UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
1849 C Street NW
Washington, DC 20240

ENVIRONMENTAL ASSESSMENT
Waste Prevention, Production Subject to Royalties, and Resource Conservation

DOI-BLM-WO-WO2100-2017-0001-EA

November 10, 2016

Table of Contents

Contents

ENVIRONMENTAL ASSESSMENT
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Waste Prevention, Production Subject to Royalties, and Resource Conservation

DOI-BLM-WO310-2017-XXX-EA

1. Introduction

This Environmental Assessment examines the potential environmental impacts of the Bureau of Land Management's (BLM) Waste Prevention, Production Subject to Royalties, and Resource Conservation rule ("the Waste Prevention Rule" or "the Final Rule" or "the Rule"), a new regulation to reduce waste of natural gas from venting and flaring operations, and to eliminate leaks during oil and natural gas production activities on onshore Federal and Indian leases. The regulation also clarifies when produced gas lost through venting, flaring, or leaks is subject to royalties, and when oil and gas production used on site is royalty-free.

The BLM issued a draft of this EA on February 8, 2016 in tandem with the Proposed Waste Prevention Rule. The BLM received comments from the public and has considered them in this final EA in support of the Final Rule.

The Final Rule replaces *Notice to Lessees and Operators of Onshore Federal and Indian Oil and Gas Leases, Royalty or Compensation for Oil and Gas Lost (NTL-4A)*, which addresses venting, flaring, and royalty-free use of gas. The Final Rule will be codified primarily at new 43 CFR subparts 3178, and 3179. The analysis within this environmental assessment (EA) assesses the potential environmental impacts from this regulatory action. Significant impacts would require preparation of an environmental impact statement (EIS) pursuant to the *National Environmental Policy Act of 1969* (NEPA), 42 U.S.C. § 4321, *et seq*. Because the BLM herein determines that the potential environmental impacts are not significant, a finding of no significant impact has been prepared, documenting that an EIS is not necessary.

This BLM action includes provisions directing operators of Federal oil and gas leases to take certain steps to reduce the amount of natural gas wasted during oil and gas production operations. The rulemaking is programmatic and not expected to have any direct impacts on the human environment. Changes implemented by operators in response to the rule would take place on the ground and may have beneficial and/or adverse indirect and/or cumulative effects on the human environment. The analysis in this document identifies both the benefits to the environment from the reductions in the releases of gas that this rule is expected to drive and the potential adverse effects that may occur as a result of human activities required to comply with the rule.

The BLM applies a tiered decision-making approach when analyzing the environmental impacts of development of Federal oil and gas resources on public lands, and conducts

NEPA analysis at the land use planning, lease sale, and site-specific action stages. First, the BLM develops land use plans (the BLM refers to these plans as Resource Management Plans, or RMPs). The RMP serves as the basis for all land use decisions the BLM makes, including decisions to allow oil and gas leasing. Establishment or revision of an RMP requires preparation of an EIS. In areas where oil and gas resources are located, the EIS prepared to support establishment or revision of the RMP analyzes all impacts related to oil and gas development that may be expected to occur over the life of an RMP (typically 20 years). The RMP itself identifies the terms and conditions under which the BLM would allow oil and gas development to occur, so that other resource values are protected. Those terms and conditions may include mitigation measures that would be evaluated through the EIS and are typically implemented as stipulations incorporated into oil and gas leases. Lands are closed to oil and gas leasing altogether where such use is incompatible with other planned uses, such as Wilderness Study Areas or Special Management Areas. In preparing an RMP, the BLM must not only comply with NEPA but also with other statutes, such as the National Historic Preservation Act (NHPA) and the Endangered Species Act (ESA), including any appropriate consultation with the Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), and/or the Advisory Council on Historic Preservation (ACHP). Once an RMP has been approved, the BLM makes all land use decisions, including oil and gas development decisions, in accordance with the RMP or any revisions or amendments thereto. Amendment of the RMP would likely necessitate the preparation of either an EA or an EIS and any appropriate consultations.

Before oil and gas activities may occur on Federal lands, interested parties must obtain a lease from the BLM. Oil and gas leases are acquired through an auction-style sale whereby parties first express interest in tracts of land that they would like the BLM to offer for lease. The BLM conducts a preliminary evaluation to determine whether the nominated tracts are under Federal jurisdiction and are open to leasing in accordance with the RMP. The BLM then conducts a second tier of NEPA review under the RMP EIS, typically an environmental assessment (EA), to address potential impacts from oil and gas development within the nominated area. If the BLM's analysis determines that the nominated tracts are available for leasing, the BLM offers the tracts for lease at a scheduled sale. As noted above, in addition to complying with NEPA, the BLM may also need to engage in additional consultation under the NHPA and ESA if listed species or cultural resources may be affected at the lease sale stage.[1]

After a lease is issued, oil and gas operators must seek approval from the BLM to perform drilling, completion, and production operations on a lease by filing an application for permit to drill (APD) for each well drilled on that lease. Federal Onshore Oil and Gas Order #1 (Onshore Order 1) requires all APDs to include a surface use plan of operations detailing all surface-disturbing impacts, including their type, duration, and purpose. The BLM then performs a third tier of NEPA review of an operator's proposal, which may be for a single

[1] In the event that the BLM received a nomination to open an entirely new leasing area not included in any RMP, the BLM would first need to amend the existing RMP covering that area, prepare an Environmental Impact Statement, and initiate consultation with the FWS and/or NMFS, in compliance with the ESA, before it could hold any lease sales for oil and gas development in the new area.

well, a group of wells, or for an entire field. For large field development projects, EISs are generally prepared and provide a refined level of site-specific detail at a broad scale. Proposals to drill a single well or a small group of wells may require an EIS, or may require only an EA tiered to an EIS prepared for the RMP or leasing decision, depending upon the level of significance of the impacts. In all cases, the environmental analysis identifies potential impacts from an operator's proposed action. Through this analysis, the BLM develops any necessary conditions of approval to mitigate potential impacts, which are then attached to the approved permit to drill that the operator must follow. At the APD stage, the BLM again assures compliance with the NHPA and the ESA, including any appropriate consultation. Under some circumstances, an operator on a lease within a unit or communitized area (CA) would not apply for a permit to drill because the drilling operation would not pierce federal minerals. However, the BLM's tiered NEPA analysis would nonetheless incorporate an analysis of any indirect or cumulative impacts of these actions.

Currently, under NTL-4A, operators must seek BLM approval to flare gas from well operations on a case-by-case basis, with limited exceptions. Operators must provide economic data with each request to flare, demonstrating that requiring the gas to be captured would "lead to the premature abandonment of recoverable oil reserves and ultimately to a greater loss of equivalent energy than would be recovered" if the flaring were approved. This approach results in the BLM receiving a substantial amount of applications for approval, and does not significantly limit flaring, as BLM has commonly, although not always, approved these requests.

In addition to ensuring an operator's compliance with NTL-4A, the BLM currently evaluates additional ways to reduce waste of natural gas as part of the environmental reviews the Bureau conducts to support the issuance/approval of each RMP, oil and gas lease, or APD. The BLM assesses these additional waste reduction options to ensure that the BLM's decision(s) complies with applicable Federal, State, local, or tribal air quality statutes and regulations. This new rule will add provisions to the BLM's existing regulations that will improve the BLM's ability to, *inter alia*, ensure that lessees "use all reasonable precautions to prevent waste of oil or gas developed in the land," as required by the Mineral Leasing Act of 1920 (MLA).

1.1 Background and Overview

Under the Mineral Leasing Act, the Federal Land Policy and Management Act, and other statutes, the BLM manages public land resources for a variety of uses, such as oil and gas development, livestock grazing, recreation, and timber harvesting, while protecting a wide array of natural, cultural, and historical resources. The BLM manages nearly 250 million acres of land and 700 million acres of subsurface estate, comprising nearly a third of the nation's mineral estate.

The BLM's onshore oil and gas management program, in particular, is a major contributor to the Nation's oil and gas production. Domestic production from over 100,000 Federal onshore oil and gas wells accounts for about 11 percent of the Nation's natural gas supply and about five percent of its oil. In Fiscal Year (FY) 2015, operators produced 183.4 million barrels (bbl) of oil, 2.2 trillion cubic feet (Tcf) of natural gas, and 3.3 billion gallons of

natural gas liquids (NGLs) from onshore Federal and Indian oil and gas leases. The production value of this oil and gas exceeded $20.9 billion and generated approximately $2.3 billion in royalties.[2]

The BLM's authority to regulate the venting, flaring, and leakage of federal and Indian natural gas, and royalty-free on-site use of federal and Indian oil and natural gas production, derives from a number of statutes, including the MLA and subsequent amendments; the Mineral Leasing Act for Acquired Lands (MLAAL); the Federal Oil and Gas Royalty Management Act (FOGRMA) and subsequent amendments; the Federal Land Policy and Management Act of 1976 (FLPMA) and subsequent amendments; the Indian Mineral Development Act (IMDA); the Indian Mineral Leasing Act (IMLA); and the Act of March 3, 1909. For further information on the BLM's statutory authority, see the preamble to the Final Rule.

As discussed above, NTL-4A currently governs venting, flaring, and royalty-free uses of natural gas and oil on BLM-administered leases. NTL-4A was issued by the U.S. Geological Survey (USGS) and published in the Federal Register on December 27, 1979 (44 FR 76600) before the BLM assumed oversight responsibility for onshore oil and gas development and production. Over the 36 years since NTL-4A was issued, technologies and practices for oil and gas production have advanced considerably. Today, better technologies exist for capturing and using gas on-site, detecting leaks, controlling vapors from storage tanks, removing liquids from gas wells, and many other aspects of production. NTL-4A does not incorporate or contemplate these advanced technologies for minimizing waste.

The Waste Prevention Rule is expected to yield environmental and economic benefits resulting from the reduction of natural gas waste, as well as climate benefits. In June 2013, the Obama Administration announced *The President's Climate Action Plan*, a broad-based plan to cut pollution that causes global climate change and affects public health. The plan lays out steps that would cut carbon pollution, help prepare the United States for impacts of climate change that are already on the way, and continue American leadership in international efforts to combat climate change. The subsequently issued *Climate Action Plan: Strategy to Reduce Methane Emissions* (March 2014) details the BLM's role in helping to meet the goals of the President's Climate Action Plan. The strategy identifies this rulemaking as an action that would cut GHG emissions while cost-effectively preventing waste of hydrocarbons and ensuring a fair return to the American taxpayer.

As compared to the Proposed Rule (Alternative B), the Final Rule (Alternative C) allows more flexibility for operators to meet gas capture targets by employing both a flaring allowance and a gas capture percentage requirement, both phased in over a longer period of time than the flaring limit in the Proposed Rule. The Final Rule also increases flexibility by allowing operators to elect to average their flaring, not only across all of their wells within a lease, unit, or CA, but also (with the filing of a Sundry Notice) across a county or state. The

[2] Office of Natural Resources Revenue, Statistical Information, http://statistics.onrr.gov/ReportTool.aspx using Sales Year - FY2015 – Federal Onshore – All States Sales Value and Revenue for Oil, Natural Gas Liquids (NGL), and Gas products as of September 7, 2016.

expected overall effect of these change to the Rule is that capture requirements, and thus benefits from reductions in methane and CO_2 emissions, will take longer to phase in under Alternative C than under Alternative B, but will ultimately exceed the reductions, and thus the benefits, projected for Alternative B. Alternative C is expected to result in a somewhat smaller reduction in VOCs and HAPs than Alternative B overall, but will still reduce these pollutants, in the case of HAPs, by between 1,800 to 2,000 tons per year, and in the case of VOCs, by between 250,000 to 270,000 tons per year, when compared to the No Action Alternative. The BLM further expects overall noise and light pollution impacts to decrease under Alternative C, as compared to the No Action Alternative, and to decrease more in some areas and less in others, as compared to Alternative B.

Overall, Alternatives B and C would both provide substantial climate and air quality benefits, compared to the No Action Alternative. Despite the decreased benefit relative to Alternative B, Alternative C contains features that reduce the administrative burden on operators, as well as other benefits, that make it a more optimal total alternative than Alternative B, both for the BLM and for its stakeholders.

1.2 Waste of Federal and Tribal Natural Gas

Over the past decade, the United States has experienced a dramatic increase in oil and natural gas production due to technological advances such as hydraulic fracturing combined with directional drilling. This boost in production has brought many benefits in the form of expanded and more secure domestic supplies, lower prices, increased economic activity, and greater royalty revenues for Federal, State and tribal governments. The full potential of this increased production is not being realized, however, as studies have documented significant and growing quantities of wasted natural gas from operational activities.

In March 2014, ICF International issued a report entitled *Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries*,[3] which projects that methane emissions from oil and gas activities will grow 4.5% from 2011 to 2018. This study projects that all of the net growth in methane emissions would occur in the oil sector, largely from venting and flaring of associated gas. While the natural gas sector is expected to grow as well, it is not expected to contribute to the increase in methane emissions, due to emissions reduction activities required by the Environmental Protection Agency's (EPA) New Source Performance Standards (NSPS) Subpart OOOO and other emission control programs. The study predicts that nearly 90% of the emissions in 2018 will come from sources in existence as of 2011.[4]

BLM data on applications it has received from operators to vent or flare gas support the ICF study's conclusion that methane emissions are increasing. In 2005, the BLM received just 50 applications to vent or flare gas. In 2011, the BLM received 622 applications, and this number doubled again within three years to 1,248 applications in 2014. The vast majority of

[3] This report is available at https://www.edf.org/sites/default/files/methane_cost_curve_report.pdf.
[4] Ibid, p. 1-1.

the applications were for flaring in New Mexico, Montana, the Dakotas, and, to a lesser extent, Wyoming.[5]

At the same time, several independent studies and oversight reviews have raised concerns about waste and royalty free use of gas from Federal and Indian oil and gas lease operations, and have identified cost-effective methods to reduce that waste. The reviews, described in further detail below, have consistently found that the BLM's existing requirements regarding venting and flaring are insufficient, and recommended that the BLM update its regulations and guidance on royalty free use and waste prevention. This Rule responds to recommendations in the OIG and GAO reports, as well as to concerns identified in the other studies of methane waste, described in the preamble of the Final Rule, at Sections I.A, II.B.3 and 4, and III.B.2.

1.3 Public Involvement in the Rulemaking

For information on the BLM's outreach efforts to the public, stakeholders, and tribes, see the preamble to the Final Rule.

1.4 Purpose and Need for the Proposed Action

This BLM action will replace NTL-4A and amend the BLM's existing requirements related to the venting, flaring, and royalty-free use of oil and natural gas. The new requirements will be codified primarily as new subparts 43 CFR 3178 and 3179. The purpose of the final action is to develop a regulatory mechanism to promote cost-effective capture of natural gas, reduce the waste of natural gas from venting and flaring operations, and eliminate leaks that may occur during oil and natural gas production activities on onshore Federal and Indian leases. The final action will also clarify when oil or natural gas may be used royalty-free for production activities on site.

As discussed in the preamble to the Final Rule, this action responds to the various investigations performed by government auditors, to advances in technology that have been developed since NTL-4A was issued in 1979, and to the Administration's priorities under the President's Climate Action Plan. Replacing NTL-4A with new regulations that helps maximize the public's benefit from production of oil and gas resources—while minimizing waste and environmental impacts—is consistent with the BLM's statutory authority to, *inter alia*, ensure that lessees "use all reasonable precautions to prevent waste of oil or gas developed in the land…" and to manage public lands under principles of multiple use and sustained yield.

The BLM's decision is to promulgate this Final Rule, the Preferred Alternative, for implementation.

1.5 Significant Changes Made From Draft Assessment

[5] BLM extracted this data from its Automated Fluid Minerals Support System (AFMSS) in response to a media inquiry, in October 2014.

The BLM made several significant changes to the initial EA for the Proposed Rule as a result of certain changes to the regulatory text between the proposed and final rule, public comments, internal discussions, and new information from other sources. These changes are summarized in this section.

In the Draft EA, BLM analyzed the impacts of the BLM's taking no action, in the No Action Alternative, and the impacts of the BLM's implementing the Proposed Rule, in the Proposed Action Alternative. The Final EA now identifies the Proposed Rule as Alternative B. The Final EA includes a third alternative of BLM's implementing the finalized rule, as Alternative C, which is also now the BLM's Preferred Alternative.

Within the Proposed Action Alternative analysis of the Draft EA, the BLM considered the Proposed Rule under two scenarios: one in which the EPA finalized their proposed Subpart OOOOa Rule, and one in which the EPA Rule was not finalized. The Draft EA was published on February 8, 2016, and EPA published the final Subpart OOOOa Rule on June 3, 2016. Therefore, the final EA contains no analysis and references to the latter scenario.

As stated in the preamble to the Proposed Rule, the BLM initially assessed several different levels of monthly flaring limits to maximize reductions in flaring while minimizing the number of affected leases, ultimately proposing to phase down to an 1,800 mcf/well/month limit over three years. With the inclusion of Alternative C, the final rule, the final EA now considers the impacts of the BLM's revised approach to limiting routine flaring, which now involves a phased-in gas capture requirement paired with a declining per-well flaring allowance. Significantly, an operator now has the option to average its compliance with these requirements across all of its operations within a state or county.

Alternative B, the BLM's Proposed Rule, analyzed the process of stripping natural gas liquids, or NGLs, from produced gas, and transporting these via truck. This analysis, which can be found in Section 4.2.1 of the EA for the Proposed Rule, was completed in response to the BLM's determination that NGL trucking was a reasonably foreseeable industry response to the Proposed Rule. However, during the comment period for the Proposed Rule, the BLM received comments from industry indicating that this was not the case; therefore, this final EA focuses on the environmental effects of trucking compressed natural gas (CNG) as the more likely approach to gas capture. To estimate the impacts of the increase in CNG trucking, the EA uses a base estimate of 15 miles one-way per truck trip and calculates the additional CO2-equivalent emissions from trucking based on the volume of the trucks and the volume of gas that operators are expected to capture, compress, and truck under the rule.

2. Proposed Action and Alternatives

In this analysis, the BLM considered three alternatives in detail:

- Alternative A – No Action,
- Alternative B – Proposed Rule, and
- Alternative C – Final Rule (BLM Preferred Alternative).

2.1 Description of Alternative A – No Action

The no-action alternative would keep the existing requirements of NTL-4A in place, and not promulgate the new rule. The BLM would not implement any updated requirements to, *inter alia*, capture additional natural gas, reduce the waste of natural gas from venting and flaring operations, or reduce leaks that may occur during oil and natural gas production activities on onshore Federal and Indian leases.

2.2 Description of Alternative B – Proposed Waste Prevention Rule

Alternative B would be the promulgation of the proposed Waste Prevention, Production Subject to Royalties, and Resource Conservation rule (the "Proposed Rule"), published on February 8, 2016 (81 FR 6616). This rule would amend and replace NTL-4A's requirements related to venting, flaring, and royalty-free use of gas. Requirements under the Proposed Rule would be codified in regulations at new 43 CFR 3170 subparts 3178 and 3179, as well as certain amendments to Parts 3100 and 3160, all of which would apply to Federal and Indian (other than Osage Tribe) oil and gas leases.

The Proposed Rule would (i) require operators to take various actions to reduce waste of gas; (ii) establish clear criteria for when flared gas would be subject to royalties; and (iii) clarify the on-site uses of gas that are exempt from royalties. Many of the new requirements in the Proposed Rule are administrative or procedural, and pertain to the information operators would have to submit in order to receive approval from the BLM to vent or flare natural gas from Federal and Indian leases. The Proposed Rule also requires operators to report volumes of natural gas that are vented or flared. These administrative requirements would not affect the quality of the human environment. Implementation of other requirements in the proposed action, however, would indirectly result in on-the-ground activities that could affect environmental quality.

The Proposed Rule would seek to reduce the amount of vented, flared, and fugitive natural gas emissions from the following sources:

- Venting or flaring of associated gas from development oil wells;
- Venting or flaring of gas during well testing;
- Gas loss during well drilling, completion, and workover;
- Gas loss from pneumatic controllers;
- Gas loss from pneumatic pumps (chemical injection pumps);
- Gas loss during liquids unloading;
- Gas loss from oil and condensate storage tanks; and
- Gas loss from leaks.

The discussion below summarizes the requirements from the Proposed Rule that would reduce the amount of vented, flared, and fugitive natural gas from these sources, highlighting those that could have environmental impacts.

- *Venting or flaring of oil-well gas*: To reduce the amount of venting and flaring of associated gas from development oil wells, the BLM proposed to ban venting of gas except in certain specified circumstances (such as emergencies, as defined in the rule), and to limit flaring of gas from such wells to the following amounts:
    - 7,200 thousand cubic feet (Mcf)/month for the first year of the rule's implementation;
    - 3,600 Mcf/month for the second year of the rule's implementation; and
    - 1,800 Mcf/month thereafter.
- *Waste minimization planning*: In connection with submission of each Application for a Permit to Drill (APD) a new well, BLM proposed to require operators to submit a plan to minimize waste of natural gas from the well, laying out how the gas would be captured upon the start of oil production, if reasonably possible, or as soon thereafter as reasonably possible.
- *Gas loss during well drilling, completion, and re-completions*: To reduce the amount of gas lost during well drilling, completion, and re-completions operations, the BLM proposed to require that the gas produced from these operations be captured and routed to a sales line, combusted, re-injected, or used for production purposes on site.
- *Gas loss from pneumatic controllers*: To reduce the amount of gas lost from pneumatic controllers, the BLM proposed requirements that operators replace all high-bleed continuous controllers with low-bleed continuous controllers, unless permanent well shut-in will occur within three years from the effective date of the rule, or the operator has demonstrated to BLM's satisfaction that a high-bleed controller is necessary to the proper operation of the well.
- *Gas loss from pneumatic pumps (chemical injection pumps)*: To reduce the amount of gas lost from pneumatic pumps, the BLM proposed requirements that operators replace chemical injection pumps that use gas with solar-powered pumps.
- *Gas loss during liquids unloading*: To reduce the amount of gas lost during liquids unloading, the BLM proposed a requirement that would restrict well purging from any well drilled after the rule's effective date. The BLM also proposed requirements that the operator be on site and monitor the liquids unloading event, if the well is not equipped with an automated system.
- *Gas loss from oil and condensate storage tanks*: To reduce the amount of gas vapors vented or lost from storage tanks, the BLM proposed a requirement that directs operators to either capture/route the vapors to a sales line or combust the vapors, if the VOC emissions from the tank or tank battery exceed 6 tons per year (tpy).
- *Initial Production Testing and Subsequent Well Tests*: In the Proposed Rule, the BLM allows operators to flare gas associated with a well's initial production test without paying royalties until the sooner of the following: operator has obtained adequate well information; 30 days have passed; the operator has flared 20 million cubic feet (MMcf) of gas; or production begins. These limitations can be extended in certain limited circumstances but require operators to request an extension via a Sundry Notice. For subsequent well testing, operators may flare royalty-free for 24 hours or less; again, this may be extended in certain circumstances via Sundry Notice.
- *Gas loss from leaks*: To reduce the amount of gas lost from leaks, the BLM proposed a requirement that the operator conduct periodic inspections of its well site. The operator would be required to assess the well site for leaks semi-annually, with the inspection

frequency either lengthening or shortening depending on whether leaks are found or not found during three consecutive inspections.

2.3 Description of Alternative C – Final Waste Prevention Rule (BLM Preferred Alternative)

Alternative C would be the promulgation of the final Waste Prevention Rule, which the BLM now seeks to issue after having considered new information and comments on the Proposed Rule. Like Alternative B, this Final Rule will amend and replace NTL-4A's requirements related to venting, flaring, and royalty-free use of gas. Requirements under the Final Rule will be codified in regulations at new 43 CFR 3170 subparts 3178 and 3179, as well as certain amendments to Parts 3100 and 3160, all of which would apply to Federal and Indian (other than Osage Tribe) oil and gas leases.

Based on information that has become available since the rule was initially proposed and the extensive information BLM received through public comments, the BLM has made numerous changes and adjustments to several of the requirements in the Proposed Rule. The following section summarizes major changes from the Proposed Rule to the Final Rule.

- *Venting or flaring of oil-well gas*: The Final Rule shifts from numerical limits on flaring to the following, more flexible approach:
    - Beginning one year after the effective date of the Final Rule, the operator's capture percentage must equal the following phased-in values:
        - 85% for each month from (effective date plus one year) through December 31, 2019;
        - 90% for each month from January 1, 2020 through December 31, 2022;
        - 95% for each month from January 1, 2023 through December 31, 2025; and
        - 98% for each month beginning January 1, 2026.
    - The "capture percentage" referred to above means the "total volume captured" over the "relevant area," divided by the "adjusted total volume produced" over the relevant area.
    - The "total volume captured" means, for each month, the volume of gas sold from all of the operator's development oil or gas wells in the relevant area plus the volume of gas used on lease, unit, or communitized area in the relevant area.
    - The "relevant area" means: (i) Each of the operator's leases, units, or communitized areas; or (ii) all of the operator's development wells on leases, units, and communitized areas within a county or within a State, if the operator notifies the BLM by Sundry Notice that the operator has chosen to comply on a county- or State-wide basis.
    - The "adjusted total volume produced" means the total volume captured over the month plus the total volume of gas flared over the month from high-pressure flares from all of the operator's development oil or gas wells in production in the relevant areas, minus the flaring allowances below:

        - For each month from (effective date plus one year) until December 31, 2018: 5,400 Mcf times the total number of development oil or gas wells in production in the relevant area;
        - For each month in calendar year 2019: 3,600 Mcf times the total number of development oil or gas wells in production in the relevant area;
        - For each month in calendar year 2020: 1,800 Mcf times the total number of development oil or gas wells in production in the relevant area; and
        - For each month in calendar year 2021: 1,500 Mcf times the total number of development oil or gas wells in production in the relevant area.
        - For each month in calendar years 2022 – 2023: 1,200 Mcf times the total number of development oil or gas wells in production in the relevant area.
        - For each month in calendar year 2024: 900 Mcf times the total number of development oil or gas wells in production in the relevant area.
        - For each month in calendar year 2025 and thereafter: 750 Mcf times the total number of development oil or gas wells in production in the relevant area.
    - *Option of averaging gas capture percentage over all of an operator's development wells on leases, units, and CAs within a county or within a State*: The Final Rule allows an operator to average its capture percentage compliance across its wells on leases, units, and CAs within a county or State, in lieu of demonstrating compliance with the gas capture percentage on each lease, unit, or CA. The operator must notify the BLM by Sundry Notice if it chooses to comply on a county- or State-wide basis.
- *Gas loss during well drilling, completion, and re-completions, and from leaks*: Exemptions based on operator economics were added to the Final Rule's requirements relating to well completions and related operations, as well as those relating to leak detection and repair (LDAR). Operators may be exempted from these requirements where they demonstrate, and the BLM agrees, that compliance "would impose such costs as to cause the operator to cease production and abandon significant recoverable oil reserves." This is the same economic standard used for other exemptions in the Proposed Rule.
- *Natural Gas Liquids (NGL)-Stripper Flaring*: The Final Rule has been revised so that the flaring associated with NGL-stripper equipment (which captures natural gas liquids from the gas stream and flares the residual gas) would be considered "unavoidable" (i.e., not subject to royalties) and also would not count against the flaring limit.
- *Gas loss from pneumatic controllers*: The Final Rule deletes the Proposed Rule requirement for the operator to notify the BLM when the operator chooses to route pneumatic controller exhaust to flare rather than employ a low-bleed controller. Also, under the Final Rule, the operator can comply by routing pneumatic exhaust to processing equipment or other combustor instead of routing to a flare.

- *Gas loss from pneumatic pumps (chemical injection pumps)*: The Final Rule clarifies that zero-emissions pumps include electric-powered pumps. Portable pneumatic pumps are exempted from the rule's requirements. The Final Rule adds definitions of "pneumatic controller" and "continuous bleed."
- *Gas loss during liquids unloading*: The Final Rule eliminates the prohibition in the Proposed Rule on conducting liquids unloading through well purging for new wells.
- *Gas loss from storage vessels*: The Final Rule incorporates a new definition of "storage vessel" and extends the time period for compliance with storage vessel requirements from six months to one year, while allowing a three-year compliance period if the operator intends to comply by replacing the storage vessel. The Final Rule also adds a requirement that affected vessels be "adequately sized" and a prohibition on venting from access points on those vessels.
- *Initial Production Testing and Subsequent Well Tests*: In the Final Rule, as was in the Proposed Rule, the BLM allows operators to flare gas associated with a well's initial production test without paying royalties until the sooner of the following: operator has obtained adequate well information; 30 days have passed; the operator has flared 20 million cubic feet (MMcf) of gas; or production begins. However, the Final Rule modifies the "has flared 20 million cubic feet (MMcf) of gas" event by increasing the limit specified by an additional 30 million cubic feet of gas for exploratory wells in remote locations where additional testing is needed in advance of development of pipeline infrastructure. As stated in the Proposed Rule, these limitations can be extended in certain limited circumstances but require operators to request an extension via a Sundry Notice. For subsequent well testing, operators may flare royalty-free for 24 hours or less; again, this may be extended in certain circumstances via Sundry Notice.
- *Gas loss from leaks*: To reduce the amount of gas lost from leaks, the Final Rule retains the Proposed Rule requirement that the operator conduct semi-annual inspections of sites and equipment on a lease, unit, or communitized area, but adds a requirement for quarterly inspections of compressor stations. The Final Rule removes the sliding scale of inspection frequency, depending on whether leaks are found or not found during three consecutive inspections, and adds that sites with only a wellhead or wellheads and no other equipment are exempt from the leak detection and repair (LDAR) requirements.

The BLM expects some differences in environmental impacts based on the longer implementation time in the Final Rule, which gives operators more time to plan for gas capture, to develop techniques and technologies to address flaring, and to spread out the cost of compliance over a longer timeframe. Other differences in environmental impacts between Alternatives B and C are foreseeable based on Alternative C's allowance for operators to average flaring on a county or State-wide basis, rather than solely across a lease, unit, or CA. For example, noise and light from flaring could decrease more drastically in some areas under the Final Rule than under the Proposed Rule, but could be more concentrated in others. The BLM also expects some differences in environmental impacts due to Alternative C allowing a degree more flaring in the short term than would be allowed under Alternative B, as well as a degree less flaring in the long term. The BLM concludes that Alternative C, incorporating insights gained from public comments received, is more equitable and feasible than Alternative B, as it ameliorates some of the costs of implementation and eventually

reduces flaring close to or below the levels proposed in Alternative B, thus better meeting the purpose and need of the rule.

2.4 Alternatives Considered but Eliminated from Detailed Analysis

In developing the Rule, the BLM considered but ultimately rejected several alternative approaches to prevent waste and loss of gas, as well as several alternative features of different aspects of the Proposed Rule. First, the agency considered whether it should assess royalty on all flared associated gas. The BLM determined, however, that imposing royalties alone was unlikely to significantly curb waste and gas loss and, thus, would not adequately meet the purpose and need. Likewise, the BLM determined that an approach focused on royalty collection would not be as effective in reducing the harmful environmental impacts of vented and flared gas. The BLM also identified legal concerns with this approach.

The BLM also considered whether it should focus its flaring limits on areas where, in the Bureau's estimation, it is economically feasible for operators to install capture equipment. The BLM considered implementing this idea by identifying zones in which the internal rate of return (IRR) for gas capture projects would exceed 7%. The BLM envisioned that it would determine a timeframe for capturing gas from the area on a case-by-case basis (not to exceed three years). The BLM did not move forward with this alternative, due to concerns about the complexity of identifying gas capture zones and making capture determinations. Further, analysis suggested that adding this requirement in addition to the flaring limit would add significantly to the costs of the rule without significantly reducing gas waste.

The BLM also considered a number of different flaring limit, capture percentage, and flaring allowable levels in arriving at the flaring and capture requirements in Alternatives B and C. To analyze the impacts of potentially limiting flaring on Federal and Indian lands, the BLM requested oil and gas disposition data for all onshore activity reported to ONRR during FY 2015. This resulted in 816,231 observations with the unit of analysis being an operator's monthly volume of gas for each relevant disposition code. The data allowed for various extractions of data by date, operator, lease/unit, county, state, land class, and disposition code. The BLM modified the analysis over time, as early results revealed different aspects of flaring behavior on the lands of interest. One limitation of the data is in the land class. The land class types are Federal, Indian, State, Fee and Mixed. While we would like to focus on only Federal and Indian flared volumes for the purpose of this analysis, a record falls into the "mixed" category if any of the previous varieties are in the unit/lease reported. Nearly 78 percent of the records are mixed. However, according to ONRR, about 50 percent of gas and 27 percent of oil production belongs to Federal and about 4 percent of the gas and 10 percent of the oil belongs to Indian lands.

A change from the proposed rule to the final rule includes allowing operators to group their production (at their option) across a State or county (as well as a unit/lease). As averaging the production across the State is seemingly the most advantageous to the operator, all further analysis was completed at the State level. To that end, spreadsheets were created to analyze the data state-by-state. From the 800,000 plus records, each State specific set of records were extracted to the State spreadsheet template. For example, the North Dakota (ND)

spreadsheet contains 84,604 records while the New Mexico (NM) spreadsheet has 297,268 records. Next the unique state and operator combinations were determined. For example, ND had 76 unique operators and NM had 354. To calculate a capture target percent for each operator in a State, relevant records had to be combined and then appropriately added or subtracted. We performed the calculations for each of the top flaring States: ND, NM, Wyoming (WY), Montana (MT), Colorado (CO), Utah (UT), California (CA), and South Dakota (SD). According to ONRR records, these eight States represented about 99.7 percent of the flaring reported from oil wells on Federal and Indian lands (including the mixed volumes).

The BLM used the operator data in each state to determine the volume of flaring that would be allowed by the rule and the volume of excess flaring that would have occurred in FY 2015, for each of the specified flaring allowable volumes and capture targets shown in Table 7-6a. We then calculated the volume of excess flaring that would have occurred in FY 2015 with and without this rule in each of the eight top flaring states listed above.

In the analysis for the Proposed Rule, the BLM constructed several scenarios which represented likely responses of reasonable operators to the proposed flaring limits. This approach used geo-located data to group operators into response categories. These categories included the use of onsite capture (via NGL recovery), curtailment and exemptions in certain situations. After reviewing the data described above, the BLM selected the 1,800 Mcf/well/month as the flaring limit for the Proposed Rule because it would allow the BLM to achieve significant reductions in the waste of natural gas, while minimizing the number of impacted oil wells. The 1,800 Mcf/well/month limit also had the benefit of aligning with requirements already imposed by the states of Wyoming and Utah, which supports our conclusion that the limit is achievable, and reduces confusion for operators in those states. Finally, BLM believed that the 1,800 Mcf/well/month limit, as averaged over a lease, unit, or communitization agreement and with a three-year phase-in, would allow operators to effectively plan strategies to minimize venting and flaring of oil well gas, while simultaneously providing an effective development time to allow operators to measure and reach target capture levels. These assessments were refined through the public comment process.

The BLM considered comments on the Proposed Rule that recommended prohibiting both venting and flaring, either immediately or after a phase-out period. The BLM did not develop such an alternative for analysis because such a prohibition was viewed as technically infeasible and impractical for an operator to meet. The BLM also considered comments favoring a 3,000 Mcf/well/month or higher flaring limit. We did not develop such an alternative for detailed analysis because the data and our analysis showed that such a limit would not reduce gas waste enough to fulfill the purpose and need for the rulemaking.

Because the Final Rule allows operators to average across all their oil operations, even as broadly as statewide, it becomes much more difficult to predict how operators will respond to meet the requirements for flaring reductions. Without this location information or cost data on each individual oil operator and operation, it is difficult to ascertain on which locations operators might focus to reduce flaring. Thus, in order to generate an estimate of the likely

costs of reducing these flared volumes in each state, it was necessary to make certain assumptions regarding how operators could respond to the requirements to meet these capture targets. For further information on the BLM's process in arriving at the flaring requirements in the Final Rule, see the RIA at Section 7.6.

The BLM also considered requiring operators to repair only those leaks for which the sales of the recovered gas would pay for the cost of the repair, or only those leaks above a specified volume. Ultimately, the BLM proposed that the operator repair all detectable leaks, since the available data indicate that the vast majority of leaks can be repaired with a payback period of less than one year, and repair of all leaks more effectively reduces waste.

The BLM requested comment on several other approaches or concepts in the preamble of the Proposed Rule, including the following:

- whether to assess higher royalty rates for all production from a lease on which the operator is routinely flaring gas from development wells and prohibiting routine flaring of associated gas from new development wells;
- whether to set a different frequency of inspection, as well as whether the inspections should be carried out by a third party, by the operator (i.e. in-house), or by a combination of the two, through third-party confirmation of in-house inspection results;
- whether to focus operators' LDAR efforts on higher production wells; and
- whether to modify or waive the LDAR requirements for low-producing "stripper" wells.

As a general matter, the BLM decided not to analyze the environmental impacts of each of the suggested changes that it did not adopt, because doing so would have resulted in an impractical number of potential alternatives that would not better inform the public or the decisionmaker, and would complicate the EA without enhancing it.

Further information and data on the above alternatives specifically pertaining to economic implications is available in the Regulatory Impact Analysis document accompanying this Rule.

3. Affected Environment

This section describes the existing baseline condition of the human environment that may be affected by implementing the No-Action Alternative (Alternative A), the Proposed Rule (Alternative B), or the Final Rule (Alternative C). In doing so, this section broadly describes elements of the environment in which BLM-administered oil and gas leases affected by this Rule are located. More importantly, however, this section focuses on describing existing trends related to environmental impacts of venting and flaring operations on Federal and Indian oil and gas leases. This description will provide a baseline against which to compare the potential effects of the proposed action. This section also includes a description of how environmental impacts of oil and gas operations, such as impacts to climate change and air quality, are currently addressed under the existing regulatory framework.

3.1 Area and Background Environmental Conditions

As stated in Section 1.1, the BLM manages more than 245 million acres of public lands and administers about 700 million acres of mineral estate in the United States. Public lands under the management of the BLM are extraordinarily diverse, and include desert mountain ranges, coastal areas, alpine tundra, evergreen forests, expanses of rangeland, and red rock canyons. The BLM manages these lands for a variety of resource values and uses, including recreation, conservation, mining, livestock grazing, rights-of-way, and oil and gas development.

The BLM oversees the development of federal mineral resources in 32 states (Figure 1; also listed below). Domestic production from 96,000 Federal onshore oil and gas wells accounts for 11 percent of the Nation's natural gas supply and 5 percent of its oil. In Fiscal Year (FY) 2015, operators produced 183.4 million barrels (bbl) of oil, 2.2 trillion cubic feet (Tcf) of natural gas, and 3.3 billion gallons of natural gas liquids (NGLs) from onshore Federal and Indian oil and gas leases. The majority of the Federal Government's onshore oil and gas leases are located in the West; however, many of the environmental effects of the Final Rule are expected to be consistent on Federal and Indian lands throughout the United States wherever the BLM has management responsibilities.

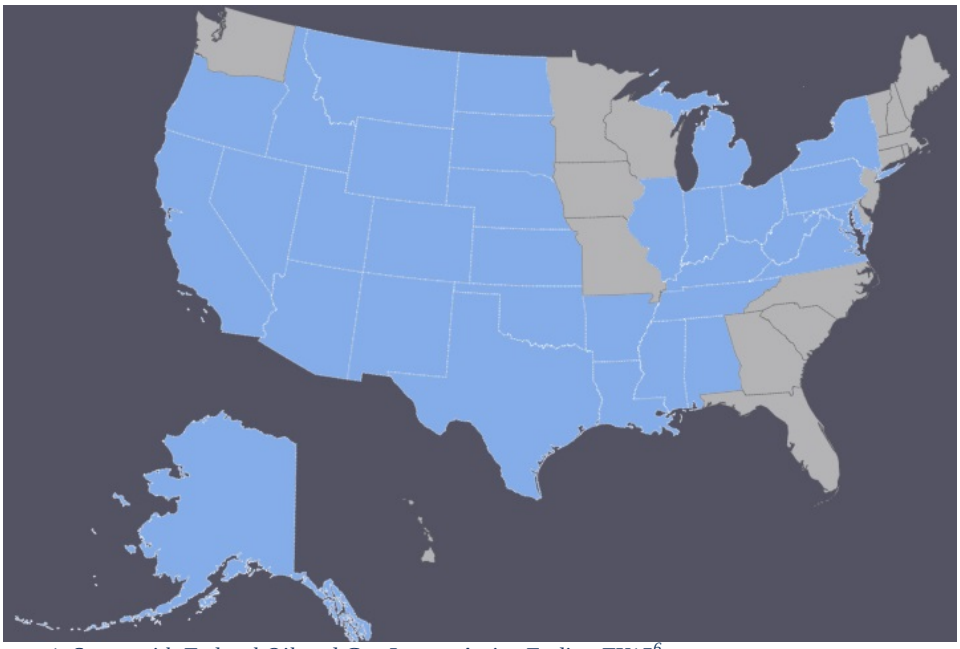


Figure 1. States with Federal Oil and Gas Leases Active Ending FY15[6]

[6] BLM Energy Program Data, http://www.blm.gov/wo/st/en.

States with Current (FY15 Year-end) Onshore Federal and Indian Oil and Gas Leases

Alabama	Kansas	New Mexico	Texas
Alaska	Kentucky	New York	Utah
Arizona	Louisiana	North Dakota	Virginia
Arkansas	Maryland	Ohio	West Virginia
California	Michigan	Oklahoma	Wyoming
Colorado	Mississippi	Oregon	
Idaho	Montana	Pennsylvania	
Illinois	Nebraska	South Dakota	
Indiana	Nevada	Tennessee	

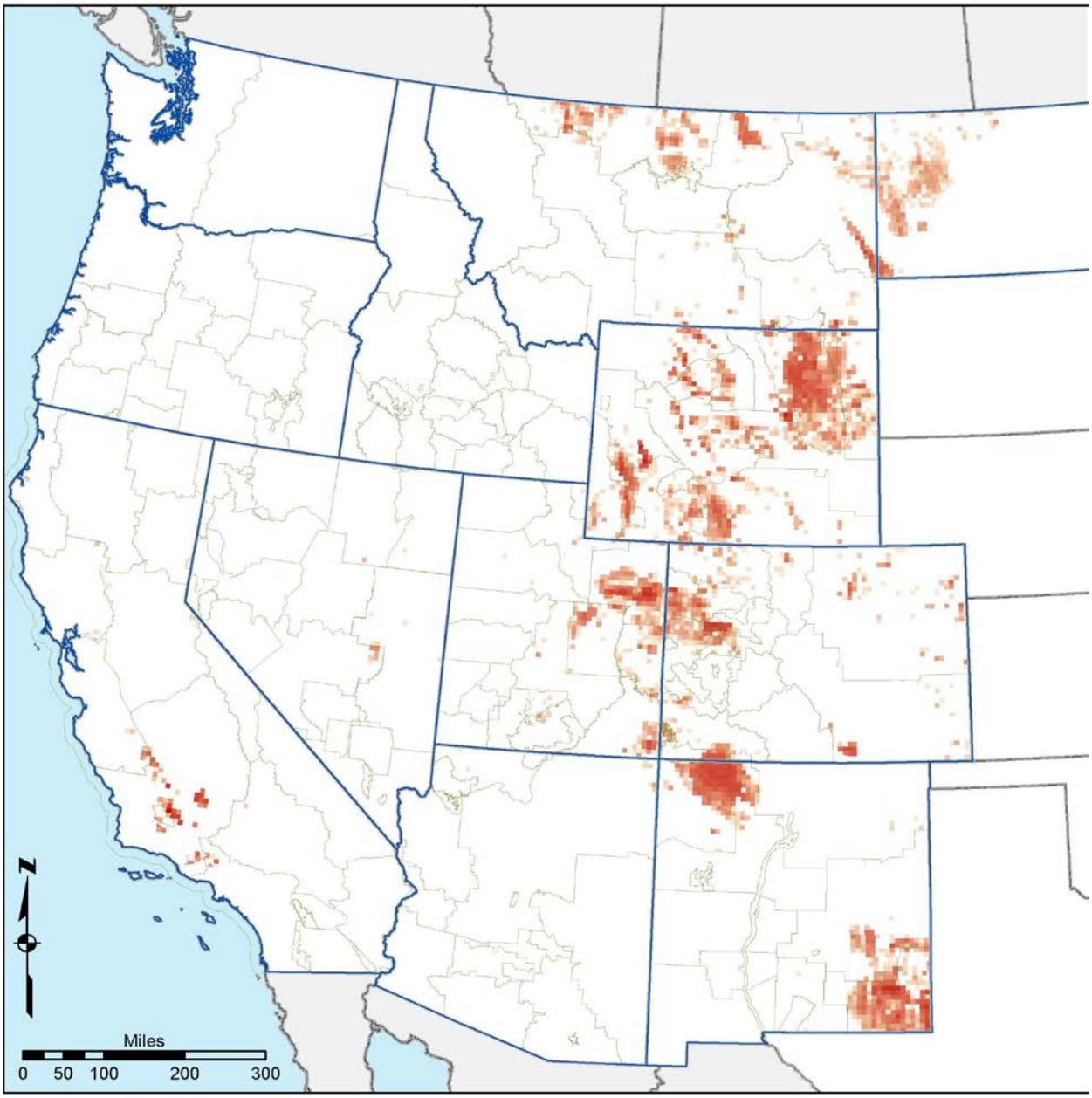
Since 2010, the BLM has been completing analyses known as Rapid Ecoregional Assessments (REAs). These REAs are intended to improve the Bureau's understanding of the existing condition of the landscapes in which public lands are located, and how those conditions may be altered by ongoing environmental changes and land use demands. REAs look across ecoregions (areas defined by their environmental conditions, especially climate, landforms, and soil characteristics) to describe, among other things, how resources on such lands are being affected by climate change, wildfires, invasive species, and development, among other impacts. Examples of ecoregions include the Sonoran Desert, the Columbia River basin, and the Colorado Plateau. This EA incorporates by reference the findings of the relevant REAs governing the lands in which Federal and tribal oil and gas leases are located.[7]

The BLM's land use plans provide the framework that guides the decision for every action and approved use that occurs on lands managed by the Bureau. Figure 2, on the following page, illustrates the land use planning area boundaries and regions where oil and gas development administered by the BLM occurs throughout the American West. Development in Eastern states is sparse and thus is not depicted in the map for ease of description. The types of impacts and benefits discussed herein are expected to occur in the Eastern states in which Federal oil and gas development takes place, but proportional to the level of development.

Table 1 lists the land use planning areas in which oil and gas development primarily occur. Each land use plan contains a detailed description of the physical, biological, cultural, and socioeconomic environment within the boundaries of the plan. The description of the affected environment includes the resource values, resource uses, special designations, and socioeconomic settings present within each planning area. The environmental impact statement associated with each land use plan also contains a detailed description of the existing condition and trends of the physical, biological, cultural, and socioeconomic elements of the human environment within the boundaries of a given planning area. This EA incorporates by reference the affected environment descriptions from the EISs associated with each plan identified in Table 1.

[7] For more information about REAs, please refer to: http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/reas.html.

Federally Administered Oil and Gas Activity in the Western U.S



U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Washington Office
Minerals and Realty Management

Well Density
1 Well
3000 Wells

Boundaries
LUP Boundary
State Boundary

This map is intended for display purposes only. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data, or for purposes not intended by the BLM. This map may not meet National Map Accuracy Standards. This product was developed through digital means and information may be updated without notification.

This map was created by WO-300 staff on 2011.12.21

Map uses a UTM Zone 13 North (NAD83) Projection

Intensity of color within the map is proportional to the level of oil and gas development within a specific area. This analysis is based on the amount of wells per township that are administered by the BLM.

Figure 2.

Table 1: Summary of Land Use Plan Names			
BLM STATE OFFICE	**LAND USE PLAN NAME**	**BLM STATE OFFICE**	**LAND USE PLAN NAME**
AK	Ring of Fire RMP	NM	White Sands RMP
	Nat'l Petroleum Reserve AK IAP[8]	NV	Wells RMP
AZ	Arizona Strip National Monument		Elko RMP
CA	Caliente RMP		Tonopah RMP
	South Coast RMP		Ely RMP
	Sierra RMP	OR/WA	Prineville RMP
	Hollister RMP	UT	Randolph MFP
	Ukiah RMP		Pony Express RMP
	West Mohave RMP		Moab RMP
CO	Grand Junction RMP		Monticello RMP
	Little Snake RMP		Richfield RMP
	Kremmling RMP		Vernal RMP
	Northeast RMP		Price RMP
	White River RMP		Kanab RMP
	Glenwood Springs RMP	WY	Green River RMP
	Royal Gorge RMP		Buffalo RMP
	San Juan/San Miguel RMP		Newcastle RMP
	Canyons of the Ancients NM[9] RMP		Grass Creek RMP
MT/DK	North Dakota RMP		Washakie RMP
	Powder River RMP		Cody RMP
	Big Dry RMP		Lander RMP
	Billings RMP		Jack Morrow Hills RMP
	West Hi-Line RMP		Casper (Platte River) RMP
	Judith, Valley, and Phillips RMP		Pinedale RMP
	Upper Missouri River Breaks NM RMP		Rawlins RMP
NM/OK/ TX/KS	Rio Puerco RMP		Kemmerer RMP
	Taos RMP	ES	Southeastern States RMP
	Carlsbad RMP		Alabama/Mississippi RMP
	Farmington RMP		Florida RMP
	Roswell RMP		Wisconsin RMP

3.2 Venting and Flaring on Federal and Indian Lands

The venting of natural gas from oil and gas leases generally occurs during drilling and production activities (such as during well completions, liquids unloading, emergency events where the gas cannot be flared, etc.), or during operation of production equipment. Some

[8] "Integrated Action Plan," a planning document that functions as an RMP for this area of Alaska.
[9] "National Monument."

equipment uses the gas for production purposes (for example, on-site generators), while other equipment may passively vent gas either intentionally (for example, pneumatic devices) or unintentionally (for example, leaky storage tank valves).

Multiple independent studies, including the above-described investigation performed by the GAO, have identified the following oil and gas activities as being the primary sources of vented and flared gas:

Table 2: Venting and Flaring Operations on BLM-administered Oil and Gas Leases

Source	Description
Gas flaring from production operations, including associated gas	*Associated gas* (or casinghead gas) is the natural gas that is produced from an oil well during normal production operations and is either sold, re-injected, used for production purposes, vented, or flared, depending on whether the well is connected to a gathering line or other method of capture.
	Production tests (or productivity tests) are "tests in an oil or gas well to determine its flow capacity at specific conditions of reservoir and flowing pressures."[10] To determine the maximum well flow rate, the operator may flare or vent for a period of time; but it is also possible to calculate the maximum flow rate while capturing the gas in a sales line.
	Emergency venting or flaring may be necessary for safety reasons. Emergency situations include circumstances where there is a failure of the equipment that is capturing or using the natural gas.
Well completions and workovers	Well completion refers to the process of converting a drilled well to a producing well. A well workover is "the repair or stimulation of an existing production well for the purpose of restoring, prolonging or enhancing the production of hydrocarbons."[11] Releases of natural gas may occur during any well completion and workover.
Pneumatic controllers	Pneumatic controllers are automated instruments used for maintaining a process condition, such as liquid level, pressure, pressure difference and temperature. Depending on the design, controllers are most often powered by pressurized natural gas. Natural gas-driven pneumatic controllers come in a variety of designs for a variety of uses, but can generally be classified as continuous, intermittent, low, and zero bleed-rated pneumatic controllers. The bleed-rate represents the rate at which a particular device may release natural gas into the atmosphere for its intended purpose.
Pneumatic pumps	Pneumatic pumps are devices that use gas pressure for chemical injection or glycol circulation, and are generally used at oil and natural gas production sites where electricity is not readily available. The supply gas for these pumps is most often natural gas from the

[10] "Productivity test" as defined by the Schlumberger Oilfield Glossary.
[11] "Workover" as defined by the Schlumberger Oilfield Glossary, http://www.glossary.oilfield.slb.com/en/.aspx.

Source	Description
	production stream. The gas leaving the exhaust port of the pump is either directly discharged into the atmosphere or is recovered and used as a fuel gas or stripping gas.
Liquids unloading	In producing gas wells, fluids may accumulate in the wellbore and impede the flow of gas, sometimes halting production itself. Gas wells naturally have sufficient pressure to produce both formation fluids and gas early on, but as production continues and reservoir pressure declines, the gas velocity in the production tubing may not be sufficient to lift the formation fluids out of the well. When this occurs, liquids may accumulate in the tubing, causing a further drop in pressure, slowed gas velocity, and raised pressure at the perforations. When the bottom-hole pressure becomes static, gas flow stops and all liquids accumulate at the bottom of the well tubing. Liquids accumulating in the well may be removed by several methods, and the volume vented into the atmosphere may be less for one method compared with another. In all cases, some venting will occur. The largest volumes are vented when an operator elects to purge a well, which entails shutting-in the well to increase bottom-hole pressure and then venting (opening) the well to the atmosphere. This allows for all liquids trapped in the well to be removed/vented directly into the atmosphere.
Oil and condensate storage tanks	Crude oil and condensate tanks or vessels are used on-site to store produced hydrocarbons and other fluids. In most cases, an operator will direct recovered fluids from the well to a separator, with the hydrocarbons then directed to the storage tanks. During storage, light hydrocarbons dissolved in the crude oil or condensate vaporize and collect in the space between the tank liquids and the tank roof. These vapors are often vented to the atmosphere when the liquid level in the tank subsequently fluctuates. Losses of gas vapors generally occur when oil is dumped into the tank, the fluids within the tank are circulated or agitated, or when the temperature changes.
Leaks	Production sites with the potential for natural gas leaks include natural gas well pads, oil wells that co-produce natural gas, gathering and boosting stations, gas processing plants, and transmission and storage infrastructure. Leaked natural gas results in methane and VOC emissions to the atmosphere. If the well is connected to a gathering line for production purposes, then the leaked gases represent lost production, and therefore lost revenue for both the operator and the Government.

The BLM evaluated recent trends in flaring on BLM-administered leases using data from the Office of Natural Resources Revenue (ONRR). These data indicate that the total amount of annual reported flaring from oil and gas wells on Federal and Indian leases increased by 109 percent from 2009 through 2013. Applications the BLM received to allow operators to vent or

flare gas also increased twelvefold, from 50 in 2005 to 622 in 2011, and then doubled again over the next three years to 1,248 in 2014.

For baseline purposes, the BLM estimated the amount of natural gas that was vented or flared from BLM-administered leases in 2014. Tables 4a and 4b below display these figures:

Table 4a: Estimated Vented Gas from Federal and Indian Leases in 2014, by Source

Natural Gas Lost Through Venting	
Source	**Volume (Bcf)**
Well completions	1.12
Pneumatic controllers	14.93
Pneumatic pumps	2.32
Gas Engines	1.06
Compressors	0.52
Liquids Unloading	3.26
Storage Tanks	2.94
Other Production (Includes Leaks)	4.01
Total Venting	**30.15**

Table 4b: Estimated Flared Gas from Federal and Indian Leases in 2014, by Mineral Ownership,[12] Volume in Bcf

Source	**Mineral Ownership**			**Total**
	Federal	**Indian**	**Non-Federal, Non-Indian**	
Flared oil-well gas	26.1	15.2	35.6	76.9
Flared gas-well gas	2.3	0.5	1.2	4
Total	**28.4**	**15.8**	**36.7**	**80.9**

For further background on venting and flaring operations, please refer to Chapter 3 of the Regulatory Impact Analysis (RIA) prepared for the Final Rule.

3.3 Existing Regulatory Framework

As noted above, the Bureau's existing requirements for venting, flaring, and royalty-free use of gas are contained in Notice to Lessees and Operators of Onshore Federal and Indian Oil and Gas Leases, Royalty or Compensation for Oil and Gas Lost 4A (NTL-4A). NTL-4A, was issued in December 1979, before the BLM assumed oversight responsibility for onshore oil and gas development and production. Its basic provisions are as follows:

[12] The flared volume represents all natural gas flared from Federal and Indian leases, but the ownership of those minerals is mixed between Federal, Indian, and non-Federal non-Indian owners. The estimates illustrated in this table represent flared gas from the Federal, Indian, and other mineral estate owners.

- NTL-4A prohibits venting or flaring of gas well gas, and it prohibits venting or flaring of oil well gas unless approved in writing by the "Supervisor." Both prohibitions are subject to specified exemptions for emergencies, certain equipment malfunctions, certain well tests, and vapors from storage vessels. The rule does provide, however, that the Supervisor may approve an application for the venting or flaring of oil well gas if justified either by the submittal of:
  - An evaluation report demonstrating that the expenditures necessary to market or beneficially use such gas are not economically justified and conservation of the gas would lead to the premature abandonment of recoverable oil reserves; or
  - An action plan that will eliminate venting or flaring of the gas within 1 year from the date of application.

- NTL-4A specifies the circumstances under which an operator owes royalties on oil and gas lost from a lease. NTL-4A provides that royalties are due on gas that is "avoidably lost," as defined in the rule.

- NTL-4A authorizes royalty-free venting or flaring of gas on a short-term basis without the need for approval under specified circumstances, including during: (1) emergencies; (2) well purging and evaluation tests; and (3) initial production tests.
  - Emergencies include circumstances such as equipment failures, for up to 24 hours per incident and up to 144 cumulative hours per lease per month.
  - Well purging and evaluation tests include the unloading or cleaning up of a well during drillstem, producing, routine purging, or evaluation tests, not exceeding a period of 24 hours.
  - Initial production tests includes initial well evaluation tests, for up to 30 days or up to 50 million cubic feet (MMcf) of gas, whichever occurs first.

- Finally, NTL-4A provides that gas vapors that are released from storage vessels or other low-pressure vessels are considered to be unavoidably lost and not subject to royalties, unless the Supervisor determines that the recovery of vapors would be warranted.

In addition to NTL-4A, various environmental analysis documents associated with project-specific environmental impact statements describe and analyze how oil and gas development projects may impact applicable air quality standards. Examples of these analysis documents include the following:

- BLM, 2008, Pinedale Anticline Project Area Supplemental Environmental Impact Statement
  - http://www.blm.gov/wy/st/en/info/NEPA/documents/pfo/anticline/seis.html
- BLM, 2010, West Tavaputs Plateau Project Final Environmental Impact Statement
  - http://www.blm.gov/ut/st/en/fo/price/energy/Oil_Gas.html
- BLM, 2010, Greater Natural Buttes Environmental Impact Statement
  - http://www.blm.gov/ut/st/en/fo/vernal/planning/nepa_.html
- BLM, 2012, GASCO Energy Inc. Uinta Basin Natural Gas Development Project Final Environmental Impact Statement
  - http://www.blm.gov/ut/st/en/fo/vernal/planning/nepa_.html

- BLM, 2012, Continental Divide-Creston Natural Gas Project Expansion Draft Environmental Impact Statement
  - http://www.blm.gov/wy/st/en/info/NEPA/documents/rfo/cd_creston.html

The decisions associated with these projects include, among other things, mitigation measures designed to reduce emissions from various sources that may adversely impact air quality. Some of the mitigation measures incorporated in these individual decisions are intended to reduce the amount of federal and Indian gas emitted into the atmosphere, and were considered as part of this rulemaking.

4. Environmental Effects

This chapter evaluates the direct, indirect, and cumulative effects on the human environment that may occur as a result of implementing the Proposed Rule (Alternative B), the Final Rule (Alternative C), or the No-Action Alternative.

The Council on Environmental Quality ("CEQ") NEPA implementing regulations at 40 CFR 1508.8(a) define "direct effects" as "those effects which are caused by the action and occur at the same time and place."

CEQ's regulations at 40 CFR 1508.8(b) define "indirect effects" as those effects "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on water and air and other natural systems, including ecosystems."

"Cumulative impact" is defined in CEQ's NEPA regulations at 40 CFR 1508.7 as the "impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions[.]"

This EA analyzes the impacts of the two action alternatives compared to the No Action Alternative, which is the current environmental baseline. This analysis focuses primarily on elements of the action alternatives that would require an operator to perform an activity that it might not otherwise perform under the No Action Alternative.

Independent of the BLM's proposed action, newly-finalized EPA regulations on oil and gas production under the Clean Air Act are expected to affect the current baseline environment. On September 18, 2015, the EPA published a Proposed Rule to establish and update new source performance standards (NSPS) for emissions of methane and VOCs from oil and gas production (80 FR 56593).[13] EPA finalized these regulations on June 3, 2016, and codified them at 40 C.F.R. Part 60 as Subpart OOOOa.[14] These standards apply to new, modified, and reconstructed

[13] EPA, *Oil and Natural Gas Sector: Emission Standards for New and Modified Sources, Proposed Rule,* 80 FR 56593 (Sept. 18, 2015).
[14] EPA, *Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources*, Final Rule, 81 FR 35824 (June 3, 2016).

emissions sources in the oil and gas production sector, and while they target VOC emissions, they also require actions that cause reductions in venting and leaks of gas.

There is some potential overlap between the BLM rule and the EPA rule with respect to several categories of new, modified, and reconstructed sources. Specifically, both rules could apply to oil well completions, and to new, modified, and reconstructed sources subject to LDAR requirements. The BLM has made revisions between the Proposed and Final Rules, in close consultation with EPA, to minimize overlap or duplication. For example, in many cases, the BLM rule specifies that compliance with relevant EPA provisions is deemed to be compliance with the corresponding provision of the BLM rules. For further information on this overlap, see the preamble to the Final Rule. As a practical matter, the BLM rule would have no impact on the vast majority of oil well completions, including all hydraulically fractured and refractured completions. Further, the environmental benefits of the LDAR requirements with respect to new, modified, and reconstructed sources on Federal and Indian leases, units, and communitized areas could be attributed to either rule.

As explained in detail below, additional truck traffic associated with Alternative C is projected to generate small quantities of additional air emissions compared to the No Action Alternative, and further small additions when compared to Alternative B. However, Alternative C would avoid much larger quantities of air emissions in the forms of methane, VOCs and HAPs from venting, and would reduce GHGs released from flaring that would otherwise occur under the No-Action Alternative. Overall, Alternatives B and C would both provide substantial climate and air quality benefits, compared to the No Action Alternative. Alternative C provides slightly greater reductions in methane emissions than Alternative B, while Alternative C provides lesser reductions in air emissions than Alternative B. Overall, Alternative C contains features that reduce the administrative and cost burdens on operators, as well as other benefits, that make it a more optimal alternative than Alternative B, for both the BLM and its stakeholders.

4.1 Environmental Effects of Alternative A – No Action

Under the No Action Alternative, the BLM would not issue a rule to reduce the waste of natural gas from venting, flaring, and leaks that occur during oil and natural gas production activities on onshore Federal and Indian leases, units, and communitized areas. None of the requirements prescribed by Alternatives B or C, the Proposed or Final Rule, would be promulgated, and operators would continue their current practices, consistent with the BLM's existing requirements in NTL-4A and applicable state and Federal regulations.

Under the No Action Alternative, the BLM would continue to administer its existing oil and gas regulations and prepare environmental documents under NEPA when making decisions allowing for the development of BLM-administered oil and gas resources. On a project-by-project basis, the BLM could, where appropriate, limit venting or flaring.

The following discussion summarizes how losses of natural gas from oil and gas operations (whether vented, flared, or leaked) affect climate change and air quality, as well as how related noise and light affect wildlife, recreation, and dwellings and communities, under the No Action Alternative. This section incorporates by reference analyses of applicable environmental impacts

and mitigation measures contained in recent EISs prepared by the BLM for the land use plans identified in Table 1, in order to provide context regarding the types of effects and their magnitude that would be expected under the No Action Alternative.

4.1.1. Climate Change

This section discusses the contribution of greenhouse gases (GHGs), primarily methane, from venting, flaring, and leaks of gas to global climate change, as well as the impacts of climate change generally and in regions of the U.S. where oil and gas extraction on Federal and Indian leases is taking place. Under the No Action Alternative, the BLM projects that GHG emissions from venting, flaring, and leaks of gas from existing sources on Federal and Indian leases would continue more or less unabated, potentially modified to some degree by state requirements and voluntary industry actions in some areas. GHG emissions from new, modified, and reconstructed sources are expected to decrease as a result of the EPA's new source performance standards (NSPS) Subpart OOOOa Rule.

While both venting and flaring contribute to GHG emissions, venting contributes primarily methane, with small amounts of CO_2 and other air pollutants, while flaring contributes primarily CO_2. Not all gas is combusted during flaring; the uncombusted portion contributes small amounts of methane and other air pollutants, but significantly less than venting the same volume of gas. This is particularly important when considering methane's global warming potential (GWP) value of 88, compared to CO_2's GWP of 1. Finally, emissions from truck and other vehicle traffic associated with Federal oil and gas development contribute GHGs in the form of CO_2 and other pollutants from exhaust emissions.

Climate Change and Methane Emissions

In December 2014, CEQ issued revised draft guidance explaining how agencies should consider both the potential effects of a proposed action on climate change and the implications of climate change for the environmental effects of a proposed action. CEQ issued finalized guidance on August 1, 2016. In it, CEQ encourages all Federal agencies to consider the extent to which a proposed action and its reasonable alternatives would contribute to climate change, through GHG emissions, and take into account the ways in which a changing climate may impact the proposed action and any alternative actions, change the action's environmental effects over the lifetime of those effects, and alter the overall environmental implications of such actions. The guidance recommends quantifying GHG emissions of a proposed action and action alternatives when possible, and describing the current and expected future state of the affected environment without the proposed action, based on authoritative climate change reports.

The following discussion provides context regarding the relationship between the waste of natural gas from oil and gas operations and global warming, climate change, and methane emissions. It also describes the current and expected future state of the environment in which the proposed action would take place, in light of global climate change.

In May 2014, the U.S. Global Change Research Program (USGCRP) issued the 3rd National Climate Assessment (Assessment), which the BLM considers to be a comprehensive and authoritative report[15] on the impacts of climate in the United States. The USGCRP was established by Presidential Initiative in 1989 and mandated by Congress in the Global Change Research Act GCRA of 1990 to develop and coordinate a comprehensive and integrated United States research program which will assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change.

The Assessment found that since record keeping began in 1895, the U.S. average temperature has increased by 1.3°F to 1.9°F; most of this increase has occurred since about 1970. It also states that "[s]ince 1991, in particular, temperatures have averaged 1°F to 1.5°F higher as compared to temperatures over most of the United States from 1901-1960, except for the Southeast, where the warming has been less than 1°F. On a seasonal basis, long-term warming has been greatest in winter and spring."[16] The most recent decade was the nation's warmest on record.[17]

The Assessment also projects that warming will continue for all parts of the nation during this century. In the next few decades, in particular, this warming will be roughly 2°F to 4°F in most areas, with the largest temperature increases projected for the Upper Midwest and Alaska.[18] Although this increase is attributed in part to natural variability, the amount of climate change expected for the next two to three decades is a combination of the warming already built into the climate system by the past history of human emissions of GHGs, and the expected ongoing increases in emissions of those gases.[19] The report goes on to state that reductions in some short-lived human-induced emissions that contribute to warming, such as methane, could reduce some of the projected warming over the next couple of decades, because, unlike carbon dioxide, these gases and particles have very high warming potentials but relatively short atmospheric lifetimes.[20]

According to the Assessment, currently observed and projected climate change impacts will vary across different regions[21] of the United States and affected lands. Those regions where Federal and Indian oil and gas leases are predominantly located (or may be located in the near future) include the Great Plains, Southwest, and Alaska. The following discussion describes how climate change is currently affecting and will likely continue to affect these regions. All of these changes and others detailed further in the Assessment are occurring in one way or another on lands the BLM manages. With greater temperature increases, these effects are expected to continue and intensify.

---

[15] Third National Climate Assessment – http://s3.amazonaws.com/nca2014/low/NCA3_Climate_Change_Impacts_in_the_United%20States_LowRes.pdf?download=1
[16] Ibid. p.29.
[17] Ibid. p.61.
[18] Ibid. p. 29.
[19] Ibid, p. 28–29.
[20] Ibid, p. 8.
[21] Ibid, p.369.

Great Plains Region

On the Great Plains, rising temperatures will likely result in increased energy use, particularly for cooling. Energy used for cooling purposes is provided almost entirely by electricity, while energy for heating is based on multiple delivery forms and fuel types, including electricity, natural gas, heating oil, passive solar, and biofuel. Under the conditions of longer/hotter summers and warmer winter temperatures, the balance of energy use among delivery forms and fuel types will likely shift from natural gas and fuel oil used for heating to electricity used for air conditioning. In hotter conditions, more fuel and energy are required to generate and deliver electricity, so increases in air conditioning use and shifts from heating to cooling in the Great Plains will increase primary energy demands.[22]

From an energy supply perspective, the Great Plains is rich with resources, primarily from coal, oil, and natural gas, with growing wind and biofuel industries. However, energy production from these sources requires the use of significant amounts of water. For example, water is necessary to cool coal-fired power plants that produce electricity, and water is needed to irrigate energy crops used for biofuels. Hydraulic fracturing to release oil and natural gas from these lands may also contribute to water shortages. Although hydraulic fracturing is a small component of total water use nationwide, it can be a significant proportion of water use in local groundwater systems. The trend toward more dry days and higher temperatures in this region will also increase evaporation and decrease water supplies. These changes may add stress to limited water resources and affect management choices related to irrigation, municipal use, and energy generation.[23]

Southwest Region

In the Southwest, drought and increased temperatures have caused extensive tree deaths, and winter warming has exacerbated bark beetle outbreaks by allowing more beetles, which normally die in cold weather, to survive through the winters, reproduce, and infect more trees. Wildfire and bark beetles killed trees across 20% of Arizona and New Mexico forests from 1984 to 2008.[24] Numerous fire models project more wildfire as climate change continues, with models projecting a doubling of burned area in the southern Rockies toward the end of the century, and up to a 74% increase in burned area in California in the same timeframe. Wildfires can destroy homes, expose slopes to erosion and landslides, threaten public health, and cause economic damage. Wildfires can also contribute to an upslope shift of vegetation, spread of invasive plants, and conversion of forests to woodland or grassland.[25]

Alaska Region

Climate change impacts in Alaska are already pronounced, due mainly to the rapidity of warming and the presence of cold-adapted biota and landscape features. These impacts include earlier spring snowmelt, reduced sea ice, widespread glacier retreat, warmer permafrost, drier landscapes, and more extensive insect outbreaks and wildfires. Over the past 60 years, Alaska has warmed more than twice as rapidly as the rest of the United States, with state-wide average

[22] Ibid, p. 116.
[23] Ibid, p.446.
[24] Ibid, p. 468.
[25] Ibid, p. 468.

annual air temperature increasing by 3°F and average winter temperature by 6°F. Permafrost near the Alaskan Arctic coast has warmed 4°F to 5°F at 65-foot depths since the late 1970s and 6°F to 8°F at 3.3 foot depth since the mid-1980s. This is of particular concern because average annual temperatures are projected to rise by an additional 2°F to 4°F by 2050 and 80% of the land in Alaska is underlain by permafrost. Permafrost thaw can lead to subsidence of the surface. Depending on its severity, uneven sinking of the ground can lead to damage of public infrastructure, such as buildings, pipelines, roads, and airports. The Assessment states that permafrost thaw is estimated to add between $3.6 and $6.1 billion (10% to 20%) to current costs of maintaining public infrastructure.[26] As a result of reduced sea ice, the northern Arctic Ocean is becoming more accessible for marine traffic, including trans-Arctic shipping, oil and gas exploration, and tourism; however, reduced sea ice can also have negative effects on various wildlife species. Polar bears, seals, and walruses, for example, spend a large portion of the year on sea ice, but have recently been coming ashore much earlier and more often due to reduction in sea ice area. Such change in their life cycle adds stress, affecting their ability to properly breed and feed in their natural habitat. In recent years, large numbers of walrus have abandoned the ice and come ashore. The high concentration of animals results in increased competition for food and can lead to stampedes when animals are startled, resulting in trampling of calves.[27]

4.1.2. Air Quality

In addition to contributing to climate change, the venting, flaring, and leakage of natural gas can also affect local air quality. Natural gas contains volatile organic compounds (VOCs), which are precursors to ozone and particulate matter, and various toxic air pollutants, such as benzene. These air pollutants affect the public health and welfare of humans, as well as the health of plant and wildlife species.

Both the venting and flaring of natural gas result in the emission of VOCs and other hazardous air pollutants (HAPs) such as benzene, NOx, and sulfur oxides, among others. Venting results in far more of these emissions than flaring, because gas is combusted during flaring, converting it into mostly carbon dioxide. However, since flares are not 100% efficient, there is a small amount (~5% or less) of uncombusted gas released during a flare. This uncombusted gas is comprised of mostly methane, but also contains small percentages of VOCs and HAPs. Finally, oil and gas operations also lead to the release of additional air pollutants such as particulate matter, HAPs, nitrogen oxides, and carbon monoxide from the exhaust emissions of associated truck and other vehicle traffic.

Ozone

Ozone is one of the primary air pollutants controlled under the National Ambient Air Quality Standards (NAAQS), under the Clean Air Act. The NAAQS are set at the level requisite to protect public health with an adequate margin of safety. Ozone is a powerful oxidant that can inflame and damage the airways, causing coughing, a burning sensation, wheezing, and shortness of breath. It can worsen bronchitis, emphysema, and asthma. These effects may lead to

[26] Ibid, p. 516.
[27] Ibid, p. 518.

increased school absences, medication use, visits to doctors and emergency rooms, and hospital admissions. Children in particular are at greatest risk from exposure to ozone because their lungs are still developing and they are more likely to be active outdoors when ozone levels are high, increasing their exposure. Research also indicates that ozone exposure may increase the risk of premature death from heart or lung disease.[28]

Exceedances of the ozone standards under the NAAQS have occurred in Northeastern Utah, where the BLM oversees numerous oil and gas operations from Federal and Indian leases. In 2012, the BLM approved the *Greater Natural Buttes Area Gas Development Project*, which is a long-term field development project to drill, complete, and produce approximately 3,675 wells on existing Federal leases in a project area encompassing approximately 163,000 acres located in Northeast Utah. The EIS for the project acknowledged that given the quantity of emissions anticipated by the project—the proposed action would add approximately 2,213 tpy of nitrous oxide (NOx) and 6,617 tpy of VOC emissions (representing increases of 22 and 4 percent, respectively) to the regional air quality emission levels—and the levels of ozone in the winter at the time the Record of Decision (ROD) for the EIS was signed, there likely would be an incremental increase in regional ozone levels resulting from the Proposed Action.[29] As part of the BLM's ROD for that project, an air resource management strategy was established to reduce impacts to air quality, especially ozone. [30]

According to the EPA, exposure to ozone has been associated with a wide array of vegetation and ecosystem effects as well. These effects include reduced growth and/or biomass production in sensitive plant species and forest trees, reduced crop yields, visible foliar injury, reduced plant vigor (e.g., increased susceptibility to harsh weather, disease, insect pest infestation, and competition), species composition shift, and changes in ecosystems and associated ecosystem services.[31]

Particulate Matter

VOCs entrained within the natural gas vented into the atmosphere can also serve as a precursor to the formation of particulate matter, specifically when they react with other chemicals, such as NOx and sulfur oxides in the atmosphere.[32] On BLM-managed lands, particulate matter is of specific concern because of its potential to impact air quality related values (AQRV). AQRVs are attributes of relatively pristine areas (such as National Parks and Wilderness Areas) that Federal land managers specifically protect, the primary example of which is visibility and visual

[28] Ground-level Ozone Health Effects – http://www3.epa.gov/ozonepollution/health.html (accessed November 2015)
[29] DOI-BLM 2012, Greater Natural Buttes Area Gas Development Project FEIS pp. 4-12.
[30] The strategy is described in the ROD. Greater Natural Buttes Area Gas Development Project ROD, 7-1, 7-2 (http://www.blm.gov/style/medialib/blm/ut/vernal_fo/planning/greater_natural_buttes/record_of_decision.Par.86388.File.dat/Cover_ROD.pdf); Greater Natural Buttes Area Gas Development Project Appendix A, A-2 to A-5 (http://www.blm.gov/style/medialib/blm/ut/vernal_fo/planning/greater_natural_buttes/gnbfeis_iv.Par.51557.File.dat/f_Cover_Volume_II_through_Appendix_F.pdf).
[31] U.S. Environmental Protection Agency (U.S. EPA). 2013. Regulatory Impact Analysis Final New Source Performance Standards and Amendments to the National Emissions Standards for Hazardous Air Pollutants for the Oil and Natural Gas Industry, p. 4-27 – Accessed January 7, 2016.
[32] *See* EPA's website on Air Emission Sources, Basic Information, available at http://www3.epa.gov/air/emissions/basic.htm.

resources. Particulate matter can contribute to visibility impairment in two ways—plume impairment and regional haze. Plume impairment occurs when a section of the atmosphere becomes visible due to the contrast or color difference between a discrete pollutant plume and a viewed background, such as a landscape feature. Regional haze is caused by light scattering and light absorption of particulate matter (typically 2.5 microns or smaller) and gases in the atmosphere, causing a general alteration in the appearance of landscape features, changing the color or contrast between landscape features, or causing features of a view to disappear.

In 2008, the BLM approved the *Pinedale Anticline Oil and Gas Exploration and Development Project*, which is a long-term field development project to drill, complete, and produce approximately 4,999 wells on existing Federal leases in a project area encompassing approximately 198,037 acres located in Southwestern Wyoming. An air quality modeling system was used to estimate the level of visibility impacts that could be expected from the project's emissions. In particular, the model estimated there would be visibility impacts to eight pristine areas within proximity to the project area, as well as visibility impacts on local regional communities, that would be above the BLM's threshold of significance.[33] The BLM's ROD for this project included mitigation measures to reduce visibility and ozone-related air impacts.[34]

Particulate matter also harms public health, and it is regulated under the NAAQS. According to the EPA, health effects from particulate matter include premature mortality for adults and infants, cardiovascular morbidity such as heart attacks, hospital admissions, respiratory morbidity such as asthma attacks, acute and chronic bronchitis, hospital and ER visits, lost work days, restricted activity days, and respiratory symptoms.[35] Although releases of natural gas contribute to particulate matter formation, BLM's air modeling efforts to date have not projected exceedances of the particulate matter standards for proposed oil and gas projects.

Finally, particulate matter composed of SO_2 or NO_x can contribute to acidic atmospheric deposition on the landscape. Air pollutants are deposited by precipitation and by gravitational settling of pollutants.[36] Acidic deposition can have a multitude of environmental effects, including making lakes and streams acidic, particularly in regions where lakes are nearly acidic and surrounding soils have a low buffering capacity to neutralize any rain falling on the ground and flowing into these lakes.[37]

[33] US DOI BLM 2008, Pinedale Anticline Oil and Gas Exploration and Development Project FEIS p. 4-84.
[34] US DOI BLM 2008, Pinedale Anticline Oil and Gas Exploration and Development Project ROD, 25-28 (http://www.blm.gov/style/medialib/blm/wy/information/NEPA/pfodocs/anticline/rod.Par.50775.File.dat/00ROD.pdf).
[35] U.S. Environmental Protection Agency (U.S. EPA). 2013. Regulatory Impact Analysis Final New Source Performance Standards and Amendments to the National Emissions Standards for Hazardous Air Pollutants for the Oil and Natural Gas Industry, p. 4-27 – Accessed January 7, 2016.
[36] US DOI BLM 2008, Pinedale Anticline Oil and Gas Exploration and Development Project FEIS p. 3-8
[37] See EPA's website, Effects of Acid Rain, available at https://www.epa.gov/acidrain/effects-acid-rain for more information.

Hazardous Air Pollutants

According to the EPA, the main hazardous air pollutants (HAPs) of concern from the oil and natural gas sector are benzene, toluene, carbonyl sulfide, ethyl benzene, mixed xylenes, and n-hexane.[38] HAPs are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects (e.g., reduced fertility or birth defects), damage to the immune system, and neurological, developmental, respiratory and other health problems.[39] For example, EPA has classified benzene as a known human carcinogen.[40]

In 2012, the BLM approved the *Gasco Energy Inc. Uinta Basin Natural Gas Development Project*, which is a long-term project to drill, complete, and produce approximately 1,300 new gas wells on existing Federal leases in a project area encompassing approximately 207,000 acres located in Northeast Utah. The results from the air modeling system used to project increases in and impacts from HAPs (benzene, toluene, ethylbenzene, xylene and methanol were the principal air toxics) were compared to applicable Federal and state toxic screening levels. All modeled results were below the applicable thresholds.[41] Although the modeling simulations for that project did not demonstrate exceedances of applicable thresholds, HAPs are a concern to the BLM and the public because of their cancer-causing and other serious health effects.

4.1.3. Dwellings and Communities – Noise and Light

Oil and gas operations can also affect the human environment, specifically dwellings and communities, by producing noise and light. Flaring, in particular, can be loud and very bright, depending upon the size of the flare. In 2014, operators vented about 30 Bcf and flared at least 81 Bcf of natural gas from BLM-administered leases, totaling 4.1 percent of the total production from those leases in that year, and sufficient gas to supply nearly 1.5 million households with gas for a year.[42] Although many Federal and Indian oil and gas operations take place in rural areas, some of these operations occur near dwellings, where noise and light generated by well flaring operations can have an impact.

For example, in 1999, the first EIS that analyzed oil and gas exploration and development in the Pinedale Anticline noted that there were potential well sites less than 800 feet from a residence and considerable noise impacts were expected to occur at these locations. The EIS noted that noise from well flaring operations during the initial testing of a well is very loud; some members of the public liken the sound to that of a "jet engine."[43] An oil and gas development in Wyoming found flaring operations exceeded 66 dBA at 0.1 mi, and neared 98 dBA on-site

[38] Regulatory Impact Analysis of the Proposed Emission Standards for New and Modified Sources in the Oil and Natural Gas Sector, 2015, p. 4-31.
[39] EPA Air Toxics Web Site – http://www3.epa.gov/ttn/atw/allabout.html.
[40] US EPA, Benzene Hazard Summary (http://www3.epa.gov/ttn/atw/allabout.html).
[41] US DOI BLM 2012, Gasco Energy Inc. Uinta Basin Natural Gas Development Project FEIS Appendix L-15.
[42] RIA at 16-17.
[43] US DOI BLM 1999, Pinedale Anticline Oil and Gas Exploration and Development Project DEIS pp. 4-77, available at http://www.blm.gov/style/medialib/blm/wy/information/NEPA/pfodocs/anticline.Par.4905.File.dat/044chap4.pdf.

Similarly, as part of the outreach forums the BLM sponsored in the spring of 2014, members of the public testified and submitted comment letters to the BLM about nearby oil and gas operations raising concerns about noise from flaring. For example, one commenter stated: "We felt as if we were living right on the Denver airport tarmac." These impacts are not limited to initial well testing, but can also occur on an ongoing basis at wells with large quantities of associated gas that is flared instead of captured.

Members of the public have also expressed concerns that the bright light of flares can dominate the skies at night, interfering with natural darkness and changing the character of predominately rural, relatively light-free areas.

4.1.4. Recreation –Noise and Light

Flaring also impacts recreational values on lands managed by the BLM. For example, certain lands in Utah covered by the Moab Master Leasing Plan contain a wide range of recreation opportunities throughout the planning area. The majority of recreationists in these areas are participating in activities that emphasize solitude and undisturbed night skies and landscapes.[44] Light pollution reduces the naturalness and opportunities for primitive recreation within lands with wilderness characteristics.[45]

While the BLM has not quantified the impacts that noise from flaring operations has had on recreational opportunities, it is reasonable to assume that such noise could adversely affect recreationists seeking to experience the quiet and solitude of a natural environment.

4.1.5. Wildlife –Noise and Light

Noise and light from flaring operations can also affect wildlife. The *Continental Divide-Creston Natural Gas Development Project Draft EIS* stated that the loudest noise generated from oil and gas operations came from drilling and initial well-test flaring operations.[46] The EIS noted that noise can modify sage-grouse behavior and habitat-use patterns such as the use of critical winter habitat or sage-grouse leks.[47] The *Jonah Infill Drilling Project Final EIS* described noise levels from typical sources within and near a natural gas field. Flaring operations at the Jonah field

---

[44] US DOI BLM 2015, Moab Master Leasing Plan and Draft Resource Management Plan Amendments DEIS pp. 3-52, available at http://www.blm.gov/style/medialib/blm/ut/moab_fo/mlp_2015_documents/draft_rmp_amendment.Par.63788.File.dat/Moab%20MLP_Chapter-3_Web_508.pdf.

[45] US DOI BLM 2015, Moab Master Leasing Plan and Draft Resource Management Plan Amendments DEIS pp. 4-33, available at http://www.blm.gov/style/medialib/blm/ut/moab_fo/mlp_2015_documents/draft_rmp_amendment.Par.78667.File.dat/Moab_MLP_Chapter-4_Web_508.pdf.

[46] US DOI BLM 2012, Continental Divide-Creston Natural Gas Development Project Draft EIS, pp. 4-205, available at http://www.blm.gov/style/medialib/blm/wy/information/NEPA/rfodocs/cd_creston.Par.77653.File.dat/V-I-Ch4-EnvConsequence.pdf.

[47] US DOI BLM 2012, Continental Divide-Creston Natural Gas Development Project Draft EIS, pp. 4-207, available at http://www.blm.gov/style/medialib/blm/wy/information/NEPA/rfodocs/cd_creston.Par.77653.File.dat/V-I-Ch4-EnvConsequence.pdf.

measured at 97.9 decibels on the A-scale (dBA) onsite and 66.3 dBA at 0.1 miles from the location. The use of a flowback separator decreased flaring noise to 63.7 dBA on site.[48]

While the BLM has not studied how light from flaring has affected wildlife, it is reasonable to presume that such impacts could also deter wildlife from using habitat adjacent to an oil and gas wellpad. For some species, flares could have the opposite effect, attracting wildlife to the light source and potentially causing injury or death. Further, since wells can flare for years, wildlife could avoid well sites or experience stress from the noise and light for extended periods of time.

Under the No Action Alternative, the types of impacts described above would continue largely unabated, except for implementation of EPA's rule. The BLM would continue to evaluate mitigation as part of its planning- or project-level environmental analysis under NEPA, but would be able to require mitigation measures only on a case-by-case basis as conditions of the agency's approval decision.

4.1.6. Threatened and Endangered Species and Critical Habitat

The BLM has conducted information consultation with the FWS on this Rule and has prepared a Biological Assessment (BA) to which FWS has concurred. The BA is incorporated by reference herein.

Species listed as endangered or threatened under the Endangered Species Act (ESA), and their designated critical habitats, are present in the regions of the United States where BLM-regulated oil and gas operations take place. These species and their critical habitat are protected by the ESA and by conditions of approval and mitigation requirements that the BLM imposes on oil and gas operations that are approved by the FWS or NMFS. Those protections would continue under the No-Action Alternative.

Under current regulations, the BLM reviews proposed activities on oil and gas leasehold lands that will result in additional surface disturbance, as well as applications for pipeline rights of way across federal lands under BLM jurisdiction or the jurisdiction of two or more federal agencies. Thus, potential site-specific impacts occur only after a separate BLM review of subsequent actions and a determination of the appropriate level of compliance with applicable laws, including the ESA. These site-specific review processes would continue under the No Action Alternative.

4.1.7. Socioeconomic Effects

As part of this rulemaking process, the BLM prepared a Regulatory Impact Analysis (RIA) to estimate the costs and benefits of the proposed action. Detailed information, including a thorough discussion of the economic impacts expected from the implementation of the Proposed Rule, can be found in the RIA. The compliance costs for the Proposed Rule can be categorized into two types; "private costs" are those incurred by oil and gas industry operators as a result of

[48] US DOI BLM 2006, Jonah Infill Drilling Project Final EIS, pp. 3-46, available at http://www.blm.gov/style/medialib/blm/wy/information/NEPA/pfodocs/jonah.Par.1828.File.dat/09chap3.pdf.

the implementation of the rule (such as costs of implementing a leak detection and repair program), and "public costs" are those incurred by society as a result of the rule (such as the additional amount of carbon dioxide from the combustion of natural gas that would otherwise have been vented). The benefits of the Proposed Rule are not categorized in this way, as they are expected to be beneficial to both private and public entities.

Under the No Action Alternative, these private and public entities would incur no additional costs associated with the proposed venting and flaring regulations. Similarly, the No Action Alternative would not result in socio-economic benefits to these entities.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires Federal agencies to incorporate environmental justice as part of their missions. Specifically, it directs them to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations. For a description of the geographic distribution of low-income and minority populations in the areas affected by this rulemaking, please refer to the applicable *Affected Environment* sections of the EISs for the RMPs listed in Table 1. The No Action Alternative would not result in systemic changes to environmental justice impacts to minority and low-income populations in areas adjacent to Federal and Indian oil and gas development.

4.1.8. Cumulative Effects

The cumulative impacts to the human environment that would likely result from the promulgation of the Rule are nearly identical in scope to those that are currently occurring as a result of existing Federal regulations, State and local regulatory efforts, and voluntary industry activities. Under the No Action Alternative, these impacts would continue in much the same manner as they currently occur.

Multiple activities related to the exploration, development, and production of oil and natural gas resources have already affected the environment of Federal and Indian lands in and around currently-leased Federal oil and gas reserves. Under the No Action Alternative, these activities are expected to continue, both in the same areas and in areas that may be leased in the future. Examples of these activities include the construction of roads, facility pads (including well pads and centralized tank batteries), pipelines, gathering lines, compressor stations, and electrical transmission lines; drilling, completion, and production of wells; venting, flaring, and leaking of gas (with resultant emissions of VOCs, HAPs, and GHGs) from existing sources; and the interim and final reclamation of facility pads. EPA's Subpart OOOOa Rule is expected to decrease air pollution emissions from venting, flaring, and leaking of gas from new, reconstructed, and modified sources under the No-Action Alternative. State regulations in place are also currently limiting gas vented and flared to a limited extent. Of the States with extensive oil and gas operations on BLM-administered leases, only one has comprehensive requirements to reduce flaring, and only one has comprehensive statewide requirements to control losses from venting and leaks.[49] Furthermore, State regulations do not apply to BLM-administered leases on Indian

[49] 81 Fed. Reg. at 6636.

lands, and States do not have a statutory mandate or trust responsibility to reduce the waste of Federal and Indian oil and gas. For more information on EPA's Subpart OOOOa Rule and State regulations, see the preamble to the Final Rule at Section III.B.3.

These oil and gas related activities, to date, have contributed land surface disturbance, noise pollution, light pollution, and air pollution that, taken together, impact wildlife, air quality, climate, socioeconomics, and recreational opportunities in the immediate area where oil and gas development occurs. However, as oil and gas fields play out, wells and infrastructure are removed and reclaimed, even as others are being developed in other fields. The impacts are therefore temporary, and the relationship between Federal oil and gas development and surface disturbance and associated air quality impacts/etc. is not correlated linearly. There are times during which development proceeds at a higher rate than reclamation; at these times, environmental impacts tend to be higher in aggregate. Conversely, there are times during which reclamation is more prevalent than new development; here, these environmental impacts tend to be lower.

Under the No Action Alternative, the BLM's site-specific inspection and approval procedures would still apply to any surface-disturbing project, and would ensure evaluation and mitigation of site-specific adverse impacts.

Section 5, below, discusses the cumulative impacts of other BLM regulatory efforts involving Federal and Indian oil and gas production, specifically the revisions to Onshore Orders 3, 4, and 5. These rules are expected to take effect regardless of which alternative is selected for implementation, and would have no effect on the No Action Alternative for this Rule.

4.2. Environmental Effects of Alternative B – Proposed Rule

Alternative B, the Proposed Rule, would reduce the amount of natural gas vented, leaked, and flared from Federal and Indian oil and gas leases compared to the No Action Alternative by prohibiting venting except in limited circumstances, limiting flaring of associated gas from oil wells and requiring the capture or control of natural gas from well completion and re-completion operations, pneumatic controllers, pneumatic pumps, liquids unloading operations, oil and condensate storage tanks, and leaks from various production equipment, upon the effective date of the Proposed Rule. This would lead to a reduction in the waste of federal and Indian natural gas.

The Proposed Rule would result in capture and control of a substantial percentage of the natural gas that would be released under the No Action Alternative, thereby reducing various air pollutants and pollutant precursors, HAPs, and GHGs that would otherwise be generated by continuing similar levels of venting and flaring under the No Action Alternative. Reduced flaring would also decrease both noise and light pollution, thereby lessening impacts of noise and light on communities living near oil and gas development, wildlife (including protected species), night-sky resources, and recreationists. The BLM also projects net socio-economic benefits from Alternative B, as calculated in the RIA for the Proposed Rule.

The BLM expects there would be minor to negligible adverse environmental effects from implementation of Alternative B. Most of these adverse impacts would stem from operators' compliance with the proposed flaring limit requirements. As previously discussed, the BLM expects that most operators would comply with the proposed flaring limits through one or more of the following actions: (i) curtailing production to keep flaring below the proposed limit; (ii) installing (or speeding installation of) gathering pipelines to connect to pipeline infrastructure systems, or install (or speed installation of) compressors to increase pipeline capacity to allow for transport of additional natural gas; (iii) using mobile gas capture and transport technology, which includes NGL recovery and CNG trucking; or (iv) applying for an exemption from the requirements.

In particular, localized and temporary adverse environmental impacts are expected from the use of mobile gas capture and transport technology. Impacts would also be created from the installation and operation of any gathering pipelines and compressors that would be used to capture gas. As discussed in the RIA for the Proposed Rule, the BLM does not project that operators will build new gathering pipelines or install compressors in response to this rule, beyond those that would have been constructed or installed under the No Action Alternative. Rather, the BLM expects that the rule would accelerate these activities, reducing the time lag between well development and capture infrastructure. Such possible future activities on Federal and Indian leases, units, or communitized areas will be subject to site-specific NEPA review and to project-specific mitigation measures and conditions of approval, as warranted.

To a lesser extent, adverse impacts could also occur from various activities conducted to comply with the flaring requirements under Alternative B. Below, we describe the individual activities that we projected operators would conduct if they elect to use mobile gas capture and transport technology or build gathering lines or install compressors, as well as actions operators would take to comply with the flaring requirements under the Proposed Rule, Alternative B.

Most or all of the sections below describe generalized and/or aggregate potential impacts, not site-specific impacts. The BLM does not presently have information to determine under what circumstances an operator might elect to comply with the Proposed Rule by employing mobile capture and transport technology, versus building a gathering line, constructing a new compressor station, or seeking an exemption from the Proposed Rule's flaring requirements. The BLM (and other relevant agencies) will have future opportunities to identify and mitigate potential impacts due to site-specific construction activity because prior approval of such activities is required via a Sundry Notice, Special Use Permit (SUP), or Right-of-Way (ROW) grant authorized under Section 28 of the MLA or Title V of FLPMA.

Assumptions Made as Part of the Impact Analysis

The following list outlines the BLM's assumptions about oil and gas operators' likely responses to the BLM's Proposed Rule, Alternative B, to limit the loss of gas. This summary is based on a more detailed discussion of our assumptions, which is provided in the RIA for the Proposed Rule at Chapter 7 and the Appendix.

- *Limits on Flaring Associated Gas* – To comply with this requirement, the BLM expects that operators may:
  - Curtail production to keep flaring below the proposed limits and allowances;
  - Accelerate construction of gathering lines to connect a well to pipeline infrastructure systems and/or speed installation of additional compressors to expand pipeline capacity and allow for increased transport of associated natural gas; or
  - Use mobile gas capture and transport technology, which may include:
    - Natural gas liquid (NGL) recovery – separating NGLs (heavier hydrocarbons that can be stored as liquids under pressure) from raw associated gas at wellpads, so that NGLs can be trucked or piped to market; or
    - Compressed natural gas (CNG) trucking – compressing lean associated gas at wellpads and trucking it to processing plants or consumers.
- *Requirement to Capture, Flare, or Inject Gas Produced During Well Drilling and Well Completions/Re-completions* –
  - For well drilling operations, operators are anticipated to meet the requirement by using a drilling rig fitted with a flare to capture and direct the gas to the flare. However, operators already typically control gas from drilling operations as a matter of safety and best operating practices. Thus, the BLM does not expect operators to perform any new action in response to the requirements for drilling operations.
  - For well completions and re-completions, the BLM estimates that the proposed requirements would practically impact only conventional oil and gas well completions, which we expect would be about 116 – 146 completions per year. All emissions related to hydraulically fractured well completions or recompletions would be subject to the requirements EPA's OOOOa rule. For development oil wells completed or recompleted using hydraulic fracturing techniques, the BLM projects that operators would use reduced emissions completion (REC) equipment to capture gas – a three-phase separator unit in particular – on 50% of the wells, while the other 50% of wells would be flared. The BLM would expect operators to flare the gas from completion and re-completion operations on exploratory and delineation wells, since these types of wells are not likely to be close to existing pipelines.
- *Pneumatic Controllers* – The BLM estimates that the proposed pneumatic controller requirements would affect up to about 15,600 existing high-bleed pneumatic devices. To comply, operators would replace existing controllers with new low-bleed controllers or rout the controller exhaust to a flare device.
- *Pneumatic Pumps* – The BLM estimates that this requirement would affect about 8,775 existing pumps. To comply, operators would replace existing pumps with new pumps that meet the applicable requirements or control the releases from the pump by routing them to a flare.
- *Liquids Unloading* – The BLM estimates that the proposed liquids unloading requirements would affect up to about 1,550 existing wells and about 25 new wells per year. We anticipate operators would meet this requirement by remaining on site during liquids unloading events or installing lift systems.
- *Storage Tanks* – The BLM estimates that the proposed tank requirements would impact about 300 existing storage tanks. We anticipate operators would comply with this requirement by installing combustors or vapor recovery units (VRU) on existing tanks to comply with the Proposed Rule.

- *Leak Detection And Repair* – The BLM estimates that the proposed LDAR requirements would affect up to about 36,700 well sites per year. The BLM anticipates that operators would likely comply with this requirement by using hand-held leak detection equipment to inspect production equipment, and repairing the leaks found.

With respect to construction of gathering lines and installation of additional compression, the BLM does not project that the Proposed Rule is likely to drive operators to engage in construction that they would not have otherwise undertaken absent the rule. The BLM believes that the Proposed Rule would *accelerate* the construction of gathering lines and/or installation of compressors that would have otherwise been developed under the No Action Alternative. Nevertheless, to ensure that the EA appropriately evaluates all possible effects of the proposed action, the EA includes a discussion of the impacts of gathering line construction and compressor installation, as if an increase in such activities would be anticipated as a result of the Proposed Rule.

Mobile Gas Capture and Transport Technology

As stated above in Section 1.5, Alternative B, the BLM's Proposed Rule, analyzed the process of stripping natural gas liquids, or NGLs, from produced gas, and transporting these via truck. This analysis, which can be found in Section 4.2.1 of the EA for the Proposed Rule, is also included below. It was completed in response to the BLM's determination that NGL trucking was a reasonably foreseeable industry response to the Proposed Rule. However, during the comment period for the Proposed Rule, the BLM received comments from industry indicating that this was not the case; therefore, the analysis of the Final Rule focuses on the environmental effects of trucking compressed natural gas (CNG) as the more likely approach to gas capture. To estimate the impacts of the increase in CNG trucking, the EA uses a base estimate of 15 miles one-way per truck trip and calculates the additional CO2-equivalent emissions from trucking based on the volume of the trucks and the volume of gas that operators are expected to capture, compress, and truck under the rule.

Increased use of mobile gas capture and transport technology could cause an increase in truck traffic to transport the compressed natural gas or processed natural gas liquids from the oil wells to a gas processing plant. To calculate potential increases in truck traffic as a result of Alternative B, the BLM reviewed 2014 lease-level flaring data from ONRR for leases in North Dakota and New Mexico (where aggregate flaring was the highest). We combined this flaring data with well data from the Automated Fluid Mineral Support System (AFMSS) to determine the number of wells associated with each lease included in the ONRR dataset, and we attempted to geo-locate the leases. We were able to locate about 36% of the federal leases with flaring in North Dakota and New Mexico, and about 26% of the total federal leases with flaring nationwide. With the matched leases, we calculated the distance to the nearest gas processing plants and determined which leases might already be connected to a pipeline system.

Using this information, we constructed seven scenarios representing potential operator responses to the proposed flaring limit. Of these seven scenarios, the BLM projected that operators would be likely to use mobile capture and transport technology in two of them. Specifically, the BLM identified leases located within 20 miles of a gas processing plant, at which the operator is currently flaring in excess of the proposed flaring limit by more than 40 Mcf per day, and the

lease is either connected or not connected to a gas pipeline. In these cases, the BLM believed the available quantity of gas and the short transit distance would make mobile capture and transport economically feasible. For the five other cases, we expected the operator to curtail production or to request an alternative flaring limit or exemption from the flaring limit. In those cases, the BLM would not expect any new adverse impacts.

Tables 5a and 5b show the leases from the matched dataset that are either connected or unconnected to a pipeline where flaring from the lease is more than 40 Mcf per day above the Proposed Rule's flaring limit during the 3-year period over which the limit is phased in. Each table shows the total volume of gas flared, the number of affected leases and wells, and the total distance of these leases and wells to gas processing plants that are within 20 miles of an affected connected or unconnected lease.

Table 5a: Unconnected Leases Less than 20 Miles from a Gas Processing Plant

Phase-In Flaring Limit Equivalent	Flared volume (Mcfy)	Leases	Wells	Total distance to processing plants (mi)
60 Mcf per day or 1,800 Mcf per month (year 3)	6,229,717	88	179	1,039
120 Mcf per day or 3,600 Mcf per month (year 2)	5,439,949	63	129	781
240 Mcf per day or 7,200 Mcf per month (year 1)	4,232,788	43	92	533

Table 5b: Connected Leases Less than 20 Miles from a Gas Processing Plant

Phase-In Flaring Limit Equivalent (Mcfd)	Flared volume (Mcfy)	Leases	Wells	Total distance to processing plants (mi)
60 Mcf per day	4,460,995	58	108	641
120 Mcf per day	3,949,790	44	75	487
240 Mcf per day	3,232,673	25	45	299

Because we do not know which mobile capture technology an operator may select, we estimated both the amount of truck traffic that might be expected if NGL stripping was the preferred method of compliance and the amount of truck traffic that might be expected if natural gas compression was the preferred method.

NGL Scenario

Under an NGL scenario, the BLM assumes that 1 Mcf of natural gas is converted to 1.25 gallons NGLs. Transport of the NGLs would be accomplished through tanker trailers capable of holding up to 12,600[50] gallons of NGLs. With these assumptions, the BLM converted the flared volumes from all the leases identified in Tables 5a and 5b into NGLs and established an average volume of NGLs that would be produced per lease during the 3-year phase-in period in order to

[50] *See e.g.,* Alliance Truck and Tank LPG/NH3 Transport Trailer Specifications, available at https://alliancetruckandtank.files.wordpress.com/2015/02/alliance-transtrailer-spec_fob-tx.pdf.

determine an average amount of truck trips that can be expected from a lease. Table 6 illustrates the results of this calculation and includes the other data points used to determine truck trips, including average volume of NGLs in gallons produced per day (gpd), that could be produced per lease per day during a given phase-in period and the average distance between a lease and a gas processing plant.

Table 6: Average Truck Trips Per Lease if Associated Gas is Converted to NGLs

Phase-In Period (Mcfd)	Unconnected Lease			Connected Lease		
	Avg. Vol. NGL Produced Per Lease Per Day (gpd)[1]	Avg. Dist. to Gas Plant (mi)[2]	Average Round Trips Per Year[3]	Avg. Vol. NGL Produced Per Lease Per Day (gpd)[1]	Avg. Dist. to Gas Plant (mi)[2]	Average Round Trips Per Year[3]
60	242	12	14	263	12	15
120	296	12	17	307	11	18
240	337	12	20	443	11	26

[1] Flared volume in Tables 5a/b ÷ 365 × 1.25 ÷ number of leases impacted during phase-in period in Tables 5a/b
[2] Total distance to processing plants in Tables 5a/b ÷ number of leases impacted during phase-in period in Tables 5a/b
[3] Average volume NGL produced per lease per day ÷ 12,600 × 2 × 365

Table 7 illustrates the total number of truck trips that would be expected from all the matched leases, connected and unconnected, in Tables 5a and 5b during the 3-year phase-in period. Total annual truck trips for all leases was calculated by multiplying the total number of leases impacted during a given phase-in period by the average round trip per lease that was calculated in Table 6.

Table 7: Total Truck Trips for All Leases if Associated Gas is Converted to NGLs

Phase-In Period (Mcfd)	Unconnected Lease			Connected Lease		
	Leases	Avg. Round Trip Per Lease Per Year	Total Round Trips Per Year	Leases	Avg. Round Trip Per Lease Per Year	Total Round Trips Per Year
60	88	14	1,236	58	15	885
120	63	17	1,079	44	18	784
240	43	20	840	25	26	641

CNG Scenario

Under a CNG scenario, the BLM assumes that a trailer capable of holding up to 526,612 standard cubic feet of gas[51] would be used to store and transport the produced natural gas. Based on this bulk storage capacity, the BLM converted the annual flared volumes from all the leases identified in Tables 5a and 5b into daily flared volumes in order to estimate the average number of truck trips that would take place annually per lease during the 3-year phase-in period. Table 8

[51] For example, see Hexagon Composites Titan Specifications, available at http://www.hexagonlincoln.com/mobile-pipeline/titan/titan-specifications

illustrates the results of this calculation and includes the other data points used to determine truck trips, including average natural gas production volume per lease per day and the average distance traveled between a lease and a gas processing plant.

Table 8: Average Truck Trips Per Lease if Associated Gas is Compressed

Phase-In Period (Mcfd)	Unconnected Lease			Connected Lease		
	Avg. Vol. Flared Per Lease Per Day (scfd)[1]	Avg. Dist. to Gas Plant (mi)[2]	Avg. Round Trips Per Lease Per Year[3]	Avg. Vol. Flared Per Lease Per Day (scfd)[1]	Avg. Dist. to Gas Plant (mi)[2]	Avg. Round Trips Per Lease Per Year[3]
60	193,951	12	269	210,722	11	292
120	236,571	12	328	245,940	11	341
240	269,690	12	374	354,266	12	491

[1] Flared volume in Tables 5a/b ÷ 365 × 1000
[2] Total distance to processing plants in Tables 5a/b ÷ number of leases impacted during phase-in period in Tables 5a/b
[3] Average volume flared per lease per day ÷ 526,612 × 2 × 365

Table 9 illustrates the total number of truck trips that would be expected from all the matched leases, connected and unconnected, in Tables 5a and 5b during the 3-year phase-in period. Total annual truck trips for all leases was calculated by multiplying the total number of leases impacted during a given phase-in period by the average round trip per lease that was calculated in Table 6.

Table 9: Total Truck Trips for All Leases if Associated Gas is Compressed

Phase-In Period (Mcfd)	Unconnected Lease			Connected Lease		
	Leases	Avg. Round Trips Per Lease Per Year	Total Round Trips Per Year	Leases	Avg. Round Trips Per Lease Per Year	Total Round Trips Per Year
60	88	269	23,660	58	292	16,942
120	63	328	20,660	44	341	15,001
240	43	374	16,076	25	491	12,277

After estimating the truck trips to the matched leases in both cases, the total truck trips are scaled up by multiplying the trips by a factor of 3.82 to represent the estimated impacts on all leases with oil-well gas flaring. The factor was calculated as the number of unique leases with oil-well gas flaring in the ONRR dataset (or 2,057) divided by the number of matched leases (or 539). Using this approach assumes that the matched leases are representative of the leases in the larger dataset. Tables 10 and 11 illustrate the total amount of truck trips on all connected and unconnected leases less than 20 miles from a gas processing plant with oil-well gas flaring emitting more than 40 Mcfd above the flaring limit.

Table 10: Total Truck Trips for All Affected Leases if Associated Gas is Compressed

Phase-In Period (Mcfd)	Unconnected Leases		Connected Leases	
	Total Round	Total Round	Total Round	Total Round

	Trips Per Year For Matched Leases	Trips Per Year For All Leases (x3.82)	Trips Per Year For Matched Leases	Trips Per Year For All Leases (x3.82)
60	23,660	90,380	16,942	64,719
120	20,660	78,922	15,001	57,303
240	16,076	61,409	12,277	46,899

Table 11: Total Truck Trips for All Affected Leases if Associated Gas is Converted to NGLs

Phase-In Period (Mcfd)	Unconnected Leases		Connected Leases	
	Total Round Trips Per Year For Matched Leases	Total Round Trips Per Year For All Leases (x3.82)	Total Round Trips Per Year For Matched Leases	Total Round Trips Per Year For All Leases (x3.82)
60	1,236	4,722	885	3,381
120	1,079	4,123	784	2,994
240	840	3,208	641	2,450

In both CNG and NGL scenarios, we expect the existing unconnected leases will become connected to pipelines within the first three years of implementation, and that the infrastructure for connected leases would provide the necessary pipeline transportation capacity to reduce the need to flare. However, we also expect that new wells will be drilled and come on line. Those new wells might not be connected to pipelines at the time of well completion or there might be temporary upsets in the pipeline such that operators would want to flare. Thus, we estimate that in years four through ten, the intensity of truck trips would be similar to what is projected during the third year of the phase-in period. Subsequent sections discuss how this increased truck traffic could affect the environment.

Installation of Additional Gathering Pipelines and Pipeline Compression Capacity

As discussed above, the BLM expects that operators would be unlikely to meet the flaring requirement in the Proposed Rule merely by installing gathering pipelines or adding compressors that would not have been installed absent the rule, although these activities could be accelerated as a result of the Proposed Rule. Nevertheless, to ensure that the EA appropriately evaluates all possible effects of Alternative B, we include the following discussion of the impacts of gathering line construction and compressor installation.

Gathering pipelines are 4- to 6-inch-diameter pipelines that run from the wellhead to a gas transmission line. If an operator elects to build a gathering line, various types of heavy equipment would be used to install the line, typically including trenching machines, excavators, bulldozers, and offset booms. Trenchers and excavators would be used to dig the trench in which the pipeline would be placed by the offset booms. Prior to laying the pipe in the trench, segments of pipes would be welded in place adjacent to or within vicinity of the trench. Once the pipe is in the trench, a bulldozer or other similar type of earth moving equipment would be used to replace spoil materials back into the trench. In some cases where bedrock material is encountered, the pipeline might be placed on the surface or rotary jackhammers would be used to cut through the bedrock material to create a trench, or the bedrock material may be detonated

with small-scale blasts to break up the rock so it may easily be excavated. Other equipment that would be used includes pickup trucks to transport workers and flatbed trailers to transport heavy equipment to and from a work site. Pipeline infrastructure equipment that would be installed on a permanent basis may include valves to manage the flow of fluids running through the pipe, pipeline inspection gauge ("pig" or "pigging") facilities to clean and inspect the interior of the pipeline, and tie-in risers for possible connections to gathering lines from wells.

Another option to reduce flaring is to boost the capacity of existing pipelines by constructing a new compressor station along an existing pipeline route or adding compressors to an existing compressor station. The surface area needed to install and operate a compressor station will vary depending on the circumstances of a given project, including, but not limited to, the volume of gas that the station is expected to accommodate. However, for reference purposes, the area for an entirely new compressor station could be as much as 3 acres in size, while far less surface area would be disturbed by adding compressors to an existing compressor station.

Miscellaneous Activities Conducted to Reduce Venting

Other requirements of Alternative B, the Proposed Rule, may also lead operators to perform on-the-ground activities. Replacing existing pneumatic pumps and controllers with new pumps and controllers, installing lift systems for liquids unloading, and installing combustors or vapor recovery units (VRU) on existing tanks would require one-time truck trips to wellsites to perform these tasks. Performing leak detection and repair inspections would require one to four truck trips per year, likely using pickup trucks. However, these inspection trips could be integrated with other maintenance visits to reduce the number of truck trips.

4.2.1. Climate Change

Beneficial Impacts of Alternative B

As discussed above, methane is the second most prevalent GHG emitted in the United States, and oil and gas operations are the largest industrial source of methane emissions. Although methane's lifetime in the atmosphere is short-lived compared to carbon dioxide, methane is an especially powerful greenhouse gas, with climate impacts roughly 34 times those of carbon dioxide, if measured over a 100-year period, or 86 times those of carbon dioxide, if measured over a 20-year period.[52]

The USGCRP assessment noted that reductions in some short-lived human-induced emissions that contribute to warming, such as methane, could reduce some of the projected warming over the next couple of decades, as these gases and particles have relatively short atmospheric lifetimes compared to carbon dioxide.

Table 12 illustrates the estimated amounts of methane that would be avoided on an annual basis under Alternative B. We have broken down these estimated reductions by requirements of the rule related to flaring, venting, and leaks.

[52] See Intergovernmental Panel on Climate Change, Climate Change 2013: The Physical Science Basis, Chapter 8, *Anthropogenic and Natural Radiative Forcing*, at 714 (Table 8.7), available at https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf.

Table 12: Estimated Methane Reductions (tons) for Alternative B

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Well Completion	1,100	1,100	1,100	1,200	1,200	1,200	1,300	1,300	1,300	1,400
Pneumatic Controllers	43,400	43,400	43,400	43,400	43,400	43,400	43,400	43,400	43,400	43,400
Pneumatic Pumps	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000
Liquids Unloading	29,800	30,300	30,700	31,200	31,700	32,200	32,600	33,100	33,600	34,100
Storage Tanks	7,100	7,100	7,100	7,100	7,100	7,100	7,100	7,100	7,100	7,100
LDAR	66,600	66,600	66,600	66,600	66,600	66,600	66,600	66,600	66,600	66,600
Total	**164,000**	**165,000**	**165,000**	**166,000**	**166,000**	**167,000**	**167,000**	**168,000**	**168,000**	**169,000**
Total in CO2e tpy	**5,576,000**	**5,610,000**	**5,610,000**	**5,644,000**	**5,644,000**	**5,678,000**	**5,678,000**	**5,712,000**	**5,712,000**	**5,746,000**

Based on the social cost of methane, as described in the RIA for the Proposed Rule, the estimated monetized value of these methane reductions ranges from $180 – $277 million per year. As indicated in the USGCRP assessment, this amount of methane release avoided under the Proposed Rule is expected to have additional minor environmental benefits in terms of lessening the contribution of Federal and Indian oil and gas development to climate change.

Adverse Impacts of Alternative B

Adverse climate-related impacts under Alternative B would stem from GHGs generated from operational activities conducted to reduce the quantity of natural gas lost through flaring, venting and leaks. The amount of additional CO_2 and methane the BLM expects to be emitted as a result of Alternative B is *de minimis*, and it is dwarfed by the GHG reductions projected under the Proposed Rule.

The BLM expects that most of the additional GHG emissions would be generated from an operator's compliance with the flaring requirements. The trucks used to transport the gas that would be compressed or converted to NGLs would emit CO_2 as the fuel is combusted, and a small amount of methane would be lost during the process.

Table 13 illustrates the average quantity of GHGs, expressed as CO_2-equivalent (CO_2e) tons, which would be emitted on an annual basis from truck traffic if the gas is compressed or converted to NGLs.

Table 13: Annual Additional GHG Emissions From Truck Traffic if Associated Gas is Compressed or Converted to NGLs

Gas Capture Method	CO_2e (tpy)
CNG	5,435
NGL	434

Table 14 derives from information analyzed in the RIA accompanying the Proposed Rule at Tables 15, 16, 17, 20, 27a, and 34a. It presents the estimated average annual amount of additional CO_2e that operators would emit under other requirements of Alternative B, assuming that the additional gas captured by operators would be combusted onsite or downstream. The table also presents the estimated total quantity of CO2e that operators would emit on an annual basis in response to Alternative B.

Table 14: Annual Additional GHG Emissions From Other Requirements of Alternative B and Total Additional GHG Emissions Under Alternative B

Requirement	**CO_2e (tpy)**
Well Completion	44
Pneumatic Controllers	109
Pneumatic Pumps	35
Liquids Unloading	80
Storage Tanks	2
LDAR	147

Table 14: Annual Additional GHG Emissions From Other Requirements of Alternative B and Total Additional GHG Emissions Under Alternative B

Requirement	CO_2e (tpy)
CNG Truck Traffic	5,435
NGL Truck Traffic	434
TOTAL (with CNG)	**5,811**
TOTAL (with NGL)	**810**

The BLM estimates that an average of 5,811 additional CO_2e tpy would be released annually under Alternative B if operators elect to compress a portion of the associated gas that is captured from oil wells. If operators elect to strip off NGLs instead, we estimate that they would emit an additional 810 tpy CO_2e. This marginal increase in GHG emissions is smaller by orders of magnitude than the methane reductions projected for the Proposed Rule in Tables 12 above.[53]

With respect to LDAR requirements, trucks that would access oil and gas wellsites to perform the necessary inspections and/or retrofits on existing equipment would emit some CO_2. However, there is likely to be only one to four truck trips per year per wellsite, which could be incorporated into the operators' normally scheduled maintenance activities in many instances. In such cases, those truck traffic emissions would not be considered new air emissions resulting from implementation of the Proposed Rule. In addition, compliance with the Proposed Rule's venting restrictions may result in a small increase in CO_2 emissions from the flaring of gas that would otherwise have been vented. However, we project that those increases are likewise *de minimis* compared to the substantial anticipated GHG reductions from reduced venting.

The construction and operation of gathering pipelines and compressors would also generate some GHG emissions, primarily in the form of combusted fuel and leaked methane. As noted above, the BLM does not expect operators to meet the flaring requirement by installing new gathering pipelines or adding compressors that would not have been installed absent the rule. However, these activities, and hence any resulting GHG emissions, may occur earlier as a result of the rule than they would otherwise. In any event, these GHG emissions would be negligible and minimized through appropriate conditions of approval authorizing the construction and operation of the devices, such as the requirement of additional leak inspections, minimization the length of lines and the number of joints in sections of pipe or pipe-to-component, and using on-lease "beneficial use" gas as much as possible.

Any minor increases in CO_2 emissions caused the Proposed Rule would be much smaller, in CO2e, than the methane reduction that the rule would achieve.

[53] Because methane is a more potent greenhouse gas than carbon dioxide, 1 tpy of methane is equivalent to 25 tpy of CO2. For comparison, while Alternative B could lead to increased GHG emissions of between 5,811 and 810 tpy, Alternative B is also expected to decrease GHGs between 4.1 and 4.3 million tpy of CO2e from the expected methane reductions resulting from the Proposed Rule.

4.2.2 Air Quality

Beneficial Impacts of Alternative B

Alternative B would reduce the amount of VOCs and HAPs that adversely impact local and regional air quality in and around BLM-managed oil and gas operations. Tables 15 and 16 indicate the additional quantity of VOCs and HAPs that the BLM estimates would be emitted into the atmosphere under the No Action Alternative, compared to Alternative B.

Table 15: Estimated VOC Reductions Under Each Applicable Requirement of Alternative B (tons)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Well Completion	900	900	900	1,000	1,000	1,000	1,100	1,100	1,100	1,100
Pneumatic Controllers	199,000	199,000	199,000	199,000	199,000	199,000	199,000	199,000	199,000	199,000
Pneumatic Pumps	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Liquids Unloading	136,000	138,000	140,000	143,000	145,000	147,000	149,000	151,000	153,000	156,000
Storage Tanks	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500
LDAR	18,600	18,600	18,600	18,600	18,600	18,600	18,600	18,600	18,600	18,600
Total	**391,000**	**393,000**	**395,000**	**398,000**	**400,000**	**402,000**	**404,000**	**406,000**	**408,000**	**411,000**

Table 16: Estimated HAP Reductions Under Each Applicable Requirement of Alternative B (tons)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Well Completion	1	1	1	1	1	1	1	1	1	1
Pneumatic Controllers	484	484	484	484	484	484	484	484	484	484
Pneumatic Pumps	8	8	8	8	8	8	8	7	7	7
Liquids Unloading	1,374	1,396	1,418	1,440	1,461	1,483	1,505	1,527	1,549	1,571
Storage Tanks	328	328	328	328	328	328	328	328	328	328
LDAR	65	65	65	65	65	65	65	65	65	65
Total	**2,261**	**2,283**	**2,304**	**2,326**	**2,348**	**2,370**	**2,392**	**2,414**	**2,435**	**2,457**

Over a 10-year analysis time frame, we estimate that the requirements under the Proposed Action would cumulatively reduce annual VOC emissions by 391,000 to 423,000 tons and HAP emissions by 2,261 to 2,469 tons.

Ozone formation and visibility

As noted under the No Action Alternative, on multiple occasions, ambient concentrations of ozone in the atmosphere over BLM-managed oil and gas operations in Northeast Utah and Southwest Wyoming have exceeded the NAAQS standards. As previously stated, VOCs are a precursor to ozone formation.

In recent years, the BLM has been performing air modeling to understand better the circumstances under which emissions from oil and gas operations contribute to ozone formation. Findings from these modeling exercises indicate that ozone formation in areas that have experienced exceedances of the ozone NAAQS in Utah are VOC-limited, which means that VOC emissions, rather than NOx emissions, are the primary factor driving the formation of ozone in those areas.[54]

For scale purposes, we looked at a recent EIS for an oil and gas project in Northeastern Utah—the Proposed Action for the *Greater Natural Buttes Area Gas Development Project*. The proponent of that project proposed to drill, complete, and produce approximately 3,675 gas wells across 163,000 acres of land, and those activities were expected to contribute 6,617 tons of VOC per year from 2017 to 2026. By comparison, the BLM estimates that implementation of Alternative B would reduce annual VOC emissions from BLM-administered oil and gas projects nationwide by more than 50 times that amount (Table 16). Thus, BLM expects that the VOC reductions under Alternative B could help address unhealthy levels of ozone pollution that are currently occurring on certain public lands managed by the Bureau.

HAPs

As noted under the No Action Alternative, HAPs can cause serious human health problems, including cancer, birth defects, and neurological damage. As a basis for comparison, the Proposed Action for the *Monument Butte Oil and Gas Development Project* of 5,750 wells was expected to contribute 1,004 tons of HAPs per year (benzene, toluene, ethyl benzene, xylenes, formaldehyde, and n-hexane, specifically).[55] These project emissions represent a little over 50 percent of the HAPs that would be reduced per year under Alternative B. Although project-related analysis performed by the BLM in the past have not shown exceedances of applicable HAPs thresholds, the emissions reductions produced by Alternative B would further reduce the

[54] DOI-BLM 2014, Utah Air Resource Management Strategy Modeling Project Impact Assessment Report, http://www.blm.gov/style/medialib/blm/ut/natural_resources/airQuality.Par.80404.File.dat/ImpactsRpt.pdf - Accessed January 8, 2016.

[55] DOI-BLM 2014, Draft Environmental Impact Statement, Monument Butte Oil & Gas Development Project, Appendix B, http://www.blm.gov/style/medialib/blm/ut/vernal_fo/planning/environmental_documents/monument_butte_deis.Par.49253.File.dat/15-Monument%20Butte%20DEIS%20-%20Appendix%20B%20-%20Air%20Quality%20TSD.pdf

risks from projects authorized by the BLM. As such, the Proposed Rule is expected to beneficially impact public health and welfare.

Adverse Impacts of Alternative B

While the Proposed Rule will have substantial beneficial effects in reducing air emissions overall, some operators' compliance activities will generate a small quantity of air pollution that would not have occurred under the No Action Alternative. Overall, the amount of additional local air pollutants the BLM expects to be emitted as a result of Alternative B is small, and the quantity is dwarfed by the air pollutant reductions that the Proposed Rule will effect.

The requirement to limit flaring of associated gas is likely to lead to some minor additional tailpipe emissions generated from large trucks transporting the compressed natural gas or NGLs from oil wells to gas processing plants. These emissions would primarily be NOx, PM_{10}, and $PM_{2.5}$, with a negligible amount of VOCs. Tables 17 and 18 present the average amount of each pollutant emitted annually into the atmosphere from the truck traffic after implementing Alternative B. Emissions shown on Tables 17 and 18 have already been scaled up by a factor of 3.82 above the connected and unconnected leases that were analyzed as part of the case study discussed in Section 4.2.

Table 17: Truck Traffic Related Air Pollutants Emitted Annually if Associated Gas is Converted to NGLs

Air Pollutant	Volume (tpy)
NOx	4
PM_{10}	14
$PM_{2.5}$	2
VOCs	0.14

Table 18: Truck Traffic Related Air Pollutants Emitted Annually if Associated Gas is Compressed

Air Pollutant	Volume (tpy)
NOx	45
PM_{10}	181
$PM_{2.5}$	15
VOCs	2

Impacts from these emissions are expected to be negligible, especially because they will be geographically dispersed across BLM oil and gas producing regions nationwide. By way of comparison, the average annual NOx emissions from the No Action Alternative of the *Monument Butte Oil and Gas Development Project* is 1,817 tpy, compared to a nationwide estimate of at most 45 tpy caused by compliance with Alternative B. Air modeling conducted for the *Monument Butte* project did not cause any exceedances of applicable NOx standards under the NAAQS.[56] For oil and gas operations in the water in the Port Eads area of Louisiana, the BLM

[56] Ibid. at Appendix B.

would not expect Alternative B to result in any additional boat trips to the wells or the island on which major equipment is located, as operators already visit each well and facility on a daily basis.

Air emissions would also be generated from the construction or installation and operation of any gathering pipelines and compressors that would be built to capture gas. As noted above, the BLM does not project that operators will build new gathering pipelines or install compressors in response to the Proposed Rule, if such pipelines or compression would not otherwise ultimately have been constructed or installed. Rather, the BLM expects that the Proposed Rule would accelerate these activities, reducing the time lag between well development and capture infrastructure.

While we cannot estimate the additional air emissions that could conceivably occur from capture infrastructure development, those impacts are anticipated to be relatively small and would be minimized through appropriate mitigation conditions during the review of individual infrastructure projects at the time of a specific project proposal.

Alternative B could also result in increases in emissions from the flaring of gas from well completion/re-completion operations or of gas captured from oil and condensate storage tanks. We expect any additional emissions of this nature to be negligible. With the finalization of the EPA Subpart OOOOa Rule, the proposed BLM well completion requirements would affect only conventional oil and gas well completions, which are far fewer (115 – 150 conventional completions annually versus 1,250 – 1,575 hydraulically fractured completions annually) and produce much less associated gas than hydraulically fractured well completions. We also expect additional combustion emissions from storage tanks to be negligible, given the small number of tanks estimated to be affected by the requirement (300 out of an estimated nearly 40,000 storage vessels on Federal and Indian lands).

In sum, although Alternative B would be projected to generate small quantities of additional air emissions compared to the No Action Alternative, particularly in the form of NOx and CO_2, Alternative B would avoid much larger quantities of air emissions in the forms of methane, VOCs and HAPs. Overall, Alternative B would provide substantial climate and air quality benefits compared to the No Action Alternative.

4.2.3 Dwellings and Residences – Noise and Light

As noted in Section 4.1.3, flaring from oil and gas operations adversely affects nearby dwellings and residences by producing noise and light. Flaring can be loud and very bright, depending upon the size of the flare. Although the production of Federal and Indian oil and gas takes place overwhelmingly in rural areas, some of these operations occur near dwellings, where noise and light generated by well flaring operations can have an impact on local communities and residents.

Beneficial Impacts of Alternative B

The Proposed Rule's requirement to limit flaring would be expected to reduce the size, number, frequency, and duration of flaring operations compared to the No Action Alternative. Where operators curtail production or deploy NGL mobile gas capture technologies to meet the flaring limit, the size and duration of the flares would be reduced. Where operators use CNG mobile gas capture and transport technologies, build gathering pipelines, or install compressors to meet the flaring limits, flares would be eliminated. The BLM expects that the amount of flaring would decrease over time as the rule is phased in, and that by the third year after the rule becomes effective, when the flaring limit is fully phased in, flaring operations on Federal and Indian leases should decrease dramatically.

Thus, Alternative B would be expected to result in beneficial impacts to communities and dwellings adversely impacted by the noise and light caused by flares that would otherwise operate under the No Action Alternative.

Adverse Impacts of Alternative B

While the Proposed Rule would greatly reduce flaring overall, in some narrow circumstances Alternative B could increase flaring in the short-term compared to the No Action Alternative due to the prohibition on venting. The Proposed Rule would prohibit venting, except in narrowly defined circumstances. The BLM believes that in most cases, for safety reasons, operators already flare larger quantities of gas (such as gas produced during well completions) rather than vent it, but we do not have data to quantify the extent of the current practice. To the extent that some operators that are currently venting some quantities of gas would now have to flare or capture it instead, Alternative B could result in some increased flaring. This could arise, for instance, where an operator chose to flare gas from storage vessels instead of venting it.

The BLM expects this additional flaring to have negligible noise and light impacts. By way of example, the BLM projects that the Proposed Rule would affect only 300 tanks. The BLM projects that half of those tanks would capture and route associated gas to a gas sales pipeline rather than flaring. Assuming that none of the remaining 150 tanks are routed to an existing on-site flare, the Proposed Rule would result in the construction of an estimated 150 additional flares, the gas from which would count against operators' overall flaring limit. Depending on their location, these additional flares could have some adverse impact on nearby dwellings and residences.

If an operator elects to build a gathering line or adds compressors to an existing line to comply with the flaring limit requirement, noise eliminated from flaring operations would be replaced with noise generated from compressor stations. The relative volumes of the noise would likely depend on the size of the flare. A compressor would operate for the life of the well, while flaring volume, and the associated noise, would eventually decrease as production levels taper off on a well. Proper placement of the compressor(s) away from noise receptors and the installation of sound-absorbing material housed around the compressor(s) would reduce the noise generated from this source. The BLM would evaluate and require these options where appropriate in the

course of approving an operator's Sundry Notice, SUP, or ROW application. By contrast, flare noise cannot be effectively mitigated.

Overall, the BLM estimates that the reductions in flaring resulting from the flaring limits under Alternative B would greatly exceed any small increases in flaring.

4.2.4. Recreation – Noise and Light

As noted in Section 4.1.4, certain public lands managed by the BLM contain a wide range of dispersed recreation opportunities. Many recreationists in these areas participate in activities that emphasize solitude and undisturbed night skies and landscapes. Flaring impacts recreational values on lands managed by the BLM due to light and noise pollution reducing the naturalness and opportunities for primitive recreation within lands with wilderness characteristics.

Beneficial Impacts of Alternative B

The flaring limit under the Proposed Rule would greatly reduce flaring of associated gas from oil wells overall. This would improve recreation opportunities on nearby lands by reducing noise and light from industrial operations. As stated above in Section 4.2.4.1., the BLM expects that under Alternative B the amount of flaring will decrease over time as the rule is phased in, and that by the third year after the rule becomes effective, when the flaring limit is fully phased in, flaring operations on Federal and Indian leases should decrease dramatically. Such a decrease in flaring is expected to decrease adverse light and noise impacts to recreationists making use of lands near oil and gas development.

Thus, Alternative B is expected to result in beneficial impacts to recreationists by reducing noise and light pollution caused by flares that would otherwise operate under the No Action Alternative.

Adverse Impacts of Alternative B

As noted above, to the extent that operators construct additional flares or install additional compressors, light from the flares or noise from the compressors may adversely affect recreation, nearby residents, and wildlife. As previously stated, proper placement of the compressor(s) away from noise receptors and the installation of sound absorbing material housed around the compressor(s) would reduce the noise generated from this source. The BLM would evaluate and require these options where appropriate in the course of approving an operator's Sundry Notice, SUP, or ROW application.

4.2.5 Wildlife Resources

Wildlife is affected by changes to local air quality, land use, and climate in their surrounding environment. Noise and light pollution generated when flaring associated gas from oil wells can affect various wildlife species. Noise and light pollution modify animal behavior and habitat-use patterns, leading wildlife to avoid areas where the flaring is taking place. Where development is

intensive and multiple well pads flare within an area, the flaring exacerbates habitat fragmentation and edge effects, further stressing local biodiversity.[57]

Beneficial Impacts of Alternative B

As noted above, noise and light from flaring operations adversely affect wildlife. The Proposed Rule's requirement to limit flaring is expected to reduce the size, number, frequency, and duration of flaring operations compared to the No Action Alternative. Where operators curtail production or deploy NGL mobile gas capture technologies to meet the flaring limit, the size of the flares would be reduced. Where operators use CNG mobile gas capture and transport technologies, build gathering pipelines, or install compressors to meet the flaring limits, flares would be eliminated. The BLM expects that by the third year after the rule becomes effective, when the flaring limit is fully phased in, flaring operations on Federal and Indian leases, units, and communitized areas should decrease dramatically.

In the absence of a flare, no additional ongoing noise and light-related activities on the well pad would deter wildlife from using any potential habitat adjacent to a well pad. At the production phase of a well, there is a greater likelihood for wildlife to use habitat adjacent to a well pad without flaring operations taking place than habitat adjacent to a well pad where flaring is occurring.

In addition, wildlife on BLM-managed lands is being adversely affected by climate change (e.g., adverse impacts of exacerbated droughts, wildfires, and extreme weather events). While the methane reductions produced under the Proposed Rule would not directly reduce those impacts of climate change, they would contribute to broader efforts to mitigate climate change.

Adverse Impacts of Alternative B

The BLM expects operators to respond to the Proposed Rule's flaring limit in multiple ways. Installing gathering lines and compressors and using mobile capture technologies could lead to surface disturbing activities. The following discussion identifies how wildlife would be affected under each mode of potential operator response.

Gathering line installation – As previously noted, operators might accelerate installation of 4 to 6 inch diameter gathering lines that would tie the wellsite to a gas processing plant or an existing pipeline system that is nearby. Pipeline construction requires clearing vegetation to build and bury the line, so to the extent that a pipeline is routed through wildlife habitat, the habitat would be disturbed. The BLM expects most gathering lines to be constructed along existing access roads, and the surface disturbance to build the pipeline would largely overlap with the existing

[57] "Edge effects" refer to the changes in population or community structures that occur at the boundary of two habitats. Areas with small habitat fragments exhibit especially pronounced edge effects that may extend throughout the range. As the edge effects increase, the boundary habitat allows for greater biodiversity, such as where a grassland transitions to a forest. For an in-depth discussion of the effect of oil and gas operations on habitat fragmentation, see DOI-BLM 2012, Greater Natural Buttes Area Gas Development Project FEIS at Section 4.15.

surface disturbance from the road. Placing pipelines adjacent to existing roads also reduces habitat fragmentation.

While a gathering line is being constructed, there would be an increase in noise and dust from increased traffic, which could temporarily displace or preclude wildlife use of the project area and adjacent lands. Unusual or loud noises can startle and stress many wildlife species, causing them to leave the area. Increased vehicle traffic may result in direct mortality in occupied habitat.

Overall and in the long term, the BLM would expect minimal impacts to wildlife as a result of accelerated gathering line construction resulting from the Proposed Rule. The BLM expects that most (if not all) of the projected gathering line construction would eventually occur even in the absence of the Proposed Rule; the most likely scenario is that the rule would cause operators to accelerate this construction. In addition, operators would be required to seek approval prior to pipeline construction, via a Sundry Notice, Special Use Permit, or a ROW application, or as part of the Application for Permit to Drill. At that time, site-specific impacts from any proposed pipeline projects would be evaluated, and mitigation measures identified to reduce impacts to wildlife.

BLM develops and utilizes both standard and project-specific mitigation measures and best management practices to minimize the impacts of oil and gas development on wildlife. These measures include timing limits and spatial buffers to avoid direct impacts to sensitive wildlife, reclamation stipulations to recover habitat and ground cover as quickly as possible, and practices such as common corridor infrastructure placement. Common corridor infrastructure placement is a technique in which roads, buried pipelines, surface flowlines, overhead electric lines, and other necessary infrastructure is placed in a common right-of-way. This limits surface disturbance to a single area, limits the amount of habitat fragmentation, and makes the detection and repair of leaks and other infrastructure damage or malfunction far easier to detect, access, and repair quickly.

Compressors – Wildlife habitat might also be encroached upon to accommodate the construction and operation of compressor stations. Compressors continually generate noise, potentially stressing species. In some cases, many species rely on their hearing to avoid predators and perform other necessary life functions. However, different species react to noise in different ways, particularly noise that is constant. Some species may become accustomed to the sound and return to using any habitat that may exist within proximity to a compressor station, while others may not acclimate and will not use that habitat again. Potential consequences of these types of displacement are increased opportunities for predation, lower survival, lower reproductive success, lower recruitment, and ultimately lower carrying capacity and reduced populations. Under the Proposed Rule, operators may add some compressors to existing stations or they may apply to construct new compressors where none currently exist. While the adverse impacts to wildlife could possibly result from the implementation of the Proposed Rule, the Rule itself does not authorize the construction of any compressors or compressor stations. An operator would first request approval from the BLM via Sundry Notice to add compressors, or perform any other surface-disturbing activity, and the BLM would then conduct environmental review, and apply mitigation measures and best management practices to any approval.

Mobile Capture and Transport Technology – As noted above, the BLM expects some increased truck traffic if operators elect to comply with the flaring requirement by using mobile capture technology to capture and transport the associated gas from oil wells to a gas processing plant. (See Tables 6-11.) This additional truck traffic would, however, be spread out over a longer time period than the truck traffic that occurs during drilling and completion operations, where transport of equipment and fluids to and from a well location occurs multiple times on a daily basis until the well is placed into production. (The additional traffic calculated in Tables 6-11 above are for all wells on a lease, not per well.) For purposes of comparison, the *Pinedale Anticline Oil and Gas Exploration and Development Project* projected up to 360 heavy vehicle trips per each well drilled and 300 heavy vehicle trips per each well completed.[58] Thus, compared to levels of truck traffic for routine well drilling and completion, the truck trips anticipated to occur as a result of the Proposed Rule would be much less frequent and would be expected to have less overall impact.

Lastly, production equipment used to compress the natural gas or convert it to NGLs may take up a small amount of space on the wellpad, making less space available for interim reclamation of the wellpad. If interim reclamation has already occurred in certain parts of the wellpad and no unreclaimed areas are available for the new equipment, then a small portion of the wellpad that was reclaimed on an interim basis may be cleared of its vegetation to accommodate the production equipment. In addition, some increased truck traffic is possible for well shut-ins and some additional surface disturbance may occur as a result of a flare device being added to storage vessels.

Overall and in the long term, impacts to wildlife expected to occur as a result of placing additional equipment on the surface will likely be negligible because the surface disturbance would involve small areas, in close proximity to existing well operations, which had already been cleared of vegetation when the well was first drilled and completed. Furthermore, the BLM will have an opportunity to evaluate the currently unknown, site-specific impacts under its regulations requiring BLM approval for any operation on a leasehold that will result in further surface disturbance.

4.2.6. Threatened and Endangered Species and Critical Habitat

Species listed as endangered or threatened under the Endangered Species Act, and their associated critical habitat, are present in the regions of the United States where oil and gas operations that would be subject to the Proposed Rule take place.

As stated above, the Proposed Rule will lead to direct beneficial effects for many species through reduced noise pollution and night time light pollution from gas flaring. Listed species and critical habitat will also benefit from improved local air quality as a result of reduced emissions of VOCs and HAPs. The Proposed Rule will also avoid greenhouse gas emissions

[58] US DOI BLM 1999, Pinedale Anticline Oil and Gas Exploration and Development Project DEIS pp. 4-39, available at http://www.blm.gov/style/medialib/blm/wy/information/NEPA/pfodocs/anticline.Par.4905.File.dat/044chap4.pdf.

that cause climate change, which, in turn, is adversely affecting most listed species and critical habitat.

As discussed above, we also expect the proposed action to spur development that will involve ground disturbance and noise. As a general matter, foreseeable indirect and cumulative effects of the Proposed Rule could include: addition of equipment to areas of well pads that had been reclaimed on an interim basis; construction (or acceleration of construction) of new gathering lines to transport an increased volume of captured gas; and installation (or acceleration of installation) of additional compressors on existing pipelines.

However, the Proposed Rule is a framework programmatic action as defined in 50 CFR 402.02, and the existence and magnitude of site-specific adverse effects are not possible to predict at this stage. Under any scenario, the BLM will continue to review proposed activities on oil and gas leasehold lands that will result in additional surface disturbance, as well as applications for pipeline rights of way across federal lands under BLM jurisdiction or the jurisdiction of two or more federal agencies. Thus, potential site-specific impacts would likely occur only after a separate BLM review of subsequent actions and a determination of the appropriate level of compliance with applicable laws, including the ESA. The BLM has initiated informal consultation with FWS for this rulemaking, and has prepared a Biological Assessment for review by that agency. BLM has determined that the Proposed Rule may affect, but is not likely to adversely affect, listed species or their associated designated critical habitats.

4.2.7 Socio-economic Effects

As part of this rulemaking process, the BLM prepared a Regulatory Impact Analysis (RIA) to estimate the costs and benefits of the Proposed Rule (Alternative B). Detailed information on socio-economic impacts of the Proposed Rule, including a thorough discussion of the economic impacts expected from its implementation, can be found in the RIA that accompanied the Proposed Rule. The BLM emphasizes that the Proposed Rule is not expected to impact employment in the oil and gas sector "in any material way."[59] The compliance costs for the Proposed Rule can be categorized into two types: "private costs" are those incurred by oil and gas industry operators as a result of the implementation of the rule (such as costs of implementing a leak detection and repair program); and "public costs" are those incurred by society as a result of the rule (such as the additional amount of carbon dioxide from the combustion of natural gas that would otherwise have been vented). We do not categorize the benefits of the Proposed Rule in this way, as they are expected to be beneficial to both private and public entities.

The economic analysis estimated the following quantified benefits and compliance costs of the Proposed Rule:

Benefits[60]

[59] See RIA for Proposed Rule, p. 148; available at https://www.regulations.gov/document?D=BLM-2016-0001-0002
[60] See RIA for Proposed Rule p. 132.

- Benefits range from $255 – $327 million per year, using a 7% discount rate to calculate the present value of future annual cost savings and using model averages of the social cost of methane with a 3% discount rate.
- Benefits range from $255 – $357 million per year, using a 7% discount rate to calculate the present value of future annual cost savings and using model averages of the social cost of methane with a 3% discount rate.

Costs[61]

- Using a 7% discount rate to annualize costs, we estimate that the Proposed Rule would pose costs ranging from $125 – $161 million per year.
- Using a 3% discount rate to annualize costs, we estimate that the Proposed Rule would pose costs ranging from $117 – $134 million per year.

Section 4.1.7 discussed the directive to agencies from Executive Order 12898 to address any disproportionately high adverse impacts to minority or low-income populations from agency actions. The gas capture requirements under Alternative B would benefit minority and low-income populations living near oil and gas operations by reducing air pollution from vented, leaked, and flared natural gas. Reductions of VOCs and HAPs would reduce health risks to these populations. Alternative B would not lead to any significant or adverse differential environmental justice impacts compared to the No Action Alternative. Any impacts from gathering lines, including impacts to minority and low-income populations, would be evaluated on a project-specific basis by the local BLM Field Office, which is better positioned to understand local communities, including minority and low-income populations. Adverse impacts from the Proposed Rule could be caused by an increased number of pickup truck trips to replace pneumatic controllers and pumps, perform leak detection inspections, install artificial lift systems, and install combustors or VRUs on oil and condensate storage tanks. These impacts are expected to be short-term and minor in nature.

For these reasons, Alternative B is expected to reduce adverse impacts to low-income and minority populations that may be affected by venting, flaring, and leaks from oil and gas leases on Federal or Indian lands.

4.2.8. Cumulative Effects

The cumulative impacts to the human environment that would likely result from the promulgation of the Proposed Rule are nearly identical in scope to those that are currently occurring as a result of existing Federal regulations, State and local regulatory efforts, and voluntary industry activities, as described above in Sections 3 and 4.1.8. These impacts would vary mainly in scale, not in type. Certain aspects of the Proposed Rule would cause minor adverse impacts (for example, the addition of an LDAR program would increase the number of vehicle trips), while some would cause more substantial beneficial impacts (for example, restrictions on venting would decrease the amount of methane released to the atmosphere).

[61] See RIA for Proposed Rule p. 129.

Cumulative impacts to resources under BLM's management are reasonably foreseeable as a result of the promulgation and implementation of the Proposed Rule. Cumulative impacts to certain resources, particularly air quality, climate, and impacts to dwellings, are expected to be less adverse under the Proposed Rule than under the No-Action Alternative. Cumulative impacts to wildlife resultant from the Proposed Rule may be adverse in the short term, mainly due to additional ground disturbance; however, these impacts are expected to be minor in nature, as most of the additional disturbance is likely to occur immediately adjacent to roadways or facility pad areas that are already disturbed. Moreover, BLM's site-specific inspection and approval procedures would apply to any surface-disturbing project; these would ensure evaluation and mitigation of any site-specific adverse impacts when project-specific applications are received.

The BLM is currently in the process of finalizing revisions to Federal Onshore Oil and Gas Orders 3, 4, and 5; which will impact the measurement of oil and gas produced from Federal and Indian leases, as well as general site security. The regulatory burden of those rules is expected to be minimal, and the cumulative impacts of the BLM's current regulatory efforts are slight. For more information on cumulative impacts of BLM's revised Onshore Orders, please see Section 5 below.

4.3. Environmental Effects of Alternative C – Final Rule

Like Alternative B, the Final Rule, Alternative C, would reduce the amount of natural gas vented, leaked, and flared from Federal and Indian oil and gas leases, units, and communitized areas compared to the No Action Alternative. The Final Rule would accomplish this by prohibiting venting except in limited circumstances; requiring an increasing percentage of operators' associated gas to be captured over time,; requiring the capture or control of natural gas from well completion and re-completion operations, pneumatic controllers, pneumatic pumps, liquids unloading operations, oil and condensate storage tanks; and detecting and repairing methane leaks from production equipment, and minimizing vented gas from liquids unloading operations. The Final Rule would lead to a reduction in the waste of federal and Indian oil and gas resources.

The Final Rule would result in capture and control of a substantial percentage of the natural gas that would be released under the No Action Alternative, thereby reducing various air pollutants/pollutant precursors, HAPs, and GHGs that would otherwise be generated under the No Action Alternative. Reduced flaring would also decrease both noise and light pollution, thereby lessening impacts of noise and light on communities living near oil and gas development, wildlife (including protected species), night-sky resources, and recreationists. The BLM also projects net socio-economic benefits from the Final Rule, as calculated in the RIA as revised for the Final Rule.

As compared to Alternative B, the Final Rule, Alternative C, allows more flexibility for operators to meet gas capture targets by employing both a flaring allowance and a gas capture percentage requirement, both phased in over a longer period of time than the flaring limit in the Proposed Rule. The Final Rule also increases flexibility by allowing operators to elect to average their flaring, not only across all of their wells within a lease, unit, or CA, but also (with the filing of a Sundry Notice) across a county or state. The expected overall effect of these

change to the Rule is that capture requirements, and thus benefits from reductions in methane and CO_2 emissions, will take longer to phase in under Alternative C than under Alternative B, but will ultimately exceed the reductions, and thus the benefits, projected for Alternative B. Alternative C is expected to result in a somewhat smaller reduction in VOCs and HAPs than Alternative B overall, but will still reduce these pollutants, in the case of HAPs, by between 1,800 to 2,000 tons per year, and in the case of VOCs, by between 250,000 to 270,000 tons per year, when compared to the No Action Alternative. The BLM further expects overall noise and light pollution impacts to decrease under Alternative C, as compared to the No Action Alternative, and to decrease more in some areas and less in others, as compared to Alternative B.

4.3.1 Climate Change

As discussed in Alternative B, the reduction of venting and flaring on Federal and Indian oil and gas leases would reduce the amount of greenhouse gases (GHGs) released to the atmosphere from development of these resources. Again, from a GHG standpoint, venting is primarily responsible for the release of methane, while flaring is primarily responsible for releasing CO_2. Table 19, below, shows the estimated methane reductions achieved by Alternative C under certain aspects of the Rule, all of which represent either leakage (venting) or routing to a flare, as each operator determines to be feasible. Alternative C would have similar impacts as those demonstrated under Alternative B, and both would cause significant reductions in GHG emissions as compared to the No-Action Alternative. Alternative C would also lead to slightly higher reductions of methane emissions than Alternative B.

Beneficial Impacts of the Final Rule

Section 4.2.1.1 discussed the importance of methane and carbon dioxide control in managing greenhouse gas emissions and that reducing methane emissions in particular may lead to reductions in projected warming, due to methane's short effective life and higher global warming potential. Section 4.2.1 on Alternative B discussed the benefits of reducing the amount of these gases released to the atmosphere. The reductions in GHGs under Alternative C are expected to be ultimately greater from those in Alternative B.

The final version of the rule contains changes to the gas capture and flaring limit requirements originally proposed under Alternative B; the specifics of the changes are discussed in detail in Section 2.3 of this EA. These changes are expected to cause somewhat more natural gas to be captured rather than vented or flared as compared to Alternative B, and thus less GHGs released to the atmosphere than under Alternative B. The beneficial impacts to climate resources under the Final Rule are expected to be greater than those of the Proposed Rule. Table 19 shows the estimated annual reduction in methane emissions from the Final Rule, and calculates that the Final Rule will reduce methane emissions by 11,000 more tons each year than the Proposed Rule, and between 175,000 and 180,000 tons more each year than the No-Action Alternative.

Table 19: Estimated Annual Methane Reductions (tons) for Alternative C

Requirement	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Capture Target Req.	NE[62]	NE	NE	NE	NE	NE	NE	NE	NE	NE
Pneumatic Controllers	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
Pneumatic Pumps	26,800	26,800	26,800	26,800	26,800	26,800	26,800	26,800	26,800	26,800
Liquids Unloading	33,700	34,300	34,800	35,400	35,900	36,400	37,000	37,500	38,000	38,600
Storage Tanks	7,100	7,100	7,100	7,100	7,100	7,100	7,100	7,100	7,100	7,100
LDAR	89,500	89,500	89,500	89,500	89,500	89,500	89,500	89,500	89,500	89,500
Total Total in CO2e typ	**175,000**	**176,000**	**176,000**	**177,000**	**177,000**	**178,000**	**178,000**	**179,000**	**179,000**	**180,000**
Net +/- from Alt. B	**11,000**	**11,000**	**11,000**	**11,000**	**11,000**	**11,000**	**11,000**	**11,000**	**11,000**	**11,000**

[62] NE stands for “no effect.”

Adverse Impacts of the Final Rule

Similarly to Alternative B, adverse impacts on climate change under this rule would originate primarily from indirect GHG emissions due to operators' efforts to comply with to the new requirements for gas capture. The additional amount of greenhouse gases expected to be emitted as a result of the implementation of the Final Rule is about 12,800 tpy of CO2e, about twice the expected emissions from Alternative B. These GHG emissions are orders of magnitude smaller than the GHG reductions expected from the Final Rule.

As stated above, beneficial GHG reductions under Alternative C would likely be slightly higher than under Alternative B. Some further additional GHG emissions may occur under Alternative C from additional vehicle traffic, due to increased use of trucking as the additional gas captured in compliance with the rule is compressed and transported or converted to NGLs, and due to the leak detection and repair requirements of the rule. The primary sources for these emissions re expected to be traffic, along with minimal amounts of natural gas lost during transfer operations, but these are expected to be de minimus when compared to the Final Rule's substantial reduction in GHG emissions. Based on the revised estimates of methane conserved annually in the revised RIA, the BLM estimates that additional CO_2 equivalent (CO_2e) emissions would average approximately 5,699 tons per year. The reduction in GHG emissions from the gas capture requirements of the Rule are expected to be much greater, averaging approximately 6,029,000 tpy CO2e.

Table 20 displays information from the updated RIA for the Final Rule regarding the amounts of additional GHG emissions expected from all components of the Final Rule, assuming that additional gas captured under the requirements of this rule are combusted either onsite or at a downstream point. Thus, it demonstrates the estimated total annual quantity of CO_2 e that would be emitted as a result of this alternative.

Table 20: Annual Additional GHG Emissions From Other Requirements of the Final Rule and Total Additional GHG Emissions Under the Final Rule

Requirement	CO_2e (tpy)
Pneumatic Controllers	720
Pneumatic Pumps	1,072
Liquids Unloading	1,446.4
Storage Tanks	284
LDAR	3,580
CNG Truck Traffic	5,699
TOTAL (with CNG)	12,801.4

In total, the increases in GHG emissions under this alternative as a result of compliance with the Final Rule are minimal; the overall effect is a significant reduction in GHG emissions under this alternative, as is the case for Alternative B. The capture and flaring limits in Alternative C have a longer phase in period than Alternative B, but and ultimately tighter than the limits proposed in

Alternative B. As such, Alternative C is expected to result in more methane reductions each year than Alternative B and so more climate benefits. On the other hand, Alternative C's inclusion of the option to average flaring across a county or state is expected to lead to slightly less overall gas capture than would be accomplished under Alternative B. Overall, Alternative C is expected to have a beneficial impact regarding climate change.

4.3.2 Air Quality

Beneficial Impacts of the Final Rule

In addition to reductions in GHG emissions discussed above, Alternative C would also reduce the amount of volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) released to the atmosphere as a result of BLM-regulated oil and gas development, as compared to the No Action Alternative, but would reduce VOCs and HAPs slightly less than Alternative B. The reductions in VOCs and HAPs are driven almost entirely by the venting prohibition; flaring does not release VOCs or HAPs in substantial quantities and the reduction in flaring has a much larger impact on CO_2 emissions, recreational activities, and noise and light pollution than on air quality.

Tables 21 and 22 demonstrate the estimated total reductions in VOCs and HAPs, respectively, expected as a result of the Final Rule; in addition, Tables 23 and 24 display the differential amount of reduction between Alternative B and Alternative C.

Table 21: Estimated VOC Reductions Under Each Applicable Requirement of Final Rule (tons)

Requirement	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Capture Target Req.	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Pneumatic Controllers	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000
Pneumatic Pumps	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
Liquids Unloading	121,000	123,000	125,000	127,000	129,000	131,000	132,000	134,000	136,000	138,000
Storage Tanks	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500	32,500
LDAR	24,800	24,800	24,800	24,800	24,800	24,800	24,800	24,800	24,800	24,800
Total	250,300	252,300	254,300	256,300	258,300	260,300	261,300	263,300	265,300	267,300

Table 22: Estimated HAP Reductions Under Each Applicable Requirement of Final Rule (tons)

Requirement	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Capture Target Req.	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Pneumatic Controllers	188	188	188	188	188	188	188	188	188	188
Pneumatic Pumps	13	13	13	13	13	13	13	13	13	13
Liquids Unloading	1,222	1,242	1,263	1,283	1,303	1,323	1,333	1,353	1,374	1,394
Storage Tanks	328	328	328	328	328	328	328	328	328	328
LDAR	108	108	108	108	108	108	108	108	108	108
Total	1,859	1,879	1,900	1,920	1,940	1,960	1,970	1,990	2,011	2,031

Table 23: Differential VOC Reductions From Alternative C less Alternative B (tons) (negative values in parentheses)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Well Completion	(900)	(900)	(900)	(1,000)	(1,000)	(1,000)	(1,100)	(1,100)	(1,100)	(1,100)
Pneumatic Controllers	(134,000)	(134,000)	(134,000)	(134,000)	(134,000)	(134,000)	(134,000)	(134,000)	(134,000)	(134,000)
Pneumatic Pumps	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Liquids Unloading	(15,000)	(15,000)	(15,000)	(16,000)	(16,000)	(16,000)	(17,000)	(17,000)	(17,000)	(18,000)
Storage Tanks	-	-	-	-	-	-	-	-	-	-
LDAR	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200	6,200
Total	(140,700)	(140,700)	(140,700)	(141,700)	(141,700)	(141,700)	(142,700)	(142,700)	(142,700)	(143,700)

Table 24: Differential HAP Reductions From Alternative C less Alternative B (tons) (negative values in parentheses)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Well Completion	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Pneumatic Controllers	(296)	(296)	(296)	(296)	(296)	(296)	(296)	(296)	(296)	(296)
Pneumatic Pumps	5	5	5	5	5	5	5	6	6	6
Liquids Unloading	(152)	(154)	(155)	(157)	(158)	(160)	(172)	(174)	(175)	(177)
Storage Tanks	-	-	-	-	-	-	-	-	-	-
LDAR	43	43	43	43	43	43	43	43	43	43
Total	(402)	(404)	(404)	(406)	(408)	(410)	(422)	(424)	(424)	(426)

These tables show that the implementation of Alternative C would result in somewhat smaller reductions in VOCs and HAPs than under Alternative B. However, Alternative C is still expected to achieve a sizeable reduction in air pollutants as compared to the No-Action Alternative.

Ozone formation and visibility

Section 4.2.2 on Alternative B discussed the formation of ozone and the characteristics of VOCs as precursory to its formation. Alternative C would reduce emissions of VOCs, and thus the formation of ozone, that would otherwise occur under the No Action Alternative, but at a level slightly less than Alternative B. The implementation of the Final Rule is expected to reduce the formation of ozone at levels demonstrated in Table 21, above, which will have a beneficial impact to public health.

HAPs

Alternative C would reduce these HAPs at a level slightly lower than Alternative B, and at all times would reduce HAPs emissions more than the no-action alternative. Thus, BLM expects a decrease in HAP emissions and a corresponding beneficial impact to public health and welfare.

Adverse Impacts of the Final Rule

Similarly to the adverse impacts of this alternative on climate change and greenhouse gas emissions, the gas capture and flaring limit requirements under Alternative C, along with the LDAR requirements, are expected to cause an increase in truck traffic associated with Federal and Indian oil and gas development. This additional traffic is likely to drive an increases in air pollutant releases from associated truck traffic as compared to both Alternative B and the No-Action Alternative. In comparison, however, these additional amounts represent a small fraction of the overall reduction in air pollutants, and still result in a net decrease when combined with the prohibition on venting. Table 25, below, presents the average amount of each pollutant emitted annually into the atmosphere from the truck traffic after implementing Alternative C.

Table 25: Truck Traffic-Related Air Pollutants Emitted Annually if Associated Gas is Compressed

Air Pollutant	Volume (tpy)
NOx	20.29
PM_{10}	1.45
$PM_{2.5}$	1.3
VOCs	0.8

Adverse impacts from these emissions are expected to be minimal, especially because the emissions will be geographically dispersed across BLM oil and gas producing regions nationwide. Also, as industry adapts to the new requirements and finds efficient ways to meet their obligations, truck traffic and the associated air pollutants would likely decrease further. For

oil and gas operations in the water in the Port Eads area of Louisiana, the BLM would not expect Alternative C to result in any additional boat trips to the wells or the island on which major equipment is located, as operators already visit each well and facility on a daily basis.

In sum, although the additional truck traffic associated with Alternative C is projected to generate small quantities of additional air emissions compared to the No Action Alternative, and further small additions when compared to Alternative B, it would avoid much larger quantities of air emissions in the forms of methane, VOCs and HAPs from venting, and would reduce GHGs released from flaring. Overall, this alternative and Alternative B would both provide substantial climate and air quality benefits, compared to the No Action Alternative. Despite the decreased benefit from Alternative B, however, Alternative C contains features that reduce the administrative burden on operators, as well as other benefits, that make it a more optimal total alternative than Alternative B, both for the BLM and its stakeholders.

4.3.3. Dwellings and Residences – Noise and Light

Beneficial Impacts of the Final Rule

Alternative C contains a requirement to capture gas from oil well operations and production, while simultaneously limiting royalty-free flaring from Federal and Indian oil and gas leases, units, and communitized areas, similar in effect to the requirement in Alternative B. The BLM expects the gas capture and flaring limit requirements to decrease the size, number, frequency, duration, and intensity (gas volume) of flares, regardless of the method operators choose to handle the increased captured gas. This large-scale reduction in the routine flaring that would otherwise continueunder the No Action Alternative is expected to lead to less noise and light pollution, having a beneficial impact on nearby dwellings and residences. When fully phased in, the added gas capture percentage requirements in Alternative C are expected to reduce the total flaring, and with it noise and light pollution from flaring to a level below that expected for Alternative B. However, because of the averaging option, the additional reductions in flaring from Alternative C over Alternative B may not occur uniformly across the country, and some areas may continue to see high levels of flaring while others see substantial reductions. Thus, Alternative C may have greater beneficial impacts than Alternative B for those who live near federal and Indian oil and gas development, depending on where operators choose to reduce flaring.

Adverse Impacts of the Final Rule

When compared to Alternative B, the Final Rule could result in additional short-term flaring, due to its longer phase-in. Allowing operators to flare gas on an average basis across a county or state may lead to additional localized flaring (i.e., one well may flare at three times the limit, while two others do not flare at all). This flaring could lead to higher levels of localized noise and light pollution than under Alternative B for some areas, though it would still result in a marked decrease in noise and light pollution as compared to the No Action Alternative and is expected to result in a decrease in noise and light pollution overall as compared to Alternative B.

In the long run, the more stringent gas capture requirements in the Final Rule could result in the addition of more compressor stations and other equipment, and thus increased noise pollution, when compared to Alternative B and the No Action Alternative. However, these installations would be subject to site-specific review by representatives of the appropriate BLM field office, and would likely be placed in areas far from dwellings, to the extent possible. The BLM often utilizes mitigation measures such as sound baffles and flare screening to reduce these impacts in especially sensitive areas; the use of these techniques could be expanded to reduce the amount of noise and light pollution from flares or equipment. With BLM review and the application of mitigation measures, the BLM expects additional noise under Alternative C to have minimal adverse impacts to nearby dwellings and residences and be vastly outweighed by the decline in noise impacts due to reduced flaring overall.

4.3.4 Recreation – Noise and Light

As noted in Section 4.3.3, noise and light from flaring operations adversely affect nearby residents and persons recreating on nearby public lands. The Final Rule's requirement to limit flaring is expected to reduce the size, number, frequency, and duration of flaring operations compared to the No Action Alternative. Where operators curtail production or deploy NGL mobile gas capture technologies to meet the flaring limit, the size of the flares would be reduced. Where operators use CNG mobile gas capture and transport technologies, build gathering pipelines, or install compressors to meet the flaring limits, routine flares would be eliminated. The BLM expects that over time after the rule becomes effective, when the flaring limit is fully phased in, flaring operations on Federal and Indian lease, units, and communitized areas should decrease dramatically.

Thus, the Final Rule is expected to provide substantial benefit to recreationists; to nearby residents, including minority or low-income residents; and to recreationists over the No Action Alternative, and slightly more benefit to such persons over time than Alternative B.

Beneficial Impacts of the Final Rule

Because Alternative C is expected to result in less flaring long term compared to Alternative B, it is also expected to reduce noise and light impacts to recreation comparatively. However, these benefits may not be as evenly dispersed as Alternative B because of the operators' option to average their gas capture across a county or state.

Adverse Impacts of the Proposed Action

The installation of compressors and other oilfield equipment in response to the Final Rule could, as discussed above, cause an increase in noise and light pollution in areas where night-sky qualities are important to recreationists; anecdotal evidence suggests that oil and gas development on BLM lands may negatively impact views from other areas such as national parks. Allowing averaged flaring across a county or state would result in a smaller decrease in noise/light pollution compared to Alternative B; however, this difference would be minimal. In addition, mitigation measures and best management practices may reduce these adverse impacts,

if properly applied; BLM field office personnel would be mindful of visual resource management proscriptions and would adjust conditions of approval as necessary to mitigate these impacts.

4.3.5. Wildlife Resources

Alternative C, like Alternative B, is expected to indirectly cause beneficial impacts to wildlife through its attendant beneficial impacts to air quality and climate change, but also adverse impacts through the potential increase in surface disturbance and habitat fragmentation that would result from the accelerated development of gathering line infrastructure that BLM projects may occur as an aspect of the operator response to this rule. In addition, as under Alternative B, some increased truck traffic is possible for well shut-ins and some additional surface disturbance is possible to occur from a flare device being added to storage vessels. These impacts are expected to occur at a similar level to those of Alternative B, and are expected to be similar and magnitude, to those considered in Alternative B.

Beneficial Impacts of the Proposed Action

This assessment has discussed the expected decrease in the size, frequency, and intensity of flares as a result of the gas capture and flaring limit requirements. Those reductions would also positively impact wildlife in the area where development occurs. Reduced flare noise, even considering the additional noise of newly-installed compressors and other equipment, could lead to increased habitat utilization around the site, and for species that rely on auditory cues for breeding, such as sage-grouse (*Centrocercus* sp.), increased breeding successes would likely result. Additionally, reduced light pollution could also lead to increase in habitat utilization, and would result in lower direct mortality to light attracted species such as the American burying beetle (*Nicrophorus americanus*). These benefits would be nearly identical to those realized under Alternative B.

Adverse Impacts of the Proposed Rule

Adverse impacts to wildlife under Alternative C would be very similar to those under Alternative B, and would include surface disturbance, habitat fragmentation, and loss of foraging and nesting habitat. These impacts would likely occur at similar levels under both alternatives. However, best management practices such as common-corridor infrastructure placement and sound baffling equipment would reduce these impacts.

Both alternatives would result in the disturbance of more surface area as a result of the accelerated installation of gathering lines. This causes the loss of habitat for foraging and nesting, and if accomplished haphazardly may contribute to habitat fragmentation. Increased fugitive dust pollution as a result of removing vegetative cover could lead to further air quality issues. Alternative C's provision to allow flaring to be averaged across a county or state could lead to more or longer avoidance of certain habitat areas when compared to Alternative B, though this would likely be localized and minimal.

The above impacts would likely be similar under both Alternatives B and C; however, due to the change in gas capture and flaring limit requirements, Alternative C may lead to higher levels impact to wildlife in the short term, but less impact over the longer term.

4.3.6. Threatened and Endangered Species and Critical Habitat

As stated previously, the impacts of Alternative C are expected to be similar to those of Alternative B; the exception perhaps being the short-term increase in air pollutants from B to C due to the longer phase in time and the ability to average flaring across a county or state. These impacts are expected to cause similar effects to threatened and endangered species as they are to other wildlife, but importantly, the impacts of Alternative C are not expected to have any measurable adverse effects on any listed species.

4.3.7. Socio-economic Effects

In response to the changes made between the Proposed Rule and the Final Rule, the BLM has revised its RIA. The Final RIA shows the costs of compliance incurred by industry and the social costs of the implementation of the rule, compared with the economic and environmental benefits of implementation. The BLM has determined that the compliance costs of Alternative C are significantly lower than those of Alternative B, due to reduced paperwork requirements and streamlined and clarified regulations, which will decrease amounts of staff time spent on compliance. Based on the updated RIA, BLM expects the following socio-economic impacts from Alternative C.

Benefits[63]

- Benefits range from $211 – 335 million per year, using a 7% discount rate to calculate the present value of future annual cost savings and using model averages of the social cost of methane with a 3% discount rate. This represents a potential increase of $28 million per year compared to Alternative B.
- Benefits range from $211 – 370 million per year, using a 3% discount rate to calculate the present value of future annual cost savings and using model averages of the social cost of methane with a 3% discount rate. This represents a potential increase of $13 million per year compared to Alternative B.

Costs[64]

- Using a 7% discount rate to annualize costs, we estimate that the Proposed Rule would impose costs ranging from $118 – $221 million per year. This represents a potential decrease of $9 million per year compared to Alternative B.
- Using a 3% discount rate to annualize costs, we estimate that the Proposed Rule would impose costs ranging from $113 – $243 million per year. This represents a potential decrease of $7 million per year compared to Alternative B.

[63] See RIA p. 103.
[64] See RIA p. 101.

The projected net benefits of this alternative range from $63-172 million annually, using a 7% discount rate, and from $60-192 million using a 3% discount rate. These do not include non-monetized benefits such as health effects.

Alternative C is subject to the same requirements of Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," and would have a somewhat more beneficial effect on minority and low-income population segment due primarily to the fact that it would reduce air pollutants by a greater degree in the long run than Alternative B.

4.3.8. Cumulative Effects

The types of cumulative impacts to the human environment that would likely result from the promulgation of Alternative C are nearly identical both to those expected under Alternative B, as well as to those that are currently occurring as a result of existing Federal regulations, State and local regulatory efforts, and voluntary industry activities. These impacts would vary mainly in magnitude. Certain aspects of the Proposed Rule would cause increases in negative impacts (for example, the addition of an LDAR program would increase the number of vehicle trips), while some would cause decreases in these negative impacts (for example, restrictions on venting would decrease the amount of methane released to the atmosphere); the same is true for beneficial impacts. There are only minor differences in cumulative environmental impacts between Alternatives B and C (mostly favoring Alternative C), while Alternative C would significantly reduce compliance costs. Thus, Alternative C is the BLM's Preferred Alternative.

Cumulative impacts, including both beneficial and negative impacts, to resources under BLM's management are reasonably foreseeable as a result of the promulgation and implementation of Alternative C. Cumulative impacts to certain resources, particularly air quality, climate, and impacts to residents and recreationists, are expected to be less adverse under this alternative than under either Alternative B or the No-Action Alternative. Cumulative impacts may be adverse in the short term, mainly due to additional truck traffic and wellpad operations visits; however, these impacts are expected to be minor in nature, as most of the additional disturbance from trucks and visits is likely to occur either on or immediately adjacent to roadways or facility pad areas that are already disturbed and many visits can be combined. The gas capture and flaring limit requirements of Alternative C are expected to capture more gas long-term than Alternative B. Moreover, BLM's site-specific inspection and approval procedures still apply to any surface-disturbing project; these policies ensure evaluation and mitigation of any site-specific adverse impacts when project-specific applications are received. Adverse cumulative impacts on the human environment resulting from the implementation of the BLM Preferred Alternative in this case are expected to be minimal.

5. Cumulative Effects of Current BLM Regulatory Efforts

The CEQ regulations define "cumulative effects" 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 regardless of what agency (Federal or non-Federal) or person undertakes such actions."[65]

Federal and Indian oil and gas development occurs primarily in States located in the Rocky Mountain West, the Southwest, the northern Midwest, the southern Great Plains, California, and Alaska. On public lands, a variety of activities that affect the human environment already occurs on existing oil and gas leases. Examples of such activities include recreation, livestock grazing, forestry, mining (e.g., coal and hard rock minerals), power generation and transmission facilities, solar energy development, and wind energy development.

In addition to the provisions of this Rule, the BLM is also concurrently preparing and anticipates issuing separate rules to update and replace Onshore Oil and Gas Order 3 (site security), Onshore Oil and Gas Order 4 (oil measurement), and Onshore Oil and Gas Order 5 (gas measurement). Those rules would be codified at 43 CFR 3173, 3174, and 3175, respectively. Additionally, a new subpart 3170 will contain definitions of certain terms and other provisions common to all subparts within Part 3170.

The BLM has analyzed the cumulative environmental impact of these rules and expects that the impacts of these four rules will be minimal. With respect to surface disturbance, as described in the EAs for these rules, the BLM expects that little or no new surface disturbance will be required to meet the requirements of the rules. Further, the required actions will likely be incorporated into an operator's well maintenance schedule, and therefore will not result in unique or new surface activities. These required actions are either minor (increased meter proving activities, increased leak inspections) or short term (one-time retrofit to existing storage tanks and LACT systems with automatic temperature or gravity compensators). Moreover, the actions will most likely take place on surface that has already been disturbed, where infrastructure is already in place, including pipelines, separation equipment, compressors, and production measurement facilities.

There is the possibility that some of the surface activities resulting from these rules would occur on privately owned surface from which an operator is producing some Federal or Indian minerals. In these instances, the cumulative impacts from the BLM rules in combination with other activities occur on that surface because that surface is governed by other Federal, State, Tribal, or local requirements. However, all federal operations are also subject to state and local regulation unless preempted, and Indian operations are also subject to tribal regulation unless there is an actual conflict with BLM regulations. It is also likely that operations on these lands would follow applicable Best Management Practices (BMPs) regardless of land ownership. While it is not possible to quantify or parse out the environmental impacts of the full suite of regulatory requirements applying to Federal and Indian leases, units, and communitized areas, the BLM believes that the incremental environmental impacts of activities required by this rule are negligible.

With respect to air quality, the BLM expects that the cumulative impacts of the three rules on air resources are unlikely to be significant. The BLM found that the increased methane emissions of

[65] 40 CFR 1508.7.

the subpart 3175 revision (3.9 scf per FMP per year; described in Section 5.2.2 of the Environmental Assessment for that rule) would not be significant. The EAs from subparts 3173 and 3174 identified insignificant increases in construction equipment and vehicle emissions (which the BLM did not quantify) as the only additional source of air emissions. Additionally, the BLM expects that there would be overlap in vehicle traffic to meet the requirements of the three rules; therefore any additional air resource impacts would be minimized.

Overall, the BLM finds that cumulative impacts on the human environment resulting from the three rules at subparts 3173, 3174, and 3175, along with this Final Rules will not be significant.

5.1. Cumulative Socio-Economic Effect of Subparts 3173 – 3175

While socio-economic effects themselves do not trigger a requirement to prepare a NEPA analysis, the BLM also considered the cumulative economic impacts of the measurement rules (that is, the three rules to identified above as subparts 3173, 3174, and 3175), because even though they have independent utility, they are inter-related. The BLM expects that the overall costs associated with subpart 3175 would include a one-time transition cost of about $22 million ($6,000 per small entity over a one- to three-year period), and an annual increase in cost of approximately $13 million ($4,000 per small entity). The BLM expects that costs associated with subpart 3174 would include a one-time cost for retrofitting 346 lease automatic custody transfer (LACT) systems of $1.38 million and an annual cost increase on the 74 LACT systems that would require more frequent proving of $258,000 per year ($550 per proving).[66] Subpart 3174 would also have a small positive economic impact by reducing the time and money operators now spend on applying for and processing variance requests. The BLM expects that costs associated with subpart 3173 would include a one-time transition cost of up to $121.5 million over a 3-year period (averaging $32,800 per entity), and an annual cost increase of about $13.5 million (averaging $3,600 per entity per year).[67] The cumulative costs of the three subparts will have an annual effect of less than $100 million. To put these economic impacts into context, in FY 2015 the production value of oil and gas produced from public and Indian (except Osage Tribe) lands was approximately $3 billion.

5.2 Cumulative Impacts of EPA's Sub OOOOa Rule and State Regulations

As was stated in Section I.B.6 of the Preamble, the Final Rule seeks to minimize regulatory overlap. Thus, if EPA and/or States or tribes have adopted requirements that are at least as effective as and would potentially overlap or conflict with the provisions of this Rule, the Final Rule provides a means for operators to comply with the EPA, State, local or tribal requirements in lieu of the BLM requirements. Specifically, in cases in which EPA rules limit venting from equipment or require leak inspections and repairs, those operators that are in compliance with those EPA requirements are deemed, under this Rule, to be in compliance with the comparable BLM requirements. With respect to State, local, or tribal rules, the Final Rule allows a State or

[66] Economic and Threshold Analysis for Proposed Rule Onshore Oil and Gas Operations; Federal and Indian Oil and Gas Leases; Oil Measurement. https://www.regulations.gov/#!documentDetail;D=BLM-2015-0004-0002.
[67] Economic and Threshold Analysis For Proposed Rule Onshore Oil and Gas Operations; Federal and Indian Oil and Gas Leases; Site Security. https://www.regulations.gov/#!documentDetail;D=BLM-2015-0003-0002.

tribe to request a variance from a particular BLM regulation. If the variance is granted, the BLM has the authority to enforce the specific provisions of the State, local, or tribal rule for which the variance was granted, in lieu of the comparable provisions of the BLM rule. As clarified in the Final Rule, the BLM may grant a State or tribal variance request only if the BLM determines that the State, local, or tribal rule would perform at least as well as the BLM provision to which the variance would apply, in terms of reducing waste of oil and gas, reducing environmental impacts from venting and/or flaring of gas, and ensuring the safe and responsible production of oil and gas.

Because the BLM has minimized regulatory overlap in this rulemaking, cumulative impacts of the Final Rule and EPA and State regulations are expected to be insignificant.

6. Tribal, State, and Agency Consultation

6.1.Tribes

In mid-2014, the BLM conducted a series of forums to consult with tribal governments and solicit stakeholder views to inform the development of the Proposed Rule. The BLM held public meetings in Denver, Colorado (March 19, 2014), Albuquerque, New Mexico (May 7, 2014), Dickinson, North Dakota (May 9, 2014), and Washington, D.C. (May 14, 2014). During each meeting, the BLM held a tribal outreach sessions that served as initial outreach to and invitation to consult with Indian tribes to comply with Executive Order 13175. The Denver, CO and Washington, D.C. sessions were live-streamed to allow for the greatest possible participation by tribal parties. The BLM also had tribal meetings following the issuance of the Proposed Rule, and will continue to engage the tribes and offer opportunities for consultation as it progresses through the rulemaking process.

During the public comment period, the BLM received comments from several tribes, including the Southern Ute Indian Tribe, the Ute Mountain Ute Tribe, and the Jicarilla Apache Nation. BLM invited the responding tribes to participate in formal consultation regarding the Proposed Rule; however, due to the rule's similarity to Colorado's regulations, the Southern Ute Tribe declined formal consultation. The Ute Mountain and Jicarilla tribes did not respond to the invitation, but given their comments during the comment period the BLM has determined that tribal involvement was sufficient. The Southern Ute Tribe noted that they would have preferred formal consultation during the drafting of the regulatory text rather than the review period, but that since the rule was written, they did not see a need for formal consultation.

6.2.Agencies

The BLM has engaged in outreach to States with extensive oil and gas production on BLM-administered leases and has contacted the regulatory bodies within these states that oversee aspects of oil and gas production to discuss their requirements and practices. These states include Colorado, North Dakota, Wyoming, Alaska, New Mexico, Utah, Montana, and California. Many state agencies from most of these states provided comments during the public comment period, which the BLM considered in drafting the Final Rule.

As noted in Section 4 of this EA and the preamble accompanying the Final Rule, the BLM worked closely with EPA in developing the Proposed and Final Rules to minimize overlap and duplication. In particular, the BLM requirements on venting from pneumatic controllers, pneumatic pumps, and storage vessels all explicitly apply to existing sources that are *not* subject to EPA's subpart OOOOa, but would be subject to that rule if they were new, modified, or reconstructed sources. In addition, even where the BLM and EPA requirements address the same type of activity, but apply to different sources (existing (BLM) versus new, modified, or reconstructed (EPA)), the agencies have worked together to align the text and substance of the requirements as closely as practicable. For example, the BLM modified the requirements in the proposed rule for pneumatic pumps in response to comments and to better align with the EPA's final subpart OOOOa requirements. Here, the BLM eliminated the proposed requirements for chemical injection pumps and diaphragm injection pumps that operate relatively infrequently, as we believe that these pumps vent relatively small quantities of gas. Like the proposed rule, the final rule does not apply to pneumatic pumps that are subject to EPA regulations.

As noted in Section 4.2.7, the BLM initiated informal consultation with FWS, and prepared a Biological Assessment for review by that agency. Through this Biological Assessment, the BLM has determined that the Final Rule may affect, but is not likely to adversely affect, listed species or their associated designated critical habitats, a determination to which FWS has concurred.

7. Public Comment

On February 8, 2016, the BLM published the EA for the Proposed Rule, and invited public comment. The comment period was initially 30 days, but was extended due to increased public interest and eventually closed on April 22, 2016. The BLM received over 330,000 individual comments, most of which were on technical and regulatory matters. BLM did receive several comments on the EA for the proposed rule. Table 1 summarizes all substantive comments received that are specific to the EA for the proposed rule, the name of the commenter, and BLM's response to each comment.

Table 1, Public Comments on Draft EA.

Name of Commenter	Comment	BLM Response
Petroleum Association of Wyoming	"Even where BLM has authority for portions of the Proposed Rule, PAW believes BLM has failed to properly account for the interrelatedness of its actions by not conducting a single NEPA analysis of Proposed Rules to replace Onshore Orders 3, 4 and 5 as well as this Proposed Rule…."	This Rule imposes new requirements to reduce the waste of natural gas through venting, flaring, and leaks. Onshore Orders 3, 4, and 5 address site security at oil and gas operations under BLM jurisdiction and procedures for measuring oil and gas respectively. Under CEQ's NEPA regulations at 40 C.F.R. §1508.25 regarding the scope of environmental impact statements: "Connected actions . . . are closely related [actions] and therefore should be discussed in the same impact statement. Actions are connected if they: (i) Automatically trigger other actions which may require environmental impact statements. (ii) Cannot or will not proceed unless other actions are taken previously or simultaneously. (iii) Are interdependent parts of a larger action and depend on the larger action for their justification." Neither this Rule nor Onshore Orders 3, 4, or 5 were found to have significant impacts that would require the preparation of an EIS. Thus, the requirement to address connected actions in a single impact statement under §1508.25 does not apply here. Furthermore, even if it did apply, this Rule and the Onshore Orders are not connected actions under the criteria at §1508.25 to warrant analysis in the same NEPA document. The Rule and the Onshore Orders do not automatically trigger one another. They are not interrelated so that one action cannot proceed without the other taken previously or simultaneously. They are not interdependent parts of a larger action, nor do they depend on one another, or on another larger action, for their justification. A single NEPA analysis for this Rule and the Onshore Orders is not required, nor would it have presented any practical advantages for analysis. The cumulative impacts analysis in this EA has taken the new Onshore Orders into account as appropriate under 40 C.F.R. §1508.7 and has found no cumulatively significant impacts.
EnCana Services Company, Ltd.; Wave Petroleum Operating, LLC (separate comments)	"BLM must analyze the environmental impacts of a range of alternative monthly flaring limits… The EA offers no explanation for	Both the draft and final EA contain discussion of alternatives considered but not carried forward for analysis, including discussion of why the BLM did not conduct a full NEPA analysis of each of the alternative monthly flaring limits, in Section 2.4. As stated in

Name of Commenter	Comment	BLM Response
	BLM's failure to evaluate alternative flaring limits."	Section 2.3, the Proposed and Final Rules cover a range of flaring limits in and of themselves, targeted to meet the purpose and need for the Rule while being economically feasible for operators to implement. Under NEPA, an agency need not consider every feasible alternative. See e.g. *Envtl. Prot. Info. Ctr. v. Blackwell*, 389 F. Supp. 2d 1174, 1200 (N.D. Cal. 2004).
EnCana Services Company, Ltd.; Wave Petroleum Operating, LLC (separate comments)	"BLM failed to analyze the significant adverse effects the Proposed Rule will have on development of the federal and Indian oil and gas estates… specifically, BLM must assess the degree to which the Proposed Rule will cause operators to cease production of existing wells because it renders such production uneconomic."	Economic viability of the Rule's new requirements have been a central tenet of this rulemaking and have largely driven changes from the Proposed Rule to the Final Rule. The economic impacts of the Final Rule are discussed in the Regulatory Impact Assessment (RIA) that accompanies this analysis as a supplemental document to the Rule. BLM has also summarized the socio-economic impacts of the Proposed and Final Rules in this EA in Sections 4.2.7 and 4.3.7.
EnCana Services Company, Ltd.; Wave Petroleum Operating, LLC (separate comments)	"BLM failed to analyze the cumulative impacts of the Proposed Rule together with other regulatory efforts to reduce methane emissions from oil and gas exploration and production activities."	The BLM analyzes the cumulative impacts of the Proposed and Final Rule alternatives together with the EPA's Sub OOOOa rulemaking and the various state regulations in Sections 4.2.9, 4.3.9, and 5.2. Through this rulemaking effort, the BLM has striven to harmonize the requirements of this Rule with the requirements of EPA's Sub OOOOa for consistent application and ease of compliance. Thus, the cumulative impacts of these two rules considered together are expected to be minor.
EnCana Services Company, Ltd.; Wave Petroleum Operating, LLC (separate comments)	"Given BLM's repeated statements that the Proposed Rule will have significant GHG-reducing benefits, BLM is required to prepare an EIS rather than an EA prior to finalizing the Proposed Rule. NEPA requires federal agencies to prepare an EIS when a proposed action is expected to result in significant impacts."	An EIS is not required if a project has only beneficial effects and no adverse effects. See e.g. *Friends of Fiery Gizzard v. Farmers Home Admin*., 61 F.3d 501, 505 (6th Cir. 1995) ("If the agency reasonably concludes, on the basis of the environmental assessment, 'that the project will have no significant adverse environmental consequences,' an environmental impact statement is not required . . . It would be anomalous to conclude that an environmental impact statement is necessitated by an assessment which identifies beneficial impacts while forecasting no significant adverse impacts, when the same assessment would not require the preparation of an impact statement if the assessment predicted no significant beneficial

Name of Commenter	Comment	BLM Response
		effect." See also *Rosebud Sioux Tribe v. Gover*, 104 F. Supp. 2d 1194, 1211 (D.S.D. 2000) (overturned on other grounds) ("The conclusion that a project will have purely beneficial impacts does not require preparation of an EIS."). The BLM believes the commenter is conflating the term "significant," in the context of GHG benefits, with the term in the context of NEPA significance; the Final Rule has been determined to have "no significant impact." Therefore, an EIS is not required.
American Petroleum Institute	"The EA accompanying BLM's proposal fails to consider all of the reasonably foreseeable environmental effects associated with the Proposed Rule…Permanently or temporarily shutting-in production has numerous deleterious environmental consequences…."	The effects commenters describe relate to potential additional truck traffic associated with shutting down a well and subsequently bringing it back on line, or associated with potential problems bringing a well back on line (in which case, additional intervention such as contract services would be required). This could result in additional human presence, noise, and dust impacts that otherwise would not occur. However, some of these potential visits might already be required regardless of the Rule, or visits might overlap with maintenance visits. To the extent that additional truck traffic and its associated impacts due to potential well shut-ins are reasonably foreseeable, they are discussed above in Sections 4.2 and 4.3. We also note that, under the Final Rule, operators have options to meet the requirements that do not involve shut ins.
American Petroleum Institute	"The LDAR requirements mandated in the Proposed Rule would result in approximately 146,800 – 152,000 truck trips per year…. The EA nowhere considers the effects of this traffic on wildlife, habitat, noise, dust, emissions, roads, or any other potential environmental receptor."	BLM included discussion of LDAR truck trips in its Draft EA in Section 4.2.1, and does so in this Final EA in Sections 4.2.1 and 4.3.1. Please also see Section 4.3 for a description of the differential of impacts of truck traffic between Alternatives B and C
American Petroleum Institute	"Installing capture equipment on-lease would in many cases necessitate an increase in overall well pad size and power needs. BLM nowhere considers the direct, indirect, or cumulative	BLM conducts site-specific NEPA analyses on each individual project, including the direct, indirect, and cumulative effects of land disturbance. It is unfeasible to consider in detail the impacts of an unknown amount of additional surface disturbance in a programmatic EA such as this one, Sections 4.2.5 and 4.3.5 of the

Name of Commenter	Comment	BLM Response
	environmental impacts of expanding the footprint of potentially thousands of well pads across federal and Indian lands."	EA acknowledges the possibility of such indirect impacts, particularly their effects on wildlife.
American Petroleum Institute	"BLM's extensive preamble narrative contains many regulatory proposals that do not appear in the proposed regulatory text. BLM seeks comments on these "proposals," yet they do not appear to be accounted for in the EA."	Based on public comments, the BLM made numerous changes to the Proposed Rule, incorporating in the Final Rule many commenters' considerations and suggestions that the BLM received on the different proposals put forward in the Proposed Rule preamble. Alternative C describes the environmental effects of the Final Rule, which incorporates these comments as appropriate, based on the substance of the comments and on the BLM's review.
American Petroleum Institute	"The EA also fails to adequately consider the cumulative incremental environmental impacts of the proposal together with the foreseeable effects of other recent BLM proposed and final regulations relating to oil and gas operations on federal and Indian leases."	The EA contains this analysis in Section 5.
Badlands Conservation Alliance	"Road and pipeline building can be difficult and results in ever greater fragmentation of wildlife habitat, agricultural usage and consequently human enjoyment. Pipeline building can be a less than desirable action. In sensitive or isolated locations, alternative solutions should be sought."	While the BLM believes that this Final Rule will likely result in few new, as opposed to accelerated, pipelines, and roads, this EA acknowledges the potential for additional new surface disturbance in the form of roads and pipelines to adversely impact wildlife and human land uses. BLM conducts site-specific NEPA analyses and ESA consultation as needed on each project to be constructed on a Federal or Indian lease, unit, or CA prior to deciding whether to approve it for construction. If a proposal occurs in a sensitive location, BLM field personnel will employ the best available scientific information to seek alternative solutions, on a project specific basis. This will be reflected in subsequent NEPA analyses. As stated in the EA, the BLM also encourages operators to route all their access needs through the same rights of way or corridors.
Environmental Defense Fund	"The proposal further understates the environmental impact of these	BLM has reviewed AR5 and has updated the 100-yr GWP of methane based on the "with cc fd" value found in the table on page

Name of Commenter	Comment	BLM Response
	emissions by relying on an outdated global warming potential ("GWP") value for methane."	714 of IPCC AR5. This change is reflected in section 4.2.1.1 of this Assessment.
Colorado Oil and Gas Association	"The MOU of June 2011 between USDA, USDI, and EPA gives that agency the power to determine the adequacy of air quality analyses."	BLM has reviewed the MOU in question and determined that it merely restates EPA's responsibility under Section 309 of the Clean Air Act to "review and comment on" proposed regulations. Through the OIRA/OMB Interagency Review Process, all of these listed agencies have had the opportunity to review and comment on the draft Final Rule. The BLM has documented this correspondence and adjusted its analysis as appropriate.
American Petroleum Institute	Regarding requirements for storage vessels, additional surface disturbance may be required to add a control device. This can have repercussions including: * The added cost for more land * NEPA analysis for the additional disturbance * National Historic Preservation Act review * Potential wetland disturbance resulting in need for an Army Corps of Engineers Clean Water Act § 404 permit and wetland mitigation * Encroachment on endangered species habitat	Commenter here lists routine issues that the BLM considers in issuing any permit to drill and approving any Sundry Notice for addition surface disturbance. While BLM does not feel that these issues can be analyzed in an EA for a nationwide regulation in a way that would be meaningful for the decisionmaker or the public, this EA does acknowledge in Sections 4.2 and 4.3 the potential for some amount of additional new surface disturbance resulting from the addition of a control device such as a flare to storage vessels, as well as the fact that such surface disturbance could adversely affect wildlife and human land uses. The BLM conducts site-specific NEPA analyses and ESA consultation as needed on each project for additional surface disturbance on a Federal or Indian lease, unit, or CA prior to deciding whether to approve the project. If a proposal occurs in a sensitive location, BLM field personnel will employ the best available scientific information to seek alternative solutions or mitigation measures, on a project specific basis. This will be reflected in subsequent NEPA analyses.

Name of Commenter	Comment	BLM Response
Petroleum Association of Wyoming, American Petroleum Institute	Standard industry practice and insurance requirements require that a combustion device or flare be placed ~50-100 feet from any equipment containing hydrocarbons. Therefore, additional surface disturbance will be a direct effect of control device installation.	See comment response above.
Petroleum Association of Wyoming	By requiring orifice plate inspections, routine verification and spot sampling for high-volume wells every 3 months and very-high-volume wells every 1 month, operators will be required to enter areas that have restrictive stipulations, such as eagle nesting or sage-grouse breeding. Under this type of inspection schedule, operators will either violate a wildlife stipulation or miss the inspection timeframe and by proposing this, the BLM has placed the operator in a situation where maintaining compliance is not always possible.	The requirements cited by the commenter are not a part of this Waste Prevention Rule, but rather, can be found in Onshore Orders 4 and 5. Cumulative impacts of the Waste Prevention Rule along with the other BLM oil and gas rules such as Onshore Orders 4 and 5 are addressed in this EA at Sections 5 and 5.1. The required actions under Onshore Orders 4 and 5 are expected to be incorporated into an operator's well maintenance schedule, and therefore, not result in unique or new surface activities or site visits. The BLM will handle on a case-by-case basis instances in which seasonal restrictions exist and conflict with new inspection, verification, and sampling requirements.