



November 14, 2016

Via Hand Delivery

Ruth Welch
 State Director
 U.S. Bureau of Land Management
 Colorado State Office
 2850 Youngfield St.
 Lakewood, CO 80215

U.S. DEPT. OF INTERIOR
 BUREAU OF LAND MGMT.
 COLORADO STATE OFFICE DENVER
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Re: Protest of December 2016 Competitive Oil and Gas Lease Sale

Dear Ms. Welch:

Pursuant to 43 C.F.R. § 3120.1-3, WildEarth Guardians hereby protests the Bureau of Land Management's ("BLM's") proposal to offer 31 publicly owned oil and gas lease parcels covering 20,101.58 acres of land for competitive sale on December 13, 2016. The parcels are located in the Royal Gorge, Colorado River Valley, and Grand Junction Field Offices of Colorado. The lease parcels included for sale, as identified by the BLM's in its Final December 2016 Oil and Gas Sale List, include the following:¹

Lease Serial Number	Acres	Field Office	County
COC77980	320.00	Royal Gorge	Washington
COC77981	80.30	Grand Junction	Mesa
COC77982	161.63	Royal Gorge	Lincoln
COC77983	600.00	Royal Gorge	Lincoln
COC77984	320.00	Royal Gorge	Lincoln
COC77985	280.00	Royal Gorge	Las Animas
COC77986	120.00	Royal Gorge	Huerfano
COC77987	441.85	Grand Junction	Mesa
COC77988	320.00	Grand Junction	Mesa
COC77989	80.00	Grand Junction	Mesa
COC77990	214.57	Grand Junction	Garfield
COC77991	24.46	Grand Junction	Garfield
COC77992	626.73	Grand Junction	Garfield

¹ This list of lease parcels is available on the BLM's website at <https://eplanning.blm.gov/epl-front-office/projects/nepa/59590/85330/102137/FinalSaleList.pdf>.

COC77993	160.00	Grand Junction	Garfield
COC77994	160.00	Grand Junction	Garfield
COC77995	870.48	Grand Junction	Garfield
COC77996	120.00	Grand Junction	Garfield
COC77997	280.00	Grand Junction	Mesa
COC77998	1520.00	Colorado River Valley/Grand Junction	Mesa
COC77999	33.83	Colorado River Valley	Mesa
COC78000	320.00	Grand Junction	Mesa
COC78001	40.00	Grand Junction	Mesa
COC78002	639.48	Grand Junction	Mesa
COC78003	2283.29	Grand Junction	Mesa
COC78004	1360.47	Grand Junction	Mesa
COC78005	1520.39	Grand Junction	Mesa
COC78006	2277.55	Grand Junction	Mesa
COC78007	1920.38	Grand Junction	Mesa
COC78008	2560.00	Grand Junction	Mesa
COC78009	400.00	Grand Junction	Mesa
COC78010	80.00	Grand Junction	Garfield

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In support of its proposed leasing, the agency prepared an Environmental Assessment (“EA”) for leases in the Royal Gorge Field Office, DOI-BLM-CO-F020-2016-0013-EA, and a Determination of National Environmental Policy Act (“NEPA”) adequacy (“DNA”) for leases in the Grand Junction and Colorado River Valley Field Offices, DOI-BLM-CO-N040-2016-0044-DNA.

As will be explained, the BLM’s proposal to lease falls short of ensuring compliance with applicable environmental protection laws and is not based on sufficient analysis and assessment of key environmental impacts under NEPA, 42 U.S.C. § 4331, *et seq.* The agency’s EA and DNA are therefore deficient and fail to provide sufficient justification for its proposed action and its proposal to issue a FONSI. For the reasons below, we request the BLM refrain from offering the 28 proposed lease parcels for sale and issuance.²

STATEMENT OF INTEREST

WildEarth Guardians is a nonprofit environmental advocacy organization dedicated to protecting the wildlife, wild places, wild rivers, and health of the American West. On behalf of our members, Guardians has an interest in ensuring the BLM fully protects public lands and resources as it conveys the right for the oil and gas industry to develop publicly owned minerals. More specifically, Guardians has an interest in ensuring the BLM meaningfully and genuinely takes into account the climate implications of its oil and gas leasing decisions and objectively and robustly weighs the costs and benefits of authorizing the release of more greenhouse gas emissions that are known to contribute to global warming.

² For purposes of this protest, we hereby incorporate by reference comments and attachments thereto submitted by WildEarth Guardians in response to the BLM’s Draft EA and DNA.

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WildEarth Guardians has submitted extensive comments on the proposed leasing, including comments submitted on June 13, 2016 over the BLM's EA and DNA. WildEarth Guardians has also extensively commented on BLM's proposed oil and gas leasing in Colorado, raising concerns over the agency's failure to adequately address climate impacts.

The mailing address for WildEarth Guardians to which correspondence regarding this protest should be directed is as follows:

WildEarth Guardians
2590 Walnut St.
Denver, CO 80205

STATEMENT OF REASONS

WildEarth Guardians protests the BLM's December 2016 oil and gas lease sale over the agency's failure to adequately analyze and assess the climate impacts of the reasonably foreseeable oil and gas development that will result in accordance with NEPA, 42 U.S.C. § 4331, *et seq.*, and regulations promulgated thereunder by the White House Council on Environmental Quality ("CEQ"), 40 C.F.R. § 1500, *et seq.*

NEPA is our "basic national charter for protection of the environment." 40 C.F.R. § 1500.1(a). The law requires federal agencies to fully consider the environmental implications of their actions, taking into account "high quality" information, "accurate scientific analysis," "expert agency comments," and "public scrutiny," prior to making decisions. *Id.* at 1500.1(b). This consideration is meant to "foster excellent action," meaning decisions that are well informed and that "protect, restore, and enhance the environment." *Id.* at 1500.1(c).

To fulfill the goals of NEPA, federal agencies are required to analyze the "effects," or impacts, of their actions to the human environment prior to undertaking their actions. 40 C.F.R. § 1502.16(d). To this end, the agency must analyze the "direct," "indirect," and "cumulative" effects of its actions, and assess their significance. 40 C.F.R. §§ 1502.16(a), (b), and (d). Direct effects include all impacts that are "caused by the action and occur at the same time and place." 40 C.F.R. § 1508.8(a). Indirect effects are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." *Id.* at § 1508.8(b). Cumulative effects include the impacts of all past, present, and reasonably foreseeable actions, regardless of what entity or entities undertake the actions. 40 C.F.R. § 1508.7.

An agency may prepare an environmental assessment ("EA") to analyze the effects of its actions and assess the significance of impacts. *See* 40 C.F.R. § 1508.9; *see also* 43 C.F.R. § 46.300. Where effects are significant, an Environmental Impact Statement ("EIS") must be prepared. *See* 40 C.F.R. § 1502.3. Where significant impacts are not significant, an agency may issue a Finding of No Significant Impact ("FONSI") and implement its action. *See* 40 C.F.R. § 1508.13; *see also* 43 C.F.R. § 46.325(2).

Within an EA or EIS, the scope of the analysis must include “[c]umulative actions” and “[s]imilar actions.” 40 C.F.R. §§ 1508.25(a)(2) and (3). Cumulative actions include action that, “when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement.” 40 C.F.R. § 1508.25(a)(2). Similar actions include actions that, “when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together.” 40 C.F.R. § 1508.25(a)(3). Key indicators of similarities between actions include “common timing or geography.” *Id.*

Here, the BLM fell short of complying with NEPA with regards to analyzing and assessing the potentially significant climate impacts of oil and gas leasing. In support of its proposed leasing, the agency prepared an EA for leasing in the Royal Gorge Field Office and a DNA for leasing in the Colorado River Valley and Grand Junction Field Offices. In the EA, however, the BLM failed to analyze the reasonably foreseeable greenhouse gas emissions both from the proposed leasing and from cumulative and similar actions. In the DNA, the underlying NEPA analysis relied upon by BLM similarly failed to analyze the reasonably foreseeable greenhouse gas emissions both from the proposed leasing and from cumulative and similar actions. The agency further failed to assess the significance of any emissions, particularly in terms of carbon costs. Below, we detail how BLM’s proposal fails to comply with NEPA.

1. The BLM Failed to Fully Analyze and Assess the Direct, Indirect, and Cumulative Impacts of Greenhouse Gas Emissions that Would Result from Issuing the Proposed Lease Parcels

We are pleased to see the BLM finally develop estimates for reasonably foreseeable direct and indirect greenhouse gas emissions associated with the proposed leasing in the Royal Gorge Field Office. *See* EA at 24. However, we are concerned that the BLM made no effort to undertake a similar analysis and assessment in the DNA for leasing in the Grand Junction and Colorado River Valley Field Offices. In fact, the BLM implies that analyzing reasonably foreseeable greenhouse gas emissions in the Grand Junction and Colorado River Valley Field Offices would be “speculative.” It is unclear how such analysis would be speculative when the BLM was clearly able to conduct such an analysis for the Royal Gorge Field Office. This alone indicates that the agency’s reliance on a DNA for leasing in the Grand Junction and Colorado River Valley Field Offices is not supported under NEPA.

Regardless, for both the EA and the DNA, it appears that the agency’s analysis fails to fully comply with NEPA and to demonstrate support for a FONSI and/or DNA.

Notably, the BLM’s estimates of greenhouse gas emissions (or lack thereof) fail to account for emissions from cumulative and similar actions. As NEPA requires, an agency must analyze the impacts of “similar” and “cumulative” actions in the same NEPA document in order to adequately disclose impacts in an EIS or provide sufficient justification for a FONSI in an EA. *See* 40 C.F.R. §§ 1508.25(a)(2) and (3). Here, the BLM failed to take into account the greenhouse gas emissions resulting from other proposed oil and gas leasing in Colorado and other neighboring states, as well as related oil and gas development, and to analyze the impacts of these actions in terms of their direct, indirect, and cumulative greenhouse gas emissions.

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From a cumulative standpoint, it is first and foremost disconcerting that BLM's analysis is entirely devoid of any consideration of greenhouse gas emissions from oil and gas development within other Field Offices in Colorado, as well as throughout the Rocky Mountain west. Although in its EA, the BLM relies on a Colorado Air Resources Management Modeling Study ("CARMMS") report to disclose cumulative emissions in the Royal Gorge Field Office, the EA fails to disclose cumulative greenhouse gas emissions from past, present, and reasonably foreseeable oil and gas leasing and development in other field offices, including in the Colorado River Valley and Grand Junction Field Offices. While the BLM does not define the "project impact zone" for purposes of cumulative climate impacts analysis in the Royal Gorge EA, we assume that given the agency's comparison of cumulative emissions with statewide and global greenhouse gas emissions (*see* EA at 34), that the proper scope of the "project impact zone" for purposes of cumulative greenhouse gas emissions analysis would necessarily be statewide, if not global. The failure of the EA to disclose emissions beyond the Royal Gorge Field Office therefore undermines the agency's claim that a FONSI is warranted. The failure of the DNA to disclose any cumulative greenhouse gas emissions or to rely on any NEPA analysis that discloses such cumulative emissions further undermines the claim that a DNA is warranted.

In terms of similar actions, we are particularly concerned that the BLM failed to analyze and assess greenhouse gas emissions resulting from oil and gas leasing within Colorado and in the neighboring Rocky Mountain States of Montana, New Mexico, Utah and Wyoming. It is notable that at the same time and in this same region, the BLM has sold, is selling, and will be selling thousands of acres of oil and gas leases, including:

- **Utah:** On February 16, 2016 and May 3, 2016, the BLM sold numerous oil and gas leases covering several thousand acres throughout Utah. *See* <https://www.blm.gov/sites/blm.gov/files/uploads/SALERESULTS.pdf> and https://www.blm.gov/style/medialib/blm/ut/lands_and_minerals/oil_and_gas/may_2016.Par.8057.File.dat/CompStatsTwo.pdf. Utah is also planning to sell 28 oil and gas lease parcels totaling 12,224.48 acres. *See* https://www.energy.net.com/library/secure/mime/application/pdf/1424908/Notice_of_Sale.pdf?s=S7EMRXukD1B1oK2sLXQBPA&c=1479189600. In 2017, the BLM has lease sales scheduled in Utah for February 21, 2017, May 16, 2017, August 15, 2017, and November 21, 2017. *See* <https://www.blm.gov/sites/blm.gov/files/uploads/SALERESULTS.pdf>.
- **Montana:** In May of 2016, the BLM sold seven lease parcels totaling 913.86 acres. *See* https://www.blm.gov/style/medialib/blm/mt/blm_programs/energy/oil_and_gas/leasing/lease_sales/2016/may4_2016.Par.61532.File.dat/05-04-16%20Comp%20Results.pdf. And on December 8, 2016, the BLM is proposing to lease 91 parcels totaling 19,790.175 acres. *See* https://www.blm.gov/style/medialib/blm/mt/blm_programs/energy/oil_and_gas/leasing/lease_sales/2016/oct16_2016.Par.89806.File.dat/10_18_16%20SaleNotice_Map_List_Stips_for%20posting.pdf. The BLM also has lease sales scheduled for January 24, 2017, May 3, 2017, July 11, 2017, and October 17, 2017. *See*

https://www.blm.gov/mt/st/cn/prog/energy/oil_and_gas/leasing/leasesaleinfo/2017_oil_and_gas_lease.html.

- **New Mexico:** In April of 2016, the BLM sold 43 lease parcels totaling 36,841.03 acres. *See* https://www.blm.gov/style/medialib/blm/nm/programs/0/og_sale_notices_and/2016/july_2016.Par.97830.File.dat/July%202016%20OG%20Lease%20Sale%20Notice.pdf. And in September of 2016, the BLM sold 36 lease parcels totaling 13,876.08 acres. *See* https://www.blm.gov/style/medialib/blm/nm/programs/0/og_sale_notices_and/2016/july_2016.Par.97830.File.dat/July%202016%20OG%20Lease%20Sale%20Notice.pdf. The BLM also has lease sales scheduled for January 18, 2017, April 19, 2017, and July 19, 2017. *See* https://www.blm.gov/sites/blm.gov/files/2017_FYOG_Schedule_updated1%2006-06_16_V3.pdf.
- **Wyoming:** On May 3, 2016, the BLM sold 95 oil and gas lease parcels totaling 86,608.8 acres. *See* https://www.blm.gov/wy/st/cn/info/news_room/2016/may/blm_oil_and_gas_sales.html. And on November 1, 2016, the BLM sold 21 oil and gas lease parcels totaling 32,422.02 acres. *See* https://eplanning.blm.gov/epl-front-office/projects/nepa/60579/77921/87228/11_16sale_web.pdf. The BLM also has lease sales scheduled for February 7, 2017, May 2, 2017, August 1, 2017, and November 1, 2017. *See* https://www.blm.gov/wy/st/cn/programs/energy/Oil_and_Gas/Leasing/reform/schedule.html.

In Colorado, the BLM sold six lease parcels covering 6,960.48 acres in May 2016. *See* https://www.blm.gov/style/medialib/blm/co/programs/oil_and_gas/Lease_Sale/2016/may.Par.43014.File.dat/May_2016_Results.pdf. And of course on December 8, 2016, the BLM is proposing to lease 31 parcels totaling 20,101 acres. *See* https://www.blm.gov/style/medialib/blm/co/programs/oil_and_gas/Lease_Sale/2016/november.Par.63919.File.dat/Dec_2016_Final_SN_v2.pdf. The BLM also has lease sales scheduled for February, 9, 2017, May 11, 2017, August 10, 2017, and November 9, 2017. *See* https://www.blm.gov/co/st/cn/BLM_Programs/oilandgas/oil_and_gas_lease.html.

Neither the EA nor the DNA even attempts to disclose or even acknowledge greenhouse gas emissions from leasing in other Field Offices. In fact, the Royal Gorge EA does not even acknowledge that leasing is occurring at the same time in the Colorado River Valley and Grand Junction Field Offices. Conversely, the DNA does not even acknowledge that leasing is occurring at the same time in the Royal Gorge Field Office. The failure of the BLM to analyze the greenhouse gas emissions associated with leasing in the Royal Gorge, Colorado River Valley, and Grand Junction Field Offices together in a single NEPA document is a paramount indication that the agency has failed to justify a FONSI and/or DNA.

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Without any analysis of past, present, and reasonably foreseeable greenhouse gas emissions from these similar oil and gas leasing actions, the agency's proposed FONSI and DNA are unsupported under NEPA.

The BLM appears to attempt to argue that an analysis of greenhouse gas emissions is more appropriate at the drilling stage. We have yet to see the BLM actually prepare such a site-specific analysis in conjunction with an oil and gas lease development proposal. In fact, it appears that the BLM in the Grand Junction and Colorado River Valley Field Offices normally rely on DNAs or categorical exclusions to approve drilling operations. *See e.g.*, Exhibit 1, BLM, Categorical Exclusion Approving 10 APDs in Colorado River Valley Field Office, available online at <https://eplanning.blm.gov/epl-front-office/projects/nepa/51840/63384/68726/DOI-BLM-CO-N040-2015-0087-SCX1.co.pdf>. In these cases, no additional analysis is completed. This means BLM's arguments for rejecting fully analyzing and assessing greenhouse gas emissions at the leasing stage are specious at best.

What's more, BLM's argument has no merit as the agency has proposed no stipulations that would grant the agency discretion to limit, or outright prevent, development of the proposed leases on the basis of greenhouse gas emissions and/or climate concerns. The BLM is effectively proposing to make an irreversible commitment of resources, which is the hallmark of significance under NEPA. *See* 42 U.S.C. § 4332(c)(v) and 40 C.F.R. § 1502.16. The failure to prepare an EIS—or any analysis for that matter—to address the potentially significant reasonably foreseeable greenhouse gas emissions that would result from the proposed leases is contrary to NEPA.

2. The BLM Failed to Analyze the Costs of Reasonably Foreseeable Carbon Emissions Using Well-Accepted, Valid, Credible, GAO-Endorsed, Interagency Methods for Assessing Carbon Costs that are Supported by the White House

Compounding the failure of the BLM to make any effort to estimate the greenhouse gas emissions that would result from reasonably foreseeable oil and gas development is that the agency also rejected analyzing and assessing these emissions in the context of their costs to society. It is particularly disconcerting that the agency refused to analyze and assess costs using the social cost of carbon protocol, a valid, well-accepted, credible, and interagency endorsed method of calculating the costs of greenhouse gas emissions and understanding the potential significance of such emissions.

The social cost of carbon protocol for assessing climate impacts is a method for “estimat[ing] the economic damages associated with a small increase in carbon dioxide (CO₂) emissions, conventionally one metric ton, in a given year [and] represents the value of damages avoided for a small emission reduction (i.e. the benefit of a CO₂ reduction).” *See* Exhibit 10 to Guardians' June 13, 2016 Comments on EA and DNA. The protocol was developed by a working group consisting of several federal agencies, including the U.S. Department of Agriculture, EPA, CEQ, and others.

In 2009, an Interagency Working Group was formed to develop the protocol and issued final estimates of carbon costs in 2010. *See* Interagency Working Group on Social Cost of

Carbon, “Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866” (Feb. 2010), available online at <https://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf>. These estimates were then revised in 2013 by the Interagency Working Group, which at the time consisted of 13 agencies. *See* Interagency Working Group on Social Cost of Carbon, “Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866” (May 2013), available online at https://www.whitehouse.gov/sites/default/files/omb/inforeg/social_cost_of_carbon_for_ria_2013_update.pdf. This report and the social cost of carbon estimates were again revised in 2015. *See* Exhibit 13 to Guardians’ June 13, 2016 Comments on EA and DNA.

Depending on the discount rate and the year during which the carbon emissions are produced, the Interagency Working Group estimates the cost of carbon emissions, and therefore the benefits of reducing carbon emissions, to range from \$11 to \$220 per metric ton of carbon dioxide. *See* Chart Below. In July 2014, the U.S. Government Accountability Office (“GAO”) confirmed that the Interagency Working Group’s estimates were based on sound procedures and methodology. *See* Exhibit 16 to Guardians’ June 13, 2016 Comments on EA and DNA

Revised Social Cost of CO₂, 2010 – 2050 (in 2007 dollars per metric ton of CO₂)

Discount Rate	5.0%	3.0%	2.5%	3.0%
Year	Avg	Avg	Avg	95th
2010	10	31	50	86
2015	11	36	56	105
2020	12	42	62	123
2025	14	46	68	138
2030	16	50	73	152
2035	18	55	78	168
2040	21	60	84	183
2045	23	64	89	197
2050	26	69	95	212

Most recent social cost of carbon estimates presented by Interagency Working Group on Social Cost of Carbon. The 95th percentile value is meant to represent “higher-than-expected” impacts from climate change.

Although often utilized in the context of agency rulemakings, the protocol has been recommended for use and has been used in project-level decisions. For instance, the EPA recommended that an EIS prepared by the U.S. Department of State for the proposed Keystone XL oil pipeline include “an estimate of the ‘social cost of carbon’ associated with potential increases of GHG emissions.” Exhibit 14 to Guardians’ June 13, 2016 Comments on EA and DNA.

More importantly, the BLM has also utilized the social cost of carbon protocol in the context of oil and gas leasing. In recent Environmental Assessments for oil and gas leasing in Montana, the agency estimated “the annual SCC [social cost of carbon] associated with potential development on lease sale parcels.” Exhibit 15 to Guardians’ June 13, 2016 Comments on EA

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and DNA at 76. In conducting its analysis, the BLM used a “3 percent average discount rate and year 2020 values,” presuming social costs of carbon to be \$46 per metric ton. *Id.* Based on its estimate of greenhouse gas emissions, the agency estimated total carbon costs to be “\$38,499 (in 2011 dollars).” *Id.* In Idaho, the BLM also utilized the social cost of carbon protocol to analyze and assess the costs of oil and gas leasing. Using a 3% average discount rate and year 2020 values, the agency estimated the cost of carbon to be \$51 per ton of annual CO₂e increase. *See* Exhibit 4C to Guardians’ June 13, 2016 Comments on EA and DNA at 81. Based on this estimate, the agency estimated that the total carbon cost of developing 25 wells on five lease parcels to be \$3,689,442 annually. *Id.* at 83.

To be certain, the social cost of carbon protocol presents a conservative estimate of economic damages associated with the environmental impacts climate change. As the EPA has noted, the protocol “does not currently include all important [climate change] damages.” Exhibit 10 to Guardians’ June 13, 2016 Comments on EA and DNA. As explained:

The models used to develop [social cost of carbon] estimates do not currently include all of the important physical, ecological, and economic impacts of climate change recognized in the climate change literature because of a lack of precise information on the nature of damages and because the science incorporated into these models naturally lags behind the most recent research.

Id. In fact, more recent studies have reported significantly higher carbon costs. For instance, a report published this month found that current estimates for the social cost of carbon should be increased six times for a mid-range value of \$220 per ton. *See* Exhibit 12 to Guardians’ June 13, 2016 Comments on EA and DNA. In spite of uncertainty and likely underestimation of carbon costs, nevertheless, “the SCC is a useful measure to assess the benefits of CO₂ reductions,” and thus a useful measure to assess the costs of CO₂ increases. Exhibit 10 to Guardians’ June 13, 2016 Comments on EA and DNA.

The requirement to analyze the social cost of carbon is supported by the general requirements of NEPA. As explained, NEPA requires agencies to analyze the consequences of proposed agency actions and consider include direct, indirect, and cumulative consequences. In terms of oil and gas leasing, an analysis of site-specific impacts must take place at the lease stage and cannot be deferred until after receiving applications to drill. *See New Mexico ex rel. Richardson v. Bureau of Land Management*, 565 F.3d 683, 717-18 (10th Cir. 2009); *Conner v. Burford*, 848 F.2d 1441 (9th Cir.1988); *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1227 (9th Cir.1988).

To this end, courts have ordered agencies to assess the social cost of carbon pollution, even before a federal protocol for such analysis was adopted. In 2008, the U.S. Court of Appeals for the Ninth Circuit ordered the National Highway Traffic Safety Administration to include a monetized benefit for carbon emissions reductions in an Environmental Assessment prepared under NEPA. *Center for Biological Diversity v. National Highway Traffic Safety Administration*, 538 F.3d 1172, 1203 (9th Cir. 2008). The Highway Traffic Safety Administration had proposed a rule setting corporate average fuel economy standards for light trucks. A number of states and public interest groups challenged the rule for, among other things, failing to monetize the

benefits that would accrue from a decision that led to lower carbon dioxide emissions. The Administration had monetized the employment and sales impacts of the proposed action. *Id.* at 1199. The agency argued, however, that valuing the costs of carbon emissions was too uncertain. *Id.* at 1200. The court found this argument to be arbitrary and capricious. *Id.* The court noted that while estimates of the value of carbon emissions reductions occupied a wide range of values, the correct value was certainly not zero. *Id.* It further noted that other benefits, while also uncertain, were monetized by the agency. *Id.* at 1202.

More recently, a federal court has done likewise for a federally approved coal lease. That court began its analysis by recognizing that a monetary cost-benefit analysis is not universally required by NEPA. *See High Country Conservation Advocates v. U.S. Forest Service*, 52 F.Supp.3d 1174 (D. Colo. 2014), citing 40 C.F.R. § 1502.23. However, when an agency prepares a cost-benefit analysis, “it cannot be misleading.” *Id.* at 1182 (citations omitted). In that case, the NEPA analysis included a quantification of benefits of the project. However, the quantification of the social cost of carbon, although included in earlier analyses, was omitted in the final NEPA analysis. *Id.* at 1196. The agencies then relied on the stated benefits of the project to justify project approval. This, the court explained, was arbitrary and capricious. *Id.* Such approval was based on a NEPA analysis with misleading economic assumptions, an approach long disallowed by courts throughout the country. *Id.*

A recent op-ed in the New York Times from Michael Greenstone, the former chief economist for the President’s Council of Economic Advisers, confirms that it is appropriate and acceptable to calculate the social cost of carbon when reviewing whether to approve fossil fuel extraction. *See Exhibit 2, Greenstone, M., “There’s a Formula for Deciding When to Extract Fossil Fuels,” New York Times* (Dec. 1, 2015), available online at http://www.nytimes.com/2015/12/02/upshot/theres-a-formula-for-deciding-when-to-extract-fossil-fuels.html?_r=0.

In light of all this, it appears more than reasonable to have expected the BLM to take into account carbon costs as part of its NEPA analyses. The agency did not. Instead, the BLM rejected the notion that a social cost of carbon analysis was appropriate, implicitly concluding that there would be no cost associated with the proposed oil and gas leasing. This violates NEPA and fails to demonstrate that a FONSI and/or DNA is appropriate.

In both the EA and DNA, the BLM variously asserts that, absent a cost-benefit analysis, an assessment of carbon costs would not be “useful.” *See EA at 91, DNA at 165.* However, analyzing social cost of carbon does not require a cost-benefit analysis, as the BLM asserts. Here, all it requires is basic multiplication. For example, using the mid-range cost of \$36 per ton, all BLM would have to do is multiply \$36 by the potential emissions disclosed on p. 24 of the EA. This is not rocket science and the carbon costs that this basic multiplication would yield would not be confusing. It is unclear how providing such numbers to the American public would not be “useful.” In any case, simply because the BLM may believe some information is “not useful,” does not mean the agency may summarily avoid compliance with NEPA.

Further, using social cost of carbon provides critical insight into the potential significance of the proposed action from a climate standpoint and is by no means mean to be limited in use to

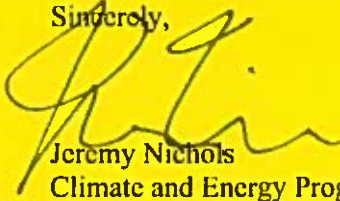
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only situations where a full cost-benefit analysis is conducted. BLM appears to misconstrue what information and insight social cost of carbon can provide as a tool and as such, has failed to demonstrate compliance with NEPA in rejecting this basic methodology as a means of assessing the climate impacts of the proposed oil and gas leasing. This further calls into question the validity of relying on a FONSI and/or DNA to support the proposed leasing.

Sincerely,



Jeremy Nichols
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Exhibit 1

U.S. Department of the Interior
Bureau of Land Management
Colorado River Valley Field Office
2300 River Frontage Road
Silt, Colorado 81652

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Section 390 Categorical Exclusions for Oil and Gas Development, Exclusion No. 1

NEPA LOG NUMBER: DOI-BLM-CO-N040-2015-0087-CX (390)

A. Background

Bureau of Land Management (BLM) Office: Colorado River Valley Field Office

CASEFILE/PROJECT NUMBER: COC66921 for Federal Oil and Gas Lease.

PROPOSED ACTION TITLE/TYPE: Drill 10 Federal Wells and six Fee wells from the Existing but Expanded 17L-794 Pad Located on Private Land East of Parachute in Garfield County, Colorado, Authorized by Applications for Permit to Drill.

LOCATION OF THE PROPOSED ACTION: Township 7 South (T7S), Range 94 West (R94W), Section 17, NWSW, Sixth Principal Meridian. The project area is located entirely on private land approximately 8 miles east of Parachute, Garfield County, Colorado (**Figure 1**).

DESCRIPTION OF THE PROPOSED ACTION:

Caerus Picance, LLC submitted Applications for Permits to Drill (APDs) 10 Federal oil and gas wells from the existing 17L-794 well pad (formerly known as the 17L pad) located on private surface with underlying Federal minerals (**Table 1**). The Federal wells would be drilled directionally into Federal lease COC66921. The existing 17L-794 pad was previously analyzed in the Cache Creek Master Development Plan (CCMDP), DOI-BLM-CO-N040-2009-0088-EA. In order to drill the wells, the existing 4.2-acre pad would be expanded by 0.9 acre.

Six Federal wells were previously permitted at this location in 2010; however, the wells were never drilled and the APDs expired in 2014. In addition to the 10 Federal wells, Caerus also plans to drill six Fee wells. In addition, the operator is currently working on plans for a Fee Saltwater Disposal Well (SDW). However, the landowner has not granted permission to drill the SDW, which is still in the early stages of planning.

The access road used to serve the 17L-794 pad would generally follow an existing ranch road used by the private landowner to access a private hunting lodge. This road was previously reconstructed to meet the standards of both the BLM and the private landowner on split-estate and Fee lands in the area. The existing road provides serviceable access to the pad in its present condition and alignment. No new road construction would be needed for the 17L-794 pad.

Wells on the 17L-794 pad would be located in what is known as the Project Rulison Three-Mile Area. The Project Rulison Three-Mile Area is a 3-mile buffer zone surrounding the site of an underground nuclear explosion conducted by the U.S. Department of Energy (DOE) in 1969 to investigate the potential for liberating natural gas from the tight formation within which it occurs. Caerus Picance, LLC would

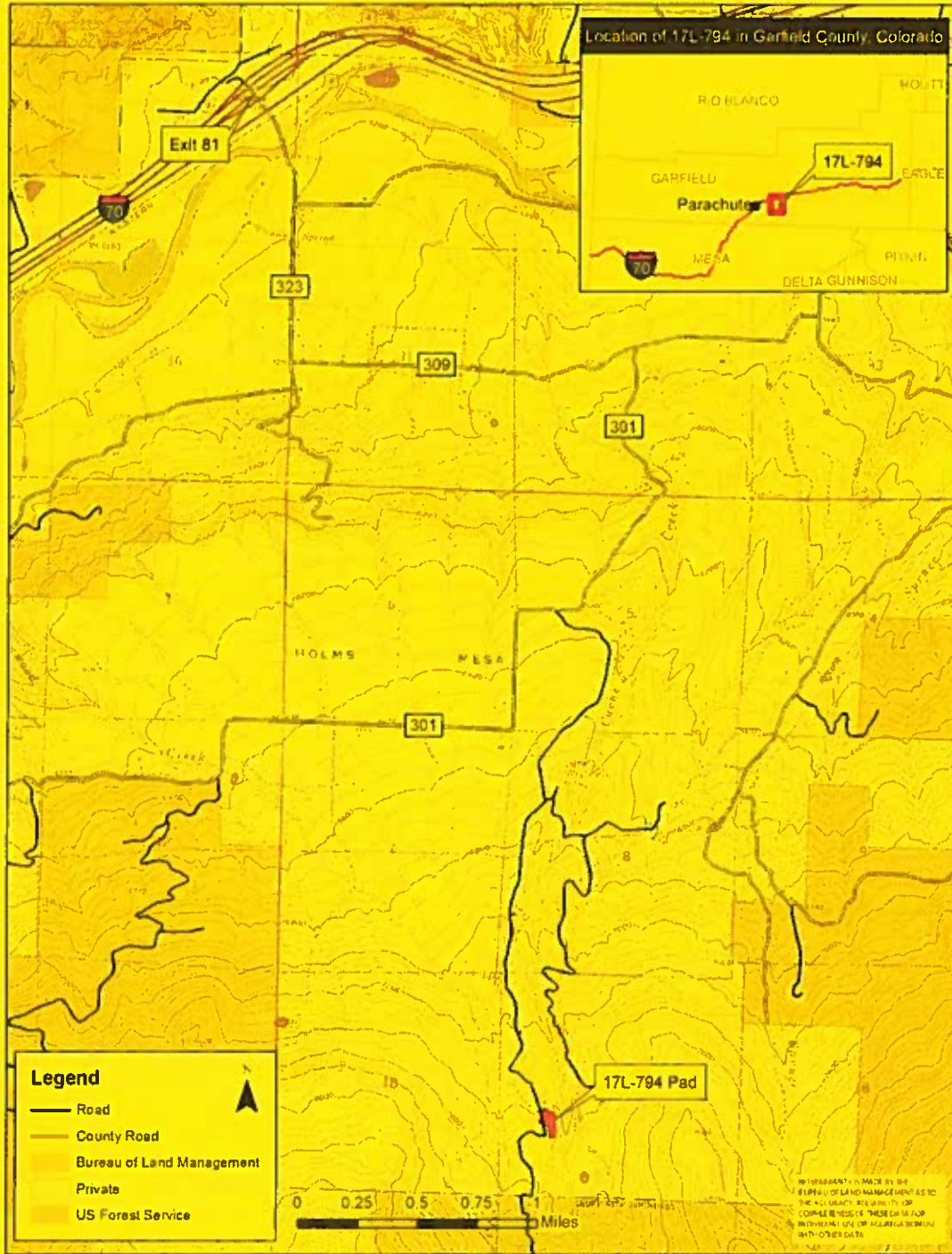


Figure 1. Location of 17L-794

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comply with all Colorado Oil and Gas Conservation Commission (COGCC) Rules, Orders, and Conditions of Approval associated with the Project Rulison Three Mile Area. The proposed Federal wells would be subject to meeting the requirements set forth in the COGCC policy statement issued on December 21, 2007, by David Neslin, the acting Director at that time. The policy statement can be viewed on the COGCC website at www.cogcc.state.co.us.

Table 1. Surface and Bottomhole Locations of Proposed Federal Wells

<i>Proposed Wells</i>	<i>Federal Lease</i>	<i>Surface Locations (T7S, R94W, Section 17, NWSW)</i>	<i>Bottomhole Locations (T7S R96W)</i>
Rulison Federal 13A-17 (17L-794 pad)	COC66921	NWSW 1645 feet FSL, 1108 feet FWL	Section 17, SWNW 2199 feet FNL, 238 feet FWL
Rulison Federal 13B-17 (17L-794 pad)	COC66921	NWSW 1639 feet FSL, 1112 feet FWL	Section 17, NWSW 2292 FSL feet, 243 feet FWL
Rulison Federal 13C-17 (17L-794 pad)	COC66921	NWSW 1627 feet FSL, 1121 feet FWL	Section 17, NWSW 1950 feet FSL, 250 feet FWL
Rulison Federal 13D-17 (17L-794 pad)	COC66921	NWSW 1621 feet FSL, 1126 feet FWL	Section 17, NWSW 1609 feet FSL, 252 feet FWL
Rulison Federal 14A-17 (17L-794 pad)	COC66921	NWSW 1609 feet FSL, 1135 feet FWL	Section 17, SWSW 1279 feet FSL, 254 feet FWL
Rulison Federal 14B-17 (17L-794 pad)	COC66921	NWSW 1603 feet FSL, 1139 feet FWL	Section 17, SWSW 847 feet FSL, 675 feet FWL
Rulison Federal 33A-17 (17L-794 pad)	COC66921	NWSW 1633 feet FSL, 1129 feet FWL	Section 17, NWSE 2392 feet FSL, 1939 feet FEL
Rulison Federal 33B-17 (17L-794 pad)	COC66921	NWSW 1615 feet FSL, 1143 feet FWL	Section 17, NWSE 2071 feet FSL, 1919 feet FEL
Rulison Federal 33C-17 (17L-794 pad)	COC66921	NWSW 1609 feet FSL, 1147 feet FWL	Section 17, NWSE 1745 feet FSL, 1933 feet FEL
Rulison Federal 33D-17 (17L-794 pad)	COC66921	NWSW 1597 feet FSL, 1156 feet FWL	Section 17, NWSE 1413 feet FSL, 1919 feet FEL

The 17L-794 project would involve expanding the existing pad by approximately 111 feet on the south end (Figure 2). The Holmes irrigation ditch would not be realigned as originally planned in the Cache Creek MDP. At an onsite held in June 2015, Caerus agreed to keep the pad as it currently exists on the northeast edge, meaning the pad would not be expanded on that edge and the ditch would not need realignment. The pad's construction would be scheduled for the second quarter of 2016. An 8-inch buried steel gas line would run from the separators to the "Pipe Assembly" labeled on Figure 2. This would involve no new disturbance.

A variety of culverts, retention ponds, sediment traps, ditches, and other stormwater BMPs would be put in during expansion of the 17L-794 pad. These BMPs would be installed as shown on Figure 3. A French drain would also be placed on the south end of the pad to address the standing water that was observed at an onsite held in June 2015.

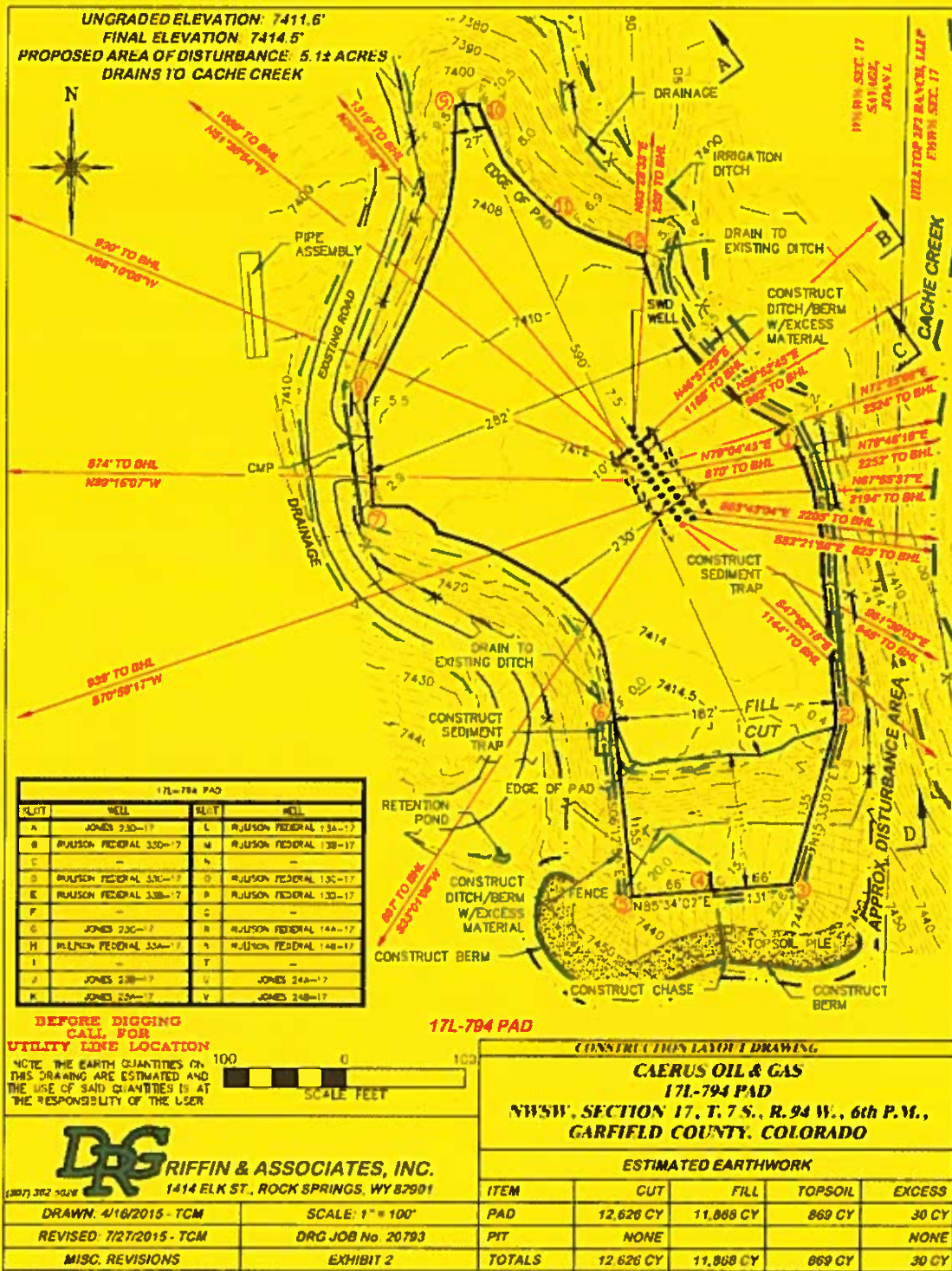


Figure 2. 17L-794 Construction Layout.

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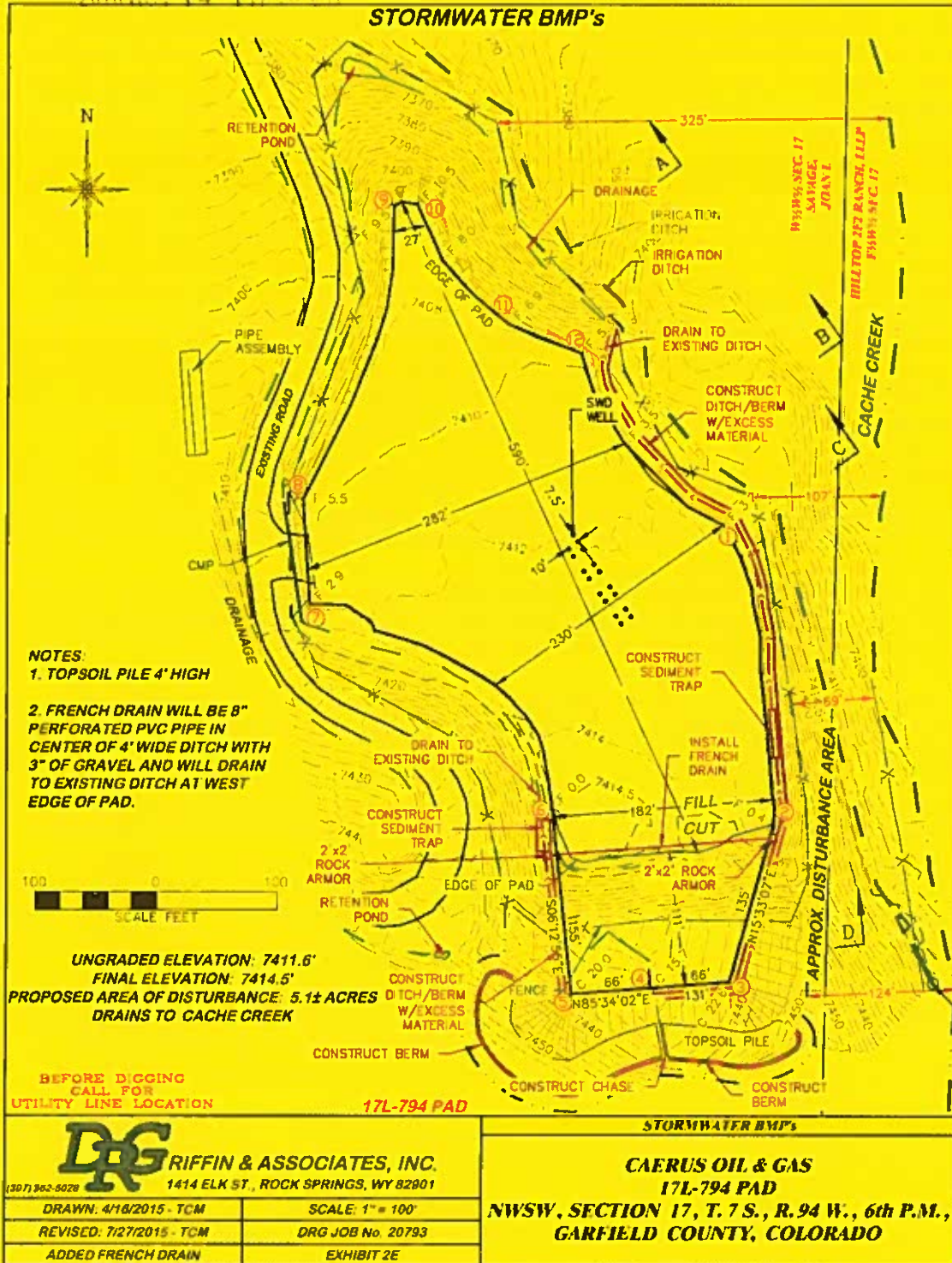


Figure 3. Stormwater BMPs

Before the pad expansion begins, oakbrush would be mowed with a hydro-axe machine to reduce the amount of fuel loading and slash generated, and augment the topsoil windrows with organic matter. The edge of disturbance would be flagged and a wildlife-friendly range fence would be installed along this boundary. The topsoil would be stripped and placed around the outer edge of the pad footprint, as shown in Figure 2.

A closed-loop drilling system would be used, eliminating the need for a reserve pit to contain fluids. Recovered drilling fluid would be stored on location in steel tanks for reuse. The moisture content of the drill cuttings would be reduced through the use solids control equipment such as shakers, centrifuges and a flocculating unit. The dried cuttings would be placed in a bermed cuttings management area on the pad. After the drilling is finished, the cuttings would be tested to ensure compliance with COGCC standards, blended with the excess material, and be buried during the earthwork stage of interim reclamation.

All surface disturbance for this project would occur on private land and would total 5.1 acres, including 4.2 acres of existing disturbance and 0.9-acre new disturbance. The new disturbance estimate falls under the 5-acre threshold required for the use of this Statutory Categorical Exclusion. After interim reclamation, the long-term disturbance would be reduced to 1.98 acres on private land.

To summarize, the 17L-794 project would include the following components:

- (1) Expand the existing pad by approximately 0.9 acre on the south end
- (2) Drill 10 Federal wells directionally into the Federal lease COC66921
- (3) Conduct well completion operations
- (4) Connect gas lines into existing infrastructure adjacent to the 17L-794 pad
- (5) Reclaim (interim) the 17L-794 pad to a working area footprint of 1.98 acres and establish desirable vegetative cover on the reshaped pad.

The Proposed Action would include well drilling and well completion, production of natural gas and associated liquid condensate, proper handling and disposal of produced water, and interim and final reclamation.

Construction of the pad would follow the guidelines established in the BLM Gold Book, *Surface Operating Standards for Oil and Gas Exploration and Development* (USDI and USDA 2007). A road maintenance program would be required during the production phase of the well. This program would include, but not be limited to, blading, ditching, culvert installation and cleanout, weed control, and gravel surfacing where excessive rutting or erosion may occur. Roads would be maintained in a safe and usable condition.

The Proposed Action would be implemented consistent with the Federal oil and gas lease, Federal regulations (43 CFR 3100), and the operational measures included in the APDs. The Appendix lists the specific Surface Use Conditions of Approval (COAs) to be implemented as mitigation measures for this project. The operator would be responsible for continuous inspection and maintenance of the access roads, pad, and pipelines.

Western Ecological Resource, Inc. conducted botanical surveys for special status plants in June 2008 (WER 2008). Only one Federally listed plant species, Ute lady's-tresses (*Spiranthes diluvialis*), has the potential to grow near the project area, and no suitable habitat for this species was found near the 17L-794 pad. Due to the lack of suitable habitat, this project would have No Effect on any Federally listed plant species. Only one BLM sensitive plant species has the potential to occur in this area, Harrington's penstemon (*Penstemon harringtonii*). Surveys conducted in 2008 found this species east of

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the 17L-794 pad, but none near this pad location. Vegetation surrounding the pad is primarily dense Gambel oak (*Quercus gambelii*) woodland, which does not provide suitable habitat for Harrington's penstemon. Due to the lack of known occurrences and suitable habitat, this project would have no impact on any BLM sensitive plant species.

The directional wells would be drilled into Federal lease COC66921, which includes a big game winter timing limitation from December 1 through April 30. This timing limitation restricts any construction, drilling, or completion work during the TL period.

B. Land Use Plan Conformance

The Proposed Action is subject to, has been reviewed for, and is in conformance with (43 CFR §1610.5 and § 2800, BLM 1617.3) the following plan:

Land Use Plan (LUP) Name: The current land use plan is the *Colorado River Valley Field Office Record of Decision and Approved Resource Management Plan (ROD/RMP)*.

Date Approved: June 12, 2015.

Determination of Conformance: The Proposed Action is subject to and has been reviewed for and is in conformance with (43 CFR §1610.5 and § 2800, BLM 1617.3) the CRVFO land use plan.

Decision Page and Language: Page 111, Oil and Lands and Realty, MIN-OBJ-01 – "Facilitate orderly, economic, and environmentally sound exploration and development of oil and gas resources...using the best available technology."

C. Compliance with NEPA

Consistency with CX Category #1: *Individual surface disturbances of less than 5 acres so long as the total surface disturbance on the lease is not greater than 150 acres and site-specific analysis in a document prepared pursuant to NEPA has been previously completed.* All questions listed in Table 2 must be answered "Yes" to use this Section 390 CX.

NEPA Document Name: The Cache Creek Master Development Plan (DOI-BLM-CO-N040-2009-0088-EA, approved on November 24, 2009) identified the existing well pad, roads and various pipeline connections serving the affected pad. That EA satisfies the criteria of being an activity-level or project-level EIS or EA that is applicable to the Proposed Action.

Table 2. Project Screening Questions		Yes	No
1.	Would the proposed action disturb less than 5 acres?	<u>Yes</u>	
2.	Is the current amount of surface disturbance on the entire leasehold, plus the proposed action, less than 150 acres? (See Figure 4)	<u>Yes</u>	
3.	Was the proposed action adequately analyzed in an existing site-specific National Environmental Policy Act (NEPA) document?	<u>Yes</u>	

COC 66921

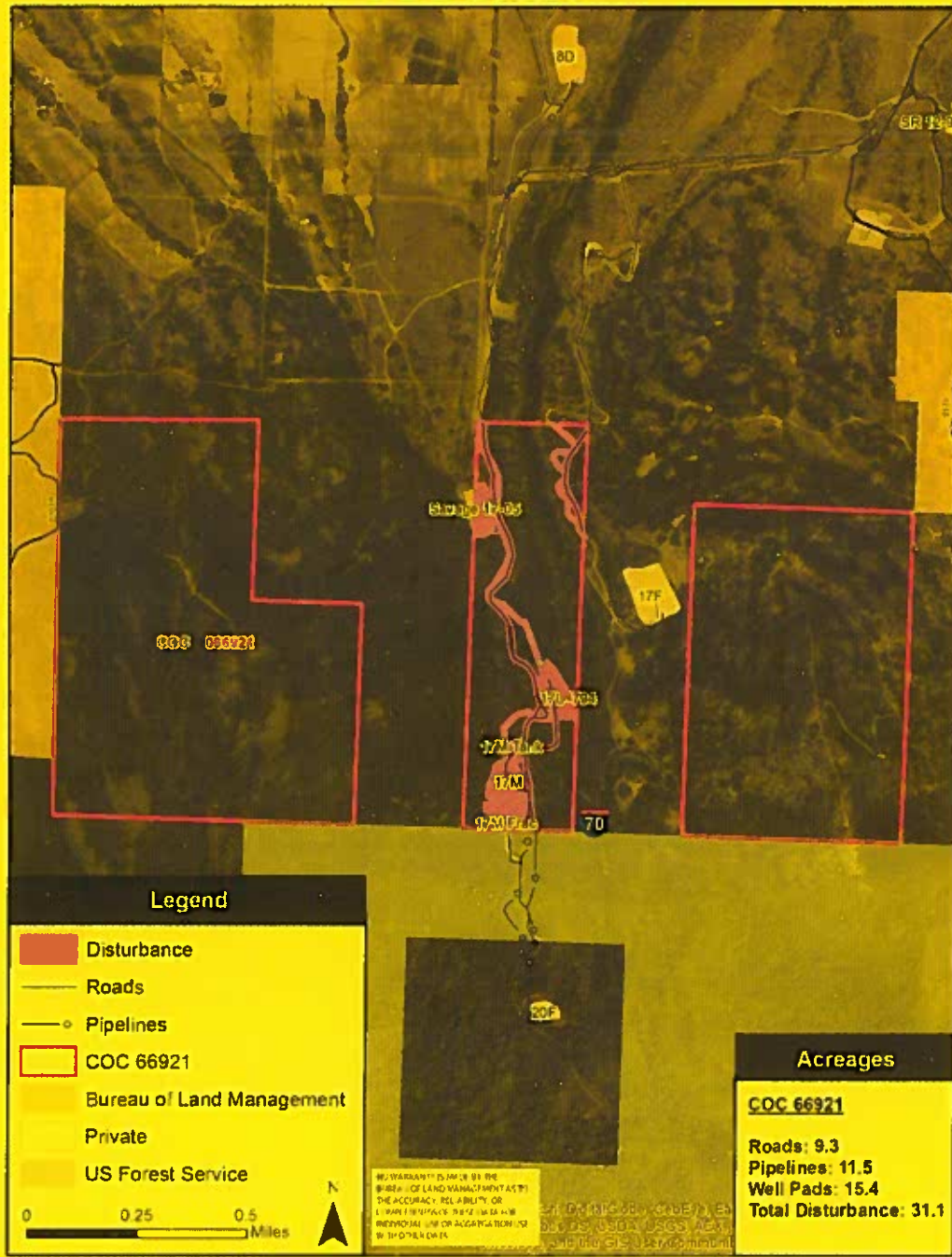


Figure 4. Acres of Disturbance for Federal Lease COC66921

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Persons and/or Agencies Consulted:

Caerus- Reed Haddock, Michael McKee, Steve Schmitz, Dean Lawton, Terry Tracy
USFWS- Creed Clayton
CPW- Taylor Elm
Landowner- Jeb Savage

Interdisciplinary Review: BLM staff from the CRVFO listed in **Table 3** participated in the preparation of this Section 390 CX, including review of resource survey results submitted by the Operator's consultants, evaluation of impacts likely to occur from implementation of the proposed action, and identification of appropriate COAs. The Proposed Action was presented to the CRVFO interdisciplinary team for SCX review on September 1, 2015.

Mitigation: Conditions of Approval to be attached to the BLM Applications for Permits to Drill (APDs) for the 10 Federal Wells Drilled on the Expanded 17L-794 Pad are listed in this Section 390 CX.

Name of Preparers: Christina O'Connell, Natural Resource Specialist Date Prepared: September 18, 2015

Table 3. BLM Interdisciplinary Team Authors and Reviewers		
<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
John Brogan	Archaeologist	Cultural Resources, Native American Religious Concerns
Vanessa Caranese	Geologist	Geology and Minerals, Groundwater, Paleontology
Allen Crockett, Ph.D., J.D.	Supervisory NRS	NEPA Review
Stephen Garcia	Petroleum Engineer	Downhole Reviews and Conditions of Approval
Christina O'Connell	Natural Resource Specialist	Project Lead, Access & Transportation, Socioeconomics, Wastes-Hazardous or Solid,
Judy Perkins, Ph.D.	Botanist	Invasive Non-native Species, Special-status Species (Plants), Vegetation
Sylvia Ringer	Wildlife Biologist	Migratory Birds, Special-status Species (Animals), Wildlife, Aquatic and Terrestrial
Carmia Woolley	Physical Scientist	Air Quality, Noise, Soils, Surface Water, Waters of the U.S.

D. Signature

The Proposed Action is statutorily categorically excluded from further NEPA documentation in accordance with Section 390 (b)(1) of the Energy Policy Act of 2005, which provides for such exclusion of individual surface disturbances of less than 5 acres so long as the total surface disturbance on the lease is not greater than 150 acres and site-specific analysis in a document prepared pursuant to NEPA has been previously completed. The surface disturbance acreage of Federal lease COC6691 is shown on **Figure 3**.

Authorizing Official:



Date:

9-23-15

E. Decision and Rationale for Action

I have decided to approve the BLM Applications for Permits to Drill (APDs) the 10 Federal Wells Drilled on the Expanded 17L-794 Pad with the attached Conditions of Approval (COAs). The COAs are required by this decision, and variance from these COAs during project implementation may require further NEPA review. I have reviewed Section C, Land Use Plan Conformance and Compliance with NEPA, and have determined that the proposed activity is in conformance with the applicable land use plan(s) and referenced NEPA documents. I have also evaluated the proposal to ensure the appropriate exclusion category as described in Section 390 of the Energy Policy Act of 2005 has been correctly applied and that no further environmental analysis is required.



Allen Crockett, Ph.D., J.D.
Supervisory Natural Resource Specialist

9-23-15

Date

F. Administrative Review or Appeal Opportunities

Applications for Permit to Drill and Sundry Notices

Under BLM regulations addressed in 43 CFR 3165, the decision to approve this Sundry Notice is subject to appeal and administrative review. An administrative review must be conducted in accordance with 43 CFR 3165.3, and must take place prior to pursuing an appeal to the Interior Board of Land Appeals.

Any adversely affected party may request an administrative review, before the State Director, either with or without oral presentation. Such a request must include information required under 43 CFR 3165.3(b) (State Director Review [SDR]), including all supporting documentation. Such a request must be filed in writing with the *BLM Colorado State Director, 2850 Youngfield Street, Lakewood, CO 80215* within 20 business days of the date the decision is received, or considered to have been received. Upon request and showing of good cause, an extension for submitting supporting/additional data may be granted by the State Director.

Any party who is adversely affected by the State Director's decision may appeal that decision to the Interior Board of Land Appeals in accordance with 43 CFR 3165.4.

References Cited:

U.S. Department of the Interior and U.S. Department of Agriculture (USDI and USDA). 2007. Surface operating standards and guidelines for oil and gas exploration and development. The Gold Book.

Western Ecological Resource, Inc. (WER). 2008. Federally listed and sensitive species habitat assessment, raptor nest survey, and wetland survey. Boulder, CO.

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APPENDIX

Surface-Use and Drilling Conditions of Approval

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2016 NOV 14 PM 5:08 **CONDITIONS OF APPROVAL**

Caerus Piceance, LLC
Ten Federal Wells Drilled on the Expanded 17L-794 Pad
DOI-BLM-CO-N040-0087-CX (390)

GENERAL SURFACE-USE CONDITIONS OF APPROVAL

1. **Administrative Notification.** Caerus Piceance, LLC ("Caerus") shall notify the BLM Authorized Officer (AO) at least 48 hours prior to initiation of construction. If requested by the BLM, the operator shall first schedule a preconstruction meeting, including key operator and contractor personnel, to ensure that any unresolved issues are fully addressed prior to initiating surface-disturbing activities and to review the COAs of the Sundry Notice as well as required safety regulations, if appropriate.
2. **Road Construction and Maintenance.** Roads shall be crowned, ditched, surfaced, drained with culverts and/or water dips, and constructed to BLM Gold Book standards. Initial gravel application shall be a minimum of 6 inches. The operator shall provide timely year-round road maintenance and cleanup on the access roads. A regular schedule for maintenance shall include, but not be limited to, blading, ditch and culvert cleaning, road surface replacement, and dust abatement. When rutting within the traveled way becomes greater than 6 inches, blading and/or gravelling shall be conducted as approved by the BLM.
3. **Air Emissions.** Pursuant to BLM Instruction Memorandum No. CO-2015-009 issued on February 9, 2015, the operator shall either voluntarily submit an emissions inventory to the BLM using the online Emissions Tool or provide the necessary data for the BLM to complete an emissions inventory. The BLM may direct the operator to implement appropriate mitigation measure(s) if the emissions inventory results indicate a threshold exceedance of any single criteria pollutant (PM10, PM2.5, CO, NOx, SOx).
4. **Dust Abatement.** The operator shall implement dust abatement measures as needed to prevent fugitive dust from vehicular traffic, equipment operations, or wind events. The BLM may direct the operator to change the level and type of treatment (watering or application of various dust agents, surfactants, and road surfacing material) if dust abatement measures are observed to be insufficient to prevent fugitive dust.
5. **Drainage Crossings and Culverts.** Construction activities at perennial, intermittent, and ephemeral drainage crossings (e.g., burying pipelines, installing culverts) shall be timed to avoid high-flow conditions. Construction that disturbs any flowing stream shall utilize either a piped stream diversion or a cofferdam and pump to divert flow around the disturbed area.

Culverts at drainage crossings shall be designed and installed to pass a 25-year or greater storm event. On perennial and intermittent streams, culverts shall be designed to allow for passage of aquatic biota. The minimum culvert diameter in any installation for a drainage crossing or road drainage shall be 24 inches. Crossings of drainages deemed jurisdictional Waters of the U.S. pursuant to Section 404 of the Clean Water Act may require additional culvert design capacity. Due to the flashy nature of area drainages and anticipated culvert maintenance, the U.S. Army Corps of Engineers (USACE) recommends designing drainage crossings for the 100-year event. Contact the USACE Colorado West Regulatory Branch at 970-243-1199 ext. 14.

Pipelines installed beneath stream crossings shall be buried at a minimum depth of 4 feet below the channel substrate to avoid exposure by channel scour and degradation. Following burial, the channel grade and substrate composition shall be returned to pre-construction conditions.

6. Jurisdictional Waters of the U.S. The operator shall obtain appropriate permits from the USACE prior to discharging fill material into Waters of the U.S. in accordance with Section 404 of the Clean Water Act. Waters of the U.S. are defined in 33 CFR Section 328.3 and may include wetlands as well as perennial, intermittent, and ephemeral streams. Permanent impacts to jurisdictional waters may require mitigation. Contact the USACE Colorado West Regulatory Branch at 970-243-1199 ext. 14.
7. Temporary and Interim Reclamation. For Fee locations, such as this project, the choice of the revegetation method and seed mixes is at the discretion of the private landowner. However, the operator shall be responsible for achieving temporary stabilization and interim reclamation that minimize erosion and transport of soils from disturbed surfaces and soil stockpiles and that minimize the potential for infestations of State-listed noxious weeds or other invasive non-native plant species.
8. Reclamation. The goals, objectives, timelines, measures, and monitoring methods for final reclamation of oil and gas disturbances are described in Appendix I (Surface Reclamation) of the 1998 Draft Supplemental EIS (DSEIS). Specific measures to follow during interim reclamation are described below.
 - a. Reclamation Plans. In areas that have low reclamation potential or are especially challenging to restore, reclamation plans will be required prior to APD approval. The plan shall contain the following components: detailed reclamation plans, which include contours and indicate irregular rather than smooth contours as appropriate for visual and ecological benefit; timeline for drilling completion, interim reclamation earthwork, and seeding; soil test results and/or a soil profile description; amendments to be used; soil treatment techniques such as roughening, pocking, and terracing; erosion control techniques such as hydromulch, blankets/matting, and wattles; and visual mitigations if in a sensitive VRM area.
 - b. Deadline for Interim Reclamation Earthwork and Seeding. Interim reclamation to reduce a well pad to the minimum size needed for production, including earthwork and seeding of the interim reclaimed areas, shall be completed within 6 months following completion of the last well planned to be drilled on that pad as part of a continuous operation. If a period of greater than one year is expected to occur between drilling episodes, the BLM may require implementation of all or part of the interim reclamation program.

Reclamation, including seeding, of temporarily disturbed areas along roads and pipelines, and of topsoil piles and berms, shall be completed within 30 days following completion of construction. Any such area on which construction is completed prior to December 1 shall be seeded during the remainder of the early winter season instead of during the following spring, unless the BLM approves otherwise based on weather. If road or pipeline construction occurs discontinuously or continuously but with a total duration greater than 30 days, reclamation, including seeding, shall be phased such that no portion of the temporarily disturbed area remains in an unreclaimed condition for longer than 30 days. The BLM may authorize deviation from this requirement based on the season and the amount of work remaining on the entirety of the road or pipeline when the 30-day period has expired.

If requested by the project lead NRS for a specific pad or group of pads, the operator shall contact the NRS by telephone or email approximately 72 hours before reclamation and reseeding begin.

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This will allow the NRS to schedule a pre-reclamation field visit if needed to ensure that all parties are in agreement and provide time for adjustments to the plan before work is initiated.

The deadlines for seeding described above are subject to extension upon approval of the BLM based on season, timing limitations, or other constraints on a case-by-case basis. If the BLM approves an extension for seeding, the operator may be required to stabilize the reclaimed surfaces using hydromulch, erosion matting, or other method until seeding is implemented.

- c. Topsoil Stripping, Storage, and Replacement. All topsoil shall be stripped following removal of vegetation during construction of the well pad, pipelines, road, or other surface facilities. In areas of thin soil, a minimum of the upper 6 inches of surficial material shall be stripped. The BLM may specify a stripping depth during the onsite visit or based on subsequent information regarding soil thickness and suitability. The stripped topsoil shall be stored separately from subsoil or other excavated material and replaced prior to final seedbed preparation. The BLM best management practice (BMP) for the Windrowing of Topsoil shall be implemented for well pad construction whenever topography allows.
- d. Seedbed Preparation. For cut-and-fill slopes, initial seedbed preparation shall consist of backfilling and recontouring to achieve the configuration specified in the reclamation plan. For compacted areas, initial seedbed preparation shall include ripping to a minimum depth of 18 inches, with a maximum furrow spacing of 2 feet. Where practicable, ripping shall be conducted in two passes at perpendicular directions. Following final contouring, the backfilled or ripped surfaces shall be covered evenly with topsoil.

Final seedbed preparation shall consist of scarifying (raking or harrowing) the spread topsoil prior to seeding. If more than one season has elapsed between final seedbed preparation and seeding, and if the area is to be broadcast-seeded or hydroseeded, this step shall be repeated no more than 1 day prior to seeding to break up any crust that has formed.

If directed by the BLM, the operator shall implement measures following seedbed preparation (when broadcast-seeding or hydroseeding is to be used) to create small depressions to enhance capture of moisture and establishment of seeded species. Depressions shall be no deeper than 1 to 2 inches and shall not result in piles or mounds of displaced soil. Excavated depressions shall not be used unless approved by the BLM for the purpose of erosion control on slopes. Where excavated depressions are approved by the BLM, the excavated soil shall be placed only on the downslope side of the depression.

If directed by the BLM, the operator shall conduct soil testing prior to reseeding to identify if and what type of soil amendments may be required to enhance revegetation success. At a minimum, the soil tests shall include texture, pH, organic matter, sodium adsorption ratio (SAR), cation exchange capacity (CEC), alkalinity/salinity, and basic nutrients (nitrogen, phosphorus, potassium [NPK]). Depending on the outcome of the soil testing, the BLM may require the operator to submit a plan for soil amendment. Any requests to use soil amendments not directed by the BLM shall be submitted to the CRVFO for approval.

- e. Seed Mixes. A seed mix consistent with BLM standards in terms of species and seeding rate for the specific habitat type shall be used on all BLM lands affected by the project (see Attachment I of the letter provided to operators dated October 24, 2014).

For private surfaces, the operator shall use a BLM-approved native seed mix unless specified otherwise by the private landowner.

The seed shall contain no prohibited or restricted noxious weed seeds and shall contain no more than 0.5 percent by weight of other weed seeds. Seed may contain up to 2.0 percent of "other crop" seed by weight, including the seed of other agronomic crops and native plants; however, a lower percentage of other crop seed is recommended. Seed tags or other official documentation shall be submitted to the BLM at least 14 days before the date of proposed seeding for acceptance. Seed that does not meet the above criteria shall not be applied to public lands.

- f. Seeding Procedures. Seeding shall be conducted no more than 24 hours following completion of final seedbed preparation.

Where practicable, seed shall be installed by drill-seeding to a depth of 0.25 to 0.5 inch. Where drill-seeding is impracticable, seed may be installed by broadcast-seeding at twice the drill-seeding rate, followed by raking or harrowing to provide 0.25 to 0.5 inch of soil cover or by hydroseeding and hydromulching. Hydroseeding and hydromulching shall be conducted in two separate applications to ensure adequate contact of seeds with the soil.

An exception to these seeding requirements shall be made for seeding of sagebrush. Sagebrush seeding shall occur prior to winter snowfall, or on top of snow. Sagebrush may be sown either by broadcast seeding, or, if not on snowpack, by placing the seed in the fluffy seed box of a seed drill, with the drop tube left open to allow seed to fall out on the ground surface.

If interim revegetation is unsuccessful, the operator shall implement subsequent reseeding until interim reclamation standards are met.

- g. Mulch. Mulch shall be applied within 24 hours following completion of seeding in project areas within pinyon-juniper, sagebrush shrubland, and/or salt desert shrub habitat types. Mulch may consist of either hydromulch or of certified weed-free straw or certified weed-free native grass hay crimped into the soil. Mulch shall not be used within mountain shrub or spruce-fir forest habitat types, unless requested or approved by the BLM.

NOTE: Mulch is not required in areas where erosion potential mandates use of a biodegradable erosion-control blanket (straw matting).

- h. Erosion Control. Cut-and-fill slopes shall be protected against erosion with the use of water bars, lateral furrows, or other BMPs approved by the BLM. Additional BMPs, such as biodegradable wattles, weed-free straw bales, or silt fences, shall be installed as necessary to reduce erosion and transport of sediments into drainages. The BLM may, in areas with high erosion potential, require the use of hydromulch or biodegradable blankets/matting to ensure adequate protection from slope erosion and from offsite transport of sediments and to improve reclamation success.
- i. Site Protection. The pad shall be fenced to BLM standards to exclude livestock grazing for the first two growing seasons or until seeded species are firmly established, whichever comes later. The seeded species will be considered firmly established when at least 50 percent of the new plants are producing seed. The BLM will approve the type of fencing.
- j. Monitoring. The operator shall conduct annual monitoring surveys of all sites categorized as "operator reclamation in progress" and shall submit an annual monitoring report of these sites, including a description of the monitoring methods used, to the BLM by **December 31** of each year. The monitoring program shall use the four Reclamation Categories defined in Appendix I of the 1998 DSEIS to assess progress toward reclamation objectives. The annual report shall

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document whether attainment of reclamation objectives appears likely. If one or more objectives appear unlikely to be achieved, the report shall identify appropriate corrective actions. Upon review and approval of the report by the BLM, the operator shall be responsible for implementing the corrective actions or other measures specified by the BLM.

9. Weed Prevention and Control. To prevent the spread of invasive species, all construction equipment and vehicles shall be power-washed, including the under-carriage, to remove all soil, mud, and vegetation material prior to entering the project area. Driving through or parking on weed infestations in the project area shall be avoided.

The operator shall regularly monitor and promptly control noxious weeds or other undesirable plant species as set forth in the Glenwood Springs Field Office *Noxious and Invasive Weed Management Plan for Oil and Gas Operators*, dated March 2007. A Pesticide Use Proposal (PUP) must be approved by the BLM prior to the use of herbicides. Annual weed monitoring reports, including GPS shapefiles of treatment areas and Pesticide Application Records (PARs) (see the letter provided to operators dated February 27, 2014), shall be submitted to the BLM by **December 1**.

10. Big Game Winter Range Timing Limitation. To minimize impacts to wintering big game, no construction, drilling, or completion activities shall occur during a Timing Limitation (TL) period of **December 1 through April 30 annually**. This stipulation applies to Federal lease COC66921.
11. Bald and Golden Eagles. It shall be the responsibility of the operator to comply with the Bald and Golden Eagle Protection Act (Eagle Act) with respect to "take" of either eagle species. Under the Eagle Act, "take" includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest and disturb. "Disturb" means 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. Avoidance of eagle nest sites, particularly during the nesting season, is the primary and preferred method to avoid a take. Any oil or gas construction, drilling, or completion activities planned within 0.5 mile of a bald or golden eagle nest, or other associated activities greater than 0.5 miles from a nest that may disturb eagles, should be coordinated with the BLM project lead, the BLM wildlife biologist and the USFWS representative to the BLM Field Office (970-876-9051).
12. Raptor Nesting. Raptor nest surveys in the project vicinity conducted in June 2015 did not result in location of raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility associated with this project. Therefore, a 60-day raptor nesting TL is not required. However, to help ensure compliance with the Migratory Bird Treaty Act (MBTA), the operator should schedule construction or drilling activities to begin outside the raptor nesting season (February 1 to August 15) if practicable. If initiation of construction, drilling, or completion activities during these dates cannot be avoided, the operator is responsible for complying with the MBTA, which prohibits the "take" of birds or of active nests (those containing eggs or young), including nest failure caused by human activity (see COA for Migratory Birds).
13. Migratory Birds – Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, all vegetation removal or surface disturbance in previously undisturbed lands providing potential nesting habitat for Birds of Conservation Concern (BCC) is prohibited from **May 15 to July 15**. An exception to this TL may be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate that no BCC species are nesting within 30 meters (100 feet) of the area to be disturbed. Nesting shall be deemed to be occurring if a territorial (singing) male is present within the distance specified above. Nesting surveys shall include an audial survey for

diagnostic vocalizations in conjunction with a visual survey for adults and nests. Surveys shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 AM under favorable conditions for detecting and identifying a BCC species. This provision does not apply to ongoing construction, drilling, or completion activities that are initiated prior to May 1 and continue into the 60-day period at the same location.

14. **Range Management.** Range improvements (fences, gates, reservoirs, pipelines, etc.) shall be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, the operator will be responsible for repairing or replacing the damaged range improvements. If a new or improved access road bisects an existing livestock fence, steel frame gate(s) or a cattleguard with associated bypass gate shall be installed across the roadway to control grazing livestock.

A wildlife-friendly range fence shall be installed around the disturbance perimeter of the pad and a gate shall be installed at the pad entrance prior to construction startup to reduce conflicts with livestock grazing.

15. **Fossil Resources.** All persons associated with operations under this authorization shall be informed that any objects or sites of paleontological or scientific value, such as vertebrate or scientifically important invertebrate fossils, shall not be damaged, destroyed, removed, moved, or disturbed. If in connection with operations under this authorization any of the above resources are encountered the operator shall immediately suspend all activities in the immediate vicinity of the discovery that might further disturb such materials and notify the BLM of the findings. The discovery must be protected until notified to proceed by the BLM.

Where feasible, the operator shall suspend ground-disturbing activities at the discovery site and immediately notify the BLM of any finds. The BLM will, as soon as feasible, have a BLM-permitted paleontologist check out the find and record and collect it if warranted. If ground-disturbing activities cannot be immediately suspended, the operator shall work around or set the discovery aside in a safe place to be accessed by the BLM-permitted paleontologist.

16. **Cultural Education/Discovery.** All persons in the area who are associated with this project shall be informed that if anyone is found disturbing historic, archaeological, or scientific resources, including collecting artifacts, the person or persons would be subject to prosecution.

If subsurface cultural values are uncovered during operations, all work in the vicinity of the resource will cease and the Authorized Officer with the BLM notified immediately. The operator shall take any additional measures requested by the BLM to protect discoveries until they can be adequately evaluated by the permitted archaeologist. Within 48 hours of the discovery, the SHPO and consulting parties will be notified of the discovery and consultation will begin to determine an appropriate mitigation measure. The BLM, in cooperation with the operator, will ensure the discovery is protected from further disturbance until mitigation is completed. Operations may resume at the discovery site upon receipt of written instructions and authorization by the authorized officer.

Pursuant to 43 CFR 10.4(g), the holder must notify the authorized officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony on Federal land. Further, pursuant to 43 CFR 10.4 (c) and (d), the holder must stop activities in the vicinity of the discovery that could adversely affect the discovery. The holder shall make a reasonable effort to protect the human remains, funerary items, sacred objects, or objects of cultural patrimony for a period of thirty days after written notice is provided to

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the authorized officer, or until the authorized officer has issued a written notice to proceed, whichever occurs first.

Antiquities, historic ruins, prehistoric ruins, and other cultural or paleontological objects of scientific interest that are outside the authorization boundaries but potentially affected, either directly or indirectly, by the Proposed Action shall also be included in this evaluation or mitigation. Impacts that occur to such resources as a result of the authorized activities shall be mitigated at the operator's cost, including the cost of consultation with Native American groups.

Any person who, without a permit, injures, destroys, excavates, appropriates or removes any historic or prehistoric ruin, artifact, object of antiquity, Native American remains, Native American cultural item, or archaeological resources on public lands is subject to arrest and penalty of law (16 USC 433, 16 USC 470, 18 USC 641, 18 USC 1170, and 18 USC 1361).

17. Visual Resources. Production facilities shall be placed to avoid or minimize visibility from travel corridors, residential areas, and other sensitive observation points—unless directed otherwise by the BLM due to other resource concerns—and shall be placed to maximize reshaping of cut-and-fill slopes and interim reclamation of the pad.

To the extent practicable, existing vegetation shall be preserved when clearing and grading for pipelines. The BLM may direct that cleared trees and rocks be salvaged and redistributed over reshaped cut-and-fill slopes or along linear features.

Aboveground facilities including valve risers and welded pipe protection cages shall be painted **Shadow Gray** to minimize contrast with adjacent vegetation or rock outcrops.

SITE-SPECIFIC CONDITIONS OF APPROVAL

- A. Construction on South End of Pad. To prevent any sediment from entering Cache Creek, no disturbance shall occur on the east side of the naturally occurring ridge to the southeast of the pad, between Cache Creek and the proposed expansion area on the south end of the pad. Caerus shall schedule a pre-construction meeting with the BLM prior to beginning construction to discuss this COA in the field.
- B. Sediment Trap near Corner 12. An additional sediment trap shall be installed immediately upgradient of the existing riprapped drainage to the Holmes irrigation ditch at Corner 12 on the northeast portion of the pad.
- C. Drainage on South End of Pad. Berms shall be constructed on the south end of the pad to direct run-on storm-water around the well pad. A chase shall be constructed between the berms to align with the contours of the naturally occurring drainage, which will route water to the ditch around the perimeter of the pad. The southwest berm shall be constructed to route drainage to the existing retention pond and road ditch between the well pad and the road; the southeast berm shall be constructed to route drainage to a newly constructed retention pond. Caerus shall schedule a pre-construction meeting with the BLM prior to beginning construction to discuss this COA in the field.
- D. Runoff Management. The French drain, chase, ditches, culverts, sediment traps, and retention ponds shall be regularly inspected and maintained for their proper function.
- E. Construction Disturbance. The disturbance limits shall be staked and/or flagged prior to any commencement of operations. A wildlife-friendly range fence shall be installed around the

disturbance perimeter and a gate shall be installed at the pad entrance prior to construction startup to reduce conflicts with livestock grazing. All trees and brush within the disturbance corridors of proposed roads, pipelines, and pads would be hydro-axed or chipped prior to beginning excavation work.

- F. COGCC Project Rulison Compliance. For any wells located within the Project Rulison Three-Mile Area, the operator shall comply with all Colorado Oil and Gas Conservation Commission (COGCC) Rules, Orders, and Conditions of Approval associated with the Project Rulison Three-Mile Area, which specify that all well permits issued by COGCC are reported to and reviewed by the Department of Energy (DOE). The Federal wells proposed shall be subject to meeting the requirements set forth in the COGCC policy statement issued by David Neslin, Director, on December 21, 2007. Included in these requirements are the following:
- a. Drill cuttings from Federal wellbores (mainly shale, sand, and miscellaneous rock minerals) shall be tested as required by the COGCC policy statement.
 - b. A drill rig with a closed-loop system shall be used on the proposed Federal wells.

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Colorado River Valley Field Office
2300 River Frontage Road
Silt, CO 81652

DRILLING CONDITIONS OF APPROVAL
Applications for Permit to Drill

Operator: Caerus Piceance, LLC
Lease Number: COC 66921
Pad: Caerus 17L-794
Surface Location: Garfield County, NWSW, Section 17, T7S, R94W

1. Twenty-four hours *prior* to (a) spudding, (b) conducting BOPE tests, (c) cementing/running casing strings, and (d) within 24 hours *after* spudding, the CRVFO shall be notified. One of the following CRVFO inspectors shall be notified by phone. The contact number for all notifications is: 970-876-9064. The BLM CRVFO inspectors are David Giboo, Lead PET; Ed Fancher, PET; Greg Rios, PET; Tim Barrett, PET; Alex Provstgaard, PET; Brandon Jamison, PET.
2. A CRVFO petroleum engineer shall be contacted for a verbal approval prior to commencing remedial work, sidetracking operations, plugging operations on newly drilled boreholes, changes within the drilling plan, changes to the well design, changes or variances to the BOPE, deviating from conditions of approval, and conducting other operations not specified within the APD. Contact the petroleum engineer for verbal approvals (contact information below).
3. If a well control issue or failed test (e.g. kick, blowout, water flow, casing failure, or a bradenhead pressure increase) arises during drilling or completions operations, the petroleum engineer shall be notified within 24 hours from the time of the event. IADC/Driller's Logs and Pason Logs (mud logs) shall be forwarded to CRVFO – Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652 within 24 hours of a well control event.
4. The BOPE shall be tested and conform to Onshore Order No. 2 for a 5M system and recorded in the IADC/Driller's log.
5. Flexible choke lines shall meet or exceed the API SPEC 16C requirements. Flexible choke lines shall have flanged connections and configured to the manufacturer's specifications. The flexible choke lines shall be anchored in a safe and workmanlike manner. At minimum, all connections shall be effectively anchored in place for safety of the personal on location. Manufacturer specifications shall be kept with the drilling rig at all times and immediately supplied to the authorized officer/inspector upon request. Specifications at a minimum shall include acceptable bend radius, heat range, anchoring, and the working pressure. All flexible choke lines shall be free of gouges, deformations, and as straight/short as possible.
6. An electrical/mechanical mud monitoring equipment shall be function tested prior to drilling out the surface casing shoe. As a minimum, this equipment shall include a pit volume totalizer, stroke counter, and flow sensor.
7. A gas buster shall be functional and all flare lines effectively anchored in place, prior to drilling out the surface casing shoe. The discharge of the flare lines shall be a minimum of 100 feet from the wellhead and targeted at bends. The panic line shall be a separate line (not open inside the buffer

- tank) and effectively anchored. All lines shall be downwind of the prevailing wind direction and directed into a flare pit, which cannot be the reserve pit. The flare system shall use an automatic ignition. Where noncombustible gas is likely or expected to be vented, the system shall be provided supplemental fuel for ignition and maintain a continuous flare.
8. On the first well drilled on this pad, a triple combo open-hole log shall be run from the base of the surface borehole to surface and from TD to bottom of surface casing shoe. This log shall be submitted within 48 hours in .las and .pdf format to: CRVFO – Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652. Contact 970-876-9000 for clarification.
 9. Submit the (a) mud/drilling log (e.g. Pason disc), (b) driller's event log/operations summary report, (c) production test volumes, (d) directional survey, and (e) Pressure Integrity Test results within 30 days of completed operations (i.e. landing tubing) per 43 CFR 3160-9 (a).
 10. Notify the BLM Petroleum Engineer two weeks prior to commencing completion operations.
 11. Whether the well is completed as a dry hole or as a producer. "Well Completion and Recompletion Report and Log" (Form 3160-4) will be submitted not later than 30 days after completion of the well or after completion of operations being performed, in accordance with 43 CFR 3164. In accordance with 43-CFR 3162.4(b) submit a complete set of electrical/mechanical logs in .LAS format with standard Form 3160-4, Well Completion or Recompletion Report and Log.
 12. Should the well be completed for production, the AO will be notified when the well is placed in a producing status. Such notification will be sent by telegram or other written communication, not later than five (5) days following the date on which the well is placed on production.
 13. A schematic facilities diagram as required by 43 CFR 3162.7-5 (b.9. d.), and shall be submitted to the appropriate District Office within sixty (60) days of installation or first production, whichever occurs first. All site security regulations as specified in Onshore Oil & Gas Order No. 3 shall be adhered to. All product lines entering and leaving hydrocarbon storage tanks will be effectively sealed in accordance with 43 CFR 3162.7-5 (b. 4).
 14. All off-lease storage, off-lease measurement, or commingling on-lease or off-lease will have prior written approval from the AO.
 15. "Sundry Notice and Report on Wells" (Form 3160-5) will be filed for approval for all changes of plans and other operations in accordance with 43 CFR 3162.3-2.

Contact Information

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List of Wells

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<i>Proposed Pad</i>	<i>Proposed Wells</i>	<i>Surface Locations</i>	<i>Bottom Hole Locations</i>
Caerus 17L-794 Pad	Rulison Federal 13A-17	T7S R94W, Sec 17 NWSW	T7S R94W, Sec 17 SWNW
	Rulison Federal 13B-17	T7S R94W, Sec 17 NWSW	T7S R94W, Sec 17 NWSW
	Rulison Federal 13C-17	T7S R94W, Sec 17 NWSW	T7S R94W, Sec 17 NWSW
	Rulison Federal 13D-17	T7S R94W, Sec 17 NWSW	T7S R94W, Sec 17 NWSW
	Rulison Federal 14A-17	T7S R94W, Sec 17 NWSW	T7S R94W, Sec 17 SWSW
	Rulison Federal 14B-17	T7S R94W, Sec 17 NWSW	T7S R94W, Sec 17 SWSW
	Rulison Federal 33A-17	T7S R94W, Sec 17 NWSW	T7S R94W, Sec 17 NWSE
	Rulison Federal 33B-17	T7S R94W, Sec 17 NWSW	T7S R94W, Sec 17 NWSE
	Rulison Federal 33C-17	T7S R94W, Sec 17 NWSW	T7S R94W, Sec 17 NWSE
	Rulison Federal 33D-17	T7S R94W, Sec 17 NWSW	T7S R94W, Sec 17 NWSE

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Exhibit 2

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The New York Times <http://nyti.ms/21rt5UC>

Edited by David Leonhardt

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CLIMATE CHANGE

There's a Formula for Deciding When to Extract Fossil Fuels

"Drill, Baby, Drill" became a popular campaign mantra back in the 2008 election cycle. But now we're hearing the opposite call: "Leave It in the Ground."

These calls come from environmentalists who see the end of drilling and mining as the way to avoid disruptive climate change. They direct these calls toward the federal government because it is estimated that about half of the carbon in technologically recoverable fossil fuels in the United States is on public lands.

Is there a middle ground that can supply the energy we need without causing significant climate damages? Yes. And it doesn't involve exploiting all available resources, nor banning their use.

What if we continued to lease the rights to access fossil fuels on federal land but required the leases and royalty payments to reflect the full climate damages from these fuels? Doing so would put the market to work by unlocking fossil fuels that have the highest value in relation to their impact on the climate. The bonus: It provides money to pay for some of the damage of climate change.

We've seen the benefits of using our domestic resources over the last decade as the amount of our energy coming from domestic oil and gas resources increased 54 percent. Chiefly, we have lower fuel prices. We now pay 74 percent less for natural gas and 25 percent less for petroleum, compared with 2005. Further, net imports will account for just 23 percent of American liquid fuel supplies this year — down from 60 percent in 2005 — with important energy security benefits. Our carbon emissions are also below 2005 levels, with cheap natural gas having taken significant market share from coal, which is more carbon intensive.

At the same time, the combustion of fossil fuels causes climate change that is projected to impose myriad costs around the world. But in this regard, not all fossil fuels are created equal. The value per unit of energy, measured by the market price, is greater for some (like petroleum) than others (like coal). Further, some contain more carbon or result in the release of more emissions because of other factors like the extraction and transportation process, and inflict greater climate damages. Knowing the monetary value of climate damages associated with a ton of carbon emissions is therefore the key to this whole problem.

Luckily, there is a way to determine this. It is called the Social Cost of Carbon (S.C.C.), and the federal government sets it at \$40 per metric ton of CO₂ emissions. The S.C.C. is used to inform a wide variety of regulations that limit the use of fossil fuels, including emissions standards for vehicles, appliances and power plants. But the S.C.C. has not been used to guide extraction policies. (I was co-leader of an interagency group that set the S.C.C. when I worked in the Obama administration from 2009 to 2010.)

If the S.C.C. were applied as a part of leasing and royalty rates on federal lands, we would unlock resources with the greatest net benefits. To illustrate the consequences of such a shift, I did some calculations based on the spot prices for coal, petroleum and natural gas and their respective energy and carbon contents. The addition of a charge based on the S.C.C. is unlikely to

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have a substantial effect on domestic production of petroleum. The spot price per million British thermal units (B.T.U.s) this year has been \$8.81, and the associated climate damages are \$2.98. If the federal government collected a charge of \$2.98 for each million B.T.U.s of petroleum extracted on federal lands, the revenue could be refunded directly to taxpayers or used to help the nation adapt to climate damages. The story is similar for natural gas; its value today exceeds the expected climate damages.

The case of coal is different, especially coal from the federal land in the Powder River Basin in Wyoming and Montana. The climate damages from coal mined from this region are five to six times greater than its market value (\$0.66 at market value versus \$3.89 of climate damages). Thus, a climate charge linked to the S.C.C. would probably make at least some of the coal mining in this region unprofitable. There is currently an opportunity for policy overhaul: The Department of the Interior is considering how to restructure lease terms for fossil fuels on federal lands. Further, a federal judge ruled last year that the government should take into account climate impacts when making decisions about mining on federal lands.

The application of an S.C.C.-related fee would meet many goals. Environmentalists would naturally like it, and so should fiscal conservatives who recognize that the federal government will be increasingly on the hook for climate damages (recall the more than \$50 billion of federal tax dollars appropriated in response to Hurricane Sandy). At the same time, this fee would not stop the development of economically attractive fossil fuels.

Such a change in policy would have challenges. There would inevitably be some shifting of fossil fuel production to private lands in the United States, as well as to other countries; but it would also reduce the long-run global supply of fossil fuels. Further, there would be a strong case for harmonizing S.C.C. charges with existing domestic climate regulations to ensure that the carbon policies operate as efficiently as possible. There is also a strong case for providing support to communities that experience meaningful declines in

economic activity because of an extraction fee linked to the S.C.C.

An efficient climate policy would price carbon throughout the global economy so that users of all fossil fuels recognized their climate costs. It does not appear likely that the current Paris climate negotiations will produce such a system. In the absence of such a policy, the solution doesn't need to be to use all fossil fuels, or to ban their usage. Common sense suggests that we use the ones that provide more value than harm and that we leave the others in the ground.

For a detailed analysis of the calculations, the technical document is available [here](#).

Michael Greenstone, the Milton Friedman professor of economics at the University of Chicago, runs the Energy Policy Institute there. He was the chief economist of President Obama's Council of Economic Advisers from 2009 to 2010.

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