UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
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Washington, DC 20240

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

DOI-BLM-WO310-2015-XXX-EA

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BLM

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1. Introduction

This assessment examines the potential environmental impacts of the Bureau of Land Management's (BLM) proposed regulations to reduce waste of natural gas from venting and flaring operations, and eliminate leaks during oil and natural gas production activities on onshore Federal and Indian leases. The regulations would also clarify 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.

These proposed regulations would replace *Notice to Lessees and Operators of Onshore Federal and Indian Oil and Gas Leases (NTL-4A), Royalty or Compensation for Oil and Gas Lost*, which addresses venting, flaring, and royalty-free use of gas. The regulations would be codified primarily at new 43 CFR subparts 3178, and 3179. The analysis within this environmental assessment (EA) determines whether the potential environmental impacts from this regulatory action may be significant, which 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.* If the potential environmental impacts are determined not to be significant, a finding of no significant impact will be prepared documenting that an EIS is not necessary.

The BLM's Proposed Action includes provisions that direct operators to undertake certain steps to reduce the amount of natural gas that is wasted during oil and gas production operations. These activities would take place on the ground and may have beneficial or adverse effects on the human environment. The analysis in this document identifies both the benefits to the environment from this reduction and potential adverse effects that may occur as a result of human activities required to reduce the waste of Federal and Indian natural gas resources.

By way of background, the BLM applies a tiered decision-making approach when providing access for the development of Federal oil and gas resources on public lands. 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 oil and gas development-related impacts 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 in order to protect other resource values. Those terms and conditions may include mitigation

measures that would be evaluated through the EIS and are implemented as stipulations incorporated into oil and gas leases. Lands are closed to oil and gas leasing altogether when such use is incompatible with other planned uses. 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 and/or the Advisory Council on Historic Preservation. 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 to that RMP.

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 oral auction-style sale whereby interested parties first nominate 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 – typically through an environmental assessment (EA) – to address potential impacts that could be caused by oil and gas development within the nominated area. The NEPA review conducted at the leasing stage tiers to the EIS prepared for the RMP. If the BLM's analysis determines that the nominated tracts are available for leasing, the BLM offers the tracts for lease during the next scheduled sale. As noted above, in addition to complying with NEPA, the BLM may also need to comply with the NHPA and the ESA. Any of the tracts that did not receive bids during the auction are offered non-competitively to the first qualified applicant beginning the first business day following the last day of the sale.

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 an application for permit to drill (APD). All APDs require a surface use plan of operations. The BLM performs a third tier of NEPA review of an operator's proposal, which may be for a single 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. In all cases, the environmental analysis identifies potential impacts from an operator's proposed action. Through the analysis, the BLM develops any necessary conditions of approval to mitigate potential impacts, which are then attached to the approved APD that the operator must follow. At the APD stage, the BLM again assures compliance with the NHPA and the ESA, including any appropriate consultation.

Currently, under NTL-4A, operators must seek BLM approval to flare on a case-by-case basis, with limited exceptions. Operators must provide economic data with each request, 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 a substantial amount of paper-work, but 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 an RMP, oil and gas lease, or APD. Assessment of these additional waste reduction options is conducted to ensure that the BLM's decision(s) complies with applicable Federal, State, local, or tribal air quality statutes and regulations. This proposed regulation would add provisions to the BLM's existing regulations that would improve the BLM's ability to 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

The Federal Land Policy and Management Act of 1976 directs the BLM to manage 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 Bureau's administrative responsibility applies to 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 our 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 5 percent of its oil. In Fiscal Year (FY) 2014, operators produced 204.6 million barrels (bbl) of oil, 2 trillion cubic feet (Tcf) of natural gas, and 3.1 billion gallons of natural gas liquids from onshore Federal and Indian oil and gas leases. The production value of this oil and gas exceeded $33.5 billion and generated approximately $4.1 billion in royalties.

The BLM's authority to regulate the venting and flaring of natural gas, and royalty-free use of oil and natural gas production from Federal and Indian tribal and allotted lands 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.

As previously mentioned, the MLA requires the BLM to ensure that lessees "use all reasonable precautions to prevent waste of oil or gas developed in the land…;" to regulate "all surface-disturbing activities conducted pursuant to any lease issued under [the MLA];" and to "determine reclamation and other actions as required in the interest of conservation of surface resources." In addition, the BLM must manage public lands under principles of multiple use and sustained yield, which includes avoiding permanent impairment of the quality of the environment.

As discussed above, venting, flaring, and royalty-free uses of natural gas and oil on BLM-administered leases are currently governed by NTL-4A. This rule 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. The development of modern hydraulic fracturing combined with directional and horizontal drilling has allowed for access to resources previously considered uneconomic. In today's operating environment, there are better

technologies 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 avoiding waste.

In addition to waste reduction, this proposed rule would have climate benefits. In June 2013, the 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 proposed rule as an action that would cost-effectively reduce flaring and venting of natural gas, prevent waste of hydrocarbons, promote conservation of produced oil and gas, and ensure a fair return to the American taxpayer.

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, for example, ICF International (ICF) issued a report entitled, *Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries*,[1] which projected that methane emissions from oil and gas activities will grow 4.5% from 2011 to 2018. These projections take into account the Environmental Protection Agency's (EPA) existing New Source Performance Standards (NSPS), issued in 2012. The 2012 NSPS, also known as Subpart OOOO, limits the release of volatile organic compounds (VOCs) from new and modified hydraulically-fractured natural gas wells, certain new or modified sources located at well sites, natural gas processing plants, or natural gas gathering and boosting stations.[2] Some of the requirements of that rule, such as the limits it imposes on leakage from gas-powered pneumatic devices on new and modified well sites, are similar to the requirements the BLM presently proposes to impose on *existing* Federal and Indian (other than Osage Tribe) leases.

The ICF Study projected 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,

[1] https://www.edf.org/sites/default/files/methane_cost_curve_report.pdf
[2] U.S. EPA, Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews; Final Rule, 77 FR 49490 (Aug. 16, 2012).

due to emissions reduction activities required by 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.[3]

BLM data on applications to vent or flare support the ICF Study's conclusion that methane emissions are increasing. The BLM assessed the number of applications to vent or flare that the Bureau received between 2005 and 2014. In 2005, the BLM received just 50 applications to vent or flare gas. In 2011, the BLM received 622 applications, and this doubled again within three years to 1,248 applications in 2014. The vast majority of the additional applications were for flaring in New Mexico, Montana, the Dakotas, and, to a lesser extent, Wyoming.

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 identified cost-effective methods to reduce that waste. The reviews 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.

In December 2007, for instance, the Subcommittee on Royalty Management of the Royalty Policy Committee (RPC), a Federal advisory committee to the Department of Interior, the Inspector General of the Department of Interior, and the Government Accountability Office (GAO), issued a report entitled *Mineral Revenue Collection from Federal and Indian Lands and the Outer Continental Shelf*. The report emphasized the need for enhanced verification of production accountability, and it recommended that the BLM update relevant pre-1983 rules. The BLM began a process to implement the recommendations to improve production accountability oversight.

A few years later, in October 2010, the GAO issued a report titled *Federal Oil and Gas Leases—Opportunities Exist to Capture Vented and Flared Gas, Which Would Increase Royalty Payments and Reduce Greenhouse Gases* (GAO-11-34). The GAO report examined the amounts of natural gas being vented and flared on Federal oil and gas leases, and evaluated the potential for additional capture using technologies available to reduce emissions from key sources. Sources considered in the report include gas well liquid unloading operations, pneumatic devices, well completion operations, glycol dehydrators, and oil and condensate storage tanks. The GAO also evaluated the potential for increases in royalty payments and decreases in greenhouse gas emissions from any additional gas capture.

The GAO determined that in 2008, "the increased use of available technologies, including technologies that capture emissions from sources such as well completions, liquid unloading, or venting from pneumatic devices, could have captured about 40 percent—around 50 Bcf—of the natural gas EPA estimated was lost from onshore federal leases nationwide."[4] According to the GAO, "if…40 percent of this lost gas could have been economically captured and sold, federal royalty payments could increase by approximately $23 million annually, which represents about

[3] ibid, p. 1-1
[4] GAO-11-34, pp. 19 & 20

1.8 percent of annual federal royalty payments on natural gas."[5] The GAO also noted that "such reductions could … reduce greenhouse gas emissions by an amount equivalent to about 16.5 million metric tons of CO2—the annual emissions equivalent of 3.1 million cars."[6]

In March 2010, the Department of the Interior's Inspector General (IG) issued a report titled *BLM and MMS Beneficial Use Deductions* that evaluated the policies and practices of the BLM and the Minerals Management Service (MMS), which was later divided into the Office of Natural Resources Revenue (ONRR), the Bureau of Ocean Energy Management, and the Bureau of Safety and Environmental Enforcement, as it related to beneficial use. Oil and gas companies that drill on Federal and Indian lands and offshore are not required to pay royalties on the portion of produced oil and gas that they use to run onsite operations, such as to power drilling and pumping equipment. This is referred to as "beneficial use." The IG found guidance from the BLM and the MMS to be lacking, leading to inconsistencies in the reporting of this "beneficial use."

Most recently, in June 2015, the Environmental Defense Fund (EDF) commissioned a study prepared by the Inner City Fund International (ICF) that evaluated methane emission reduction opportunities from oil and natural gas operations on Federal and tribal lands. The study concluded that the total emissions to the atmosphere from fugitive sources (leaks), vented emissions, and flares was 47.7 billion cubic feet (Bcf) of natural gas on Federal lands and 18.4 Bcf on tribal lands in 2013. The researchers projected that existing technologies and techniques could reduce the volume of waste gas on Federal land by 39%, and on tribal land by 38%.[7]

This proposed rule responds to recommendations in the OIG and GAO reports, as well as to concerns identified in the other studies of methane waste, described above.

1.3. Public Involvement in the Rulemaking

In March and May of 2014, the BLM conducted four forums throughout the country, primarily in regions with widespread BLM-administered oil and gas operations, to get the public's and the tribes' views on venting and flaring operations on public and Indian lands. The BLM informed the public and the tribes that it was considering various options for addressing venting and flaring of gas and the loss of gas through fugitive emissions from onshore Federal and Indian oil and gas operations. This includes preventing the waste of hydrocarbons, while promoting conservation of produced oil and gas, and to also ensure a fair return to the American taxpayer.

The forums were held 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). At the Denver and Washington, D.C. sessions, the tribal and public meetings were live-streamed to allow for the greatest possible participation by interested parties.

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[5] GAO-11-34, pp. 24 & 25
[6] GAO-11-34, p. 1
[7] http://www.edf.org/sites/default/files/content/federal_and_tribal_land_analysis_presentation_6_22_final.pdf
(slides 8, 12, and 13)

Meetings with the tribes served as an initial outreach, communication, and information sharing opportunity in which senior policy makers from the BLM Washington Office, as well as State and local line officers that have built the relationship with the tribes in the field, were present. The four meetings with the tribes served as a starting point for tribal consultation, from which the BLM will continue the dialog using the established local relations with the BLM field office managers.

As part of its outreach efforts, the BLM accepted informal comments generated as a result of the public/tribal forums through May 30, 2014. A total of 30 unique comments were received: 12 from the oil and gas industry and trade associations, 6 from NGOs representing 37 organizations, 2 from government officials or elected representatives and 9 from private citizens. Two hundred and sixty comments from private citizens were part of an email campaign.

1.4. Purpose and Need for the Proposed Action

This proposed action would replace existing 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 would be codified primarily as new subparts 43 CFR 3178 and 3179. The purpose of the proposed 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 proposed action would also clarify when oil or natural gas may be used royalty-free for production activities on site.

As discussed in Section 1.2 above, this BLM 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 would help maximize the public's benefit from production of oil and gas resource—while minimizing waste and environmental impacts—is consistent with the Bureau's responsibilities under the MLA and FLPMA to 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 determine whether it should promulgate this rule for implementation.

2. Proposed Action and Alternatives

In this regulatory environmental analysis, the BLM considered two alternatives in detail:

- Alternative A – No Action, and
- Alternative B – Proposed Action.

2.1. Description of Alternative A – No Action

This alternative would keep the existing requirements of NTL-4A in place, and not promulgate the proposed rule. The BLM would not implement any updated requirements to capture

additional 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.

2.2. Description of Alternative B – Proposed Action

The proposed action is the promulgation of the Waste Prevention, Production Subject to Royalties, and Resource Conservation rule (the "proposed rule"). This proposed 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. There are also provisions in the proposed rule requiring operators to report volumes of natural gas that are vented or flared. These administrative requirements would not directly affect the human environment. Implementation of other requirements in the proposed action, however, would result in on-the-ground activities that could affect the human environment.

The proposed rule seeks 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 is proposing 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 an Application for a Permit to Drill a new well, an operator must 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 is proposing 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 is proposing requirements that operators replace all high-bleed continuous controllers with low-bleed continuous controllers.
- *Gas loss from pneumatic pumps (chemical injection pumps)*: To reduce the amount of gas lost from pneumatic pumps, the BLM is proposing 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 is proposing a requirement that would restrict well purging from any well drilled after the rule's effective date. The BLM is also proposing 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 is proposing 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).
- *Gas loss from leaks*: To reduce the amount of gas lost from leaks, the BLM is proposing 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. Alternatives Considered but Eliminated from Detailed Analysis

In developing the proposed rule, the BLM considered but ultimately rejected several alternative approaches to prevent waste and loss of gas. As a general matter, the BLM believes that the proposed action is a more cost-effective way to achieve the desired waste reductions, as compared to the considered alternatives.

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. 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 considered whether it should focus 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 3 years). However, the BLM did not move forward with this alternative due to perceived difficulties with implementation. For instance, identifying gas capture zones and calculating accurate internal rates of return would be quite complex and would depend on having accurate data about companies' cost environments.

In addition, the BLM considered whether it would be appropriate to require the installation of plunger lifts on existing wells, but determined that such a requirement would not be technically feasible in all cases.

In developing the proposal, the BLM also considered a few different approaches to leak detection. The agency considered using different inspection frequencies based on the level of production from the site. Under this approach, sites with less gas production might require less frequent inspections (e.g., annual) while sites with greater gas production might require more frequent inspections (e.g., quarterly). Because the proposed action provides for a variable frequency of inspections based on the amount of leaks detected on site, these alternatives of set frequencies based on the level of production were not carried forward for analysis here.

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 has requested comment on other approaches for preventing waste in the proposed rule, such as applying a higher royalty rate to 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. The agency is also requesting comment on the 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. BLM is also requesting comments on whether to focus operators' leak detection and repair (LDAR) efforts on higher production wells, and whether to modify or waive the LDAR requirements for low-producing "stripper" wells.

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

3. Affected Environment

The affected environment section describes the existing condition of elements of the human environment that may be affected by implementing the proposed action or the alternative. In doing so, this section broadly describes elements of the environment where BLM-administered oil and gas leases affected by this rule are located. More importantly, however, this section focuses on describing existing trends related to venting and flaring operations on Federal and Indian oil and gas leases, including the BLM's current regulatory framework applicable to those

leases and how climate change and air quality are addressed under that existing framework. This description will provide a baseline against which to compare the potential effects of the proposed action.

The BLM manages over 245 million acres of public lands and administers about 700 million acres of subsurface 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. These lands are managed for a variety of resource values and uses that include recreation, conservation, mining, livestock grazing, rights-of-way, and oil and gas development.

The BLM's land use plans provide the framework that guides the decision for every action and approved use that occurs on lands the agency manages. Map 1, below, illustrates the land use planning area boundaries and regions where BLM-administered oil and gas development occurs. Table 1 lists the land use plans governing most of these areas of oil and gas development. The environmental impact statement associated with each land use plan 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.

3.1. Background Environmental Conditions and Climate Change

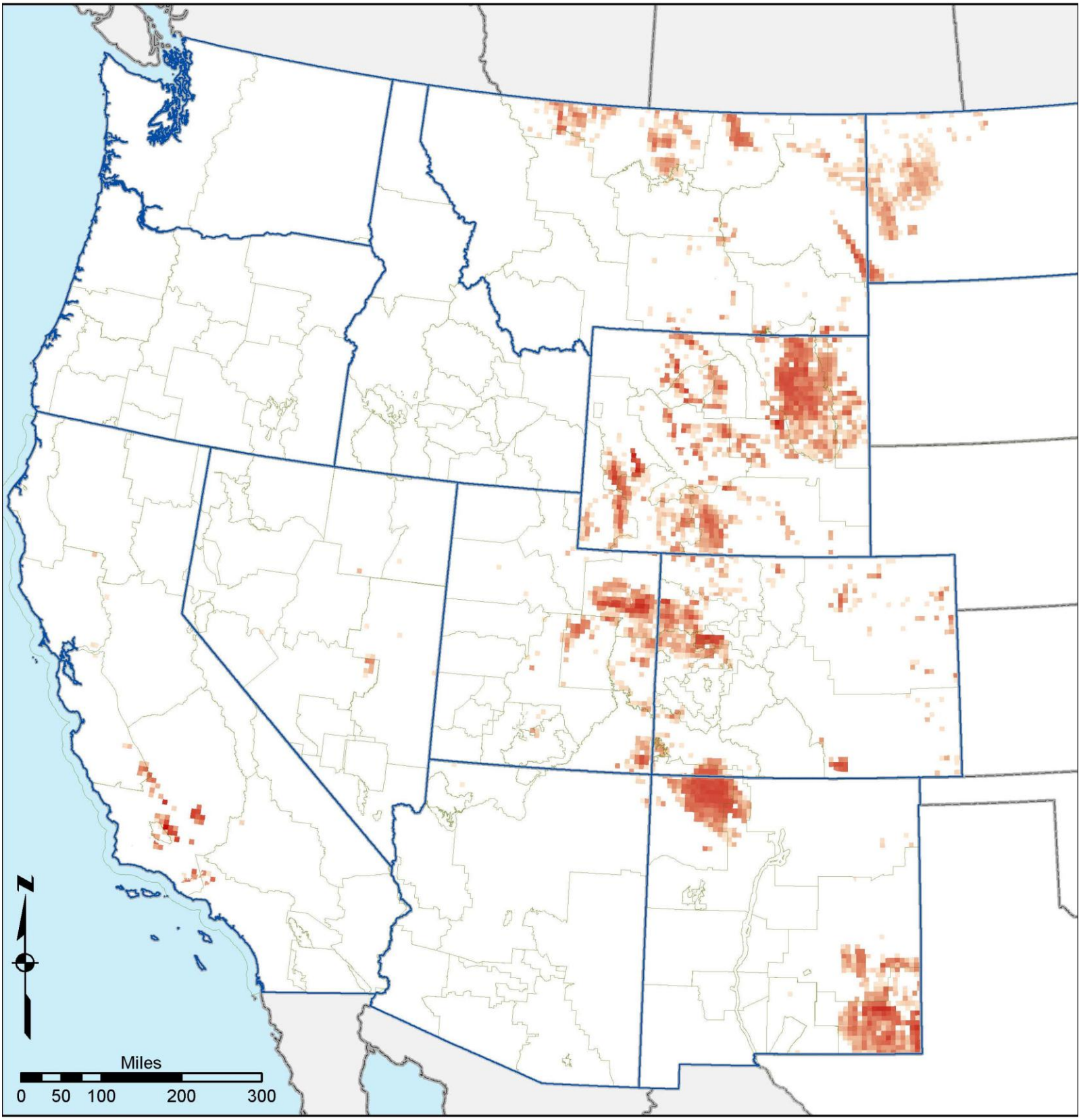
Since 2010, the BLM has been undertaking an effort, known as Rapid Ecoregional Assessments (REA), to improve the Bureau's understanding of the existing condition of the landscapes in which public lands are located, and how those conditions may be altered by ongoing environmental changes and land use demands. The REAs look across ecoregions where public lands are located to describe, among other things, how resources on such lands are being affected by climate change, wildfires, invasive species, and development. Examples of ecoregions include the Sonoran Desert and the Colorado Plateau.

One observation of these assessments is that climate change, in particular, is influencing western lands and resources in many ways. Findings from a 2009 United States Global Change Research Program report pointed out that as average temperatures rise in the Western U.S., droughts are increasing, snowpack is declining, and water supplies are diminishing in key areas. Arctic permafrost is thawing. Wildfires have become larger and more frequent. Noxious weeds and invasive species are crowding out native plants and wildlife. Section 4.1.1 below contains a more detailed description of current and projected impacts of climate change generally and in the regions of the U.S. with Federal and Indian oil and gas development.

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. Map 1, 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 West. Table 1 lists the land use plans 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.

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. For more information about REAs, please refer to the following website – http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/reas.html.



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.

Table 1 Summary of Land Use Plan Names for the States			
STATE	**LAND USE PLAN NAME**	**STATE**	**LAND USE PLAN NAME**
AZ	Arizona Strip National Monument	NM	White Sands RMP
CA	Caliente Resource Management Plan (RMP)	NV	Wells RMP
	South Coast RMP		Elko RMP
	Sierra RMP		Tonopah RMP
	Hollister RMP		Ely RMP
	Ukiah RMP	UT	Randolph MFP
	West Mohave RMP		Pony Express RMP
CO	Grand Junction RMP		Moab RMP
	Little Snake RMP		Monticello RMP
	Kremmling RMP		Richfield RMP
	Northeast RMP		Vernal RMP
	White River RMP		Price RMP
	Glenwood Springs RMP		Kanab RMP
	Royal Gorge RMP	WY	Green River RMP
	San Juan/San Miguel RMP		Buffalo RMP
	Canyons of the Ancient National Monument RMP		Newcastle RMP
MT	North Dakota RMP		Grass Creek RMP
	Powder River RMP		Washakie RMP
	Big Dry RMP		Cody RMP
	Billings RMP		Lander RMP
	West Hi-Line RMP		Jack Morrow Hills RMP
	Judith, Valley, and Phillips RMP		Casper (Platte River) RMP
	Upper Missouri River Breaks National Monument		Pinedale RMP
NM	Rio Puerco RMP		Rawlins RMP
	Taos RMP		Kemmerer RMP
	Carlsbad RMP		
	Farmington RMP		
	Roswell RMP		

3.2. Overview and Discussion of Venting and Flaring Operations on Federal and Indian Lands

Table 2 provides a brief overview of venting and flaring operations, and identifies the primary sources of vented and flared gas from oil and gas production operations. For further background on venting and flaring operations, please refer to Chapter 3 of the regulatory impact analysis (RIA) titled, *Regulatory Impact Analysis for: Revisions to 43 CFR 3100 (Onshore Oil and Gas Leasing) and 43 CFR 3600 (Onshore Oil and Gas Operations) Additions of 43 CFR 3178*

(Royalty-Free Use of Lease Production) and 43 CFR 3179 (Waste Prevention and Resource Conservation) U.S. Bureau of Land Management, prepared for the proposed rule.

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 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, 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 (rarely) 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."[8] To determine the maximum well flow rate, the operator may need to flare gas (and sometimes vent) for a period of time; it is also possible, however, to calculate the maximum flow rate while capturing the gas in a sales line.
	Emergency venting or flaring may also be performed and is 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 is the process taken to transform a drilled well into 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."[9] 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

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

Source	Description
	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 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 through multiple options in which the volume vented into the atmosphere may be less for one option over 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. Natural gas leaks, leaked gases, or evaporated liquids, are lost to the atmosphere, and thereby contribute methane, VOC, and uncombusted carbon dioxide. If the

Source	Description
	well is connected to a gathering line for production purposes, then the leaked gases are lost production.

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.

The BLM also reviewed the trends in the amount of applications it received by operators to vent or flare gas. In 2005, the BLM received just 50 applications to vent or flare gas. By 2011, the BLM received 622 applications, and the number doubled again within three years to 1,248 applications in 2014. These applications are being processed under the requirements and provisions of NTL-4A.

For baseline purposes, the BLM estimated the amount of natural gas that was vented or flared from BLM-administered leases in 2013:

Table 3 – Estimated Vented Gas from Federal and Indian Leases in 2013, by Source

Natural Gas Lost Through Venting	
Source	**Volume (Bcf)**
Well completions	2.08
Pneumatic controllers	5.37
Pneumatic pumps	2.46
Gas Engines	1.11
Compressors	0.42
Liquids Unloading	3.26
Storage Tanks	2.77
Other Production (Includes Leaks)	4.35
Total Venting	**21.82**

Table 4: Estimated Flared Gas from Federal and Indian Leases in 2013, by Mineral Ownership[10], Volume in Bcf

Source	Mineral Ownership			Total
	Federal	Indian	Non-Federal, Non-Indian	
Flared oil-well gas	24.27	16.25	30.84	71.37
Flared gas-well gas	2.40	0.67	1.50	4.58
Total	**26.68**	**16.92**	**32.34**	**75.94**

[10] 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.

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 (NTL-4A), Royalty or Compensation for Oil and Gas Lost*. 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:

- 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 their recovery is warranted.

In addition to NTL-4A, various environmental analysis documents associated with project-specific environmental impact statements describe and analyze how specific oil and gas natural 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 would reduce the amount of natural gas emitted into the atmosphere, and are being considered as part of this proposed regulation.

4. Environmental Effects

The following analysis evaluates the direct, indirect, and cumulative effects on the human environment that may occur as a result of implementing the proposed action 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 action alternative compared to the No Action Alternative, which is the current operating environment. This analysis focuses primarily on elements of the action alternative that would require an operator to perform an activity that it might otherwise not perform under the No Action Alternative.

Independent of the BLM's proposed action, forthcoming EPA regulations on oil and gas production under the Clean Air Act are expected to affect the current operating 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).[11] These proposed standards would apply to new and modified emissions sources in the oil and gas production sector, and while they target VOC emissions, they would also have the effect of reducing venting and leaks of gas.

There is some potential overlap between the BLM proposed rule and the EPA proposed rule with respect to several categories of new and modified sources. Specifically, both rules could apply to oil well completions, and to new and modified sources subject to LDAR requirements. The BLM and the EPA are working together to minimize any potential for overlap or duplication. As a practical matter, the BLM proposal would have no impact on the vast majority of oil well completions (all hydraulically fractured and refractured completions), assuming the EPA rule is finalized. In addition, if both rules are in place, the environmental benefits of the LDAR requirements with respect to new and modified sources on Federal and Indian leases could be attributed to either rule.

The BLM expects that the EPA rule will be finalized in a form similar to the proposal. Thus, we assume that the benefits of the requirements to limit venting from well completions would be realized in the base case. But we also note that if the EPA proposed rule is not finalized, the action alternative (Alternative B) will result in additional positive environmental impacts.

Assumptions Made as Part of the Impact Analysis

The following list outlines the BLM's assumptions about operators' likely responses to the proposed regulations to limit the loss of gas. This summary is based on a more detailed discussion of our assumptions, which is provided in the RIA 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 limit;
  - Accelerate construction of a gathering line to connect a well to pipeline infrastructure systems and/or install or speed installation of additional compression to expand pipeline capacity and allow for transport of the 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,

[11] EPA, *Oil and Natural Gas Sector: Emission Standards for New and Modified Sources, Proposed Rule*, 80 FR 56593 (Sept. 18, 2015).

operators already control gas from drilling operations as a general matter of safety and operating practice. 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 hydraulically fractured well completions or recompletions would be controlled under EPA's proposed rule. If, however, EPA's proposed rule did not become final, then the BLM requirements for well completions and recompletions would affect up to about 1,250 – 1,575 completions per year. In this latter case, 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 and, if the EPA did not finalize its proposed standards, about 75 new pumps per year. 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 ensure tank emissions are below the threshold established by 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 (or 37,000 – 38,000 wellsites per year if the EPA did not finalize its proposed rule). We anticipate 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 take these actions in circumstances where the operators would not have constructed a gathering line or installed a compressor absent the rule. The BLM believes that the rule would *accelerate* the construction of gathering lines and/or installation of compressors that would have occurred more slowly 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 those are activities that might result from the proposed rule.

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. None of the requirements prescribed by Alternative B 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. NTL-4A authorizes venting and flaring of gas during emergencies, well purging and evaluation tests, initial production tests, and routine or special well tests, and it allows operators to vent and flare unlimited quantities of gas with approval from the BLM.

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. However, the BLM would impose such limits only to address the project's potential air quality impacts, consistent with the Bureau's authority under FLPMA to provide for compliance with applicable state, Federal, or tribal air pollution control requirements.

The following discussion summarizes how losses of natural gas from oil and gas operations (whether vented, flared, or leaked) affect air quality under the No Action Alternative – that is, the current BLM regulatory framework. This incorporates by reference applicable environmental impacts and mitigation that has been disclosed in recent EISs prepared by the BLM, 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 GHGs from venting, flaring, and leaks of gas (primarily methane) 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 (and disregarding the projected impacts from the EPA's proposed rule), the BLM projects that GHG emissions from venting, flaring, and leaks of gas on Federal and Indian leases would continue unabated.

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. Although the guidance is still in draft form, the CEQ encourages all Federal agencies to apply the guidance to all new agency actions moving forward. The guidance recommends describing the current and expected future state of the affected environment without the proposed action, based on available climate change

information, including observations, interpretive assessments, predictive modeling, scenarios, and other empirical evidence.

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 (Federal and Indian oil and gas leases), 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 is the most comprehensive and authoritative report[12] 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."[13] In addition, the most recent decade was the nation's warmest on record.[14] 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.[15] 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.[16] 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.[17]

[12] Third National Climate Assessment – http://s3.amazonaws.com/nca2014/low/NCA3_Climate_Change_Impacts_in_the_United%20States_LowRes.pdf?download=1
[13] Ibid. p.29.
[14] Ibid., p.61.
[15] Ibid., p. 29.
[16] ibid, p. 28 and 29
[17] ibid, p. 8

According to the Assessment, currently observed and projected climate change impacts will vary across different regions[18] 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. And with projections of greater temperature increases, these effects are expected to continue and intensify.

Great Plains Region

On the Great Plains, rising temperatures will 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.[19]

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 and rural groundwater systems. The trend toward more dry days and higher temperatures in this region will also increase evaporation and decrease water supplies. These changes will add stress to limited water resources and affect management choices related to irrigation, municipal use, and energy generation.[20]

Southwest Region

In the Southwest, drought and increased temperatures due to climate change 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. 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. Excessive wildfires destroy homes, expose slopes to erosion and landslides, threaten public

[18] ibid, p.369
[19] ibid, p. 116
[20] ibid, p.446

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.[21]

Alaska Region

Because of its cold-adapted features and rapid warming, climate change impacts on Alaska are already pronounced, including earlier spring snowmelt, reduced sea ice, widespread glacier retreat, warmer permafrost, drier landscapes, and more extensive insect outbreaks and wildfire. Over the past 60 years, Alaska has warmed more than twice as rapidly as the rest of the United States, with state-wide average annual air temperature increasing by 3°F and average winter temperature by 6°F. Warming 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.[22] With regards to reduced sea ice, the Arctic Ocean is more accessible for marine traffic, including trans-Arctic shipping, oil and gas exploration, and tourism. Reduced sea ice will also have negative effects on various wildlife species. Polar bears, seals, and walruses spend a good portion of their year on sea ice, but have recently been coming ashore much earlier and more often due to the lack of sea ice. 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.[23]

4.1.2. Air Quality

In addition to contributing to climate change, lost natural gas can also affect local air quality. Natural gas contains VOCs, which are precursors to ozone and particulate matter, and various toxic air pollutants, such as benzene. These air pollutants affect public health and welfare.

4.1.2.1. 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 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

[21] ibid, p. 468
[22] ibid, p. 516
[23] ibid, p. 518

high, which increases their exposure. Research also indicates that ozone exposure may increase the risk of premature death from heart or lung disease.[24]

Exceedances of the ozone standards under the NAAQS have occurred in Northeastern Utah, where the BLM administers 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 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 for the EIS was signed, there likely would be an incremental increase in regional ozone levels resulting from the Proposed Action.[25] As part the BLM's Record of Decision (ROD) for this project, an air resource management strategy was established to reduce impacts to air quality, especially ozone. [26]

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, including 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.[27]

4.1.2.2. 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 (SOx), in the atmosphere.[28] 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)

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[24] Ground-level Ozone Health Effects – http://www3.epa.gov/ozonepollution/health.html (accessed November 2015)

[25] DOI-BLM 2012, Greater Natural Buttes Area Gas Development Project FEIS pp. 4-12.

[26] 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).

[27] 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

[28] http://www3.epa.gov/air/emissions/basic.htm

that Federal land managers specifically protect, such as visibility. 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.[29] The BLM's ROD for this project included mitigation measures to reduce visibility and ozone-related air impacts.[30]

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, and respiratory morbidity such as asthma attacks, acute and chronic bronchitis, hospital and ER visits, work loss days, restricted activity days, and respiratory symptoms.[31] While releases of natural gas contribute to particulate matter formation, to date, BLM's air modeling efforts for proposed oil and gas projects have not projected exceedances of the particulate matter standards.

Finally, particulate matter composed of SO_2 or NO_x can contribute to acidic atmospheric deposition (the process by which air pollutants are removed from the atmosphere and deposited on terrestrial and aquatic ecosystems). Air pollutants are deposited through precipitation (acid rain) and by gravitational settling of pollutants.[32] Acid rain can have a multitude of environmental effects, including making lakes and streams acidic, particularly in regions where

[29] USDI BLM 2008, Pinedale Anticline Oil and Gas Exploration and Development Project FEIS pp. 4-84

[30] USDI 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).

[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

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.[33]

4.1.2.3. 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.[34] 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.[35] For example, EPA has classified benzene as a known human carcinogen.[36]

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.[37] Although the modeling simulations did not demonstrate exceedances of applicable thresholds, HAPs are a concern to the BLM and the public because of their cancer-causing and/or other serious health effects.

4.1.3. Dwellings and Communities – Noise and Light

Oil and gas operations can also affect the human environment, and 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. 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 (sounds like a jet engine).[38]

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[34] Regulatory Impact Analysis of the Proposed Emission Standards for New and Modified Sources in the Oil and Natural Gas Sector, 2015, p. 4-31
[35] EPA Air Toxics Web Site – http://www3.epa.gov/ttn/atw/allabout.html
[36] US EPA, Benzene Hazard Summary (http://www3.epa.gov/ttn/atw/allabout.html)
[37] USDI BLM 2012, Gasco Energy Inc. Uinta Basin Natural Gas Development Project FEIS Appendix L-15
[38] USDI BLM 1999, Pinedale Anticline Oil and Gas Exploration and Development Project DEIS pp. 4-77 – 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, transforming rural areas into an industrial setting and interfering with natural darkness.

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.[39] Light pollution reduces the naturalness and opportunities for primitive recreation within lands with wilderness characteristics.[40] While the BLM has not quantified the impacts that noise from flaring operations has had on recreational opportunities, it is reasonable to presume 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.[41] The EIS noted that noise can modify sage-grouse behavior and habitat-use patterns such as the use of critical winter habitats or sage-grouse leks.[42] The *Jonah Infill Drilling Project Final EIS* described noise levels

[39] USDI BLM 2015, Moab Master Leasing Plan and Draft Resource Management Plan Amendments DEIS pp. 3-52 – 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

[40] USDI BLM 2015, Moab Master Leasing Plan and Draft Resource Management Plan Amendments DEIS pp. 4-33 – 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

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

[42] USDI BLM 2012, Continental Divide-Creston Natural Gas Development Project Draft EIS, pp. 4-207 –

from typical sources within and near a natural gas field. Flaring operations at the Jonah field 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.[43]

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 proximate to an oil and gas wellpad. For some wildlife species, flares could also have the opposite effect, attracting wildlife to the light from the flame and potentially burning them.

Since wells can flare for years, wildlife could avoid well sites and/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. 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.

4.2. Environmental Effects of Alternative B – Proposed Action

Alternative B 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 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.

Overall, the expected beneficial impacts of Alternative B would dwarf the potential adverse impacts. First and foremost, Alternative B 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, air toxics, and GHGs that would be generated under the No Action Alternative. Reduction in flaring would also reduce both noise and light pollution, thereby lessening impacts of noise and light on communities living near oil and gas development, wildlife (including protected species), and recreationists. The BLM also projects net socio-economic benefits from Alternative B, as calculated in the RIA.

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) curtail production to keep flaring below the proposed limit; (ii)

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http://www.blm.gov/style/medialib/blm/wy/information/NEPA/rfodocs/cd_creston.Par.77653.File.dat/V-I-Ch4-EnvConsequence.pdf

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

install (or speed installation of) gathering pipelines to connect to pipeline infrastructure systems and/or install (or speed installation of) compressors to increase pipeline capacity to allow for transport of additional natural gas; and/or (iii) use mobile gas capture and transport technology, which includes NGL recovery and CNG trucking.

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, 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.

To a lesser extent, adverse impacts could also occur from various miscellaneous activities conducted to comply with the venting requirements under Alternative B. Below, we describe the individual activities 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 venting requirements.

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, versus constructing a new compressor station. 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.

Mobile Gas Capture and Transport Technology

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 looked at 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 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 are 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 flaring in excess of the flaring limit by more than 40 Mcf per day, and the lease either is, or is not, connected to a gas pipeline. In these cases, the BLM believes the available quantity of gas and the short transit distance would make mobile capture and transport economically feasible. For the five other cases, we expect the operator to curtail production or request an alternative flaring limit or exemption from the flaring limit. In those cases, the BLM would not expect any new adverse impacts. For a description of the five other cases, please refer to Section 7.6 of the RIA.

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 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 impacted 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 NGLs were the preferred method of compliance and the amount that might be expected if natural gas compression were 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[44] 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

[44] 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[45] standard cubic feet of gas 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

[45]Source – http://www.hexagonlincoln.com/product-lines/titan/titan-specifications/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	Unconnected Leases	Connected Leases

(Mcfd)	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	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 are unlikely to meet the flaring requirement by installing gathering pipelines or adding compressors that would not have been installed absent the rule, although these activities may accelerate as a result of the rule. Nevertheless, to ensure that the EA appropriately evaluates all possible effects of the proposed action, we include the following discussion of the impacts of gathering line construction and compressor installation.

Gathering pipelines are 4- to 6-inch 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-scaled

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, 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 area needed to install and operate a compressor station will vary in surface area 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 a 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 the 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.

4.2.1. Climate Change

4.2.1.1. Beneficial Impacts of the Proposed Action

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 25 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.[46]

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.

Tables 12 and 13 illustrate 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, and also by whether or not EPA's proposed rule is finalized.

[46] 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)

	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**

Table 13: Estimated Methane Reductions if EPA Does Not Finalize Subpart OOOOa (tons)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Well Completion	11,500	11,800	12,200	12,500	12,900	13,200	13,500	13,900	14,200	14,500
Pnumatic Controllers	43,400	43,400	43,400	43,400	43,400	43,400	43,400	43,400	43,400	43,400
Pneumatic Pumps	16,100	16,300	16,400	16,600	16,700	16,800	17,000	17,100	17,200	17,400
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	67,700	67,800	67,800	67,800	67,900	67,900	67,900	68,000	68,000	68,000
Total	**176,000**	**177,000**	**178,000**	**179,000**	**180,000**	**181,000**	**182,000**	**183,000**	**184,000**	**185,000**

Based on the social cost of methane, as described in the RIA, the estimated monetized value of these methane reductions ranges from $180 – 277 million per year, depending on whether or not the EPA's proposed rule is finalized. The reduction in flaring through gas capture is expected to have additional minor environmental benefits associated with the productive use of the gas downstream instead of combusting the gas upstream, but we are not able to quantify those benefits.

4.2.1.2. Adverse Impacts of the Proposed Rule

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

Table 14: 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 15 derives from information in the RIA 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, with and without the EPA rule.

Table 15: Annual Additional GHG Emissions From Other Requirements of Alternative B and Total Additional GHG Emissions Under Alternative B

Requirement	CO_2e (tpy) with EPA Proposed Rule	CO_2e (tpy) without EPA Proposed Rule
Well Completion	44	48
Pneumatic Controllers	109	109
Pneumatic Pumps	35	3636
Liquids Unloading	80	80
Storage Tanks	2	2
LDAR	147	150

Table 15: Annual Additional GHG Emissions From Other Requirements of Alternative B and Total Additional GHG Emissions Under Alternative B

Requirement	CO_2e (tpy) with EPA Proposed Rule	CO_2e (tpy) without EPA Proposed Rule
CNG Truck Traffic	5,435	
NGL Truck Traffic	434	
TOTAL (with CNG)	**5,811**	**5,859**
TOTAL (with NGL)	**810**	**858**

The BLM estimates that the average amount of additional CO_2e that would be released annually under Alternative B would range from 5,811 to 5,859 CO_2e tpy 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 to 858 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 12-13 above.

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, such truck trips are likely to be only one to four truck trips per year, which in some instances, could be incorporated into the operators' normally scheduled maintenance activities that they already perform on existing production equipment. In such cases, these 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. In any event, these GHG emissions would be negligible and minimized through appropriate conditions of approval authorizing the construction and operation of the devices.

Any climate impacts of the anticipated minor increases in CO_2 emissions caused the proposed rule would be more than offset by the benefits of methane reduction that the rule would achieve.

4.2.2. Air Quality

4.2.2.1. Beneficial Impacts of the Proposed Action

Alternative B would reduce the amount of VOCs and HAPs that adversely impact local and regional air quality in and around BLM-managed lands. Tables 16 through 19 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 16: 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 17: Estimated VOC Reductions Under Each Applicable Requirement of Alternative B if EPA Does Not Finalize Subpart OOOOa (tons)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Well Completion	9,600	9,900	10,200	10,500	10,800	11,000	11,300	11,600	11,900	12,200
Pneumatic Controllers	199,000	199,000	199,000	199,000	199,000	199,000	199,000	199,000	199,000	199,000
Pneumatic Pumps	4,040	4,080	4,110	4,150	4,190	4,230	4,270	4,300	4,340	4,380
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	18,900	18,900	18,900	18,900	18,900	18,900	19,000	19,000	19,000	19,000
Total	**400,000**	**402,000**	**405,000**	**408,000**	**410,000**	**413,000**	**415,000**	**417,000**	**420,000**	**423,000**

Table 18: 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

Table 18: Estimated HAP Reductions Under Each Applicable Requirement of Alternative B (tons)

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**

Table 19: Estimated HAP Reductions if EPA Does Not Finalize Subpart OOOOa (tons)

	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Well Completion	9	9	9	9	10	10	10	10	11	11
Pneumatic Controllers	484	484	484	484	484	484	484	484	484	484
Pneumatic Pumps	8	8	8	8	8	8	8	9	9	9
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	66	66	66	66	66	66	66	66	66	66
Total	**2,269**	**2,292**	**2,314**	**2,336**	**2,358**	**2,380**	**2,402**	**2,425**	**2,447**	**2,469**

Over the 10-year analysis window, we estimate that the requirements under Alternative B would cumulatively reduce annual VOC emissions by 391,000 to 423,000 tons and HAP emissions by 2,261 to 2,469 tons, depending on whether the EPA finalizes its proposed rule.

4.2.2.1.1. Ozone formation and visibility

As noted under the No Action Alternative, on multiple occasions, ambient concentrations of ozone in the atmosphere over BLM-managed lands 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 exercises 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.[47]

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*. This project proposed to drill, complete, and produce approximately 3,675 gas wells across 163,000 acres of land, and it was 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.

4.2.2.1.2. 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* was expected to contribute 1,004 tons of HAPs per year (benzene, toluene, ethyl benzene, xylenes, formaldehyde, and n-hexane, specifically). 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 risks from projects authorized by the BLM. As such, the proposed rule is expected to pose benefits to public health and welfare.

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[47] 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.

4.2.2.2. Adverse Impacts of the Proposed Action

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 *de minimis*, 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 20 and 21 present the average amount of each pollutant emitted annually into the atmosphere from the truck traffic after implementing Alternative B. Emissions shown on Tables 20 and 21 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 20: 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 21: 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 the emissions will be geographically dispersed across BLM oil and gas producing regions. 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 simulate any exceedances of applicable NOx standards under the NAAQS.[48].

[48] 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/monu

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 and in the RIA, the BLM does not project that operators will build new gathering pipelines or install compressors in response to this rule, if such pipelines or compression would not otherwise ultimately have been constructed or installed. Rather, the BLM expects that the 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 drive combustion 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. Assuming that the EPA rule becomes final, 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 gas than hydraulically fractured well completions. We also expect additional combustion emissions from storage tanks to be negligible, given the very small number of tanks affected by the requirement (300 out of an estimated nearly 40,000 storage vessels on Federal and Indian lands).

In sum, although Alternative B is projected to generate small quantities of additional air emissions compared to the No Action Alternative, particularly in the form of NOx and CO2, 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 ozone air pollution benefits, compared to the No Action Alternative.

4.2.3. Dwellings and Residences – Noise and Light

4.2.3.1. Beneficial Impacts of the Proposed Action

As noted in Section 4.1.3, noise and light from flaring operations adversely affect nearby residents. 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

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ment_butte_deis.Par.49253.File.dat/15-Monument%20Butte%20DEIS%20-%20Appendix%20B%20-%20Air%20Quality%20TSD.pdf - Accessed January 21, 2016.

becomes effective, when the flaring limit is fully phased in, flaring operations on Federal and Indian leases should decrease dramatically.

In addition, if the EPA proposed rule does not become final, the BLM projects that the proposed well completion and recompletion requirements would reduce flaring (and the associated noise and light) compared to the No Action Alternative. The BLM projects that 50 percent of operators would comply with these requirements by continuing to flare at lower rates, while the other 50 percent would comply by capturing the gas instead.

Thus, Alternative B is expected to provide substantial benefit to communities and dwellings adversely impacted by the noise and light caused by flares that would otherwise operate under the No Action Alternative.

4.2.3.2. Adverse Impacts of the Proposed Rule

While the overall effect of the proposed rule would be to greatly reduce flaring, in some specific situations, Alternative B could increase flaring operations in the short-term compared to the No Action Alternative. However, BLM estimates that the reductions in flaring resulting from the flaring limits under Alternative B would greatly exceed any small increases in flaring.

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 venting 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 that gas instead, Alternative B could result in some increased flaring.

The BLM expects this additional flaring to have negligible noise and light impacts. First, 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.

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, however, 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. In contrast, flare noise cannot be effectively mitigated.

4.2.4. Recreation – Noise and Light

4.2.4.1. Beneficial Impacts of the Proposed Action

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 are participating in activities that emphasize solitude and undisturbed night skies and landscapes.[49] The flaring limit would reduce flaring of associated gas from oil wells. This would improve recreation opportunities on nearby lands by reducing noise and light from industrial operations.

4.2.4.2. Adverse Impacts of the Proposed Action

As noted above, to the extent that operators install additional compressors, noise from the compressors may adversely affect recreation. As previously stated, however, 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 are flaring within an area, the flaring exacerbates the habitat fragmentation and edge effects, further stressing local biodiversity.[50]

4.2.5.1. Beneficial Impacts of the Proposed Action

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

[49] USDI BLM 2015, Moab Master Leasing Plan and Draft Resource Management Plan Amendments DEIS pp. 3-52 – 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

[50] 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.

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 should decrease dramatically.

In addition, if the EPA proposed rule does not become final, the BLM projects that the proposed well completion and recompletion requirements would reduce flaring – and the associated noise and light – compared to the No Action Alternative. BLM projects that 50 percent of operators would comply with these requirements by continuing to flare, while the other 50 percent would comply by capturing the gas instead.

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 proximate 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 efforts to mitigate climate change.

4.2.5.2. Adverse Impacts of the Proposed Rule

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 in from the well location 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,. However, we expect most gathering lines to be constructed along existing access roads, and the surface disturbance to build the pipeline would largely overlap with the existing 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 generally startle and stress most wildlife species, causing them to leave the area, and increased vehicle traffic may result in direct mortality in occupied habitat.

Habitat could also be removed to accommodate the construction and operation of compressor stations. Compressors continually generate noise, potentially stressing species. In some cases, wildlife 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.

Overall and in the long term, the BLM expects minimal impacts to wildlife as a result of accelerated gathering line construction resulting from the proposed rule. For one thing, 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. In addition, operators would be required to seek approval prior to pipeline construction, via a Sundry Notice, Special Use Permit, or a ROW application. At that time, site-specific impacts from any proposed pipeline projects would be evaluated, and mitigation measures identified to reduce impacts to wildlife.

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 takes place 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.[51] Thus, compared to truck traffic for well drilling and completion, the truck trips anticipated to occur as a result of the proposed rule would be less intense and would be expected to have less overall impact.

Lastly, production equipment used to compress the natural gas or convert the natural gas 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.

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

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

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 Western and Intermountain United States where oil and gas operations take place that are subject to the proposed regulations.

As stated above, the proposed action 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 action will also avoid greenhouse gas emissions 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 rule making could include: addition of equipment to areas of wellpads that had been reclaimed on an interim basis; construction (or acceleration) of new gathering lines to transport an increased volume of captured gas; and installation (or acceleration) of additional compressors on existing pipelines.

Because the proposed rule is a framework programmatic action as defined in 50 CFR 402.02, however, the existence and magnitude of site-specific adverse effects are not possible to predict. 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 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 intends to initiate informal consultation with USFWS.

4.2.7. Socio-economic Effects

As part of this rulemaking process, the BLM prepared a regulatory impact analysis to estimate the costs and benefits of the proposed rule (Alternative B). Please refer to the BLM's regulatory impact analysis for a thorough discussion of the economic-related impacts that are expected from implementing Alternative B analyzed in this EA.

The proposed rule's compliance costs are based on the private costs that would be assumed by the industry and public costs to society from the amounts of carbon dioxide additions (coming from the combustion of natural gas that would have otherwise been vented). The economic analysis estimated the following quantified benefits and compliance costs of the proposed rule:

Benefits[52]

If the EPA does not finalize Subpart OOOOa:

- Benefits range from $270 – 353 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 $270 – 384 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.

If the EPA finalizes Subpart OOOOa:

- 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 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.

Costs[53]

If the EPA does not finalize Subpart OOOOa:

- Using a 7% discount rate to annualize costs, we estimate that the proposed rule would pose costs ranging from $139 – $174 million per year.
- Using a 3% discount rate to annualize costs, we estimate that the proposed rule would pose costs ranging from $130 – $147 million per year.

If the EPA finalizes Subpart OOOOa:

- 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.

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 area affected by this rulemaking, please refer to the applicable *Affected Environment* sections of the EISs for the RMPs listed in Table 1.

The BLM's requirements under Alternative B considered in this document could 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, a precursor to ozone, and HAPs would reduce health risks to these populations. Alternative B would not lead to any

[52] See RIA p. 132.
[53] See RIA p. 129.

environmental justice impacts that are high and adverse when compared to the No Action Alternative. Any impacts from gathering lines, including impacts to minority and low-income populations, would be evaluated when the BLM receives an application for a specific project. Other adverse impacts from the proposed rule could be caused by 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, but these impacts are short-term and minor in nature—particularly compared to the attendant environmental benefits of the rule.

For these reasons, Alternative B is expected to reduce 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

Relevant cumulative impacts that may occur as a result of the proposed rule when its effects are added to effects of other past, present, and foreseeable future actions are discussed within the resource topics above. However, they are also restated generally here for ease of reference.

A variety of oil and gas development activities have already affected the environment on public lands in and around existing oil and gas leaseholds, and they are expected to occur in future oil and gas leased areas as well. Examples of such activities are: construction of roads, wellpads, pipelines, gathering lines, compressor stations, and transmission lines; well drilling; venting, flaring and leaking of gas, with resulting emissions of VOCs, HAPs, and GHGs; and the interim reclamation of wellpads. These activities have contributed varying amounts of ground disturbance, noise pollution, light pollution, and air pollution that cumulatively impact wildlife, air quality, climate, dwellings and residences, and the quality of recreation opportunities in the area.

Cumulative impacts to resources are foreseeable as a result of the BLM's promulgation and implementation of the Alternative B proposed action. In terms of air quality, climate, and impacts to dwellings and residences, however, cumulative impacts are expected to be less adverse under the proposed action than under the No-Action alternative. Cumulative impacts to wildlife as a result of the proposed action may be adverse in the short term because of additional ground disturbance; these impacts are projected to be minor, however, as most of the disturbance is likely to occur along roadways or on wellpad areas that are already disturbed. Moreover, approval mechanisms are in place that will ensure evaluation and mitigation of any site-specific adverse impacts when specific applications are received.

5. Tribal, State, and Agency Consultation

5.1. Tribes

Over several months of last year, the BLM conducted a series of forums to consult with tribal governments and solicit stakeholder views to inform the development of this 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 consultation 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 will continue to engage the tribes and offer opportunities for consultation as it progresses through the rulemaking process.

The BLM is currently scheduling further tribal outreach sessions for February or March of 2016. Invitation letters will be sent in conjunction with the publication of this proposed rule.

5.2. Agencies

The BLM has conducted outreach to States with extensive oil and gas production on BLM-administered leases and has contacted State regulatory bodies that oversee aspects of oil and gas production to discuss their requirements and practices. This includes the states of Colorado, North Dakota, Wyoming, Alaska, New Mexico, Utah, Montana, and California.

In addition, the BLM has been working closely with the EPA in developing the proposed rule. On September 18, 2015, EPA published a notice of proposed rulemaking that proposes NSPS standards to be codified as 40 CFR part 60 Subpart OOOOa.[54] The EPA proposes to establish both methane and VOC standards for several emission sources not covered by the existing Subpart OOOO rule, including hydraulically fractured oil well completions, pneumatic pumps, and fugitive emissions from well sites and compressor stations. In addition, the EPA proposed methane standards for certain emission sources that are currently regulated for VOCs but not for methane, and proposed to extend VOC standards and create methane standards for equipment used widely in the industry.[55] The BLM is working closely with the EPA in an effort to ensure that the final Subpart OOOOa rule and this proposed rule are aligned and do not impose redundant or inconsistent requirements.

[54] 80 FR 56593, Sept. 18, 2015.
[55] 80 FR 56593, Sept. 18, 2015.