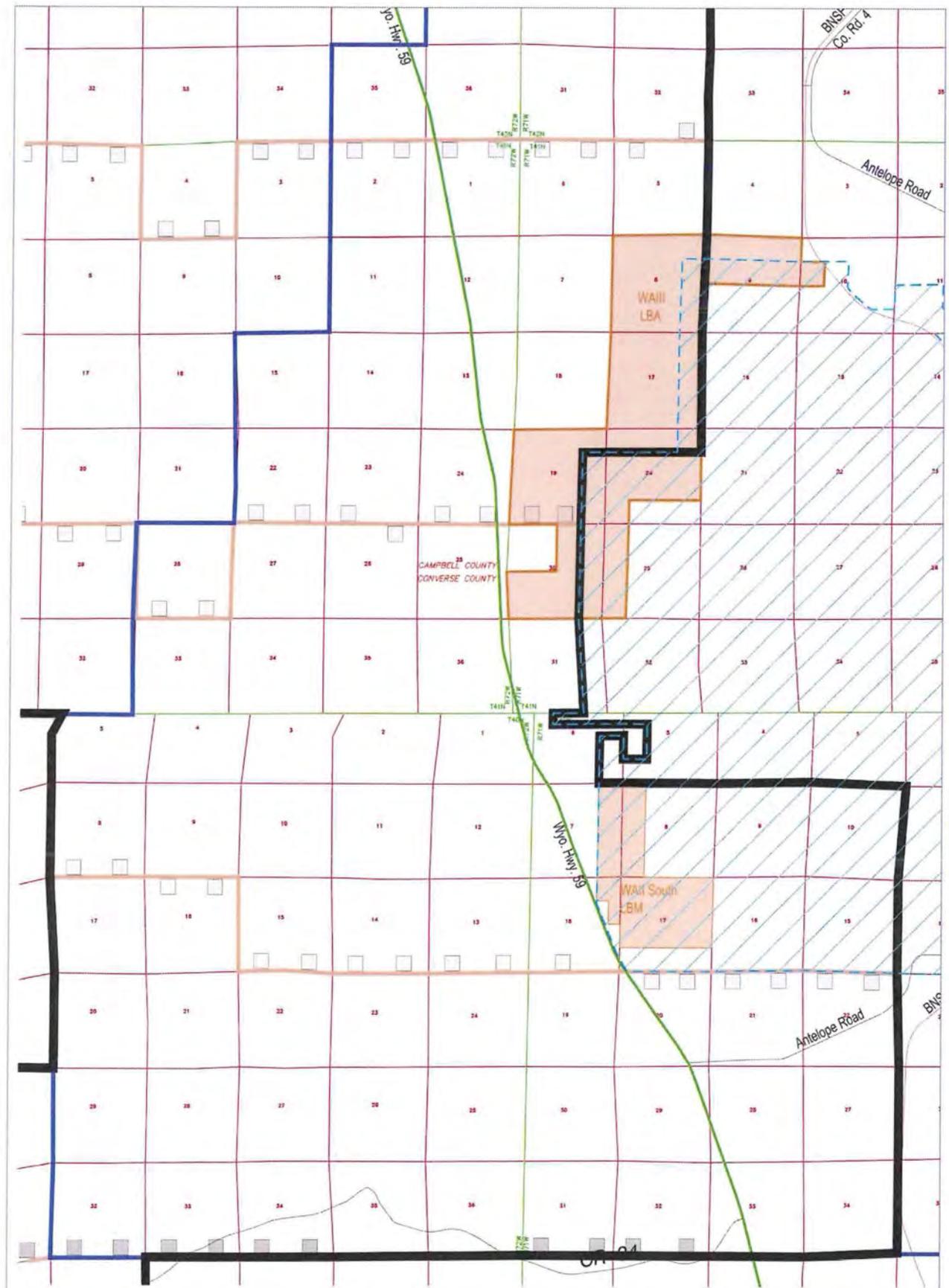
Yours truly,

Antelope Coal LLC



Bruce E. Jones
Senior Vice President, Technical Services

Enclosure (Map of EOG Project w/ Antelope Mine)



- Legend**
- Coal Development Potential Area
 - Waiii LBA Waiii South LBM Boundaries
 - Antelope Mine Permit Boundary
 - Proposed EOG Pad Location
 - EOG Crossbow Expansion Boundary
 - EOG Option D Corridor



| Antelope Mine | | | | | | | | | | | | | |
|---|--|------|----------|--|--|--|--|--|--|--|--|--|--|
| P.O. BOX 3009 GILLETTE, WYOMING 82717 (307) 682-6500 | | | | | | | | | | | | | |
| EOG Greater Crossbow Field Project CPE EIS Scoping Comments | | | | | | | | | | | | | |
| Figure 1 | | | | | | | | | | | | | |
| DRAWN BY: <u>BJW</u> SHEET <u>1</u> OF <u>1</u> DATE: <u>11/02/15</u> SCALE: <u>1"=500'</u> FILE NUMBER: <u>EOG20100101502 Log</u> | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">DATE</th> <th style="width: 90%;">REVISION</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> </tbody> </table> | DATE | REVISION | | | | | | | | | | |
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From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Cloud Peak Energy Comments Crossbow EIS Scoping
Date: Thursday, December 31, 2015 2:07:17 PM
Attachments: [Cloud Peak Energy Comments Crossbow Prj Dec 2015.pdf](#)

----- Forwarded message -----

From: **Maunder, Darryl (CPE)** <Darryl.Maunder@cldpk.com>
Date: Thu, Dec 31, 2015 at 10:51 AM
Subject: Cloud Peak Energy Comments Crossbow EIS Scoping
To: "BLM_WY_BuffaloGCEIS@blm.gov" <BLM_WY_BuffaloGCEIS@blm.gov>

Mr. Bills:

Thank you for accepting the attached comments package into the administrative record for the *Notice of Intent to Prepare and Environmental Impact Statement for the Greater Crossbow Oil and Gas Project and Possible Amendments to the Casper Resource Management Plan, Wyoming*, 80 Fed. Reg. 65242.

If Cloud Peak Energy can provide any additional details about these comments, please do not hesitate to contact Darryl Maunder at 307-687-6061.

Sincerely,

Bruce E. Jones

Senior Vice President, Technical Services

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Dec 30, 2015

Mr. Thomas Bills
NEPA & Environmental Coordinator
BLM Buffalo Field Office

RE: Scoping Comments on Greater Crossbow Oil & Gas Exploration and Development Project

Dear Mr. Bills,

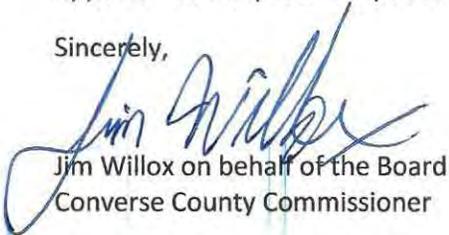
The following are submitted on behalf of the Converse County Commissioners. In no particular order we offer these comments;

- The socioeconomic impacts of this project are of significance to Converse County. This project is on top of the Converse County EIS project and the regular economic activity of our area. The cumulative effects of 2 significant Oil and Gas projects need to be looked at during this process. The time line suggests that the Converse EIS will be concluded before the Crossbow, and it is important that the 2 are analyzed separately and together.
- Converse County is concerned that if oil and gas prices rebound to 2013-14 levels, the amount of development "on the books" could overwhelm our infrastructure. We strongly support multiple use and the full development of our natural resources, but we must conduct it in a way that we can provide the essential services necessary, including law enforcement, road and bridge maintenance, health care, housing, schools, etc. The Crossbow EIS should have to look at new and creative ways to mitigate impacts and incentivize paced development. We are hopeful the Converse County EIS may provide some guidance in that area.
- The area covered by this project also includes coal reserves in both Converse and Campbell counties. It is in the best interest of all parties to have a plan that allows for multiple use and full, or nearly full, development of both resources. The EIS needs to look at methods and timelines that will allow economic development of both coal and oil and gas.
- The water and air quality effected by this project should be carefully looked at. The region does not want to be in "non-attainment" for air quality, so cumulative sources need to be identified. It is also important to look at water usage and quality. Oil and Gas exploration uses a lot of water. We need to be sure the sources are identified and measured for quality and quantity.
- The County Commissioners are sensitive to the private property rights and values of the citizens within the county. The split estate situation found in the project raises concerns regarding how the development will be permitted and the potential impacts analyzed. The negotiation and payment of fair access fees is more desirable than condemnation or "bonding on." We request that a thorough analysis of the potential effects and benefits of the private property rights and values be conducted.
- A concern of ours relates to the sustainability, enforcement, and implementation of all parts of the permitting, monitoring or mitigation that may be proposed or required in the (EIS) and/or Record of Decision (ROD). A plan that cannot be fully implemented due to resources is of little use. We believe conditions will continue to change in the future as a result of continued

development, reclamation, unforeseen events (i.e., new industries to the area or natural occurrences such as fire or drought), thus these programs cannot be effective without considering the inclusion of adaptive management. We would like assurance that any permitting, mitigation or monitoring programs will include an adaptive mechanism to adjust to changes as they occur.

Converse County is a Cooperating Agency in this EIS and we look forward to continued discussions and opportunities to provide input and suggestions.

Sincerely,



Jim Willox on behalf of the Board
Converse County Commissioner

From: [Bills, Thomas \(Tom\)](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); [Serreze, Susan](#)
Subject: Fwd: Crossbow Comments
Date: Thursday, December 31, 2015 2:02:52 PM
Attachments: [Converse County Crossbow Comments 12-30-15.pdf](#)

Thomas Bills

NEPA & Environmental Coordinator
BLM Buffalo Field Office
(307) 684-1133

----- Forwarded message -----

From: **Jim Willox** <jim.willox@conversecountywy.gov>
Date: Thu, Dec 31, 2015 at 1:13 PM
Subject: Crossbow Comments
To: "Bills, Thomas (Tom)" <tbills@blm.gov>
Cc: Lucile Taylor <Lucile.Taylor@conversecountywy.gov>

Tom,

Attached are Converse County's scoping comments.

Happy New Year.

Jim Willox

Converse County Commissioner

Chairman -WCCA Transportation Committee

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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8**

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DEC 31 2015

Ref: 8EPR-N

Duane Spencer
Field Office Manager
1425 Fort Street
Buffalo, WY 82834-2436

Re: Greater Crossbow Oil and Gas Exploration and Development Project Notice of Intent to Prepare a Draft EIS

Dear Mr. Spencer:

The U.S. Environmental Protection Agency Region 8 has reviewed the Bureau of Land Management's October 26, 2015 Notice of Intent (NOI) to prepare the Greater Crossbow Oil and Gas Exploration and Development Project (the Proposed Project) Draft Environmental Impact Statement (Draft EIS). In accordance with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act (CAA), we are providing scoping comments. These comments convey what the EPA believes are important questions or concerns, and we recommend they be addressed during the NEPA process.

The EPA greatly appreciates your Office's staff and BLM's contractors' hard work on hosting public information meetings, a recent Cooperative Agency meeting, and sharing several details related to the Plan of Development for the proposed project. It has helped us prepare scoping phase comments that are more specific to the project and that will hopefully assist BLM in incorporating relevant analysis into the NEPA process.

Background

EOG Resources Inc. (EOG) proposes to develop 1,500 oil and natural gas wells on 100 multi-well pads in Wyoming's southern Campbell and northern Converse counties. EOG proposes a "spine and rib" approach that would use multiple well pads (i.e., the ribs) that are strategically placed along a primary corridor system that includes pipelines and utilities (i.e., the spines). This design is intended to minimize surface disturbance, habitat fragmentation, truck traffic, and air emissions compared to that of a traditional oil and gas field development project. The EPA, the U.S. Forest Service (USFS), and other federal, state and local agencies are working with the BLM as cooperating agencies in the preparation of this DEIS. The project area is between Wright and Bill, Wyoming, primarily west of WY Highway 59.

The project area is about 107,000 acres, which includes approximately 93,000 acres of private surface (87 percent of the project area), 8,200 acres of surface administered by the State of Wyoming (eight percent of the project area), and 5,700 acres of the Thunder Basin National Grassland administered by the USFS (five percent of the project area). There are no BLM-administered public lands within the project area. The project area includes about 66,000 acres (62 percent of the project area) of BLM-administered public fluid mineral estate. The remainder of the project area has fluid

minerals managed by the State of Wyoming or private owners. Authorization of this proposal may require amendment of the Casper Field Office, Casper Resource Management Plan (RMP). Similarly, the USFS, as cooperating agency, may use the EIS analysis to support preparation of a land use plan amendment for the Thunder Basin National Grassland, Land and Resource Management Plan (LRMP), if appropriate.

Key Topics the EPA Recommends the BLM Address during the NEPA Process

Based on our current understanding of the proposed project, the EPA has identified the following topics that we recommend be analyzed and disclosed in the Draft EIS so that potential impacts to public health and the environment can be fully understood: (1) air resources; (2) groundwater resources; (3) surface water resources; (4) public drinking water supply resources; (5) wetlands, riparian areas and floodplains; (6) water management and water resource monitoring; (7) livestock grazing; (8) greenhouse gas (GHG) emission and climate change; (9) environmental justice, (10) complex split estate nature of the proposed project (no federal surface managed lands), (11) overlap with the area being analyzed for the Converse County Plan of Development EIS (12) the developer's unique spine and rib optimal drill pad plan of development approaches. We also note the following analysis considerations, (13) increased development in areas already under development, robust reasonably foreseeable development and cumulative impacts.

(1) Air Resources

Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions through NEPA

Oil and gas development includes emissions of Clean Air Act criteria air pollutants and other hazardous air pollutants (HAPs) that can cause or contribute to human health impacts or impacts to Air Quality Related Values (AQRVs) such as visibility, vegetation, water, fish and wildlife. The air quality analysis for this Draft EIS is particularly important given the relatively large number of wells proposed in the project area and the associated increases emissions of ambient pollutants. We recommend that the Draft EIS consider and disclose the potential environmental effects of oil and gas development on air quality in the planning areas, and determine whether there is a need to revise management actions or develop stipulations to minimize the potential air quality impact of oil and gas development.

The EPA, U.S. Department of Agriculture and U.S. Department of Interior entered into a "Memorandum of Understanding (MOU) Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions through the National Environmental Policy Act Process" on June 11, 2011. The parties to the MOU committed to using this MOU to ensure effective and efficient NEPA air quality evaluations. We are committed to continue working with the BLM using this MOU, and we commend the BLM Wyoming office for the current cooperative efforts on air quality analysis concurrently while developing NEPA documentation for this project.

It will be appropriate to utilize the MOU's agency stakeholder process to continue to share reasonably foreseeable development (RFD) and emissions inventory information as well as information regarding the quantitative analysis that has been proposed in the draft modeling protocol shared with the MOU signatory agencies. We look forward to continuing to work with BLM to complete the air quality modeling protocol for the modeling that will inform the Draft EIS.

Analysis Recommendations

With these issues in mind, the EPA recommends that the Draft EIS include an evaluation of the current air quality conditions and trends as well as the direct, indirect, and cumulative impacts from potential activities for:

- Each of the criteria pollutants relevant to the project and their appropriate National Ambient Air Quality Standards (NAAQS), i.e., ozone, particulate matter, carbon monoxide, nitrogen oxides, and sulfur dioxide;
- AQRVs in potentially impacted Class I areas and sensitive Class II areas;
- Prevention of Significant Deterioration increment at potentially impacted Class I and Sensitive Class II Areas; and
- HAPs and relevant health-based risk thresholds for HAPs including acetaldehyde, benzene, ethyl benzene, ethylene glycol, formaldehyde, methanol, n-hexane, toluene, xylene (mixture), and any other compounds that the BLM identifies as potential hazardous air pollutants in the planning area.

The EPA supports the current efforts by the BLM to address these components of the analysis with quantitative impact assessment techniques including near-field modeling and far-field photochemical grid modeling.

According to the EPA's Office of Air Quality Standards (see: www.epa.gov/airdata) the current ozone design value at the Campbell County monitor, approximately 45 miles north of the project area, is 63 ppb, which is 90% of the 70 ppb standard. Breathing ozone at levels above the National Ambient Air Quality Standard (NAAQS) can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen existing respiratory health conditions such as bronchitis, emphysema, and asthma. Ground level ozone also can reduce lung function and inflame the lining of the lungs. Repeated exposure to high ozone levels may permanently scar lung tissue. The EPA recommends the BLM include an analysis in the Draft EIS that describes how ozone levels will be maintained, or lowered below the current levels, both of which would maintain ozone design level below the NAAQS.

Recent studies have increased awareness of the potential health impacts associated with hazardous air pollutants (HAPs) emitted during oil and gas activities.¹²³⁴ HAPs, also known as toxic air pollutants or air toxics, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive or developmental effects, and/or adverse environmental and ecological impacts. We therefore recommend that oil and gas EISs evaluate the expected HAP concentrations during the drilling, completion and operational phases using best available, project-specific information about the equipment and processes that will be used. One study³ suggests that "health effects resulting from air emissions during development of unconventional natural gas resources are most likely to occur in

¹ McKenzie *et al.*, Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado, *Environmental Health Perspectives*, April 2014.

² Adgate *et al.*, Potential Public Health Hazards, Exposures and Health Effects from Unconventional Natural Gas Development. *Environmental Science and Technology*, 2014.

³ McKenzie *et al.*, Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources. *Sci Total Environ* 424:79-87.

⁴ Paulik *et al.*, Impact of Natural Gas Extraction on PAH Levels in Ambient Air, *Environmental Science and Technology*, 2015.

residents living nearest to the well pads and warrant further study.” That study recommends “risk prevention efforts should be directed towards reducing air emission exposures for persons living and working near wells during well completions.”

Mitigation

The EPA recommends that the BLM identify in the Draft EIS the mitigation measures (including control measures and design features) it would apply in the event that potential adverse impacts to air quality or AQRVs on affected lands are predicted for this project. These measures could include equipment type or design requirements, emission standards or limitations, best management practices (BMPs), dust suppression measures for unpaved roads and construction areas, add-on control technologies, and limitations on the density and/or pace of development. The EPA also recommends that the BLM identify the regulatory mechanisms it will use to ensure implementation of these measures including lease stipulations, conditions of approval, and notices to lessees.

To protect human health, the EPA recommends identifying and implementing an oil and gas surface occupancy buffer from occupied structures such as homes, schools and office buildings. The buffer or “setback” distance should be sufficient to minimize the potential for public health impacts associated with exposure to the following: near-field criteria pollutants and HAPs emissions; any other potential toxic emissions such as hydrogen sulfide releases; and emissions associated with drill cuttings and flow back, well blowout or other explosive events. Setbacks can be an effective health protection tool because they provide an opportunity for emitted air pollutants to disperse before entering an area where they could be respired. They also provide extra time to warn residents of any unintended releases or emissions. We recommend the setback distances be informed by the following factors:

1. The relevant near-field modeling results for this EIS. We recommend the setback buffer ensures that people are not exposed to air pollution levels exceeding the NAAQS or other health based thresholds.
2. Whether mitigation measures and BMPs are being required to reduce risks to nearby residents and other building occupants. Examples of risk reduction mitigation may include: requiring closed-loop drilling and completion; prohibiting reserve pits or produced water ponds; using lower emitting engine technology; capturing emissions from tanks, separators, and glycol dehydrators; and implementing stringent fugitive vapor controls.
3. The composition of the planning area’s oil and gas resource. For example, certain resource conditions may indicate the need for a larger setback buffer, including those with high HAPs content, higher explosive potential, or high sulfur or hydrogen sulfide content.

Specifically, we understand the State of Wyoming requires a minimum setback distance from residences of 500 feet. It is not clear whether the statewide minimum setback distance applies for the factors above, or whether there are other site specific factors that are relevant to this planning area. The EPA recommends the Draft EIS include a map of the residential locations and production well locations so that it is better understood if there are concerns for potential exposure.

We note that the Plan of Development discusses workovers and completions that will require development materials (please see the second paragraph under “*Mitigation*” directly above for some example conditions) will be stored on site for some period of time. The EPA recommends the Draft EIS disclose whether the operator will have a process to monitor air and minimize odors (often reliable

olfactory indicators of hazardous air pollutants) before there are complaints about air quality. The EPA recommends the Draft EIS consider, analyze BMPs for, and disclose notification process for nearby residents in the case of a release.

We therefore recommend this Draft EIS document whether the minimum setback distance is likely to be protective of residents in the planning area from an air quality perspective, and discuss the factors (e.g., model results, required mitigation measures, resource composition) leading to that conclusion.

(2) Groundwater Resources

Groundwater Resource Characterization

It is important to characterize both the existing and potential ground water drinking water resources in the affected area. We recommend the Draft EIS include the following information:

- A description of all aquifers in the study area, noting which aquifers are Underground Sources of Drinking Water (USDWs). Federal Safe Drinking Water Act regulations define a USDW as an aquifer or portion thereof: (a)(1) which supplies any public water system; or (2) which contains a sufficient quantity of ground water to supply a public water system; and (i) currently supplies drinking water for human consumption; or (ii) contains fewer than 10,000 mg/l total dissolved solids; and (b) which is not an exempted aquifer (See 40 CFR Section 144.3);
- Available water quality and water yield information from each aquifer;
- Maps depicting the location of sensitive groundwater resources such as municipal watersheds, source water protection areas (available from the Wyoming Department of Environmental Quality [WYDEQ] and see comment #4 below), sensitive aquifers, and recharge areas; and
- Descriptions and locations of ground water use (e.g., public water supply wells, domestic wells, springs, and agricultural and stock wells); and a map and discussion of proposed production wells, existing producing wells, and nonproducing wells in the area including their status (e.g., idle, shut-in, plugged, and abandoned), if available. Please refer to the Wyoming Oil and Gas Conservation Commission (WYOGCC) for location and abandonment information.

We understand that Spine E is currently under interim development through approval under an Environmental Assessment. The EPA recommends the Draft EIS analyze and disclose information available from Spine E to describe the volume of fresh water per well used, the volume of produced water and how the produced water is being managed. The data from Spine E development may be very useful to inform the potential impacts for the entire project's ultimate reasonably foreseeable development scenario.

Ground Water Impacts, Monitoring and Mitigation

The EPA recommends that the Draft EIS analyze potential impacts to ground water quality and quantity related to resource extraction such as mining and oil and gas production. Potential impacts include those associated with the following: leaks and spills; production and disposal of produced water or processing waters; use of pits, underground injection control (UIC) wells, NPDES discharges, infiltration basins and evaporation ponds; well construction and wellbore integrity; well closure; pipeline use; and impacts associated with re-stimulation and abandonment of existing wells.

The EPA also recommends that the Draft EIS discuss measures the BLM will require at the leasing, field-wide plan of development, or APD stage to minimize the potential for these impacts to occur and how the operations will be monitored to determine if the mitigation measures are effective. Appropriate groundwater protection measures can vary depending on hydrologic conditions and the presence of drinking water resources. We recognize that regulations and guidance documents exist to guide BLM and the operator in protecting water resources during oil and gas development and production operations (e.g., BLM Gold Book, Onshore Order #2, State regulations, etc.). We recommend that the Draft EIS discuss how groundwater will be protected according to these existing regulations and guidances. In addition, we note that, in many cases, the existing regulations and guidances leave much of the decision-making regarding water resource protection to determinations by the authorized officer on a well-by-well basis. We recommend that the BLM utilize the NEPA analysis and Resource Management Plan revision process to streamline or add consistency to these decisions where possible. For example, an understanding of hydro-geological features can help to identify critical elements of well design that will likely be necessary to achieve effective protection of USDWs at the APD stage. In other cases, adequate information may exist at the Resource Management Plan level to identify stipulations that will apply consistent resource protection to future leases, such as for protection of existing public and private drinking water supply wells.

Specifically, the EPA recommends that the BLM analyze and disclose potential groundwater impacts. It is EPA's experience that planning and implementation of proper BMPs for managing waste disposal materials from oil and gas development are critical to prevent down hole, or surface to ground water connections resulting in adverse groundwater impacts. The Plan of Development states that eventually four producing wells will be converted to salt water disposal wells. Current wells in the project area are listed in the Plan of Development Table 2, "Existing Oil and Gas Well Types within the Greater Crossbow Project Area." Because there are no salt water disposal wells listed, the EPA recommends the Draft EIS describe how the current produced water and production fluids are managed for disposal. The EPA also recommends the Draft EIS describe the range and average volume of water being produced from production wells and, if possible, specify the volume of water produced from the different production horizons.

The Plan of Development describes many water infrastructure requirements for the project. Water usage and infrastructure for oil and gas development can result in significant impacts to groundwater quantity and quality. For example, currently, four existing source water wells within the project area are identified. It is important to disclose in the EIS what the water infrastructure is, where it is located relative to groundwater resources, and any potential for groundwater impacts associated with the use and management of water facilities.

The EPA also recommends that the BLM analyze and disclose potential groundwater protection, monitoring and mitigation measures, including:

- BMPs and measures such as water reuse, closed loop drilling, lining of evaporation ponds, monitoring of water quality and water levels, reserve pits and evaporation ponds;
- Water will be applied to roads for dust suppression. Produced water has many constituents that could cause either health or ecosystem impacts. The EPA recommends the Draft EIS identify whether or not produced water will be used for this purpose and what mitigation is available to prevent degradation (including not using production water, if appropriate) for this purpose.

- Setback stipulations, such as No Surface Occupancy (NSO), to minimize the risk for impacts to potential drinking water resources, including domestic water wells and public water supply wells. Setbacks are effective health and environmental protection tools because they provide an opportunity for released contaminants to attenuate before reaching a water supply well. They may also afford an opportunity for a release to be remediated before it can impact a well, or for an alternate water supply to be secured. For these reasons, we recommend that the BLM require a minimum 500 foot NSO setback from private wells. We note that a number of states including Colorado and North Dakota have adopted a 500 foot setback from occupied dwellings (and by default, the associated domestic well). The EPA also encourages the BLM to consider source water protection areas delineated by the WYDEQ when evaluating the basis and need for setbacks from public water supply wells (see comment #4 below);
- A mitigation plan for remediating future unanticipated impacts to drinking water wells, such as requiring the operator to remedy those impacts through treatment, replacement or other appropriate means (e.g., supplying drinking water until impacts are remediated or mitigated);
- A general production well schematic that depicts the following: casing strings; cement outside and between the various casing strings; and the relationship of the well casing and cementing design to potentially important hydro-geological features such as confining zones and aquifers or aquifer systems that meet the definition of a USDW. Discuss how the generalized design will achieve effective isolation of USDWs from production activities and prevent migration of fluids of poorer quality into zones with better water quality; and
- Abandonment procedures for sealing production wells no longer in use in order to reduce the potential for inactive wells to serve as the conduits for fluid movement between production zone(s) and aquifer(s). This is particularly important where existing wells do not have surface casing set into the base of USDWs and lack sufficient production casing cement.

(3) Surface Water Resources

Surface Water Characterization

The EPA recommends the Draft EIS describe the current water quality conditions for surface water bodies within the planning area, including intermittent, perennial, and ephemeral streams, rivers, lakes, reservoirs, and surface water drinking water resources. We recommend comparing existing conditions to existing water quality standards or other reference conditions and presenting associated water quality status and trends.

The EPA also recommends the Draft EIS include the following information:

- A map of water bodies within and/or downstream of the planning area that includes perennial, intermittent and ephemeral water bodies; water body segments classified by the WYDEQ as water quality impaired or threatened under the Clean Water Act (CWA) Section 303(d); water bodies considered not impaired by WYDEQ, and water bodies that have not yet been assessed by the WYDEQ for impairment status. We also recommend that a table be provided to identify the designated uses of water bodies and the specific pollutants of concern, where applicable; and
- Maps and descriptions of topography and soils, specifically steep slopes and fragile or erodible soils, especially near surface waters and intermittent/ephemeral channels.

Surface Water Impacts

We recommend that the Draft EIS analyze potential impacts to surface waters related to erosion and sedimentation from land disturbance and stream crossings, as well as potential impacts associated with oil and gas well development, including drilling and production and potential spills and leaks from pits, evaporation ponds, and pipelines. We also recommend that the BLM analyze potential impacts to impaired water bodies within and/or downstream of the planning area, including water bodies listed on the most recent EPA-approved CWA § 303(d) list and coordinate with WYDEQ if there are identified potential impacts to impaired water bodies (in order to avoid causing or contributing to the exceedance of water quality standards). Where a Total Maximum Daily Load (TMDL) exists for impaired waters in the area of potential impacts, we recommend that pollutant loads comply with the TMDL allocations for point and nonpoint sources. Where new loads or changes in the relationships between point and nonpoint source loads are created, we recommend that the BLM work with WYDEQ to revise TMDL documents and develop new allocation scenarios that ensure attainment of water quality standards. Where TMDL analyses for impaired water bodies within, or downstream of, the planning area still need to be developed, we recommend that proposed activities in the drainages of CWA impaired or threatened water bodies be either carefully limited to prevent any worsening of the impairment or avoided if such impacts cannot be prevented.

Erosion and Sediment Load Analysis

Increased sediment from surface disturbance may degrade water quality. Because sediment loading has already caused impairment of water bodies in the proposed development area, and future activities (including livestock grazing, oil and gas development, and use of off-highway vehicles) that may be authorized under the existing Resource Management Plan for this area would result in new surface disturbance that may enable erosion, it is important the Draft EIS include information about this concern. Erodible soils may represent a significant source of pollutants in the planning area. Depending on a host of variables including soil characteristics, industrial operations and topography, associated runoff could introduce sediments as well as salts, heavy metals, nutrients and other pollutants into surface waters. To fully disclose and, if necessary, mitigate the potential impacts of soil disturbance, we recommend that the Draft EIS include an estimate of erosion rates and resulting impacts to water quality for each alternative. For example, the Wyoming BLM's Bighorn Basin Draft Resource Management Plan/EIS estimated erosion rates based on projected amount of surface disturbance, types of surface disturbance and general characteristics of the basin (erodible soils, slopes, etc.). Erosion rates were calculated using the Water Erosion Prediction Project model (WEPP), a web-based interface developed by the U.S. Department of Agriculture, Agricultural Research Service, which can be accessed at <http://www.ars.usda.gov/News/docs.htm?docid=10621>. We recommend that the BLM consider using this model or another appropriate model that would be applicable to this project location.

Surface Water Mitigation

Contaminants from surface events such as spills, pit and pipeline leaks, and nonpoint source runoff from surface disturbance have the potential to enter and impact surface water resources if these events occur in close proximity to water bodies. If surface activities are set back from the immediate vicinity of surface water, wetlands, and designated source water protection areas, this provides an opportunity for accidental releases to be detected and remediated before impacts reach water resources. If accidental releases are not detected, the setback provides a safety factor and some possibility of natural attenuation

occurring. Setbacks also help prevent nonpoint source pollutants such as sediments from impacting surface waters.

Accordingly, the EPA recommends that the BLM include in the Draft and Final EIS an evaluation of setback distances identified through leasing stipulations such as NSO for perennial waters including lakes and reservoirs, intermittent and ephemeral streams, steep slopes, and impaired waters within the planning area. The EPA recommends the following minimum NSO setbacks:

- Minimum 100 foot NSO setback from slopes greater than 30%;
- Minimum 500 foot NSO setback for flowing waters (rivers and streams) or 100-year floodplain, whichever is greater;
- Minimum 500 foot NSO setback for lakes, ponds and reservoirs, wetland and riparian areas and springs;
- Minimum 750 foot NSO setback for 303(d) Impaired waters;
- Minimum 1,000 foot NSO setback for special or significant waters; and
- Minimum 100 foot NSO setback for intermittent and ephemeral streams.

In addition, we recommend the BLM consider a designation of NSO within Areas of Critical Environmental Concern (ACEC), or other valued areas where important water resources may be impacted.

(4) Public Drinking Water Supply Sources

Public Drinking Water Supply Source Characterization

In order to ensure that public drinking water supply sources (e.g., surface water sources, including groundwater under the direct influence of surface water (GWUDISW) sources, and groundwater sources) are protected from potential impacts associated with BLM-authorized activities in the planning area, the EPA recommends that groundwater and surface water sources of public drinking water supplies, and the associated source water assessments and source water protection areas, be identified in the Draft EIS. To assist with this effort, the EPA or the WYDEQ can develop a map showing the generalized areas of the source water assessments and protection areas in/near the planning area. Such a map may be used in public documents; therefore, we recommend including it in the Draft EIS. However, more specific maps, available from WYDEQ, can be utilized by the BLM when locating activities on the leased parcels. Please contact Kim Parker, WYDEQ, at kim.parker@wyo.gov or 307-777-6128 for a map of source water protection areas in the proposed project area, if any. We also recommend identifying reservoirs that are drinking water sources and disclosing potential impacts to these sources.

Public Drinking Water Supply Source Mitigation

It is important to ensure public drinking water supply sources (e.g., surface water sources, including GWUDISW sources, and groundwater sources) are protected from potential impacts associated with resource extraction. In our review of EISs across the region, the EPA has documented a range of resource analysis approaches and mitigation proposals to understand and protect drinking water. Because environmental and regulatory settings vary across the region, the EPA is attempting to develop

state-specific recommendations in collaboration with each state resource agency. The EPA has not developed a specific agreement with the State of Wyoming on this matter at this time. Consequently, unless there is a locally defined Source Water or Wellhead Protection Area, the EPA recommends the BLM consider the following No Surface Occupancy (NSO) protections be analyzed and considered in alternatives in the Draft EIS.

For surface water sources, as a minimum, we typically recommend a 1000-foot NSO setback on both sides of the river or stream for 10 miles upstream of the intake. For lakes and reservoirs, this would include a 1000-foot NSO setback around the water body. For groundwater and GWUDISW sources, we recommend a minimum one-half mile (2,640 feet) NSO concentric buffer around these sources. If there are unavoidable activities in these areas, site specific mitigation should be included to minimize risk of adverse impacts.

The EPA also recommends the BLM include a commitment in the EIS and Record of Decision to provide notice to lessees of any existing Source Water Protection Areas in and near the planning area. Notice could be provided through the BLM mineral lessee manuals and/or guidelines, Field Office Resource Management Plan BMPs or through the Permit to Drill. As an example, lease notices for drilling within Source Water Protection (SWP) Zones of public water supplies are now being given for all wells drilled under BLM authority within SWP Zones in Utah. This information is then available to the operator as they propose well locations and well bore designs.

(5) Wetlands, Riparian Areas and Floodplains

We recommend that the Draft EIS present inventories and maps of existing wetlands and waters of the U.S. within the planning area, including waters that are regulated under Section 404 of the CWA and wetlands and waters that are protected under Executive Order 11990 – Protection of Wetlands (May 24, 1977). We suggest providing information on acreages and channel lengths, habitat types, values, and functions of these waters.

We suggest that the BLM describe potential indirect impacts to wetlands and riparian areas that could occur at the project level due to impacts on the following:

- Stream structure and channel stability;
- Streambed substrate, including spawning habitats; and
- Stream bank vegetation, riparian habitats, and aquatic biota.

BLM-authorized activities in the planning area, including grazing, oil and gas development and construction activities, have the potential to cause changes in hydrology due to surface disturbance, compaction and increased run-off. These changes in hydrology may result in stream structure failure and additional sediment loading of wetlands and riparian areas.

We recommend that the Draft EIS analyze methods to protect wetlands, riparian areas and floodplains, including the following:

- Prohibit surface disturbing activities within 500 feet of surface water and riparian/wetland areas;
- Apply a NSO restriction on wetland areas greater than 20 acres and on designated 100-year flood plains;

- Leasing stipulations to protect floodplains, such as NSO within the 100-year floodplain; and
- Delineation and marking of perennial seeps, springs and wetlands on maps and on the ground prior to project level development to ensure identification of these resources to facilitate their protection.

We also recommend including a list of potential mitigation requirements and BMPs that may be applicable at the project level for grazing, construction, oil and gas well drilling and production activities to prevent adverse impacts to these aquatic resources. These could include silt fences, detention ponds and other stormwater control measures.

(6) Water Management and Water Resource Monitoring

Water Management

Water demand associated with the drilling and completion of new production wells in the planning area is an important consideration that will benefit from analysis and disclosure. This project plan proposes to construct 10 new source water wells and 10 associated fresh water storage ponds with 100 acre feet capacity each. Depletion of surface or ground water in the planning area watersheds may affect rivers, lakes, streams and springs. Further, releases of produced water from oil and gas development may adversely affect groundwater. We recommend that the Draft EIS include a discussion of the following:

- A range of estimated water demand per oil and gas well developed in the proposed project area (based on predicted well depths, formation characteristics, and well designs, as well as hydraulic fracturing operations, if used);
- Expected surface and groundwater sources for the water needed for oil and gas development;
- For groundwater sources:
 - the number and location of water supply wells
 - the geologic formation(s) targeted by those wells
 - the proximity of water supply wells to domestic and public water supply wells
- An assessment of the potential impacts of water withdrawals (e.g., drawdown of aquifer water levels, reductions in stream flow, impacts on aquatic life, wetlands, and other aquatic resources)
- Plans for plugging of abandoned and unneeded source water wells to prevent groundwater contamination

In addition, the EPA recommends the Draft EIS include a general discussion of how flow back and produced water will be managed including:

- Estimated volume of produced water per well;
- Options and potential locations for managing the produced water (i.e., UIC wells, evaporation ponds, and surface discharges);
- Possible target injection formations, formation characteristics and depth of any UIC wells; and
- Potential impacts of produced water management.

The Plan of Development document identifies that EOG will pursue a water recycling program. The EPA supports this resource management decision as it is a prudent water resource resiliency measure, can offset water use and avoid potential impacts to drinking water resources. The EPA also recommends the BLM identify and encourage operators, through EIS BMPs, alternatives and APD stipulations, to

consider recycling produced water for use in well drilling and stimulation, thereby decreasing the need for water withdrawals, produced water management/disposal facilities and for minimizing the associated impacts.

Water Resource Monitoring

The EPA recommends the Draft EIS address how water quality monitoring in the project area will occur at the project level prior to, during, and after anticipated development to document and detect impacts to surface water and groundwater resources, including private well monitoring. The EPA notes that for groundwater, operators will at a minimum need to follow relevant Wyoming Oil & Gas Conservation requirements for pre-development and post-development of groundwater. As Wyoming has no requirements presently for surface water pre-and post-development monitoring, the EPA recommends the Draft EIS describe how project-level monitoring will occur to identify any impacts to surface water resources resulting from oil & gas exploration and production. An example of a surface and groundwater quality monitoring plan is the “Long-Term Plan for Monitoring of Water Resources for Gas Development” developed by the BLM for the Gasco Energy Inc. Uinta Basin Final EIS.⁵

(8) Greenhouse Gas Emissions and Climate Change

The EPA recommends that the BLM use the Council on Environmental Quality’s December 2014 revised draft guidance for Federal agencies’ consideration of GHG emissions and climate change impacts in NEPA to help outline the framework for its analysis of these issues. Accordingly, we recommend the Draft EIS include an estimate of the GHG emissions associated with the project, qualitatively describe relevant climate change impacts, and analyze reasonable alternatives and/or practicable mitigation measures to reduce project-related GHG emissions, locally and downstream, and where the produced energy is consumed. More specifics on those elements are provided below. In addition, we recommend that the NEPA analysis address the appropriateness of considering changes to the design of the proposal to incorporate GHG reduction measures and resilience to foreseeable climate change. We recommend that the Draft and Final EIS make clear whether commitments have been made to ensure implementation of design or other measures to reduce GHG emissions or to adapt to climate change impacts.

More specifically, we suggest the following approach:

“Environmental Consequences” Section

The EPA recommends that the Draft EIS estimate the GHG emissions associated with the proposal and its alternatives including emissions associated with the end use of the oil and gas due to the reasonably close causal relationship of this activity to the project. Example tools for estimating and quantifying GHG emissions can be found on CEQ’s NEPA.gov website.⁶ These emissions levels can serve as a basis for comparison of the alternatives with respect to GHG impacts. We do not recommend comparing GHG emissions from a proposed action to global emissions. As noted by the CEQ revised draft guidance, “[t]his approach does not reveal anything beyond the nature of the climate change challenge itself: [t]he

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http://www.blm.gov/pgdata/etc/medialib/blm/ut/vernal_fo/planning/gasco_eis/gasco_folder_6.Par.10452.File.dat/28_Gasco%20Appendix%20O.%20Long-term%20Water%20Monitoring%20Plan.pdf

⁶ https://ceq.doe.gov/current_developments/GHG_accounting_methods_7Jan2015.html

fact that diverse individual sources of emissions each make relatively small additions to global atmospheric GHG concentrations that collectively have huge impact.” We also recommend that you do not compare GHG emissions to total state or U.S. emissions, as this approach does not provide meaningful information for a project level analysis. Instead, we recommend BLM consider providing a frame of reference, such as an applicable federal, state, tribal or local goal for GHG emission reductions and discuss whether the emissions levels are consistent with such goals. If no frame of reference exists, it may be appropriate to utilize an equivalency point that is easily visualized by the public, such as energy required to heat x number of homes annually (<http://www.epa.gov/cleanenergy/energy-resources/calculator.html>).

The EPA recommends that the Draft EIS describe measures to reduce GHG emissions associated with the project, including reasonable alternatives or other practicable mitigation opportunities and disclose the estimated GHG reductions associated with such measures, for example, energy efficiency, consideration of renewable energy resources to address energy needs for compressor stations and other facilities. The Draft EIS alternatives analysis should, as appropriate, consider practicable changes to the proposal to make it more resilient to anticipated climate change. The EPA further recommends that the Record of Decision commit to implementation of reasonable mitigation measures that would reduce or eliminate project-related GHG emissions.

Effects of Climate Change on Project Impacts:

The EPA recommends that the Draft EIS describe potential changes to the affected environment that may result from climate change. Including future climate scenarios in the Draft EIS would help decision makers and the public consider whether the environmental impacts of the alternatives would be exacerbated by climate change. If impacts may be exacerbated by climate change, additional mitigation measures may be warranted.

For example, impacts could be exacerbated in a case where a project draws water from an aquifer that supports wetland areas or future drinking water resources. If future climate scenarios predict declining precipitation to a level at or below aquifer recharge rates, drawdown due to the project could cause wetland and groundwater loss. In such a case, it may be appropriate to consider monitoring groundwater levels and wetland boundaries and employing adaptive management to stop losses. Alternatively, in some scenarios predicted changes in climate could potentially reduce project related impacts. One such example could be a reduction of pollutants and erosion caused by stormwater runoff volumes in areas where precipitation is expected to decrease.

Climate Change Adaptation:

The EPA recommends considering climate adaptation measures based on how future climate scenarios may impact the project in the Draft EIS. The National Climate Assessment (NCA), released by the U.S. Global Change Resource Program,^[1] contains scenarios for regions and sectors, including energy and transportation. Using NCA or other peer reviewed climate scenarios to inform alternatives analysis and possible changes to the proposal can improve resilience and preparedness for climate change.

Changing climate conditions can affect a proposed project, as well as the project’s ability to meet the purpose and need presented in the Draft EIS. In addition to considering the resilience and preparedness of a facility itself, in some cases adaptation measures could avoid potentially significant environmental impacts. For example, for projects designed to manage water resources, it would be critical to consider potential changes in precipitation, snow pack, and drought. Increases in flow rates due to these factors

could lead to dam failures, while decreases in flow could lead to difficulty in providing expected water volumes. In this example, a dam failure could lead to dramatic changes in sediment transport, water quality, and habitat, among other potential impacts.

(9) Environmental Justice

Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” applies to federal agencies that conduct activities that substantially affect human health or the environment. Consistent with this order, the EPA recommends the NEPA analysis for the Wyoming Greater Crossbow Region EIS include the following:

- Identification of any minority, low-income and tribal communities within the geographic scope of the impact area, including the sources of data and a description of the methodology and criteria utilized. The EPA recommends comparing census block group percentages (if available, or, at a minimum, census tract data) for below poverty and minority populations with the state average, and conducting the following steps if a block group percentage is greater than the state average. The EPA does not recommend use of higher thresholds.
- A detailed assessment of environmental justice and other socioeconomic concerns for any environmental justice communities, to the extent information is available, including:
 - A discussion of the potential direct, indirect and cumulative environmental impacts of potential BLM-authorized RMP activities on the health of these communities, including air quality and water quality and quantity impacts.
 - An evaluation of the socio-economic impacts to the local communities, including the potential for any additional loading placed on local communities’ abilities to provide necessary public services and amenities.
 - A determination of whether there may be disproportionately high and adverse impacts, including cumulative impacts, on the identified communities.
- Mitigation measures to reduce any disproportionate adverse impacts. We recommend involving the affected communities in developing the measures. The EPA recognizes the need for early involvement of the local communities, and supports the meaningful participation of community representatives in the NEPA process.

(10) Complex Split Estate Setting

The project area consists of lands that have minimal U.S. Forest Service surface management designation and no BLM surface management designation, with significant federal minerals subsurface designation. The EPA appreciates BLMs presentation at the December 20, 2015, Cooperating Agency meeting in Gillette, Wyoming, where a project specific explanation of how land management controls and resource protection must be carefully coordinated with the developer, surface land owners and the tribal, federal, state and local agencies/stakeholders involved in overseeing and living with the development. The split estate jurisdictional designations and the applicability of various requirements and mitigation measures across those jurisdictions can be difficult to understand. The EPA recommends the Draft and Final EIS include a method of describing how the various permit conditions, requirements and best management practices that influence the project’s environmental effects will be applied under each of the possible well pad surface and mineral ownership and development completion progress scenarios. Additionally, it would be helpful for the Draft and Final EIS to provide similar information for the Optimized Drill Pads likely to be developed in the future.

(11) Overlap with the Converse County Plan of Development EIS

There is a simultaneous Converse County EIS energy development process under way. It will be important to understand and disclose the best management and mitigation options for the cumulative impacts to the area's resources due to extensive existing and potential oil, gas and coal development in the region. The EPA recommends that the Draft EIS identify where there is interconnection and value added resource impact mitigation potential from using BMPs, stipulations and requirements in the Converse County EIS process that can be considered in alternatives in the Greater Crossbow Draft EIS process.

(12) Unique Spine and Rib Optimal Drill Pad Plan of Development Design

The developer's unique spine and rib optimal drill pad plan of development design approaches have advantages for minimizing overall impacts (e.g., concentrated rather than widespread habitat and environmental impacts). The design can also present challenges related to intense concentrated industrialized development for the communities, private land owners and ecosystems located near this development. The EPA recommends the Draft EIS include a complete analysis of the pros and cons of such development. One specific example to consider is how monitoring will be done in the pipeline corridor systems that will be carrying production water and product (e.g., oil and gas). It is important to assure that complex infrastructure for the spine and rib industrialization of the area is monitored so that impacts can be identified, mitigated and/or remediated once found. The EPA also recommends identification of preventative systems, like shut off valve locations included in the final designs, especially in any sensitive areas including sensitive aquifers (Wyoming's sensitive areas, see above comment #4).

The EPA appreciates that on Page 22 and 24 of the Plan of Development that both closed loop drilling and green completions will be employed at every well. The document also mentions centralized facilities (pits, ponds, injection and withdrawal wells which is a positive feature of highly concentrated industrialized development. The EPA recommends that, in addition to the advantages of centralized facilities, the Draft EIS disclose more information about the operation and potential environmental impacts from these facilities. At minimum the Draft EIS should include in its analysis of alternatives, where they will be located and how they will be managed to minimize and/or mitigate environmental impacts associated with their location and operation.

(13) Increased Development in Areas Already Under Development, Robust Reasonably Foreseeable Development and Cumulative Impact Analysis

Increased development of coal, oil and gas resources, may result in cumulative stress on fragile natural resources in the area and possibly impact human health. For these reasons, this area may warrant additional mitigation measures to ensure protection of important resources. We also note that, based on our knowledge of the area, there could be additional oil, gas and coal resources development beyond this project. For this reason, the EPA recommends including a robust cumulative impacts and reasonably foreseeable development analysis for affected resources in the project area.

Closing

Thank you for the opportunity to participate in the scoping process and sharing valuable detailed information with cooperating agencies and the public for the Greater Crossbow Project Draft EIS. The EPA hopes to continue to work closely with the BLM on preparation of the Draft EIS and to assist with the development of an analysis which will adequately address potential environmental impacts and identify appropriate mitigation measures. If you have any questions or comments, please feel free to contact me at 303-312-6704, or Lead NEPA Reviewer, Nat Miullo, at 303-312-6233 or Miullo.nat@epa.gov.

Sincerely,



Philip S. Strobel

Director, NEPA Compliance and Review Program
Office of Ecosystems Protection and Remediation

cc: Kim Parker, WYDEQ

From: [Bills, Thomas \(Tom\)](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); [Serreze, Susan](#)
Subject: Fwd: FW: Greater Crossbow Oil and Gas Exploration scoping letter
Date: Monday, January 04, 2016 10:03:56 AM
Attachments: [Greater Crossbow Letter.pdf](#)

Thomas Bills

NEPA & Environmental Coordinator
BLM Buffalo Field Office
(307) 684-1133

----- Forwarded message -----

From: **Lloyd, Lisa** <Lloyd.Lisa@epa.gov>
Date: Thu, Dec 31, 2015 at 2:19 PM
Subject: FW: Greater Crossbow Oil and Gas Exploration scoping letter
To: "Bills, Thomas (Tom)" <tbills@blm.gov>
Cc: "Miullo, Nat" <Miullo.Nat@epa.gov>

Tom,

Attached is our comment letter for the Greater Crossbow Project scoping. A hard copy will go out in the mail today. Nat Miullo will be back in the office next week if you have any questions.

Lisa Lloyd

Acting Deputy Director

NEPA Compliance and Review Program

U.S. EPA Region 8 (EPR-N)

1595 Wynkoop St.

Denver, Colorado 80202-1129

(303) 312-6537 (office)

Summary of General Concerns re: proposed EOG Greater Crossbow Project

Submitted to: Tom Bills, Greater Crossbow PM: blm_wy_buffalogceis@blm.gov

Submitted by: [REDACTED]

Submittal Date: December 31, 2015 (1635 hrs, Mountain Time)

1. Section 1.4 of the Plan of Development (POD) states the following:

“EOG is proposing an interim drilling program that will allow wells to be drilled during the preparation of the EIS. Interim drilling will include wells for which APDs have already been secured, wells for which approved APDs are pending, and new wells for which APDs will be submitted. The BLM will prepare site-specific NEPA analyses to support EOG’s interim drilling plans. Interim drilling will help EOG to define the reservoir geology in the Greater Crossbow Project Area, and will consequently allow them to refine ODP locations.”

As noted, all three Applications for Permit to Drill (APD) (approved, pending, and new proposals) referenced in this excerpt are located within the Environmental Impact Statement (EIS) analysis area. Section 2.1 of the POD further describes the project as a phased approach, where Phase I (exploration) is integral to Phase II (development). Consequently, all of the above APD categories should be considered as “connected,” “cumulative,” and/or “similar” actions to the Greater Crossbow Project as a whole (40 Code of Federal Regulations [CFR] 1508.25).

According to Council on Environmental Quality (CEQ) regulations regarding implementation of the National Environmental Policy Act (NEPA), connected and cumulative actions are required to be discussed in the same NEPA document as the overall proposed project (<http://www.ntc.blm.gov/krc/uploads/400/06RelatedAction.pdf>). Those regulations also state that “NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken” (40 CFR 1500.1[b]). Consequently, allowing drilling to occur in the project area, including drilling of previously approved APDs, prior to completion of the EIS analysis and issuance of the Record of Decision would appear to be a violation of the NEPA process.

**The EIS should be completed and the Record of Decision issued and finalized prior to any further drilling by EOG in the Greater Crossbow Project area.

2. As noted, Section 1.4 of EOG’s POD states that *“the BLM will prepare site-specific NEPA analyses to support EOG’s interim drilling plans.”*

This statement implies that: 1) the BLM has adequate staffing resources to complete multiple NEPA documents in a timely fashion, namely prior to completion of the project EIS; and 2) that the conclusions of those NEPA analyses are expected to be pre-decisional *“to support EOG’s interim drilling plans.”*

Respectfully, it seems unlikely that the BLM lead office has the resources to complete multiple individual analyses prior to conclusion of the EIS process. More importantly, it is presumed that EOG anticipates these additional site-specific analyses to fall under the

Environmental Analysis process vs. the EIS process, implying “No Significant Impact.” However, as connected and cumulative actions directly associated with the overall Greater Crossbow Project, that conclusion seems indefensible at this time. Additionally, it would seem logical to expect results from these individual analyses to be incorporated into the broader EIS effort, which would result in perpetual revisions of the EIS as new disturbances occur and new impact analyses are made available. Plus, potential impacts at a specific well pad would not be comparable in scale to those for the overall project.

**This aspect of the project proposal does not appear to conform to NEPA requirements for connected actions, implies “pre-decisional” outcomes, and would presumably compromise the overall EIS analysis process. It should not be considered as a viable option.

3. In Section 1.6 of the POD, EOG points out that the BLM has a “multiple-use mission.” That mandate is equally applicable to resources other than EOG’s oil and gas interests.

Approximately the eastern half of the Greater Crossbow Project area overlaps the BLM’s Coal Development Potential area (refer to the attached modified Coal Development figure from the POD), including both existing and pending coal leases. These coal operations also have valid existing “rights and obligations” to develop their mineral interests.

The BLM is included in the directives issued under Executive Order 13186 (66 Federal Register [FR] 3853; January 17, 2001), which instruct Federal agencies taking actions that have, or are likely to have, a measurable negative impact on migratory bird populations to develop and implement Memoranda of Understanding (MOU) with the U.S. Fish and Wildlife Service (USFWS) that promote the conservation of populations of species of special interest and the habitats upon which they depend. To support that MOU (signed April 12, 2010), the BLM developed the *BLM Strategic Plan for Migratory Bird Conservation – A Commitment to Migratory Bird Conservation as Part of BLM’s Multiple-use Mission* (BLM 2013¹). Among other things, that Strategic Plan has a series of Emphasis Areas and Goals specifically directing the BLM to “...address BLM priority migratory birds during the NEPA and planning process...” and “identify and implement feasible measures, in coordination with the USFWS, to avoid or minimize unintentional take of migratory birds that may result from conducting BLM authorized activities.”

**The EIS should fully describe all users of the project area: energy operators (including competing interests), livestock producers, wildlife populations, etc., and fully analyze the potential impacts of the proposed project for each group.

4. As noted in Section 2.4.1 of the POD, Figure 1 for the Greater Crossbow EIS Project is incomplete, as are all other available figures for this proposal.
 - a. The figures show only 86 of the potential 100 optimized development pads (ODP) with no explanation as to the omission of the remaining 14 proposed locations.

¹ Bureau of Land Management (BLM). 2013. BLM Strategic Plan for Migratory Bird Conservation – A Commitment to Migratory Bird Conservation as Part of BLM’s Multiple-use Mission. http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/im_attachments/2013.Pa.r.65352.File.dat/IM2013-119_att1.pdf

- b. Only the Primary Corridors of disturbance are shown, omitting Secondary, Connecting, and Cross-country Corridors. Additionally, the legend descriptions do not accurately reflect what is being depicted in the figure(s) (see modified Coal Development map, attached). As a result, Figure 1 (and all other associated figures) gives a distorted and minimalized impression of the level of surface disturbance and, therefore, the potential impacts to known wildlife resources in the area, that are likely to be associated with the proposed project.

****All figures in the EIS should fully disclose EOG’s proposed development plans (even if only conceptual) to allow for the required level of impact analyses and necessary public input.**

- 5. Sections 2.4 and 2.5 describe in varying detail the construction, development, and production processes for the different components of the project. Section 2.5 also states:

“To the greatest extent possible, EOG intends to conduct drilling, exploration, and development operations within the Project Area on a year-round basis... As part of this POD, EOG is seeking approval from the BLM to waive discretionary timing limitations on a programmatic basis (e.g., several wells on specific ODPs). Without this waiver, the application of timing limitations would force EOG to move drilling rigs in and out of areas during portions of the year, which would increase operational costs, decrease efficiencies, and potentially increase impacts to wildlife and other sensitive resources.”

- a. If timing limitations are in place, activities would be curtailed during sensitive times of year throughout the entire project area. Therefore, it is not likely that impacts to wildlife and other sensitive resources would “potentially increase” by moving drill rigs around because they would not be doing so in vulnerable areas such as near active raptor nests, for example.
- b. The request in Section 2.5 for “programmatic” waivers of protective stipulations for wildlife resources is somewhat confusing relative to the commitment outlined in Section 2.8 that:

“EOG would adhere to seasonal and spatial buffers applicable to occupied raptor nests in the Greater Crossbow Project Area. In accordance with USFWS rules, EOG may on a case-by-case basis apply for exceptions, waivers, or modifications to timing limitations.”

****The EIS needs to clearly explain EOG’s intentions regarding efforts to protect wildlife resources while concurrently seeking waivers from those protective measures, and fully analyze the potential impacts to known and potential resources, particularly in regard to the potential for “take” (refer to item “d” below).**

- c. While many details are provided regarding equipment to be used, acreages to be affected during initial and long-term disturbance, interim reclamation, etc., other important

information is not provided for all aspects of the project. For example, the POD gives no estimate as to the average number of days needed to construct each ODP, transport and erect drill rigs, excavate individual pipeline corridors, perform interim reclamation, etc. Consequently, it is not possible to accurately estimate the overall timeline from start to finish associated with each individual ODP.

**As EOG is requesting “programmatic waivers” from wildlife stipulations for these grouped activities at each ODP, it would be appropriate for them to provide a summary table of these projected timelines, much like Table 4 provides a summary of disturbance information for all project components in both the POD and the EIS to allow for more accurate analyses of potential impacts, especially to known and potential wildlife resources in the project area.

- d. The BLM has the authority to waive its stipulations regarding surface activities, but only the USFWS has the authority to enforce the Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act, etc. All non-game migratory birds (raptors, songbirds, etc.) are protected under the MBTA. Eagles are protected under both laws. The MBTA applies to any person, business, organization, institution, and any local, state, or Federal agency. That is, Federal agencies have an obligation to ensure that their own actions do not result in violations of the MBTA, and they can be prosecuted for such violations. As noted above, the BLM’s (2013) Strategic Plan for Migratory Birds explicitly directs the BLM to coordinate with the USFWS regarding the potential for “take” of these species.

**The EIS should clearly outline EOG’s specific plans to minimize impacts to migratory birds and other wildlife populations, including when “programmatic waivers” would be sought (timing, triggering circumstances, etc.).

6. Due to the location of the proposed project relative to existing surface coal operations, an extensive, long-term database for numerous wildlife resources is available for approximately the eastern third of the Greater Crossbow Project area (refer to the attached modified Crossbow vs. Coal Development map). Numerous additional wildlife features are documented in the BLM’s database for the remainder of the project area.

The following wildlife resources are known to occur within the overlap area between the Greater Crossbow Project and adjacent coal mines due to long-term required annual monitoring conducted for the mines:

- At least 120 raptor nest sites (most intact) in at least 48 documented territories for at least 8 different raptor species.
 - At least 30 other confirmed nest sites (most intact) in the same or 14 additional territories (for 1 new and 5 previously counted species) are present immediately adjacent to and/or within 0.5 mile (BLM 2005²) or 1.0 mile (Service 2009³) of the

² Bureau of Land Management (BLM), Buffalo Field Office. 2005. Wildlife Survey Protocol for Coal Bed Natural Gas Development, Powder River Basin Wildlife Task Force Buffalo, WY. 23 pp.

³ U.S. Fish and Wildlife Service (Service). 2009. Wyoming Field Office Guidelines for Raptor Protection Proximal

- project boundary in the eastern third of the area.
- Ferruginous hawks (*Buteo regalis*) have used the majority of these nest sites over the years. This species is known to be especially vulnerable to disturbance near active nest sites, and often abandons their nesting effort following a single disturbance, especially if it occurs early in the nesting process; thus, the Service's recommended buffer of 1.0 mile for this species (only nest sites for this species were included in the above 1.0-mile buffer tally).
- Based on ODP locations depicted in Figure 1 of the POD, at least 52 known ferruginous hawk nests sites in at least 15 different territories will be within 1.0 mile of one or more of the 86 ODP sites shown.
 - A minimum of 14 intact ferruginous hawk nests in 5 territories are likely to be physically removed by well pad construction.
 - Additional nests in the same or other territories also are likely to be affected by the 14 ODP well sites and numerous pipeline, power line, and road corridors not shown on Figure 1.
 - No nests of other raptor species are likely to be physically removed by ODP construction within the coal overlap area at this time.
 - As noted, these numbers only represent data collected during annual wildlife monitoring conducted for neighboring coal mines in the overlap area. Numerous other wildlife resources (nests, etc.) are known to occur elsewhere within the Greater Crossbow Project area, as documented in the BLM database.
 - Several known mountain plover (*Charadrius montanus*) use areas, including nesting and brood-rearing habitat, also have been documented in the overlap area between coal mine monitoring and the proposed Greater Crossbow Project.
 - Likewise, multiple active black-tailed prairie dog (*Cynomys ludovicianus*) colonies are known to be present within at least the eastern third of the project area. These colonies serve as foraging and/or nesting habitat for multiple wildlife species: raptors, mountain plovers, passerines, rabbits, snakes, swift fox (*Vulpes velox*), red fox (*Vulpes vulpes*), etc.
 - As indicated, numerous other wildlife features are known or likely to be present in the western two-thirds of the project area that are not included in coal mine annual wildlife monitoring efforts, but have been surveyed in conjunction with multiple oil and gas projects in recent years.
 - All data referenced in the above bullets are part of the public record and, therefore, are readily available to EOG. Furthermore, the neighboring coal operators voluntarily provided long-term raptor nest data to EOG's subcontractors for the Greater Crossbow Project during the planning process to assist EOG in minimizing impacts to known wildlife resources. Additional data for mountain plover nest and use sites also was offered.

**Given the extensive database of known wildlife features in the area and the presumed relatively limited timeline necessary to complete each ODP (pending additional information), EOG should be able to plan its operations in a manner that targets high use areas for ODP construction and drilling operations to occur during the non-breeding season and lower use areas during the breeding season, following pre-disturbance clearance surveys. Drilling during the

to Disturbance from Land Use Activities. Wyoming Field Office, Cheyenne, Wyoming. December 2009.

non-breeding season also allows EOG to establish continuous and on-going activity prior to nesting, which gives the birds a chance to decide whether or not to tolerate and nest nearby or try elsewhere. This appears to be the proposed application of the “programmatic waiver” approach, but needs to be clarified in the EIS. Additionally, due to other known territories within and among species, options may be limited for alternate nesting so the EIS analysis will need to account for that, as well. Appropriate planning with input from professional biologists familiar with the project area can greatly reduce potential impacts, including potential for “take.”

7. The Wyoming Department of Environmental Quality (WDEQ) issues a State Mining Permit to each surface coal operator in the Powder River Basin (PRB), where the proposed Greater Crossbow Project is to be located. Part of those permit requirements include:
 - Standardized annual wildlife monitoring and reporting for the life of the mine (vs. typical 5-year periods associated with oil and gas conditions of approval).
 - Includes repeated monitoring of nest sites within each breeding season, including collection of production data
 - Includes collection of annual prey base data
 - Includes collection of annual disturbance data (type, distance from nest site, line-of-sight information) for each intact raptor nest
 - Implementation of appropriate measures to minimize and/or mitigate impacts
 - including the requirement of an Avian Monitoring and Mitigation Plan (Avian Plan) to be approved by the U.S. Fish and Wildlife Service (Service) and included in the permit document (both the plan itself and the letter from the Service approving the plan)
 - The Service further requires that coal operators either include additional measures relating to Avian Protection Plan (APP) in the overall Avian Plan or that they develop a separate APP to address specific impacts that may occur due to electrocutions on or collisions with overhead power lines and associated infrastructure.
 - Enormous financial bonding levels
 - Strict reclamation requirements such as the use of agency-approved native seed mixes (based on pre-mining vegetation composition), prescribed shrub restoration standards, annual monitoring of vegetation conditions for a minimum 10-year period, rigorous bond-release parameters, etc.

The fact that neighboring coal mines operate 24/7 in the Powder River Basin should not be misinterpreted as an indication that they do not have to abide by any wildlife stipulations. On the contrary, coal mines are one of the most heavily regulated industries in Wyoming. As outlined above, each mine, including those overlapping the Greater Crossbow Project area, is required as part of its State Mining Permit to have a WDEQ-LQD approved annual wildlife monitoring and mitigation plan that follows State requirements regarding survey types and methods, including explicit annual reporting requirements. As a required component of the wildlife program, each mine also must have a specific avian monitoring and mitigation plan that is approved by the USFWS, with copies of both the approval letter and the plan itself included in the permit document on file with the State. In addition, each mine must have a detailed reclamation plan (including proposed seed mixtures, seeding rates, etc.), and numerous other approved planning documents, all of which are designed and intended to minimize impacts to other resources and

ensure that appropriate post-mining reclamation occurs and is monitored for a sufficient length of time (generally 10 years) to ensure success and/or replanting, as needed. The entire mine permit must be renewed at 5-year increments or revised to incorporate permit amendments or major changes to the mine development plan. Each permit renewal and amendment includes agency and public review processes.

It is precisely due to this elevated level of data collection and reporting for the life of the project that provides the foundation of information necessary for successful mitigation planning and implementation. Given the high level of known wildlife resources within the proposed project area, EOG should be required to adhere to the same level of monitoring, reporting, and mitigation requirements, including regular updates to incorporate new information and project operations, particularly if they intend to request waivers from wildlife stipulations as part of their operating approach.

In addition to these WDEQ requirements, both adjacent coal mines are actively involved in a large-scale conservation planning effort in conjunction with the USFWS, BLM, U.S Forest Service, Wyoming Game and Fish Department, and multiple other entities and individuals. This landscape-scale effort overlaps the entire Greater Crossbow Project area.

Knowing that the adjacent coal mines have USFWS approved avian monitoring and mitigation plans in place, along with ongoing and pending conservation measures directly associated with other USFWS approved (current or pending) conservation programs, EOG also should be required to confer with the affected mines prior to development of its own avian plan(s), including deference to existing coal documents to avoid conflicting efforts in the same territories.

**The EIS should specifically describe and analyze EOG's plans and commitments to incorporate existing wildlife data and ensure that its actions and mitigation efforts do not conflict with ongoing approved conservation and mitigation measures in the project area. Furthermore, it should address the discrepancy between wildlife monitoring, reporting, and mitigation requirements between overlapping energy operations and how such discrepancies could affect the likelihood for "take" of protected species to occur as a result of the proposed Greater Crossbow Project.

ATTACHMENT A: Programmatic Reclamation Plan (Reclamation Plan)

Attachment B of the Reclamation Plan outlines specific efforts regarding reclamation of habitat for the greater sage-grouse (*Centrocercus urophasianus*). Similar special considerations should be made during reclamation efforts for other habitat-specific species.

For example, numerous short-grass wildlife species are known to regularly nest in upland habitats in the eastern third of the Greater Crossbow Project area including, but not limited to, the mountain plover, McCown's longspur (*Rhynchophanes mccownii* [formerly *Calcarius*]), burrowing owl (*Athene cunicularia*), ferruginous hawk, chestnut-collared longspur (*Calcarius ornatus*), swift fox, and others. Many of these species are considered "Sensitive Species" by the BLM and/or U.S. Forest Service Region 2 (Thunder Basin National Grassland). It is reasonable to assume that such species also occur elsewhere in the project area where similar habitat

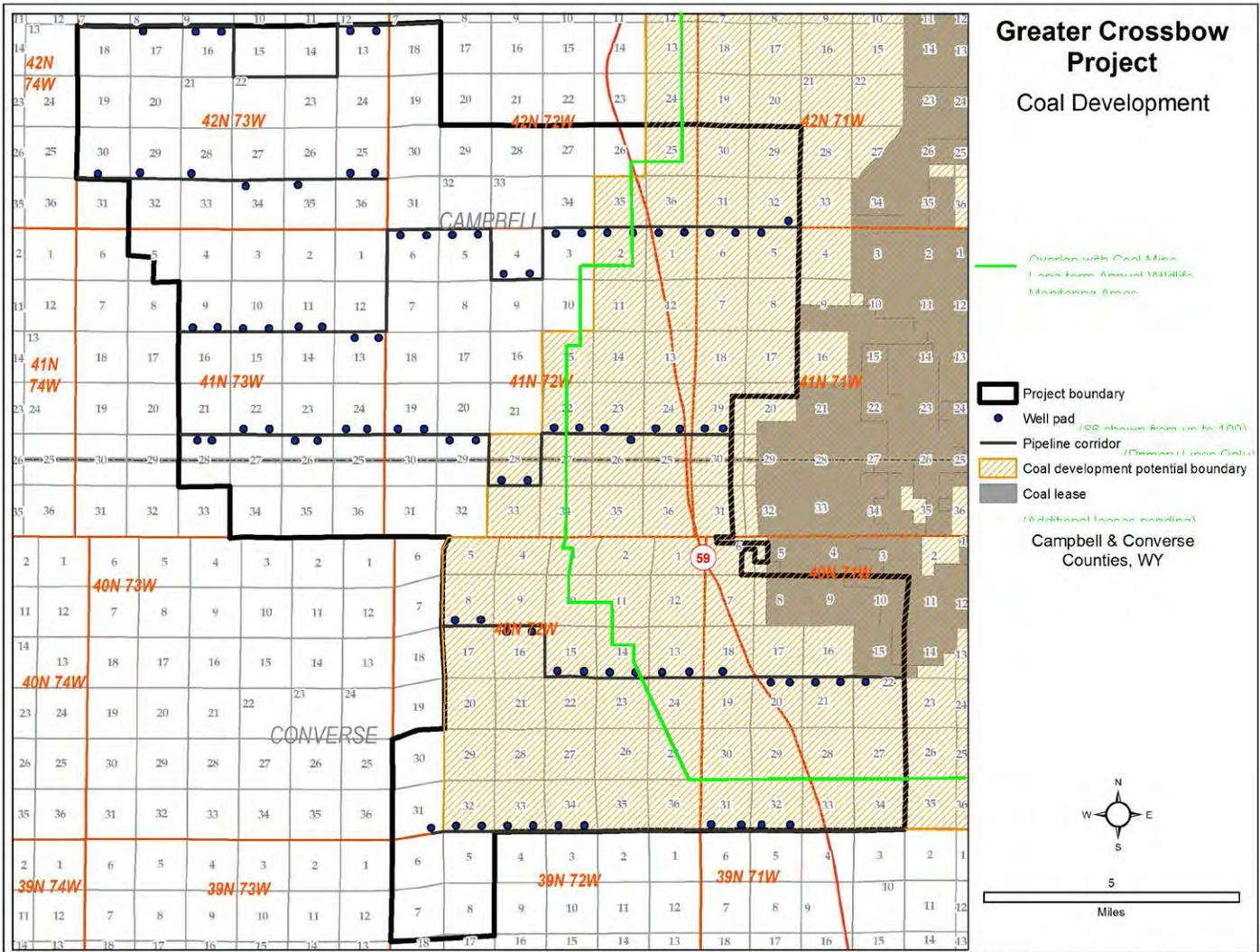
conditions are present; existing data for the remainder of the project area may be available in current BLM databases for the region.

As noted in Section 1.0 of the Reclamation Plan, 87% of the project area is comprised of private surface. Recognizing the understandable caveat that all activities on private surface require the consent of the surface owner, EOG should nevertheless be cognizant of the fact that the results of their reclamation efforts could have substantial impacts on more specialized wildlife habitats and populations in affected areas. For example, it is reasonable to presume that livestock producers will be most interested in seed mixes that provide improved forage for their animals on reclaimed lands. However, such seed mixes would not necessarily provide appropriate habitat conditions to support short-grass species present prior to development of the project.

****In that light, the EIS should analyze the potential for long-term habitat loss and population declines for short-grass species (plants and animals) due to conversion of pre-disturbance short-grass communities to post-disturbance mid-grass (mid-height) communities. EOG also should be required to include additional Best Management Practices for short-grass habitats in their reclamation plan.**

Greater Crossbow Project

Coal Development



From: [Bills, Thomas \(Tom\)](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); [Serreze, Susan](#)
Subject: Fwd: Scoping Comments for proposed Greater Crossbow Project EIS attached
Date: Monday, January 04, 2016 10:04:57 AM
Attachments: [REDACTED]

Thomas Bills
NEPA & Environmental Coordinator
BLM Buffalo Field Office
(307) 684-1133

----- Forwarded message -----

From: [REDACTED]
Date: Thu, Dec 31, 2015 at 4:38 PM
Subject: Scoping Comments for proposed Greater Crossbow Project EIS attached
To: blm_wy_buffalogceis@blm.gov
Cc: tbills@blm.gov

Tom,

Please find attached my Scoping Comments on the proposed Greater Crossbow Project EIS.

Thanks much for your time and consideration of this input.

Regards,

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



December 30, 2015

Greater Crossbow Oil and Gas Project
BLM Buffalo Field Office
1425 Fort Street
Buffalo, Wyoming 82834

RE: Greater Crossbow Oil and Gas Exploration and Development Project

To Whom It May Concern:

Peabody Energy is a private sector coal company that has operations in the U.S. and owns and operates four mines in the Powder River Basin of Wyoming. Peabody is an active coal producer, landowner and neighbor near the proposed Greater Crossbow Oil and Gas Exploration and Development Project. Therefore, Peabody has substantial interest in the December 2015 scoping effort by Bureau of Land Management for this project, and submits the following comments.

The most important issue that the Bureau of Land Management (BLM) can and should address in this environmental impact statement (EIS) relates to federal lease conflict resolution. The proposed project area falls within the area of Coal Development Potential. This area, so named and delineated by the BLM, identifies the area in which future federal coal leases are expected to be located. The project area also falls within existing lease boundaries and the boundary of at least one current Wyoming Permit to Mine for a surface coal mine.

The BLM needs to identify the overlap issues between the various leases and permits, identify whether the overlaps can be avoided, and if not identify strategies they will use to manage possible conflicts. Impacts associated with these conflicts have and will continue to result in tremendous costs to all parties, including the agency, if they are not addressed in the planning process. Evaluation of this issue is essential for the agency officials to be fully informed of the impacts associated with the decisions they will be asked to make.

Project Versus Programmatic EIS

Numerous questions and issues were discussed or mentioned in the December 10th public scoping meeting in Gillette for which no answers were available. Then it was stated that the BLM is intending to construct a programmatic EIS. A programmatic EIS (it was stated) requires less site-specific information and is intended to address more broadly defined plans and goals. As best we can tell, the concept of a programmatic EIS was not addressed in the scoping literature handed out at the meeting.

In 2014, the Council on Environmental Quality (CEQ) proposed guidance for the use of programmatic environment reviews, including environmental impact statements. (79 FR 50578; Pages 50578 -50589). In that proposal, the CEQ defined the term *programmatic* as,
“...any broad or high-level NEPA review; it is not limited to a NEPA review for a particular program.”

CEQ further stated there are other reasons for a programmatic NEPA review, including,

“...when there are limitations in available information and uncertainty regarding the timing, location, and environmental impacts of subsequent implementing action(s). For example, in the absence of certainty regarding the environmental consequences of future tiered actions, agencies may be able to make broad program decisions and establish parameters for subsequent analyses based on a programmatic review that adequately examines the reasonably foreseeable consequences of a proposed program, policy, plan, or suite of projects.”

The Powder River Basin has experienced oil and gas exploration and development projects for decades. We believe that the information required to evaluate environmental impacts needs to be, and can be made available. According to the presentation materials at the public scoping meeting and the Federal Register NOI, there is nothing that is programmatically new associated with the project.

We believe a programmatic EIS will be completely unsuitable for informing the BLM on the decisions they will face. The 4,000-acre affected area (100 pads @ 40 acres each) may be likened to a medium-sized mining lease. This project will also appear to add no less than 50 miles of new unpaved roads to the area, which are apparently not included in this 4000-acre area. The size of the project is similar to that for many other kinds of energy development projects, which both the BLM and the US Forest Service (USFS) have routinely analyzed. In nearly every known case, the agencies have felt compelled to conduct full project-level environmental impact statements. These analyses have relied upon the project proponent providing all the specific development details for that project. The EIS analyses have been thorough, specific and justified as necessary to properly inform the BLM and the USFS prior to deciding whether to issue leases, authorize development, or issue special use permits. It should be noted that most of these recent project-specific EIS's have been upheld in appeals.

The statement by the BLM that the 'rib and spine' concept will decrease impacts needs to be thoroughly evaluated in the EIS. This can only be evaluated with detailed project information provided, as described above. While the 'rib and spine' concept may reduce the overall affected area substantially, we believe impacts to air, water and traffic, for example, are likely to be more concentrated as discussed below.

Air Emissions

The nature of this project was characterized in the Gillette public meeting as much more concentrated than traditional oil and gas exploration projects. Numerous wells could be placed on each of the 100 well pads, thereby concentrating the drilling, and pumping activities. While this may be beneficial from the perspective of total disturbed acres, this will also concentrate activities such as transportation and emissions of air pollutants. Often it has been found that concentrated air emissions, for example have a greater project impact than less concentrated emission sources.

Unpaved roads in the oil and gas sector currently contribute significantly to particulate emissions throughout the area. Not only worker traffic but also the continual access of contractors and suppliers as well as larger tanker and service truck traffic contribute significantly to the emissions from untreated and unpaved roads. Numerous industrial particulate monitors, operated by mining companies, are already located downwind of this proposed project. Rather than to wait for exceedances to be recorded at these monitors, we believe the BLM is obliged to fully evaluate particulate emissions from the proposed activities in conjunction with existing permitted and unpermitted emission sources in the area. In order to ensure that current

compliant air quality is maintained in the area, the EIS needs to include an evaluation of emission control strategies with the Wyoming Department of Environmental Quality, including requirements and enforcement for best practices and standard emission control activities.

It was noted that the project involves 125,000 horsepower of new gas compression in the area. With the recent reduced ozone standard, the EIS should carefully evaluate ozone emissions and ozone formation in the general area. The evaluation needs to be in sufficient detail to ascertain whether the project will contribute to ozone formation in violation of the new standard. Such an analysis understandably requires project specific information regarding the size and location of the various compression units.

Impacts to Water Resources

Several questions were asked by the public at the Gillette meeting on December 10th, relating to which aquifers are to be impacted for water withdrawal and for wastewater disposal. BLM and project proponent personnel were unable to provide specific answers to any of the questions about both of these topics at the scoping meeting. Furthermore, with more than 4,000 acres projected to be disturbed, the impacts upon surface water are also a concern. The EIS should be detailed enough to analyze impacts to the quality and quantity of groundwater withdrawal and disposal sources. The EIS should also be detailed enough to evaluate impacts to surface water runoff on water in streams and to water available to downstream water users.

Impacts to Wildlife

There was some discussion at the meeting in Gillette regarding a request by the project proponent to drill and develop wells throughout the entire year without regard to nesting restrictions for raptors and Greater sage-grouse. The BLM presentation seemed to imply that this was a primary objective of the program. We find it curious that there is no apparent mention of this request in the scoping literature. Peabody strongly suggests that seasonal nesting restrictions cannot and should not be ignored. The EIS needs to specifically address impacts to raptor and sage-grouse populations. In so doing, the request needs to be evaluated against habitat and population concerns as addressed in the recent resource management plan amendments by the BLM, the land use plan amendments by the USFS, and the Wyoming Governor's Executive Order dealing with the Greater sage-grouse.

Raptor populations in the area pose a different but equally important concern. There are currently decades-old projects and programs for the management of raptor populations to the north, east, and south of this proposed project. Impacts to the populations near this proposed oil and gas project could alter or affect the projects and programs being implemented by other energy and mining industry companies. The EIS should specifically evaluate the impact of the proposed project on raptor populations of the project site as well as the secondary impacts to nearby raptor populations and territories. The project area cannot be viewed in isolation from the perspective of raptors. For this analysis, it is recommended that US Fish and Wildlife Service be properly consulted and involved, because many of the ongoing raptor management projects are done with their concurrence or approval.

Resource Management Plan

It was noted in the Gillette meeting that the project area extends into both the Casper and the Buffalo Resource Management Plan areas. There was no discussion regarding which of the two Resource Management Plans is to control decisions on the project. The issue becomes further complicated by the presence of the USFS as a cooperating agency. The EIS also needs to address which plan(s) will control in the project area. Further, the evaluation needs to

address any changes that will have to be made to one plan or the other in order to proceed. The BLM needs to evaluate this issue in the EIS including whether the various Resource Management Plans are equivalent in their treatment of resource and environmental protection, remediation, and reclamation.

Miscellaneous

At the meeting in Gillette it was stated that as many as 300 (of the 1500 total) wells might be drilled under some other authority, concurrent with the programmatic NEPA analysis. There were no specifics regarding these 300 wells, other than the general statement that their purpose is to help define the project. We have been unable to find mention of these 300 wells anywhere in the scoping literature.

Again, we believe these issues are justifications for a project-specific EIS. It would be appropriate, if not necessary, for the EIS to evaluate impacts from these additional 300 wells also.

Peabody appreciates the opportunity to comment on the scoping for this project.

Sincerely,



Bryce West
Vice President Environmental Services – Americas
Peabody Energy

From: tbills@blm.gov on behalf of [BuffaloGCEIS, BLM_WY](#)
To: [Meredith Griffin](#)
Cc: [Ellen Carr](#); SSerreze@ene.com
Subject: Fwd: Greater Crossbow Oil and Gas Exploration and Development Project scoping comments
Date: Thursday, December 31, 2015 2:08:07 PM
Attachments: [ATT00001.htm](#)
[Crossbow Comments.pdf](#)

----- Forwarded message -----

From: **West, Bryce** <BWest@peabodyenergy.com>
Date: Thu, Dec 31, 2015 at 1:47 PM
Subject: Greater Crossbow Oil and Gas Exploration and Development Project scoping comments
To: "BLM_WY_BuffaloGCEIS@blm.gov" <BLM_WY_BuffaloGCEIS@blm.gov>

Please accept the attached comments regarding the subject listed above.
Thank you for the opportunity to submit these comments.
Bryce West
Peabody Energy

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Comments EOG corridor project

Thu, Dec 24, 2015 at 1:06 PM

Ladies and Gentlemen of the Bureau of Land Management:

The following comments represent the concerns of individuals, employees, stockholder's, Board of Directors and executives of [REDACTED] pertaining to Energy Oil and Gas Inc. colossal undertaking, called Greater Crossbow Project affecting the landscape, nature local economy and our property holdings.

- 1.) EOG has no surface damage agreement with [REDACTED] that addresses the damage caused to [REDACTED]. By the taking of multiple 1/4 mile wide strip of lands miles long EOG calls the Greater Crossbow Project. These multiple massive strips will completely impede our ability to operate the entire ranch at every faucet of operation if not destroy the business in it entirety. Thus the need for contract that pays for all forms of damage. The need for this contract has been acknowledged by [REDACTED] attorneys, advisers, EOG attorneys and a former federal judge. This required damage contract has not been initiated, offered by [REDACTED] negotiated, drafted nor executed. Agreement simply does not exist. EOG has expressed many times its unwillingness to have such an arrangement.
- 2.) None of the Greater Crossbow Project routes or in use corridors have been approved by [REDACTED]
- 3.) Series of 3/8 mile wide strips miles long will have permeate, destructive effects on wildlife and natural habitat that the people (many generations) living on this land have long strived to preserve. These industrial strips will halt migration and normal movement of wildlife necessary for the survival of many species. This will also deny citizens of natural food resource, recreation and income.
- 4.) Year round cow/calf, ewe/lamb grazing will become virtually impossible with EOG industrial strips having project name or no name being a huge impassable barrier to the daily grazing, rotational plan and seasonal movement of livestock necessary for an efficient, sustainable livestock production operation to survive. Low input and less labor is absolutely essential to livestock operations and these industrial barrier strips called Greater Crossbow Project vastly multiply input and labor to the point of impossible. These industrial barriers will also deny citizens healthy nutritional food resources, natural fiber resource, income, recreation, open space and clean air.
- 4.) EOG is already implementing and constructing the corridor barriers of Greater Crossbow Project prior to and with out Environmental Impact Statement, Public comment and Bureau of Land Management approval.
- 5.) In the majority industrialized local political climate the lease corridor strips of Greater Crossbow Project would be classified as industrial zones therefore assessed and taxed at much higher rates. Very likely at such high rates that far exceed blade of grass compensation levels. Thus [REDACTED] not being able to afford the property taxes and losing ownership of the property completely. The given situation created the necessity for industrial strength compensation that has not been exchanged with EOG for the Greater Crossbow Project or corridor strips called by any other name or corridor strips already in use.
- 6.) Uncomprehensible amounts of fresh water resources(4 to 8 billion barrels or more) will be needed to drill, frac and maintain this enormous amount of oil gas wells. The taking of nearly all the water in the area will leave this ranch and surrounding ranches a useless wasteland as water is the life blood of landscape, nature and sustainable agriculture. [REDACTED] insists yet another contract be executed to compensate this organization of family members for the loss of life giving water resource that we are the effective stewards of.

7) pollution, light pollution, noise pollution and every conceivable source of ravage unimaginable. Huge amounts of contaminated material in need of disposal with no disposal facilities in place capable of handling such amounts of hazardous waste including produced contaminated water, drill tailing's and unidentified fr acing chemicals.

8.) Legions of omnibott energy industry zealots and industrial equipment rampaging the serene pristine carefully stewarded natural landscape. with no consideration to the 120 years of stewardship work or intent of compensation at all, much less payment that addresses complete loss. Who are and will continue jeopardizing the safety, security and health of citizens that exist on the land at this time that will ultimately be forced to relocate without necessary funds to evacuate this abusive dangerous harm.

9.) Violating the concept of right of homestead.

10.) Denying Civil Rights.

11.) Obliterating our Cultural Heritage

Comments of our individual selves are reflected in this letter same as the corporation.

Thank you for the opportunity to provide input on this project that massively alters our lives and the environment.

